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Economic and environmental questions:
Science and technology for development

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

Report of the Secretary-General

Summary

   This report has been prepared in response to Economic and Social Council resolution 2006/46, which requested the Secretary-General of the United Nations to inform the Commission on Science and Technology for Development about implementation of outcomes of the World Summit on the Information Society. It highlights major activities undertaken by stakeholders during 2019. It has been prepared by the secretariat of the United Nations Conference on Trade and Development, based on information provided by entities in the United Nations system, international organizations and other stakeholders.

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Introduction

1.   The present report was prepared in response to Economic and Social Council resolution 2006/46. It includes information provided by 31 United Nations entities and other international organizations and stakeholders [1] in response to a letter from the Secretary-General of the United Nations Conference on Trade and Development (UNCTAD) requesting contributions on trends, achievements and obstacles in the implementation of World Summit on the Information Society (WSIS) outcomes, as well as additional information compiled by UNCTAD. The report summarizes developments and activities during 2019.

I.   Key trends

A.   Increased access, but a slowing growth rate

2.   Access to information and communications technologies (ICTs) continued to grow during the year. Mobile cellular signals now reach more than 95 per cent of the global population, and it is estimated that 4.1 billion people, more than 50 per cent, use the Internet. Although this represents rapid growth since WSIS, there remain large discrepancies between regions and countries, while the rate of growth in access appears to be slowing as more developed and some developing countries reach saturation in telephone and Internet markets.[2]
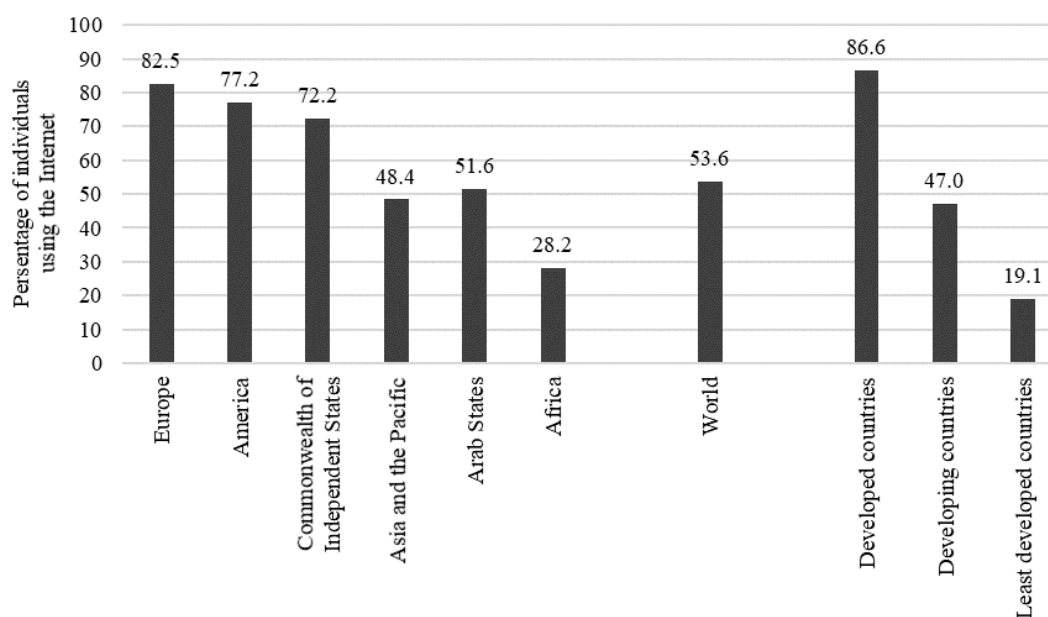
3.   The figure below illustrates inequalities relating to the Internet. The proportion of individuals using the Internet in developed countries is more than four times that in the least developed countries. Affordability, particularly in the least developed countries, is a powerful barrier to access for many people, reducing opportunities to take advantage of new technology and potentially exacerbating other inequalities. Fixed and mobile broadband prices exceed 5 per cent of average gross national income per capita in various developing and the least developed countries, while in many developed countries prices are lower than 2 per cent. On average, women are 17 per cent less likely than men to use the Internet. The gap ranges from 3 per cent in developed countries, to 43 per cent in the least developed countries. [3] Furthermore, the use of international bandwidth grew by 33.4 per cent on average annually between 2015 and 2019; however, 89 per cent of global use is concentrated in Asia and the Pacific (43 per cent), Europe (25 per cent) and America (21 per cent).

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[1] Association for Progressive Communications (APC); Council of Europe; Economic Commission for Latin America and the Caribbean (ECLAC); Economic and Social Commission for Asia and the Pacific (ESCAP); Economic and Social Commission for Western Asia (ESCWA); Economic Commission for Europe (ECE); Food and Agriculture Organization of the United Nations (FAO); International Chamber of Commerce (ICC); International Federation of Library Associations and Institutions (IFLA); International Trade Centre (ITC); Internet Corporation for Assigned Names and Numbers (ICANN); Internet Governance Forum (IGF) secretariat; Internet Society (ISOC); International Telecommunication Union (ITU); Organization for Economic Cooperation and Development (OECD); United Nations Children's Fund (UNICEF); United Nations Conference on Trade and Development (UNCTAD); United Nations Development Programme (UNDP); United Nations Department of Economic and Social Affairs; United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women); United Nations Environment Programme (UNEP); United Nations Human Settlements Programme (UN-Habitat); United Nations Industrial Development Organization (UNIDO); United Nations Office on Drugs and Crime (UNODC); Universal Postal Union; World Bank; World Food Programme (WFP); World Health Organization (WHO); World Intellectual Property Organization (WIPO); World Meteorological Organization (WMO); and World Trade Organization (WTO). See http://unctad.org/en/Pages/CSTD/WSIS-UNSG-Report.aspx.

[2] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2019.pdf.

[3] Ibid.

Inequalities in Internet access

Source: ITU (available at https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2019.pdf).

4.   The quality of infrastructure varies widely. International Internet bandwidth in developed countries is, on average, twice that in developing countries and nine times that in the least developed countries, with lower access speeds and higher costs for users in the latter. While fourth-generation mobile networks are now predominant in many countries, these networks have not yet reached most users in Africa or the least developed countries.[4] These inequalities undermine capacity to meet the international community's goal of universal coverage of ICTs and the ability of Governments to leverage developmental gains.

B.   The digital economy

5.   The digital economy is changing. At the time of WSIS, it principally referred to the ICT sector itself and the relatively few businesses that were then highly dependent on it. Currently, ICTs are crucial to many sectors in most economies and are rapidly become more pervasive. Electronic commerce (e-commerce) is increasingly widespread in international and domestic markets, with global sales reaching an estimated $29 trillion dollars and, currently, one quarter of the world's population sometimes shopping online.[5] While engagement in the digital economy does not guarantee success, companies and countries that lag behind in ICT infrastructure, skills and services are becoming less competitive in international markets and more vulnerable in domestic markets.

6.   Significant changes have been taking place in the structure of the sector. Hardware and software industries remain dynamic, with continuous improvements in capabilities leading to rapid turnover in products and services. The most dynamic growth, however, has been in data management, where corporations with roots in social media, search engines, e-commerce and cloud-based services have displaced earlier business models. Global platform and data corporations, predominantly based in the United States of America and China, currently dominate world markets in these areas.[6]

7.   Powerful economic factors, which create advantages in scope and scale, underpin market concentration in network and platform sectors, whose leading companies are

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[4]   Ibid.

[5]   https://unctad.org/en/pages/PressRelease.aspx?OriginalVersionID=505.

[6]   https://unctad.org/en/PublicationsLibrary/der2019_en.pdf.

extending into frontier technologies, including artificial intelligence and quantum computing. This has led to renewed discussion about international regulatory governance, especially concerning the exploitation of data resources and the role of competition.

8.   An important discussion in this context concerns ways in which smaller and developing countries can maximize advantage in the face of competition from global players and the advent of artificial intelligence business models. Business process outsourcing, which has been a source of service sector revenue and jobs in some developing countries, is vulnerable to artificial intelligence displacement. The UNCTAD *Digital Economy Report 2019: Value Creation and Capture – Implications for Developing Countries* stressed the importance of moving beyond access and considered how countries can create and capture value in the digital economy. Developing-country digital businesses may need to focus on niche products and services that relate strongly to local markets.[7] Governments, donors and ICT sector businesses all need to consider strategies to support national economic, social and employment needs in an age of growing economic interdependence.

C. Rights and ethics for digital technologies

9.   The Geneva Declaration of Principles, agreed at WSIS, affirmed the centrality of rights in the information society. The General Assembly has since confirmed that the rights people enjoy offline should also be protected online. Particular attention has been paid to civil and political rights, but there has also been increased attention in recent years to economic, social and cultural rights, such as those concerned with employment, education and cultural diversity.

10.   Much recent discussion has focused on privacy and data protection. Information about individuals is now gathered by default through automated systems for identity and public services and through digital footprints on social media, search engines and devices. Global Internet Protocol traffic has grown enormously, from about 100 gigabytes (GB) per second in 2002 to more than 45,000 GB per second in 2017, and is expected to reach 150,000 GB per second by 2022.[8] The majority of these data are held by private corporations that leverage their commercial value, combining diverse data sets to maximize their analytical capacity. Public concern has grown about the intrusiveness and potential impact of data gathering, the risk of surveillance and the increasing use of algorithms drawing on such data sets to automate decisions that affect individuals' lives.

11.   While such systems can be highly beneficial, for example in the early detection of disease, there is growing concern about the privacy and ownership of personal data, the risk that biases in existing data sets may lead to discrimination by automated systems and the implications of controversial applications that might result such as predictive policing. This has led to regulatory interventions such as the European Union's General Data Protection Regulation and to a proliferation of proposed ethical frameworks for the deployment and use of digital and frontier technologies.

D. Digital cooperation

12.   The High-level Panel on Digital Cooperation was established by the Secretary-General of the United Nations in 2018 to consider means of collaboration to address the social, ethical, legal and economic impact of digital technologies in order to maximize their benefits and minimize their harm. It drew together expertise from different world regions and stakeholder contexts in the evolving age of digital interdependence. United Nations agencies in general are concerned with these issues as they seek to implement the United Nations strategy to exploit new technologies in delivering the Sustainable Development Goals.[9]

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[7] Ibid.

[8] Ibid.

[9] https://www.un.org/en/newtechnologies/images/pdf/SGs-Strategy-on-New-Technologies.pdf.

13. The High-level Panel's report, published this year, recognized that digitalization is leading to profound changes in the economy, society and culture and emphasized the need for cooperation and inclusion, drawing on multilateral and multi-stakeholder experience, in building the information society.[10] The High-level Panel suggested the development of global commitments on digital cooperation and on issues concerned with trust and security, along with three alternate models for developing practical cooperation that will be considered further by the international community in 2020.

14. Research undertaken for the High-level Panel identified more than 1,000 international forum that are currently discussing different aspects of the information society. It is impossible for even the best resourced Governments and businesses to participate effectively in so many discussion spaces. The need for greater coordination is particularly acute for smaller and developing countries and for non-governmental stakeholders, such as developing country businesses – which have a particular interest in processes that set the terms and standards under which they operate – and civil society organizations concerned with the impact of digitalization on societies.

II. Implementation and follow-up at the regional level

A. Africa

15. African ICT ministers adopted a draft Digital Transformation Strategy for Africa that will be submitted to the African Union for endorsement in 2020.[11] A joint report by UNCTAD, ECA, the African Union Commission and the African Development Bank recommended next steps for the African Continental Free Trade Area, including e-commerce and digital integration.[12]

16. The Broadband Commission for Sustainable Development launched a working group on connecting Africa through broadband in partnership with the World Bank.[13] ECA is also working to promote broadband development on the continent.[14]

17. The World Bank completed 11 diagnostic studies, under the Digital Economy for Africa Initiative, based around digital infrastructure, platforms, financial services, skills and entrepreneurship.[15] A series of lending programmes was introduced following the studies and Bank assessment of African employment needs.

18. The African Internet Governance Forum was held in Chad,[16] preceded by a session of the African School on Internet Governance.[17]

B. Asia and the Pacific

19. ESCAP conducted a regional review of WSIS implementation during the year. This noted a widening of some digital divides, particularly in fixed broadband, though there were also significant improvements in mobile broadband in middle-income countries. The review emphasized the importance of cross-border policy dialogue and operational cooperation to maximize the impact of available infrastructure.

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[10] https://www.un.org/en/pdfs/HLP%20on%20Digital%20Cooperation%20Report%20 Executive%20Summary%20-%20ENG.pdf.

[11] https://www.tralac.org/documents/resources/african-union/3013-the-draft-digital-transformation-strategy-for-africa-2020-2030/file.html.

[12] https://www.tralac.org/documents/resources/africa/2898-assessing-regional-integration-in-africa-ix-uneca-auc-afdb-unctad-july-2019/file.html.

[13] https://broadbandcommission.org/workinggroups/Pages/WG2-2018.aspx.

[14] https://www.uneca.org/sites/default/files/PublicationFiles/eca_policy_brief_improved_ access_to_broadband_rev1_0.pdf.

[15] For example, https://openknowledge.worldbank.org/handle/10986/31841.

[16] https://www.afigf.africa/.

[17] https://afrisig.org/afrisig-2019/.

20.   ESCAP continued to lead the Asia–Pacific Information Superhighway initiative,[18] a regional broadband initiative to improve the connectivity of landlocked developing countries to promote universal broadband and facilitate disaster preparedness. Interconnection, Internet exchange points and capacity-building are current areas of focus.

21.   ESCAP also published various regional studies, covering social media and the digital divide,[19] the use of broadband connectivity in education[20] and the operation of cross-border fibre networks,[21] and shared expertise on satellite communication among Pacific island countries.[22]

C.   Western Asia

22.   ESCWA has identified the need for greater regional and cross-sectoral coordination as a priority for its work to implement WSIS outcomes and the Sustainable Development Goals. Desired improvements include the development of action plans for broadband, cybersecurity, artificial intelligence and the role of ICTs in Sustainable Development Goal delivery, together with more effective measurement of digital inequalities among citizens and in the penetration of e-commerce. It has formulated recommendations to address these challenges.

23.   ESCWA organized the second Arab High-level Forum on WSIS and the 2030 Agenda for Sustainable Development, focused on the digital economy, Internet governance, digital empowerment and inclusiveness.[23] It published the *Arab Horizon 2030* report, setting out the potential of digital technologies for development,[24] a regional report on digital trade facilitation[25] and reviewed national digital development reports from 10 countries.

D.   Europe

24.   ECE coordinates the United Nations Centre for Trade Facilitation and Electronic Business, which develops trade facilitation recommendations and electronic standards for commercial and government business processes.[26] During 2019, it implemented initiatives concerned with blockchain, the Internet of things, e-agriculture and e-business standards, and semantic data models.

25.   The Council of Europe assists member States in developing e-governance and supports the introduction of e-participation platforms. It also focused on cybercrime, human rights and the emergence of artificial intelligence.

26.   The European Commission published a report on the anticipated benefits of the European digital single market for businesses and citizens.[27]

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[18] https://www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/about.

[19] https://www.unescap.org/resources/who-connected-social-media-and-digital-divide.

[20] https://www.unescap.org/resources/inclusive-use-broadband-connectivity-quality-education-insights-asia-and-pacific.

[21] https://www.unescap.org/resources/operation-cross-border-terrestrial-fibre-optic-networks-asia-and-pacific.

[22] https://www.unescap.org/sites/default/files/Satellite%20Communications%20in%20Pacific%20Island%20Countries.pdf.

[23] https://www.unescwa.org/events/arab-forum-wsis-sdgs-2019.

[24] https://www.unescwa.org/publications/arab-horizon-2030-digital-technologies-development.

[25] https://www.unescwa.org/publications/digital-sustainable-trade-facilitation-implementation-arab-region.

[26] https://www.unece.org/cefact/.

[27] https://bruegel.org/wp-content/uploads/2019/02/IPOL_STU2019631044_EN.pdf.

27.   The 2019 European Dialogue on Internet Governance explored governance mechanisms for the Internet of things and artificial intelligence, and the role of regulation and public policy in the evolving digital society.[28]

E.   Latin America and the Caribbean

28.   ECLAC acts as the secretariat for eLAC 2020, the region's digital agenda to implement WSIS outcomes. This includes a range of activities concerned with digital access and infrastructure, culture, inclusion and skills, Internet governance, digital transformation and economy, the regional digital market, cyberlegislation, digital government and telework.[29] Preparation of the next two-year agenda, eLAC 2022, is under way.[30]

29.   ECLAC published a report on the regulation of cross-border e-commerce as part of its efforts to promote a regional digital market. It organized the Artificial Intelligence Latin America Summit, with the Massachusetts Institute of Technology to address the need for greater investment in artificial intelligence within the region. It also supported regional activities concerned with big data and the development of digital policies.

30.   ECLAC maintains regional observatories on information society the and broadband to improve understanding of access, use and impact of ICTs.[31]

III.   Implementation and follow-up at the international level

A.   United Nations Group on the Information Society

31.   The United Nations Group on the Information Society is an inter-agency mechanism to coordinate implementation of WSIS outcomes throughout the United Nations system which meets annually during the WSIS Forum.[32] It submitted a report on partnership relating to the Sustainable Development Goals to the year's United Nations high-level political forum on sustainable development.[33]

B.   General Assembly and Economic and Social Council

32.   The Economic and Social Council adopted resolution 2019/24 assessing progress in implementation and follow-up to WSIS outcomes.[34]

33.   The General Assembly adopted resolution 74/197 on information and communications technologies for sustainable development.

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[28] https://www.eurodig.org/fileadmin/user_upload/eurodig_The-Hague/Messages_from_The_Hague_EuroDIG_2019.pdf.

[29] https://conferenciaelac.cepal.org/6/es/documentos/agenda-digital-america-latina-caribe-elac2020.html.

[30] http://comunidades.cepal.org/elac/sites/default/files/2019-07/PROPOSAL%20DIGITAL%20AGENDA%20FOR%20LATIN%20AMERICA%20AND%20THE%20CARIBBEAN%20eLAC2022.docx.

[31] https://www.cepal.org/cgi-bin/getprod.asp?xml=/socinfo/noticias/paginas/8/44988/P44988.xml&xsl=/socinfo/tpl-i/p18f-st.xsl&base=/socinfo/tpl-i/top-bottom.xsl; https://www.cepal.org/es/observatorio-regional-de-banda-ancha.

[32] http://www.ungis.org/.

[33] https://www.ungis.org/Portals/0/documents/HLPF2019/UNGIS-HLPF2019Input.pdf.

[34] https://www.un.org/ga/search/view_doc.asp?symbol=E/RES/2019/24.

C. Commission on Science and Technology for Development

34. The twenty-second session of the Commission on Science and Technology for Development included a high-level round table on the impact of rapid technological change on achievement of the Sustainable Development Goals.[35]

D. Facilitation and coordination of multi-stakeholder implementation

35. The tenth annual WSIS Forum took place in Geneva in April, with a focus on the role of ICTs in achieving the Sustainable Development Goals, especially in priority areas including health, education, employment, gender empowerment and the environment.[36]

36. Over 3,000 participants from some 150 countries took part in more than 300 workshops and other sessions. The Forum's ministerial round table focused on ministerial collaboration in pursuit of Sustainable Development Goal objectives, while high-level dialogues considered scaling digital transformation to support the Sustainable Development Goals, ICT inclusion, the ethics of artificial intelligence, e-waste and indigenous languages. Special discussion tracks addressed ICTs and sport, youth and innovation. Prizes were awarded to recognize excellence among projects in each action line.[37]

37. The WSIS stocktaking platform, maintained by ITU, provides information on more than 12,000 ICT and development activities undertaken by diverse stakeholders across different WSIS action lines.[38] ITU published a global report on stocktaking and a compendium of stocktaking success stories.[39]

38. The Broadband Commission for Sustainable Development, jointly convened by ITU and UNESCO, draws public and private sector partners together to advocate broadband deployment. It published reports on broadband connectivity and coordinated working groups on several issues of interest to its intergovernmental, business and civil society stakeholders.

E. Civil society, business and multi-stakeholder partnerships

39. Many activities that support WSIS objectives are implemented by business, civil society, the academic and technical communities, and multi-stakeholder partnerships.

40. The ICC coordinates WSIS-related activities through its Business Action to Support the Information Society initiative and contributes to international discussions including the IGF and WSIS Forum.[40]

41. The Global System for Mobile Communications Association (GSMA) represents mobile communications businesses. Its Mobile World Congress events, held during 2019 in Barcelona (Spain), Shanghai (China) and Los Angeles (United States of America), are the leading trade shows in the telecommunications sector. Its annual report, *The Mobile Economy*,[41] was published alongside seven regional reports[42] and a separate report entitled

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[35] https://unctad.org/en/pages/MeetingDetails.aspx?meetingid=2026;
https://unctad.org/en/pages/MeetingDetails.aspx?meetingid=2232.

[36] https://www.itu.int/en/itu-wsis/Documents/Forum2019/DRAFT-
WSISForum2019OutcomeDocument.pdf?CB=EJPDHX.

[37] Ibid.

[38] https://www.itu.int/net4/wsis/forum/2019/Files/Outcomes/DRAFT-WSISStocktakingReport2019-
en.pdf.

[39] https://www.itu.int/net4/wsis/forum/2019/Files/Outcomes/DRAFT-
WSISStocktakingSuccessStories2019-en.pdf.

[40] https://iccwbo.org/global-issues-trends/digital-growth/internet-governance/business-action-to-
support-the-information-society-basis/.

[41] https://www.gsmaintelligence.com/research/?file=b9a6e6202ee1d5f787cfebb95d3639c5&download.

[42] https://www.gsmaintelligence.com/research/tags/mobile-economy-series/.

The State of Mobile Internet Connectivity 2019.[43] It also published an assessment of the mobile industry's impact on Sustainable Development Goals.[44]

42.   ISOC provides a forum for the technical and professional Internet community and others concerned with development and maintenance of an open Internet. Its *Global Internet Report* focused on consolidation in the global Internet market.[45] Other work during the year supported community networks,[46] interconnection and peering ecosystems, training and skills development.

43.   The World Wide Web Foundation has proposed principles for improving the impact of the web[47] and hosts the Alliance for Affordable Internet.[48]

44.   Civil society organizations play a prominent part in the WSIS Forum and IGF. IFLA supports access to the Internet through libraries and other public facilities and the skills required by library professionals to support this.[49] APC is an international network of civil society organizations concerned with development, rights and gender. Its flagship *Global Information Society Watch* report explored human rights, social justice and development in the context of artificial intelligence.[50] It also published reports on community-led connectivity, spectrum management and online content regulation.[51]

F.   Facilitation of action lines and selected implementation of activities of United Nations entities

1.   Implementation of action lines

45.   Implementation of WSIS outcomes is aligned with implementation of the 2030 Agenda for Sustainable Development through General Assembly resolutions 70/1 and 70/125.[52]

46.   WSIS agreed 11 action lines for multi-stakeholder implementation of outcomes in 2005. The annual meeting of action line facilitators took place during the WSIS Forum.[53] Facilitators reviewed the WSIS/Sustainable Development Goal matrix which maps and helps coordinate the implementation of action lines against Sustainable Development Goals.[54]

(a)   The role of public governance authorities and all stakeholders in the promotion of information and communications technologies for development (C1)

47.   The value of multi-stakeholder cooperation in support of sustainable development was emphasised at WSIS and in the General Assembly's WSIS+10 review. The importance of multilateral, multi-stakeholder and multidisciplinary involvement in the information society was reiterated in the report of the High-level Panel on Digital Cooperation, which

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[43] https://www.gsmaintelligence.com/research/?file=eb1684470d0bf6c77dfc5720e44ebc6f&download.

[44] https://www.gsmaintelligence.com/research/?file=a60d6541465e86561f37f0f77ebee0f7&download.

[45] https://www.internetsociety.org/globalinternetreport/.

[46] https://www.internetsociety.org/issues/community-networks/.

[47] https://contractfortheweb.org/.

[48] a4ai.org.

[49] https://www.ifla.org/files/assets/faife/publications/policy-documents/public_access_toolkit_final_review_all_partners.pdf.

[50] https://www.giswatch.org/.

[51] https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure; https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure; https://www.apc.org/en/pubs/online-content-regulate-or-not-regulate-question.

[52] http://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf; https://unctad.org/en/PublicationsLibrary/ares70d125_en.pdf.

[53] https://www.itu.int/en/itu-wsis/Documents/Forum2019/DRAFT-WSISForum2019OutcomeDocument.pdf?CB=NK1K63.

[54] https://www.itu.int/net4/wsis/forum/2018/Files/documents/outcomes/WSISForum2018_WSIS-SDGSMatrix.pdf.

considered the wide range of multilateral and multi-stakeholder forums discussing aspects of international cooperation in the information society, and presented its recommendations for future cooperation in *The Age of Digital Interdependence*.[55]

48.   ITU held its quadrennial World Radiocommunication Conference, which focuses on issues of spectrum management.[56] It organized the Artificial Intelligence for Good Global Summit in May, focusing on the potential benefits which may be derived from artificial intelligence for implementing Sustainable Development Goals.[57]

49.   The annual Rights Con conference was held in Tunisia, attended by almost 3,000 participants from over 120 countries, covering a wide range of issues with a particular focus on human rights.[58]

(b)   *Information and communication infrastructure (C2)*

50.   Private sector businesses play the leading role in ICT infrastructure finance and network deployment. The World Bank and other international financial institutions provide support for infrastructure projects in developing regions.

51.   More than 160 countries now have a national broadband plan.[59] The Broadband Commission published its annual report, entitled *The State of Broadband 2019: Broadband as a Foundation for Sustainable Development.* The report noted that, despite increased investment especially in emerging economies, there has been a deceleration in the rate of growth in online users.[60]

52.   ITU works with Governments to support infrastructure deployment,[61] including development of national broadband strategies, communications regulation and management of radio spectrum.[62] ITU has mapped the deployment of broadband connectivity by almost 500 operator networks.[63] The Broadband Commission published a strategy for connecting Africa through broadband, with the aim of achieving universal access by 2030.[64]

53.   GSMA found that over 5 billion people now subscribe to mobile services, with some 3.5 billion using mobile Internet. Smartphones currently make up 60 per cent of these subscriptions, with 43 per cent using fourth-generation technology. More than 9 billion Internet-of-things devices are now connected.[65]

54.   Progress towards the next generation of mobile technology is well under way, with networks launched in 16 countries.[66] An OECD report, *The Road to [Fifth Generation] 5G Networks*, examined the impact of the fifth generation on investment, market structure and digital transformation, drawing on case studies from OECD countries.[67] GSMA considered the foundations required for the fifth generation in sub-Saharan Africa[68] and India.[69]

(c)   *Access to information and knowledge (C3)*

55.   ITU launched a new series of publications and online resources, *Measuring Digital Development*, highlighting facts and figures derived from ITU databases and data from

[55]   https://www.un.org/en/pdfs/DigitalCooperation-report-for%20web.pdf.

[56]   https://www.itu.int/en/ITU-R/conferences/wrc/2019/Pages/default.aspx#

[57]   https://www.seti.org/event/ai-good-global-summit.

[58]   https://www.rightscon.org/program/.

[59]   https://broadbandcommission.org/Documents/SOBB-REPORT%20HIGHTLIGHTS-v3.pdf.

[60]   https://broadbandcommission.org/publications/Pages/SOB-2019.aspx.

[61]   https://www.itu.int/en/ITU-D/Projects/Pages/default.aspx.

[62]   https://www.itu.int/en/ITU-D/Technology/Pages/SMS4DCVersion4.0.aspx.

[63]   https://www.itu.int/en/ITU-D/Technology/Pages/InteractiveTransmissionMaps.aspx.

[64]   https://broadbandcommission.org/Documents/working-groups/DigitalMoonshotforAfrica_Report.pdf.

[65]   https://www.gsmaintelligence.com/research/?file=5a33fb6782bc75def8b6dc66af5da976&download.

[66]   https://www.gsmaintelligence.com/research/?file=b9a6e6202ee1d5f787cfebb95d3639c5&download.

[67]   https://www.oecd-ilibrary.org/docserver/2f880843-en.pdf?expires=1571736526&id=id&accname=guest&checksum=5B0C93D362D5B4026F336E40A80B4E49.

[68]   https://www.gsmaintelligence.com/research/?file=7d4569ab4c1f69b82e9ad8f179ba92ef&download.

[69]   https://www.gsmaintelligence.com/research/?file=ff6b12ab0f6e04939ea041bf86d299ba&download.

national government reports.[70] This replaces the earlier *Measuring the Information Society* report series.

56.   The GSMA *Mobile Gender Gap Report* found that women's mobile phone ownership has increased significantly in low- and middle-income countries, but that women in such countries are still 10 per cent less likely than men to own a phone. This gender gap is largest in South Asia.[71] The principal barriers identified are affordability, lack of literacy and digital skills, perceived lack of relevance, and safety and security concerns. UN-Women published a report titled *Innovation for Gender Equality*[72] and a working paper on leveraging digital finance for gender equality and women's empowerment.[73]

57.   The Alliance for Affordable Internet published the latest in its annual series of *Affordability Reports* on Internet access.[74] IFLA published the second instalment of its *Development and Access to Information* report, focused on five Sustainable Development Goals.[75] The United Nations Educational, Scientific and Cultural Organization (UNESCO) published a report on the value of access to information for sustainable development.[76]

58.   The World Bank is leading the Digital Identification for Development programme, aimed at helping individuals prove their identity and thereby access rights and services. The programme has established 10 principles for maximizing the benefits of identification while maintaining rights.[77]

(d)   *Capacity-building (C4)*

59.   Lack of ICT skills is an important barrier to take-up and effective use of new technology. Gender disparity in science and technology education, employment and leadership received particular attention. The Equals partnership, led by ITU and UN-Women, published a report, *I'd Blush if I Could*, on ways to close the digital skills gap through education.[78] ITU and UNESCO organized a hackathon at the WSIS Forum on solutions for lifelong learning and livelihoods.[79]

60.   ITU Centres of Excellence serve as focal points for ICT professional development, research and knowledge sharing, under the umbrella of the ITU Academy. Following a competitive selection process, 29 new Centres were selected for the period 2019–2022, covering a wide range of technical and policy issues. The ITU Academy also finalized development of its Spectrum Management Training Programme, which will be delivered through the Centres and other academic outlets.[80]

(e)   *Building confidence and security in the use of ICTs (C5)*

61.   The Global Cybersecurity Agenda, led by ITU, provides a framework for coordinating legal, technical, organizational and training needs concerned with cybersecurity.[81] National computer security incident response teams have been established in an increasing number of countries, supported by the Forum of Incident Response and

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[70]   https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2019.pdf.

[71]   https://www.gsmaintelligence.com/research/?file=17ebe22503e597f6e4687365106d6ad6&download.

[72]   https://www.unwomen.org/en/digital-library/publications/2019/03/innovation-for-gender-equality.

[73]   https://www.unwomen.org/en/digital-library/publications/2019/09/discussion-paper-leveraging-digital-finance-for-gender-equality-and-womens-empowerment.

[74]   https://a4ai.org/affordability-report/report/2019/.

[75]   https://da2i.ifla.org/da2i-report-2019/.

[76]   https://unesdoc.unesco.org/ark:/48223/pf0000371485.

[77]   http://pubdocs.worldbank.org/en/332831455818663406/WorldBank-Brochure-ID4D-021616.pdf; https://id4d.worldbank.org/principles.

[78]   https://www.equals.org/single-post/2019/05/23/Id-Blush-if-I-Could-New-Report-by-the-Skills-Coalition.

[79]   https://www.itu.int/net4/wsis/forum/2019/Home/Hackathon.

[80]   https://www.itu.int/en/itu-wsis/Documents/ITUContribution/2019_ITU_Contribution_to_WSIS-Implementation-20190926.pdf.

[81]   https://www.itu.int/en/action/cybersecurity/Pages/gca.aspx.

Security Teams.[82] The UNCTAD Cyberlaw Tracker monitors the implementation of legal frameworks for e-commerce.[83]

62.   The Global Commission on the Security of Cyberspace launched its final report, *Advancing Cyberstability*, at the Paris Peace Forum.[84] This focuses on multi-stakeholder engagement, cyberstability principles and the development and implementation of voluntary norms.

63.   The United Nations held the first meetings of an open-ended working group and of a group of government experts on cybersecurity, which were established by the General Assembly in 2018.[85]

64.   ITU published the third edition of its *Global Cybersecurity Index*, which showed significant improvements including more widespread adoption of national cybersecurity strategies, legislation and response teams, but also demonstrated the need for further action.[86] Microsoft published a global cyber risk perception survey.[87]

65.   The World Economic Forum (WEF) published the *Cybersecurity Guide for Leaders in Today's Digital World*.[88] The United Nations Institute for Disarmament Research launched a global portal on cybersecurity.[89]

66.   The Secretary-General submitted a report to the General Assembly, prepared by UNODC and drawing on information from Member States, which highlighted the need for international cooperation in countering the use of ICTs for criminal purposes.[90] ECE published white papers on the use of distributed ledger technologies to support electronic business and trade facilitation. ISOC launched the Mutually Agreed Norms for Routing Security Observatory to support routing security[91] and focused resources on Internet of things security.[92]

67.   The Broadband Commission's Working Group on Child Safety Online presented its report[93] and opened a Universal Declaration on the subject for signature by diverse stakeholders.[94] UNICEF, Ecpat International and the International Criminal Police Organization are undertaking a 14-country research project, "Disrupting Harm", to research and develop policy approaches to online sexual exploitation and abuse.[95]

(f)   *The enabling environment (C6)*

68.   ITU assists Member States and businesses to develop policy and regulatory frameworks for telecommunications through information-sharing, capacity-building and the provision of regulatory resources.

69.   The annual ITU Global Symposium for Regulators, on the theme of regulation for inclusive connectivity, was attended by more than 300 delegates and focused on the role of

[82]   https://www.first.org/.

[83]   https://unctad.org/en/Pages/DTL/STI_and_ICTs/ICT4D-Legislation/eCom-Global-Legislation.aspx.

[84]   https://cyberstability.org/wp-content/uploads/2019/11/Digital-GCSC-Final-Report-Nov-2019_LowRes.pdf.

[85]   https://www.un.org/disarmament/ict-security/.

[86]   https://www.itu.int/en/ITU-D/Cybersecurity/Documents/draft-18-00706_Global-Cybersecurity-Index-EV5_print_2.pdf.

[87]   https://www.microsoft.com/security/blog/wp-content/uploads/2019/09/Marsh-Microsoft-2019-Global-Cyber-Risk-Perception-Survey.pdf.

[88]   http://www3.weforum.org/docs/WEF_Cybersecurity_Guide_for_Leaders.pdf.

[89]   https://www.sbs.ox.ac.uk/cybersecurity-capacity/content/unidir-cyber-policy-portal.

[90]   https://www.unodc.org/documents/Cybercrime/SG_report/V1908182_E.pdf.

[91]   https://www.internetsociety.org/blog/2019/08/manrs-observatory-monitoring-the-state-of-internet-routing-security/.

[92]   https://www.internetsociety.org/resources/doc/2019/the-economics-of-the-security-of-consumer-grade-iot-products-and-services/.

[93]   https://broadbandcommission.org/Documents/working-groups/ChildOnlineSafety_Report.pdf.

[94]   https://broadbandcommission.org/Documents/working-groups/ChildOnlineSafety_Declaration.pdf.

[95]   https://www.ecpat.org/news/disrupting-harm-new-project/.

regulation in promoting inclusive connectivity.[96] Best practice guidelines were identified and endorsed. Meetings of regional regulatory associations and of private sector chief regulatory officers were held alongside the Symposium.

70. ITU published an expert report on the economic contribution of broadband, digitization and ICT regulation.[97] Web portals have been established on international mobile roaming resources, quality of service, the digital ecosystem and infrastructure development, alongside a new regional regulatory associations portal to share activities and resources across geographic regions.[98]

71. The World Bank's digital development platform focused on the regulatory and governance framework for disruptive technologies,[99] while ISOC, APC and Mozilla made recommendations for innovations in spectrum management to support community networks.[100]

72. The Internet and Jurisdiction Policy Network held its third conference exploring issues of cross-border jurisdiction in relation to content, data and domains.[101] It published a *Global Status Report* and maintains a database of relevant documentation.[102]

73. The UNCTAD Intergovernmental Group of Experts on Competition Law and Policy considered competition issues in the digital economy, and the Intergovernmental Group of Experts on Consumer Protection Law and Policy considered the implications of e-commerce and extended the mandate of its working group on the topic for another year.[103]

(g) *ICT applications (C7)*

E-government

74. The Department of Economic and Social Affairs is gathering evidence for the 2020 edition of the *United Nations E-Government Survey*.[104] This will focus on ways in which digital Government can facilitate integrated policies and service across the economic, social and environmental dimensions of sustainable development. an expert group meeting was organized to explore ways in which the findings of the survey can be leveraged to enhance digital inclusion and engagement.

75. ESCWA has implemented an initiative to foster open Government in the Arab region[105] and introduced a regional assessment tool to measure government electronic and mobile services in 12 countries.[106] WIPO held a conference on the management of public service information for developing countries and the least developed countries.[107]

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[96] https://www.itu.int/en/ITU-D/Conferences/GSR/2019/Pages/default.aspx.
[97] https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/FINAL_1d_18-00513_Broadband-and-Digital-Transformation-E.pdf.
[98] https://www.itu.int/en/itu-wsis/Documents/ITUContribution/2019_ITU_Contribution_to_WSIS-Implementation-20190926.pdf.
[99] http://pubdocs.worldbank.org/en/225781554301401135/DDP-Annual-Review-2018-Final-Web.pdf.
[100] https://www.internetsociety.org/wp-content/uploads/2019/03/InnovationsinSpectrumManagement_March2019-EN.pdf.
[101] https://www.internetjurisdiction.net/event/3rd-global-conference-of-the-internet-jurisdiction-policy-network-june-3-5-2019.
[102] https://www.internetjurisdiction.net/uploads/pdfs/Internet-Jurisdiction-Global-Status-Report-2019-Key-Findings_web.pdf;
https://www.internetjurisdiction.net/publications/retrospect#eyJ0byI6IjIwMTktMTAifQ==.
[103] https://unctad.org/en/Pages/DITC/CompetitionLaw/Intergovernmental-Group-of-Experts-on-Consumer-Protection.aspx.
[104] https://publicadministration.un.org/en/research/un-e-government-surveys.
[105] https://www.unescwa.org/study-fostering-open-government-arab-region.
[106] http://workspace.unpan.org/sites/internet/Documents/GEMS%20Maturity%20Index_ESCWA.pdf.
[107] https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=452130.

E-business

76.   UNCTAD has supported rapid electronic trade readiness assessments in 18 countries[108] and is helping to develop national e-commerce strategies. Its eTrade for all initiative brings together 29 international organizations to reduce knowledge gaps, facilitate interactions to identify requirements and constraints in e-commerce development, and propose appropriate solutions.[109] The first seven "eTrade for Women Advocates" were announced on 24 September 2019, on the margins of the seventy-fourth session of the United Nations General Assembly in New York.[110]

77.   The fifth E-commerce Week, organized by UNCTAD in Geneva, explored the theme "From digitalization to development",[111] while the Intergovernmental Group of Experts on E-commerce and the Digital Economy focused on the value and role of data in e-commerce and the digital economy and their implications for trade and development.[112] A working group was established on measuring e-commerce and the digital economy.

78.   The UNCTAD *Digital Economy Report 2019* focused on value creation and capture for developing economies.[113] ITC and WEF published a road map for action on e-commerce in Africa,[114] while the World Bank developed a road map for a digital single market in east Africa.[115] OECD published a report, *Southeast Asia Going Digital*, on ways to address barriers to access for small and medium-sized enterprises,[116] while ITC presented findings on collaborative business models for small African firms.[117] The ITC She Trades initiative[118] and Refugee Employment and Skills Initiative provide networks and opportunities for women and refugees, respectively.

79.   The WTO *World Trade Report* for 2019, on trade in services, noted continued growth in ICT-enabled services and in trade and employment related platforms.[119] At its Public Forum, the role of regulation was discussed in relation to digitalization and artificial intelligence. Negotiations on trade-related aspects of electronic commerce were launched in January.

80.   The International Monetary Fund published a report titled *The Rise of Digital Money*.[120] ITU published technical reports on various aspects of the digital financial services ecosystem, including regulation and payment infrastructures.[121] GSMA reported on the impact of mobile money on monetary and financial stability in sub-Saharan Africa.

81.   The latest UNIDO *Industrial Development Report* is concerned with industrializing in the digital age.[122] UPU published a global panorama of *The Digital Economy and Digital*

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[108]   https://unctad.org/en/Pages/Publications/E-Trade-Readiness-Assessment.aspx.

[109]   https://unctad.org/en/Pages/DTL/STI_and_ICTs/eTrade-for-All/eTrade-for-All-Organization.aspx.

[110]   https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=2203.

[111]   https://unctad.org/meetings/en/SessionalDocuments/dtl_eWeek2019_summary_en.pdf.

[112]   https://unctad.org/en/Pages/Meetings/Group-of-Experts-Ecommerce-Digital-Economy.aspx.

[113]   https://unctad.org/en/PublicationsLibrary/der2019_en.pdf.

[114]   http://www3.weforum.org/docs/WEF_Africa_EComm_EN.pdf.

[115]   http://documents.worldbank.org/curated/en/809911557382027900/pdf/A-Single-Digital-Market-for-East-Africa-Presenting-Vision-Strategic-Framework-Implementation-Roadmap-and-Impact-Assessment.pdf.

[116]   http://www.oecd.org/going-digital/southeast-asia-connecting-SMEs.pdf.

[117]   http://www.intracen.org/publication/joining-forces-ecommerce/.

[118]   http://www.intracen.org/itc/women-and-trade/SheTrades/.

[119]   https://www.wto.org/english/res_e/booksp_e/05_wtr19_4_e.pdf.

[120]   https://www.imf.org/~/media/Files/Publications/FTN063/2019/English/FTNEA2019001.ashx.

[121]   https://www.itu.int/en/ITU-T/focusgroups/dfs/Documents/09_2016/FINAL%20ENDORSED%20ITU%20DFS%20Introduction%20Ecosystem%2028%20April%202016_formatted%20AM.pdf; https://www.itu.int/en/ITU-T/focusgroups/dfs/Documents/09_2016/Regulation%20and%20the%20DFS%20Ecosystem.pdf; https://www.itu.int/en/ITU-T/focusgroups/dfs/Documents/09_2016/Access%20to%20Payment%20Infrastructures.pdf.

[122]   https://www.unido.org/resources-publications-flagship-publications-industrial-development-report-series/idr2020.

Postal Services[123]and offers assistance to postal services through its Financial Inclusion Technical Assistance Facility, supported by Visa and the Bill and Melinda Gates Foundation.

82.   ECE updated its Trade Facilitation Implementation Guide[124] and worked on a white paper concerned with the support that e-commerce platforms can give to small and medium-sized enterprises engaged in international trade.[125]

E-learning

83.   Many international agencies are concerned with the need for skills development to meet changing employment requirements in the information society.[126]

84.   The UNESCO Mobile Learning Week focused on artificial intelligence for sustainable development, including publication of a synthesis report and summaries of relevant initiatives. [127] UNESCO organized a conference on artificial intelligence and education in partnership with the Government of China.[128]

85.   The Project Connect project, supported by UNICEF, seeks to map the connectivity of schools worldwide. GIGA, a new initiative of UNICEF and ITU, seeks to connect every school to the Internet. It will aggregate demand for connectivity and seek to coordinate private sector funding to address deficiencies.

E-health

86.   The Global Digital Health Partnership coordinates the work of diverse stakeholders concerned with e-health.[129] The Health Data Collaborative seeks to build national capacity to monitor and review progress towards health-related Sustainable Development Goals.[130]

87.   WHO has prepared a draft global strategy on digital health, which seeks to address gaps in health-related Sustainable Development Goals and will be considered for adoption at the 2020 World Health Assembly. The draft strategy prioritizes global collaboration and knowledge transfer, implementation of national digital health strategies, improved governance for digital health and people-centred health systems.[131]

88.   ITU and WHO organized a global conference on networks, standards and innovation in ICT for Health.[132] WHO also released guidelines on digital health interventions aimed at contributing to improvements in health systems.

E-employment

89.   The ILO Global Commission on the Future of Work, led by the President of South Africa and Prime Minister of Sweden, published its final report in January 2019, emphasizing investment in capabilities and the need to develop employment regulations, collective representation and social protections in the digital age.[133] ILO also published a report on *Telework in the Twenty-First Century*.[134]

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[123]   http://www.upu.int/uploads/tx_sbdownloader/theDigitalEconomyAndDigitalPostalActivities AGlobalPanoramaEn.pdf.

[124]   http://tfig.unece.org/.

[125]   https://www.unece.org/info/media/news/trade/2018/uncefact-to-help-smaller-businesses-access-international-trade-through-new-digital-platforms/doc.html.

[126]   https://www.ilo.org/global/topics/future-of-work/publications/WCMS_662410/lang--en/index.htm.

[127]   https://en.unesco.org/mlw.

[128]   https://en.unesco.org/events/international-conference-artificial-intelligence-and-education.

[129]   https://www.gdhp.org/.

[130]   https://www.healthdatacollaborative.org/.

[131]   https://extranet.who.int/dataform/upload/surveys/183439/files/Draft%20Global%20Strategy%20on%20Digital%20Health.pdf.

[132]   https://www.itu.int/en/ITU-T/academia/kaleidoscope/2019/Pages/default.aspx.

[133]   https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_650666/lang--en/index.htm.

[134]   https://www.ilo.org/global/publications/books/forthcoming-publications/WCMS_723395/lang--en/index.htm.

90.   The *World Development Report 2019* of the World Bank focused on the changing nature of work[135] and was supported by a separate report titled *The Future of Work in Africa*. [136] Many organizations, including employers' associations and trades unions, considered the potential impact of the growth of platform businesses, robotics and artificial intelligence on future employment needs and job security.

E-environment

91.   UN-Habitat leads work within the United Nations on issues concerning human settlements. It supports sharing of data between stakeholders in order to maximize the potential contribution of emerging technologies to improve the lived environment and infrastructure management and is seeking to develop agreements between local governments and non-State actors to facilitate this.

92.   ITU organized the fourth meeting of the United for Smart Sustainable Cities Initiative of the United Nations which supports technical innovation in relation to Sustainable Development Goal 11, concerning human settlements.[137] UNDP launched the City2City Network to build the capacity of city governments, particularly in the global South, including capabilities for digital transformation and smart cities.[138] WEF published a report on transforming infrastructure through new technology.[139]

93.   Ten agencies are now collaborating in the United Nations E-Waste Coalition, together with the World Economic Forum and the World Business Council for Sustainable Development.[140] WEF published *A New Circular Vision for Electronics*[141] in support of the Coalition, which will be fully functional in 2020.

94.   ECE promotes information sharing on environmental issues through the Aarhus Convention and the Protocol on Pollutant Release and Transfer Registers. It supports the European Environment Agency's Shared Environmental Information System which seeks to ensure that timely and reliable environmental information is available for evidence-based policy.[142]

95.   The WMO Information System makes extensive use of geospatial and other ICTs to support the priority areas of the Global Framework for Climate Services: agriculture and food security, water, energy, health and disaster risk reduction. The World Meteorological Congress endorsed a new implementation agenda designed to provide a virtual one-stop-shop for weather, water and climate information.[143] The annual facilitation meeting of the action line on e-environment discussed multi-hazard early warning systems, emphasising the need to develop awareness and resilience capacity in vulnerable communities.[144]

E-agriculture

96.   The annual Global Forum for Food and Agriculture focused on the digitalization of agricultural production and productivity.[145] Following this meeting, FAO has worked with the World Bank, the International Fund for Agricultural Development, WTO and other

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[135] http://documents.worldbank.org/curated/en/816281518818814423/pdf/2019-WDR-Report.pdf.

[136] https://openknowledge.worldbank.org/handle/10986/32124.

[137] https://www.itu.int/en/ITU-T/Workshops-and-Seminars/gsw/201910/Pages/programme-05.aspx.

[138] https://city2city.network/.

[139] https://www.weforum.org/reports/transforming-infrastructure-frameworks-for-bringing-the-fourth-industrial-revolution-to-infrastructure.

[140] https://www.ewaste1.com/the-un-is-building-a-coalition-to-combat-the-growing-amount-of-global-e-waste/.

[141] http://www3.weforum.org/docs/WEF_A_New_Circular_Vision_for_Electronics.pdf.

[142] https://www.unece.org/environmental-policy/environmental-monitoring-and-assessment/areas-of-work/shared-environmental-information-system.html.

[143] https://public.wmo.int/en/eighteenth-world-meteorological-congress-cg-18.

[144] https://www.itu.int/en/itu-wsis/Documents/Forum2019/DRAFT-WSISForum2019OutcomeDocument.pdf?CB=EJPDHX.

[145] https://oiebulletin.com/wp-content/uploads/2019/Official2019-1/8-1-1_communique.pdf.

agencies to develop the concept of an international digital council for food and agriculture which can advise Governments and promote multi-stakeholder dialogue.[146]

97.   FAO is reconfiguring the e-Agriculture Community of Practice, which facilitates online knowledge sharing on agriculture and rural development. [147] Its first digital agriculture transformation seminar brought together more than 400 industry leaders to assess opportunities and risks arising from new and future technologies. [148] It has also launched a series of digital innovation dialogue seminars to draw on expertise from industry experts.

98.   GSMA published a study of scalable and sustainable business models for smallholder inclusion in agricultural e-commerce.[149]

E-science

99.   The Commission on Science and Technology for Development considered the role of science, technology and innovation in supporting sustainable and resilient societies, with particular reference to citizen science.[150] It organised a workshop on ways to apply a gender lens to science, technology and innovation at its intersessional panel in January 2019[151] and has subsequently considered space technology.[152]

100.   UNESCO launched the Global Alliance of Open Access Scholarly Communication Platforms to facilitate sharing of scientific information and resources.[153] It also launched an online platform for its Global Observatory of Science, Technology and Innovation Policy Instruments.[154]

101.   FAO, UNEP, WHO, ILO and WIPO collaborate with the International Association of Scientific, Technical and Medical Publishers in the Research for Life programme, which offers access for developing countries to more than 100,000 scientific journals, books and databases.[155]

(h)   *Cultural diversity and identity, linguistic diversity and local content (C8)*

102.   UNESCO promotes implementation of WSIS outcomes concerned with cultural and linguistic diversity, digital heritage and creative industries. Its work in this area is guided by the road map established in its *Global Report 2018: Reshaping Cultural Policies*[156] and *Digital Guidelines*, on cultural expression.[157]

103.   IFLA published guidelines for setting up a digital unification project aimed at ensuring the digital preservation of cultural heritage.[158]

104.   ICANN has developed a new policy process to oversee applications for generic top-level domains, including treatment of geographic names.[159] Its Universal Acceptance

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[146] http://www.fao.org/e-agriculture/news/establishing-international-digital-council-food-and-agriculture.

[147] http://aims.fao.org/activity/blog/e-agriculture-community-practice.

[148] http://www.fao.org/about/meetings/digital-agriculture-transformation/en/.

[149] https://www.gsmaintelligence.com/research/2019/05/ecommerce-in-agriculture-new-business-models/763/.

[150] https://unctad.org/meetings/en/SessionalDocuments/CSTD2019_Issues02_STI_Build.Res.Comm_en.pdf.

[151] https://unctad.org/en/pages/MeetingDetails.aspx?meetingid=2057.

[152] https://unctad.org/meetings/en/SessionalDocuments/CSTD2019-2020_Issues02_Space_en.pdf.

[153] https://en.unesco.org/news/launch-global-alliance-open-access-scholarly-communication-platforms-democratize-knowledge.

[154] https://en.unesco.org/go-spin.

[155] https://www.research4life.org/.

[156] https://en.unesco.org/creativity/global-report-2018.

[157] https://en.unesco.org/creativity/publications/digital-guidelines.

[158] https://www.ifla.org/files/assets/hq/topics/cultural-heritage/documents/guidlines-on-setting-up-a-digital-unification-project.pdf.

[159] https://gnso.icann.org/en/group-activities/active/new-gtld-subsequent-procedures.

Steering Group aims at making all domain names globally accessible in diverse languages and scripts.[160]

(i) *Media (C9)*

105. Issues concerning the changing nature of journalism and its relationship with other media, including social media, were discussed in many forums. There was particular concern over disinformation and misinformation, including the potential risks of technologically enabled fake video in marketing and political processes.

106. UNESCO published a policy report entitled *Steering Artificial Intelligence and Advanced ICTs for Knowledge Societies*, addressing opportunities and challenges for journalism and rights.[161] It also published a handbook for journalists titled *Journalism, "Fake News" and Disinformation*,[162] an assessment of developments in the protection of journalists[163] and a study entitled *Elections and Media in Digital Times*.[164] Assessments of nine countries are under way using the UNESCO Media Development Indicators.[165]

107. The Council of Europe published a study titled *Freedom of Expression in 2018*[166] and agreed a declaration on the financial sustainability of quality journalism in the digital age. It has completed an implementation guide concerned with the protection of journalism and safety of journalists.

(j) *Ethical dimensions of the information society (C10)*

108. The Human Rights Council passed a resolution on new and emerging digital technologies and human rights.[167] The General Assembly and Human Rights Council reiterated the right to privacy in the digital age.[168] The Special Rapporteur on freedom of opinion and expression presented a report on online hate speech.[169]

109. Many organizations have discussed ethical frameworks and principles concerned with artificial intelligence and other frontier technologies.[170] WEF published *Navigating Uncharted Waters*, a road map to responsible innovation for artificial intelligence in financial services.[171] UNESCO is seeking to build understanding of the ROAM principles[172] in relation to artificial intelligence.

110. UNICEF published a comparative report on children's opportunities and risks online in 11 countries and has developed a series of training material concerned with ICT sector responsibilities to balance online opportunities and protection for children.

111. The Council of Europe is completing a handbook on children's rights in the digital environment. UNICEF published a discussion paper titled *Child Rights and Online Gaming*[173] and is working in the Generation Artificial Intelligence partnership to develop policy guidance for stakeholders concerned with the safe and beneficial use of artificial intelligence for children's development.[174] It polled over 170,000 children worldwide to improve understanding of their perceptions of their experiences online and held a workshop with WEF on standards for artificial intelligence as these relate to children.

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[160] https://uasg.tech/2019/10/are-the-worlds-top-websites-truly-accessible-for-global-audiences/.
[161] https://en.unesco.org/system/files/unesco-steering_ai_for_knowledge_societies.pdf.
[162] https://en.unesco.org/fightfakenews.
[163] https://unesdoc.unesco.org/ark:/48223/pf0000371487.
[164] https://unesdoc.unesco.org/ark:/48223/pf0000371486.
[165] https://en.unesco.org/programme/ipdc/initiatives/mdis.
[166] https://www.coe.int/en/web/portal/-/freedom-of-expression-report-assesses-the-situation-in-2018.
[167] https://documents-dds-ny.un.org/doc/UNDOC/LTD/G19/208/64/PDF/G1920864.pdf?OpenElement.
[168] https://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/73/179; https://documents-dds-ny.un.org/doc/UNDOC/LTD/G19/282/23/PDF/G1928223.pdf?OpenElement.
[169] https://www.ohchr.org/Documents/Issues/Opinion/A_74_486.pdf.
[170] For example, https://link.springer.com/article/10.1007/s11023-018-9482-5.
[171] http://www3.weforum.org/docs/WEF_Navigating_Uncharted_Waters_Report.pdf.
[172] See para. 126 below.
[173] https://www.unicef-irc.org/files/upload/documents/UNICEF_CRBDigitalWorldSeriesOnline_Gaming.pdf.
[174] https://www.unicef.org/innovation/GenerationAI.

(k)   International and regional cooperation (C11)

112.   The High-level Panel on Digital Cooperation presented its report, together with proposals for strengthening cooperation in the digital space among Governments, the private sector, civil society, international organizations, academia, the technical community and other relevant stakeholders.[175]

113.   The fourth Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals considered the role of science, technology and innovation in facilitating inclusiveness and equality, with a focus on employment and economic growth, climate change, peace and justice.[176] Developments concerning ICTs were also highlighted during the 2019 high-level political forum on sustainable development under the Economic and Social Council, which focused on empowerment, inclusiveness and equality.[177]

2.   Implementation of themes

(a)   Financing mechanisms

114.   Private investment is the main source of ICT sector finance. Several ICT businesses are now among the largest global corporations, investing in new technologies, including artificial intelligence, as well as new approaches to enabling connectivity.

115.   The World Bank's Digital Development Partnership provides a platform for public and private sector cooperation on infrastructure.[178] The Bank has committed $25 billion to connect all African Governments, businesses and citizens to high-speed broadband by 2030, representing one quarter of the total cost requirements estimated for this purpose by the Broadband Commission's working group on connecting Africa through broadband.[179] A new tranche of Digital Development Partnership funding was launched in August.

116.   The United Nations Secretary-General's Task Force on Digital Financing of the Sustainable Development Goals presented an interim report which suggested that digitalisation could facilitate more effective targeting of financial resources for citizens' needs and the Sustainable Development Goals, but that this would require innovations in commercial practice and in governance.[180]

(b)   Internet governance

Enhanced cooperation

117.   The Tunis Agenda for the Information Society called for enhanced cooperation to enable Governments to carry out their roles and responsibilities, on an equal footing, in international public policy issues pertaining to the Internet.[181] The General Assembly noted the work of the Working Group on Enhanced Cooperation of the Commission on Science and Technology for Development and the need for continued dialogue and work on the implementation of enhanced cooperation as envisioned in the Tunis Agenda.[182]

Internet Governance Forum

118.   The fourteenth annual IGF was held in Berlin in November 2019 with the overarching theme of "One World, One Net, One Vision" and a secondary focus on data governance, digital inclusion, and safety, security, stability and resilience.

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[175] See https://digitalcooperation.org/, section D.

[176] https://sustainabledevelopment.un.org/TFM/STIForum2019.

[177] https://sustainabledevelopment.un.org/hlpf/2019.

[178] http://pubdocs.worldbank.org/en/225781554301401135/DDP-Annual-Review-2018-Final-Web.pdf.

[179] https://broadbandcommission.org/workinggroups/Pages/WG2-2018.aspx.

[180] https://digitalfinancingtaskforce.org/wp-content/uploads/2019/09/Task-Force-CoChair-Interim-Report.pdf.

[181] https://www.itu.int/net/wsis/docs2/tunis/off/6rev1.html.

[182] https://undocs.org/en/A/RES/74/197.

119. The IGF Multi-stakeholder Advisory Group worked during the year to introduce new approaches to its programme and activities in light of the Secretary-General's recommendations and discussions at the 2018 IGF.[183] Multi-stakeholder Advisory Group working groups considered long-term improvements to the IGF, fundraising and outreach.

120. Some 5,000 participants registered for the IGF, in person and/or online. A range of issues was discussed, including trust in the cybersecurity context, the future of work, data protection, digital inclusion, human rights, emerging technologies and the role of digital technologies in delivering the Sustainable Development Goals. Outcomes of the IGF were summarised in IGF messages.

121. Intersessional work was undertaken by 18 "dynamic coalitions" and by four best practice fora – concerned with cybersecurity, local content, gender and access, and big data, the Internet of things and artificial intelligence – between the 2018 and 2019 IGFs.[184] Dynamic coalitions have adopted common work standards to support their contribution to the IGF. There are now more than 120 national, regional and youth IGFs, constituted into a network which reports formally to the global IGF.[185]

(c)   *Measuring ICT for development*

122. The Partnership on Measuring ICT for Development is a collaboration between 14 United Nations and other agencies concerned with data collection and analysis. Its Task Group on ICT for Sustainable Development Goals, led by the Department of Economic and Social Affairs and ITU, finalized a thematic list of ICT indicators in relation to the Sustainable Development Goals, to be implemented alongside the global Sustainable Development Goal indicator framework. These indicators cover 27 Sustainable Development Goal targets, including the business use of ICTs, e-government, e-waste and education. The list will be presented to the United Nations Statistical Commission during 2020. The Partnership also presented a report to the high-level political forum on cross-cutting issues of ICT for sustainable development.[186]

123. ITU maintains the World Telecommunication/ICT Indicators Database, which includes more than 180 indicators from over 200 economies.[187] It has replaced its *Measuring the Information Society* series of reports with a new series of publications and online resources, *Measuring Digital Development*, which presents information from the Database and other sources, highlighting key findings.[188]

124. The GSMA Mobile Connectivity Index measures mobile infrastructure, affordability, consumer readiness, content and services in over 150 countries.[189]

125. UNCTAD will hold the first meeting of a new Working Group on Measuring E-commerce and the Digital Economy in December 2019.[190]

126. UNESCO published its framework of Internet Universality Indicators, based around its ROAM principles concerned with rights, openness, accessibility for all and multi-stakeholder participation, together with guidelines for multi-stakeholder implementation.[191] The quantitative and qualitative indicators in the framework have been designed to enable systematic analysis of national Internet environments. Several national studies have been undertaken using the indicators, the first of which were presented at the IGF.

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[183] https://www.un.org/sg/en/content/sg/speeches/2018-11-12/address-internet-governance-forum.
[184] https://www.intgovforum.org/multilingual/content/thematic-intersessional-work.
[185] https://www.intgovforum.org/multilingual/content/igf-regional-and-national-initiatives.
[186] https://sustainabledevelopment.un.org/content/documents/21939ITU_Partnership_measuring_ICT4D_input_for_HLPF_2019_Final.pdf.
[187] https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.
[188] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2019.pdf.
[189] https://www.mobileconnectivityindex.com/.
[190] https://unctad.org/en/Pages/MeetingDetails.aspx?meetingid=2259.
[191] https://unesdoc.unesco.org/ark:/48223/pf0000367617.

IV. Findings and suggestions

127. Fifteen years have passed since the international community set out its WSIS vision of a people-centred, inclusive and development-oriented information society. Much has happened since then. Access to ICTs has grown much more rapidly than that in services, such as electricity and sanitation, but not rapidly enough to ensure that everyone can benefit. Digital divides inhibit ICTs from achieving their full development potential. Nevertheless, ICTs have become pervasive in many areas of economic and social life, in both developed and developing countries, enabling improvements in the quality and productivity of public services and commercial enterprise. ICTs are recognized as important catalysts for delivering the Sustainable Development Goals, but the international community remains a long way from fulfilling the objective in them of achieving universal and affordable access for all, including the least developed countries.[192]

128. The nature of the information society continues to change dramatically. The Internet and social media have become fundamental to the lives of those who are online, but even those who are not personally connected are increasingly affected by the growing prevalence of ICTs in Government and business. Many of the technologies, products and services that dominate the current information society were in their infancy at WSIS, including social networking and cloud computing, big data and the Internet of things. Seven of the eight largest companies in the world today, by market capitalization, are data management companies that have grown rapidly since WSIS. Their reach extends beyond their origins in software and the Internet, to frontier technologies that are setting the stage for the evolving information society, including artificial intelligence, machine learning, robotics and quantum computing.

129. The world in which the current information society is emerging is complex and experiencing many and diverse developments. The review of progress towards achievement of the Sustainable Development Goals by the Department of Economic and Social Affairs identified some of the major challenges facing the world community, including weakening global economic growth, rising income inequality, unabated global warming and escalating conflict. Technological advances were identified as the best hope for accelerating progress in the face of these constraints.[193] These include not only digital technology but also other innovative sectors, such as biomedicine, genetics, nanotechnology and renewable energy.

130. Many lessons have been learned since WSIS, not least that the opportunities proffered by ICTs are accompanied by risks. Cybersecurity has become a major preoccupation for governments, businesses and citizens. Many are anxious about changes that are taking place in their societies, including the impact of automated systems on employment, loss of privacy, and the growing use of algorithms to make decisions that affects their lives. The impact of social media and the risks of disinformation and misinformation in politics and journalism are increasingly contentious. There has been a proliferation of proposals for ethical frameworks for the digital age, particularly concerning frontier technologies such as artificial intelligence, and increased attention to the balance needed between multilateral, multisectoral and multi-stakeholder approaches to maximizing the opportunities and risks ahead.

131. The United Nations General Assembly agreed in its 10-year review of WSIS in 2015 that the United Nations should review the outcomes of WSIS again, after 20 years, in 2025. Halfway between these dates, the rapid pace of technological development has made clear that the current understanding of the information society will be further transformed by 2025. People are living, as the High-level Panel on Digital Cooperation put it, in "an age of digital interdependence", which requires continuous analysis of trends in technology and use of ICTs and new approaches to their deployment and governance aimed at maximizing benefits and minimizing risks.

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[192] See https://sustainabledevelopment.un.org/post2015/transformingourworld, Goal 9.c.
[193] https://www.un.org/development/desa/dpad/publication/sustainable-development-outlook-2019-gathering-storms-and-silver-linings/.

132.   The original WSIS 10-year targets received their final review in 2015,[194] but new and broader goals have been established, by United Nations agencies and other international bodies, since then for connectivity, for developmental impact through the Sustainable Development Goals and for other areas affected by ICTs, from the environment to trade and conflict prevention. One constant in this rapidly changing context, however, has been the WSIS vision of a "people-centred, inclusive and development-oriented information society".

133.   Hopes placed in new technology will only be realized through dialogue and cooperation between the information society and other areas of international governance. The United Nations has a central role to play in this. In five years' time, when the United Nations General Assembly reviews outcomes from WSIS, it will also need to look forward, in the light of the information society of the day, to identify ways of bridging persistent digital divides, maximizing the benefits of the information society, minimizing the risks that have become identified with it and leveraging ICTs to address the broader global challenges being faced. It will be particularly important for Governments and development partners to facilitate digital development in countries that are at risk of competitive disadvantage in the growing digital economy, to ensure that all countries, including the least developed countries, participate in future growth.

134.   Achieving a forward-looking outcome from the 20-year review of WSIS will require much more extensive evidence about the impact of ICTs in different sectors and geographic contexts, foresight into the implications of frontier technologies and partnership between Governments, businesses and other stakeholders. The work to generate that evidence, secure that foresight and build those partnerships will be a priority for the United Nations system over the next five years.

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[194] https://www.itu.int/en/ITU-D/Statistics/Documents/publications/wsisreview2014/WSIS2014_review.pdf.