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## Seventy-fourth session

Item 20 (b) of the provisional agenda\*

### Globalization and interdependence

## Science, technology and innovation for development

### Report of the Secretary-General

#### *Summary*

The present report, submitted pursuant to General Assembly resolution [72/228](#), provides information on the implementation of the resolution, in particular through the work of the Commission on Science and Technology for Development, the United Nations Conference on Trade and Development and other relevant United Nations organizations. In the report, the Secretary-General discusses the impact of new and emerging technologies on sustainable development; showcases lessons learned and good practices from developing countries in strengthening their capacity in the area of science, technology and innovation; highlights findings from high-level policy discussions and research on science, technology and innovation as an enabler of sustainable development at the national, regional and global levels; discusses the review of progress made in implementing the outcomes of the World Summit on the Information Society; and highlights initiatives to strengthen the science-policy interface within the United Nations and enhance global support mechanisms for science, technology and innovation.

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\* [A/74/150](#).



## I. Introduction

1. The present report is submitted pursuant to General Assembly resolution [72/228](#).
2. In its resolution [72/228](#), the General Assembly recognized the role that science, technology and innovation can play in development and in addressing global challenges, and reaffirmed its commitment to support better coordination and coherence on development priorities in this field.
3. The General Assembly expressed concern that many developing countries lacked affordable access to information and communications technologies (ICT) and emphasized the need to effectively harness technology to bridge the digital divide within and between countries. The Assembly also underscored the opportunities and challenges presented by rapid technological change.
4. The General Assembly requested the Commission on Science and Technology for Development to continue its science, technology and innovation activities and, as the focal point for the system-wide follow-up to the outcomes of the World Summit on the Information Society (see [A/C.2/59/3](#) and [A/60/687](#)), to continue to assist the Economic and Social Council.
5. The General Assembly encouraged the United Nations Conference on Trade and Development (UNCTAD), in collaboration with relevant partners, to continue to undertake reviews of science, technology and innovation policy to assist developing countries in integrating such policies into their national development strategies.
6. The General Assembly urged Governments to mainstream a gender perspective in legislation, policies and programmes to facilitate full and equal access to and participation in science, technology and innovation for women of all ages.
7. The General Assembly encouraged Governments to foster investment and promote the involvement of the business and financial sectors in the development of environmentally sound technologies. Governments were encouraged to explore ways and means of conducting national, regional and international technology assessment and foresight exercises on existing, new and emerging technologies to evaluate their development and mitigate potential negative effects and risk. Governments were encouraged to support policies that increase financial inclusion and deepen the sources of financing towards innovations for the Sustainable Development Goals.
8. The General Assembly encouraged the international community to support the increase in the availability of data for measuring national innovation systems and to support empirical research on innovation and development. The Assembly also encouraged enhanced capacity-building support for developing countries, the promotion of regional, subregional and interregional joint research and development projects and support for science, technology and innovation partnerships with developing countries in education, business opportunities, infrastructure and technical advice.
9. In the present report, the Secretary-General highlights findings from high-level policy discussions on ways of harnessing science, technology and innovation for achieving sustainable development. He showcases lessons learned and good practices from developing countries in strengthening their capacities in the area of science, technology and innovation and summarizes discussions concerning the review of progress made in implementing the outcomes of the World Summit on the Information Society. He also highlights initiatives to enhance global support mechanisms for science, technology and innovation.

## II. Science, technology and innovation for achieving sustainable development

10. The Commission on Science and Technology for Development serves as a forum for strategic planning, sharing lessons learned and providing foresight about trends in science, technology and innovation in key sectors of the economy, as well as drawing attention to emerging technologies.

11. At its twenty-first session, the Commission considered the priority themes “Building digital competencies to benefit from existing and emerging technologies, with a special focus on gender and youth dimensions” and “The role of science, technology and innovation in increasing substantially the share of renewable energy by 2030”. At its twenty-second session, it considered the priority themes “The impact of rapid technological change on sustainable development” and “The role of science, technology and innovation in building resilient communities, including through the contribution of citizen science”.

### A. Impact of rapid technological change on the achievement of the Sustainable Development Goals

12. In response to General Assembly resolutions [72/242](#) and [73/17](#), the Commission discussed how rapid technological change could contribute to sustainable development. For example, genetic modification, methods for improving soil fertility and irrigation technologies can increase food availability. New and emerging technologies, including synthetic biology, artificial intelligence and tissue engineering, have potential implications for the future of crop and livestock agriculture. Frontier technologies could be used to address formerly intractable challenges to human health, including through the more effective deployment of interventions, the monitoring and assessment of health-related indicators and the development of gene editing techniques. Frontier technologies are also reshaping the potential for the generation and storage of renewable energy through sensors and machine learning that can maximize generation efficiency. Other prominent examples include Industry 4.0 and smart manufacturing for economic development, digital technologies for social inclusion and new digital platforms to expand access to quality education.

13. While the application of new technologies represents an opportunity to address the Sustainable Development Goals, such applications also pose new challenges, as they can disrupt economic development, exacerbate social divides and raise ethical questions. In the *Technology and Innovation Report 2018*,<sup>1</sup> a number of recent estimates of the impact of automation on jobs are reviewed. The results vary widely, but the impact of the report will depend on a range of factors, including levels of industrialization, skills and the role played by a country in international value chains.

14. Rapid technological change has the potential to perpetuate divides within and between countries, including between women and men, rural and urban populations and rich and poor communities. For example, only 12 per cent of leading machine-learning researchers are women, and with fewer women in the science, technology, engineering and mathematics fields, they are less likely to benefit from new jobs created by frontier technologies. Rapid technological change also poses challenges for legal, social and cultural norms regarding such issues as the integrity of human life, privacy, security and the prevention of new forms of discrimination.

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<sup>1</sup> United Nations publication, Sales No. E.18.II.D.3.

15. Without appropriate policies, technologies, whether old or new, are unlikely to deliver progress on the global development agenda. The Commission discussed various policies and strategies for building and managing effective innovation systems to harness rapid technological change for sustainable development, including aligning science, technology and innovation policies with national development priorities and the Sustainable Development Goals, developing technology-specific strategies, managing the potentially disruptive effects of rapid technological change and closing digital divides. Regional and international cooperation and multi-stakeholder partnerships can also advance rapid technological change for sustainable development. The discussion was focused on the potential of global research collaboration and multi-stakeholder initiatives for advocacy and collaborative research and development.

16. The Commission encouraged Governments to continue to consider the impact of rapid technological change on the achievement of the Sustainable Development Goals and to conduct technology assessment and foresight exercises with a view to fostering structured debate among all stakeholders towards creating a shared understanding of the implications of rapid technological change. Governments were encouraged to consider engaging in an inclusive global discourse about all aspects of rapid technological change and its impact on sustainable development.

## **B. Building digital competencies, with a special focus on gender and youth dimensions**

17. New technologies increase the demand for digital skills and competencies. At the same time, developing countries are experiencing higher numbers of young people entering the labour market and a widening gap between their knowledge, skills and abilities and those sought by employers. Furthermore, the share of women in specialist ICT occupations remains low, especially in developing countries. This underlines the importance of addressing the gap in capabilities across and between countries, sectors and segments of society so that societies can adapt and benefit from technological changes.

18. Digital competencies, in addition to the technical knowledge and skills required to use ICT, encompass the cognitive, social and emotional aspects of working and living in a digital environment. The Commission discussed new and emerging technologies that can help to build digital skills and competencies, including massive open online courses, open access to scientific literature and educational resources and technology-mediated teaching and learning. Examples of case studies included the Digital Doorway programme in South Africa, which provides women in remote rural areas with access to ICT for obtaining agricultural information, and media centres in Brazil that provide e-learning technologies and complementary human interaction for children in remote communities.

19. In addition, countries could consider incorporating digital competencies into the education system, with a special focus on encouraging girls to build intermediate and advanced digital skills. Digital skills development can also be enhanced through the creation of an enabling environment, including through investment in digital infrastructure, policy and institutional development and multi-stakeholder and international collaboration.

### C. Role of science, technology and innovation in increasing the share of renewable energy by 2030

20. Universal energy access and increased renewable energy are likely to have largely positive impacts with regard to the achievement of several of the Sustainable Development Goals. Those impacts include the development of modern infrastructure to reduce poverty, the lessening of health risks associated with the use of traditional biomass, a reduction in the amount of time women and girls spend gathering wood, increased flexibility for other activities, the fostering of innovation and the mitigation of the effects of greenhouse gases.

21. Inclusive access to electricity can lead to significant improvements in livelihoods, owing not only to the electrification of homes, schools and hospitals, but also to the productive use of electricity. It can create new income-generating opportunities and increase the productivity of existing activities in agriculture, retail and other types of businesses. Whether grid-based or off-grid, affordability is a major challenge for increasing access to electricity. Even if grid access is available, high connection charges can limit the ability of poor rural communities to connect. Therefore, electrification strategies in some settings cannot rely on market solutions.

22. The Commission discussed key issues in the innovation and deployment of renewables, including market and policy challenges. Technological innovation can be accelerated by both competition and cooperation, for example through international innovation chains. The example of solar photovoltaic panels shows that innovation dynamics are highly international, with drivers in one country having the potential to significantly affect others. The systemic nature of innovation in the area of renewables requires the creation of clear market demand for renewable products, as well as a mix of supporting policies to stimulate research and development, coordinate actors and infrastructure, align regulations and incentives such as subsidies, feed-in tariffs and auctions and mobilize funding.

23. Several countries shared their experiences in integrating renewables into their grid infrastructure. Demand-side flexibility in the system is required to keep costs low, which may stimulate innovation in supporting technologies like smart grids and storage. Those technologies can play a key role in managing and shifting demand loads to help in balancing the variable output of renewables. There is also an important potential convergence of electricity systems with digital technologies.

24. The Commission encouraged countries to increase support for research and development in the field of renewable energy technologies and to improve policy coordination and coherence with sectoral policies. Renewable energy policies should be incorporated into national development strategies, promoting a systematic approach to innovation to stimulate research and development, build skills, ensure affordability and create a regulatory environment for increasing the share of renewables.

25. The Economic and Social Council, in its resolution [2018/29](#), recommended that the Commission identify mechanisms for improving capabilities in developing countries for renewable energy, including capabilities to develop policies, flexible plans and regulations and measures to improve capabilities to absorb, maintain and adapt renewable energy technologies to the local context.

## **D. Role of science, technology and innovation in building resilient communities, including through the contribution of citizen science**

26. The Commission discussed the role of science, technology and innovation in building resilient communities. Digital technologies have empowered and given voice to people. Innovation results in economic diversification, which increases the ability of economies to adapt to shocks, and new technologies are used for resource management and could help to decouple economic development from environmental degradation. A new development is citizen science, which uses new technologies to engage volunteers in carrying out such tasks as data collection in support of science.

27. The Commission discussed critical technical, social and market challenges. Some key issues relate to data and underlying enabling technologies and the need for the prudent use of data acquired during citizen science projects. Social challenges relate to knowledge generation and use, given that resilience is not neutral but reflects social norms and competing interests within a community. The scalability and sustainability of technological solutions are also important, as many are implemented only as prototypes. Another key issue is the need to develop science, technology and innovation solutions that are themselves resilient, since disruption can be extremely harmful to communities.

28. Resilience projects that use new technologies must be designed with respect for local cultures and key leaders must be identified and worked with as champions. It is important to adopt measures to prevent the misuse of citizen science data. Sharing knowledge and experience across countries can help to improve outreach aimed at bringing science, technology and innovation to marginalized groups through grass-roots actors and initiatives.

29. The Commission discussed factors that affect the sustainability of citizen science projects, including the alignment of the interests of scientists and citizens in the project, and also discussed the proper provision of feedback to citizens in order to keep them engaged. National bodies for scientific and technological culture have been active in implementing initiatives for dialogue on science. Certain initiatives were designed to promote open spaces for public debate about the production of scientific knowledge, including the organization of events to mobilize the communities involved in citizen science and showcase their experience and projects.

30. The Commission also discussed the importance of combining different sources of knowledge, including indigenous and traditional knowledge, in order to provide useful solutions for building resilient communities that took into consideration the capacity, resources and needs of communities. The Commission noted several national programmes in support of indigenous knowledge, including initiatives to employ indigenous people to monitor ecological health, maintain cultural sites and protect biodiversity.

31. The Commission encouraged countries to design and implement science, technology and innovation policies and other relevant policies to make them responsive to building resilient communities.

## **E. Considerations in applying science, technology and innovation in sustainable development**

### **Applying a gender lens to science, technology and innovation**

32. As the only functional commission of the Economic and Social Council with a Gender Advisory Board, the Commission on Science and Technology for Development continues to work on analysing the gender implications of applying

innovation and knowledge for sustainable development. The Board identifies and highlights the gender dimensions of the annual priority themes of the Commission through contributions at the intersessional and annual Commission meetings and by way of panels to explore issues for each theme, contributions from Commission members, expert contributions and participation in discussions.

33. The Gender Advisory Board identified and raised awareness of the need for increasing women's participation in science, technology, engineering and mathematics, which are driving rapid technological change, and for women to participate in the policy decisions and creation of research and development agendas. The Board also advocates access to technology, participation in priority-setting and a better understanding of the different roles and specific needs of women. Through collaboration with GenderInSITE, the Board has developed strong connections to the global science community in its work with organizations such as the International Science Council, the InterAcademy Partnership, the World Academy of Sciences for the advancement of science in developing countries and the Organization for Women in Science for the Developing World.

34. In January 2019, in support of the work of the Commission on Science and Technology for Development and the Commission on the Status of Women, UNCTAD, the United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women) and the Government of Austria organized a workshop on the theme "Applying a gender lens to science, technology and innovation" to coincide with the 2018–2019 intersessional panel of the Commission on Science and Technology for Development. Workshop participants discussed gender perspectives in science, technology and innovation and examined opportunities for gender-responsiveness in those areas. The findings and recommendations of the workshop were presented to the Commission at its twenty-second session and made available to the Commission on the Status of Women at its sixty-third session as contributions to the preparatory process for the twenty-fifth anniversary of the Fourth World Conference on Women and the Beijing Declaration and Platform for Action.

#### **Improving the capacity to foresee the evolution and impact of frontier technologies**

35. The Commission encouraged countries to undertake strategic foresight initiatives on global and regional challenges at regular intervals and to cooperate towards the establishment of a system to review and share technology foresight outcomes, including pilot projects, making use of existing regional mechanisms and collaborating with relevant stakeholders.

36. The Commission also encouraged countries to use foresight to promote debate among all stakeholders with a view to creating a shared understanding of long-term issues, such as the changing nature of work, and building a policy consensus to meet demands for competence and adaptation to change. In its resolution [2018/29](#), the Economic and Social Council had recommended that the Commission explore ways and means of conducting international technology assessment and foresight exercises on existing, new and emerging technologies and their implications for renewable energy and digital competency, including discussions about models of governance for new areas of scientific and technological development.

#### **Innovative financing models enabling innovation for the Sustainable Development Goals**

37. Innovative financing models, such as impact investment, can attract new stakeholders, innovators and sources of investment for science-, technology-, engineering- and innovation-based solutions for achieving the Sustainable

Development Goals. Impact investment could fund science, technology and innovation, given its social and environmental orientation, although it has been focused mainly on developed countries and mature private companies. Crowdfunding offers potential but exists mainly in developed countries, as does impact investment, is focused mainly on social and artistic causes and real estate activities, largely takes the form of donations, rewards and pre-selling and is relatively small in scale.

38. At the same time, innovation and technology funds financed by the public sector, international donors, development banks or the private sector have become an important instrument for innovation funding in developing countries. They can be introduced relatively quickly, are flexible in design and operation and can be used to target particular industries, activities or technologies and support strategic goals.

39. The Commission encouraged countries to support policies that increase financial inclusion, deepen the sources of financing and direct investments towards innovations that address the Sustainable Development Goals. The Economic and Social Council, in its resolution 2018/29, had recommended that the Commission explore innovative financing models and other resources contributing to enhancing the capacities of developing countries in collaborative projects and initiatives in science, technology and innovation.

#### **Harnessing international, regional and multi-stakeholder cooperation on science, technology and innovation for sustainable development**

40. In order to strengthen South-South collaboration in the areas of science, technology and innovation, the Commission collaborated with the Government of China on a new set of training courses. In 2018, two such courses were held in China, on science, technology and innovation policy and management for sustainable development and on high-tech park and incubator development. More than 30 experts and policymakers from member countries of the Commission took part in the training programmes. The training included a mix of practical lectures and field visits in Guangzhou and the Wuhan Optics Valley. The collaboration will continue in 2019, with two further training courses and a young scientists programme on which 24 scientists from developing member countries of the Commission will work in China for between 6 and 12 months, exchanging experience and knowledge.

41. UNCTAD has sought to strengthen the collaboration between the Commission and the regional commissions and other stakeholders. In 2018, UNCTAD representatives gave a number of briefings on the work of the Commission, including at meetings of the Economic and Social Commission for Asia and the Pacific and of the International Federation for Information Processing. During the Science Forum South Africa in December 2018, a session on the priority themes of the Commission was organized to gather inputs from the region.

### **III. Building capacity for science, technology and innovation**

#### **A. Transformative science, technology and innovation policymaking that advances the sustainable development agenda**

42. In 2018, UNCTAD initiated science, technology and innovation policy reviews in Ethiopia, Panama and Uganda. Those reviews provided support for national Governments to integrate policies for science, technology and innovation into their national development strategies while working towards the Sustainable Development Goals. Preliminary findings of the three reviews were presented to the Commission.

43. The preliminary findings included the need for development strategies to leverage science, technology and innovation in the development of productive capacities for industry, manufacturing and services and in the development of competitive higher-value-added activities and more complex export products. There was a need for policy coherence across major areas of development policy, including science, technology and innovation policy and industrial policy, in order to accelerate development.

44. Functional innovation systems are a key element in creating comparative advantages in priority activities and industries. They are essential for channelling innovative and entrepreneurial energy to address the 2030 Agenda for Sustainable Development and national development plans, especially those related to inclusiveness, gender, jobs, and industrialization and innovation.

45. The experience of UNCTAD in implementing such reviews shows the need for a broadly shared approach to innovation policy for development among policymakers and other stakeholders. The preliminary findings noted an imbalance in policy practice in that a predominantly science-push linear model of the innovation process presents obstacles to the broadly systemic approach to innovation policy called for in the 2030 Agenda. Capacity-building activities are needed to strengthen the capabilities of organizations with relevant mandates in the fields of science, technology and innovation in order to effectively design, implement, monitor and assess policies and programmes to harness science, technology and innovation for the Sustainable Development Goals.

46. UNCTAD launched a framework for science, technology and innovation policy reviews: harnessing innovation for sustainable development to assist countries in aligning policies with their development strategies while promoting sustainable development and the achievement of the Sustainable Development Goals. The framework builds on the established approach of addressing the fundamental issue of how science, technology and innovation can support the economic development goals of growth, higher productivity, structural transformation and economic diversification. It also serves to enhance the integration of considerations regarding inclusiveness and environmental sustainability in providing directionality to science, technology and innovation policies and in broadening the range of actors and stakeholders whose involvement needs to be secured for science, technology and innovation policies to deliver outcomes conducive to the implementation of the 2030 Agenda.

## **B. International intellectual property system**

47. Intellectual property is a critical component of innovation and technological development, as it helps to set the incentive structure for the world's innovators who create new technologies and processes that improve lives. The UNCTAD secretariat implements a work programme on the development dimensions of intellectual property rights in response to a mandate from member States at the fourteenth session of UNCTAD, held in Nairobi in 2016, and to requests contained in the development agenda of the World Intellectual Property Organization (WIPO) and World Health Assembly resolution 61.21 on the Global Strategy and Plan of Action on Public Health, Innovation and Intellectual Property. Through the intellectual property programme, UNCTAD conducts research and analysis on trade and development aspects of intellectual property, provides request-based technical assistance and facilitates consensus-building in international discussions on issues at the interface of investment and intellectual property.

48. The programmes and services of WIPO are used to promote an effective intellectual property system that promotes innovation and creativity and supports the flow of knowledge and technical expertise within and among countries. WIPO assists the Member States in the development, formulation and implementation of national intellectual property and innovation strategies that address the specific needs, priorities, challenges and level of development of countries, with due attention to the requirements of the least developed countries. Those strategies strengthen the establishment of national ecosystems that enable countries to access and generate innovative technologies. WIPO, in cooperation with national and regional industrial property offices, supports the establishment and development of technology and innovation support centres, which are designed to provide innovators in developing countries with access to locally based high-quality technology information and related services. Over 750 such centres have been established worldwide, helping innovators to exploit their potential and create, protect and manage their intellectual property rights.

49. The Access to Research for Development and Innovation programme of WIPO provides free or low-cost access to around 7,700 subscription-based scientific and technical journals and 22,000 e-books and reference works to over 1,600 registered institutions in 105 developing and least developed countries through a public-private partnership with leading publishers. Similarly, its Access to Specialized Patent Information programme provides free or low-cost access to commercial patent search and analytical services to over 120 registered institutions in 43 developing and least developed countries through a public-private partnership with leading patent database providers.

50. The WIPO Match platform is an online tool for matching seekers of specific intellectual property-related development needs with potential providers offering resources. The growing WIPO Match community has 76 supporters from 36 countries, including intellectual property offices, non-governmental organizations, industry bodies, universities and technology transfer offices. In addition to offering technical assistance, the platform can bring new business opportunities for more sophisticated integrated intellectual property and innovation projects.

### **C. Data and indicators for harnessing science, technology and innovation for sustainable development**

#### **Strengthening the capacity of countries to measure information and communications technology for development**

51. Through the Partnership on Measuring Information and Communication Technology for Development, work has been under way since 2004 to increase the availability of internationally comparable data on ICT and build the capacity of national statistical offices to produce the data for evidence-based policymaking. The Partnership is composed of 14 United Nations agencies and other entities and reports every two years to the Statistical Commission.

52. The partners produce six of the indicators in the monitoring framework for the Sustainable Development Goals. Following a multi-stakeholder consultation, they have proposed a complementary thematic list of ICT indicators, along with methodological guidelines, which will be presented in their report to the 2020 session of the Statistical Commission.

53. The partners continue their capacity-building work with national statistical offices and producers of official statistics on ICT in developing countries in the form of courses, workshops and manuals. They also identify areas in which data

disaggregated by sex exist or would be desirable and the methodological work needed to develop relevant indicators in order to fill the data gaps. In addition, the partners conduct research and analysis on the basis of ICT statistics in their respective areas of competence.

### **Building a global evidence base on science, technology and innovation**

54. The United Nations Educational, Scientific and Cultural Organization (UNESCO), through the UNESCO Institute for Statistics, is actively engaged in the development of indicators on science, technology and innovation in relation to the Sustainable Development Goals. It has contributed to the revision of the Frascati Manual of the Organization for Economic Cooperation and Development (OECD) on measuring research and development (target 9.5 of the Sustainable Development Goals), as well as the OECD/Eurostat Oslo Manual on measuring innovation, new versions of which were published in 2015 and 2018, respectively.

55. While Governments, in the Addis Ababa Action Agenda of the Third International Conference on Financing for Development, recognized the critical role of science, technology and innovation and capacity-building in achieving the Sustainable Development Goals, there are few indicators in the global indicator framework that relate to science, technology and innovation (see resolution [71/313](#), [E/CN.3/2018/2](#) and [E/CN.3/2019/2](#)). Therefore, the UNESCO Institute for Statistics is developing a thematic list of relevant indicators for the Goals. A proposal has been produced for validation by Governments. As part of those efforts, a new definition for scientific and technological services is being finalized, following an open consultation submitted to States in 2017. The definition of scientific and technological services was last reviewed in 1984, and the activities it covers play a critical role in realizing the potential for the sustainable development of science, technology and innovation.

56. The Institute for Statistics, in partnership with the Division of Science Policy and Capacity-Building of UNESCO, was a participant in the first phase of the STEM and Gender Advancement project that was aimed at developing improved measures of gender equality in science, technology, engineering and mathematics. The Institute also collaborates with the Intergovernmental Oceanographic Commission of UNESCO on definitions and data that are used to inform target 14.a of the Sustainable Development Goals and are included in the Global Ocean Science Report.

### **Assessing national innovation performance through innovation indices**

57. The Global Innovation Index is published jointly by Cornell University, the European Institute of Business Administration and WIPO. In addition to providing a ranking of innovation performance in some 130 countries, the Index is used to identify policies that foster environments conducive to innovation. With its twelfth edition, the Index has become the leading international benchmark by which national economies gauge their innovation performance.

58. The 2018 report on the Index was focused on energy, and the 2019 report on health. The Index model is updated and revised on the basis of the latest knowledge on innovation systems theory, a thorough review of available indicators and readership feedback from the international community and users of the index. The Index is also used to identify the best practices of countries that consistently overperform compared with those at a similar level of development, inspiring innovation leaders and champions. Intraregional and intra-income group comparisons are also performed with Index data, providing a realistic basis for action.

### **Developing indicators on telecommunications and information and communications technology**

59. The International Telecommunication Union (ITU) assists Governments in developing countries with the collection and dissemination of ICT data and with the production of statistics on ICT infrastructure and on access to and use of the infrastructure by households and individuals. Technical workshops are held at the national and regional levels to exchange experiences and discuss methodologies, definitions, survey vehicles and other issues related to the collection of ICT statistics. The workshops are based on the ITU handbook for the collection of administrative data on telecommunications/ICT, which covers the ICT infrastructure and access indicators collected from administrative sources. In relation to access and use, training is based on the ITU manual for measuring ICT access and use by households and individuals according to data collected by national statistical offices. Both documents are being revised in 2019.

### **Big data for sustainable development**

60. The Global Pulse initiative is aimed at accelerating the discovery, development and scaled adoption of big data innovation for sustainable development and humanitarian action. The initiative functions as a network of innovation laboratories in which research on big data for development is conceived and coordinated. Current projects include a collaboration with Office of the United Nations High Commissioner for Refugees to analyse anonymized call detail records provided by a Turkish telecommunications operator to understand refugee integration in Turkey and a partnership with a technology company and the Pompeu Fabra University in Spain to develop a taxonomy and build an initial corpus of terms related to online hate speech targeting Muslim communities in English-speaking countries.

61. In 2018, United Nations entities and a corporate partner worked on more than 15 projects, from prototypes to approaches that were brought to scale. Partnering agencies included UN-Women, the World Food Programme, the Office of the United Nations High Commissioner for Refugees and the Office for the Coordination of Humanitarian Affairs, as well as United Nations country teams in Indonesia, Papua New Guinea, Samoa, Somalia, Turkey, Uganda and Vanuatu.

## **D. Developing a way to look at science, technology and innovation policy and research and analysis through a gender-sensitive lens**

62. UN-Women has partnered with public and private sector organizations to launch the Global Innovation Coalition for Change and define standards and systems to ensure that women and girls have equal rights to innovation, equal access to innovation and equal opportunities to contribute to innovation. In September 2018, UN-Women launched the Gender Innovation Principles to promote women as innovators, stakeholders and end users at every phase of innovation. By adopting the Principles, public and private sector partners commit to: (a) championing diversity and inclusiveness in their innovation labs and management structures; (b) including women and gender experts at the design stage; (c) integrating the needs of women and carefully selecting data sets at the testing and piloting stages; (d) using sex-disaggregated data and gender impact assessments to monitor the results achieved with innovative technologies; and (e) scaling only the utilization of tools that provide gender-responsive and sustainable solutions. The unique insights and perspectives that women offer can help to ensure that technology affecting their lives and their communities meets their needs and matches their reality. Ensuring that women participate in science, technology and innovation is not only a matter of justice and

equality, but also a fundamental prerequisite to ensure that technology can deliver its promises to all without further exacerbating discrimination.

## **E. Strengthening capacity in e-commerce**

63. The global initiative eTrade for All helps developing countries to engage in and benefit from e-commerce. Launched in July 2016 by UNCTAD, the initiative is organized around seven policy areas: e-commerce assessments, ICT infrastructure and services, payments, trade logistics, legal and regulatory frameworks, skills development and financing for e-commerce.

64. At the heart of the initiative is the online eTrade for All platform, an information hub launched in April 2017 that lets countries look for partners that can provide assistance in the seven policy areas. Using the platform, countries can connect with potential partners, learn about trends and best practices, access up-to-date e-commerce data and stay informed about upcoming e-commerce events, all in one place. The platform has almost 20,000 users, of whom 40 per cent are located in developing countries. As of May 2019, eTrade for All had 30 partners among international and regional organizations, national entities, and development banks, all of which had a common vision of making e-commerce work in step with sustainable development.

65. A major spin-off from the initiative are the rapid e-trade readiness assessments, a tool with which to analyse each of the seven policy areas and identify opportunities and obstacles that can be addressed with appropriate policy measures. The initiative has raised considerable interest among the least developed countries and among potential donor countries. Seventeen assessments have been carried out to date, including 11 in the least developed countries, and 8 are in progress. The assessments have confirmed that vast policy reforms are needed before the countries in question can benefit from e-commerce. Common obstacles to be overcome are the low levels of Internet accessibility and Internet service quality, often due to a lack of competition in the telecommunications sector. Delivery to the customer of goods bought online (known as last-mile delivery) is hampered by weak and costly infrastructure and by insufficient integration of logistics services on the part of operators.

## **F. International Year of the Periodic Table of Chemical Elements**

66. In its resolution [72/228](#), the General Assembly proclaimed 2019 the International Year of the Periodic Table of Chemical Elements. The International Year marks the 150th anniversary of its creation by scientist Dmitry Ivanovich Mendeleev, underscores its importance for science, technology and sustainable development and provides UNESCO with an opportunity to promote the basic sciences as a path to sustainable development, for example through the Organization's International Basic Sciences Programme.

67. Several programmes and initiatives are under way. The multimedia initiative "1001 inventions: journeys from alchemy to chemistry" focuses on the contributions that ancient cultures and civilizations have made to the foundations of modern chemistry, in particular the work of Jabir ibn Hayyan, in the eighth century. Other activities include the periodic table challenge of the International Union of Pure and Applied Chemistry; the periodic table competition of the European Young Chemists Network; and the periodic table stories of the Royal Australian Chemical Institute. The International Year is supported by the International Union of Pure and Applied Chemistry in partnership with the International Union of Pure and Applied Physics, the European Chemical Society, the International Science Council, the International

Astronomical Union and the International Union of History and Philosophy of Science and Technology.

#### **IV. Implementation of the outcomes of the World Summit on the Information Society**

68. In accordance with the mandate given by the Economic and Social Council and the General Assembly, most recently in their resolutions [2018/28](#) and [70/125](#), respectively, the Commission serves as the focal point in the system-wide follow-up to the outcomes of the World Summit on the Information Society.

##### **A. Follow-up to the World Summit outcomes**

69. In 2018 and 2019, the Secretary-General issued reports on the 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 (see [A/73/66-E/2018/10](#) and [A/74/62-E/2019/6](#)). The reports of the Secretary-General highlighted that access to ICT continued to grow worldwide but remained uneven, and that levels of connectivity and usage in developed countries were significantly higher than in developing countries. In the reports, the Secretary-General stressed that insufficient progress had been made with connectivity and access to achieve target 9.c of the Sustainable Development Goals (Significantly increase access to ICT and strive to provide universal and affordable access to the Internet in the least developed countries by 2020). The reports also examined the role of new technology in sustainable development, the opportunities and challenges associated with frontier technologies, in particular the changes in job markets and the development potential of the digital economy. The Secretary-General noted that new technologies and services were emerging constantly, expanding the range and diversity of available applications and increasing the potential of ICT to affect the economy, society and development in all their aspects.

##### **B. Promoting dialogue and building consensus on furthering the implementation of the World Summit outcomes**

70. At its twenty-first and twenty-second sessions, the Commission discussed developments and trends related to the World Summit. The Commission welcomed the fact that the rapid growth in access to mobile telephony and broadband since 2005 had meant that almost two thirds of the world's inhabitants should have access to ICT within their reach, and that 51 per cent of the world's population used the Internet. It noted with great concern that many developing countries lacked affordable access to ICT and emphasized the need to harness technology, including ICT, effectively, and promote digital literacy to bridge the digital and knowledge divides. ICT presented new opportunities and challenges and there was a pressing need to address the major impediments that developing countries faced in accessing the new technologies, such as an appropriate enabling environment, sufficient resources, and infrastructure.

##### **C. Working Group on Enhanced Cooperation**

71. In its resolution [70/125](#), entitled "Outcome document of the high-level meeting of the General Assembly on the overall review of the implementation of the outcomes of the World Summit on the Information Society", the General Assembly requested the Chair of the Commission to establish a working group to develop

recommendations on how to further implement enhanced cooperation as envisioned in the Tunis Agenda for the Information Society, with the full involvement of all relevant stakeholders. Between September 2016 and January 2018, the Working Group on Enhanced Cooperation held five meetings. In his report, the Chair of the Working Group noted that, although consensus seemed to emerge on some issues, significant divergence of views on a number of other issues persisted, such as on what should be the nature, purpose and scope of the process leading towards enhanced cooperation. The complexity and political sensitivity of the topic did not allow the Working Group to agree on a set of recommendations. The report was presented to the Commission for consideration at its twenty-first session. The Assembly and the Economic and Social Council, in Assembly resolution [73/218](#) and Council resolution [2018/28](#), respectively, welcomed the good progress made by the Working Group while regretting that it had been unable to find agreement on recommendations concerning how to further implement enhanced cooperation as envisioned in the Tunis Agenda, and called for continued dialogue on that issue.

## **V. Enhancing global support mechanisms for science, technology and innovation**

### **A. Technology Facilitation Mechanism**

72. The Technology Facilitation Mechanism was established by the Addis Ababa Action Agenda as a form of multi-stakeholder collaboration between the Member States, civil society, the private sector, the scientific community, United Nations entities and other stakeholders to support the implementation of the Sustainable Development Goals. The Mechanism comprises the United Nations inter-agency task team on science, technology and innovation for the Goals and the collaborative multi-stakeholder forum on science, technology and innovation for the Goals and will also comprise an online platform to be developed to match demand and supply in the field of technology. The mandate of the Mechanism includes a group of 10 representatives of civil society, the private sector and the scientific community that is to work with the task team in supporting the development and operations of the Mechanism.

#### **United Nations inter-agency task team on science, technology and innovation for the Sustainable Development Goals**

73. The inter-agency task team is convened jointly by UNCTAD and the Department of Economic and Social Affairs and comprises more than 100 staff experts from 41 United Nations entities. In cooperation with the group of 10 representatives, the task team has undertaken joint activities on the forum on science, technology and innovation; the online platform of the Mechanism; science, technology and innovation road maps for the Sustainable Development Goals; joint capacity-building; new and emerging technologies; and gender and science, technology and innovation.

74. The central topics of the first three meetings of the forum have included road maps and action plans to support the realization of the Sustainable Development Goals. The task team established a subsidiary working group tasked with taking forward the discussions to devise and implement an intersessional work programme to enrich the discussions of the forum on such road maps. The task team and national partners have organized four expert group meetings on science, technology and innovation road maps for the Goals. The first two were held before the meeting of the science, technology and innovation forum in 2018, in New York and Tokyo, the third in Brussels in November 2018 and the fourth in Nairobi in April 2019. The meeting

in Nairobi was attended by representatives of African Governments interested in being part of the global pilot programme on science, technology and innovation road maps for the Sustainable Development Goals. The task team plans to support pilot projects based on projects and programmes that the United Nations system already has in place in various countries, using existing resources, and based on how responsive the Governments of those countries are in completing the required preparations, such as the establishment of focal points and intergovernmental teams to support the road map process.

75. In 2017, the members of the capacity-building workstream of the task team, representing seven United Nations agencies, designed an introductory training programme on innovation policies for the Sustainable Development Goals. The pilot course for the Arab region, entitled “UN-IATT-WS6 capacity-building course on technology for development: innovation policies for the Sustainable Development Goals in the Arab region”, was held in Amman in April 2018 in partnership with the Higher Council for Science and Technology of Jordan. Policymakers from 13 countries in the subregion attended the five-day pilot course and were introduced to the various aspects of innovation for the Goals, in particular policies, the conceptual framework, design and implementation, and monitoring and evaluation. A second United Nations-wide course was held under the introductory training programme, this time in Panama City in May 2019, for policymakers in the Central American region in collaboration with the National Secretariat of Science, Technology and Innovation of Panama. Participants were exposed to existing practices in policies around the world and in the region on science, technology and innovation, and gained insight into the status of innovation in the Central American region. In South-Eastern Europe and in Central Asia, the task team is exploring forms of collaboration with regional entities with a view to organizing subregional courses for countries there. With the Common Market for Eastern and Southern Africa and with the East African Community, it is doing the same with a view to organizing training for East African countries.

76. The task team subgroup on new and emerging technologies has, with contributions from the group of 10 representatives, held a series of expert group meetings in Mexico City, as well as substantive meetings relating to the Mechanism (for example, in Paris and Incheon, Republic of Korea, in 2017). The aim was to systematically take stock of trends in and explore policy perspectives on the impact that new and emerging technologies are having on sustainable development, in particular with regard to robotics, artificial intelligence, biotechnology and nanotechnology. In April 2018, in Mexico City, the task team held an expert group meeting on rapid technological change, artificial intelligence, automation and their policy implications for targets of the Sustainable Development Goals. Participants discussed the impact that those technologies were having on a number of Goals and targets and spoke about artificial intelligence and its ethical dimensions.

77. The task team subgroup on gender and science, technology and innovation was formed in 2018 to increase synergies and collaboration among United Nations entities working on gender and science, technology and innovation, enhance the visibility of United Nations engagement in the field and raise awareness of the importance of supporting opportunities for women and girls to participate in science, technology and innovation. The subgroup is comprised of 13 United Nations agencies. It added a gender dimension to the fourth meeting of the science, technology and innovation forum, held in May 2019 in New York, and is engaged in advocacy for gender and science, technology and innovation; the development of a web page dedicated to gender and science, technology and innovation about the work of the subgroup and related activities; making available policy initiatives on gender and science, technology and innovation at the national and international levels as part of the

UNESCO Global Observatory of science, technology and innovation Policy Instruments platform; and working with other task team subgroups to mainstream gender across their work programmes.

### **Multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals**

78. In 2018 and 2019, the science, technology and innovation forum was held twice. The themes chosen gave rise to in-depth discussions about the Sustainable Development Goals focused on at the meetings of the high-level political forum on sustainable development, as well as about cross-cutting issues relating to science, technology and innovation for the Goals in a broader sense. The third forum on science, technology and innovation was held in New York in June 2018. Participants explored policies and actions aimed at advancing science, technology and innovation for achieving the Goals. They proposed a list of recommendations that covered, among other topics, science, technology and innovation road maps and the disruptive impact on societies of new technologies, such as nanotechnology, automation, robotics, artificial intelligence, gene editing, big data, and three-dimensional printing. The fourth forum was held in May 2019 in New York on the theme “Science, technology and innovation for empowering people and ensuring inclusiveness and equality”.

### **Online platform**

79. In 2018, the task team developed a prototype or demo version of the Technology Facilitation Mechanism online platform, which is to serve as a gateway for information on science, technology and innovation initiatives, mechanisms and programmes around the world and connect suppliers and users of technologies being harnessed for the Sustainable Development Goals. The Department of Economic and Social Affairs has mobilized resources to support the operationalization of the platform, for which no provisions have been made in the budget. The Department and the Office of Information and Communications Technology held a crowdsourcing competition. The winning design formed the basis for a demo version, which was presented at the 2018 science, technology and innovation forum and at the global sustainable technology and innovation conference held in Brussels in 2018.

## **B. Technology Bank for the Least Developed Countries**

80. The Technology Bank for the Least Developed Countries started its operational activities in 2018. The Technology Bank focuses on raising awareness among beneficiaries and potential donors, preparing science, technology and innovation reviews and technology needs assessments, and facilitating digital access to research.

81. The Technology Bank entered into arrangements with UNESCO for the preparation of the reviews for Guinea, Haiti, the Sudan and Timor-Leste, and with UNCTAD for the preparation of the review for Uganda. Work is under way on all five reviews. The Bank is finalizing discussions with the Commonwealth Secretariat to conduct science, technology and innovation reviews and technology needs assessments in Bangladesh, the Gambia, Kiribati, Tuvalu and Vanuatu.

82. The programme on digital access to research has as its aim to increase online access to scientific and technical published information with a view to supporting the capacity of the least developed countries to improve the training given to researchers and the quality of the research produced. Activities in 2018 included 38 workshops in 10 of the least developed countries (Burkina Faso, Liberia, Madagascar, Malawi, Mozambique, Nepal, Rwanda, Senegal, Uganda and the United Republic of

Tanzania), involving about 1,500 researchers, academics and librarians. Planning for workshops to be held in Bangladesh and Bhutan is at an advanced stage. The workshops resulted in an increase in the usage of scientific and technical published information in 2017. The activities continued into 2019, and an additional five countries will be targeted.

83. The Technology Bank is developing activities aimed at improving policymaking with regard to science, technology and innovation and building capacity among scientists, technologists and relevant public institutions. Those activities will include: scaling up science, technology and innovation reviews to cover all the least developed countries; networking with institutional actors and development partners; supporting academies of science; building capacity among tertiary-level science, technology and innovation institutions; training researchers in preparing grant proposals; supporting research collaboration; supporting the dissemination of best practices and processes that help to translate research into innovation and thus reap benefits in the form of sustainable development; promoting mechanisms and links between research and innovation activities and marketing opportunities in cooperation with the private sector; and outreach to diasporas and creation of a diaspora network around science, technology and innovation.

### C. High-level Panel on Digital Cooperation

84. In July 2018, the Secretary-General launched the High-level Panel on Digital Cooperation to advance proposals to strengthen cooperation in digital matters among Governments, the private sector, civil society, international organizations, academia, the technical community and other relevant stakeholders. The panel is comprised of 20 members who represent a cross-section of expertise from government, private industry, civil society, academia and the technical community.

85. In June 2019, the Panel submitted to the Secretary-General its report entitled “The age of digital interdependence”. The Panel identified nine values that, in its view, should shape the development of digital cooperation: inclusiveness, respect, people-centred approaches, human flourishing, transparency, collaboration, accessibility, sustainability and harmony. It also identified 11 priority actions in five categories that deserved immediate attention. The categories were: an inclusive digital economy and society; human and institutional capacity; human rights and human agency; trust, security and stability; and global digital cooperation. Furthermore, the Panel identified gaps in global digital cooperation and ways in which those could be addressed. An open consultation is being launched on the Panel’s recommendations that could contribute to the development of an implementation road map.

## VI. Conclusion

**86. The transformative changes required to implement the 2030 Agenda and achieve the ambitious Sustainable Development Goals can be realized only by harnessing science, technology and innovation for sustainable development. To that end, science, technology and innovation should be an integral part of national development strategies and should be promoted by Governments and other stakeholders in a coordinated and coherent way. Inclusive approaches to science, technology and innovation policies are critical to reducing inequalities within countries, including between men and women, as well as among countries.**

**87. New and emerging technologies could help to address pressing development challenges and accelerate progress towards the Sustainable Development Goals.**

**At the same time, rapid technological change poses challenges for Governments and societies in that they need to adapt to that change and increase their capacity for technological assessment and foresight so that they can evaluate and address the possible risks.**

**88. International cooperation should be strengthened so that support can be continued for a people-centred, development-oriented information society, for the development, dissemination, adoption and use of science and technology, and for the promotion of innovation for sustainable development.**

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