ITU Regional Forum on ICT Measurement

13-15 December 2016

Dubai, United Arab Emirates

FINAL REPORT

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Summary and recommendations

1. The ITU Regional Forum on ICT Measurement, held in Dubai (United Arab Emirates), was structured in two parts: a Technical Segment (Days 1 and 3, 13 and 15 December 2016) and a Policy Segment (Day 2, 14 December 2016). It was attended by 89 participants from telecommunication regulatory authorities, ICT sector companies, and national statistical offices from countries of the region. The host institution, the Telecommunications Regulatory Authority of the United Arab Emirates (TRA) provided excellent facilities and support to the event.

Policy Segment: use of ICT indicators for policy-making

2. Inaugurating the Policy Segment, **H.E. Majed Al Mesmar**, Deputy Director General, TRA UAE welcomed the participants, thanked the ITU for providing this opportunity to TRA UAE, and stressed the importance of measuring ICT development and uptake in the UAE. The UAE has ambitious investment plans to adopt the latest technologies for Internet connection and aims to be in top position in readiness for ICT. Identifying patterns and trends in the current environment with abundance of data - especially using Big Data sources - is a challenge as well as an opportunity. Internet of Things (IoT) and machine-to-machine communication will be part of the knowledge production system making cities and governments smarter.

3. **Mr Brahima Sanou**, Director, Telecommunications Development Bureau (ITU) thanked the host, welcomed and informed the participants of the recent WTIS in Gaborone, Botswana, and ITU's new project on the use of Big Data for measuring development and the Information Society. Mr Sanou also highlighted the recently launched Measuring the Information Society Report and the ICT Development Index (IDI), emphasising that the IDI is a tool for evaluating the progress of countries through the national appropriation of its methodology, as well as for benchmarking. IDI indicators are continuously assessed and a working group has been convened for the revision of IDI methodology on the basis of new technological developments, with the support of the expert groups EGTI and EGH. IDI 2016 revealed that there is significant improvement in the Arab region, in particular the UAE. The UAE, host country, was praised for its consistent achievements on ICT developments. Over the past few years, the UAE has scored outstanding growth in several ICT indicators and has moved up from rank 49 in the IDI 2010, to rank 38 in the IDI 2016.

Indicators on Smart Cities

4. **Mr Chaesub Lee** (Telecommunication Standardization Bureau (TSB), ITU), in his keynote address, presented the use of KPIs for assessing Smart Cities. He first stressed the difference between subjective assessments (e.g. quality of service) and objective measurements (e.g. service performance) in the field of ICT and recalled the role of indicators for planning and designing, setting goals, and obtaining feedback for adjustments and improvements of policies. The TSB has developed a set of indicators to assess Smart Sustainable Cities, taking

into account the growing urbanization trends and the economic role of cities in achieving the SDGs. As cities present large differences in location, culture and other aspects, adapting KPIs for diverse cities is a challenge. KPIs have been proposed by a TSB Study group and Dubai, Singapore, Manizales, Montevideo, Buenos Aires, Valencia and Rimini have been chosen as pilot for measurement[1]. The KPIs structure include 50 components and Mr Lee invited the participants to examine the methodological proposals (ITU-TY.4901/L1601 and subsequent documents, open for discussion).

ICT indicators to measure progress in SDGs and the Connect 2020 Agenda

5. **Ms Vanessa Gray** (ITU) presented the links between Sustainable Development Goals (SDGs) and targets and the Connect 2020 Agenda with the existing ICT indicators. SDGs represent a new framework for international cooperation to promote sustainable development between 2015 and 2030, across many social, economic and environmental areas. The UN Statistical Commission set up an Inter-Agency Expert Group on SDGs with representatives of National Statistical Offices, regional UN commissions and UN agencies, including ITU, responsible for monitoring of international agreements.

6. No SDG has been defined specifically on ICT development, but because of its cross-cutting nature, ICTs can contribute to achieve different goals. Five ICT indicators that are collected by ITU have been selected to measure the progress in different goals (three indicators collected via household surveys and two based on administrative data from regulatory authorities/ICT Ministries). Two other ICT-related indicators are collected by the UNESCO Institute of Statistics (UIS). The indicators are:
   - From household surveys (collected by ITU):
     - *Proportion of individuals with ICT skills, by type of skills*
     - *Proportion of individuals who own a mobile telephone, by sex*
     - *Proportion of individuals using the Internet*
   - From administrative sources (collected by ITU):
     - *Proportion of population covered by a mobile network, broken down by technology*
     - *Fixed Internet broadband subscriptions, broken down by speed*
   - Collected by UIS:
     - *Proportion of schools with access to the Internet for pedagogical purposes*
     - *Proportion of schools with access to computers for pedagogical purposes*

7. The Connect 2020 Agenda for Global Telecommunication/ICT Development sets specific goals (4) and targets (17) for the development of the ICT sector. The measurement of progress towards targets and goals is supported by ICT indicators, many of them already collected by ITU. The ITU *Measuring the Information Society Report 2015* provided a first review and quantitative assessment of the ITU Connect 2020 Targets. The analysis of trends on available indicators allows forecasting the degree of achievement of those targets: some of them show that gaps persist between Least Developed and Developed countries, rural and urban population and women and men.

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[1] http://www.itu.int/en/ITU-T/ssc/Pages/KPIs-on-SSC.aspx

8. **Dr Susan Teltscher** presented the results of the *Measuring the Information Society Report 2016*[2] and the ICT Development Index (IDI) launched at the recent WTIS in Gaborone, Botswana. The *Report* and the calculation of the IDI are both based on data submitted to ITU by countries. The IDI shows strong correlation with countries' income level and the level of education of their population. However, the progress made in the use of ICT is three times higher in developing countries, showing a catch-up effect. She presented the IDI results for the Arab region as well as those for several indicators, especially for developing countries.

9. The analysis of trends in Internet use show that the top barrier in developing countries is the cost of service and cost of equipment, and thus strongly related to household income (this is also valid for developed countries). There is lack of data for several key indicators as not all countries are collecting the data or reporting data to the ITU, e.g. the SDG indicators on Internet users, mobile phone ownership and ICT skills.

Other uses of ICT indicators: compilation and use of the Network Readiness Index (NRI)

10. **Mr Tariq Al Awadhi** (TRA, UAE) showcased the use of KPIs for the UAE Vision 2021. More than 500 indicators are compiled for different Government entities. In particular, the WEF Network Readiness Index (NRI) is used by TRA to measure progress in the ICT field, and identify particular intervention areas for ICT policies to achieve the goal of ranking the country in the Top 10.

11. **Ms Silja Baller** (WEF) made a presentation of the work of WEF in measuring the Digital Economy, highlighting the role of ICT indicators. She recalled the different industrial revolutions and in particular the 4th industrial revolution based on the convergence of the digital, physical and biological worlds. Systems-thinking about technology must consider governance principles, values (such as inclusive growth) and measurement issues. The Digital-Competitiveness-Inclusion Nexus[3] index takes this into account.

12. Ms Baller presented the methodology of the Network Readiness Index (NRI) which covers over 140 countries. The NRI is compiled by aggregating 53 indicators of which 27 come from ITU, UNESCO and The World Bank sources, while other 26 are derived from the WEF Executive Opinion Survey. This survey is implemented in more than 140 countries and also feeds into the Global Competitiveness Report. The WEF is considering the refinement of the current indicators, broadening the set of indicators and using new data sources.

13. The WEF NRI 2016 - based on direct data collection from countries - identifies seven top-ranking countries all of them characterised by a digital core of the economy and fastest-growing and even higher individual use of ICT than that of businesses and governments (Finland, Switzerland, Sweden, Israel, Singapore, the Netherlands and USA). She stressed that the ranking based on NRI (aggregating sub-indices) calls the attention of the media, but the detailed analysis and quality assessment of its component indicators should be considered to assess the national situation and improve national policies.

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[2] http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2016.aspx
[3] https://www.oecd.org/global-forum-productivity/library/The-Productivity-Inclusiveness-Nexus-Preliminary.pdf

14. Current data gaps include: what Internet services are being used (micro-level) and traffic (macro-level), non-adoption of Internet, impact of ICT on GDP, effectiveness of individual programs and policies on digital inclusion.

15. During the discussion, the participants and speakers commented on the collection and dissemination of metadata (e.g. sample size, precision, and source) of the different individual indicators that are used to compile aggregate indices. The revision of national metadata is part of the process of validation by ITU or WEF to ensure the maximum comparability. With respect to opinion surveys, WEF does not probe the results obtained. If countries can identify alternative sources for some of the indicators collected through surveys, they can approach WEF to discuss the methodology.

16. International indices such as ITU's *IDI* and WEF's *NRI* are useful to rank countries and call the attention of the media. However, detailed analysis of their component indicators is needed for policy-making at the national level. Countries and international organisations must pay attention to the metadata of national data used to produce composite indicators.

17. Ms Baller identified several challenging areas for measurement such as the consideration of the digital economy in the National Accounts, the impact of ICT beyond the economy, the link to SDG measurement, and the distributional issues (digital divide). The shared economy, free goods and services do difficult the capture of prices, so not well captured as economic activities in National Accounts. Productivity statistics are, according to scientific literature, not capturing the impact of ICT.

Recommendations:

- Regional forums on ICT measurement provide a useful platform for exchange on current and future topics in the Arab region and should be organized every three years.
- In addition, technical trainings courses on ICT statistics should be organized to enhance the capacity in countries. ITU is encouraged to develop certified online and face-to-face trainings in this field.
- Countries are encouraged to participate in the annual ITU World Telecommunication/ICT Indicators Symposium (WTIS) which is the main global event to discuss emerging ICT trends and the role of measurement. WTIS 2017 will be held in Tunisia in the fourth quarter of 2017.
- Countries are encouraged to collect data for the ICT indicators identified in the SDG indicators framework.
- Countries not currently included in the IDI should collect the data and provide them to ITU;
- Countries and international organisations must pay attention to the metadata of national data used to produce composite indicators;
- Countries are invited to examine the methodology for assessing Smart Sustainable Cities (http://www.itu.int/rec/T-REC-L.1602-201606-I and related documents;
- Increased data sharing, improved dissemination and data quality assessment are required to better serve user needs.

Technical Segment: ITU Statistics and ICT Measurements

18. The Technical Segment was opened by **Mr Tariq Al Awahdi** of TRA and **Dr Susan Teltscher** of ITU. Mr Al Awadhi focused on the use of ICT statistics and indicators to define KPIs for measuring the progress of the UAE towards higher networked readiness. Dr Teltscher presented the data collection work of ITU.

ITU data collection and standard-setting of ICT Statistics

19. **Dr Teltscher (ITU)** presented an overview of ITU's work on ICT measurement, including data collection from national official sources on both the supply (telecommunications infrastructure and prices) and the demand side (household use of ICT). ITU's work is integrated with that of other international institutions members of the Partnership on Measuring ICT for Development.

20. ICT statistics and indicators are relevant for national and international purposes. At the national level, they provide the evidence for monitoring ICT developments and goals, for market analysis to inform regulatory and policy interventions. At the international level, ICT statistics allow benchmarking countries, monitoring global ICT development targets (WSIS+10, Connect 2020, Broadband Commission targets) as well as the ICT-related development goals (MDGs/SDGs). They also provide information for private investors, donors and the media.

21. ITU provides indicators for monitoring international agreements on the progress of the Information Society. The process of ITU's data collection requires the collaboration of national authorities (national statistical offices (NSOs), regulators, ministries responsible for ICT) which provide official data via 5 questionnaires with fixed schedules.

22. National data are harmonised on the basis of statistical standards, presented in the ITU Handbook for the Collection of Administrative Data on Telecommunications/ICT, 2011[4] and the Manual for measuring ICT access and use by Households and Individuals, 2014.[5] The methodology of ICT indicators are discussed and agreed by two expert groups: the Expert Group on Telecommunication/ICT Indicators (EGTI) and the Expert Group on ICT Household Indicators (EGH), which work through annual meetings and online discussion forums. Country experts can access the online forums upon registration. As of end 2016, more than 700 and 400 experts are registered in the online forums. Mr Brahima Sanou (ITU) invited the participants to join the expert groups and actively contribute to their discussions. The discussions and agreements in both expert groups are reported annually to the World Telecommunication/ICT Indicators Symposium (WTIS).

23. **Mr Fredrik Eriksson (ITU)** presented the ITU data collection schedule, which is structured as presented in Table 1, and explained ITU's extensive validation process following each data collection exercise.

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[4] http://www.itu.int/en/ITU-D/Statistics/Pages/publications/handbook.aspx
[5] http://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-ITCMEAS-2014-PDF-E.pdf

Table 1. ITU questionnaires on ICT Statistics.

Name of Questionnaire	Short World Telecommunication / ICT Indicators (WTI) questionnaire	Long World Telecommunication / ICT Indicators (WTI) questionnaire	ICT Price Basket (IPB) Questionnaire	Short Questionnaire on ICT Access and Use by Households and Individuals	Long Questionnaire on ICT Access and Use by Households and Individuals
Addressed to	Regulator/Ministry	Regulator/Ministry	Regulator/Ministry	National Statistical Offices	National Statistical Offices
Format	Online	Online	Online	Online	Excel
Periodicity	Annually	Annually	Annually	Annually	Annually
Collection period	March/April	July/August	October	February	July/September
Open for	2 weeks	2 months	2 weeks	3 weeks	2 months
Number of indicators	7 key indicators (+ sub-categories = 12 in total)	57 indicators in total	Three main sets of ICT prices (fixed telephone, mobile cellular and fixed broadband)	5 key indicators (+ disaggregation = 17 in total)	19 indicators (with many sub-categories and classificatory variables)
Data published	June and December	June and December	June and December	June and December	June and December

24. National Statistical Focal Points are essential to ensure the timely and accurate reporting of national data to ITU questionnaires. Common mistakes in data submissions were also highlighted, encouraging countries to perform additional checks before submitting the data to ITU, in particular, checking that data from household surveys have been correctly extrapolated and no sample data are reported.

25. **Mr Saeed Mashkoor** (TRA Bahrain) shared Bahrain's experience in using National Statistical Focal Points to coordinate data requests between different national stakeholders to ensure good quality and awareness of ICT Statistics.

26. Data availability is constantly increasing as countries gain the resources and capabilities to collect data. However, data gaps still remain, especially in Africa. There are several reasons for data gaps:
    * lack of understanding of main authorities of the importance of collecting the data, i.e. no priority;
    * the service provider does not have the data or does not respond to requests.
    * lack of capacity or resources within NSOs to collect household data
    * lack of coordination between data users and data producers at the national level.

27. In the case of missing country data, ITU uses different methods to estimate a few key indicators. In principle, historical data are used to the maximum extent. Historical data are used to model the missing data by different statistical/econometric methods, including: time series models, regression models using GNI per capita, and models using mobile and fixed broadband subscriptions. To validate the estimates, cross-checks are made over time and

against other countries in the region and with similar levels of GNI per capita, and other sources are also used for benchmarking, e.g. surveys or estimates. In case of severe lack of information, estimations may not be possible.

28. ITU encourages all countries to produce and submit ICT data to the ITU since lack of data can lead to different estimates produced by ITU and other institutions, with the risk of confounding the users.

29. ITU's ICT data are disseminated through the WTI database, the different online tools (ICT Eye, ITU Statistics website, UN Data Portal), publications and direct requests from users.

Recommendations

- Countries/relevant agencies should identify national statistical focal points for ICT statistics. National statistical focal points should ensure that:
    o the validation procedures (Excel macros) are run before submitting the questionnaires and data are corrected as necessary;
    o only extrapolated data are reported;
    o metadata are reported together with the statistical data;
    o the data are submitted to ITU within the given deadlines.

National coordination of ICT measurement

30. The session on national coordination and collaboration for ICT measurement included presentations by **Mr José L. Cervera** (DevStat, consultant to ITU), **Mr Nasreddine Bahri** (Statistical Observatory Division, Instance Nationale des Télécommunications, Tunisia) and **Ms Rouqiya Al Abri** (TRA, Oman).

31. The first presentation on coordination described the complex and fragmented "national ICT data ecosystem" common in most countries, including different types of data providers (households, businesses and in particular ICT companies such as telecommunications and Internet service providers), national institutions compiling data (regulatory agencies, national statistical offices (NSOs)) and diverse users (ministries and agencies responsible for ICT, as well as regulatory agencies). While the national statistical system is generally governed by institutional provisions (statistical law, national statistical councils), not many countries have a structured, specific "national ICT data ecosystem".

32. In general, the issues that need coordination for ICT statistics include methodological aspects (indicator lists, definitions and concepts), implementation aspects (timing of data collection, financing, data collection instruments) and dissemination (production of national reports and response to international questionnaires). Some good practices for coordination include:
    - inter-institutional technical committees combining domain-specific expertise on ICT (from regulator and policy-maker institutions) and statistical expertise (from NSOs);
    - agreements for the implementation of statistical operations;
    - statistical observatories compiling data from different sources.

33. The availability of timely population data (provided by NSOs) is key for the calculation of several ICT indicators (rates of penetration, population coverage of technologies. Frequent

exchange of updated population data between statistical offices and other institutions is recommended.

34. National Strategies for the Development of Statistics (NSDS) set the multi-annual objectives of improvement of the statistical production and dissemination, and their institutional environment. It is recommended that users of ICT indicators examine the NSDS to identify opportunities to strengthen the "national ICT statistics system", distributing responsibilities, and programming the calendar of ICT-related statistical operations (surveys, modules).

35. Two national cases were presented in detail: Tunisia and Oman. The presentation of the Tunisian ICT data ecosystem showed its complexity, including: the regulator, the telecommunication operators and Internet service providers, the Tunisian Internet Agency, the ministry in charge of ICT, the NSO, the ministry of education and research, the postal service, and several other national institutions. Administrative data are collected by the *Instance Nationale des Télécommunications* while household data are collected by the *Institut National de la Statistique.* The coordination is carried out in the framework of the National Statistical Council, through a specific *working group on indicators of the digital economy*. In the Sultanate of Oman, the *Telecommunications Regulatory Agency* (TRA) has established a Market Research Department which is responsible for coordinating with the users and producers of data. Licensed operators are requested to submit statistical data to TRA on monthly and quarterly basis. A problem detected in the submission of data is the revision of past figures, which is not communicated to TRA by the operators. Revisions of population figures also affect the accuracy of reported data. The presentation recalled the importance of regulating the data collection and dissemination.

Recommendations:

- Countries should establish inter-institutional committees focusing on ICT statistics, including users and producers of data, at least policy-makers, regulators and NSOs, which are useful to enhance data quality (increased relevance, coherence and efficient allocation of funds).
- Domain expertise in ICT and know-how on implementing statistical operations should be combined.
- Countries should consider multi-annual National Strategies for the Development of Statistics as an opportunity for strengthening the «national ICT data ecosystem», distributing responsibilities and programming the calendar of ICT-related statistical operations (surveys, modules).

Telecommunication indicators

36. **Ms Vanessa Gray** (ITU) presented the questionnaire used by ITU to collect data on telecommunication/ICT indicators from member countries ("short questionnaire"), which is used to collect the following:
    - *Fixed telephone subscriptions*,
    - Mobile cellular indicators (*Subscriptions, Population coverage*),
    - Broadband indicators (*Fixed-broadband subscriptions, Active mobile-broadband subscriptions*) and *International Internet bandwidth*.

All are based on the definitions provided in the ITU *Handbook for the collection of administrative data on Telecommunications/ICT[6]* (2011 edition) but it is important to take note of revisions, which are published separately on the *Handbook web*site, and included in the ITU questionnaires.

37. Revisions are necessary in particular to track new technological developments and the following new indicators have been added in 2015:

- *M2M mobile-network subscriptions,*
- *Fixed-broadband subscriptions for organizations,*
- *Percentage of the population covered by at least an LTE/WiMAX mobile network,*
- *Subscriptions to bundled telecommunication services*

and in 2016:

- *Active subscriptions to LTE/WiMAX mobile-broadband networks,*

Methodological details for each one of the abovementioned indicators were provided, in particular, clarifications were given on the interpretation of indicators due to technological advances. A change in the mobile broadband sub-categories has also been introduced.

38. In order to get acquainted with and contribute to the discussion of the methodological issues, ITU suggests that countries (public and private experts) actively participate in the EGTI.

Recommendations:

- Countries should adhere as much as possible to international statistical standards for comparability (necessary for benchmarking) and carefully read the instructions and definitions in the questionnaires;
- Since new indicators and revised methodologies are published separately from the Handbook, it is recommended that national experts consult them before reporting to ITU;
- An update of the *Handbook* is required. Given frequent revisions, an on-line format would help keeping it up-to-date;
- Experts from both public and private sector are strongly encouraged to get actively involved in the Expert Group on Telecommunication Indicators (EGTI) to contribute and stay informed of the work on telecommunication indicators.

Demand side indicators (ICT household indicators)

39. Demand side indicators refer, in the context of ITU data collection, to access by households to ICT and use by individuals of ICT. **Mr José Cervera** (DevStat) recalled the core list of ICT indicators, approved by the UN Statistical Commission, which currently includes 19 indicators[7] on the demand by households and individuals. Other demand indicators (e.g. by businesses) were not discussed in the Forum.

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[6] http://www.itu.int/pub/D-IND-ITC_IND_HBK-2011
[7] As of March 2016, the latest list is presented in http://www.itu.int/en/ITU-D/Statistics/Documents/coreindicators/Core-List-of-Indicators_March2016.pdf.

40. ICT household indicators are obtained through household surveys. These can take the form of stand-alone surveys (i.e. dedicated to the topic of ICT) or modules included in other surveys (e.g. Household Living Conditions Survey, Labour Force Survey, etc.) depending on the resources, the information needs and the organisation of the system of household surveys of each country. The *ITU Manual for measuring ICT access and use by Households and Individuals, 2014* provides methodological guidance for the implementation of such surveys and the compilation of ICT household indicators, offering for each one definitions and concepts, model questions, classificatory variables, scope population and statistical units to which they refer (households or individuals).

41. In 2015 and 2016, four new indicators, generally compiled from household surveys, have been added:
    - *HH16: Household expenditure on ICT,*
    - *HH17: Proportion of individuals using the Internet, by type of portable device and network used to access the Internet;*
    - *HH18: Proportion of individuals who own a mobile phone;*
    - *HH19: Proportion of individuals not using the Internet, by type of reason.*

    Methodological details for each one of the abovementioned indicators were provided, in particular, clarifications were given on:

    - the type of goods and services included for the calculation of household expenditure,
    - the definition of a portable device,
    - the precisions for the concept of ownership (meaning the personal use of an active SIM card on a mobile cellular phone, even if supplied by employers that authorise the personal use),
    - a list of reasons (barriers) for not using the Internet.

42. With regards to implementation of ICT surveys, it was recalled that household surveys should be carried out on the basis of samples representative of the whole population. In the Arab region, several issues hamper the design of representative surveys, including: the lack of up-to-date household frames, the large population of temporary workers or refugees in some countries, the difficulties of fieldwork due to cultural constraints (e.g. deploying unaccompanied female enumerators on the terrain).

43. Validation of survey data should be carried out at the primary level (individual records), at the aggregate level (by comparison with other indicators and reference population data) and at the national level (trends). A mistake that has often been detected in responses to ITU questionnaires is the provision of estimates from the survey sample, not extrapolated (grossed-up) at the population level. National Statistical Focal Points should check that population estimates are provided, not sample values.

44. Several of the **core ICT indicators** have been considered to monitor the Sustainable Development Goals[8]. These are:

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[8] See http://unstats.un.org/sdgs/indicators/Official%20List%20of%20Proposed%20SDG%20Indicators.pdf for a complete list of SDG indicators.

- For goal SDG4.4 "By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship": *HH15: Individuals with ICT skills, by type of skills* (indicator SDG4.4.1);
- For goal SDG5.b "Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women": *HH18: Proportion of individuals who own a mobile phone (by sex)* (Indicator 5.b.1);
- For goal SDG17.8 "Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology": *HH7: Proportion of individuals using the Internet* (Indicator 17.8.1)

The use of ICT indicators for monitoring the SDG and other international development policies was further elaborated during the Policy Segment (paragraphs 35-37).

Recommendations

- Countries are encouraged to collect the data for the ICT indicators included in the SDG monitoring framework, in particular those collected through household surveys
- To reduce costs, countries can include modules on ICT in different existing or scheduled household surveys. Household surveys should be based on representative samples (with probabilistic selection);
- An on-line format of the *Manual* would help keeping it up-to-date.

Big Data for ICT measurement

45. **Dr Susan Teltscher** (ITU) explained how ICT measurement can benefit from the use of Big Data sources, among other reasons, because of the amount of data generated by ICTs and the nearly universal access to mobile communication. In order to generate value of Big Data for official statistics, NSOs may explore potential partnerships with telecommunication and Internet service providers, providers of content for Internet, for social networks and of mobile apps, etc. The EGH and EGTI have discussed the potential of Big Data for ICT measurement. ITU is involved in the Project on Big Data for Measuring the Information Society, taking part in the UN Global Working Group on Big Data for Official Statistics.[9]

46. The ITU project aims to demonstrate how Big Data sources, in particular from Mobile Network Operators and Internet Service Providers, could eventually be used to produce ICT indicators, either replacing some of those currently calculated, either complementing the existing ones. A list of indicators has been proposed to be calculated from the Big Data sources. Six countries (Colombia, Georgia, Kenya, Philippines, Sweden, and United Arab Emirates) take part in the first phase of this project which will end in March 2017. In each country, the partners include the Telecommunication regulatory authority, the NSO, the data protection agency and some private service providers. A second phase to scale-up the project with more countries will be launched (ITU is currently looking for partners; Korea are currently under discussion).

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[9] http://unstats.un.org/bigdata/

47. The issues that have been encountered in the ITU project include: difficulties in data access due to legal/administrative aspects (data protection), computational issues (data processing), and of statistical quality (relevance, comparability).

48. **Mr José Cervera** (DevStat) recalled some initiatives on the use of Big Data for official statistics. At the European level, the NSOs have agreed on a strategy (Scheveningen Memorandum, 2013) and launched several pilot projects.[10] The UN Economic Commission for Europe has also launched a project including a "lab" space called the "Sandbox" for testing methodologies and systems. Several pilot projects have been launched[11].

49. Statistical quality issues that have been identified include: representativeness of Big Data sources, potential for linking Big Data sources and other (survey or administrative data) and coherence with survey data. NSOs that have participated in Big Data projects acknowledge the need for a framework for assessing the quality of Big Data sources and of the indicators produced through their use.

50. Institutional issues, besides those mentioned by Dr Teltscher regarding the opportunity for partnership with private providers, include the lack of adequate human resources for Big Data analysis in NSOs, due to the combination of skills required (data science vs traditional statistics, heavily supported by IT knowledge) and the generally low competitiveness of salaries in NSOs in comparison with the private sector (especially in developing and transition countries), where these skills are much sought after (financial sector, ICT companies, etc.).

Recommendations

- National stakeholders should consider collaborating to explore the use of big data for producing ICT indicators.
- Stakeholders (Governments, NSOs, operators, Academia) interested in the partnering with ITU on the big data project, should contact ITU.

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[10] https://ec.europa.eu/eurostat/cros/content/programme-ess-big-data-workshop-2016_en
[11] An inventory has been established in http://unstats.un.org/bigdata/inventory/