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Report of the intersessional panel meeting

Palais des Nations, Geneva
23–25 January 2017

Prepared by the UNCTAD secretariat*

* This report summarizes the intersessional panel's discussions; it does not necessarily reflect the views of the UNCTAD secretariat or of the member States of the Commission on Science and Technology for Development.

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I. Introduction

1. At its nineteenth session in May 2016, the Commission on Science and Technology for Development (CSTD) selected the following substantive themes for its 2016–2017 intersessional period:

(a) New innovation approaches to support the implementation of the Sustainable Development Goals

(b) The role of science, technology and innovation (STI) in ensuring food security by 2030

(c) Progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society (WSIS) at the regional and international levels.

2. To help address these themes, a panel meeting was organized by the CSTD secretariat in Geneva, Switzerland, from 23 to 25 January 2017. The aim of the panel meeting was to study in depth various issues related to the substantive themes, with a view to contributing to considerations by CSTD at its twentieth session, to be held in Geneva from 8 to 12 May 2017.

II. Organization of work

3. The panel meeting was attended by members of CSTD, representatives of international organizations, representatives of civil society, the technical and academic community and business entities and other observers. The documentation for the meeting included papers prepared by the CSTD secretariat, presentations and policy papers submitted by participants. All meeting documents are available on the CSTD website.[1]

III. Opening

4. The panel meeting was opened by the Director of the Division on Technology and Logistics of UNCTAD and Head of the CSTD secretariat, who highlighted that STI was a key driver of the inclusive and sustainable development to which the 2030 Agenda for Sustainable Development aspired. In many developing countries, the Sustainable Development Goals would be practically impossible to achieve in less than 15 years without an effective and widespread application of technology and innovation. The Director emphasized that both priority themes of the panel were pertinent and critical to the economic development of all countries, and recalled that STI needed to be applied in an inclusive manner in order that existing technological gaps did not widen and leave some countries and communities further behind.

5. The Acting Chair of CSTD[2] provided an overview of the work of CSTD during this intersessional period, as well as an update of the decisions taken by the Economic and Social Council and the General Assembly since the nineteenth session. He advised the panel about events in which CSTD had taken part since the last annual meeting, and emphasized the relevance of the two priority themes for the Goals.

6. The Deputy Secretary-General of UNCTAD, in his opening remarks, noted that globalization was increasingly depicted as a threat rather than an opportunity, in part because of the uncertainties and anxieties arising from the transformative potential of technology. In an effort to magnify the positive effects of technology and reduce its unintended consequences, the international community needed to recognize and discuss the challenges and to craft solutions. In this context, CSTD was a premier international forum to discuss related issues and help countries harness the power of STI for sustainable

[1] http://www.unctad.org/cstd.

[2] Mr. Peter Major, Permanent Mission of Hungary to the United Nations at Geneva.

development. He stated that given the constraints the global community faced, STI might be one of the most viable means of achieving the Goals.

IV. Theme 1: New innovation approaches to support the implementation of the Sustainable Development Goals

7. In his opening remarks to the session on the first substantive theme, the moderator of the first expert panel discussion, the Vice-Chair of CSTD,[3] highlighted STI as a critical enabler for achieving the Goals. He called on the session to explore new innovation approaches that fostered collaboration across different sectors, leveraged funding and promoted locally contextual solutions for and by grass-roots communities.

8. The CSTD secretariat[4] introduced a paper on the theme. The presentation highlighted that the ambitious 2030 Agenda for Sustainable Development required new innovation approaches that were socially inclusive and environmentally benign. Several new and emerging innovation approaches (mission-oriented; pro-poor and inclusive; grassroots; social; and digitally-enabled open and collaborative) could contribute to the achievement of the Goals, but raised a number of implications, including for policy.

9. Two expert panel discussions ensued. One speaker[5] highlighted that the world was facing new social and environmental challenges that required new types of innovation approaches that responded directly to social and environmental needs and included actors that had traditionally not been part of innovation systems. With regard to policy implications, the speaker highlighted the importance of the following: infrastructure and network facilitation; financing and incentives; regulation to nurture innovation; and appropriate governance processes.

10. Another speaker[6] noted that the deployment and scaling up of existing technical solutions might help address many global development challenges. He emphasized that financial conduits, business models, entrepreneurs and informed buyers and sellers were key pillars for scaling up and deploying proven technologies for sustainable development.

11. One speaker[7] highlighted the problem of the lack of investment and investment expertise in developing countries. In order to change the current allocation of investment and foreign direct investment, the international community needed to act as a bridge between investors and markets in developing countries. In this context, innovation models such as the triple helix that focused attention on public, private and academic stakeholders needed to be expanded to include the financial sector.

12. Another speaker[8] defined "jugaad innovation", which was the art of overcoming constraints by improvising an effective solution using limited resources. Presenting a number of case studies, he emphasized that people at the bottom of the pyramid – the poorest in society – represented a huge untapped market for frugal products and services, and that there was a role for frugal innovation in developed countries. In order to further promote jugaad and frugal innovation, the speaker suggested that partnerships between small and large firms were necessary, as well as support from Governments, public institutions and intergovernmental bodies such as CSTD and UNCTAD.

13. One speaker[9] highlighted the following seven lessons learned from the appropriate technology movement that were relevant to achieving the Goals: the concept of small is beautiful remained valid, especially in developing countries; an enabling environment and support for pro-poor innovation and scaling up were important; local communities needed

[3] Mr. Benedicto Fonseca, Ministry of External Relations, Brazil.

[4] Ms. Dong Wu, UNCTAD.

[5] Mr. Adrian Ely, Science Policy Research Unit, University of Sussex.

[6] Mr. Alfred Watkins, Global Solutions Summit and United Nations Technology Bank for Least Developed Countries.

[7] Ms. Gillian Marcelle, University of the Virgin Islands.

[8] Mr. Jaideep Prabhu, University of Cambridge.

[9] Ms. Elenita Daño, Erosion, Technology and Concentration Group.

to actively participate in deliberations on technology choice for key development challenges; local knowledge was a critical factor in the development and deployment of technologies; new innovation approaches needed to be gender sensitive and gender responsive; new innovation approaches needed to promote economic empowerment and livelihoods; and policy, regulatory and macroeconomic barriers that hindered appropriate technology development and pro-poor innovation needed to be addressed.

14. The second panel was moderated by the CSTD secretariat.[10] One speaker[11] emphasized that information and communications technology (ICT) was a catalytic driver for the achievement of the Goals (especially Goals 4, 5, 9 and 17), and provided various examples of how ICT projects supported by the International Telecommunication Union contributed to sustainable development, particularly in developing countries, such as real-time agricultural data, financial inclusion, mobile telephone-based health services and the Goals mapping tool of the International Telecommunication Union.

15. Another speaker[12] highlighted the role of academic and higher education communities in global development. For example, the Higher Education Solutions Network brought together universities and partners in Governments, academia, the private sector and civil society worldwide to create, develop and scale up international development innovations. Successful projects included those of the Development Impact Lab, Resilient Africa Network and Social Entrepreneurship Accelerator.

16. One speaker[13] stated that artificial intelligence could be effectively harnessed to combat infectious diseases. Most public health expenses regarding infectious diseases were spent on passive responses, while developing tools to forecast epidemics could be a less costly and burdensome way to fight disease. Artificial Intelligence in Medical Epidemiology had a web-based and mobile platform that combined comparative data on human movement, epidemiology, weather and the environment, with 270 variables, to predict and fight diseases such as Zika virus disease and dengue fever. To date, the application had been successfully used in Brazil, the Dominican Republic, Haiti, India, Malaysia, the Philippines and the United States.

17. Another speaker[14] highlighted the innovations that the United Nations High Commissioner for Refugees had introduced to help refugees, while being more efficient, effective and accountable. While there were an increasing number of refugees in the world, there also seemed to be increasing resistance towards them and fewer resources allocated to them. Technology platforms enabled people in crisis situations to have access to remittances, cash assistance, electronic learning and digital identification, for example through the use of biometrics.

18. One speaker[15] noted that open science and open innovation tools could provide safe and affordable medication for people who needed it the most. For example, the distribution of over 250 malaria boxes by the Medicines for Malaria Venture had facilitated the creation of a global network of research groups. A similar project, the pathogen box, had been launched to enable drug discovery for neglected diseases. These projects demonstrated that drug discovery could thrive in an open environment and that open innovation could lead to new generations of much-needed treatments.

19. During their interventions, delegates gave examples of national innovations for sustainable development, including the following: global STI conference (Belgium); electronic governance tools, start-up incubators and intellectual property rights reforms (Brazil); technology parks, incubators, accelerators for companies, Innovation and Prosperity Fund, Mahak charity and Nanotechnology Initiative Council (Islamic Republic of Iran); revisions to education legislation to review scientific education and position youth to think innovatively (Kenya); Ward-based Technology Cluster Programmes (Nigeria);

[10] Mr. Angel Gonzalez-Sanz, UNCTAD.

[11] Ms. Doreen Bogdan-Martin, International Telecommunication Union.

[12] Ms. Ticora Jones, Global Development Lab, Agency for International Development, United States of America.

[13] Mr. Dhesi Baha Raja, Artificial Intelligence in Medical Epidemiology.

[14] Mr. Andrew Harper, Innovation Lab, United Nations High Commissioner for Refugees.

[15] Mr. Paul Willis, Medicines for Malaria Venture.

Social Enterprise Promotion Act, Bangkok Mini Maker Faire, start-up expositions, folk innovation award in agriculture and student entrepreneurship programmes (Thailand); Ministry of Science, Technology and Innovation, high-level science and technology forum, Mama Hope projects and hackathons for medical solutions (Uganda); and Amplify innovation challenges, Global Innovation Fund and Segovia technology platform (United Kingdom of Great Britain and Northern Ireland).

20. The speakers determined that there was no governmental or academic consensus on the categories of innovation models presented during the panel discussions, and that more research was needed on these themes. One speaker noted that the approaches presented concerned characteristics of different innovation processes.

21. Several participants elaborated on how to extend current models of innovation such as the triple helix to the financial sector. One speaker recommended creating mechanisms to attract foreign capital such as sovereign wealth funds and pension funds to developing countries. Another speaker highlighted the fact that appeals to the financial sector for financing innovation in sustainable development needed to incorporate market and profitability considerations.

22. One delegate emphasized the importance of facilitating innovation ecosystems and engaging top-down approaches with bottom-up innovation. Another delegate noted that scientists and social scientists needed to collaboratively pursue innovation projects that leveraged their multidisciplinary insights for sustainable development.

23. The session was divided into three discussion groups on the following sub-themes: new innovation approaches; new finance models; and deploying, scaling up and supporting new innovation approaches (see annex I). Each sub-theme discussion was chaired by an expert speaker, who reported the group's findings to the plenary. The main points raised by participants in the group discussions are highlighted in the following paragraphs.

(a) New innovation approaches

24. Participants agreed that the diverse contexts, cultures and needs among countries largely determined which policies were most effective for supporting innovation in sustainable development. The group suggested that more efforts were needed to involve women and youth in innovation processes, promote computational thinking among students and improve the science–policy interface. Participants noted that impact investment was not well known and that there was a need to identify the areas of finance and investment with greater impacts on the Goals. Participants also stressed the need for policy coherence and a coordinated approach across government actors in designing policy mixes for the Goals. The group identified the following challenges, among others, in applying new innovation approaches: financing innovation; making innovation more inclusive and including local communities and people in innovation processes; understanding linkages among the Goals; improving the awareness and management of intellectual property; and supporting commercialization.

(b) New finance models

25. Participants agreed that there was a wide range of public and private sources of financing – such as friends and family, commercial banks, institutional investors such as pension funds and sovereign wealth funds, venture capital, development banks, philanthropy and crowdsourcing – and that some of these were also appropriate to financing the Goals. Participants noted that actors needed to be wary of unconscious bias in overemphasizing Western financing models. For example, collective funding models within communities of trust were effective, with low default rates, in many developing countries. The group identified the following challenges: addressing not only the level of finance but also the direction of investments; identifying strategies to deepen sources of financing; building expertise among investors on development challenges and needs; incentivizing private and public investors towards impact investment, to produce both financial returns and returns in terms of social impacts and impacts on environmental objectives; and engaging with the private sector and financial community on good governance and accountability. Finally, the group suggested that CSTD should launch an experimental

solution (namely, a financing innovation for development lab) with the finance community, to attract financial flows into development and innovation projects.

(c) Deploying, scaling up and supporting new innovation approaches

26. Participants discussed barriers to technology deployment, including regulatory barriers, skills constraints and lack of financial resources and technology prospecting or the ability to evaluate appropriate options for technology. Unintended uses of technology made it difficult to predict technological trajectories. There was a need to incorporate a gender-sensitive perspective in new innovation approaches. Participants also discussed government procurement as a policy tool to support technology deployment; technology deployment as a broad conceptual framework for selecting, accessing, buying, licensing and diffusing technologies, along with the required capabilities to apply technologies; the small-is-beautiful framework within the appropriate technology movement; and the imperative to scale up technologies for global development. The group arrived at a consensus on such innovation approaches, which were not competitive but complementary ways to address global development challenges. With regard to the role of the international community in supporting new innovation approaches, the group agreed that CSTD could systematically examine the regulatory issues related to technology deployment; include a specific focus on the Goals and socially inclusive innovation within the UNCTAD science, technology and innovation policy (STIP) reviews; and convene multi-stakeholder experts to address technology deployment and investment on a regular basis.

V. Theme 2: The role of science, technology and innovation in ensuring food security by 2030

27. In his opening remarks to the session on the second substantive theme, the moderator of the first expert panel discussion, the Vice-Chair of CSTD,[16] recalled the importance of food security for the Goals and noted that the aim of the session was to explore how STI could make agriculture more climate resilient and productive and contribute to more efficient markets and the creation of innovative mechanisms for insurance and inputs.

28. The CSTD secretariat[17] introduced a paper on the theme. The presentation highlighted the challenges associated with achieving food security by 2030 and how STI could address the various dimensions of food security, namely availability, access, use and/or utilization and sustainability. Harnessing STI for food security might require making the broader food system more innovative, including efforts to encourage and strengthen the enabling environment, regulatory framework and education and research infrastructure.

29. Two expert panel discussions ensued. One speaker[18] emphasized that, historically, few problems in agriculture had been caused by a lack of technology, yet many had been related to social, economic and cultural issues that required structural changes. To achieve food security in the context of the 2030 Agenda for Sustainable Development, STI needed to be put into a three-pronged context of a sustainable food system focused on socioeconomic, environmental and resilience dimensions. In addition, STI needed to contribute to overcoming rural poverty and empowering smallholders to use low external input and agroecological production methods that were resilient and assured livelihoods.

30. Another speaker[19] noted that there had been uneven progress in reducing malnutrition and that it remained pervasive. Nutrition-sensitive agriculture needed to contribute to addressing this challenge. In this context, the transformation of food systems was critical to ensuring diversified and healthy diets for all, a necessary condition for attaining nutrition security. There was a need for more attention to be paid to social innovations to harness people's knowledge, greater investment in research and more

[16] Mr. A Min Tjoa, Permanent Mission of Austria to the United Nations Office at Geneva.

[17] Ms. Shamika N Sirimanne, UNCTAD.

[18] Mr. Ulrich Hoffmann, Research Institute on Organic Agriculture.

[19] Ms. Olivia Yambi, International Panel of Experts on Sustainable Food Systems.

support for agroecological innovation to ensure the diversity of diets needed to halt the negative impacts of current food systems.

31. One speaker[20] stated that remote sensing could be used to improve monitoring and management for food security, with a focus on disaster, water and agriculture management. He described three monitoring system projects, namely Crop Watch for global crops, Drought Watch and Evapotranspiration Watch, and highlighted how such early warning systems could enable developing countries to fight hunger and drought, and how regional and international cooperation projects could help individual countries build capacity to use and customize such remote sensing platforms at the national level.

32. Another speaker[21] highlighted the current and future environmental consequences of livestock production. One alternative involved tissue engineering and bioprinting; it was possible to fabricate leather and meat products with no harm to animals, a reduced environmental footprint, strict quality control and easy implementation under variable geographic and climactic conditions. However, such methods were currently cost prohibitive and required further research and development.

33. One speaker[22] noted that the complex development challenges articulated by the Goals, particularly with respect to agriculture, required both technological and organizational innovations. The speaker addressed the conceptual framework of agricultural innovation systems, key drivers of agricultural change and the decline in international investment in agricultural innovation. Countries needed increased investments in agricultural research and development and extension and advisory services, as well as capacity development, in order to improve national agricultural innovation systems.

34. The second panel was moderated by the CSTD secretariat.[23] One speaker[24] highlighted the potential of technology for global crop intelligence, to address local farming challenges. New technologies enabling precision fertilizers, precision spraying, field monitoring and data management had the potential for added value while contributing to yield improvements. The speaker highlighted recent developments in hyperspectral imaging that could empower farmers with the following knowledge related to their crops: virus detection; weed detection and classification; nematode detection; plant nutrient content; and yield prediction and growth monitoring.

35. Another speaker[25] addressed the increasing use and health implications of antibiotics and the rising and unsustainable feed costs of livestock. He highlighted new scientific approaches for fabricating natural bioactive feed that promoted plant digestibility and improved immune responses at a lower cost.

36. One speaker[26] noted that effective, strengthened and well-resourced agricultural extension and rural advisory services were critical to the achievement of Goal 2. ICTs could be powerful tools to support such services, to provide timely, comprehensive, interactive and cost-effective services to rural users, especially smallholders, women, young people and the vulnerable.

37. Another speaker[27] emphasized the importance of all farmers having the tools to engage in precision agriculture. He highlighted recent innovations used to generate geometrically and radiometrically accurate results, absorb the complexity associated with remote sensing and photogrammetry and present such results in an accessible way to smallholders, as well as large agricultural companies. He emphasized the potential of unmanned aircraft to enable aerial crop analysis.

[20] Mr. Bingfang Wu, Academy of Sciences, China.

[21] Mr. Gabor Forgacs, University of Missouri and Modern Meadow.

[22] Mr. Ahmad Mukhtar, Food and Agriculture Organization of the United Nations.

[23] Mr. Angel Gonzalez-Sanz, UNCTAD.

[24] Mr. Yosef Akhtman, Gamaya.

[25] Mr. Duncan Sutherland, Twenty Green.

[26] Mr. Karim Hussein, Global Forum for Rural Advisory Services.

[27] Mr. Jorge Fernandez, Pix4D.

38. One speaker[28] noted that global demand for crop production was increasing due to rising population levels, a growing middle class, rising animal protein consumption and declining availability of arable land. Technology advancements enabled digital agriculture, whereby inputs and factors affecting agriculture – such as seed genetics, environmental conditions and sensors – were becoming digitized, and the digital agriculture revolution could optimize yields (by decreasing yield variability) and improve sustainability, such as through reduced fertilizer use.

39. Another speaker[29] emphasized that modern farming could promote sustainable agriculture with the use of robotics and machine learning. He highlighted the potential of specialized robots, for specific tasks such as weeding, which required low energy, provided high accuracy and were lightweight. Technology was not a panacea for sustainable agriculture, however, and robotics needed to be used carefully to facilitate sustainability.

40. During their interventions, delegates gave examples of national innovative solutions, as well as policy efforts, to harness STI to achieve food security by 2030, including, among others, the following: establishment of 200 small centres devoted to food and nutritional security (Brazil); STI institute for agriculture, including a success story in hybrid rice breeding (China); international cooperation, including on a project on food recovery with the United Nations Educational, Scientific and Cultural Organization, European Union and Fundamental Research Institute on Tropical Agriculture of Cuba (Cuba); development of knowledge-based production in the agricultural sector, in which 485 local technology-based agricultural firms had been identified and 96 projects selected for government support (Islamic Republic of Iran); agricultural research and development conducted by the National Biotechnology Development Agency, Sheda Science and Technology Complex, Nigerian Institute for Trypanosomiasis Research and National Research Institute for Chemical Technology (Nigeria); farm mechanization and the development of an indigenous tractor industry (Pakistan); food research supported by the Thailand Research Fund, rice varieties improved by the National Science and Technology Development Agency and a Food Innopolis at Thailand Science Park (Thailand); and the Food Innovation Network, Global Food Security programme and Waste and Resources Action Programme (United Kingdom).

41. One delegate noted that it was important to carry out demand-driven research, and cited the following examples: new techniques for seed production; technologies to produce vegetable seeds in tropical conditions; the promotion of botanical gardens of fruit trees in municipalities; and national programmes for urban, suburban and family agriculture, including organic agriculture.

42. Another delegate highlighted the following measures for addressing global food security: pursuing precautionary applications in using biotechnology for food production; launching global negotiations on agricultural development; exchanging knowledge, information, experience and best practices, in agriculture and food production; encouraging greater investment in and application of technology; supporting and maintaining traditional and environmentally friendly agricultural systems; investing in water efficiency; promoting sustainable land maintenance; supporting the exchange of professors and students to spread knowledge; providing means of implementation; increasing synergies among relevant international organizations; and supporting technological change in the agricultural sector to help achieve food security and protect the environment.

43. One delegate noted that the philosophy of a sufficiency economy could help communities achieve resiliency and greater immunity with regard to economic and ecological changes, including climate change. The delegate highlighted the potential of social labs at universities as community-based interactive spaces for learning and exchanging knowledge between locals, students and other academics.

44. Another delegate proposed a number of measures for addressing food security, including the following: making crops more efficient and resilient to climate change; promoting biodiversity; empowering smallholders, such as through land reforms;

[28] Mr. Martin Rand, Vital Fields.

[29] Mr. Steve Tanner, Eco Robotix.

supporting rural development and de-urbanization; supporting markets for organic and functional foods; recycling crop and/or livestock waste or treated human waste; and reducing the prevalence of overnutrition and overeating.

45. Finally, another delegate noted that STI could be applied across all dimensions of food security through the effective application of new and emerging technologies that could be used throughout all phases of agriculture, with a focus on farmers, agro-allied small and medium-sized enterprises and large-scale industries. Such technologies could be adapted, diffused and applied to address local food security-related challenges. The delegate emphasized that it was therefore imperative to focus on developing innovative capabilities to apply knowledge in agricultural development.

46. The panel was divided into three discussion groups on the following sub-themes: new and emerging innovations for food security; STI for smallholders; and international community support for STI in food security (see annex II). Each sub-theme discussion was chaired by an expert speaker, who reported the group's findings to the plenary. The main points raised by participants in the group discussions are highlighted in the following paragraphs.

(a) New and emerging innovations for food security

47. The group expressed its concern that new technology-based innovation often was not appropriate for developing countries, and noted that the focus should be on the full deployment of existing technologies, such as for water management, drip irrigation and fertilisers. Marketing, organizational and social innovations and infrastructure investments remained critical to improving food security. The group agreed that digital skills were also essential for countries to take advantage of technologies relevant to food security, and that access to relevant, context-specific expertise remained important. The group suggested that food security should be addressed through an integrated approach within rural development strategies. The group agreed that biotechnology was an existing innovation that was underexploited in the absence of regulatory frameworks. Finally, regarding the potential role of CSTD in STI and food security-related issues, the group suggested that CSTD should serve as a forum for mobilizing resources for technological and non-technological innovations to ensure food security and rural development. The group also suggested that STIP reviews could review how STI might address the needs of marginalized groups, including small-scale farmers and micro and small enterprises.

(b) Science, technology and innovation for smallholder farmers

48. Participants noted that STI for the specific benefit of smallholders could include labour-intensive technologies, which made full use of the abundance of labour in rural areas. Agroecological production methods, making the best use of local soil characteristics and resource availability, were particularly well suited to smallholder realities. STI also needed to involve the reinvigoration of underutilized and locally adapted crops for food, feed, wood and fibre production, which were better suited to locally adapted, context-specific pathways to sustainable agricultural development. In this regard, the group agreed that traditional and indigenous knowledge needed to be fully harnessed. Remote sensing and reliable weather forecasting were of particular relevance to smallholders. Participants underlined that broadening the use of diverse sources of off-grid renewable energy could provide many opportunities for the application of modern STI to increase crop productivity, reduce pre- and post-harvest losses and improve prospects for processing and value addition. STI could most effectively be used by community-based cooperative movements or farmer groups that facilitated the sharing of knowledge and experience, collectively used STI and linked with scientists and extension workers through farmers' field schools. In general, the capacity of public and private rural advisory services needed to be strengthened and local, national and international platforms needed to be formed to exchange experiences and specific results from such services. The group suggested that STI for smallholding farming should be addressed in future country-level STIP reviews.

(c) International community support for science, technology and innovation in food security

49. Participants discussed the paper, general issues related to STI policy and specific suggestions for CSTD. Participants suggested that greater emphasis should be placed on gender issues and frugal innovation approaches. There appeared to be a dichotomy between the human development context that explained the multidimensional aspects of food insecurity and the discussion on new and emerging technologies. Regarding general policy issues, participants noted that there was a lack of coordination at the international level in harnessing STI for development efforts in general and agricultural innovation in particular. The group highlighted the need to explore adaptive policy frameworks that dynamically responded to innovation, as well as policy sandboxes that allowed policymakers to experiment with regulatory mechanisms and assess the impact of new and emerging technologies. The group articulated four recommendations regarding the role of CSTD. First, there could be opportunities to strengthen the Gender Advisory Board of CSTD in general and with respect to food security in particular, in collaboration with other United Nations entities focused on agriculture and gender. Second, access to data for agricultural development was best mediated by the extension services interface between scientists and farmers. United Nations mechanisms – such as CSTD – could potentially play a role in helping Governments obtain access to data sources that fed into extension services at the national level. Third, CSTD could encourage a culture of sharing not only success stories and best practices but also failures and key challenges. Finally, CSTD could potentially create networks with academic departments, research institutions and think tanks that conducted research at the interface of development and STI. Such networks could strengthen the analytical and research base of CSTD and help countries better understand the impact of technology on development.

VI. 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

50. This session was moderated by the Acting Chair of CSTD.[30] Participants considered the linkages between the WSIS process and the 2030 Agenda for Sustainable Development, in particular Goal 9: build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. Advances towards achieving this Goal would be considered at the high-level political forum on sustainable development, in July 2017.

51. One speaker[31] highlighted the main trends related to the current implementation of the outcomes of WSIS, noted the role of ICTs in achieving the Goals and described some of the long-term challenges. Although each year more and more people gained access to increasing bandwidth and numbers of devices, global Internet access figures concealed large variations between and within regions and countries. The speaker noted the importance of considering issues related to the ICT environment and of reaching beyond connectivity to explore the use and impact of ICTs in different contexts, and elaborated on problems and opportunities that arose from new technologies in the context of the Goals. Requirements for shaping the information society along the lines proposed by WSIS and the Goals involved good evidence, hard thinking, partnership between Governments and other stakeholders, quick decision-making, commitment and investment.

52. Another speaker[32] addressed the fourth industrial revolution and the 2030 Agenda for Sustainable Development. Several technological breakthroughs had the potential to transform manufacturing in areas such as new materials, mechanics, digital and environmental technologies, biotechnology, nanotechnology and neurotechnology. The speaker highlighted the challenges emerging from related transformational changes in implementing the Goals, in particular Goal 9, and noted the work of the United Nations

[30] Mr. Peter Major, Permanent Mission of Hungary to the United Nations at Geneva.

[31] Mr. David Souter, ICT Development Associates.

[32] Mr. Ludovico Alcorta, United Nations Industrial Development Organization.

Industrial Development Organization in addressing the impact of the fourth industrial revolution in the light of the Goals.

53. One speaker[33] noted that technology was changing jobs and enterprises in the Association of Southeast Asian Nations region. Research by the International Labour Organization had shown that workers, especially wage workers, faced a high risk of automation in Cambodia, Indonesia, the Philippines, Thailand and Viet Nam. Enterprises and students had been surveyed about attitudes to technology, barriers to technology uptake, the demand for technical skilled workers, enterprise outlooks and drivers of technology. The speaker highlighted the following main research findings: manufacturing production processes were transforming with regard to geography, jobs and efficiency; certain sectors and groups faced particular disruptions; technology would transform rather than eliminate many jobs; making skills, training and education systems fit for purpose required a major effort; and comprehensive multifaceted growth and investment strategies were required in the technological age.

54. Another speaker[34] provided an update of the implementation process of the outcomes of WSIS. He presented the outcome of the WSIS Forum 2016 and recalled the linkages between the WSIS action lines and the Goals. Procedures and programmes prior to and during the WSIS Forum 2017 included the following: open consultation process; annual regional commission meeting; regional reviews; stocktaking process and regional reports; embeddable interfaces; and the WSIS Prizes. Finally, he recalled the important work of the Partnership on Measuring ICT for Development.

55. The CSTD secretariat[35] introduced the eTrade for All initiative that aimed to leverage ICTs for sustainable development. Statistics showed that electronic commerce (e-commerce) was growing quickly, including in some emerging markets, but that there was considerable divide between some developing countries. UNCTAD had a strong mandate to work on e-commerce policy issues and had launched the eTrade for All initiative and a new Intergovernmental Group of Experts on E-commerce and the Digital Economy. The presentation highlighted the barriers to e-commerce uptake and outlined how the initiative could help remove such barriers. The initiative covered key policy areas such as ICT infrastructure, trade logistics, payment solutions, access to financing, legal frameworks and e-commerce skills and strategies.

56. The Chair of the Working Group on Enhanced Cooperation provided a briefing on the first and second meetings of the Working Group. He highlighted the benchmark meeting documents related to the Working Group, including the Tunis Agenda for the Information Society and the outcome document of the high-level meeting of the General Assembly on the implementation of the outcomes of WSIS. At its first meeting in September 2016, the Working Group had agreed on the following two questions to guide the discussion at its second meeting: what are the high-level characteristics of enhanced cooperation?; and taking into consideration the work of the previous Working Group and the Tunis Agenda for the Information Society, particularly paragraphs 69–71, what kind of recommendations should be considered?

57. The intersessional work of the Internet Governance Forum[36] included national, regional and youth forums, best practice forums and dynamic coalitions. Its Multi-stakeholder Advisory Group had undertaken new initiatives, such as a newcomers track. The last Forum meeting, with the theme, "Enabling inclusive and sustainable growth", had been held in December 2016; the next meeting was scheduled to be held in December 2017.

58. During the ensuing discussion, one delegate noted that access to ICTs remained a priority and that a holistic policy approach was needed. Another delegate emphasized that it was important to address inequalities between different regions and countries. Delegates

[33] Ms. Jae-Hee Chang, International Labour Organization.

[34] Mr. Jaroslaw Ponder, International Telecommunication Union.

[35] Mr. Torbjorn Fredriksson, UNCTAD.

[36] Statement read on behalf of Ms. Lynn St. Amour, Multi-stakeholder Advisory Group, Internet Governance Forum.

discussed the linkages between ICTs and the Goals. The Acting Chair of CSTD presented closing remarks and concluded the intersessional panel meeting.

VII. Findings and suggestions

59. The following main findings and suggestions were highlighted by the Panel and put forward for consideration by CSTD at its twentieth session.

1. New innovation approaches to support the implementation of Sustainable Development Goals

(a) Main findings

Harnessing innovation for development key to achieving the Sustainable Development Goals

60. The scale and ambition of the Goals require innovation in development and innovation for development. To achieve the Goals by 2030, new modalities for development are required, including bringing innovation into the foreground of development projects. The key questions concern not how to encourage more innovation in more places, but which kinds of innovation need to be encouraged while at the same time discouraging harmful innovation. This entails re-orientating innovation trajectories to enable inclusive, socially just and environmentally benign patterns of socioeconomic development; encourage experimentation with different ways of solving problems; and involve various actors, processes and types of governance, along with unprecedented forms of collaboration and cooperation across stakeholders, sectors and regions.

Plurality of innovation sources from the global North and South

61. The last decade witnessed a changing geography of innovation.[37] There is growing recognition of the richness of dynamic experimentation with different ways of problem solving in the global South. Some of the new innovation approaches, such as pro-poor and grass-roots innovation, originate in developing countries. Such innovation approaches recognize the needs of poor, grass-roots and marginalized communities and involve them in innovation processes. Those at the bottom of the pyramid (the poorest in society) represent a huge untapped market for small-scale entrepreneurs as well as large multinational enterprises. The challenge in inclusive innovation is that small organizations are inherently frugal and agile but lack resources to achieve economies of scale, while large organizations have the resources to achieve economies of scale but are often slow to act. Partnerships between small and large, local and global, firms are needed.

Capabilities are central but unevenly distributed

62. Capabilities are central for effective innovation, but are unevenly distributed across countries. Efforts should be made to identify and strengthen the required capabilities to innovate and to create enabling environments for innovation. Global initiatives aimed at providing technical assistance and sharing good practices in capacity-building are highly relevant. CSTD is well placed to serve as a platform for promoting such initiatives. Country contexts, cultures and local needs are diverse when it comes to capacity-building for STI. Therefore, there is a need for Governments and various non-State actors to network and to create the capacity to adapt innovations to local contexts and cultures. For instance, developing countries, including the least developed countries, are characterized by a large informal sector and a high incidence of informal sector innovation, much of which is incremental in nature. STI capacity-building in this context means supporting the large-scale deployment of existing technologies already in widespread use elsewhere, as well as experimenting with new innovation approaches.

[37] See GM Marcelle, 2016, Redefining innovation in the global South: Critical imperatives, available at http://unctad.org/meetings/en/Presentation/CSTD_2015_ppt15_Marcelle_en.pdf (accessed on 30 January 2017).

Financing innovation for development requires more attention

63. Achieving the Goals requires addressing a range of resource constraints, including financial, technological and skills-related, as well as in other areas. Financial resources for the implementation of the Goals remain inadequate. Therefore, there is a need to mobilize and scale up development finance allocated to investment that considers social and environmental objectives in support of the Goals. There has been significant attention paid to the linkages and relationships between Governments, universities and industry in STI policymaking. However, the importance of also fostering linkages with investors in relation to financing innovation has not been adequately recognized, especially in developing countries. To change the current allocation of investment, including foreign direct investment, it is necessary to change the mindset of investors, to help overcome financing constraints for innovation and the Goals. Partnerships between Governments, the private sector and academia should also include the financial sector. Efforts in this area should increase access to financial resources and improve their allocation.

Science, technology and innovation policy implications: Direction, context, coherence and coordination

64. STI policies related to the Goals must consider the direction, distribution and diversity of innovation pathways. They should also take into account the linkages and relationships between the different actors, as well as the skills and other framework conditions required for innovation. The 2030 Agenda for Sustainable Development provides an opportunity for policymakers to support the emergence of, and experiment with, new forms of innovation for sustainable development. There is considerable scope for recombining elements of new approaches with more traditional ones. This underlines the importance of policy coherence across government actors in the design of policy mixes. A coordinated approach is needed, widening the policy focus of innovation systems both in terms of the actors involved and the means of interaction and collaboration.

(b) Suggestions

65. The intersessional panel encourages Member States to consider the following courses of action:

(a) Adopt policy mixes across various government actors that enable hybrid forms of traditional, pro-poor, grass-roots and social innovation, while prioritizing innovation that is both socially inclusive and environmentally sustainable

(b) Consult and collaborate with multiple stakeholders when setting priorities for the Goals and during the design of large-scale innovation policy initiatives such as mission-oriented projects

(c) Ensure the inclusiveness of innovation, especially with regard to local communities, women and youth, to ensure that the scaling up and diffusion of new technologies is inclusive and does not create further divides

(d) Recognize and support local communities and local populations' knowledge in innovation processes and support efforts to commercialize and scale up locally developed innovations

(e) Network across actors both nationally and internationally to adapt and deploy existing foreign innovations that can work in local cultures and contexts

(f) Include inputs from scientists, creating a science–policy interface, and other actors for innovation policy development, to understand incentives, identify policies that work and draw lessons from failures

(g) Encourage corporate social responsibility policies in the private sector that reflect inclusive and sustainable innovation to meet the Goals, and incentivize private and public investors for impact investment

(h) Support policies that increase financial inclusion, deepen the sources of financing and direct investments towards innovations that address the Goals.

66. The intersessional panel encourages the international community to consider the following courses of action:

(a) Provide networking opportunities and facilitate matchmaking between local innovative solutions and private-sector actors or policymakers who can work on scaling up and deploying new innovations

(b) Raise awareness for innovation in achieving the Goals and address financing challenges by sensitizing the finance community to the Goals and changing mindsets in the financial sector.

67. The intersessional panel encourages CSTD to take the following courses of action:

(a) Advise the international community of the importance of new innovation approaches that provide socially inclusive and environmentally sustainable solutions to achieving the Goals

(b) Provide a multi-stakeholder platform for experts to exchange lessons learned, best practices and experiences in technology deployment, as well as in policymaking, to encourage new innovation approaches and enhance hybrid approaches to innovation

(c) Include a specific focus on the Goals, bottom-of-the-pyramid approaches, social inclusion and other emerging issues in national STIP reviews

(d) Examine regulatory issues related to technology deployment, especially for developing countries that do not have the capacity to do so

(e) Examine areas of investment with a highly positive impact on the Goals and consider launching a core learning and solutions experiment with the financial community (that is, a financing innovation for development lab) to find ways to learn more about how to encourage greater investment in developmental innovation projects that contribute to achieving the Goals.

2. The role of science, technology and innovation in ensuring food security by 2030: Discussion group questions

(a) Main findings

68. About 795 million people, or every ninth person, is undernourished, the majority of which live in developing countries and rural areas. New, existing and emerging technologies can address the four dimensions of food security. For example, technologies for improving agricultural productivity, methods for improving soil fertility and irrigation technologies can increase food availability. Post-harvest and agro-processing technologies can address food accessibility, biofortification can make food more nutritious and climate-smart STI solutions – including the use of precision agriculture and early warning systems – can mitigate food instability. New and emerging technologies, including synthetic biology, artificial intelligence and tissue engineering, may have potential implications for the future of crop and livestock agriculture. However, harnessing the potential of such technologies for food security requires investments in research and development, human capital, infrastructure and knowledge flows. A favourable environment for agricultural innovation would benefit from an enabling environment, gender-sensitive approaches to technology development and dissemination, and regional and international collaboration. Furthermore, technology foresight and assessment for agricultural innovations must be in place to manage potential technological risks, while maximizing potential improvements to food security.

(b) Suggestions

69. The intersessional panel encourages Member States to consider the following courses of action:

(a) Increase national support for research and development in agriculture

(b) Support investments in infrastructure (electricity and road infrastructure), extension services, and marketing, organizational and social innovations to improve food security

(c) Create coherent policy frameworks that encourage interministerial coordination for food security, provide an enabling framework for agricultural innovation and establish appropriate regulatory frameworks

(d) Consider supporting vulnerable groups so that their traditional knowledge can be incorporated into research and extension activities

(e) Build local talent, including by fostering digital skills that are essential to take advantage of technologies relevant to food security

(f) Promote national gene banks and the protection of national genetic materials

(g) Explore adaptive policy frameworks that dynamically respond to new innovations, as well as policy sandboxes that allow policymakers to experiment with regulatory mechanisms and assess the impact of new and emerging agricultural technologies

(h) Consider mainstreaming a gender lens when developing and implementing policies that harness science and technology for food security.

70. The intersessional panel encourages the international community to consider the following courses of action:

(a) Promote the sharing and dissemination of key agricultural technologies, especially for smallholder farmers

(b) Consider how to make available data relating to agriculture, meteorology, the Internet of things, satellites and other data that could help optimize yields and support rural livelihoods

(c) Work with stakeholders to define appropriate data standards and minimize the potentially negative consequences of data sharing

(d) Facilitate the exchange of talent (for example, university professors, researchers and students) in the framework of South–South, North–South and triangular cooperation

(e) Support knowledge aid efforts that build local capacity to develop, use and deploy new and existing agricultural innovations.

71. The intersessional panel encourages CSTD to take the following courses of action:

(a) Review how STI can address the needs of marginalized groups (small-scale agriculture, micro and small enterprises) in the context of STIP reviews

(b) Strengthen the Gender Advisory Board of CSTD in general, and with respect to food security in particular, in collaboration with other United Nations entities focused on agriculture and gender

(c) Explore how national Governments can secure access to better data sources that feed into extension services, early warning systems and local innovation efforts

(d) Encourage a culture of sharing not only success stories and best practices but also failures and key challenges, in general, and with respect to agricultural innovations in particular

(e) Create and strengthen networks with academic departments, research institutions and think tanks that conduct research at the interface of development and STI

(f) Investigate ways and means of conducting international technology assessment and foresight exercises on existing, new and emerging technologies and their implications for food security.

Annex I

New innovation approaches to support the implementation of the Sustainable Development Goals: Discussion group questions

Theme 1: New innovation approaches[38]

- What policies work and which do not when supporting the new innovation approaches for sustainable development?
- What are the opportunities and challenges for applying these new approaches?

Theme 2: New finance models[39]

- How can new finance approaches support the achievement of the Sustainable Development Goals?
- What are the opportunities and challenges for applying these new approaches?

Theme 3: Deploying, scaling up and supporting new innovation approaches[40]

- How to ensure that innovation is deployed and scaled globally, especially for the poor?
- What is the role of the international community, including CSTD, in supporting these new innovation approaches?

[38] Moderator: Mr. Adrian Ely, Science Policy Research Unit, University of Sussex.

[39] Moderator: Ms. Gillian Marcelle, University of the Virgin Islands.

[40] Moderator: Mr. Alfred Watkins, Global Solutions Summit and United Nations Technology Bank for Least Developed Countries.

Annex II

The role of science, technology and innovation in ensuring food security by 2030: Discussion group questions

Theme 1: New and emerging innovations for food security[41]

- What opportunities and challenges do new and emerging technologies hold for improving food security, especially for the most marginalized people? Examples of new and emerging technologies include synthetic biology, tissue engineering, big data, the Internet of things, machine learning, artificial intelligence, mobile applications, drones and robotics.
- What role for social innovations? Are there existing innovations that are underexplored and underutilized?
- What is the role of CSTD in helping countries to understand and engage with such innovations?

Theme 2: Science, technology and innovation for smallholder farmers[42]

- What are the national experiences and best practices in improving the food production capacity of smallholder farmers and agricultural labourers in rural areas (the people most exposed to hunger or the risk of hunger)?
- What is the specific role and contribution of STI?
- What is the role of CSTD in promoting STI for smallholder farmers?

Theme 3: International community support for science, technology and innovation in food security[43]

- What is the role of CSTD and the broader international community in promoting STI for food security?
- What is the experience to date within Governments and the international community? Are there lessons to be learned from other areas of STI?
- What is needed to build partnerships among stakeholders, including Governments, business, farmers and consumers?

[41] Moderator: Ms. Olivia Yambi, International Panel of Experts on Sustainable Food Systems.

[42] Moderator: Mr. Ulrich Hoffmann, Research Institute on Organic Agriculture.

[43] Moderator: Mr. David Souter, ICT Development Associates.