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CONFERENCE OF EUROPEAN STATISTICIANS

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For discussion and recommendations

Item 2(b) of the Provisional Agenda

FOLLOW-UP TO THE CES BUREAU IN-DEPTH REVIEW OF MEASURING THE INFORMATION SOCIETY AND STATISTICS ON SCIENCE, TECHNOLOGY AND INNOVATION

Prepared by OECD

I. INTRODUCTION

1. In November 2010, the CES Bureau conducted an in-depth review of measuring the information society and statistics on science, technology and innovation. At its November 2011 meeting, the Bureau discussed the follow-up to this in-depth review. Further to this discussion, OECD offered to prepare a paper on a set of related issues:

(a) The conceptual framework for measuring the information society.

(b) The international coordination on ICT statistics.

(c) The international coordination between ICT and other statistical fields.

(d) The challenges ahead.

II. A SHARED CONCEPTUAL FRAMEWORK FOR THE INFORMATION SOCIETY

2. The OECD Guide to Measuring the Information Society (www.oecd.org/sti/measuring-infoeconomy/guide) provides a sound conceptual, statistical and analytical framework, which brings together the statistical standards developed by the OECD Working Party on Indicators for the Information Society (WPIIS) and is updated every second year (last update in 2011).

3. The Guide's conceptual framework is shown in Figure 1.1 and encompasses the widely agreed elements of ICT supply (producers and production), ICT demand (users and uses), ICT infrastructure (capital and investment), and ICT products and "content".

4. The Guide provides a set of statistical standards that permit the measurement of the information society:

(a) Statistical definitions of the components of the information society, e.g.:

- ICT manufacturing and services industries.
- ICT goods and services.

- E-commerce;

(b) Statistical classifications based on general statistical nomenclatures of economic activities and products, e.g.:

- ICT supply industries, based on ISIC Rev. 4.
- ICT products, based on CPC Rev.2.
- ICT trades goods, based on HS 2007.
- The media and content industries, based on ISIC Rev.4.
- The media and content products, based on CPC rev. 2.
- ICT patent applications, based on IPC;

(c) Two model surveys for the collection of statistical information on ICT use by firms and households/individuals, e.g.:

- Broadband Internet access.
- E-commerce and e-business.
- E-government.
- On-line social networks.

5. The conceptual framework developed in the Guide provides the foundation for the measurement of the information society in the international statistical system.

6. The classifications of ICT industries, products and trade have been adopted by the UN Economic and Social Council (ECOSOC) as "alternative aggregations" of the ISIC Rev.4, the CPC Rev.2 and the HS 2007, respectively.

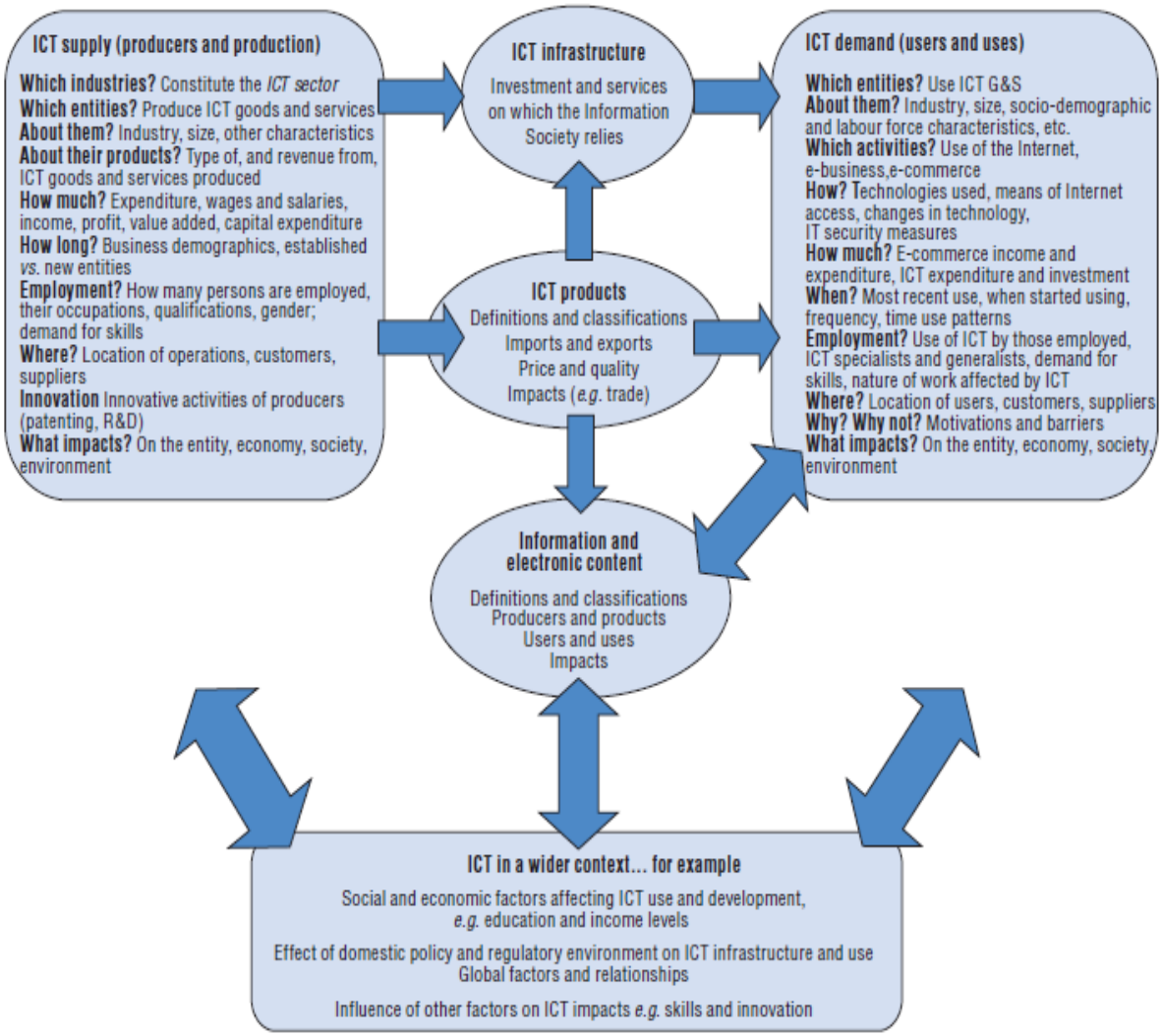
7. The approach taken by the leading international organizations in the statistical measurement of the information society (e.g. Eurostat, ITU, UNCTAD, several UN regional Economic Commissions and the World Bank) is based on the Guide's framework.

8. For instance, the UNCTAD Manual for the Production of Statistics on the Information Economy (http://www.unctad.org/en/docs/sdteecb20072rev1_en.pdf) and the ITU Manual for measuring ICT access and use by households and individuals (http://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-ITCMEAS-2009-PDF-E.pdf) explicitly adopt the conceptual framework developed in the OECD Guide.

9. A large majority of national surveys on the access and use of ICT by business, households and individuals are carried out according to the OECD model questionnaires. This applies not only to OECD member countries but also to a much wider set of countries, notably those where the diffusion of ICT has been particularly fast in recent years, e.g.: Brazil, Indonesia, Singapore, etc.

10. The OECD Guide also provides the statistical reference for the Core ICT Indicators (http://www.itu.int/pub/D-IND-ICT_CORE-2010/en) established by the Partnership on Measuring ICT for Development (see Section II below). These indicators have been adopted by the UN Statistical Commission in 2007 and, in an updated version, in 2009.

Figure 1. OECD conceptual framework for the information society



Source: OECD (2011), Guide to Measuring the Information Society

II. INTERNATIONAL COORDINATION ON ICT STATISTICS

11. Some of the leading international organizations in the statistical measurement of the information society, e.g., Eurostat, ITU, UNCTAD and ECLAC, participate in the regular sessions of the WPIIS and in all other OECD meetings related to ICT measurement.

12. In the same way, the WPIIS Secretariat participates in the meetings of the Eurostat Working Group on Information Society Statistics (WGISS) as well as in the relevant meetings of ITU (World Telecommunication/ICT Indicators Meeting) and UNCTAD (e.g., UN Commission on Science and Technology for Development).

13. OECD coordination is particularly strong with Eurostat, through regular exchanges and meetings beyond the official sessions of the WPIIS and the WGISS. As a result of this close cooperation, changes in statistical standards and definitions related to ICTs are agreed and implemented by the two organizations at the same time. In addition, the WPIIS and the WGISS work together on a number of international projects, see section III.

14. Since 2004, these cooperation activities have come together under the Partnership on Measuring ICT for Development (http://www.itu.int/ITU-D/ict/partnership/index.html). The Partnership is an international, multi-stakeholder initiative to improve the availability and quality of ICT data and indicators, particularly in developing countries. The Partnership helps measure the information society by:

(a) Defining a set of Core ICT Indicators and methodologies to collect these indicators;

(b) Helping developing countries collect ICT statistics, particularly through capacity-building and hands-on training for national statistical offices;

(c) Collecting and disseminating information society statistics in a number of formats, including a global report and database.

15. The Partnership includes the following members: ITU, ECA, OECD, ECLAC, UNCTAD, ESCAP, UNESCO, ESCWAUNDESA, EUROSTAT and the World Bank. The Partnership has organized several international conferences and technical workshops and holds a plenary meeting once a year as part of the WSIS Forum.

III. INTERNATIONAL COORDINATION BETWEEN ICT AND OTHER STATISTICAL FIELDS

16. In recent years, there have been an increasing number of international projects aimed at measuring the effects of ICT on other areas of the economy and the society.

17. The WPIIS has just released a cross-country micro data analysis on ICT-enabled Innovation (http://dx.doi.org//10.1787/19952856) carried out by a network of NSOs from OECD countries, in cooperation with the European Commission (IPTS). The study is based on a dataset linking the ICT Business surveys and the Innovation surveys at the level of firms.

18. Based on a similar approach, Eurostat is undertaking a large micro data project (ESSnet MEET, http://www.essnet-portal.eu/ict-0) with the aim to exploring the relationship between ICT and productivity. The WPIIS Secretariat is part of the scientific committee of this project.

19. The above projects are based on the statistical framework for measuring innovation (the OSLO Manual by Eurostat and OECD, http://dx.doi.org/10.1787/9789264013100-en) and the statistical framework for measuring ICT (the OECD Guide).

20. The WPIIS Secretariat is also leading an international research network on the economic impact of ICT (ICTNET, www.ict-net.eu), financed by the European Commission through its FP7 scheme. The network brings together over 30 research

institutions and statistical offices with the aim to analyze the factors behind the diffusion of ICT, the complementarities between ICT and intangible assets, the use of ICT as an enabler of innovation and the impact of ICT on growth and productivity.

21. Coordination is high also in new areas under development. The OECD has launched a wide project "The New Sources of Growth" (www.oecd.org), focusing on the measurement and analysis of intangibles. This project is fed by two related EU-sponsored projects, INNODRIVE (www.innodrive.org) and COINVEST (www.coinvest.org.uk). The latter projects are also among the contributors to the ICTNET.

22. Work on patents led by the OECD Working Party on Indicators for the Industry Analysis (WPIA) has fed into WPIIS work on the effects of ICT in the speed of diffusion of the knowledge relevant to innovation (DSTI/ICCP/IIS(2009)3). Similarly, the WPIIS has carried out some analysis on the contribution of ICT activities to economic growth based on the Input-Output table developed by the WPIA (DSTI/ICCP/IIS(2008)2).

23. The WPIIS has also been active in the area of ICT and education and cooperates with the PISA program on the analysis of the effects of ICT use on the students' performances (http://dx.doi.org/10.1787/9789264076044-en).

24. Finally, the WPIIS is working on the development of an international survey on ICT use in the health sector, in cooperation with the OECD Health Committee and a network of health agencies in over 20 OECD and non-OECD countries (DSTI/ICCP/IIS(2011)7).

IV. THE CHALLENGES AHEAD

25. The development and use of an international statistical framework for measuring the information society is a significant accomplishment. Nonetheless, there are a number of areas whether the framework requires further development to match the changing nature and use of ICTs.

26. The Guide points out the importance of a dynamic approach to the measurement of ICT and recognizes that the demand for statistical information would evolve with the very diffusion of ICTs.

27. The S-shaped curve in Figure 2 depicts the diffusion of ICT over time. The first stage - flat slope- depicts the initial adoption of ICT by a few households/firms; the second stage – steep slope – shows the acceleration in ICT diffusion driven by imitation by other households/firms; the third phase – flat slope - corresponds to the complete diffusion of ICT to the economy and the society.

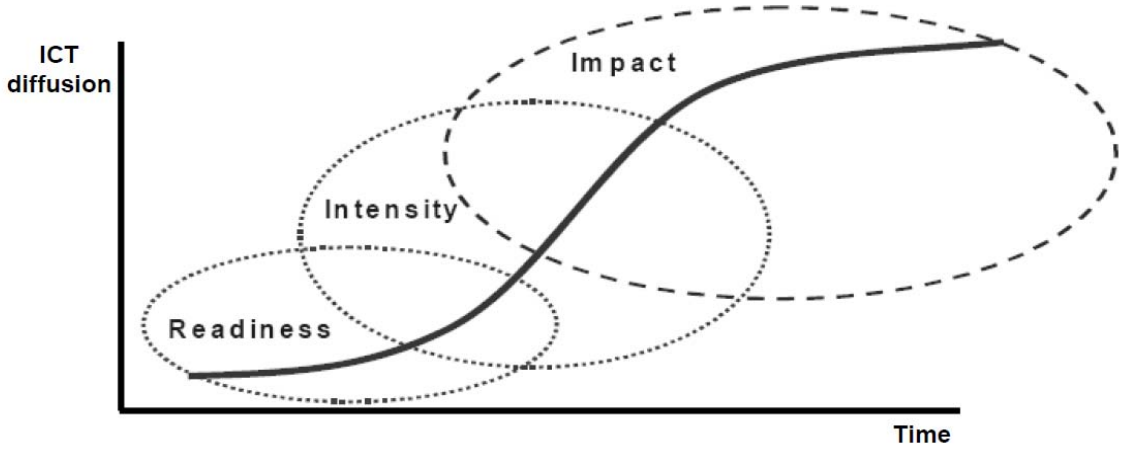
28. Statistical needs vary along these three stages of diffusion. In the first stage, the focus of measurement is on readiness - the technical, commercial and social infrastructures necessary to support ICT use. Readiness indicators allow each country to construct a statistical picture of their capability to engage in ICT.

29. In the second stage of diffusion, the focus of measurement is on intensity − the volume, value and nature of ICT use. Intensity indicators permit countries to profile who

is exploiting ICT possibilities and who is not, and to identify leading sectors and applications.

30. In the final phase of diffusion, the focus of measurement is on impact − the economic and social benefits created by ICT use. Statistics are needed to evaluate whether and to what extent ICT use makes a difference in terms of efficiency and/or the creation of new sources of wealth. Furthermore, as ICTs diffuse beyond economic activities, e.g.: to education, health, public information, etc., the statistical framework has to evolve in order to capture the effects of ICTs on social capital and well-being.

Figure 2. ICT diffusion and the statistical demand



Source: OECD (2011), Guide to Measuring the Information Society

31. It seems fair to say that the statistical activities so far have mostly focused on the measurement of ICT readiness and intensity. A better measurement of the impact of ICTs on the economy and the society would require further development in three main statistical areas:

- The measurement of ICT use.
- The international System of National Accounts.
- The survey design.

A. The measurement of ICT use

32. Some of the limitations in measuring the information society are due to the inadequate measurement of ICT use.

33. For instance, we have information on how often an individual uses a computer, e.g., once a day, but we do not know for how long. This means that our indicators of computer use do not measure the difference between somebody who checks his email every evening for a few minutes and someone whose main professional activity is to run simulations on the stock market. In order to measure the impact of computer use, we would need statistics not only on the frequency but also on the duration of ICT use.

34. Another related issue is that we collect little information on the type of ICT use. For instance, an activity like "Searching information on the Internet" is too broadly defined to permit to measure its effects as compared to other activities on the Internet. In order to measure the impact of ICT use, we would need detailed information on both the type of use and the time spent in each activity. This is likely to be a great challenge for most statistical systems.

35. In particular, it is highly questionable whether this information can be collected through a statistical survey. The respondent may find it difficult to identify different activities and to report the time spent on each of them with an acceptable degree of precision.

36. A second example is related to poor measurement of networks, particularly the Internet. Statistical surveys are designed to ask individuals/firms about their use of the Internet. However, the impact of Internet use depends on the interaction with other individuals/firms, either directly or through a website. As the number of potential networked members is infinite and unknown even to the respondent, it is unlikely that ICT-networked interactions can be measured through a statistical survey.

37. Computer-based measures – which register the actual use and time spent by each user – and Internet-based measures – which register the actual interactions among users on the web - would provide a cheaper and more reliable tool. However, they raise important problems of privacy, security and regulation.

38. In 2011, the European Commission (DG INFSO) funded a feasibility study designed by the WPIIS (DSTI/ICCP/IIS(2010)3) in order to look at the potential of the Internet as a tool to collect statistics on ICT use and behaviours, assess the risks for security and privacy and discuss potential solution to these issues. The results of the feasibility studies would become available in March 2012.

B. The international System of National Accounts

39. To a large extent, improvements in the measurement of ICTs and their impact depend on the improvement in the international System of National Accounts.

40. Communication capital appears a first priority area. Correct measurement of the ICT capital has been a major challenge from the early days of the measurement of ICT. The OECD has played a leading role in developing better measurement of ICT capital in relation to deflation, capital services and quality adjustments (Measuring Capital - OECD Manual 2009, http://dx.doi.org/10.1787/9789264068476-en). In recent years, however, the increasing relevance of communication capital (the C in ICT) is raising new measurement issues, mainly due to the network nature of communication equipment, their spillovers and the large gap between the fixed costs of investment and the marginal cost of usage, which are close to zero.

41. A second related issue for ICT measurement is the capitalization of intangible assets. While the SNA recommends the capitalization of software, there is no agreed methodology for the measurement of digital database. Available evidence suggests that the latter is the most dynamic component of intangible assets. As mentioned in Section III,the

OECD has launched a wide project on the measurement and analysis of intangibles, together with two related EU-sponsored projects, INNODRIVE and COINVEST.

42. A third major challenge is the development of satellite accounts for ICT. Unlike more traditional activities, a number of firms which are outside the boundaries of the ICT sector engage in the production of ICT goods and, above all, services. While the value of these activities is likely to be very high, only part of it is reported in the SNA or accounted for as a result of ICT-related activities. ICT satellite accounts would allow for an expansion of the national accounts to ICT while maintaining links to the basic concepts and structures of the core national accounts (STD/CSTAT/WPNA(2006)4). At present, however, ICT satellite accounts are only available in very few countries and there does not seem to be any plan to develop them in others.

C. Survey design

43. Statistical information about ICTs and their effects on the economy and the society cannot be collected in one survey. In order to measure the impact of ICT, it is necessary to link data from different surveys. Historically, statistical surveys have been designed to produce aggregate statistics so that a linked dataset tends to have a small number of observations and to be non representative. As an example, some countries run the ICT Business survey and the Innovation survey on different samples in order to reduce the statistical burden on firms.

44. An additional but equally important issue is that the scope for dataset linking is limited by confidentiality issues. On the one hand, the scope for linking is limited by the fact that the access to the datasets is restricted to few people. On the other hand, linking information from different datasets may easily result in the identification of certain firms/individuals and to the disclosure of confidential information.

45. As datasets are increasingly going to be linked, the features of representativeness and confidentiality need to be factored in the design of the surveys. Clearly, this issue is not limited to ICT statistics, but the ICT international statistical community can play a role in increasing awareness and exploring feasible solutions.

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