Distr.: Restricted
3 May 2018

English only

Commission on Science and Technology for Development
Twenty first session
Geneva, 14–18 May 2018
Item 2 of the provisional agenda
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, 2017*

Please recycle

Introduction

1.   The Secretary-General 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 (WSIS), which was held in two phases in 2003 and 2005. This report complements the formal report of the Secretary-General of the United Nations on progress made in implementing WSIS outcomes (A/73/66-E/2018/10).

2.   The 15 years since WSIS have seen remarkable developments in information and communications technology (ICT) and services, and in the impact which these are having on economic and social development. They are changing many aspects of Government, business and behaviour profoundly, in ways that were often not anticipated at the time of the Summit. Many new opportunities have emerged in that period that facilitate the implementation of WSIS outcomes and wider developmental goals, but these have been accompanied by new challenges and risks, including uncertainty about the impact of new technology on established economic structures and social norms. A new wave of innovation in information technology is now underway, which seems likely to have even more disruptive impacts, intensifying opportunities but also posing new challenges for stakeholders.

3.   The international community agreed in 2015 to work together, with the cooperation and engagement of all stakeholders, to promote digital inclusion and maximize the value of the information society for development. This report summarizes current trends in the development and impact of the information society in relation to WSIS outcomes.

- Section 1 describes the uneven distribution of ICT access and usage which is commonly called 'the digital divide'.

- Section 2 reviews progress in leveraging ICTs to support sustainable development, with particular attention to the digital economy.

- Section 3 considers three challenges arising from the impact on economies and societies of new technology.

- Section 4 addresses likely future developments and their implications for implementation of WSIS outcomes and further development of the information society.

I.   Digital divides and digital inclusion

4.   Access for all to ICTs, including the Internet, is considered essential if they are to change lives and contribute fully to sustainable development. The 2030 Agenda for Sustainable Development insists that no one should be left behind in achieving development goals and calls specifically for greater digital inclusion, with the aim of achieving "universal and affordable access to the Internet in least developed countries by 2020".[1]

5.   While access has grown steadily since WSIS, however, it remains highly uneven, with much higher levels of connectivity and usage in developed than developing countries, and particularly low levels in least developed countries (LDCs). Many people still lack access to ICTs which have become critically important to Government, business and daily life in other places and for other people. This constrains both personal opportunity and the potential for development.

6.   An overview of progress since WSIS in the global uptake of ICTs by individuals is shown in figure 1. As well as growth in overall adoption, this illustrates two important trends, towards mobile and towards broadband networks and services. The number of subscriptions to mobile phone networks now exceeds the global population, though the

---

[1] https://sustainabledevelopment.un.org/post2015/transformingourworld, Sustainable Development Goal 9, target 9c.

proportion of individuals with personal mobile subscriptions is significantly lower – around 5 billion, according to GSMA.[2] The number of fixed telephone subscriptions, meanwhile, continues to decline.

7.   Broadband connections enable much more effective use of Internet and online services. There is now more than one mobile broadband subscription for every two inhabitants worldwide, though this figure is also higher than the number of unique subscribers. Fixed broadband subscriptions are also increasing, but more slowly. Broadband adoption and usage are being driven by the spread of smartphones, and facilitating greater use of Internet and online services. As a result, it is estimated that 48 per cent of the world's inhabitants made use of the Internet at least once in a three-month period in 2017, and that Internet access is now available in more than half of global households.[3]

Figure 1
Changes in global uptake of ICTs, 2005–2017
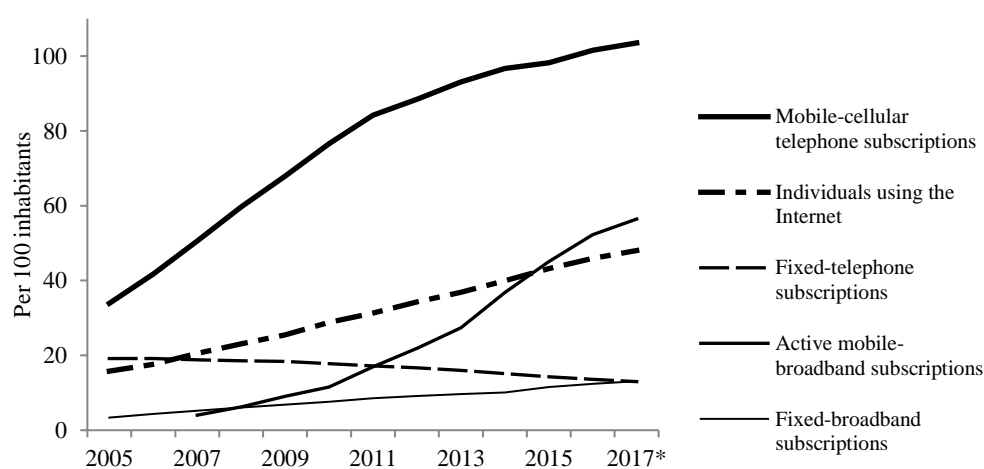
* Estimate.
Source: ITU World Telecommunication /ICT Indicators database.

8.   While these global connectivity statistics are improving year-on-year, they conceal stark differences between take-up between and within regions, countries and communities. Figure 2 illustrates the continued disparity in broadband access and Internet use between developed and developing countries and within geographic regions. This broadly reflects differences in overall economic performance, such as per capita gross national income.[4]

---

[2] The GSM Association represents mobile network operators.
See https://www.gsma.com/newsroom/press-release/number-mobile-subscribers-worldwide-hits-5-billion/.

[3] https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2017/ITU_Key_2005-2017_ICT_data.xls.

[4] See https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume1.pdf, p. 50.

Figure 2
Access to ICTs by development status and by region, 2017 estimates
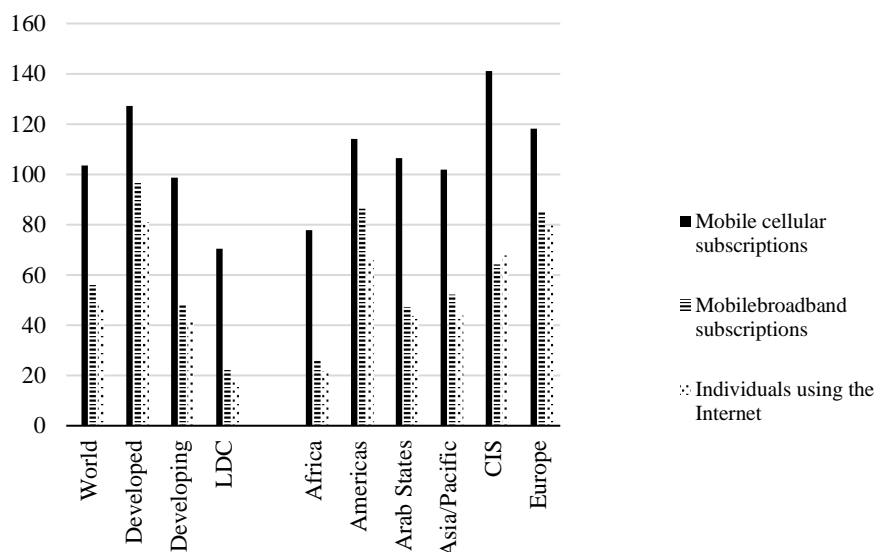
Note: The developed/developing country classifications are based on United Nations M49. See http://www.itu.int/en/ITU-D/Statistics/Pages/definitions/regions.aspx.html.
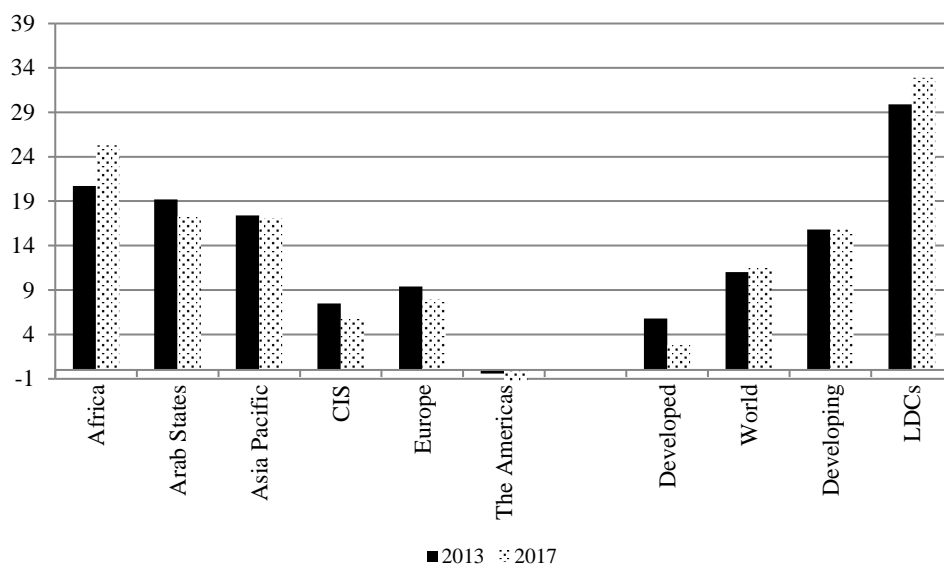*Source*: ITU.[5]

9.   The quality, reliability and speed of broadband access are also generally higher in developed than developing countries, while the cost of broadband services and broadband capable devices tends to be lower in developed countries, as a proportion of average income. These differences both reflect and potentially exacerbate existing development divides between regions and countries.

10.   The disparity is most acute where LDCs are concerned. By 2017 it was estimated that just 17.5 per cent of individuals in LDCs were making regular use of Internet and just 14.7 per cent of households had access, a long way from the 2030 Agenda target of universal access by 2020. Businesses and citizens in countries where broadband and Internet are widely available and widely used are able to benefit from greater economies of scope and scale, which enable more widespread adoption and greater innovation in electronic commerce, public services and education. Unless their low levels of ICT adoption are addressed, there is a risk that LDCs will fall further behind developed and other developing countries in the economic and social benefits derived from ICTs, which may adversely affect their economic competitiveness as well as social welfare.

11.   There are equally powerful disparities in access and use within countries. Rural areas, particularly in developing countries, are less likely to be connected to higher-bandwidth networks, illustrating the continued need for public access facilities in delivering online services. A substantial digital gender gap is evident in many countries, with women estimated to be 12 per cent less likely to make use of the Internet than men worldwide (figure 3). This is also particularly acute in LDCs, where the digital gender gap is estimated to be as high as 33 per cent. Age is also significant. Figure 4 shows that the proportion of young people aged 15-24 using the Internet (71 per cent) is much higher than that of the total population (48 per cent). Those in older age groups are particularly likely not to be online.

---

[5]   http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf.

Figure 3
**The digital gender gap, 2013 and 2017**

■2013 ⁚2017

Abbreviation: CIS, Commonwealth of Independent States region.
Note: The gender gap represents the difference. ITU regions definitions.[6]
Data estimates for 2017.
Source: ITU, *ICT Facts and Figure 2017.*[7]

12.   A number of factors play a part in part in inhibiting access to and use of ICTs. As well as inadequate infrastructure, these include the affordability of devices and services, lack of relevant skills including literacy and media literacy, lack of services which potential users consider valuable, unfamiliarity with technology, and lack of awareness of the potential benefits that can be derived from connectivity. Many of these barriers are related to wider structural inequalities within society. While ICTs may be able to help overcome these structural inequalities, their ability to do so is also inhibited by them.

Figure 4
Proportion of individuals using the Internet, by age, 2017

■Total population ⁚Age 15-24
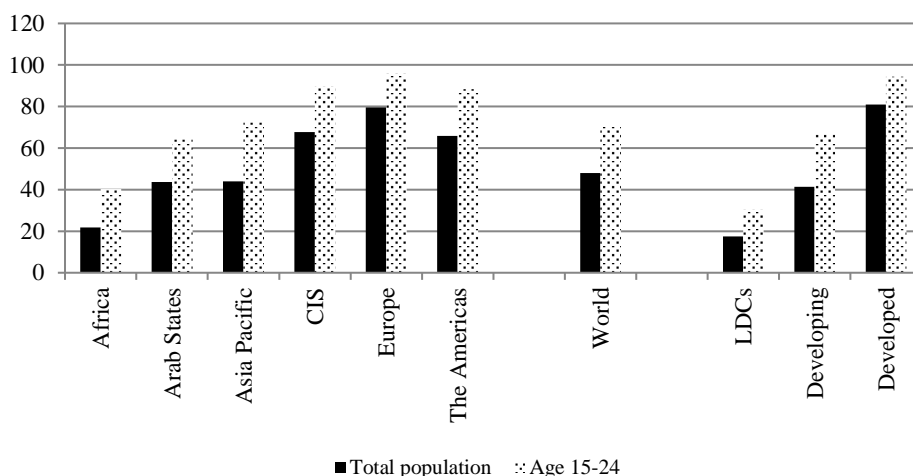
Abbreviation: CIS, Commonwealth of Independent States.
Source: ITU, *ICT Facts and Figure 2017.*[8]

---

[6] See http://www.itu.int/en/ITU-D/Statistics/Pages/definitions/regions.aspx.
[7] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf.
[8] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf.

II. ICTs and sustainable development

13. The 2030 Agenda for Sustainable Development recognized that "the spread of information and communications technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies".[9] Three interrelated dimensions of ICT for development (ICT4D) have become apparent as ICTs have become more powerful and pervasive in the years since WSIS.

14. The first concerns the application of ICT by Governments and other stakeholders in programmes intended to address specific developmental problems, for example in the delivery of health and education services, the monitoring of environmental risks, trade facilitation or the promotion of gender equality. Examples of such interventions are documented in the WSIS stocktaking database maintained by ITU, and in many other sources. As ICT access has become more widespread, Governments and stakeholders have shifted focus from narrowly defined projects that take advantage of particular applications towards sector-wide approaches. More than 120 countries, for example, now have national strategies for ICTs in health care.[10]

15. The second dimension of ICT4D arises, by contrast, from the ways in which individuals and communities have themselves appropriated connectivity, and made use of new technologies and services, in order to address their own needs and priorities. The rapid adoption of mobile phones and, more recently, smartphones has been crucial to this empowerment of individuals and communities, not least by facilitating the adoption of online services which act as catalysts for development, such as the use of mobile money to expedite financial transfers and improve access to capital, the use of market information to increase the efficiency and cost-effectiveness of supply chains and access to markets, and the use of social media to maintain and extend family and social networks.

16. As ICTs become pervasive and mainstream in governance, business and social interaction, a third dimension of ICT4D – the systemic impact of ICTs on economic, social and political structures – has become increasingly important. Pervasive ICTs disrupt, displace or alter many of the institutional structures, business models and patterns of social behaviour that have hitherto underpinned economic and social development. Many of the resulting changes – for example, in manufacturing productivity or approaches to problem solving such as crowdsourcing or big data analysis – offer new opportunities to facilitate the Sustainable Development Goals. Others can be leveraged, through appropriate policy interventions, to support overarching policy objectives such as gender equity and environmental protection. The uncertain and unpredictable impacts of technological change in areas such as employment, equality and privacy, however, require careful monitoring and appropriate policy responses if the information society is to become people-centred, inclusive and development-oriented along the lines agreed at WSIS.

17. The relationship between ICTs and sustainable development is, therefore, not a simple one. Seizing the opportunities to enhance sustainable development requires ICT4D to be integrated in approaches to development that address the underlying inequalities within society. Technological innovations that can facilitate development are being deployed more rapidly in countries which have readily available financial resources, pervasive and high-quality connectivity, sizable markets for service users and high levels of skills, particularly digital skills, in the community. Within countries they are more easily accessed and used by individuals with the financial resources and capabilities required to take advantage of them. If the developmental value of ICTs is to be maximized, policy approaches must address the deficits in connectivity, content and capabilities which inhibit progress in developing countries and marginalized communities.

---

[9] http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E, para. 15.
[10] See WHO contribution to 2017 Report of the Secretary-General on 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. Available at http://unctad.org/en/Pages/CSTD/WSIS-UNSG-Report.aspx.

18.   The work of United Nations and other stakeholders in ICT4D (A/72/64-E/2017/12) illustrates their growing experience and recognition of the importance which these human and governance aspects of development play alongside the technological dynamism of the evolving information society. International organizations and other agencies have emphasized the importance, in leveraging developmental value, of enabling policy and regulatory environments for investment and innovation, of integrating ICTs into national and sectoral development strategies, and of involving all stakeholders in the development of public policies for ICT4D. More attention is beginning to be paid to the role of foresight analysis in preparing national and ICT environments for the next wave of technological innovations discussed in chapter IV. Experience-sharing amongst stakeholders, not least through the WSIS Forum and the IGF, technical assistance from development agencies and investment from international financial institutions will all be important in ensuring that all countries, including LDCs, develop the legal and institutional structures needed to leverage ICTs for the Sustainable Development Goals. In this context, the recently established UNCTAD Intergovernmental Group of Experts on E-commerce and the Digital Economy provides a platform for discussion of relevant policies and practice.[11]

19.   It is not possible in this report to give a comprehensive overview of what is taking place in each development sector. The following paragraphs summarize trends in one selected area, the digital economy.

The digital economy

20.   The UNCTAD *Information Economy Report 2017: Digitalization, Trade and Development* underlines that the new digital economy will have transformational effects, creating significant opportunities for developing countries as well as major challenges.[12] Global production of ICT goods and services now accounts for an estimated 6.5 per cent of global gross domestic product (GDP). Exports of ICT services grew by 40 per cent between 2010 and 2015. UNCTAD estimates that worldwide e-commerce sales in 2015 reached over $25 trillion, the large majority being transactions between businesses.[13] A growing number of businesses and individuals now manage their money online, often using mobile devices rather than computers as their banking interface. Online retailers Amazon and Alibaba and service providers such as Google are now among the world's largest companies. Global corporations combine service provision and e-commerce with cloud computing, data management and innovations in the Internet of things, artificial intelligence and machine learning.

21.   This expanding digital economy, illustrated in figure 6, is a complex and evolving ecosystem. At its centre lies the core digital sector, including communications network operators, online service providers, data management companies, software and applications developers. Clustered around these are digital enterprises whose business models are wholly dependent on ICTs, including platform businesses such as Expedia, Uber and Airbnb, which have disrupted traditional service models and businesses in many economic sectors. Around these again are digitalized businesses, less dependent on ICTs, which nevertheless make extensive use of them to gain competitive advantage through enhanced productivity and customer reach. Further technological advances and the growing pervasiveness of ICT access and use are likely to extend the advantages which these enjoy over less digitally empowered competitors.

---

[11] http://unctad.org/en/Pages/MeetingDetails.aspx?meetingid=1437.

[12] UNCTAD, *Information Economy Report 2017*,
http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=1872.

[13] http://unctad.org/en/PublicationsLibrary/ier2017_en.pdf.

Figure 5
The digital economy: representation
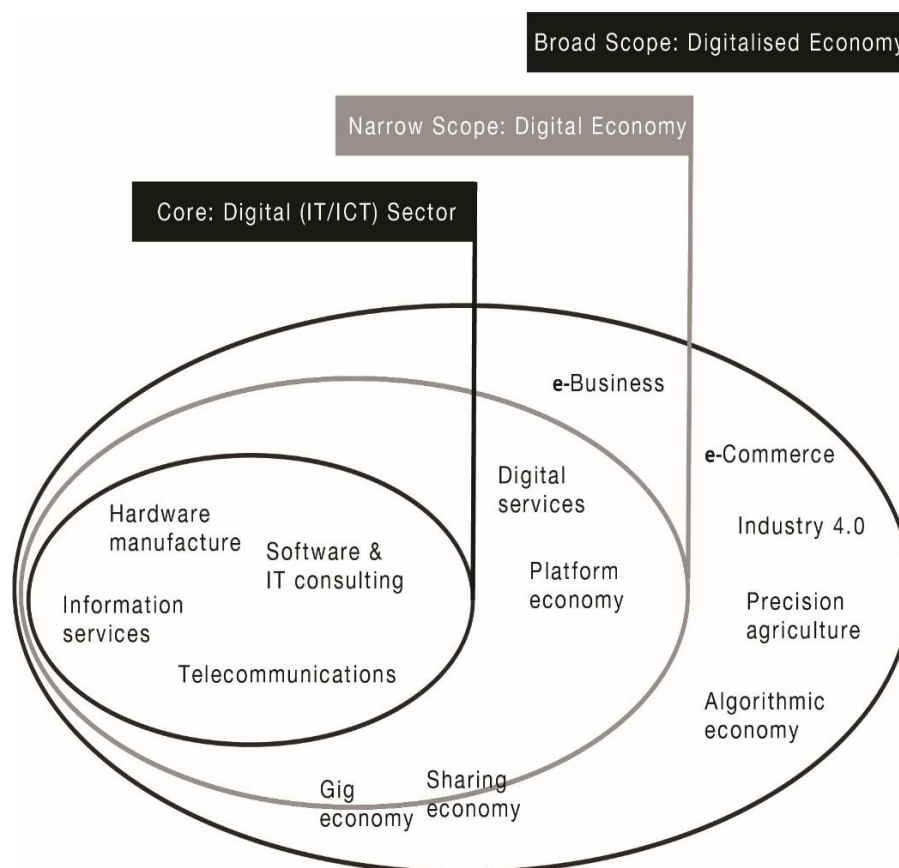
Source: UNCTAD, derived from Bukht and Heeks, *Defining, Conceptualizing and Measuring the Digital Economy*, Manchester University, 2017.

22.   The growth of the digital economy poses a number of challenges for Governments and businesses, particularly those in developing countries. UNCTAD emphasized in its *Information Economy Report* for 2017 that many countries, particularly LDCs, are insufficiently prepared to capture the opportunities arising from digitalization. Investment in readiness for e-commerce is essential if these countries, and businesses based in them, are to meet the challenge of increased competition in global markets and facilitate domestic economic growth. Within countries, smaller, local firms are less well equipped for the digital economy than larger counterparts with access to global capital and greater capacity to take advantage of the economies of scope and scale that characterize network and platform businesses. They too need to invest if they are to compete with larger enterprises that can take advantage of greater economies of scale.

23.   This is an important part of the agenda for future WSIS implementation. The Internet has become the world's largest and most dynamic commercial platform, and is now integral to almost all new economic activity. Traditional ways of doing things, no matter how successful they have been, must adapt to meet new challenges. Businesses need to adopt new technologies and develop new relationships along supply chains, not least with consumers who can access online alternatives, if they are to remain successful. Governments need to facilitate business innovation, not least because of the threat posed to traditional jobs by automation and robotics. One of the biggest challenges, which will require much more investment in future, is the need not just to reskill workforces but to prepare for a labour market in which the skills of individuals, communities and countries will need to be continually upgraded and adjusted in response to further changes in technology and markets.

III. Challenges for the international community

24.   The nature of the information society is constantly changing as new technologies emerge and applications are introduced. Many of the devices and online services which are now widespread, including mobile broadband, social media and cloud computing, have become prominent only since WSIS. ICTs are also now much more pervasive than they were at the time of WSIS, particularly in developed countries, changing patterns of behaviour, disrupting traditional business models and altering public services in ways that were not anticipated 15 years ago. They have become central to most people's lives in developed and some developing countries, and central to many people's lives in all.

25.   Dramatic changes of this kind pose challenges as well as opportunities. Indeed, these are often inextricably intertwined. The increased productivity enabled by automation, for example, improves competitiveness but also threatens jobs. If ICT4D is to facilitate the Sustainable Development Goals, it must address both of these dimensions. It is not possible in this report to cover every aspect of this. The following paragraphs consider three challenges which have been prominent in international debate during 2017.

Cybersecurity

26.   Cybersecurity is an increasingly important theme in international discussion about the information society. The growing dependence of public services, including utilities, on the Internet and on connected IT systems means that they are vulnerable to attack from State and non-State actors, which could have crippling effects on national economies. The growing dependence of individual citizens on online services, including financial services, likewise makes them vulnerable to fraud, identity theft, malware and other forms of criminality.

27.   The threat from cyberattacks is generally felt to have increased during 2017. There has been a growing number of major incidents, some of which have had significant impacts on individuals and public services. Critical vulnerabilities in software and hardware have been identified, requiring rapid interventions by infrastructure and service providers, supported by national cybersecurity response teams.

28.   Particular concern is now expressed about security risks associated with the Internet of things, digitally connected devices that perform a variety of tasks for individuals, businesses and Governments which are becoming widely available, particularly in developed countries. Some 20 billion Internet of things devices are estimated to be in use today. Within the next five years, this number is expected to double, and to accelerate thereafter.[14] There are no agreed international security standards for new Internet of things devices, the market for which is highly price-competitive. Many of those already deployed have poor security and do not facilitate security upgrades by manufacturers, some of which have limited IT experience. This potentially increases the vulnerability not just of device owners, but of societies more generally should these devices be used for distributed denial of service or other large-scale cyberattacks.

29.   Cybersecurity challenges threaten the potential developmental impact of ICTs. If Governments or individuals lose trust in the integrity of information systems, they will become less willing to use them in ways that can improve prosperity and welfare. Addressing them is therefore critical to achieving WSIS outcomes. Attention is now focused on three aspects of this. Citizens and other users need to become more aware of the risks they face and the steps that they can take to protect themselves. Suppliers of hardware and software need to pay more attention to incorporating security by default in their products and services. Governments and other stakeholders need to establish mechanisms that can respond rapidly to threats as they arise and plan ahead for coming challenges.

---

[14] https://www.statista.com/statistics/471264/iot-number-of-connected-devices-worldwide/.

Information rights and changing media

30.   The information society has had increasingly powerful impacts on the exercise of information rights and on traditional media. Like printing half a millennium ago, the Internet has greatly expanded the opportunities for individuals, businesses and organizations to publish content and to access that which has been published by others. Increasingly, this content includes audio and video material, as well as text. The Internet's structure means that it is potentially available to all who can access the Internet, though in practice access for many people is constrained by infrastructure limitations (including bandwidth), lack of affordability, media literacy and language capabilities. The advent of social media has further extended opportunities for expression and interpersonal dialogue, with a substantial majority of individual Internet users now participating in one or more social networks.

31.   These developments have challenged the business models of traditional media platforms. Leading online services are free to their end users, generating revenue by leveraging user data to target advertising. Their success has diverted advertising revenue away from print media including newspapers, with the majority of online advertising in some markets now in the hands of two or three global providers.[15] More news content is also now available online, often free to use, through websites and social media. This has also tended to reduce newspaper revenue, leading to reductions in the quantity and, some suggest, the quality of professional journalism.

32.   While the Internet has greatly increased the quantity and range of content that is available to end users, it has been widely observed that this does not necessarily increase the diversity of content or opinions that are actually accessed by individuals. Time constraints on users mean that they tend to focus on content which is most relevant or appealing to them. Many people, particularly young people, now access news primarily through social media platforms, whose algorithms personalize content around users' apparent preferences, rather than traditional media. This has led to concerns that many people are becoming less, not more, exposed to diverse viewpoints, which some believe may have a polarizing impact in society.

33.   Another area on which there has seen more debate among stakeholders and in international forums during the past year concerns the reliability of online information, and the risk that disinformation through online media may be spread, by national or international actors, for propaganda purposes, to distort political processes or to foster hatred against particular population groups. Public trust in both news sources and online platforms has been brought into question by this, with potential risks extending to trust in other online services, including e-commerce, which is of concern to both Governments and online businesses. It has raised the profile of media and information literacy in developing policy for the information society and renewed debate about issues of media regulation and cultural diversity.

Governance of the information society

34.   The information society, as noted above, has changed dramatically since WSIS. It has become much more commercial, with much greater integration between different areas of information society activity, particularly between Internet services and data management. Consolidation of market power in some areas of the information society has reinvigorated discussion about legal and regulatory norms concerned with market dominance and consumer rights. The emergence of platform businesses has raised new questions about the regulation of online firms that compete with those offline, including issues of taxation, employment and consumer rights as well as competition. Vertical integration between network and service providers has led to renewed debate about net neutrality and the economics of the Internet. Complex issues of jurisdiction are raised,

---

[15]   https://www.ft.com/content/cf362186-d840-11e7-a039-c64b1c09b482.

in this context, by the transnational nature of online services and transactions, particularly where data protection is concerned.

35. There is growing debate among Governments and other stakeholders about the best ways to foster innovation in this rapidly changing environment, while also shaping the development of the information society in ways that reflect the WSIS goal of a "people-centred, inclusive and development-oriented information society". The balance between innovation and public policy goals will become more complex and more potent as ICTs, the Internet and the new digital technologies discussed in chapter IV become more pervasive and as they play an increasingly central role in governance.

36. Current debates about this and other future-oriented aspects of the information society take place in many different fora. The WSIS Forum and the IGF play a valuable role in focusing stakeholders' attention on the diverse outcomes of such meetings. This will become increasingly important. The proliferation of discussion forums, however, makes it difficult for many stakeholders, including the governments of many developing countries, to participate fully in shaping the future information society. The General Assembly has noted the importance of ensuring greater inclusivity in these debates.

37. Pursuant to a request by the General Assembly, the CSTD Working Group on Enhanced Cooperation held five meetings between September 2016 and January 2018 in Geneva, Switzerland, to develop recommendations on how to further implement enhanced cooperation as envisioned in the Tunis Agenda. Significant divergence of views in a number of other issues persisted, including with respect to what should be the nature, purpose and scope of the process towards enhanced cooperation. The complexity and political sensitivity of the topic did not allow the group to agree on a set of recommendations. [16]

38. Human rights are central to the WSIS vision. The information society has expanded opportunities for citizens to exercise some rights, such as freedom of expression, but also increased the risk that others will be violated, notably privacy. The General Assembly confirmed in 2015 that "the same rights that people have offline must also be protected online". This raises jurisdictional challenges, particularly where legal frameworks and social norms diverge. The principle of online/offline equivalence can be extended more generally, for example to consumer rights, though difficulties of enforcement arise in such contexts because of the different modalities of online and offline transactions and interactions.

39. The need for more comprehensive, detailed and disaggregated data on ICTs and their impacts, which can provide a sound basis for policy and practice, will also intensify as they become more pervasive and as newer digital technologies become available. Big data analysis, which leverages the digitalization of information, cloud storage and the analytical capacity of modern computing, offers new ways of understanding the impacts of ICTs, but is dependent on data quality and poses challenges concerning privacy, data protection and cybersecurity. The value of better data is also constrained by the capacity of Governments to act upon it, which requires both human capacity and financial resources.

40. Not all aspects of the information society can readily be quantified. Assessing the capacity of national legal and regulatory frameworks to foster innovation and investment, for example, requires qualitative judgements to be made, against international standards where these have been agreed. United Nations agencies are collaborating to integrate ICT indicators more effectively in assessment of progress towards the Sustainable Development Goals. The Internet universality concept of the United Nations Educational, Scientific and Cultural Organization (UNESCO) presents a framework for understanding national Internet environments which builds on WSIS principles concerned with rights, openness, accessibility for all and multi-stakeholder participation, as well as cross-cutting issues including gender, the needs of children and young people, and sustainable development. UNESCO is currently developing indicators to support this concept. Other stakeholders, including the Internet Society and the World Economic Forum, have explored needs and priorities for future governance of the information society. Governments are aware that they

---

[16] E/CN.16/2018/CRP.3.

need to assess their digital environments more comprehensively, and with foresight, if they wish to maximize the value of developmental opportunities.

IV. Facing the future

41. It is widely agreed that we stand on the cusp of a new wave of technological innovation that is likely to bring about much more radical changes in our economies and societies than those which have already resulted from the spread of ICTs. It includes developments, which have been called "exponential technologies",[17] such as artificial intelligence, machine learning and advanced robotics, big data and algorithmic decision-making, virtual and augmented reality, blockchain technologies and the cryptocurrencies that use them, autonomous vehicles, the Internet of things and quantum computing. This new wave of innovation has been variously termed the "fourth industrial revolution" and the "second machine age".

42. Sustainable development will only be sustainable if it recognizes these transformations and adapts to them. Experience since WSIS has shown, however, how difficult it is to anticipate the ways in which new technologies will evolve, what impacts they will have, even within relatively short timescales, and what policy approaches will be appropriate to maximize their benefits, minimize or mitigate the risks arising from them, and integrate them with policies to shape inclusive societies oriented towards economic prosperity, social equity and environmental sustainability.

43. As with current technologies, considerations of equality and inclusiveness will be important in determining the impact of these new technologies. Countries, companies and individuals that invest in the infrastructure and capabilities required to take advantage of them are likely to improve their competitiveness in global markets. Those that lack the resources to do so are likely to be disadvantaged. Policymakers will need to consider ways of addressing the implications of these structural inequalities on inclusiveness and sustainability. The increasing pervasiveness and capabilities of new technologies will also exacerbate the challenges of privacy and data protection which have been identified above.

44. The following paragraphs outline two issues that illustrate both opportunities and risks and that have become prominent in the international discourse.

45. The term "smart systems" is now widely used to describe the use of complex information technologies, particularly those reliant on big data, to transform the productivity and effectiveness of management systems on which human activities depend. At a domestic level, smart metering of utilities like electricity and water enables more accurate and cost-effective billing systems to be introduced and encourages more efficient use of limited resources. On a larger scale, smart cars and other autonomous vehicles will, it is hoped, lower costs, improve safety and enable users to make more productive use of time. More generally, applications are now being put in place to enable the development of "smart cities", in which transport and other public services are managed digitally, in real time, to maximize efficiency, the quality and cost-effectiveness of public services, and environmental sustainability.

46. The potential of these innovations depends on the quality and reliability of infrastructure. Autonomous vehicles, for example, will need to exchange very high volumes of data in real time in order to ensure safety and efficiency. This will make them vulnerable to network failure and cyberattack. They will also gather high volumes of data on individuals' movements, which has commercial value and could be used or abused against the wishes or the interests of those individuals. Smart cities and societies which become dependent on the reliability and integrity of digital systems will need to pay high attention to data protection and cybersecurity.

47. A second issue that has become prominent in international discourse is employment. It has been suggested that automation and artificial intelligence will displace jobs that are currently done by people, including both manual and professional work. However, the net

---

[17] https://sustainabledevelopment.un.org/content/documents/12808KeyRecommendations2.pdf.

impact of technological and their consequences on labour markets and jobs remains uncertain, including on the type of jobs and sectors that will remain or be created. The employment effects of the next wave of innovation will vary considerably between countries because of different economic circumstances. Where labour costs are low, for example, businesses will have less short-term incentive to invest in automation. Whatever the overall impact of new technology on employment, however, radical reforms to education and training will be needed to enable both present and future generations to participate effectively in labour markets, as has been argued by the CSTD.[18]

48.   Taken together, this underlines the important role of foresight as tool for policymaking. The CSTD is well positioned to support countries in their efforts to identify future trends in terms of capacity building needs and other policy issues. In 1998, the work of the CSTD Working Group on Information Technology and Development culminated in "Knowledge Societies: Information Technology for Sustainable Development", which was ground-breaking in advancing the understanding of developmental impact of technological change on developing countries. The urgent need to understand the impacts of current and emerging technological change in societies points to the role of the CSTD in championing foresight efforts.

V.   Conclusion

49.   Twelve years after the end of WSIS, the information society has entered a new phase of rapid evolution. New technologies which are now being developed and introduced offer enormous opportunities to address the challenges which the international community prioritized in the 2030 Agenda for Sustainable Development. All stakeholders need to work together if we are to take full advantage of the opportunities which the information society is opening for the future.

50.   Progress towards inclusion in the information society, however, remains highly unequal. Many people, particularly in low-income countries, are unable to benefit from ICTs because of poor connectivity, high costs and lack of necessary skills. These disadvantages are likely to be exacerbated as the pace of innovation in technology intensifies. Stakeholders from Government, business, civil society and the technical and professional community need to work together, in the spirit of WSIS, to ensure that no one, and no country, is left behind as the information society evolves.

51.   As ICTs become more prevalent and pervasive, economies and societies become more vulnerable to disruption of the online systems on which they depend. This gives renewed importance to cybersecurity, and to the relationship between Government, business and citizens. Stakeholders need to cooperate in building an enabling environment for innovation which protects the rights of individuals and promotes peace and development.

52.   As the General Assembly reaffirmed in 2015, the WSIS outcome documents set out the principles which the international community should follow in shaping a "people-centred, inclusive and development-oriented information society" which contributes to the three pillars of sustainable development, that is, economic prosperity, social equity and environmental sustainability.[19] The challenge today for the international community, and all stakeholders, is to ensure continued advancement of those principles and towards those goals in the context of rapid, unpredictable changes in technology.

---

[18]   See report of the Secretary-General entitled "Building digital competencies to benefit from existing and emerging technologies with a special focus on gender and youth dimensions".

[19]   http://workspace.unpan.org/sites/Internet/Documents/UNPAN96078.pdf.