

2019 STI Forum Briefing Note

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Summary of the Fourth Annual Multi-Stakeholder Forum on Science, Technology, and Innovation for the Sustainable Development Goals: 14-15 May 2019

The fourth annual meeting of the Multi-Stakeholder Forum on Science, Technology, and Innovation for the Sustainable Development Goals (SDGs)—STI Forum 2019—convened under the theme of “STI for ensuring inclusiveness and equality.” The Forum focused on:

- SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
- SDG 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all;
- SDG 10: Reduce inequality within and among countries;
- SDG 13: Take urgent action to combat climate change and its impacts; and
- SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable and inclusive institutions at all levels.

These are the same SDGs to be reviewed at the upcoming session of the UN High-level Political Forum on Sustainable Development (HLPF) in July 2019. The outcomes of the STI Forum 2019 will be summarized by its Co-Chairs and serve as inputs to the HLPF’s deliberations.

The STI Forum 2019 featured a series of 90-second innovation pitches and nine substantive panel discussions. The Forum also examined the way forward for the facilitation of STI for the SDGs, with calls for, *inter alia*, greater science-business connections to drive implementation, more resources and funding, operationalization of an online inventory of STI, and making the STI Forum a culmination of intersessional work.

The STI Forum is a component of the Technology Facilitation Mechanism (TFM) outlined in the Addis Ababa Action Agenda and the 2030 Agenda for Sustainable Development. The TFM also includes a UN Inter-Agency Task Team on STI for the SDGs (IATT), a 10-Member Group, and an online platform.

The IATT is comprised of UN agencies, and coordinated by the UN Department of Economic and Social Affairs (UN DESA) and the UN Conference on Trade and Development (UNCTAD). The 10-Member Group was established in January 2016 to work with the IATT to prepare for the STI Forum, and develop and operationalize the TFM’s online platform, among other tasks. Its Co-Chairs for 2018-2019 are Vaughan Turekian, Executive Director, Policy and Global Affairs, National Academies of Sciences, Engineering, and Medicine, US, and Agnes Lawrence Kijazi, Director General, Tanzania Meteorological Agency. The

online platform aims to serve as a gateway for information on existing STI initiatives, mechanisms, and programmes.

The TFM was officially launched in UN General Assembly resolution 70/1 in September 2015, which calls on the President of the UN Economic and Social Council (ECOSOC) to convene the STI Forum once a year to discuss cooperation on STI around thematic areas for the implementation of the SDGs. The Co-Chairs of the STI Forum 2019, appointed by ECOSOC President Inga Rhonda King, are Amb. Elizabeth Thompson, Permanent Representative of Barbados to the UN, and Amb. Marie Chatardová, Permanent Representative of the Czech Republic to the UN. The STI Forum 2019 took place at UN Headquarters in New York on 14-15 May 2019.

Welcome Address and Opening: Appreciating the Cross-cutting Nature of STI

Opening Remarks: ECOSOC President Inga Rhonda King opened the STI Forum on Tuesday morning, noting that while STI is helping the world address global challenges, changes are not deep or fast enough to respond to those challenges. She called for stepping up efforts to leverage STI for the SDGs.

Liu Zhenmin, UN Under-Secretary-General for Economic and Social Affairs, said 2019 is a special year as it completes the first cycle of the HLPF, and is an opportunity to reflect on lessons learned and the way forward. He noted that the TFM demonstrates a model of working together in the UN system, adding that 42 UN entities are part of the IATT. Among the TFM’s accomplishments, he indicated the release of a “Guidebook for the Preparation of STI for SDGs Roadmaps,” and the development of a prototype of the online platform to help connect providers of technology solutions to those who seek them. Liu outlined the need for sustainable funding and partnership contributions for making further progress on the Mechanism. He further reported that more than 30 side events are being organized in parallel with the STI Forum, and that a record number of submissions were received for the Global Call for Innovations.

Keynote Presentations: Romain Murenzi, Executive Director, The World Academy of Sciences, stressed the importance of SDG 4 (quality education), noting that much of the world’s inequality is related to technology and a lack of STI in education. He highlighted the importance of addressing inter-related issues, including the need for:

- children to think as innovators;
- education for women and girls;
- internet technology that provides education to a growing number of people in Africa;
- policy support for development and capacity;
- international cooperation and the use of diplomacy; and
- more science academies, especially in developing countries.

He qualified science and technology as key to the future of all developing countries.

Claudette McGowan, Chief Information Officer, Bank of Montreal, Canada, said velocity, speed, and direction are needed for technology and innovation, and described data as the “new oil,” and speed as the “new water” since both are vital resources for humanity’s existence. She underscored the importance of education, providing opportunities to participate in the digital economy, and connecting leaders with learners. She provided examples of inclusive initiatives undertaken by Canada to close the technology and innovation gap, saying more than one million students and thousands of teachers in the country were taught how to code, including women, indigenous peoples, and rural communities. Commenting that Canada is investing in artificial intelligence (AI), she remarked that the future will include humans collaborating with robots to deliver value. She added that 5G technology will be a key enabler for smart connectivity, but warned that this technology is also characterized by unknowns.

Session 1: Emerging Technology Clusters and the Impact of Rapid Technological Change on the SDGs

Presentation of TFM Findings: In accordance with General Assembly resolution 73/17, Alexander Trepelkov, Officer-in-Charge, Division for Sustainable Development Goals, UN DESA, updated participants on the TFM findings on the impact of rapid technological change on the achievement of the SDGs. He reported on the great potential and promise of STI for the SDGs, while underscoring risks, gaps, and other impacts identified, such as the potential imbalance between job creation and job destruction, greater wealth concentration and shrinking demand for low-skilled workers, and pollution. He highlighted proposed solutions, such as lifelong learning systems, a stronger science-policy interface, responsible and ethical deployment of technology, and policy coherence through multi-stakeholder and multi-sectoral engagement.

Noting 50 science-policy briefs had been volunteered by experts, Trepelkov provided a glimpse of the issues covered, ranging from governance systems for AI and disruptive technologies to geospatial mapping systems and applications for the SDGs. He highlighted recent activities by IATT partners, including the operationalization of the Centre for AI and Robotics, a series of UN Technology and Innovation Labs, and the AI for Global Good Summit.

Panel: Abby Shapiro, Senior Vice President, US Council for International Business, warned against policies and regulations imposed from the top down as a potential drag on development, calling instead for fostering consistent and mutually-supportive policies that empower business to drive change. She cited business as an essential partner to bridge financial and technical gaps, noting that the promise of STI cannot be achieved without the full deployment of the private sector’s know-how. Describing the Business for 2030 Platform, she provided examples of large corporations’ initiatives that support the SDGs on water, energy, gender, and more.

Isabel Guerrero Pulgar, Secretary-General’s High-level Panel on Digital Cooperation, Director, IMAGO Global Grassroots, and Lecturer, Harvard Kennedy School, reported on the draft recommendations of the High-level Panel, including forming a multi-stakeholder alliance that creates a platform for the sharing of “digital goods” and creating digital policy helpdesks to build capacity for dealing with rapid technological change. In the interest of bringing together two schools of thought about regulation, she said the Panel recommended a set of “common rails,” such as access and connectivity, as well as “guard rails,” such as smart regulation. Noting data as a cross-cutting theme,

she reported that the Panel is calling for a multi-stakeholder agreement on standards that allow data to flow while also preventing it from going beyond its intended use.

Amir Dossal, President, Global Partnerships Forum, called for making the TFM’s online portal less passive by developing it as an interactive partnerships portal where people can learn from one another. He also called for delivering low-tech solutions through high-tech means, citing healthcare solutions that have the potential to reach a broader population.

Discussion: Stakeholders raised concerns about ethics, social justice, and security of online data, with one citing “extremely concentrated data in a few clouds and digital platforms that are essentially self-regulated,” warning that if data is the new oil, then we should remember that “oil brought us climate change.” Participants also discussed “horizon-scanning” tools that help anticipate and cope with technological change before its onset.

Closing the session, moderator Ada Yonath, Director, Helen and Milton A. Kimmelman Center for Biomolecular Structure and Assembly of the Weizmann Institute of Science, Israel (and 10-Member Group), pointed to examples related to health raised during the panel, calling upon the UN, governments, and companies to act against antibiotic resistance.

Session 2: Ministerial Segment – Strengthening Capacity and Policy for the Development of STI Roadmaps

High-Level Statements: Palestine, for the Group of 77 and China, called for building capacity on STI, and for allocating financing for the TFM, including for the operationalization of the online platform. She also underscored the need to close the technology gap, and highlighted technology transfer as one of the core priorities of developing countries in order to implement the 2030 Agenda.

Among other STI initiatives, Ecuador said his country developed regional hubs to break down silos between universities, and organizes competitions for research projects as a way to stimulate creativity and bring people together.

Serbia indicated that it has adopted a research for innovation strategy, and developed a research infrastructure roadmap and an open science platform.

Ethiopia reported that his country has developed STI policies that seek to enhance national capacities, and has created an enabling environment for the involvement of the private sector and the Ethiopian diaspora.

The Philippines said his country’s Development Plan seeks to champion access to technology and innovation. He also mentioned the Philippine Startup Challenge, which encourages students to engage in the digital economy.

Japan said her country’s vision for the future, “Society 5.0,” is linked to the SDGs. She also reported that Japan has started formulating STI for SDGs roadmaps.

Hungary announced plans to be a frontrunner on 5G, and noted that the country will be hosting the International Telecommunication Union (ITU) Telecom World 2019 Event.

Barbados said it has created a Ministry of Innovation, Science, and Smart Technology, and outlined the challenges her country faces, such as its sensitivity to external shocks, and the need to import key commodities.

Egypt reported that it is hosting a UN Technology Innovation Lab, and that high quality education is a top priority for his country’s development.

The European Union (EU) said it started designing local STI roadmaps in 2011 and initiated their implementation in 2014.

She also noted Europe’s implementation of more than one hundred Smart Specialization Strategies that involve stakeholders and are evidence-based.

Session 3: STI for Education and Decent Work for the Future (SDG 4 and SDG 8)

Co-Chair Chatardová introduced the session, explaining it would examine how to reshape education for the rapidly changing future of work.

Innovation Pitches: Rana Dajani, We Love Reading, Jordan, noted this grassroots programme empowers adults, mostly women, with a mindset of “I can.” She described how “ambassadors,” aged 16-100, are trained to read aloud in their local language to children aged 0-10. Stressing that We Love Reading harnesses technology to “serve us,” and not vice versa, Dajani noted the programme’s adults become leaders and social entrepreneurs who connect via an online platform, while children build human connections.

Kate Radford, Can’t Wait to Learn, the Netherlands, lamented the millions of children who are either not learning in, or lack access to, school due to conflict. She introduced the concept of developing gaming technology for curriculum applications to be used globally. She said that the pilots, studies, and trials conducted so far have shown very strong learning results.

Panel Presentations: Moderator Anne-Christine Ritschkoff, Senior Advisor, VTT Technical Research Centre of Finland Ltd. (and 10-Member Group), opened the Panel with the premise that education is the basis for a sustainable and resilient society.

Stefan Schnorr, Director-General, Digital and Innovation Policy, Federal Ministry for Economic Affairs and Energy, Germany, presented an optimistic view of technological change’s impact on work and economic growth, noting that previous ages of industrialization were followed by more jobs and higher wages, as well as visible environmental benefits. He called digitization an enabler, rather than a destructive force, noting how AI can optimize manufacturing without job cuts, while also improving job quality. With regard to policy recommendations, he emphasized that the best approaches are largely dependent on the country in question.

Myung Ja Kim, President, Korean Federation of Science and Technology Societies, presented the Republic of Korea’s rise from the ashes of the Korean War, largely thanks to its strong focus on institutional infrastructure for STI. In presenting her policy recommendations, she called for the creation of national STI ecosystems, the restructuring of school curricula to incorporate STI for the SDGs, and the promotion of “leapfrogging,” such as through educational technology transfer.

Antonin Fejfar, Czech Academy of Sciences, gave concrete examples of innovations affecting the SDGs. He described how basic research with an unknown application resulted in treatment for HIV. Fejfar also highlighted how the EU Horizon 2020 project NextBase has accelerated the development of the next generation of solar photovoltaic panels, adding that solar has now become the fastest growing source of electricity.

Chaesub Lee, Director, Telecommunication Standardization Bureau, ITU, noted how technology can prompt such workstyle phenomena as teleworking, remote participation, and more people choosing one or more part-time jobs. He called for sustainable infrastructure to support the implementation of information and communications technology and for all stakeholders to create international standards for secure and safe deployment of technology.

Discussion: Member States gave concrete examples of their programmes that are implementing technological solutions, such as Digital Kazakhstan, which is promoting human capital development and a “digital silk road,” and the implementation of an electronic portal for public services and databases to increase public safety in Kyrgyzstan.

In response to a call for concerted efforts to address gender disparity in science, technology, engineering, and mathematics

education, Schnorr highlighted the Group of 20 #eSkills4Girls initiative, which promotes participation of women and girls in the digital economy. Lee also noted age gaps, stressing the need to take into account difficulties that aging people can have with technology change.

With regard to policy, participants called for:

- more environmental education;
- examining how technological change will affect employment in the near-term;
- reshaping engineering education to prepare students for designing solutions for the SDGs; and
- implementing a comprehensive learning strategy that includes education in enterprises, communities, and families.

Session 4: Gender and STI for SDGs

Panel Presentations: Moderating the session on Gender and STI for SDGs, Špela Stres, Head of Innovation and Technology Transfer Center, Jožef Stefan Institute, Slovenia (and 10-Member Group) noted the challenges of retaining women in STI fields, and the need to close the gender gap in STI.

James Heintz, Andrew Glyn Professor of Economics, University of Massachusetts, Amherst, US, called for addressing women’s access to technologies, including mobile technologies, and to improve women’s representation in fields that inform policy recommendations, such as economics. He also encouraged recognition of the economic contributions of women, noting that a substantial amount of work carried out by women, such as family work, is unpaid.

Alice Abreu, Professor Emerita, Federal University of Rio de Janeiro, Brazil, Member of Gender Advisory Board, Brazil, noted the need for structural change in scientific and technological institutions to achieve gender equality. Referring to the GenderInSite report on Pathways to Success, she said more gender-related evidence is needed to inform international science and policy formulation, and to promote women’s leadership in science. She also remarked that international science organizations should further advocate for gender equality in science.

Aliza Inbal, Director, Pears Program for Global Innovation, Jerusalem Institute for Policy Research, Israel, noted that while Israel has a top innovative ecosystem, it faces the challenge of having not enough programmers. To address this issue, she recommended:

- identifying top people early in their education, from different areas of society;
- improving training by organizing boot camps and by bringing on board community leaders, private companies, and other stakeholders; and
- using peer learning and peer networks.

Discussion: Some participants called for leaving no one behind in innovation and noted the importance of women’s leadership to address the technological gender divide. Stakeholders highlighted the need to, *inter alia*:

- spend more time teaching coding skills;
- combine basic literacy skills with basic technology skills;
- address structural and gender barriers on STI; and
- ensure institutional support and mentorship for women.

Following these comments, Heintz remarked that women’s higher attainment in education does not necessarily translate into work opportunities. Abreu noted that norms and culture are among the more difficult things to change, and highlighted the importance of support “from the top” and institutional will. Inbal called for respecting work-life balance in STI.

Briefing from the UN Commission on Science and Technology for Development

In a video message on Wednesday morning, A Min Tjoa, Chair, UN Commission on Science and Technology for Development (CSTD), briefed participants on the work of the Commission's 22nd session taking place this week in Geneva, Switzerland. He reported that participants were highlighting the need to steer technological changes in ways that support inclusiveness and are consistent with the values and principles of the UN.

Session 5: A Brighter Future – Youth, Innovation Ecosystems, and Development

Innovation Pitches: Anne K. Rweyora, A roof, A skill, and A market for Women, Uganda, described how this initiative is empowering women to become homeowners, using environmentally-friendly building materials to provide durable homes in order to leave no woman behind without decent shelter.

Fakhira Najib, Broad Class – Listen to Learn, Pakistan, characterized radio as a powerful tool that her programme is employing to broadcast daily lessons, benefiting more than 200,000 children and teachers across Pakistan. She indicated that local industry has partnered to manufacture rechargeable radios, helping to ensure more people can access this important medium for information and education.

Prince Agbata, Coliba Recycling, Ghana, described the deplorable working conditions and permanent consequences of people working in landfills to recover waste, noting that Coliba makes use of mobile technology in Ghana, Côte d'Ivoire, and soon Nigeria, to cope with the huge plastic waste problem.

Panel Presentations: Khalisah Zulkefli, Biochemist, University of Melbourne, Australia, stressed the importance of building SDG awareness among youth and teaching them how they can apply their education and knowledge to tangible solutions. She also raised the issue of scientific communication, calling for more effective methods for increasing social understanding of science. While scientists are trained to communicate data to other scientists, she said, they must also be able to relate their research to other stakeholders, such as policymakers and the media. She cited the Science meets Parliament event in Australia as one example of a step in this direction.

Amollo Ambole, Policy Fellow, Africa Climate Change Leadership Program, University of Nairobi, Kenya, relayed findings from research on household energy problems in informal settlements in Kenya. She noted that young people are very innovative in these situations, learning to create electricity connections for their households, albeit illegally. Adding that the role of researchers is to facilitate constructive dialogue, she called for involving these young people in formal systems within the bounds of law and order. She called for researchers to collaborate with communities to design their research projects and to aim for policy relevance in order to enable an effective regulatory framework.

Tia Hodges, Senior Program Officer, Citi Foundation, informed participants of the global activities of Pathways to Progress, a Citi Foundation programme that supports youth employment, entrepreneurship, and social enterprise development. She called out the programme's special focus on funding low-to-moderate income and poor youth, quoting that, "Talent is equally distributed but opportunity is not." She recommended providing young entrepreneurs access to seed capital, and to be cognizant of protecting their intellectual property.

Discussion: Responding to a comment on the largely undefined concept of an "innovation ecosystem," Moderator Heide Hackmann, CEO, International Science Council (and

10-Member Group), agreed on the need for conceptual clarity and suggested this issue could be addressed in future STI Forum sessions or by the 10-Member Group.

Many participants spoke about youth's contribution to the implementation of the SDGs, calling for going beyond empowering and engaging them to transforming them into decision- and policymakers.

The discussion also highlighted potential pitfalls, such as the possibility that separating out youth in an effort to highlight their work could also create silos between young scientists and the rest of the scientific community. One participant raised the risk of not accounting for the negative effects of digital applications, and noted the difference between "fully digital classrooms" and digital literacy.

In response to questions about preparing young people for the workforce, panelists stressed the need for peer learning, mentorship, and state funding for research.

Closing the session, Co-Chair Thompson described the rigorous process used to select the finalists for the innovation pitches, suggesting that the next step in future iterations might be to find financiers to fund the winners' enterprises.

Session 6: STI for Inclusive and Equitable Societies (SDG 10 and SDG 16)

Co-Chair Chatardová opened the session, and later noted that SDG 16 is both an outcome and enabler for sustainable development, and that new technologies must help overcome inequalities.

Innovation Pitches: Funkola Odeleye, DIYlaw, Nigeria, said her company makes legal services affordable to entrepreneurs in Africa, adding that over 35,000 people have used these services so far.

Speaking about her innovation on unmanned aerial vehicles (UAVs) to map, monitor, and protect indigenous territories, Nina Tushev, Tushevs Aerials, US, said indigenous peoples face pressure related to land invasions, and lack resources and the ability to monitor their territories. She noted that UAVs are effective, powerful, low-cost tools that indigenous peoples can use in this regard, including for protecting territories against deforestation.

Panel Presentations: Moderating the session, Huadong Guo, Chairman of Academic Committee, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences (and 10-Member Group), asked how different data holders, civil society, and others can collaborate for the general achievement of SDGs 10 and 16. He invited participants to reflect on effective ways for STI to support these goals, among other issues.

Mahmoud Mohieldin, Senior Vice President for the 2030 Development Agenda, World Bank, indicated that the World Development Report 2019 addresses challenges and solutions related to advances in technology. He said consideration should be given to the impact of STI on well-being, and whether they make people happier, and stressed the importance of regulation and strong societal capabilities since not all technologies are safe or good for the environment.

Bonian Golmohammadi, Secretary-General, 16+ Forum, Sweden, noted that strengthening institutional capacity and making online data accessible and findable can play a significant role in SDG 16 implementation. He provided examples of cases where technologies had beneficial outcomes, such as delivering health services in rural areas or allowing stakeholders to track progress on SDG 16, but also noted issues arising from the digital divide.

Elizabeth Lockwood, Stakeholder Group of Persons with Disabilities, said emerging technologies can help persons with disabilities overcome barriers such as difficulties in finding

work, but highlighted the importance of the “3As” (accessibility, affordability, and availability). She called for including persons with disabilities in discussions on emerging technologies and engaging them in the development of these technologies.

Wilbert Muroke, on behalf of Khadija Malima, Chief Research Officer, Tanzania Commission for Science and Technology, outlined the need to ensure a more inclusive representation of developing countries in decision-making processes, and to promote collaborative and equitable research and development programmes.

Discussion: In the ensuing discussion, the EU announced the launch of an online public consultation in June 2019 on the strategic plan of its research and innovation programme, Horizon Europe 2021-2027. He said the programme is expected to include a budget of €100 billion. Chile reported on the recent establishment of a Ministry of Science, Technology, and Innovation, and the creation of a Data Observatory.

Stakeholders outlined the importance of:

- sustainable infrastructure to achieve the SDGs;
- assessing technologies on whether they benefit not only the economy but also the planet; and
- ways to engage young people in technology innovation, among other topics.

Following these comments, some panelists remarked that SDG 16 is not only about peaceful, just, and strong institutions, but also about inclusion, and noted the importance of engaging youth in planning and decision-making processes early on. Lockwood remarked that all youth should be engaged, including those with disabilities, and Golmohammadi recommended that institutions make data available for public scrutiny, in line with SDG 16 targets on transparency and accountability.

Session 7: STI for Taking Action to Combat Climate Change and Its Impacts (SDG 13)

Co-Chair Thompson introduced this session, and further clarified criteria used to select the global innovations presented during the Forum, namely the need for these technologies to: satisfy local needs; be related to the SDGs under consideration at the Forum; and have the capacity to be scaled up.

Innovation Pitches: Matthew Goldberg, BioLite HomeStove, US, reported that three billion people still cook on open fires, which impacts climate change, deforestation, and health. He noted that HomeStove is an ultra-efficient stove that reduces smoke emissions by 90% and fuel consumption by 50%, and co-generates electricity from the heat of the cooking flame.

Padmanaban Anantha Gopalan, No Food Waste, India, said his technological innovation seeks to “feed people not landfills” through the collection of surplus food supplies and the distribution of surplus to people in need. He said an app has been developed to help users find the closest location where food can be shared.

Christina Dahl Jensen, Danmission, presented “It’s our forest too,” an app that helps prevent illegal logging, empowers communities, and allows the collection of data “with the same accuracy as professionals.” The app was used in the Prey Lang Forest in Cambodia.

Panel Presentations: Agnes Lawrence Kijazi, 10-Member Group Co-Chair, moderated the session and asked participants to discuss ways that STI can better support SDG 13, as well as knowledge and implementation gaps for technology development, among other topics.

Mikiko Kainuma, Senior Research Advisor, Institute for Global Environmental Strategies (IGES), Japan, noted the synergies and tradeoffs that exist between climate mitigation options and other SDGs. She highlighted the need to accelerate renewable energy

technologies, and called on governments to further support and encourage business to decarbonize.

Seth Schultz, Special Advisor to Global Covenant of Mayors on Science and Innovation, and Founder/CEO, Urban Breakthroughs, New York, US, said cities are key players in dealing with climate change impacts, and outlined initiatives taken by cities to address this issue. Among these initiatives, he noted the Edmonton Declaration, a call-to-action for mayors to lead on climate change, and the Global Covenant of Mayors for Climate and Energy, which represents over 9,000 cities and local governments around the world that are committed to taking action on climate change.

Signe Ratso, Deputy Director General, Directorate-General Research and Innovation, European Commission, said the EU is leading the way at the international level on addressing climate change as it has set the overarching objective of reducing greenhouse gas emissions by 40% in 2030 compared to 1990, and has defined a long-term vision to achieve carbon neutrality by 2050. She said the Horizon Europe 2021-2027 Programme will include climate components, and stressed the need for international cooperation for global solutions on climate change.

Discussion: During the ensuing discussion, countries provided various examples of innovative steps they are taking for the climate. Rwanda said it has established the African Air Quality and Climate Laboratory to measure more than 50 gases that degrade the ozone layer and affect climate change. Kazakhstan noted its deep commitment to a green economy and said it has established the International Center for Green Technologies and Investment Projects. The Republic of Korea reported that it has a climate technology roadmap that includes cooperation with developing countries.

Stakeholders called for:

- multidisciplinary education to address the complexity of climate change;
- human rights-based adaptation plans, noting that vulnerable populations are disproportionately affected by climate change; and
- considering further the links between climate change and health.

Following this discussion, Schultz suggested having millions of students trained in multidisciplinary learning by 2025 to tackle the complexity of sustainable development issues, and said one-third of government budgets should be applied to climate change and urbanization. Ratso remarked that international partnerships should link developing, testing, and the up-scaling of solutions to achieve impact on the ground.

Session 8: Linking STI of Indigenous Peoples, Culture and Traditional Knowledge, and the Achievement of the SDGs

Panel Presentations: Moderating the session, José Ramón López-Portillo Romano, Chairman, Q Element Ltd., Mexico (and 10-Member Group), noted that modern agricultural and industrial progress has benefited from millennia of contributions from indigenous peoples, without any reciprocity. He added that achievement of the SDGs is dependent on recognizing and compensating indigenous peoples for what they have already done.

Minnie Degawan, Director of Indigenous and Traditional Peoples Program, Conservation International, stressed that traditional knowledge has to be applied holistically, without trying to pick and choose individual practices. She called for an approach that protects the source of the knowledge, because if the people practicing the knowledge are not protected, the knowledge will be lost. She recommended increased dialogue between the traditional and scientific/innovative knowledge systems at the

national level, facilitated by governments. She urged stakeholders, when developing new rules and regulations related to STI, to remember that there are already agreed instruments on indigenous peoples' rights.

Freddy Mamani, Aymara architect, Bolivia, described how Bolivia is demonstrating that a country can develop and make use of age-old knowledge, noting that better education can be achieved through recognition of identity. He said that indigenous peoples who are now urban dwellers are finding creative ways to acknowledge their traditional culture and integrate it into their cities, citing economic development through tourism as one area where this has been achieved.

Chandra Roy-Henriksen, Chief, Secretariat of the Permanent Forum on Indigenous Issues, reminded participants that indigenous peoples are dynamic, countering a common perception that they are "stuck in time." She warned against misappropriation of their innovation, knowledge, culture, and technology. Noting that the UN has proclaimed 2019 the International Year of Indigenous Languages, she highlighted how indigenous peoples are embracing mobile and other technologies to preserve their languages.

Discussion: Key points made during the discussion focused on indigenous peoples' right to self-determination through their local governance processes, guiding their own form of development, and decision-making power. Roy-Henriksen noted that if you are involved in the decision-making process, but your opinion is not ultimately taken into account in the decisions made, then your involvement is meaningless.

Stakeholders called for respect, education, reciprocity, and the recognition that we already have many of the tools we need to achieve the SDGs in the form of traditional knowledge and practices. Referring to the right to prior informed consent in relation to technology, Degawan explained that this requires ensuring the other party fully understands what the technology is, the intent behind it, and the ultimate implications of adopting or deploying it. Mamani recommended that institutions like the STI Forum and the UN need to get closer to indigenous peoples and vice versa.

López-Portillo echoed many comments related to the need for an online inventory of knowledge and technology both for the use of and from indigenous peoples, saying that this is exactly what the online platform aims to do.

Session 9: Supporting the Implementation of the TFM – The Way Forward for Joint Action

Co-Chair Chatardová said this session includes a number of initiatives from across the world that support the science-based, solution-oriented, multi-stakeholder, and collaborative approach of the TFM.

Panel Presentations: 10-Member Group Co-Chair Vaughan Turekian moderated this session, saying the TFM was built on the desire to move beyond business-as-usual on STI, and invited participants to look at what it has accomplished.

Macharia Kamau, Principal Secretary to the Ministry of Foreign Affairs, Kenya, said four years ago the TFM was started with the hope of having a great impact, but "we should do better." He congratulated the UN for keeping the momentum going on the Mechanism, and noted its relevance in bringing Member States, the UN, the private sector, youth, and other stakeholders together. He stressed the importance of connecting science to business to drive implementation and countries' development. He also remarked that governments must remain front and center on STI and put in place incentives and the enabling environment that drive science and technology. Kamau outlined STI initiatives undertaken by Kenya, including the establishment of a national innovation administration that connects various stakeholders for

innovation, and the Ajira Digital, an initiative intended to promote job creation for young people.

Lynn St. Amour, Chair, Multi-stakeholder Advisory Group to the Internet Governance Forum (IGF), said the IGF, entering its 14th year of work, has a lot in common with the TFM. She noted that the IGF is about inclusiveness and access, and suggested that "the learning" from the IGF could help support the TFM. She said the global IGF collaborates with local IGFs, which allows the Forum to facilitate work on the ground. She announced that the IGF 2019 session will take place in Berlin from 25-29 November 2019.

Joshua Phoho Setipa, Managing Director, Technology Bank for Least Developed Countries (LDCs), said the Technology Bank focuses on the 27 LDCs, and was established following a decision by the General Assembly in 2016, at the request of LDCs. He reported that the Bank is participating in the work of the IATT, and is undertaking STI reviews in countries in collaboration with UNCTAD and the UN Educational, Scientific, and Cultural Organization (UNESCO). He further noted that four billion people are still offline.

Discussion: During the discussion that followed, UNESCO said its actions are aligned with the work of the TFM, adding it has launched the Global Observatory of Science, Technology, and Innovation Policy Instruments (GO-SPIN) platform. The Food and Agriculture Organization of the UN (FAO) announced it will organize a high-level seminar on digital agriculture transformation from 12-13 June 2019 in Rome, Italy. One stakeholder called for participatory technology assessments, and suggested opening the Co-Chairs' Summary of the STI Forum for comments before its submission to the HLPF. Other participants called for: bringing pilot projects to the attention of policy-makers; new legislation to stimulate innovative solutions; and innovative financing.

Closing Remarks

ECOSOC President King said the two days of "intense, informative discussions" demonstrated practical examples of STI for the SDGs, and enabled discussion on cross-cutting issues such as building synergies with indigenous and traditional knowledge, and attracting and retaining women and youth in science and technology. She added that the Forum identified gaps and challenges in STI knowledge, capacity, and application, and discussed innovative science and technology solutions for addressing climate change and for promoting equitable societies in a rapidly changing world, among other topics.

King said the TFM seeks to support cooperation among multiple stakeholders on STI for the SDGs, and expressed hope that it inspired participants to connect. She remarked that the work of the TFM should be more than two days of discussion and should be seen as the yearly culmination of intersessional work. She thanked participants for being the "pioneers and the change makers" in applying STI to realize the SDGs. She gavelled the meeting to a close at 6:00 pm.

Glossary

AI	Artificial intelligence
ECOSOC	United Nations Economic and Social Council
HLPF	High-level Political Forum on Sustainable Development
IATT	Inter-Agency Task Team
ITU	International Telecommunication Union
SDGs	Sustainable Development Goals
STI	Science, technology and innovation
TFM	Technology Facilitation Mechanism
UNCTAD	UN Conference on Trade and Development
UN DESA	UN Department for Economic and Social Affairs