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**Progress made in the implementation of
and follow-up to the outcomes of the
World Summit on the Information Society
at the regional and international levels**

**Implementing World Summit on the Information
Society outcomes, 2018**

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Introduction

1. The Secretary-General of the United Nations is requested by the General Assembly to report annually, through the Economic and Social Council, on progress made in implementing the outcomes of the World Summit on the Information Society, which was held in two phases, in 2003 and 2005. This report on developments during 2018 complements the Secretary-General's formal report on progress made in implementing the World Summit on the Information Society outcomes (A/74/62-E/2019/6).

2. Information and communications technologies have developed rapidly since the World Summit. Today's information and communications technology networks and devices have much greater capabilities than those that were available, or even, in many cases, anticipated, at the time of the World Summit. As a part of the 10-year review of World Summit outcomes, undertaken in 2015 by UNCTAD in its role as the secretariat of the Commission on Science and Technology for Development,¹ a number of new technologies and services were identified that had been mere innovations in 2005 but that became central to the information society within a decade, including high-speed broadband, mobile Internet, smartphones, cloud computing and big data analysis. These innovations had already facilitated more rapid changes and, in some cases, transformations, in economies and societies than had been anticipated at the time of the World Summit.

3. The pace of progress in technology and services has accelerated considerably since that review. A new wave of innovation in information technology is currently strengthening opportunities to facilitate sustainable development, while posing new challenges to Governments, businesses and citizens, and highlighting the importance of international cooperation in promoting prosperity, peace and security and achieving the Sustainable Development Goals set out in the 2030 Agenda for Sustainable Development.² These "frontier technologies" include machine learning, artificial intelligence and algorithmic decision-making, new types of computing, and new interfaces between people and information and communications technology services. Many discussions on the information society now focus on the opportunities these technologies present for contributing to sustainable development, the potential risks associated with them and the impacts that they will have across economies, societies and cultures.

4. The Declaration of Principles – Building the Information Society: a global challenge in the new Millennium agreed on at the World Summit called for the development of a "people-centred, inclusive and development-oriented information society".³ This vision of the future, and the commitments to sustainable development, inclusiveness and human rights that were reiterated by the General Assembly following its 10-year review of the World Summit in 2014,⁴ require that the emerging information society be shaped in the interests of humanity in order to maximize the benefits of new technology and minimize the risks that it may pose. As participants at the World Summit recognized, this will require both international cooperation and the participation of all stakeholders in determining priorities and implementing policies and programmes that are consistent with the international community's agreed objectives.

5. This report summarizes current trends in the development and impact of the information society in relation to World Summit outcomes, addresses some aspects of the further evolution of the information society and draws particular attention to examples of that evolution. The report is structured as follows:

¹ UNCTAD, 2015, *Implementing [World Summit on the Information Society] WSIS Outcomes: A Ten-year Review*, UNCTAD/DTL/STICT/2015/3 (United Nations publication, New York and Geneva).

² A/RES/70/1.

³ International Telecommunication Union (ITU), 2005, *WSIS Outcome Documents*, December (Geneva). Available at www.itu.int/dms_pub/itu-s/opb/pol/S-POL-WSIS.OD-4-2006-PDF-E.pdf.

⁴ ITU, 2014, *WSIS+10 Outcome Documents*, June (Geneva), available at www.itu.int/dms_pub/itu-s/opb/pol/S-POL-WSIS.OD-2014-PDF-E.pdf.

- Chapter I summarizes the distribution of information and communications technology access and use, which remains highly uneven both between and within countries.
- Chapter II draws attention to some of the ways in which the information society currently interacts with sustainable development.
- Chapter III draws attention to some of the challenges arising from the impact of information and communications technologies on economies and societies.
- Chapter IV addresses likely future developments and their implications for wider economic, social and cultural development.
- Chapter V considers some issues arising for international cooperation and multi-stakeholder participation, as the information society continues to evolve and new technologies become increasingly central to all aspects of human development.
- Chapter VI provides a brief conclusion.

I. Digital divides and digital inclusion

6. In the Declaration of Principles – Building the Information Society: a global challenge in the new Millennium, participants of the World Summit on the Information Society declared themselves to be “resolute in our quest to ensure that everyone can benefit from the opportunities that [information and communications technologies] can offer”.⁵ The 2030 Agenda for Sustainable Development states that no one should be left behind in achieving development goals. Target c of Sustainable Development Goal 9 calls specifically for greater digital inclusion, with the aim of achieving universal and affordable access to the Internet in least developed countries by 2020.⁶ The pervasiveness of access to and use of information and communications technologies is important, not just because it affects the extent to which such technologies can be used to achieve developmental goals, but also because of their wider impact on social and gender equity and equality.

7. The usual starting point for assessment of progress towards the information society since the World Summit has been the extent to which information and communications technologies are available and used worldwide, in different regions and by different communities. While basic connectivity is important, the challenges of access reach beyond networks and include issues such as affordability, content, capabilities and the institutional, legal and regulatory frameworks that the World Bank has called “analogue complements” to digital development,⁷ and that are considered in the following paragraphs.

8. The long-term trends illustrated in figure 1 show that there has been consistent growth in access to and use of information and communications technologies at a global level since the World Summit.⁸

9. The last year has seen continued growth in the number of mobile telephone subscriptions worldwide and more rapid growth in the number of mobile broadband subscriptions, which enable users to more effectively access the Internet and other services requiring higher bandwidth. In 2018, for the first time, the International Telecommunication Union (ITU) estimated that more than half of people worldwide now use the Internet at least occasionally: a significant milestone along the road to an inclusive information society.

10. However, ITU also noted that growth rates for most access indicators are more modest now than they were in the first decade following the World Summit.⁹ As they have

⁵ See <https://www.itu.int/net/wsis/docs/geneva/official/dop.html> (accessed 12 March 2019).

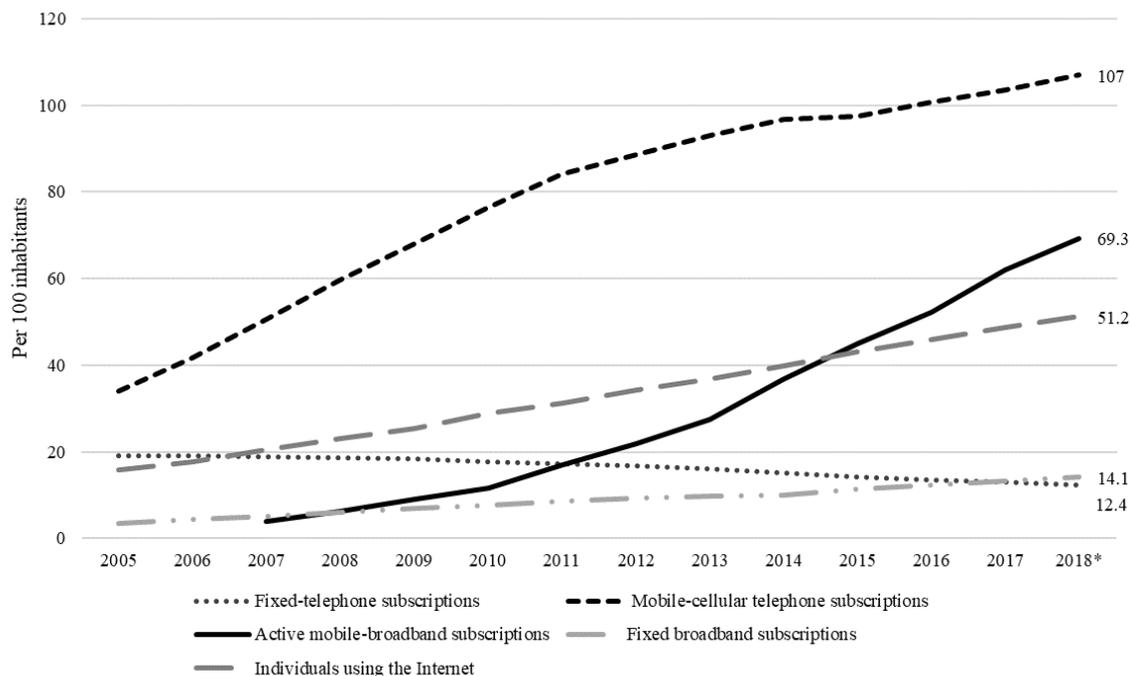
⁶ A/RES/70/1.

⁷ World Bank, 2016, *World Development Report 2016: Digital Dividends*, Washington, D.C. Available at <http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf>.

⁸ ITU, 2018, *Measuring the Information Society Report*, vol. 1, available at www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2018/MISR-2018-Vol-1-E.pdf.

done throughout the period since the World Summit, these global figures mask considerable differences in the experience of different regions, countries and communities. In developed and some developing countries, access to telephony, broadband and the Internet is now approaching saturation. In other countries, however, such access is much less widespread because of limited connectivity, especially to broadband in rural areas, relatively high costs that inhibit access and use by poorer sections of the population, and a lack of the skills that enable many citizens to make full use of the resources and services that connectivity can make available.

Figure 1
Changes in the global uptake of information and communications technologies



Source: ITU, 2018, *Measuring the Information Society*.

* Estimated figures for 2018.

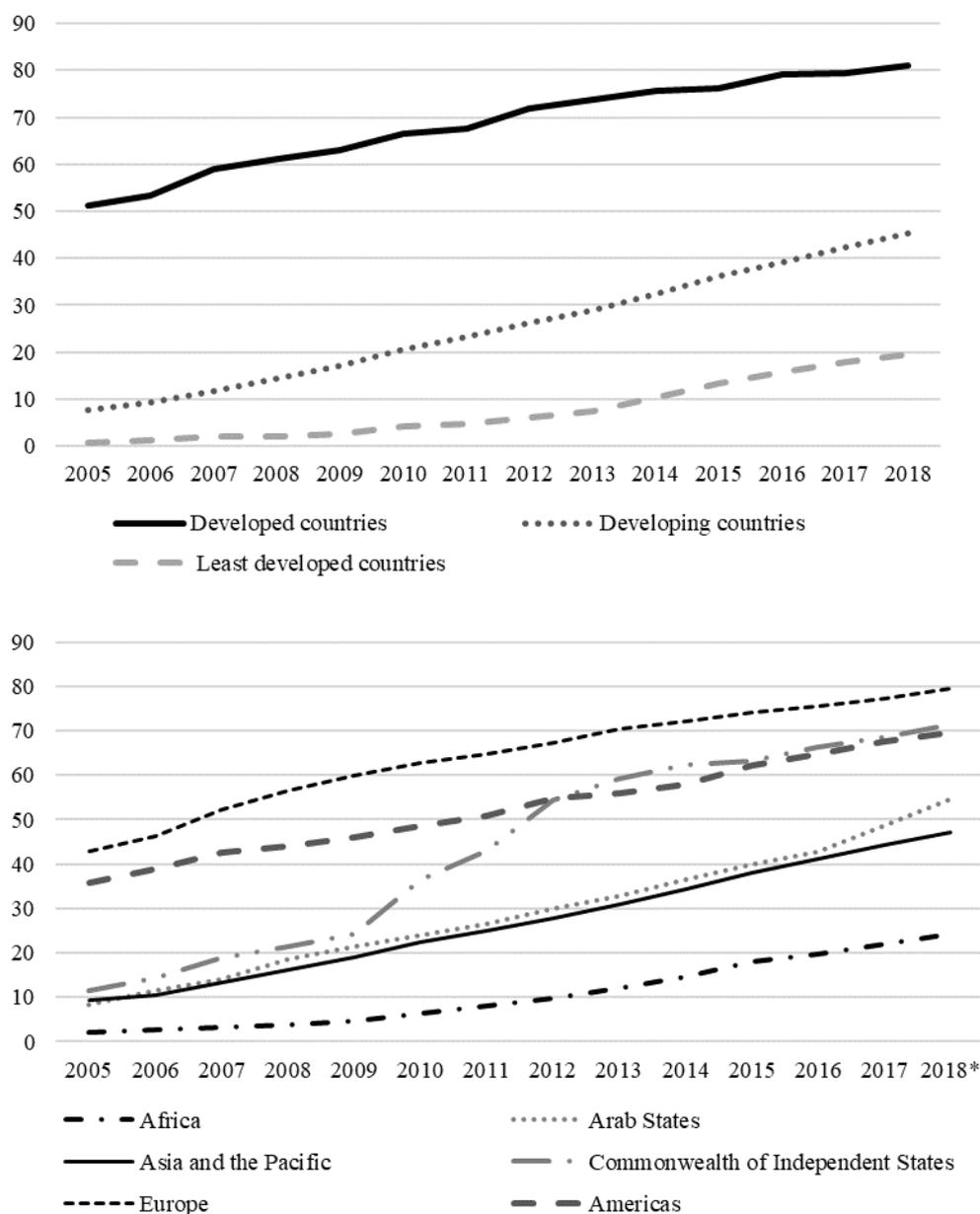
11. Figure 2 shows the differences in Internet usage between different development categories and ITU regions, with more than 80 per cent of the population online in developed countries, compared to less than 20 per cent in least developed countries, and more than 75 per cent of the population in Europe online compared to less than 25 per cent in sub-Saharan Africa.

⁹ Ibid.

Figure 2

Individuals using the Internet by development status and International Telecommunication Union region

(Percentage)



Source: ITU, 2018, *Measuring the Information Society*.

* Estimated figures for 2018.

12. There are equally powerful disparities in access and use within countries. For example, young people and those of working age are much more likely than the elderly to be online. People in urban areas are usually more connected than those in rural areas, while those with higher incomes and higher levels of educational attainment are more connected than the poor and educationally disadvantaged.

13. When it comes to connectivity, quality matters as much as quantity. While almost everyone now lives within range of a mobile cellular signal, and third-generation networks offering Internet access are also prevalent, much higher access speeds are available in some countries and to some communities than for others. Businesses and individuals that benefit from faster access can use online resources more intensively, efficiently and cost-

effectively, including services such as cloud computing that enhance competitiveness and access to international markets.

14. In 2018, the Equals partnership (founded by ITU, the United Nations University, the International Trade Centre, the United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women) and the Groupe Speciale Mobile Association), the Group of Seven, the Group of 20, business organizations and research institutes focused in particular on the continuing gender gap in access to and use of information and communications technologies. This continuing gender gap reflects underlying structural inequalities experienced by women and has ongoing impacts on efforts to redress those inequalities. The Equals partnership reports that gender divides are wider for more complex and expensive information and communications technologies that enable more transformational outcomes.¹⁰ The Strategic Plan 2018–2021 of UN-Women prioritizes innovation and technology as drivers of gender equality, seeking to ensure significant increases, not only in women’s connectivity, but also in the numbers of women and girls who are able to access lifelong learning opportunities, in order to produce and benefit from online content and engage fully in the digital sector.

15. These connectivity and usage deficits are important, not only in terms of access to information and communications technologies, but also because of the consequential impacts that differential use of such technologies can have on the distribution of prosperity and welfare. The World Summit participants aspired to build an information society “where everyone can create, access, utilize and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting their sustainable development and improving their quality of life”.¹¹ The risk that inequality in online access can reinforce existing structural inequalities within society is becoming better understood and needs to be addressed within the context of the Sustainable Development Goals.

16. Approaches to these challenges are multidimensional. During the past year, for example, there has been increased interest in the potential of community networks to provide connectivity in areas that have proved to be difficult or expensive for traditional broadband suppliers.¹² Investment by Governments and international donors, alongside private investment, is likely to remain important in remoter rural areas, particularly those with limited populations or difficult topography.

17. Efforts to address these deficits, however, need to reach beyond infrastructure. Problems of affordability have long been recognized. The Broadband Commission for Sustainable Development has recommended that all countries should aim to achieve entry-level broadband costs equivalent to no more than 2 per cent of national average income, measured in gross national income per head.¹³ Media and information literacy needs to become more firmly established within educational curricula to ensure that each new generation can take full advantage of new opportunities and protect itself from threats to privacy, security and welfare. The access and usage requirements of businesses, especially small businesses, need to be considered by both Governments and the information and communications technology businesses that offer them their services. To be properly effective, therefore, policy and programme interventions that are concerned with information and communications technologies need to be fully integrated into wider policies and programmes to address the structural challenges of sustainable development with which they interact. For instance, it is against this background that UNCTAD rapid eTrade readiness surveys of least developed countries examine the seven most relevant

¹⁰ Equals Global Partnership and United Nations University, 2018, *Taking Stock: Data and Evidence on Gender Equality in Digital Access, Skills and Leadership* (Geneva). Available at https://docs.wixstatic.com/ugd/04bfff_e53606000c594423af291b33e47b7277.pdf.

¹¹ See <https://www.itu.int/net/wsis/docs/geneva/official/dop.html> (accessed 12 March 2019).

¹² See <https://www.internetsociety.org/issues/community-networks/> (accessed 12 March 2019); and Association for Progressive Communications, 2018, *Global Information Society Watch 2018: Community Networks*. Available at https://giswatch.org/sites/default/files/gw2018_t6_stories_and_power.pdf.

¹³ See <https://broadbandcommission.org/Documents/publications/wef2018.pdf>.

policy areas for electronic commerce (e-commerce) when assessing the e-commerce readiness of these countries.¹⁴

II. Information and communications technologies and sustainable development

18. The Declaration of Principles – Building the Information Society: a global challenge in the new Millennium committed the international community to “harness the potential of information and communication technology to promote the development goals of the Millennium Declaration,”¹⁵ including the eradication of poverty and hunger, the achievement of universal primary education, gender equality and environmental sustainability. Since the adoption, in 2014, of the 2030 Agenda for Sustainable Development, United Nations agencies, led by ITU, have sought to align targets and action lines of the World Summit on the Information Society with the Sustainable Development Goals and the targets contained therein, and to ensure, in the words of the 2030 Agenda, that no one is left behind as the information society evolves.

19. It is not possible in this report to give a comprehensive overview of the many ways in which information and communications technologies contribute to sustainable development. Aspects of this topic are addressed in the report of the Secretary-General of the United Nations, to which reference should be made, which includes contributions from various entities within the United Nations system.¹⁶ The following paragraphs briefly highlight three areas of sustainable development in which information and communications technologies play an increasingly important role.

E-government

20. E-government is increasingly being used worldwide to improve public services, citizen engagement, transparency and accountability. All Governments now have an online profile, and many use online platforms extensively to deliver information, provide services and enable transactions such as licence applications and tax payments. Examples range from information resources concerning public health to agricultural extension advice for farmers and support for small businesses regarding the online filing of tax returns and licence applications.

21. In a 2018 United Nations survey, it was found that the greater ease with which information is gathered, stored, analysed and disseminated, and the decreasing cost and growing coverage of mobile cellular and broadband subscriptions, have improved service delivery to vulnerable populations.¹⁷ E-government also strengthens resilience and sustainability and helps to align local and national government operations. As a part of the survey, it was noted, however, that e-government is much more advanced in higher-income countries and that e-government projects need to be implemented in a way that is responsive to a range of diverse communities and social groups, if it is to avoid new digital impact divides arising as a result of lack of connectivity, devices, bandwidth, affordability or digital literacy.

¹⁴ See <https://etradeforall.org/development-solution/e-t-ready-rapid-e-trade-readiness-surveys-least-developed-countries-getting-started-e-commerce-development/?main-policy=e-commerce-assessments> (accessed 12 March 2019).

¹⁵ See <https://www.itu.int/net/wsis/docs/geneva/official/dop.html> (accessed 12 March 2019).

¹⁶ A/74/62-E/2019/6.

¹⁷ United Nations Department of Economic and Social Affairs, 2018, *E-Government Survey: 2018. Gearing E-Government to Support Transformation towards Sustainable and Resilient Societies* (United Nations publication, New York). Available at https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2018-Survey/E-Government%20Survey%202018_FINAL%20for%20web.pdf.

Humanitarian support

22. One of the central responsibilities of the United Nations and the international community is to work to prevent natural and humanitarian disasters and to assist in recovery efforts in their regard. Information and communications technologies now play an important part in ensuring that disaster response and recovery are fast and efficient, from the recovery of critical infrastructure to the management and coordination of rescue and emergency support and the delivery of essential supplies to affected communities.

23. Modern communications networks and techniques such as satellite imaging have proved highly effective in locating victims and survivors of disasters and targeting resources where they are most needed. As many such events are transboundary in nature, interregional and global data sharing and coordination among the countries concerned have also proved to be important. The World Food Programme leads the Emergency Telecommunications Cluster, which works with the United Nations and other stakeholders to provide services, including connectivity, to communities affected by disasters.

Digital economy

24. The digitalization of economic production and commerce is a critical aspect of the emerging information society that will have profound implications for economic prosperity and sustainability. UNCTAD estimates that, in 2016, the value of e-commerce transactions totalled \$26 trillion, 89 per cent of which consisted of business-to-business transactions. Today's figures will be even higher.¹⁸ New technologies are helping to reduce transaction costs, expedite trade flows and increase the volume of trade in services (while reducing that of some goods that can more easily be traded digitally). The decline in trade costs could be especially beneficial for small and medium-sized enterprises and for firms from developing countries.¹⁹

25. However, digital entrepreneurship and enterprise are growing at different speeds in different countries. Business-to-consumer e-commerce accounts for less than 0.5 per cent of gross domestic product in Africa, compared with 4 per cent worldwide, while three countries on the continent account for almost half of its participation in e-commerce.²⁰ Significant gaps in the readiness of countries to take part in and benefit from e-commerce need to be overcome to achieve more inclusive trade in the coming years and decades. The UNCTAD eTrade for all initiative brings together 30 international organizations to reduce knowledge gaps, facilitate interactions to identify requirements and constraints to e-commerce development, and propose appropriate solutions.²¹

26. For e-commerce to make a real and sustained contribution to development it must benefit all segments of society – producers and consumers, established firms and start-ups, women and men, rich and poor and rural and urban communities. The Nairobi Manifesto on the Digital Economy and Inclusive Development in Africa, unveiled at the UNCTAD Africa E-commerce Week in December 2018, identified and elaborated eight further critical areas for policy development alongside e-commerce readiness assessment and strategy formulation: infrastructure and services; payment solutions; transport and trade facilitation; legal and regulatory frameworks; e-commerce skills development; access to finance; women's empowerment; and measurement of e-commerce and the digital economy.²² Acting in conjunction, these elements will, through the cooperation of national and

¹⁸ See <https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1707> (accessed 14 March 2019).

¹⁹ World Trade Organization, 2018, *World Trade Report 2018. The Future of World Trade: How Digital Technologies are Transforming Global Commerce*, Geneva. Available at https://www.wto.org/english/res_e/publications_e/world_trade_report18_e.pdf.

²⁰ See https://unctad.org/meetings/en/SessionalDocuments/Africa-eWeek2018_NairobiManifesto_en.pdf.

²¹ See https://unctad.org/en/Pages/DTL/STI_and_ICTs/eTrade-for-All/eTrade-for-All-Organization.aspx (accessed 14 March 2019).

²² See <https://unctad.org/en/pages/PressRelease.aspx?OriginalVersionID=498> (accessed 14 March 2019).

international stakeholders and, where appropriate, donor support, lead to the desired developmental gains.

Data-driven development

27. One aspect of the new wave of innovation that has received increasing attention is the potential for new technologies, particularly machine learning applications, to build on current experience with big data analysis and use the very high volumes of data now generated by government and commercial sources to enhance developmental outcomes. The volume of data gathered is estimated to be growing by as much as 40 per cent each year,²³ as an increasing number of people use more applications and devices more extensively for a greater range of activities, and as Internet-of-things devices and services proliferate. Cloud computing and big data already enable the combination of data sets that were previously too complex to analyse. Machine learning and artificial intelligence enable technology to take that analysis to levels of complexity that are beyond the capabilities of both human analysts and earlier computer analysis systems.

28. The Artificial Intelligence for Good Global Summit organized by ITU and other United Nations agencies in 2018 identified practical applications of artificial intelligence and supporting strategies to improve the quality and sustainability of human development, for example by mapping poverty, improving traffic flows (and thereby productivity) through “smart city” approaches and achieving universal health coverage.²⁴

29. New ways of thinking about data will be required to maximize their value, while recognizing their strategic importance and addressing complex challenges of scalability and sustainability in very different data and development environments. Recent research has noted that open data approaches, which make data sets available to researchers and organizations beyond data-gathering institutions, are likely to generate a wider range of analysis and insights, in particular revealing hidden patterns and unexpected relationships that offer new ways of addressing individual and developmental problems.²⁵

30. However, care needs to be taken in using such techniques to develop policies and programmes. The leveraging of personal data and the integration of information from distinct data sets can come into conflict with the right to privacy of citizens and businesses. Data can be distorted and manipulated. Concerns are growing about the concentration of data in the hands of a relatively small number of international businesses. Some of these issues are considered in the following chapter.

III. Challenges for international information and communications technology development

31. Digital approaches to sustainable development are transforming lives and can greatly enhance efforts to achieve the Sustainable Development Goals, but, alongside the tremendous benefits that information and communications technologies can bring, new challenges have emerged – for example, around cybersecurity, data and artificial intelligence – that can inhibit the adoption and use of information and communications technologies themselves and adversely affect other areas of sustainable development. Likewise, while the Internet contributes immensely to the volume of information available to Governments, businesses and individuals, and to the value of human interactions, it can also be used as a platform for hate speech, repression, censorship and control.

32. Enabling the achievement of a “people-centred, inclusive and development-oriented information society” requires the international community to address the impact of information and communications technologies holistically, maximizing opportunities, while

²³ See www.un.org/en/sections/issues-depth/big-data-sustainable-development/index.html (accessed 14 March 2019).

²⁴ See <https://www.itu.int/en/ITU-T/AI/2018/Pages/default.aspx> (accessed 14 March 2019).

²⁵ World Bank, 2018, *2018 Information and Communications for Development: Data-Driven Development*, Washington, D.C. Available at <https://www.worldbank.org/en/topic/digitaldevelopment/publication/data-driven-development.print>.

minimizing risks and mitigating undesired impacts. As with developmental impacts, there is not space in this report to discuss these challenges comprehensively. The following paragraphs focus on two issues that reflect the complexity of the emerging information society and that were widely discussed in 2018.

Employment

33. The globalization of communications and the growth of online services have led to significant changes in employment patterns since the World Summit, including widespread use of online call centres and outsourcing and, more recently, the emergence of the platform economy, in which, rather than entering into formal employment relationships, workers undertake short-term assignments that are managed online.²⁶

34. These changes are expected to be merely harbingers of much greater changes in employment patterns. Artificial intelligence, automation, robotics and algorithmic decision-making are expected to displace many routine jobs in the near and medium term, as well²⁷ as enabling new types of work to emerge. Widely different estimates have been made of the potential net effect of these changes on overall employment, with some suggesting an overall increase in employment, while others point to potentially dramatic declines. Impacts are likely to differ significantly between countries, and between districts within countries, which have different dominant economic sectors and different labour costs.

35. Changing employment patterns will affect both the nature and quality of work, as well as wages and employment relationships, with widespread ramifications for public policy. Improvements in productivity in industrial countries no longer appear to be as clearly associated with higher wages as was once the case. Lifelong occupations are being displaced by the need for lifelong learning to enable workers to shift between occupations during the course of working lives in which adaptiveness is becoming increasingly essential. The automation of routine jobs is likely to shift employment requirements towards tasks and occupations that are less susceptible to automation.

36. Reports concerning these issues have been published recently by the International Labour Organization (ILO),²⁸ the World Bank,²⁹ ITU,³⁰ the World Economic Forum³¹ and other organizations. The pace at which labour market transitions will materialize is expected to be rapid. As with previous generations of technology, some areas and communities are likely to gain, while others will have more difficulty. Policy approaches will need to address the needs of both “winners” and “losers”.

37. ILO has proposed adopting a “human-centred agenda for the future of work” to maintain and build social protection, employment rights and opportunities. The World Bank has reflected on the implications for the institutional frameworks governing employment. Many agencies are focusing on the changes required in education and employment practice to build the digital and non-digital skills required for success in an increasingly digital workplace. These changes are considered in the following chapter.

Privacy and data protection

38. As has been noted above, the trend towards digitalization of most aspects of economic and social life provides great opportunities for data-driven development to target resources where they can have maximum impact on sustainable development, but also raises challenges concerning data management.

²⁶ International Labour Organization (ILO), 2018, *Digital Labour Platforms and the Future of Work: Towards Decent Work in the Online World*, Geneva.

²⁷ See <https://etradeforall.org/development-solution/e-t-ready-rapid-e-trade-readiness-surveys-least-developed-countries-getting-started-e-commerce-development/?main-policy=e-commerce-assessments> (accessed 15 March 2019).

²⁸ ILO, 2019, *Work for a Brighter Future: Global Commission on the Future of Work*, Geneva; ILO, 2018, *Digital Labour Platforms and the Future of Work*.

²⁹ World Bank, 2019, *World Development Report 2019: The Changing Nature of Work*, Washington, D.C.

³⁰ ITU, 2018, *Measuring the Information Society Report*.

³¹ World Economic Forum, 2018, *The Future of Jobs Report 2018*, Geneva.

39. Only a relatively small proportion of the rapidly growing volume of data generated today are gathered by Governments. The exceptional growth of online search, file-sharing, social media and retail platforms has been driven by a business model in which users' data is leveraged to target advertising content and thereby grow resulting revenue. Internet-of-things and emerging artificial intelligence-driven devices will increase both data volumes and the extent to which they can be used to detail individuals' lives.

40. The growing use of data for both government and commercial purposes has raised widespread concerns regarding the protection of personal information. For instance, some 90 per cent of new users of the Internet live in developing countries, but half of these countries currently lack legislation to protect users' privacy. In a 2018 World Bank report on data-driven development, it is pointed out that "no global consensus yet exists on the extent to which private firms that mine data about individuals should be free to use the data for profit and to improve services".³² As a result, it will be necessary to develop guidelines for data sharing and use and for anonymizing personal data.

41. The General Data Protection Regulation introduced last year by the European Union granted significantly stronger data protection rights to citizens of the European Union regardless of where in the world their data may be being held.³³ The African Union also issued new privacy and data protection guidelines, developed jointly with the Internet Society, which it hopes will redress the issue of lack of data protection legislation in many countries on the continent.³⁴

IV. A new wave of technological innovation

42. The information society today has changed greatly since the World Summit on the Information Society was held. Many new technologies and services have been developed, deployed and become pervasive since the World Summit, with greater impacts on economies and societies than were anticipated at the time. It is widely recognized that we are entering a new wave of technological innovation that will have even more profound implications for humanity, changing relationships between citizens, Governments and businesses, and that will alter the ways in which societies and economies are structured. If policymakers and other stakeholders are to develop policies and programmes that will shape the future information society, as envisaged at the World Summit, then they need to develop a deeper understanding, not only of past and present technology and services, but also of likely future developments and their probable impact. In its *Technology and Innovation Report 2018: Harnessing Frontier Technologies for Sustainable Development*, UNCTAD argues that frontier technologies have significant potential to accelerate the achievement of the Sustainable Development Goals, provided that policy directs change towards inclusive and sustainable outcomes through a purposeful effort by Governments, in collaboration with civil society, business and academia.³⁵

43. Artificial intelligence, big data, machine learning and algorithmic decision-making are powerful instruments of change. Information and communications technology enterprises envisage that future homes, schools, workplaces, towns and cities will be organized through connected digital devices, using aggregated data, machine learning and automated interfaces to manage everything from domestic fridges to urban traffic networks. The Task Force on Digital Financing of the Sustainable Development Goals, launched by the Secretary-General of the United Nations in November 2018, draws together expertise from business, Government and civil society to explore ways of harnessing blockchain, big

³² World Bank, 2018, *2018 Information and Communications for Development*.

³³ See <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0679&from=EN> (accessed 15 March 2019).

³⁴ Internet Society and African Union Commission, 2018, *Personal Data Protection Guidelines for Africa*. Available at www.internetsociety.org/wp-content/uploads/2018/05/AUCPrivacyGuidelines_2018508_EN.pdf.

³⁵ UNCTAD, 2018, *Technology and Innovation Report 2018: Harnessing Frontier Technologies for Sustainable Development* (United Nations publication, Sales No. E.18.II.D.3, New York and Geneva).

data analytics, artificial intelligence and other aspects of digitalization in the finance sector to support implementation of the Sustainable Development Goals.

44. Nor are these information and communications technologies the only “frontier technologies” that will profoundly affect the nature of human societies. They increasingly interact with other fast-moving areas of innovation such as biomedicine, gene editing and nanotechnology, the development of advanced materials such as graphene and biodegradable plastics, autonomous vehicles and space science. The introduction of frontier technologies such as these will create new opportunities for economic growth and development in many areas of Government, including health care, law enforcement, food security and crisis mitigation. The concept of smart cities, whose utilities, traffic and public services are managed more efficiently through intensive use of data on citizens’ behaviour, has been extensively promoted. The interaction of these issues with World Summit outcome implementation has been, and will continue to be, a priority for the Commission on Science and Technology for Development.

45. The extent to which innovations are deployed and the pace of their deployment will vary considerably between regions, countries and households. New technologies are likely to become pervasive first in advanced industrial countries with high-quality communications infrastructure and relatively prosperous populations with high levels of educational attainment, who can afford to buy hardware and services. Those countries are likely to have extensive economic and social infrastructures in the fields of transport, electricity, water, health and education. They are also more likely to trade predominantly in services and manufactures than in commodities.

46. As a result, there is a risk that the norms and standards that emerge for smart systems may be geared predominantly towards the requirements of developed countries and may pay insufficient attention to those of developing countries and, in particular, least developed countries. Standard-setting bodies should take care to ensure that developing countries’ requirements and interests are fully represented in order to avoid this risk.

47. However, experience since the World Summit has also shown that it is difficult to predict the outcomes and impacts of new technologies and services. This poses additional challenges for governance, which needs to become more adaptable and flexible in order to respond to rapid and unpredictable changes in technology and their impacts. The World Summit outcome documents recognized that technology should serve humanity, rather than dictating its development. As with past transformative innovations, societies need to establish policies to contain unintended consequences or malicious use, to shape the information society in ways that enhance sustainable development and to ensure that no one is left behind.

48. The ethical dimension of emerging frontier technologies is increasingly important in international discourse, especially with regard to artificial intelligence. Problems concerning privacy and data protection have already been mentioned above. Many people are concerned that the growing decision-making power of devices and algorithms using machine learning and large-scale data analysis will reduce their autonomy as individuals and members of society. Machine learning brings with it the prospect of decisions being made through algorithms that are not transparent, either for those affected or for those managing the digital systems responsible for those algorithms. Machine learning processes rely on the data available to them, and it is clear that data that are unrepresentative or discriminatory can lead to outcomes that perpetuate discrimination. The legal, regulatory and ethical challenges involved in addressing problems such as these are significant and should be an important part of the evolving discourse on how to achieve a “people-centred, inclusive and development-oriented information society”.

Building skills for the digital age

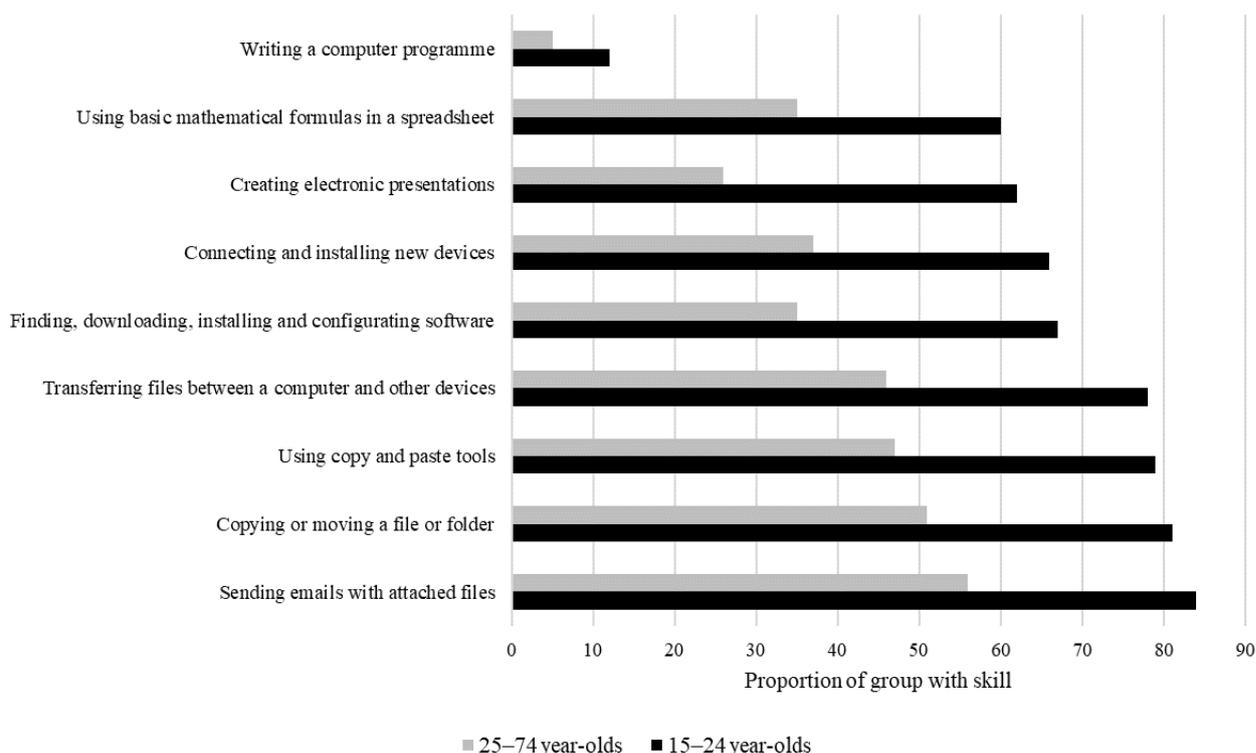
49. New skills are needed across the board if individuals, communities and countries are to take full advantage of the opportunities arising from new technologies – from advanced computer skills required to adapt systems and develop services for local markets, through those required within businesses and other organizations, to the digital and media literacy

required by individuals to find information, assess its quality and value, and use online resources.

50. Evidence published in 2018 by ITU showed that structural inequalities between and within countries in terms of employment, education, gender and geography are replicated in the distribution of digital skills. Figure 3, for example, illustrates the extent to which members of younger age groups are digitally skilled.

Figure 3

Age differences in information and communications technology-related skills, 2017



Source: ITU, *Measuring the Information Society*.

51. Similar disparities are evident between women and men and between those living in urban and rural areas.³⁶ Educational attainment levels are particularly strong indicators of acquired information and communications technology-related skills, and the shortfall in women's participation in science, technology, engineering and mathematics education and related employment is a matter of particular concern.

52. Analysis of these skills divides suggests that a combination of technical, information management, social and content-creation skills will be required at all levels of society to enable the secure and productive use of increasingly complex technologies. The identification of skills gaps will be of fundamental importance in developing a digitally capable citizenry that is ready to reap the benefits of, and avoid the more negative aspects arising from, the increased digitalization of society.

53. Many commentators have suggested that, as routine tasks are automated, demand for skills will shift towards skills that are less susceptible to automation, such as those required in the care and creative sectors. As with other aspects of information society development, the pace of change here is likely to vary substantially between countries, in line with variations in the costs of labour and the acquisition and use of digital equipment and services.

³⁶ ITU, 2018, *Measuring the Information Society Report*.

54. The career paths of many of today's young people will be very different from those of preceding generations. Educational systems and curricula need to adapt to this changing world of work. The next generation will need skills to understand and make use of new technology, including science, technology, engineering and mathematics skills, but will also need to acquire the non-digital skills required for the creative, problem-solving and caring roles that will become important for employment in a more digital world. Greater participation by women in the workforce, and particularly in science, technology, engineering and mathematics disciplines, where they are currently underrepresented, will create a more inclusive information and communications technology sector and will help to maximize the value that can be derived from digitalization. Continuous skills development will be needed, however, to ensure that citizens keep pace with ongoing technological change, thereby maintaining employment prospects in a more fluid labour market throughout their working lives.

V. The challenge of global cooperation

55. The issues raised by the developing information society are immensely important for the future of humanity. In this regard, in 2018, the international community has highlighted two aspects of these issues: measurement of the information society; and international and multi-stakeholder cooperation.

Measurement of the information society

56. Improved measurement of the information society is essential if international organizations, Governments, businesses and other stakeholders are to develop policies and programmes that make the most effective use of information and communications technologies to support sustainable development.

57. Although the information and communications technology sector is, by nature, digital, data on many aspects of access, use and impact are inadequate. Data required for policy development, such as those on skills, are often not collected systematically or rapidly fall out-of-date, while relatively few countries have disaggregated data concerning usage by gender, age group or other population categories. These deficiencies are more acute in developing countries and most acute in least developed countries. As a result, policymakers often rely on estimates, rather than real numbers, when planning for the future.

58. The United Nations and a number of international agencies have been working to improve the quality, reliability and timeliness of data on the information society, and to integrate them with other data sources. The Partnership on Measuring Information and Communication Technology for Development, which brings together 14 such agencies, is, for example, developing information and communications technology indicators for the Sustainable Development Goals, which should be presented for approval during 2019.

59. As the information society becomes more complex, it is increasingly important for policymakers to understand the interrelationships between its different aspects. The United Nations Educational, Scientific and Cultural Organization has launched a new indicator framework to assist understanding of "Internet universality" and its relationship with economic, social and cultural development. This includes quantitative, qualitative and institutional indicators concerned with rights, openness, accessibility for all and multi-stakeholder participation, as well as cross-cutting indicators regarding gender, children, sustainable development, trust and security, and the legal and ethical dimensions of the Internet.³⁷

60. The challenge of assessing impacts is particularly difficult, not least because the relationship between information and communications technologies and many aspects of economy and society is reflexive: each affects the other in ways that make it hard to ascertain causality with confidence. A number of United Nations and other agencies are

³⁷ See <https://en.unesco.org/internetuniversality> (accessed 15 March 2019).

seeking to address this crucial challenge for effective policy development, for instance through new approaches to measuring e-government and e-commerce, and through the analysis of complex and cross-cutting data sets using big data analysis. However, this is more difficult than is sometimes realized. In particular, care must be taken to avoid the risk that distortions in existing data sets are not entrenched by new analysis, and that new distortions are not facilitated by data manipulation.

International and multi-stakeholder cooperation

61. The Declaration of Principles – Building the Information Society: a global challenge in the new Millennium recognized that the information society is “intrinsically global in nature” and emphasized the importance of international and regional cooperation.³⁸ The two annual forums that arose from the World Summit – the Internet Governance Forum³⁹ and the World Summit on the Information Society Forum⁴⁰ – have facilitated multi-stakeholder discussion of relevant issues and contributed to the quality of decision-making by Governments and international agencies. They now form part of a large, diverse and growing range of multilateral and multi-stakeholder forums concerned with different aspects of the information society: from technical governance to cybersecurity, and from e-health to distance learning.

62. Meanwhile, issues concerning the Internet and the information society have also become central to discussions in almost every international forum and in every United Nations agency. The changing nature and growing significance of the information society have reinforced the need for international and multi-stakeholder cooperation to achieve a “people-centred, inclusive and development-oriented information society”. As a result, that cooperation needs to become more holistic, with sharing of both information and experiences and greater collaboration between diverse agencies and stakeholders. It needs to address critical issues, including the digital divide and cybersecurity; the interaction between information and communications technologies and wider sustainable development priorities; and the legal and ethical implications of the new wave of technological innovation that will determine the character of the future information society.

63. To achieve this aim, digital cooperation needs to be multifaceted, transversal and multidisciplinary, addressing issues across policy spaces from multiple viewpoints concerned with technology and social science, economics and human rights standardization and jurisdiction. In the spirit of the World Summit, this cooperation will be most effective if it involves all stakeholders, and if it includes a wide range of expertise, experience and ideas. Special efforts will be required to ensure that the voices of those who have previously been marginalized are heard in the places where decisions that affect their lives are made. The UNCTAD eTrade for all initiative is a concrete example of how the international community, in partnership with the private sector and other stakeholders, can join forces to scale up cooperation, transparency and aid efficiency in the field of inclusive e-commerce.⁴¹

64. A High-level Panel on Digital Cooperation⁴² has been established by the Secretary-General of the United Nations to advance proposals to strengthen cooperation in the digital space among Governments, the private sector, civil society, international organizations, academia, the technical community and other relevant stakeholders. The Panel, which began its work in 2018 and will report in 2019, is currently focusing on inclusive development and capacity-building, inclusive participation in the digital economy, developments in data, human rights and human agency, and digital trust and security.

³⁸ See <https://www.itu.int/net/wsis/docs/geneva/official/dop.html> (accessed 15 March 2019).

³⁹ See <https://www.intgovforum.org/multilingual/> (accessed 15 March 2019).

⁴⁰ See www.itu.int/net4/wsis/forum/2018/ (accessed 15 March 2019).

⁴¹ See https://etradeforall.org/app/uploads/2018/05/eTradeforall_GlobalReview2017.pdf (accessed 15 March 2019).

⁴² See www.un.org/en/digital-cooperation-panel/ (accessed 15 March 2019).

VI. Conclusion

65. The nature of the information society is changing, but the World Summit vision of a “people-centred, inclusive and development-oriented information society” remains as relevant as ever. Implementing that vision, within the framework of the 2030 Agenda for Sustainable Development, remains a priority for the United Nations and the multi-stakeholder international community concerned with information and communications technologies.

66. It is now approximately 15 years since the World Summit on the Information Society and 5 years since the General Assembly conducted its 10-year review of the implementation of the World Summit outcomes. The targets set at the World Summit in 2003 have been superseded. Considerable progress has been made, though more still needs to be done to enable all parts of the world and all people to benefit equally from the opportunities that have arisen from digital innovation. Understanding the implications of the new wave of technological innovation that will characterize the information society of the future will be crucial in interpreting the World Summit vision for the future and mitigating the potential risks of new technologies, while maximizing the benefits that they can bring to human prosperity, peace, security and well-being, in line with the goals set out in the 2030 Agenda for Sustainable Development. That forward-looking approach will increasingly become the focus of continued efforts to implement the World Summit outcomes.
