Distr.: Restricted
17 February 2025

English only

Commission on Science and Technology for Development
Twenty-eighth session
Geneva, 7–11 April 2025
Item 2 of the provisional agenda
Progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society at the regional and international levels, including the 20-year review thereof
Item 3 of the provisional agenda
Science and technology for development: priority themes

Report on the intersessional panel meeting*

Held between 21 and 22 October 2024 in Geneva

Prepared by the UNCTAD secretariat

* This report summarizes the intersessional panel's discussions. The findings, interpretations and conclusions expressed herein are those of the authors and do not necessarily reflect the views of the United Nations or its officials or Member States. This document has not been formally edited.

I. Introduction

1. At its twenty-seventh session in April 2024, the Commission on Science and Technology for Development (CSTD) selected the following substantive themes for its 2024–2025 intersessional period:

(a) Diversifying economies in a world of accelerated digitalization; and

(b) Technology foresight and technology assessment for sustainable development.

2. The Secretariat organized an intersessional panel meeting in Geneva on 21 and 22 October 2024 to address these themes. The meeting also discussed 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, including the WSIS+20 Review. In addition to reviewing progress, the meeting included an informal discussion with a focus on setting up the CSTD Working Group on Data Governance (hereinafter referred to as "Working Group") and improving the efficiency of negotiating CSTD resolutions. The findings and recommendations of the intersessional panel meeting will be considered at the twenty-eighth session of the Commission in April 2025.

II. Organization of work

3. The meeting was attended by member States, representatives of international organizations, civil society, the technical and academic community and other observers. The documentation for the meeting included the issues papers on the two themes prepared by the Secretariat with inputs from the member States and relevant international organizations, presentations and written comments submitted by participants.

III. Opening

4. The Chair[1] opened the meeting by paying tribute to the late Ms. Ana Cecilia Gervasi-Diaz, Vice Chair of the 27th and 28th CSTD from the Latin American and Caribbean Group, acknowledging her invaluable contributions and leading a minute of silence in her honour. The Chair announced the election of Mr. Bernardo Roca-Rey Ross, Deputy Permanent Representative and Chair of the Permanent Mission of Peru, as Vice Chair of the 28th CSTD from the group. In outlining the agenda of the two-day Panel, the Chair highlighted the CSTD's role as the United Nations forum for discussing science, technology and innovation (STI) in sustainable development, stressing the need for dialogue amidst widening digital divides and transformative frontier technologies.

5. The Deputy Secretary-General of UNCTAD[2] underscored that the Pact of Future adopted at the recent Summit of the Future dedicates a section to STI and digital cooperation and STI also has a central role in discussions leading to the upcoming Fourth Financing for Development Conference in Spain in 2024. Both indicate a clear recognition of STI's role in achieving the 2030 Agenda. He stressed the CSTD's pivotal role as the UN's focal point for STI and its responsibility in driving international dialogue on these issues, especially in a time when multilateralism is challenged. Emphasizing the importance of the Working Group, he called on member States to financially support its work. He pointed to UNCTAD's technology assessment projects in Seychelles, South Africa and Zambia and reiterated UNCTAD's full commitment to supporting CSTD's work.

[1] H.E. Prof. Muhammadou M.O. Kah, Ambassador and Permanent Representative of the Gambian mission to Geneva.

[2] Mr. Pedro Manuel Moreno, Deputy Secretary-General of UNCTAD.

VI. Progress made in the implementation of and follow-up to the WSIS outcomes at the regional and international levels and the WSIS+20 Review

6. In his opening remarks, the moderator[3] informed the participants that the CSTD secretariat has been organizing, since September 2023, global and regional consultations in the Arab region, Europe, Asia Pacific and Africa in partnership with ITU, UNESCO and UNDP, as well as UN regional commissions on different continents. Given the adoption of the Global Digital Compact (GDC), apart from the implementation of the WSIS in the past 20 years, it was anticipated that the various stakeholders in the WSIS process to address (a) how the processes and forums emanating from the WSIS such as the WSIS Forum and the Internet Governance Forum can support the contribution of all stakeholders to Compact implementation (Paragraph 68 of the GDC); and (b) how the CSTD can contribute further to the implementation of the Compact, building on its role in the WSIS review (Paragraph 70 of the GDC).

7. The Head of the CSTD Secretariat[4] briefed the participants on progress in preparing the WSIS+20 report for the 28th CSTD. She highlighted strong participation in open consultations, which recognized the WSIS multistakeholder model but noted challenges like the digital divide, lack of university connectivity and insufficient public investment in digital infrastructure. She emphasized the need for international cooperation to support vulnerable groups, including women and marginalized communities, to ensure the equitable distribution of the benefits of digital technologies. She also addressed concerns about privacy, data protection and governance of emerging technologies like AI, stressing the importance of aligning WSIS and GDC processes for cohesive digital governance.

8. The United Nations Secretary-General's Envoy on Technology[5] updated participants on the GDC and its implications for the CSTD and WSIS. He highlighted the GDC's efforts to address human rights, misinformation and data governance, describing it as a catalyst for updating WSIS Action Lines to meet modern challenges. A key outcome is the formation of a Working Group to develop recommendations for equitable and interoperable data governance frameworks by 2026-2027, reflecting the multistakeholder principle of digital cooperation. Housing this group within the CSTD will enhance the impact of its findings. Paragraph 70 of the GDC invites the CSTD to support WSIS in contributing to GDC implementation. The Envoy hopes the WSIS+20 Review will updates to WSIS mechanisms to address emerging issues and engage new actors. Updating WSIS Action Lines could reflect current digital cooperation challenges, with broader stakeholder engagement involving health ministries, environmental agencies, organizations focused on aging or indigenous populations and social scientists. Such engagement could be particularly valuable in areas such as artificial intelligence development and application. The Envoy's office will coordinate efficient UN system delivery, integrating GDC implementation mapping into WSIS reporting.

9. A delegate from Brazil emphasized the critical role of the Geneva community in following up on the GDC and expressed Brazil's willingness to engage in discussions on AI and data governance. The delegate raised questions about the composition and inclusivity of the proposed Working Group, inquiring whether it would be limited to UN agencies or if member States would also be involved. Additionally, the delegate suggested the inclusion of the World Trade Organization (WTO) as a relevant stakeholder, given its ongoing work on cross-border e-commerce, which intersects with many of the issues addressed by the GDC.

10. A delegate from Hungary, speaking on behalf of the European Union, asked how to ensure complementarity between the WSIS+20 Review and the GDC process while avoiding duplication.

[3] Mr. Peter Major, Vice-Chair of the CSTD.

[4] Ms. Shamika Sirimanne, Director of the Division on Technology and Logistics of UNCTAD and Head of the CSTD Secretariat.

[5] Mr. Amandeep Singh Gill, United Nations Secretary-General's Envoy on Technology.

11. A delegate from Canada sought clarification on the Working Group's openness and multi-stakeholder approach, including whether participation would be limited to organizations endorsing the GDC. He shared the suggestion from the delegate from Brazil about WTO's participation.

12. In responding, the Secretary-General's Envoy on Technology[6] clarified that the Working Group operates within the UN system internally and WTO is not a formal member of the system. It will involve multiple UN agencies. He noted that the H-Lab's mandate concludes this month and highlighted its valuable role in advancing AI discussions through expert consultations and comprehensive reflections. Addressing concerns on duplication, the speaker emphasized that the Summit of the Future aims to foster momentum, especially with private sector engagement, while Paragraph 72 of the GDC mandates strengthening coordination and avoiding overlap.

13. During the panel discussion, the first panellist[7] provided an overview of the WSIS' evolution over 20 years, including addressing emerging technologies through innovative formats like hackathons and AI-focused events, showcasing its adaptability in an ever-changing digital landscape. She highlighted the 11 WSIS Action Lines which have guided over 13,000 digital projects aligned with the Sustainable Development Goals (SDGs). Achievements include connecting 5.4 billion people, increasing female Internet users to 65 per cent and linking 250,000 schools through GIGA, a UNICEF-ITU initiative. She noted that WSIS' robust governance structure, anchored in UN mechanisms such as the General Assembly, ECOSOC and the CSTD, has been essential for its continuity and relevance. The panellist stressed that WSIS' multi-stakeholder nature is key to its success, fostering inclusivity and collaboration.

14. The second panellist[8] presented UNESCO's 2024 achievements and challenges across relevant WSIS Action Lines. Key achievements included establishing access-to-information oversight bodies in 39 countries, introducing AI guidelines for judicial contexts and supporting 80 member States in implementing ICT education policies. UNESCO advanced open science with initiatives like the Open Quantum Institute and leveraged AI to protect cultural heritage, such as combating illicit artefact trafficking. The speaker noted progress in AI ethics, with 60 countries adopting ethics assessments and announced a global forum on AI digital transformation in the public sector. However, challenges persist, including digital divides, gender gaps and funding limitations.

15. The third panellist[9] emphasized the WSIS Forum's significance for Africa, noting progress since 2005 while addressing persistent challenges such as the gender divide, digital infrastructure gaps, cybersecurity and the need for digital skills. He stressed the importance of coordination among UN frameworks, governments and the private sector to establish robust regulatory frameworks and open digital public infrastructure. Capacity-building, particularly in digital skills and cybersecurity, remains critical. He called for continued collaboration among African and global stakeholders to drive digital transformation and ensure no one is left offline.

16. The fourth panellist[10] highlighted the WSIS' success, with the Internet Governance Forum (IGF) evolving into a robust multi-stakeholder ecosystem involving over 175 countries. The speaker outlined plans for the 2024 IGF in Riyadh, focusing on building a multi-stakeholder digital future, with themes such as digital cooperation, human rights and AI ethics, while aligning with the WSIS+20 Review and GDC implementation. The IGF is enhancing collaboration across UN bodies and stakeholders, increasing engagement from the Global South in AI discussions and fostering youth participation. For 2025, the IGF plans to introduce an enhanced multi-stakeholder advisory group, strengthen partnerships and further inclusivity and capacity-building. The speaker stressed the importance of

[6] Mr. Amandeep Singh Gill, United Nations Secretary-General's Envoy on Technology.

[7] Ms. Gitanjali Sah, Strategy and Policy Coordinator, International Telecommunications Union.

[8] Mr. Davide Storti, Programme Specialist, Digital Policies and Digital Transformation Section, UNESCO.

[9] Mr. Mactar Seck, Chief of Innovation and Technology Section, UNECA.

[10] Mr. Chengetai Masango, Head of Office, Secretariat of Internet Governance Forum.

coordination among global initiatives to ensure cohesive Internet governance and digital development.

17. He then delivered a statement on behalf of Mr. Juwang Zhu, Director, Division for Public Institutions and Digital Government. UN DESA, building on its role as secretariat for the WSIS+10 Review in the General Assembly in 2015, will continue to play its secretariat role in the General Assembly's review of WSIS+20 in 2025, and commit itself to facilitating a multi-stakeholder and multi-agency process with contributions from the United Nations Group on the Information Society, CSTD which will submit its twenty-year review to the General Assembly in 2025, ITU and UNESCO. He underscored the need for building upon the existing mechanisms to support the implementation of the GDC during the WSIS+20 review so as to ensure alignment between the WSIS outcomes and broader digital governance and sustainable development goals.

18. In the ensuing discussions, a delegate from Hungary, speaking on behalf of the European Union and its Member States, highlighted the critical role of international human rights in digital governance, emphasizing the need to address online abuses and promote inclusive participation, particularly for women, girls and vulnerable groups. The delegate underscored the importance of Geneva as the basis for the proposed UN office on digital collaboration, ensuring it complements rather than duplicates the efforts of the CSTD and ITU. The EU affirmed support for the multi-stakeholder model and praised the IGF as a key platform for Internet governance, particularly for engaging developing countries in GDC implementation. The WSIS+20 Review was described as a pivotal opportunity to align digital governance with the SDGs and enhance the IGF's role in supporting GDC follow-up. The speaker concluded by inviting the IGF Secretariat to comment on its envisioned role in the GDC implementation process.

19. A delegate from the Russian Federation requested that the secretariat disseminate the zero draft of the WSIS+20 Review well in advance of the 28th CSTD session and suggested considering mechanisms to incorporate contributions from international organizations serving as facilitators of WSIS Action Lines. He emphasized inclusion of the WSIS-SDG matrix in the secretariat's report to showcase progress and address gaps, particularly in AI-related challenges. The delegate stressed careful implementation of the GDC as the GDC was adopted with concerns from some countries. There is a need to establish consensus between the international communities in New York and Geneva and ensure that developing countries are the focus of the review. He cautioned against risks such as AI misuse and called for technology transfer and education in basic user skills.

20. A delegate from Switzerland reaffirmed the country's continued support for the WSIS process, noting its hosting of the first phase in 2003. She emphasized the enduring relevance of the WSIS framework grounded in transparency, inclusivity, and collaboration. The WSIS architecture, including the leading UN agencies, as well as the WSIS Forum and especially the UN IGF, provides useful platforms for international cooperation, including addressing AI-related challenges and opportunities. She proposed strengthening and updating the process into a "WSIS Plus" through the WSIS+20 Review. This would involve: (a) enhancing the UN specialized agencies as facilitators; (b) updating the CSTD as the system-wide focal point for WSIS follow-up; (c) strengthening the WSIS Forum to assess progress on WSIS goals; (d) reinforcing the IGF as a global multistakeholder platform for internet and digital governance; and (e) making the multistakeholder approach more inclusive, accountable and impactful, following the Sao Paulo Multistakeholder Guidelines adopted in April 2024.

21. A delegate from Portugal highlighted the transformative impact of technology since the WSIS meetings in Geneva (2003) and Tunisia (2005) but stressed the need to address persistent digital divides to prevent growing inequalities. The delegate welcomed the GDC's adoption, noting its emphasis on a human-centric, multi-stakeholder approach, human rights and digital cooperation. The delegate acknowledged the GDC's recognition of the CSTD's roles in data governance and the WSIS process as well as its recognition of the IGF's role. The WSIS+20 should be reviewed in the context of the 2030 Agenda and ensure technology benefits all.

22. A delegate from Austria emphasized the importance of the GDC, highlighting its adoption as a success for multilateralism and digital cooperation. She stressed the need for a multi-stakeholder approach rooted in the Tunis principles, with international law and human rights as central to governance. The delegate called for strengthening the IGF's mandate and funding to meet GDC expectations and welcomed the establishment of the Working Group on Data Governance. She also underscored the value of Geneva's expertise.

23. The delegate from Palestine emphasized the critical need for inclusion and digital connectivity to achieve sustainable development. He noted that many countries, including Palestine, African nations and the least developed countries (LDCs), remain far from achieving the SDGs due to limited political will, infrastructure gaps and challenges in technology transfer and funding. He highlighted the importance of addressing connectivity in conflict and post-conflict settings and stressed the need for inclusive participation starting at the community level to reflect specific needs. The delegate called for enhanced international cooperation to ensure connectivity during crises and avoid duplication between UN entities in Geneva and New York. He concluded by asking how to achieve effective, inclusive outcomes that leave no one behind.

24. The delegate from the Holy See stressed that the potential benefit that humanity will be able to draw from digital progress depends on the degree to which the new technologies are employed in an ethical manner. While GDC represents a significant milestone in fostering international cooperation, he emphasized the CSTD's important role in examining science and technology questions with an enhanced focus on digital equity. He proposed that the CSTD advance discussions on the governance of Artificial Intelligence (AI), informed by the multidisciplinary Independent International Scientific Panel on AI and Policy Dialogue established under the GDC. The CSTD could facilitate the creation of comprehensive guidelines for the ethical development of AI, enhance capacity-building in developing countries to enhance computing capacity coupled with data governance frameworks. The delegate concluded by asking UNESCO about its initiatives on AI ethics, including the Business Council on AI Ethics.

25. A delegate from Indonesia reaffirmed his country's strong support for the GDC and its implementation, emphasizing practical and efficient global data governance. He welcomed the WSIS+20 Review as an opportunity to assess progress and address emerging challenges. As coordinator of the Group of 77 and China Working Group on Digital Economy and Digitalization, Indonesia advocated for greater alignment between New York and Geneva processes and inclusive global cooperation, involving regional organizations like ASEAN. He highlighted the GDC's need to prioritize capacity-building, technology transfer and support for the Global South to bridge the digital divide. Highlighting Indonesia's domestic digital transformation, reflected in restructuring of the Ministry of Communications into the Ministry of Digital Affairs, he inquired how the Geneva international community could better support the CSTD, particularly in aligning efforts between Geneva and New York.

26. A delegate from Cuba stressed the urgency of achieving the SDGs and addressing digital and economic divides. She cited noncompliance with Tunis and Geneva provisions on technology transfer, financing and capacity-building as major obstacles. Certain unilateral measures like embargo have hindered her country's development. Emphasizing international cooperation, she urged developed nations to fulfil WSIS commitments. Cuba reaffirmed its dedication to enhancing internet access, telecommunications and digital transformation as pillars of sustainable development and peaceful ICT use.

27. The delegate from Canada highlighted the complexities of digital policy and governance in today's geopolitical landscape and stressed the importance of upholding the multi-stakeholder model. Canada proposed aligning the GDC implementation with the WSIS+20 Review to set the stage for the 2030 SDG Review. The delegate emphasized reinforcing existing governance mechanisms while avoiding duplication. He urged member States to identify specific issues requiring new solutions and reiterated Canada's hope that the President of the General Assembly promptly appoint the WSIS+20 co-facilitators to ensure the process is guided by the General Assembly and member States-driven leadership.

28. The delegate from Nepal, speaking on behalf of the Group of LDCs, highlighted challenges in the LDCs and Africa, including limited connectivity, inadequate data infrastructure and insufficient skills for digital transformation. He called for forums such as the GDC, CSTD, WSIS and IGF to provide tangible support, including technological, financial and regulatory assistance. Emphasizing the importance of inclusion for global digitalization, he cautioned against deepening divides and marginalization and called for commitments to be translated into concrete results.

29. A representative from the Association for Progressive Communications[11] responded to the delegate from Palestine, noting that the IGF's multi-stakeholder Advisory Group is organizing a session on safeguarding Internet access during conflicts and encouraged attendance. She inquired about the relationship between the new Working Group and the existing UN Group on the Information Society. She expressed concern that WSIS reporting often highlights achievements instead of addressing unmet goals and emphasized that fewer than 40 per cent of Africa's population and only 28 per cent in the LDCs had Internet access in 2022. She questioned how the WSIS Review would address these inequalities and prioritize digital inclusion at national and regional levels.

30. In clarifying that the U.S. embargo includes exemptions for the export of agricultural products, medicine, medical devices and other humanitarian supplies, a delegate from the United States affirmed that human rights remain central to U.S. policy towards a country subject to U.S. embargo.

31. The delegate from Cuba reiterated the ongoing impact of the unilateral embargo measures on her country, referencing annual General Assembly resolutions advocating for the removal of such measures. She highlighted recent reports detailing the challenges it poses to Cuba and its citizens, and Cuba's social system.

32. In responding to the question on the IGF's role in GDC implementation, the panellist[12] highlighted the IGF's strengths in fostering multi-stakeholder engagement and dialogue. He emphasized its extensive network of national and regional initiatives and streamlined processes, such as public comment procedures, to gather diverse stakeholder views. Referencing Paragraph 68 of the GDC, he underlined the IGF's role in collecting contributions from all stakeholders to support the compact's implementation, noting these mechanisms as effective in advancing the process.

33. In responding to the question on UNESCO's work on ATI, the panellist[13] highlighted UNESCO initiatives, particularly the UNESCO Business Council, which aims to broaden discussions on the ethical framework outlined in UNESCO's AI ethics recommendations by engaging global tech companies. He explained that the council seeks to secure commitments from these companies to adhere to ethical principles. The initial members are actively collaborating with UNESCO and the organization aspires to gain broader support from additional tech companies to promote and implement these standards.

34. The Head of the CSTD Secretariat[14] highlighted the secretariat's extensive input collection and consultations undertaken for the WSIS+20 Review. She appreciated UK's funding for the WSIS+20 and emphasized the lack of resources for the new GDC mandate for CSTD to work on data governance. She stressed the importance of member States to prioritize funding for a truly multi-stakeholder approach to the data governance so that developing countries, civil society, academic experts and private sector from the Global South would be able to participate in person the discussions at the Working Group.

35. The discussions showed that the WSIS community supports the continuity of the WSIS process and the role it can play in the GDC implementation.

[11] Ms. Anriette Esterhuysen, Senior Advisor Internet Governance, Association for Progressive Communications

[12] Mr. Chengetai Masango, Head of Office, Secretariat of Internet Governance Forum.

[13] Mr. Davide Storti, Programme Specialist, Digital Policies and Digital Transformation Section, UNESCO.

[14] Ms. Shamika Sirimanne, Director of the Division on Technology and Logistics of UNCTAD and Head of the CSTD Secretariat.

A. Theme 1: Diversifying economies in a world of accelerated digitalization

36. The Vice Chair of the CSTD[15] moderated the session. The issues paper on the theme was presented by the Secretariat[16]. The paper examines the role of digitalization in driving economic diversification in developing countries, with a focus on Industry 4.0 technologies to enhance productivity, competitiveness and industrial transformation. It highlights challenges such as workforce reskilling and inequality and identifies infrastructure, data and skills as key policy priorities. The paper also emphasizes the importance of international cooperation in areas like digital public infrastructure, open innovation, capacity-building and technology diffusion to support developing countries in adapting to technological advancements.

37. The first panellist[17] described the shift in the global research landscape, with low and middle-income countries becoming more competitive in scientific research due to capacity-building efforts. These researchers often focus on their countries' priorities. However challenges remain, such as low citation rates, weak research-industry linkages and underrepresentation in policy documentation. He stressed that increasing citation and presenting scientific results are crucial for advancing knowledge in developing countries. The panellist advocated for inclusive research collaborations, fostering knowledge exchange and creating opportunities for these researchers in international initiatives to unlock diverse perspectives and drive global innovation.

38. The second panellist[18] highlighted the persistent capability, productivity and science & technology (S&T) gaps, especially in Latin America. She stressed that economic diversification should focus on technology-intensive industries, as low-tech sector diversification offers limited growth. She outlined a strategy for productive transformation based on three elements: (a) place- and path-dependent strategies, where local conditions, past policies and existing structures define the starting point; (b) the role of industries and their linkages, emphasizing synergy between sectors, with knowledge-intensive services complementing manufacturing and agriculture; and (c) capability-intensive growth, focusing on skills and capacity upgrading to catch up technologically. She concluded by underscoring the need for industrial and innovation policies, particularly for adopting Industry 4.0 technologies to enhance productivity and capacity-building.

39. The third panellist[19] stressed the importance of industrial diversification amidst global challenges. He noted that although manufacturing is often seen as declining, it remains vital for economic growth. He highlighted the need for a nuanced approach to assess manufacturing's role, considering country-level analysis and the impact of advanced digital technologies. He also highlighted the importance of industrial policies focused on innovation, collaboration and future strategies. Lastly, he stressed that developing countries must build industrial capabilities, particularly in production, to leverage digital technologies and drive economic diversification, creating new opportunities for growth.

40. The fourth panellist[20] underscored the role of digital technologies in driving service exports and economic growth, highlighting the growing interrelation between manufacturing and knowledge-intensive services. She noted that while digital technologies present new opportunities for developing countries, they face challenges in access and effective use. She stressed that digital technologies have varying impacts on employment, productivity and growth. The panellist highlighted the need to consider infrastructure, usage and empowerment when assessing digitalization's impact and called for a balanced approach to maximize benefits and manage risks. She also underscored the importance of intersectoral linkages in industrial policies to promote economic diversification and digital

[15] Ms. Ana Cristina das Neves, Vice Chair of the CSTD.
[16] Mr. Antonio Vezzani, Economic Affairs Officer, Technology, Innovation and Knowledge Development Branch, DTL, UNCTAD.
[17] Mr. Carlos Henrique Brito Cruz OBE, Co-chair of the UN 10-Member-Group for the SDGs.
[18] Ms. Florencia Barletta, Professor, Universidad Nacional de General Sarmiento, Argentina.
[19] Mr. Nobuya Haraguchi, Chief of the Industrial Policy Research Unit, UNIDO.
[20] Ms. Valentina Meliciani, Director of the Luiss Institute for European Analysis and Policy, Italy.

transformation, concluding with a call for stronger efforts in digital infrastructure and international cooperation.

41. The last panellist[21] discussed the importance of innovation ecosystems in driving development, as outlined in the 2024 World Intellectual Property Report. Noting the concentration of innovation in a few countries dominating scientific publications, patents, and exports, he underscored the potential for economies to progress through diversification and strategic application of existing knowledge. Drawing on examples from the motorcycle and video game industries, he illustrated how countries can leverage their capabilities to innovate and maintain competitiveness. He stressed the need for tailored economic diversification strategies, emphasizing the importance of evidence-based innovation policies to promote new knowledge creation, ensuring resilience and competitiveness.

42. During the interactive discussions, delegates presented initiatives to leverage digital technologies for economic diversification. The Philippine Development Plan 2023-2028 focuses on enhancing innovation across sectors, with the Philippine Innovation Act establishing a National Innovation Council to drive innovation policies. In China, AI is being used to improve manufacturing efficiency and product quality, while promoting industries like digital finance and e-commerce. Delegates from The Gambia and Peru reported on AI adoption in sectors such as finance, agriculture, healthcare and education. Türkiye shared its experiences with digital technologies to support SMEs and reduce foreign technology dependency.

43. Delegates discussed challenges to technology and innovation for economic diversification, such as digital infrastructure limitations, a lack of skilled workers and the high cost of adopting digital technologies. Concerns about the responsible and ethical use of AI, including risks like deepfakes and data protection issues, were raised. Many delegates emphasized the importance of strengthening international collaboration to promote inclusive digital development, establishing ethical guidelines, fostering knowledge and technology sharing, enhancing capacity-building and increasing investment in digital infrastructure. The ITU and the International Atomic Energy Agency reported on collaborative projects aimed at modernizing education and fostering capacity-building in nuclear science.

44. A delegate[22] further highlighted the importance of balancing industrial and service sector development in AI-driven economic diversification and addressing challenges such as e-waste and digital trade policies.

45. Several delegates and international organizations stressed the importance of a multi-stakeholder approach to data and AI governance and inclusive processes at the global level. Two delegates[23] stressed the importance of improving the representation of developing countries in global AI governance discussions. The delegate from France announced the upcoming AI Action Summit in February 2025. Delegates[24] highlighted the importance of collaboration in sharing best practices, conducting joint research and preventing research fragmentation to enhance knowledge transfer and innovation.

46. Many delegates[25] underlined the critical role of the CSTD in facilitating global cooperation in science and technology. They reiterated the CSTD's value in supporting developing countries with national and regional innovation strategies, technical cooperation, public-private partnerships and global governance and ethical guidelines on AI and data. One delegate[26] urged the CSTD to prioritize the needs of small developing countries and assist in building capacities for sustainable, inclusive development.

[21] Mr. Julio D. Raffo, Head of Innovation Economy Section, World Intellectual Property Organization.
[22] A representative of the Russian Federation.
[23] Representatives of Peru and the Islamic Republic of Iran.
[24] Representatives of Austria, Paraguay and Romania.
[25] Representatives of the Philippines, the Gambia, the Islamic Republic of Iran and France.
[26] A representative of The Gambia.

B. Theme 2: Technology Foresight and Technology Assessment for Sustainable Development

47. The Vice Chair of CSTD[27] moderated this session. The Secretariat presented the issues paper for the theme.[28] The paper explores the use of Technology Foresight (TF) and Technology Assessment (TA) to support sustainable development in countries at varying development levels. These tools provide evidence-based support for policymakers in addressing technological changes. Although distinct, TA and TF are complementary approaches that enhance the anticipatory governance of emerging technologies. While challenging, using these tools is critical due to rapid technological advancements. Developing countries, particularly in Africa, use these tools less and international support is needed to build national capacity, including technical assistance, funding and knowledge-sharing.

48. The first panellist[29] traced the evolution of TA and TF from developed to developing countries since the 1930s. Initially, TA addressed unintended technology consequences, while TF aimed to identify opportunities and future needs. Over time, these practices have converged, complementing each other. Traditionally, TF identifies STI opportunities and challenges, enhancing innovation systems and reducing technology gaps with leading countries. It fosters knowledge sharing among government and innovation actors, explores alternative futures and informs policy through expert insights. With the adoption of SDGs, TF increasingly focuses on addressing Grand Challenges like sustainability. The panellist concluded by stressing the importance of governance mechanisms for effective TF implementation.

49. The second panellist[30] explained TA's evolution and its three main purposes: (a) providing policy advice to governments and bodies, (b) contributing to public debates for informed decisions and (c) influencing technology development by engaging with engineers on the values and impacts of technologies. TA emerged from society's ambivalence towards technology, aiming to harness benefits while mitigating adverse effects, like climate change from energy production. While TA and TF overlap, TA primarily developed in Western contexts and the panellist emphasized the need to adapt TA methods to suit different cultural and governance traditions. He highlighted a global TA network as a foundation for broader international collaboration.

50. The third panellist[31] discussed key challenges in applying science and technology (S&T) foresight, particularly around data access and the difficulty in predicting long-term technological impacts. He emphasized the need for adaptive foresight methods in policymaking, especially in contexts of uncertainty and data limitations. He recommended leveraging AI to enhance foresight exercises and prioritizing S&T foresight in government and international agendas. The panellist suggested establishing more future labs and UNESCO chairs in developing countries to institutionalize foresight and highlighted the importance of capacity-building initiatives and increased financial support for implementing STI foresight studies, particularly in Africa.

51. The fourth panellist[32] discussed India's long experience with S&T policy advice, noting challenges such as limited capacity for applying TA tools, insufficient scientific community engagement and lack of coordination between innovation and governance. She

[27] Ms. Leah Buendia, Vice Chair of CSTD, Undersecretary, Department of Science and Technology, Philippines.

[28] Mr. Michael Lim, Economic Affairs Officer, Technology, Innovation and Knowledge Development Branch, DTL, UNCTAD.

[29] Mr. Ian Miles, Emeritus Professor, Manchester Institute of Innovation Research, University of Manchester, United Kingdom.

[30] Mr. Armin Grunwald, Head, Institute for Technology Assessment and Systems Analysis, Karlsruhe Institute of Technology, Germany.

[31] Mr. Alexander Sokolov, Deputy Director, Institute for Statistical Studies and Economics of Knowledge, Higher School of Economics, Russian Federation.

[32] Ms. Poonam Pandey, Maria Zambrano Fellow, Post-Growth Innovation Lab, University of Vigo, Spain.

stressed that social justice and environmental sustainability must remain central in developing countries. TA should focus on equity, inclusion and transformative policies, incorporating systems thinking, decoloniality and intersectionality. She highlighted the need for capacity-building, the development of reflexive tools and ongoing reflection on methods to ensure inclusive and relevant S&T policy advice.

52. The representative from the Gender Advisory Board[33] commended the CSTD for integrating a gender perspective into TA and TF. She stressed that addressing gender issues is essential to achieving the sustainable future envisioned by the Pact for the Future and the GDC. She called for institutionalizing gender analysis in TA and TF processes, embedding gender-responsive methodologies and using gender-responsive metrics to evaluate technological policies. Engaging experts and implementing capacity-building programmes to train practitioners in integrating gender perspectives are crucial steps. Integrating gender analysis is vital for fostering inclusivity and sustainability.

53. During the interactive discussions, the Chair of the CSTD[34] highlighted the diverse perspectives shared on TA and TF. He raised a critical question regarding the capacity-building needs of African countries, small island states and the LDCs in effectively applying these tools to shape policy. Additionally, he inquired whether the LDCs should prioritize foresight alone or adopt a combined approach of both TF and TA to address their specific challenges.

54. Many delegates[35] stressed the importance of international cooperation, networking and capacity-building to exchange knowledge, share best practices and bridge gaps in TA and TF expertise. The delegate from Colombia highlighted the need for a faster transition to clean energy, emphasizing that global conflicts have worsened climate change effects. He urged accelerating innovation to connect energy technologies and extend clean energy solutions, framing the energy transition as a comprehensive process that respects human rights and ensures inclusivity.

55. The delegate from the Philippines suggested the CSTD could facilitate discussions to develop international standards and tools for holistic TF, addressing grand challenges and sustainable development. While recognizing the Philippines' efforts in TF and TA, the delegate noted challenges such as limited access to quality information, insufficient technology data and difficulties in developing and retaining specialized talent. The delegate emphasized that integrating TA and TF is crucial for developing forward-looking, evidence-based STI policies.

56. The delegate from Peru inquired about improving links between global technological research centres and creating an international centre to exchange technological products and govern emerging technologies. The delegate from Romania called for increased training, funding and international networks to promote future literacy, stressing the role of international organizations in advancing TA and TF. Both delegates suggested establishing platforms for countries to share successes, challenges and lessons learned, leveraging initiatives like the UNESCO Global Futures Literacy Network to support TA and TF development.

57. Some delegates[36] supported UNCTAD's continuation of updates on pilot projects with Seychelles, Zambia and South Africa and suggested undertaking similar projects in other African countries. The delegate from the State of Palestine inquired about progress in technical assistance and access to funds for specific projects, highlighting the challenges faced by developing nations and requesting steps to accelerate implementation.

58. Two delegates[37] stressed the need to address technology transfer as a key challenge for developing countries, to be integrated into TA and TF frameworks. The delegate from

[33] Ms. Caitlin Kraft-Buchman, Co-chair, Gender Advisory Board of the CSTD.

[34] H.E. Prof. Muhammadou M.O. Kah, Ambassador and Permanent Representative of the Gambian mission to Geneva.

[35] Representatives from the Gambia, Colombia, Cuba, Ecuador, the Philippines, Peru, Paraguay, Romania, the State of Palestine, the African Union, Iran, South Africa and Ethiopia.

[36] Representatives from the African Union, Ethiopia.

[37] Representatives from the State of Palestine, Iran.

the State of Palestine highlighted the lack of capacity, financing and technology transfer as critical areas for UNCTAD to address, including through case studies. The delegate from Iran supported transparent technology transfer mechanisms, advocating for removing intellectual property barriers to enable local innovation and emphasizing the need for measures to ensure information integrity and data protection amid the growing digital divide.

59. Several delegates[38] and the representative of the Gender Advisory Board of the CSTD[39] emphasized the importance of gender diversity and a multi-stakeholder approach in TA and TF frameworks. The delegate from Colombia stressed recognizing women's diversity and protecting rights during technological progress, including energy transitions and sought recommendations for using new technologies to advance the UN 2030 Agenda and inclusive development. The Gender Advisory Board member[40] commended the CSTD for integrating a gender perspective and called for more exchange of experiences and best practices. She proposed the CSTD lead a discussion on global TA and TF, ensuring access to data on emerging technologies for all stakeholders.

60. Some delegates[41] underlined the necessity to strengthen data infrastructure and improve access to data on frontier technologies, including their gender impacts. The delegate from the African Union stressed the importance of data access to align with regional priorities and supported adopting a UN resolution to enhance data access in this context.

61. The delegate from the Russian Federation highlighted the role of industrial partners and private corporations in advancing AI and robotics, which have significant development implications. He noted that state research centres in developing countries face challenges in foresight on these technologies due to limited expertise, computing power and data. The delegate called for international recognition of these challenges and recommended specific guidance for UN Member States on technology assessment and foresight, particularly for AI and robotics, involving both Global South and North stakeholders.

62. Several delegates shared national experiences with TA and TF. The delegate from the United States highlighted TA and TF as crucial for forward-looking policymaking, emphasizing proactive, localized and anticipatory technology governance to harness emerging technologies while mitigating risks. The delegate posed a question on the role and utility of technology awareness in TA or TF. The delegate from Türkiye described its technology roadmap, developed with stakeholders to guide planning in AI, advanced materials, biotechnology and cybersecurity. The delegate from the Philippines shared their country's "PAGTANAW 2050" foresight plan, emphasizing TF and TA in equipping agencies to analyze trends and shape R&D. The delegate suggested the CSTD facilitate international discussions on standards and tools for holistic TF approaches. The delegate from South Africa referenced their country's experience with STI foresight and TA, particularly under the UNCTAD pilot project, stressing participatory approaches involving diverse stakeholders, including women.

63. Some delegates[42] commented on the challenges in implementing TA/TF methodologies, attributing these challenges primarily to a lack of familiarity, experience, funding and the absence of comprehensive policy frameworks. The delegate from Ethiopia inquired about ways to effectively integrate TA into their existing frameworks to ensure that emerging technologies align with their long-term SDGs. The delegate noted that technology is a key component of Ethiopia's National Development Plan and emphasized the importance of aligning technological advancements with the SDGs. They also requested that UNCTAD expand its TA exercises in Africa, building on the experience of the three African countries that participated in the pilot TA project.

[38] Representatives from Colombia, Paraguay, Romania, and the African Union and the Gender Advisory Board.

[39] Ms. Caitlin Kraft-Buchman

[40] Ms. Neth Daño

[41] Representatives from the Gambia, the Philippines, the Russian Federation and the African Union.

[42] Representatives from Paraguay and Ethiopia.

64. The ITU delegate noted the organization's leadership in leveraging TF and TA to ensure that emerging technologies contribute positively to global progress. They noted their ongoing support initiatives in TF and TA with member States and in collaboration with other UN agencies. Some examples of projects are the Focus Group on Technologies for Network 2030 and the AI for Good Global Summit, which provided policy guidance on digital technologies and developed standards for 5G and AI implementation. The delegate from the UN Technology Bank stated that conducting Technology Needs Assessments (TNA) is a core service that systematically identifies technological needs, gaps and priorities in the LDCs. She noted that the Technology Bank sees many synergies between TA and TF with the TNAs, describing them as highly complementary in supporting governments with informed decision-making and policymaking. She expressed a commitment to cooperate with development partners and support countries in these initiatives.

65. In response to queries, the first panellist[43] stressed the importance of supporting mechanisms for sharing experiences and capacity-building, emphasizing clarity on who provides the training, who benefits and how effectiveness is evaluated. The second panellist[44] noted that most stakeholders focus on adopting rather than shaping technologies, which are typically developed by large companies. He agreed that replacing older technologies is a social transformation, with TA addressing its technological and social implications, and highlighted the role of funding in past TA/TF projects in Israel, Jordan, Chile and Indonesia. The third panellist[45] underscored the need for government interest in TA/TF to ensure TA/TF success, with international organizations offering support. The fourth panellist[46] emphasized building national capacity in developing countries and incorporating technology transfer and equitable access in TA efforts.

V. Main messages for consideration by the 28th Commission

66. The following findings and suggestions on the two priority themes were highlighted at the panel meeting and put forward for consideration by the CSTD at its twenty-eighth session.

A. Theme 1: Diversifying Economies in a World of Accelerated Digitalization

1. Main findings

67. The session on the priority theme "Diversifying Economies in a World of Accelerated Digitalization" highlighted the opportunities and challenges of economic diversification in the digital age, emphasizing the need to develop technology- and knowledge-intensive industries. This requires strengthening innovation ecosystems and fostering linkages between industries and research institutions to maximize the impact of these sectors across the economy.

68. Structural transformation must be tailored to each country, leveraging local innovation and production capabilities. There is no single path to diversification, but linking STI is crucial, especially for developing countries where these connections remain underdeveloped.

69. A successful technology-driven transformation depends on robust digital infrastructure, data access and skills. International cooperation is essential to address gaps

[43] Mr. Ian Miles, Emeritus Professor, Manchester Institute of Innovation Research, University of Manchester, United Kingdom.

[44] Mr. Armin Grunwald, Head, Institute for Technology Assessment and Systems Analysis, Karlsruhe Institute of Technology, Germany.

[45] Mr. Alexander Sokolov, Deputy Director, Institute for Statistical Studies and Economics of Knowledge, Higher School of Economics, Russian Federation.

[46] Ms. Poonam Pandey, Maria Zambrano Fellow, Post-Growth Innovation Lab, University of Vigo, Spain.

in these areas, helping developing countries bridge the digital divide and promote economic diversification through digital public infrastructure, open innovation and capacity-building.

2. Suggestions

70. Member States may wish to consider the following suggestions:

(a) Strategically position themselves to capitalize on the opportunities offered by digitalization. Governments should engage with stakeholders to identify the potential applications of digital technologies across the economy that can support economic diversification and industrial upgrading.

(b) Develop national strategies for digital technologies. Governments should formulate national strategies to leverage digital technologies, articulating clear visions and feasible roadmaps for their applications in the economy.

(c) Diversify into digital products and services. Governments should invest in supporting the creative economy and knowledge industries that can thrive in a digital environment.

(d) Build robust digital infrastructure. Governments could mobilize investments from both public and private sources to create or strengthen Digital Public Infrastructure systems, such as digital payment and cloud services, to drive technology-led structural transformation and industrial upgrading.

(e) Promote digital literacy and skills development. Governments should prioritize education and training programmes to diffuse digital literacy, as well as provide reskilling and upskilling programmes to help the workforce leverage digital technologies.

(f) Strengthen public-private partnerships. Governments should strike a balance between competitive grants and unconditional grants, as well as between project-based and program-based support to safeguard public interest.

(g) Establish regulatory frameworks. Governments should establish clear and supportive regulations for digital technologies and digital businesses, including AI governance, data protection laws, cybersecurity frameworks and intellectual property rights.

71. The international community may wish to consider the following suggestions:

(a) Promote knowledge-sharing and exchange of experiences. The international community should leverage existing platforms and mechanisms to promote the sharing of good practices and lessons learned on harnessing digital technologies for economic diversification.

(b) Enhance capacity-building activities. The international community should support developing countries in creating strong educational and lifelong learning frameworks that integrate digital skills into current curricula as well as offer tailored training programmes and capacity-building initiatives to address gaps in skills.

(c) Create technical cooperation projects. The international community should implement technical cooperation projects to promote the adoption and development of digital technologies for economic diversification that are aligned with the needs and priorities of developing countries.

(d) Set up a global open innovation strategy. Open innovation approaches, including open data and open source, can facilitate the sharing of knowledge and resources as well as improve transparency and trust, thereby enabling global collaboration and innovation.

(e) Empower policymakers in designing and implementing STI policy. The international community, including through the CSTD, should provide training to help policymakers in developing countries improve awareness of and ability to apply different policy instruments and incentives.

(f) Support infrastructure development. The international community should support investments in national infrastructure development, particularly in digital

connectivity and computing power, which enable the deployment of digital technologies in production processes for economic diversification and industrial upgrading.

(g) Develop a global consensus on ethical frameworks and guidelines. The international community should enhance global cooperation to develop and align ethical frameworks and guidelines for the responsible development and adoption of digital technologies.

B. Theme 2: Technology Foresight and Technology Assessment for Sustainable Development

72. The following findings and suggestions on the two priority themes were highlighted at the panel meeting and put forward for consideration by the CSTD at its twenty-eighth session.

1. Main findings

73. Anticipating the future is vital for improving countries' ability to govern technologies, harnessing their benefits and mitigating risks for sustainable development. Technology foresight and assessment are increasingly critical tools for building local capacity for anticipatory governance, especially in developing countries in Africa, which lag behind global leaders. These tools, used for decades in leading countries are indispensable yet complex and complementary, requiring both national efforts and international collaboration for strategic planning. Progress remains limited, with challenges including building public sector capacity, addressing financial constraints, improving data access, fostering strong stakeholder engagement and securing decision-maker support to promote uptake. Other challenges include strengthening the research-policy interface, raising awareness of these tools, overcoming fragmented approaches and developing adaptable methodologies. International cooperation and support, including at regional levels, are crucial to accelerate progress toward the 2030 Agenda.

2. Suggestions

74. Member States may wish to consider the following suggestions:

(a) Initiate or strengthen dedicated institutions for TA/TF to scope projects that inform STI-related policy decisions. Proper scoping is critical to ensure the projects are aligned with national and regional priorities;

(b) Identify champions to advocate for the initiatives, ensuring cross-government collaboration and effective implementation of TA/TF results;

(c) Maintain independence to prevent bias in assessments, ensuring TA/TF exercises do not simply reinforce existing policies but provide objective insights;

(d) Embed considerations of social justice and environmental sustainability and actively involve women, marginalized communities and diverse stakeholders to ensure inclusive policy outcomes of TA/TF exercises.

(e) Adapt TA/TF methodologies to national and sub-national contexts to ensure relevance and effectiveness in addressing local challenges;

(f) Break down silos between ministries by promoting cross-sectoral TA/TF initiatives to address complex, overlapping issues in science and technology;

(g) Explore collaborations across national and regional borders to pool resources and address shared challenges effectively.

(h) Explore the potential of AI and other digital technologies to enhance TA and TF exercises.

75. The international community may wish to consider the following suggestions:

(a) Focus on identifying and mobilizing resources for TF/TA exercises and help countries leverage successful TA/TF models;

(b) Develop international methodological standards for TA/TF to promote mutual understanding and learning from these TA/TF exercises across regional and national contexts. This would enable consistent comparisons across countries and encourage the use of shared tools to address global technological challenges;

(c) Build national capabilities within countries to conduct TA/TF projects independently, reducing reliance on external expertise. This ensures sustainable and long-term capacity for innovation and policy formulation;

(d) Create a global framework to provide technical assistance, funding and knowledge-sharing for countries developing TA/TF capabilities;

(e) Formulate specific guidance for UN member States on TA/TF exercises in the context of developing policies for rapid technological change, with focus areas on AI, robotics, biotechnology and energy transitions.

(f) Harness the CSTD's role as a forum for strategic planning, sharing lessons learned and best practices in TA/TF methodologies.