Workshop on Science, Technology and Innovation for SDGs

Songdo Convensia, Incheon, Republic of Korea, 29 November – 1 December 2017
Co-organized by DESA, UNCTAD and UNOSD

Report of the Meeting

Contents

Key Recommendations

1.   The following conclusions and recommendations emerged from the discussions:

a) STI Forum 2018 could be structured similar to the successful format of 2017. It will thus include sessions on the SDGs under review at HLPF 2018 (SDGs 6, 7, 11, 12, and 15), discussion of their interlinkages, and some other cross-cutting themes including: local and indigenous knowledge; emerging and exponential technologies and their impacts on the SDGs; STI roadmaps for the SDGs and capacity building; and the TFM online platform. These sessions would be complemented by a coherent series of special panels, side events, exhibitions and demonstrations of solutions.

b) The present Workshop collected a wealth of facts, challenges, lesson-learnt, solutions, and initial ideas for structure, participation, format and potential substantive outcomes of the various sessions at the STI Forum 2018, as they are expected to closely correspond to the sessions at the present Workshop. It was suggested to use the wealth of material summarized below and presented to the Workshop for the purpose of preparing in-depth substantive background notes for the Forum.

c) A roadmap for joint action in preparation of the STI Forum 2018 will be prepared based on the many specific suggestions on content, meeting format, process and participation documented in the summary of the "closed meeting of IATT and 10-Member Group" provided below.

d) Members of the 10-Member Group and of the IATT, as well as participating experts expressed their willingness to continue working together in support of the TFM in general and the STI Forum in particular, regardless of potential changes in membership in the future.

e) The STI Forum process will continue to work cumulatively, building on the summaries of co-chairs of previous Forums. Similarly, the present Workshop and previous meetings and activities under the TFM will continue to aim working cumulatively, building on each other and spurring joint action and partnerships.

Introduction

2.   The United Nations Department of Economic and Social Affairs (DESA), in collaboration with United Nations Conference on Trade and Development (UNCTAD) organized the Workshop on Science, Technology and Innovation (STI) for the achievement of the Sustainable Development Goals (SDGs) as a preparatory event for the 2018 STI Forum, as well as to collect inputs for the development of the Online Platform – a component of the Technology Facilitation Mechanism (TFM). The Workshop was held at Songdo Convensia, Incheon, Republic of Korea, from 29 November to 1 December 2017.

3.   The objective of the Workshop was to contribute to the preparations of the STI Forum 2018 by mobilizing all stakeholders to share information on trends in the deployment of science, technology and innovation for the SDGs 6, 7, 11, 12, 15, including specific solutions and achievements, state of the art expertise on specific issues and practice areas, emerging priorities, critical knowledge and innovation gaps, as well as their views on ways of mobilizing science, technology and innovation responses to address these gaps. The Workshop also aimed at collecting inputs for the development of the TFM Online Platform.

4.   The Workshop was organized around the theme of the STI Forum 2018: "*STI for resilient and inclusive societies, with a special focus on SDGs 6, 7, 11, 12, and 15*"[1]. In addition, some cross-cutting issues were also taken up, as decided by the 2017 Forum, including the role of traditional knowledge, potential impacts of emerging technologies, STI roadmaps for the SDGs, barriers for scaling-up solutions, the TFM online platform, and ways to ensuring that STI benefits all, leaving no one behind. Following a formal opening, the Workshop was held in an interactive roundtable style, moderated by members of IATT and 10 Member group.

5.   Through the STI Forum, the Workshop ultimately contributed to the HLPF review of SDGs 6: (Ensure availability and sustainable management of water and sanitation for all), 7 (Ensure access to affordable, reliable, sustainable and modern energy for all), 11 (Make cities and human settlements inclusive, safe, resilient and sustainable), 12 (Ensure sustainable consumption and production patterns), and 15 (Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss) and 17.

6.   The present Report summarizes the outcomes of the Workshop which will serve as guiding reference and inputs to the STI Forum 2018 and HLPF 2018.

7.   The Workshop was attended by 48 technology experts from Governments, the private sector, financial institutions, non-governmental organizations, and research institutions. This included eight of the 10 members of the TFM Group of 10 High-level Representatives (10-Member Group), as well as selected experts and representatives of governments and major stakeholders of the TFM process, as well as selected Members of the UN Inter-Agency Tasks Team on STI for the SDGs (IATT). These experts came from 22 countries: Austria, Brazil, China, Denmark, Finland, France, Ghana, Germany, India, Indonesia, Japan, Kenya, Mexico, Nepal, Nicaragua, the Philippines, Republic of Korea, Russian Federation, Saudi Arabia, South Africa, UK and the USA. In addition, three government representatives of the Republic of Korea, St Vincent and the Grenadines, and the USA participated in the Workshop.

Summary of Discussions

Opening and introduction to the STI Forum

8.   The Workshop was opened with welcome remarks by the host, Dr. Jong-Soo Yoon, Head of the UN Office for Sustainable Development, DESA, Republic of Korea. Dr. Vaughan C Turekian, Co-Chair of STI Forum 2016 and 2017, and Senior Board Director, Science, Technology and Sustainability, National Academy of Sciences, Engineering and Medicine, USA, provided a visionary statement reflecting on the UN Technology Facilitation Mechanism (TFM) achievements and looking forward to an inclusive and highly solutions-oriented and policy relevant STI Forum 2018 which would benefit from a substantive work programme and full engagement of academies of sciences and scientific and engineering communities around the world. Congratulatory remarks by Dr. Young Sook Yoo, Korea Institute of Science and Technology, Former Minister of Environment, Republic of Korea, followed as the host government for the Workshop.

9.   It was suggested that the STI Forum should inspire, mobilize, and catalyze the many good STI initiatives around the world. Increased efforts should be made to mobilize students and to make available videos from innovators from around the world. The creation of a "shark tank" for the SDGs could be considered to bring together people that can scale prototype technologies/solutions. The Forum should be a place for Member States and NGOs to pledge action for STI for the SDGs. It should facilitate better access "frozen knowledge" and lead to processes and flagship initiatives by the co-chairs. Above all, the STI Forum would be cumulative, building a world-wide community and lead to continued action.

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[1] The 3rd STI Forum will be held from 5 to 6 June 2018.

10.   DESA and UNCTAD as the co-convenors of the TFM, represented by Mr. Shantanu Mukherjee, Chief, Policy Analysis Branch, Division for Sustainable Development and Ms. Dong Wu, Chief, Science Technology and innovation Policy Section, respectively provided an introduction to the Workshop and the organizers' expectations. This was complemented with reflections by the Co-Chair of the TFM Group of 10 High-level representatives (10-Member Group), Dr. Bill Colglazier, Senior Scholar, Visiting Scientist, Center for Science Diplomacy, American Association for the Advancement of Science, USA.

11.   The 10-Member Group emphasized the importance of following-up and building on the outcomes and recommendation of the first two STI Forums of 2016 and 2017. It recalled the suggestions contained in their "vision document" prepared for previous STI Forums, including: STI and capacity building, making all knowledge based societies; committing to societal action plans; identifying knowledge gaps and solutions including basic science; harnessing ICT revolution; need for integrated assessments and systems analysis; aligned incentives, private sector and PPP; support for those "left behind"; building peaceful societies and conflict resolution; and horizon scanning. IN addition, intersessional expert group meetings to "deep-dive" on specific SDGs, like in the case of the recent EGM in Rio on health.

Session 2a: STI for ensuring availability and sustainable management of water and sanitation for all (SDG 6)

Moderator:
- Ms. Dong Wu, Policy Review Section, Division on Technology and Logistics, UNCTAD.

Panelists:
- Prof. Eun Namkung, Seoul National University, Republic of Korea.
- Dr. Hans Thulstrup, Senior Programme Specialist, Water and Environmental Sciences, UNESCO Regional Science Bureau for Asia and the Pacific, Indonesia.
- Dr. George Essegbey, Director of the Science and Technology Policy Research Institute (STEPRI) of the Council of Science and Industrial Research, Ghana.

12.   Session 2a discussed the status of existing knowledge, explored the potential for how STI can further support the achievement of SDG6, and addressed the main knowledge gaps and challenges. It also presented recommendations regarding the structure and content of a session to be held during the 2018 STI Forum.

Key issues and facts reported

13.   Speakers highlighted the sanitation challenge as enshrined in SDG target 6.2 ("*By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation*") which is about managing human waste in all its forms in a manner that is effective, efficient, reflecting human dignity and contributing to well-being.

14.   Participants recalled that about 68% of the world population have access to at least basic sanitation, which constitutes good progress over the past. However, the challenges remain huge: 2.3 billion people still lack at least basic sanitation services using either open defecation or unimproved facilities such as pit latrines without a slab or platform, hanging latrines or bucket latrines. About 892 million practice open defecation, which is the worst form of human waste disposal. The differences in the sanitation situation in the world is striking. For example, while North America and Europe have 78% of the population using safely managed sanitation services, only 28% of the people in Sub-Saharan Africa have basic sanitation services. Sixteen of the 24 countries in which at least one person in five has limited sanitation services are found in sub-Saharan Africa. More than 20% of the people in SSA practice open defecation. All those statistics and more, reflect the very serious challenge confronting us in sanitation. It calls for some very drastic and innovative ideas to address the challenge.

15.   Participants considered science, technology and innovation (STI) as essential to achieve SDG 6 and tackle global water-related challenges, such as urbanization, population growth, food and energy production. In their view, evidence-based decision making based on sound scientific knowledge is crucial for the achievement of SDG6 and the

related targets. STI plays a critical role in the implementation and monitoring of SDG 6 by enhancing knowledge about quantity, quality, location, sustainability and reliability of water supply. STI also support the creation of water information systems that help ensure the proper utilization and management of the resource for current as well as potential future uses. STI is required to improve the general knowledge base about water resources, to fill gaps relating to availability, accessibility and quality (through technologies such as remote sensing), to stimulate the exchange of data; and to put in place appropriate water information systems, databases and smart water systems.

Most effective ways that STI could support the achievement of the SDG 6

16.   Speakers and participants proposed a range of effective ways for STI support. This focused especially on technological solutions.

17.   A wide range of smart water technologies are increasingly used for enhancing efficiency in water management, ensuring quality of water and reducing losses in the systems. In the agricultural sector, smart irrigation controllers tailor watering schedules and run times on sprinklers or drip systems can help to meet specific landscape needs, and weather information and site conditions to determine how much water to apply to the soil. Such applications can significantly reduce water consumption for irrigation. K-Water's Smart Water Management Initiative (SWMI) is an example of STI application towards SDG6 - an integrated management model covering the entire water cycle from source to tap with the aim of ensuring scientific and efficient water management through interacting technologies and ICTs. SWMI also includes a 3-step strategy consisting of technology development, standardization and standardized frame for the application of technologies.

18.   Technological transfer through South-South and North-South cooperation mechanisms and agreements is another good way forward. Considering that 80% of all wastewater is currently discharged untreated into the environment, there is a considerable potential for the introduction of green and sustainable technologies in countries that currently do not have access to it. The same approach is valid for technologies that aim to increase the efficiency of water use and the reduction of water waste. However, technology transfer does not include only 'hard' technology in the form of new plant and equipment. Significantly, it also includes 'soft' technology in the form of management practices, technological know-how, operating skills and processes that are transferred through various forms of training and coaching. For investments in infrastructure to be efficient, complementary consideration of soft infrastructures – knowledge and data mobilization sharing infrastructure – is essential.

19.   Tailored, appropriate technology solutions are needed for diverse country contexts, and in order to ensure first choice for the majority of people. One such example is ventilated pit latrines with good ventilations comparable to open defecation. The solutions need to be affordable, as cost is always a factor, especially for poorer population segments. Solutions must also be accessible and available. Technologies within reach imply better strategies for diffusion. In this context, the TFM online platform is potentially a good vehicle for global diffusion of sanitation innovations.

20.   Monitoring and evaluation technology systems are important, including for governments to track progress. Combining the information already available, such as latest satellite data with model outputs, in-situ observations, and socio-economic information and citizen-data resources is a challenge that would help water managers tackle water crises and extreme water events. This information would assist in producing updated estimation of dynamic water availability and distribution (spatial and temporal), and facilitate and allow water policies and decisions to achieve their maximum targeted impact at different scales.

21.   Acculturation through mass media activities, FM radio TV, Internet, social media, schools, and basic public education are important. Indeed, poor sanitation practices are often culturally embedded. Hence, there is need for changing mindsets, and cultural behaviours.

22.   It was noted that UN-Water established a Task Force to produce a SDG6 Synthesis Report for the HLPF review in 2018. The report will support countries by communicating the status of SDG6 implementation at the global and regional levels, and by providing a comprehensive overview of how SDG6 is linked to the 2030 Agenda and the overall sustainability challenges that member states around the world are faced with.

23.   The historical experience with sewage treatment in the Republic of Korea was discussed in detail. Sewage treatment plant have been established since 1976. They currently have a national service rate of 92.5%. STP Effluent Standards have 6 items, compared to 2 items in 1978. The development of a national policy for water and sanitation, a national roadmap and development of total solution capacity for the entire value chain proved successful. The sewage treatment system continues to face challenges from growing demand for water and sanitation infrastructure.

Main challenges for developing, adopting, disseminating or scaling these STI solutions

24.   The following key challenges were identified: (a) cultural impediments, including the norms, traditions and entrenched behaviours in communities; (b) the prevalence of inappropriate technologies; (c) high costs relative to locally available resources; (d) lack or inadequate capabilities, especially for repair, maintenance and improvement; (d) lack of ownership of sanitation campaigns on the part of primary beneficiaries; (e) weak policy regimes, including weak implementation, enforcement, monitoring and evaluation; (f) water efficiency; (g) energy efficiency in water sanitation; (h) resource recovery from waste water; (i) smart water management; and (j) membrane technology for water and sanitation.

R&D and knowledge gaps

25.   Key knowledge and R&D gaps that require action include: (a) adaptation and improvement to ensure technological solutions are appropriate, affordable and accessible; (b) scaling out; (c) upgrading, such as from pit latrines to bio-sanitation systems producing biogas for domestic use; (d) monitoring and evaluation systems; and (e) socio-cultural research to guide policy formulation and implementation. It was pointed out that there is a difference between R&D and knowledge gaps. There are gaps that will be resolved with progressive engineering, but there are also thinking gaps or paradigm gaps - the latter being particularly serious.

Structuring and organization of the STI Forum 2018

26.   Concrete suggestions were made for structuring and organization of a session on STI for SDG6 at the STI Forum 2018: Like in 2017, there should be space for innovation pitches which could be complemented with video presentations on sanitation, technological solutions and innovations, as well as content for mass communication such as success stories, in order to reach an audience far wider than the roughly 1,000 in-person participants of the STI Forum. More dramatization and use of graphics was also proposed. In terms of substance, discussions should be focused on what must be done in and for deprived communities.

Expected outcomes of the STI Forum 2018 and concrete recommendations

27.   Outcomes and recommendations could fall into the areas of technology transfer, as well as international partnerships for diffusion of technologies, innovations, scaling out, and capacity building.

Key partners, stakeholders and communities to be involved in the preparation of the STI Forum 2018

28.   It was strongly suggested to involve actual innovators in sanitation services on the ground and relevant NGOs, such as Water Aid and Care International, in the preparation of a session on SDG6. A comprehensive group of relevant UN entities should also be key partners, including UNDP, UNESCO, UNICEF, DESA, and the World Bank. In this context, it should be noted that the UN-Water Taskforce under UNESCO's World Water Assessment Programme includes the following UN-Water members: CEO Water Mandate, FAO, ILO, UNDP, UNECE, UNEP, UNESCO, UNICEF, UNU, UN-Habitat, UN-Water Technical Advisory Unit (TAU), World Bank, WHO and WMO. In addition, regional institutions, such as the African Union, ECOWAS, SADC, EAC, and the EU could play an important role, as could bilateral development agencies, such as DANIDA, DfID, CIDA, GIZ and USAID.

Session 2b: STI for making cities and human settlements inclusive, safe, resilient and sustainable (SDG 11)

***Moderator*:**
- Ms. Hayat Sindi, Founder and President, Institute for Imagination and Ingenuity (i2institute), Saudi Arabia

*Panelists***:**

- Mr. Eugene Atiemo, Director, Building and Road Research Institute of the Council for Scientific and Industrial Research of Ghana
- Mr. Richarlls Martins, coordinator of the Brazilian Network of Population and Development in Brazil, representative of Brazil in the Latin American Network of Equality and Social Justice
- Ms. Shrimoyee Bhattacharya, Senior Research Scientist Centre for Study of Science, Technology and Policy (C-STEP), Bengalaru, India
- Mr. Justin Henceroth, Project Manager and Co-Founder, FieldSight, UNOPS Nepal, and World Vision Innovation Lab

29.   Session 2b discussed the status of existing knowledge, explored the potential for how STI can further support the achievement of SDG11, and addressed the main knowledge gaps and challenges. It also presented recommendations regarding the structure and content of a session to be held during the 2018 STI Forum.

Key issues and facts reported

30.   Speakers and participants highlighted the unprecedented scale of the recent build-up of cities, fueled by industrialization, migration to the cities and globalization. In 2015, more than half (54%) of the world's population, or 4 billion people, lived in cities and this number is expected to increase to 5 billion people in 2030. Growth of cities includes mega-cities, secondary cities, and thousands of new and emerging smaller and medium-sized cities. Urbanization has caused enormous challenges, including a growing absolute number of slum dwellers, increased air pollution, inadequate basic services and infrastructure, and unplanned urban sprawl, which also make cities more vulnerable to disasters. While the absolute number of urban slum dwellers increased from 792 to 880 million between 2000 and 2014, the relative share of slum dwellers among urban populations decreased from 39% to 30% over the same time. The expansion of urban land outpaced the growth of urban populations in all regions of the world, from 2000 to 2015. As a result, cities are becoming less dense as they grow, with unplanned urban sprawl posing a challenge to sustainability.

31.   Speakers emphasized that the shift towards the urban has implications across human society, heralding changes in economies and livelihoods, social and political structures, and relationships with the climate and the environment. While concentrated in cities, many of the changes accompanying this urbanization, such as the rise and spread of internet and communications technology and the globalization and expansion of supply chains, also affect human settlements and societies in remote, rural, and other non-urban areas. This poses an opportunity to improve society and standards of living around the world, but also the challenge that in many parts of the world urbanization is too fast for governments to build supporting infrastructure and resilient institutions that can provide the necessary services, reduce poverty and improve public health and well-being despite social structures being disrupted by the migration to the cities.

Most effective ways that STI could support the achievement of the SDG 11

32.   Participants emphasized the need for urban planning to make the world's urban spaces more inclusive, safe, resilient and sustainable. 149 countries were developing national-level urban policies as of May 2017. Sustainable cities are designed to be resilient, and environmentally, socially and economically healthy. Resilient cities can survive, adapt and grow irrespective of physical, social and economic shocks, due to integrated solutions. Science, technology, and innovation can offer and create new pathways for designing, building, managing, maintaining, and engaging in cities and human settlements, while supporting critical, social, political, and economic processes. The New Urban Agenda adopted at Habitat III in Quito, Ecuador in 2016, outlines global priorities for the future of cities and human settlements. It declares that implementing the new agenda will require an "*enabling environment and a wide range of means of implementation, including access to science, technology, and innovation.*"

33.   Participants agreed that comprehensive workable STI policies need to be implemented. This required clear financial and logistical guidance, with state institutions following laws and regulation. Participants recalled that technology had been critical to the design and construction of increasingly large and inter-connected cities. Looking to the future, technology will be critical for helping design safe, resilient, and sustainable cities. New materials and construction techniques can help build safer, more sustainable, and resilient infrastructure, especially within the context

of climate change. Digital mapping and satellite imagery make new designs more suited to the physical and environmental systems. New innovations in transportation, energy, telecommunications, and other services help deliver them more widely and at lower costs. Digital infrastructure and smart cities technology provide new opportunities for effective management of cities, based on real-time monitoring of conditions. Large datasets are now available for scientists and innovators to better understand life quality and how it is grounded in urban design. Internet and telecommunication have changed the means of communication and thus the nature of engagement between and people and with their local governments. Technologies have supported community-wide conversations on development and urban planning. And reporting apps have engaged citizens in reporting crime, trash, potholes, and flooding issues. STI can also improve the quality of life and create new livelihoods in rural and remote areas, thereby potentially slowing the migration of from the countryside to the urban areas.

34. Lessons-learnt from the urbanization of India were discussed as an example of a country that comprises 2% of world's land, but 17% of world population, and where 31% of Indians live in cities. In this case, there is a need for better evidence in support of policy-making for SDG11. Data science, geospatial platforms, and drawing on multi-disciplinary knowledge can help bridge knowledge gaps on key issues like water dependence, as illustrated by the urban observatory platform in Karnataka, India promoted by CSTEP and the local government. An observatory at the State level is emerging that encompasses 200+ municipalities connected through an online data platform. Application examples featured included linking satellite data sources to monitor changing zones in ground water patterns and documenting the knowledge of indigenous communities have knowledge.

35. The case of Nepal was also discussed in more detail. In this case, efforts on STI support for SDG11 focused on infrastructure quality assessment, enforcement of policies, the use of mobile technology and common dashboards/platforms, as well as mobile data collection to improve building quality and predict flooding. Efforts should make technology and data accessible to interested partners and involve governments and a wide range of stakeholders. Incentive mechanisms are needed.

Main challenges for developing, adopting, disseminating or scaling these STI solutions

36. Speakers highlighted many challenges for developing, adopting, disseminating or scaling these STI solutions in developing countries. Examples were provided, in particular, from Nepal and Ghana.

37. Participants noted that urban planning was poor in many parts of the world. Peripheral development of housing and estates not only pose great challenges for transport systems, pollution (carbon monoxide emissions were highlighted in this regard), and affordability. Unregulated land tenure systems in many parts of the developing world lead to destruction of forest cover and vegetation, causing issues of water availability. Enforcement of planning and building regulations remains a serious issue. In fact, in some cities such enforcement is barely visible. Instead, corrupt practices can lead to multiple ownership which creates conflicts, crisis and destruction.

38. Safe removal and management of solid waste was identified as another major issue. Uncollected solid waste blocks drains, causes flooding and may lead to the spread of water-borne diseases. Based on data from cities in 101 countries from 2009 to 2013, 65% of the urban population was served by municipal waste collection. Air pollution remains a major environmental health risk. In 2014, 9 of 10 people who live in cities were breathing air that did not comply with the safety standard set by WHO. Poor transport systems in cities and connecting cities are an increasing reason for this situation. Finally, even though local government agencies employ qualified staff, they lack basic technologies, such as GPS.

R&D gaps

39. Speakers identified across-the-board R&D and knowledge gaps. In particular, they emphasized a need for comprehensive, workable national STI policies in line with sustainable development principles; financial and logistical guidance on innovative schemes for the provision of efficient transportation and utility services; technological means to support compliance with laws and regulations; and STI for housing schemes for the urban and rural poor.

Structuring and organization of the STI Forum 2018

40.   While the session did not make specific suggestions on how to structure a SDG11 session at the STI Forum 2018, they expressed the expectation that the Forum should facilitate the "right" kind of dialogue based on useful, reliable evidence.

Expected outcomes of the STI Forum 2018 and concrete recommendations

41.   Participants provided broad ideas in terms of potential outcomes of a SDG11 session at STI Forum 2018, including a call for providing the "right" policy environment, effective implementation, and ensuring compliance with regulations; a list of effective tools to address cities' challenges; and commitments for adequate funds for research in support of making cities inclusive, sustainable and resilient.

Key partners, stakeholders and communities to be involved in the preparation of the STI Forum 2018

42.   Participants proposed to involve the following communities in the preparation of a SDG11 session at STI Forum 2018: UN system especially UN-Habitat, European Commission, African Union, research institutions, individual researchers, professionals in the built environment, NGOs, and development partners.

Session 2c: STI for ensuring access to affordable, reliable, sustainable and modern energy for all (SDG 7)

Moderator:
- Mr. Richard A. Roehrl, Senior Economic Affairs Officer, DESA.

Panelists:
- Dr. Jim Watson, UK Energy Research Centre and University of Sussex, UK.
- Dr. Woosung Lee, Director of Global Policy Researches, Science and Technology Policy Institute, Republic of Korea.
- Prof. Nebojsa Nakicenovic, Deputy Director General and Deputy Chief Executive Officer, International Institute for Applied System Analysis (IIASA), Austria.

43.   Session 2c discussed the status of existing knowledge, explored the potential for how STI can further support the achievement of SDG7, and addressed the main knowledge gaps and challenges. It also presented recommendations regarding the structure and content of a session to be held during the 2018 STI Forum.

Key issues and facts reported

44.   Participants noted that, according to the UN Secretary General's report on progress towards the SDGs, progress in every area of sustainable energy falls short of what is needed to achieve energy access for all and to meet targets for renewable energy and energy efficiency. Meaningful improvements will require higher levels of financing and bolder policy commitments, together with the willingness of countries to embrace new technologies on a much wider scale.

45.   Speakers and participants highlighted the importance of affordable access to essential services underpinning development. Energy fuels many such services. The energy-system harnesses resource, transforms it to energy carriers that are used in appliances and machinery to provide those services. In order to provide services to current and future generations, the energy-system itself needs to be sustainable. This energy system may impact and interact with the economy, the environment (including other physical resource or commodity systems) and society. The effects of this impact and interaction should also be sustainably managed. The energy decision maker is thus concerned with enabling appropriate, affordable and adequate service access; ensuring the energy-system can do so in a sustainable manner; and ensure that the broader interactions between systems does not compromise the planet's sustained development.

46.   Globally, 85.3 per cent of the population had access to electricity in 2014, an increase of only 0.3 percentage points since 2012. That means that 1.06 billion people, predominantly rural dwellers, still function without electricity. Half of those people live in sub-Saharan Africa. Access to clean fuels and technologies for cooking climbed to 57.4 per cent in 2014, up slightly from 56.5 per cent in 2012. More than 3 billion people, the majority of them in Asia and sub-Saharan Africa, are still cooking without clean fuels and more efficient technologies. The share of renewable energy in final energy consumption grew modestly from 2012 to 2014, from 17.9 per cent to 18.3 per cent. Most of the increase

was from renewable electricity from water, solar and wind power. Solar and wind power still make up a relatively minor share of energy consumption, despite their rapid growth in recent years.

Most effective ways that STI could support the achievement of the SDG 7

47.   Speakers and participants highlighted the fact that many accessible and affordable technological solutions were available for SDG 7. Important examples are in the areas of production and storage of renewable, distributed energy; conversion of brackish water. While many parts of the world are resource rich, they are distributed highly unevenly. Cross-border, regional and ultimately global electricity trade is essential for untapping the full potential pf intermittent renewable sources. Science-based energy systems analysis can help quantifying and prioritizing viable and sustainable energy, water and transport infrastructure investments, and help identifying obstacles and opportunities to successful investments. Incorporating spatial specificities into energy systems analysis can identify an optimal mix between on-grid or off-grid technology choices, in order to achieving universal electricity access as early as possible. A changing climate directly impacts energy infrastructures (e.g., hydropower) and affecting energy costs. Robust climate adaptation strategies, based on alternative climate scenarios, reduce potential losses due to drier climates. It appears crucial to re-direct funding to sustainable infrastructure and STI development.

48.   Participants emphasized the importance of coherent long-term goals for spurring coherent actions among many stakeholders. In this context, it was noted that the situation in terms of SDG7 was comparably good, as they were built on the 2030 goals and targets identified in the earlier Global Energy Assessment, an in-depth assessment of energy issues by the scientific community.

49.   A lack of capacity was highlighted as one of the greatest obstacles for attracting investments. Micro-finance schemes, green bonds, and public private partnerships could be effectively used to overcome these barriers.

Main challenges for developing, adopting, disseminating or scaling these STI solutions

50.   Speakers highlighted a number of challenges: The share of renewable energy need to be increased in the heat and transport sectors which together account for 80 per cent of global energy consumption. From 2012 to 2014, three quarters of the world's 20 largest energy-consuming countries had reduced their energy intensity — the ratio of energy used per unit of GDP. The reduction was driven mainly by greater efficiencies in the industry and transport sectors. However, that progress is still not sufficient to meet the target of doubling the global rate of improvement in energy efficiency.

R&D gaps

51.   Speakers emphasized both the R&D achievement, but also a wide range of knowledge gaps regarding energy issues. In particular, major efforts were suggested to coherently bring together findings from sustainable energy scenarios and roadmaps, such as in the TWI2050 initiative.

Structuring and organization of the STI Forum 2018

52.   Participants suggested the following for a session on STI for SDG7 in the STI Forum 2018: Side-events with in-depth discussion could formally feed into the plenary session on SDG7. The plenary session might include a combination of presentations including (a) compelling descriptions of the issues, (b) short-term proven technology solutions, (c) emerging technology solutions, and (d) a case example of how a policy issue was overcome at the national level.

Expected outcomes of the STI Forum 2018 and concrete recommendations

53.   Participants discussed a number of expected outcomes and concrete recommendations of an SDG7 session, including an appreciation of the following findings: (a) Synergies between the SDGs are very important to be considered. (b) Critical objectives should be at the top of the energy agenda including universal access to modern energy, doubling energy efficiency, and increasing the renewable share of final energy generation. (c) Technologies are already available and could be deployed to solve most energy issues. (d) Optimal solutions comprise both grid extension for centralized renewables off-grid small scale renewables. (e) Cities play a critical role due to high energy densities. (f) Policies should incentivize the private sector to invest in renewable energy. (g) Actions are needed to change the behavior standards of

people and policymakers. (h) Clean cooking remains an urgent priority. (i) Affordability remains a significant challenge, and therefore new business models are considered which can help spread upfront costs. (j) Integrated policies are needed to support renewable energy with reforms to fossil fuel consumption subsidies. (k) Citizen of all ages should be involved from students to professionals. (l) Commercialization of R&D is crucial.

54.   Furthermore, participants expected progress towards international energy cooperation from the Forum's SDG7, in particular: collaborations on RD&D; on developing manufacturing, installation and M&O capacity; on cross-border grid interconnection; and on policy learning and capacity (e.g., energy strategies, policy instruments).

Key partners, stakeholders and communities to be involved in the preparation of the STI Forum 2018

55.   Participants emphasized a wide range of potential partners to be involved in preparation of a SDG7 sessions, including IIASA and its Global Energy Assessment Partners, UN-energy, national energy research centers, innovators of specific solutions and their beneficiaries.

Session 2d: STI for ensuring sustainable consumption and production patterns (SDG 12)

Moderator:
- Mr. Clovis Freire, Economic Affairs Officer, Policy Analysis Branch, DESA

Panelists:
- Dr. Jonghwan Kim, Director, Korea Environmental Industry and Technology Institute, Republic of Korea
- Ms. Sujaya Rathi, National Faecal Sludge and Septage Management (NFSSM) Alliance, India.

56.   Session 2d discussed the status of existing knowledge, explored the potential for how STI can further support the achievement of SDG12, and addressed the main knowledge gaps and challenges.

Key issues, challenges and facts reported

57.   Speakers and participants stressed the fact that the SDGs will most likely not be attainable without decoupling natural resource use and environmental pressures from economic growth and improvements in living standards. They also noted that many Governments and business leaders understand that improving resource efficiency along with inclusive economic growth are necessary means for better living quality. In fact, decoupling economic growth from natural resource use would be fundamental to sustainable development. Yet, the total amount of natural resources used in economic processes ("domestic material consumption") increased from 49 to 71 billion tons in total which corresponded to 1.2 to 1.3 kg per unit of GDP from 2000 to 2010, due to rising natural resource use especially in East Asia.

58.   Participants noted that the prevailing economic growth paradigm is necessarily based on the premise of the continuation of large supplies of cheap, easily accessible materials and energy. However, as the volatility in prices and supply chain risks have been and will continue to increase, the linear economic model of 'take, make, dispose' might trigger larger macro-economic losses associated with large-scale systemic risk effects.

59.   Participants reported that countries continue to address challenges linked to air, soil and water pollution and exposure to toxic chemicals under the auspices of multilateral environmental agreements, with almost all UN Members States being party to at least one of those conventions. Under the conventions' obligations, countries are requested to regularly report data and information related to hazardous wastes, persistent organic pollutants and ozone depleting substances. However, from 2010 to 2014, only 57 per cent of the parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 71 per cent of the parties to the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and 51 per cent of the parties to the Stockholm Convention on Persistent Organic Pollutants provided the requested data and information. All parties reported to the Montreal Protocol on Substances that Deplete the Ozone Layer.

Most effective ways that STI could support the achievement of the SDG 12 and knowledge gaps

60.   Participants emphasized that achieving SDG12 requires strong national frameworks for sustainable consumption and production (SCP) that is integrated into national and sectoral plans, sustainable business practices and consumer behaviour, together with adherence to international norms on the management of hazardous chemicals and wastes.

61.   A continuation of existing policies is not compatible with reaching the SDGs. Instead, resource efficiency and environmental resource management need to substantially improve. A circular economy approach combined with modes of sustainable consumption and production could improve the resilience of the whole global socio-economic system. Smart SDG policy portfolios targeted at impact decoupling in combination with resource efficiency can lead to net economic gains. Constructing smart SDG policy portfolios will require new economic thinking and analytical tools that couple the economic system with finance, technology and its respective STI sectors and the Earth system.

62.   Improvements in development and diffusion of big data tools are needed. Big data, citizen science and advances in stochastic optimization will help in the selection of robust STI investment strategies supporting broader SDG policy portfolios. It needs to be noted that policy change most often creates both losers and winners of the change – adding to growing socio-economic divides that need to be addressed.

63.   Participants claimed that economic and technology transfer mechanisms combined with smart SDG policies could create net positive outcomes for all countries. In contrast to statements in some sector specific sessions of the Workshop, participants expressed their view that existing technologies might not be sufficient to attain multiple SDGs or even ambitious formulations of some single SDGs. Technology gaps would need to be urgently closed not only by an incremental innovation agenda, but will necessitate targeted large-scale STI programs for break-through technologies requiring unprecedented amounts and modes of finance. However, the uncertain success of break-through technologies need to be physically hedged by preparing backstop strategies to ensure the attainability of critical targets. A particular set of risk finance instruments needs to be created to ensure the availability of "physical backstops" when needed.

Organizing the STI Forum 2018 and expected outcomes of a SCP session of STI Forum 2018

64.   The discussion in this session focused mainly on the key issues, trends and potential policies and did not venture much into specific suggestions for a SCP session of STI Forum 2018. However, participants repeatedly referred to the centrality of UNEP's programme on sustainable production and consumption.

Session 2e: STI for preserving and sustainably using terrestrial ecosystems (SDG 15)

*Moderator***:**
- Ms. Elenita Daño, Asia Director, Action Group on Erosion, Technology and Concentration (ETC Group), the Philippines

*Panelists***:**
- Dr. Wooyeong Joo, Senior Researcher, National Institute of Ecology, Republic of Korea
- Mr. Eduardo Krempser, Institutional Platform of Biodiversity and Health, Fiocruz, Brazil
- Ms. Lucinda Longcroft, Chief, WIPO New York Office, USA

65.   Session 2e discussed the status of existing knowledge, explored the potential for how STI can further support the achievement of SDG15, and addressed the main knowledge gaps and challenges. It also presented recommendations for a SDG15 session to be held during the 2018 STI Forum.

Key issues and facts reported

66.   Participants recalled that SDG 15 seeks to "protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss." Its targets encompass various aspects of 'life on land' – ranging from freshwater and mountain ecosystems through biodiversity, desertification, land degradation and benefit sharing from genetic resources. Of its nine principal targets (i.e. not related to the means of implementation), five have a target date of 2020. Eleven indicators

have been proposed for monitoring the principal targets, of which three are classed as Tier III; six as Tier II; and two as Tier I. The Secretary General's annual monitoring report on the SDGs flagged the rate of biodiversity loss as alarming and progress towards this target as "off-track".

Most effective ways that STI could support the achievement of the SDG 15

67.   Participants emphasized that implementation plans for SDG 15 typically depend upon a combination of planning, documentation and monitoring, engaging with local communities and immediate beneficiaries of ecosystem service, regulation and enforcement and – to a limited extent – innovative approaches with market based instruments. Importantly, how progress is made on other SDGs is crucially relevant for SDG 15: for example, if expanding agricultural production or energy access to achieve SDGs 2 and 7 respectively come at the expense of habitat destruction, then achieving SDG 15 is seriously imperiled.

68.   Therefore, the role of STI in achieving SDG 15 is related not just to those initiatives that directly relate to its goals and targets, but also to those that can produce significant advances for other SDGs with limited additional impact on terrestrial ecosystems. An additional sense of urgency follows from several of its targets falling due in 2020, at least one being off-track, and the relatively small number of 'Tier I' indicators, implying the severely limited data for making reliable assessments. An important role of STI in this regard is hence to come up with ways to address shortfalls in knowledge and measurement for SDG 15; as well as how to accelerate implementation for those that may be off-track or have imminent deadlines.

69.   At the same time, significant progress is possible through improving and scaling up existing technologies – for example remote sensing/GIS for land use planning and monitoring; locally applicable soil conservation methods; citizen science and community based monitoring. An especially important consideration is that of working with local communities – including indigenous peoples – to support the ways in which they may be applying traditional knowledge towards attaining these targets.

Main challenges for developing, adopting, disseminating or scaling these STI solutions

70.   Main challenges reported by participants included problems in monitoring wildlife and tracking the progress as well as making viable long-term predictions. Another big challenge is lack of capacity for dissemination of existing STI solutions. There are also particular challenges in monitoring wildlife in megadiverse countries, including: taking into account continental dimensions; taking into account parasite, vectors and hosts diversity; lack of biodiversity knowledge; high complexity of disease ecology; methodology and infrastructure bottleneck for big data; socio-cultural diversity; human health emergency; and changes in epidemiology profiles caused by social drivers.

R&D gaps

71.   R&D and knowledge gaps highlighted during the session were related to zoonoses outbreaks, in particular gaps in this area are concentrated in lack of knowledge in the causes of these disease outbreaks, their distribution and triggers of their emergence together with lack of good models to identify areas and risk factors for zoonoses outbreakes.

Expected outcomes of the STI Forum 2018 and concrete recommendations

72.   Main recommendations from the session related to developing intuitive and informative indicators to better communicate with policy decision makers and multilateral stakeholders; and to developing and advancing scenarios and modeling methodology to provide information of future changes in ecosystems for policy support. It was suggested that the Forum's session might contribute to reducing knowledge gaps and information bias between countries and regions. Participants recommended to consider a range of knowledge sources (science, engineering, companies, youth, indigenous people, etc.) in developing STI solutions, to share them widely and communicate with collaborators providing feedback and supporting new ideas.

Organization of SDG15 session at STI Forum

73.   The discussion did not address the question of how to structure and organize a session SDG15 at the STI Forum 2018, but it was proposed to involve all relevant scientific communities.

Session 2f: Harnessing the crosscutting nature of STI

Moderator:
- Dr. George Essegbey, Director of the Science and Technology Policy Research Institute (STEPRI) of the Council of Science and Industrial Research

Panelists:
- Dr. Michiharu Nakamura, Former President and Advisor, Japan Science and Technology Agency, Japan
- Ms. Erika Kraemer-Mbula, Senior Lecturer and Research Fellow at the Institute for Economic Research on Innovation at Tshwane University of Technology, South Africa
- Mr. Jean-Eric Aubert, International expert on STI Policies, former staff of World Bank and OECD

74.   Session 2f took stock of the key messages and recommendations highlighted in the breakout sessions and discussed the common elements and ways to harness the crosscutting nature of STI for the achievement of the SDGs. It highlighted synergies and trade-offs between actions under different goals and also provided recommendations on the organization of a session on that theme during the STI Forum 2018.

Key issues and facts reported

75.   Speakers and participants explored lessons-learnt from countries' strategic efforts to promote science-policy interfaces in many context and to ultimately institute effective national science advisory systems – systems that are capable to effectively deal with the complexity of interconnected sustainable development issues at various levels, from local to global. They highlighted the challenges that developing and developed countries face in this respect and collaborative ways forward, in order to mobilize the scientific and technological communities in support of informed and evidence-based decision-making.

76.   The discussion acknowledged and built on the lessons-learnt and recommendations from a similar session during STI Forum 2017: "33. The synergies and trade-offs between actions under different Goals are non-trivial and underline the cross-cutting nature of science, technology and innovation. Against this background, the 2030 Agenda for Sustainable Development must be understood as an integrated, systemic framework. There is a need for further science-informed analysis of the interactions across the Goals, in order to assist policymakers and practitioners in adopting an integrated approach to implementing the Goals — one which takes into account the positive synergies and potential trade-offs between Goals. While some interactions and interlinkages between the Goals have been analysed, such as in the case of the water-food-energy nexus, a comprehensive overview is still missing, and this continues to constrain integrated policymaking. The recent International Council for Science report entitled "A guide to SDG interactions: from science to implementation" is a first step in this direction. Coherent approaches are also needed to guide research and the identification of relevant science inputs for advancing each of the Goals. 34. Important lessons can be learned from countries' strategic efforts to promote science-policy interfaces and to institute national science advisory systems. Science informs options, but does not automatically make policy, because policymakers must balance many perspectives, including the values of their constituents. Governments and academia should change the way in which they interact with each other, as there is no close collaboration between the two in certain parts of the world. Strong science-policy advisory ecosystems are needed, with a close link between global and national discourse, in order to strengthen evidence-informed decision-making and to optimally leverage science, technology and innovation for the Sustainable Development Goals. The United Nations should take an active role in forging a closer link with national science advisory bodies and should work closely with bodies that provide access to wider networks, such as the International Council for Science and the International Network for Government Science Advice."

Most important trade-offs and synergies of key technology applications (in terms of the SDGs under review)

77.   No specific technology applications were highlighted in light of their trade-offs and synergies.

Interlinkages in SDGs and STI

78.   It was stressed that technology has always been intrinsically inter-linked, for example, bioengineering, micro-electronics, renewable/nuclear/fusion energy – all these technologies have evolved together and through interlinkages.

One example is drone measuring crop and soil (using new technologies, solar energy, satellite telecom systems for piloting, crops grown through genetically modified seeds).

79.   Today's technologies are also fundamentally interlinked which creates high importance of sharing knowledge and experience across sectors. In particular, there is a need to have a common platform for services and systems serving all 17 goals, which will be based on a database and founded on social acceptance.

80.   It was also stressed that the issue of resilience is fundamentally linked to climate change on the planet, which will significantly change our living conditions, and the issue of inclusion is fundamentally linked to the digital revolution, which offers the possibility of including all persons in finding solutions to sustainable development challenges if properly managed. Collective views of connected populations could be leveraged, leading to a new type of collective 'brain' for solving complex problems.

81.   Interlinkages are extraordinarily challenging to manage and it is important not to lose focus. There are linkages between interlinkages and so on, and it makes sense to map these interlinkages. If an important interlinkage arises then that can be addressed as required.

Disruptive technologies that could change the paradigm in the field and transform the way to reach the SDGs as a whole. Technologies to be featured in the STI Forum

82.   It was highlighted that the impact of technological developments should be examined through the perspective of time, financial dimension and real wealth. For example, in the Middle Ages, the impact of technological development was mainly on cities with currencies and barter dominating and land being the main wealth asset. Then in the industrial age the nation state was the site of power and center of social development with banks and stock exchanged developing and capital becoming the main asset. Today, power is distributed to citizens/groups who exert more influence than central governments, and power is also concentrated in globalized firms, while diversification of financial instruments has responded to technological development (crowd funding, green bonds, local currencies, block chain) which has changed the way society uses and applies technology for progress. Today, the real source of wealth is the human brain, as a source of innovation and creativity. Large companies are seeking to capture and manipulate this brainpower for influence and to create markets. Real wealth today is based on capacity to build knowledge (through education) and skills. This shows how technology is impacting our livelihoods in the global context. Finally, it was suggested to come up with a systematic framework to organize our approaches for learning from the past.

Structuring and organizing a session on emerging technologies during the 2018 STI Forum to facilitate discussion and identification of relevant recommendations. Desirable deliverables

83.   A proposal was made to create a short video of two to three minutes to tell the story on challenges behind each SDG and relevant technologies to capture imaginations, clarify the message and inspire engagement with real life examples of the way technologies can support policy implementation. Complexities of the main message from the video may then be explored through a panel discussion. The main objective would be communication to the target audience of member States.

84.   The STI Forum should serve the purpose of horizon-scanning and flag positive and negative implications and impacts of different technologies, particularly to inform developing countries.

85.   IATT should organize an international professional task team to monitor progress (use tools such as back-casting) and STI Forum 2018 should share experiences of this task team.

Session 3: Harnessing local and indigenous knowledge for the achievement of the SDGs

Moderator:
- Dr. Myrna Cunningham, President, Center for Autonomy and Development of Indigenous Peoples (CADPI), Nicaragua.

Panelists:

- Prof. Eun Mee Kim, Ewha Womans University, Republic of Korea
- Ms. Elenita Daño, Asia Director, Action Group on Erosion, Technology and Concentration (ETC Group)
- Mr Daniel Olomae Sapit, IP Hub Africa and Indigenous Peoples Major Group for SDGs

86.   Session 3 discussed how to harness indigenous and traditional knowledge relevant to the achievement of the SDGs. It also presented recommendations on how better highlight and mainstream the role of indigenous knowledge in the 2018 STI Forum.

Key issues and facts reported

87.   The need to harness local and indigenous knowledge for the achievement of the SDGs has been repeatedly emphasized in the STI Forums 2016 and 2017. In fact, science, technology and innovation derive from diverse sources of knowledge. These diverse sources should be considered and assessed in the development of technology solutions to sustainable development challenges and in the promotion of evidence-informed decision-making. Governments should consider creating national expert panels, consisting of scientists, engineers and other respected individuals, to provide expert knowledge to local and indigenous efforts for implementing the Sustainable Development Goals.

Examples of harnessing local and indigenous knowledge and grassroots technologies for the SDGs

88.   Importance of combining diverse knowledge systems was stressed by a number of participants. Example of such combination include agroecology. Agroecology is a science, movement and practice that draws on social, biological and agricultural sciences and integrates these with traditional knowledge, farmers' knowledge and indigenous peoples' knowledge. Agroecology technologies are knowledge-intensive, they build on farmers' knowledge and experiences of farmers complemented by research from the scientific community.

89.   It was also suggested to think more of practical ways of connecting knowledge and science, for example through online databases of traditional knowledge. Examples of such databases include China TCM (Traditional Chinese Medicine) Patents Database, Traditional Knowledge Digital Library (India), Korean Traditional Knowledge Portal and GENESYS Gateway to Generic Resources.

90.   Another example of traditional and formal knowledge systems working together is climate resilience farmer field schools (CRFS) operating in a number of countries in Asia, Africa, South America and Eastern Europe.

91.   It was pointed out that it might be worth adding smart databases that are connected by artificial intelligence. Comments could get scored by artificial intelligence software, creating smart folders.

Ways to ensure that STI for SDGs leaves no one behind

92.   Certain criteria were suggested to ensure that technologies are inclusive and leave no one behind, these include accessibility, affordability, gender responsiveness, social acceptability, environmental soundness, climate responsiveness, addressing inequality.

93. Structure and organization of a session on local and indigenous knowledge during STI Forum 2018

94.   Continued engagement with Traditional Knowledge holders and communities in all aspects of the SDGs process at all levels is needed. In this respect, there was a suggestion to host a dedicated session for the cross cutting role of traditional knowledge during the 2018 STI forum with the engagement of traditional knowledge holders. To support this engagement national level processes should create conducive space for entrenchment and respect of traditional knowledge. Recommendations focused on practical ways of combining science and traditional knowledge.

Session 4: Emerging frontiers: evolving STI developments with implications for SDGs

Moderator:
- Dr. Bill Colglazier, co-chair of the 10-Member Group, Senior Scholar, Visiting Scientist, Center for Science Diplomacy, American Association for the Advancement of Science, USA

*Panelists***:**
- Dr Catherine Adeya-Weya, ICT4D Consultant/Senior Representative Fieldstone Africa (Former Ag. CEO Konza City, Kenya)
- Prof. KyungBae Park, Professor of Business Administration at Sangji University, Republic of Korea, Vice President of Society of Open Innovation: Technology, Market, and Complexity(SOItmC)
- Prof. Michael Zichy, University of Salzburg, Austria
- Prof. Edward Lorenz, Professor of Economics, University of Côte d'Azur, France
- Prof. Keun Lee, Professor of Economics at Seoul National University, Director of the Center for Economic Catch-up, Member of the UN Committee for Development Policy

95.   Session 4 discussed emerging and exponential technologies and their impact on the 2030 Agenda. It also presented recommendations on how to structure and organize a session on that topic during the 2018 STI Forum.

Key issues, challenges, and facts reported

96.   Participants recalled the discussions in STI Forums 2016 and 2017 which noted the fast pace of technology change in recent years and that current technology revolutions have broad impacts on the economy, society and environment. Some of the areas of rapid advances, which are expected to have great effect in the society at large, are the information and communications technologies, energy technology, biotechnology, nanotechnology, and neuro-technology, among others. Changes in many clusters have become too fast for corresponding institutions to adapt.

97.   Participants emphasized that technology change typically is not neutral, at times disruptive and that it may create winners and losers. While disruptive technologies are essential for achieving the SDGs, there is a risk that their benefits might accrue to a minority and perpetuate and exacerbate inequalities. Considering ethical aspects in the assessment of science, technology and innovation will help to improve the regulations that are designed to lead these developments in the right direction. At the moment, harms of automation can be seen to outweigh the benefits for some stakeholders. Such effects need to be considered and ameliorated by Governments. The issue of inequality – both within and across countries – is the most pressing concern. Governments should consider actions such as installing a forum for world-wide exchange and monitoring, investing in education, and adapting taxation systems and social safety nets to ensure no one is left behind from the disruptive effects of new technologies.

98.   Much of the discussion focused on what all this might mean for Africa. Africa suffers from weak and uneven development of infrastructure in energy, transport, and communications which contributes directly to Africa's low level of productivity and industry's low and in some cases declining contribution to GDP. The share of automatable jobs is most likely even higher (e.g., 85% in Ethiopia compared to 47% in the USA) than in the developed world. Africa's participation in global value chains remains largely confined to low value added primary inputs, limiting possibilities for learning and upgrading, but agro-industry development (food and beverages, paper and wood products, textiles, footwear and apparel, leather products, and rubber products) provides an important path to industrialization in Africa which might be constrained in the future by increased automation around the world.

Results and lessons-learnt from work on this topic in the TFM

99.   Participants called for a synthesis of the patchwork of results and lessons-learnt of related discussions in the STI Forum, TFM and elsewhere, especially with regard to implications for developing countries. Transformational change could arise from visionary plans of scientists, business and governments and the scale-up of technologies. And partnerships between these groups might determine the direction of such transformational change.

100.   In particular, participants recalled the discussions on emerging and disruptive technologies in STI Forum 2017 which identified key issues, sustainable development impacts, and proposed actions to be taken by the international community, governments, businesses and relevant stakeholders. The co-chairs of the Forum concluded: "*82. In a rapidly changing world, foresight in science, technology and innovation is needed to understand the potential opportunities and challenges associated with advancing science and technology. There are positive and negative impacts from the disruptive effects on societies of new technologies, such as nanotechnology, automation, robotics, artificial intelligence, gene editing, big data and 3D printing. The future cannot be predicted, but understanding the possible consequences of*

decisions taken now is essential. In this context, there is a need to broaden discussions on the impact of technologies and science in general….. The forum to address the challenges of emerging technologies 90. The Technology Facilitation Mechanism should support or conduct forward looking exercises on emerging developments in the field of science, technology and innovation so as to make deliberations on emerging technologies a regular feature at each forum. Given the potential of these developments to have a significant impact on human well-being and sustainability around the world, a longer-term and systematic programme of work in a multi-stakeholder format would help illuminate issues and provide guidance at various levels. In this context, the creation of a group of friends among United Nations missions in New York, as suggested by the Government of Mexico, could move forward discussions on these topics."

New disruptive technologies and technology assessments

101.   Speakers and participants identified a long list of disruptive technologies that have or are expected to have a bearing on the achievement of the SDGs. They stressed that such list was not exhaustive and prone to surprises even to technology experts.

102.   The list of disruptive technologies identified by WEF in 2017 was discussed, including harvesting clean water from the air, liquid fuels from sunshine, sustainable design of communities, and quantum computing.

103.   One area discussed in detail was automation and artificial intelligence, both of which impact employment and the capacity of developing countries to catch up with the countries at the frontier of technological development. Automation (with robots, computerized algorithms, mobile sensors, unmanned vehicles, etc.) will have a deep impact on societies over the world and profoundly change the way we live our lives. It has important implications for future technology perspectives in areas of greatest concern to developing countries. It also has important cross-border implications for the development perspectives of countries. As technology change is fundamentally cumulative in nature, technology change in one country ultimately leads to lock-in of specific technology clusters across borders in many countries and thus can potentially constrain certain development options and paths. Automation emerges in many areas, from industrial production to household services and personal assistants, encompassing both physical tasks and purely virtual ones. Artificial intelligence (AI) technologies go even further by increasingly replacing cognitive tasks previously carried out by humans. It is rapidly advancing and promises enormous and exponentially improving productivity gains, but has also raised concerns about extreme inequality which is expected to be a consequence of widespread application of AI. Participants noted concerns about the potential emergence of machine super-intelligence which might be realized sometime between 2024 and 2070.

104.   Related clusters of disruptive technologies include the "Internet of Things", "big data", 3D printing, and technologies for space colonization. The Internet of Things will equipping objects with machine readable identifiers which could dramatically change lives. 3D-printing makes it possible to print settlements, furniture, utensils, transportation, clothes, etc. which might disrupt international production and distribution networks but could also reduce human activities that cause air pollution.

105.   Participants highlighted the rapid advances in biotechnology and its applications for the development of completely new products. They called for countries to develop a comprehensive set of scientific capabilities, tools, and expertise, in order to harness the benefits and reduce any downside negative risks, using frameworks for risk assessment. Biosciences also have great potential for inclusive value chain development in developing countries, as illustrated with the cases of a bio-resources innovation network in Nairobi, the development of disease resistant canning bean varieties in Kenya, Tanzania and Ethiopia; and pilot facilities to turn organic elements in wastewater from factories into biogas.

106.   Many of the emerging technology clusters are enabled by ICTs. This also applies to modern renewable technologies. In this context, the potential disruptiveness of modern renewable technologies was highlighted, such as wind turbines, photovoltaic cells, concentrated solar power, geothermal energy, ocean wave power among others. Examples of satellite-based ICT for improved crop production in Sudan and for inclusive agro-industry value chain development in Zambia and Kenya showed the growing ICT capabilities in the developing world.

Policy recommendations

107.   Speakers and participants discussed a wide range of policy recommendations, ranging for the local, national to global levels. However, most of these recommendation came with a word of caution regarding the uncertainties and many knowledge gaps. They also greatly depend on the development stage of countries. In addition, optimal policy mixes in the various countries will depend strongly on what else is being done in other countries around the world.

Organization of a session on emerging and exponential technologies during the 2018 STI Forum

108.   In view of the complexities and wide range of exponential technologies and rapidly changing technology clusters, participants stressed the importance for a balanced presentation of these issues, providing space for a variety of views rather than a single narrative. It will be essential to provide existing evidence and scientific insights to the broader audience of the Forum, as some of their findings are not readily obvious. The session should come up with ideas on what would be required to be in place to make emerging technologies contribute to achieve the SDGs. The session should build on the corresponding sessions in the first two STI Forums and also be open about what is known and what not yet. Some participants suggested to focus the session on one or two emerging technologies only, in order to sharpen the discussion. Others suggested to structure it along inequality and ethical considerations.

Study visit to Sudokwon landfill site

109.   Participants joined a study visit to Sudokwon landfill site organized by the hosts which provided additional hands-on insights and discussions on STI for SDGs 7 and 12.

Session 5: STI roadmaps incorporating SDGs and their implications for policy and capacity building

Moderator:
- H.E. Ambassador Inga Rhonda King, Vice-President of ECOSOC, Permanent Representative of St. Vincent and the Grenadines to the United Nations

Panelists:
- Mr. Tateo Arimoto, Professor of Science, Technology and Innovation Policy Program, National Graduate Institute for Policy Studies (GRIPS) / Senior Fellow, Center for Research Development Strategy (CRDS), Japan Science and Technology Agency (JST), Japan
- Mr. Klaus Tilmes, the Global Practice Director for Trade and Competitiveness (T&C) at the World Bank Group, USA

110.   Session 5 discussed STI policy and roadmaps and explore options for more efficient governance approaches, including the responsible research and innovation approach. It also presented recommendations on how structure and organize a session on that topic during the 2018 STI Forum.

Key issues and facts reported

111.   The 10-Member Group and other participants of the STI Forum and of various HLPF session have called for STI roadmaps for the SDGs at least since 2013. STI Forum 2017: In view of popular demand, there was also a session on STI roadmaps in the STI Forum 2017. The session discussed STI policy failures and explored options for more efficient governance approaches, including the responsible research and innovation approach. In particular, the session focused on key challenges for developing countries in this regard. It identified new trends and opportunities for STI policy, in support of progress towards the SDGs. It also called for increased inter-agency cooperation, synergies and guidelines for STI policy development, in line with the national strategies to achieve the SDGs.

112.   Complexity science and systems approaches can help harnessing STI for a new global vision of scientific endeavours and related science policies, based on interconnections, interfaces, participation, discussion, consultation, cooperation, and coordination of policies and perspectives at national and global levels.

113.   Increased horizontal coordination and integration of sectoral policies (breaking out of policy "silos") can help improving coherence of national STI policies within overall development visions and strategies. Taking into account complexity and uncertainties can help understanding and managing by integrating future, systemic, non-linear thinking into STI decision-making.

114.   More integrated approaches, such as whole-of-government and whole-of-society approaches, are needed to address the complexity of the problems. The whole-of-government approach cuts across the different levels of government, in order to strengthen the policy coherence between sectors, including through various concrete measures, and shared goals and targets. The whole-of-society approach aims to ensure coordinated cooperation between decision makers and representatives of stakeholder groups, in order to build broad ownership of the SDGs.

115.   While the interest in broad-based STI roadmaps has been high, no consolidated initiative or partnership to promote such plans has been launched under the TFM. The present session in the workshop provided details of a specific way forward in this regard.

Lessons learnt from STI roadmaps and plans

116.   STI can contribute to the achievement of the SDGs as a "bridging force" which unites different sectors, countries and regions, thereby opening a path to create a society for the future generation. S&T Adviser to the Minister for Foreign Affairs in Japan recommends four actions of S&T Diplomacy to Implement the SDGs, that can be summarized as follows: change through innovations (Global Future Creation through Society 5.0); Grasp and Solve (Enable solutions by global data); link across sectors, unite across the globe; and foster human resources for STI for the SDGs

117.   Japan created a new proposal for STI, called Society 5.0. Uniquely, this includes a focus on the role of STI in social dimensions – health, government services, housing etc. This policy has been supported by Japan's Business Association. The key message is the importance of bridging new national STI policies with private sector by creating a link across hardware, service, corporate, government, etc.

118.   Developing countries are faced with innovation policy dilemma which is related to government capabilities. From one side multiplicity of market failures, missing complementary factors and institutions increase policy complexity and from the other side government capabilities to design, implement, and coordinate an effective policy mix to manage these failures and gaps are weaker. In order to address this dilemma it was recommended to: follow good practices and principles in design of innovation policies; take a deep look at STI policy and expenditure; and design the policy mix in a gradual way through creating capabilities escalators – support agencies to build up capacity of local innovators.

Structure and organization of a session on STI roadmaps during STI Forum 2018

119.   It was suggested to develop more and well-organized side events and breakout sessions during the next STI for SDGs Forum that focus on specific issues, smart cities, the role of universities, funding agencies, etc.

Desirable deliverables of the Forum and recommendations for stakeholder action

120.   It was suggested to create an international task team for detailed design of roadmaps, plans, and knowledge infrastructures and generate more institutional commitment from existing universities, academies, and funding organizations in order to reform STI ecosystem to support SDGs.

Session 6: TFM Online Platform

Moderator:
- Dr. Paulo Gadelha, former President of Fundação Oswaldo Cruz (Fiocruz) , Brazil.

Panelists:
- Ms. Nina Harjula, Chairman of the board, NIA, Co-founder & Board member, GCCA, Finland
- Dr. Satoru Ohtake, Senior Executive Director, Japan Science and Technology Agency, Japan
- Mr. Jonathan Wong, Chief, Technology and Innovation Section, ESCAP, Thailand

- Dr. Jong Gun Lee, Data scientist, UN Pulse Lab Jakarta, Indonesia
- Mr. Clovis Freire, Economic Affairs Officer, Policy Analysis Branch, DESA and Mr. Jorge Martinez Navarrete, UN OICT

121.   Session 6 discussed key elements for the implementation of the TFM Online Platform, including: a standard classification of STI for facilitating matchmaking of supply and demand of STI for SDGs; the types of technologies that would be more suitable to be disseminated through the platform, and the user requirements for effective use of the platform.

Background and the independent assessment

122.   Speakers and participants agreed that innovators, entrepreneurs and everyday users worldwide need easy access to science and technology knowledge to promote the required transformations towards the sustainable development goals (SDGs). However, relevant and reliable knowledge is difficult to find and access.

123.   Participants recalled the mandate and objectives of the TFM online platform – a key operational element of the 2030 Agenda – which remains to be developed as a gateway to facilitate access to information STI solutions for the SDGs. The TFM online platform will be used to establish a comprehensive mapping of, and serve as a gateway for, information on existing science, technology and innovation initiatives, mechanisms and programmes, within and beyond the United Nations; facilitate access to information, knowledge and experience, as well as best practices and lessons learned, on science, technology and innovation facilitation initiatives and policies; and facilitate the dissemination of relevant open access scientific publications generated worldwide.

124.   Speakers reported on work underway to design, develop and operationalize the TFM online platform, including preliminary collection of existing technology applications and initiatives in addressing sustainable development challenges. The work is guided by the results of the independent technical assessment which had been undertaken by experts from the Institutes of Science and Development of the Chinese Academy of Sciences; the UK's Overseas Development Institute UK; and DNV GL in the Netherlands.

125.   Lessons from the independent assessment included the following: The online platform should support actual technology transfers via matchmaking, not be simply an information repository for policy/scientific information. A key group of platform users is public agencies and private suppliers of such services within country-based innovation ecosystem. Critical start-up phase will require more and centralised resources, including specialist technology transfer service providers. The platform will need a small team once it is fully operative, but it is crucial that it be permanently 'animated'. The skill set of the human resource should not be limited to the ICT domain, but rather focus on service development, process management and facilitation of networks.

Presentations of partner online platforms

126.   Speaker presented the approach, technology and lessons-learnt from a selection of online platforms that should be considered in the development of the TFM online platform: AGORA Platform on Open Science, technology and Education for Health; the National Innovation Center of the UK's NHS; Impact Exchange (a social stock exchange); UN's UNITE platform and challenges; and above all the platforms of 53 partners (10,000 companies in 31 countries) in the Global Cleantech Cluster Association. They also discussed technology databases by WIPO Green, UNFCCC, UNOSSC, UNIDO, APCTT, the China International Technology Transfer Center, and the Enterprise Europe Network.

127.   Research findings implicate the importance of understanding various stakeholder expectations to build a sustainable business model, related earnings logic and trust. Focus on global reach opens value creation opportunities for all stakeholders. Value creation challenges can be tackled by timely information, proactive communication and additional open innovation services to complement stakeholder weaknesses and challenges. Digital affordances are complemented by spatial (physical) affordances, thus calling for attention on the importance of studying "hybrid affordances" in the context of B2B innovation platforms.

Recommendations for the TFM online platform

128.   The meeting discussed elements of a technical "Practical Roadmap for Implementation of the TFM online platform" presented by DESA and OICT colleagues. The roadmap proposed the way forward with a rapid prototype (near completion), to be released in April, June, October and December 2018, and the first full release in February 2019. This followed the approach of building a network of networks of suppliers and users of technology; of technology transfer service providers (e.g., of services: technical certification, legal, financial); and of STI policymakers (who develop the regulatory frameworks and marketplaces), which should be accessible to non-experts.

129.   Speakers and participants suggested to follow a user-centered design focused on the mandated objective; to build credibility for the new platform through efficacy; to ensure inclusivity to allow participation by those that are less connected; to build an engaged, supporting community for the platform; to ensure interoperability in order to allow easy interfacing with other platforms; and to use performance metrics based on a coherent future vision for the platform.

Wrap up and next steps & closing

Moderator:
- H.E. Ambassador Inga Rhonda King, Vice-President of ECOSOC, Permanent Representative of St. Vincent and the Grenadines to the United Nations

Panelists:
- Dr. Bill Colglazier, co-chair of the 10-Member Group, Senior Scholar, Visiting Scientist, Center for Science Diplomacy, American Association for the Advancement of Science, USA
- Ms. Dong Wu, Chief, STI Policy Section, DTL/UNCTAD
- Mr. Shantanu Mukherjee, Chief, Policy Analysis Branch, Division for Sustainable Development, DESA

Closing:

- Representative of Major Group for Children and Youth
- Closing remarks of behalf of the ECOSOC President by H.E. Ambassador Inga Rhonda King, Vice-President of ECOSOC, Permanent Representative of St. Vincent and the Grenadines to the United Nations
- Acknowledgment and thanks (DESA)

Closed meeting of IATT and 10-Member Group

Chair: **Mr. Bill Colglazier**, Co-chair, 10MG
Participants of the closed meeting:
- **10MG:** George Essegby, Nebojsa Nakicenovic, Hayat Sindi, Myrna Cuningham, Elenita Dano, Paulo Gadelha, Bill Colglazier, Heide Hackmann (via Skype).
- **IATT:** Shantanu Mukherjee, Richard A. Roehrl, Clovis Freire, Maria Godunova (DESA/DSD); Klaus Tilmes, Naoto Kanehira (World Bank); Justin Henceroth (UNOPS); Dong WU (UNCTAD); Jonathan Wong (ESCAP).

130.   Following the Workshop, the 10-Member Group and the IATT held a closed meeting without the external experts, in order to reflect on the Workshop deliberations and discuss the way forward in preparation for the STI Forum 2018. The Group made specific recommendations with regards to participation, process, content, and meeting format. The recommendations build on those made by the 10-Member Group in its de-briefing after the STI Forum 2017 in May 2017.

Participation

131.   *Incentives for participation:* The Group proposed a systematic strategy to increase incentives for offline and online participation in the STI Forum. In this context, several Members stressed the importance to mobilize very senior representatives of Governments, UN system and other international organizations and to organize discussions among them. Other groups to incentivize include leaders of organized science and engineering; STI funders; traditional

knowledge holders; youth and young innovators; science centers and parks; and tech companies. These leaders and their organizations should be given tasks before and during the Forum, in order to build longer-term ownership of the STI Forum process. Much work remains to better engage technology companies from around the world. Members of the Group offered their willingness to reach out to these leaders and organizations. Similarly, IATT members expressed their appreciation for the persistence of IATT co-convenors in mobilizing engagement from UN entities.

132.   *Engagement of Member States:* The Group emphasized the need to mobilize Member States to become the champions, as the ultimate appeal of the STI Forum to external stakeholders is its nature as the most universal international organization that now offers a unique entry point for them to Governments from around the world. Therefore, all Member States should see a reason to be at the Forum which would require assignments and "homework" for Member States which involves a range of ministries and Government agencies. This could build on and complement the discussions of ministries of science and technology in the CSTD and their engagement in STIP reviews. CSTD outcomes to be reported by the Chair of CSTD should have an institutionalized space every year in the STI Forum.

133.   *Connecting science communities to the UN debate:* The Group emphasized that one key function of the STI Forum is to connect science communities to the UN debate. The Forum should thus build a longer-term, cross-disciplinary community of practice of scientific/engineering communities, private sector, civil society and Governments. It should start alerting key organized science players, such as the Earth League, Future Earth, SDSN, TWI2050, and STI funders.

134.   *Young innovators and solution providers:* The Group agreed that Youth and especially young innovators are a key stakeholder group that should be fully engaged and mobilized for participation in the Forum. This might require working with a wider group of partners to support their participation. The Group appreciated the specific proposals made by the UN Major Group of Children and Youth as presented to this Workshop and suggested follow-up with them. One incentive for top young innovators to participate would be a wider participation of tech companies in the Forum.

135.   *Designate UN access/service point for potential participants:* The IATT and 10-Member Group might want to institute a UN access point or service line that is open for any queries from potential participants and organizations interested in collaboration. If this was done in a systematic open way, it might make it possible to spread such workload for follow-up by all relevant IATT and 10-Member Group members.

136.   *"One billion people unicorns":* An IATT members suggested for IATT to identify technology companies that do or could potentially reach as many as one billion people. For this purpose, IATT should compile innovators from competition entries around the world, such as the Finnish slush event 25,000 innovators, and engagement them in the STI Forum. Another partner that IATT might want to engage in this respect is the singularity university and their world on ideas for reaching a billion people.

Process

137.   *Timely planning:* The Group agreed that planning should start without delay, including "save the date" outreach to potential speakers. In view of busy calendars, commitments and budget constraints, timing is essential, in order to secure very good speakers and moderators. The Group emphasized the need for joint planning by IATT and 10-Member Group, based on realistic assessment of what the Forum could achieve. The Group would aim to inspire their communities, build awareness and possibly guide action. The Group encouraged IATT co-convenors to develop a roadmap for the TFM work towards the SDG review at the HLPF in 2019, together with a shorter-term workplan for the STI Forum 2018 which should specify time commitments, resources, and roles.

138.   *Continued engagement of current 10-Member Group:* The Group expressed their willingness to continue to be engaged in preparations for the STI Forum 2018, even if there were to be changes in the composition of the 10-Member Group at the beginning of 2018. In case the current 10-Member Group were not extended, they suggested a meeting with the new members to guarantee continuation.

139.   *Partnership approach to organize sessions:* The Group suggested to follow a partnership approach for the organization of the various sessions of the STI Forum. This would build on the practice in 2017. It would involve designated IATT members with subject expertise working with one to two members of the 10-Member Group to prepare

each of the sessions. In this context, it was suggested to hold more regular virtual preparatory meetings in the run-up to the Forum, and to make special efforts to overcome certain coordination issues among IATT members.

140.   *IATT engagement:* The Group suggested to think systematically about creating incentives for engagement by all IATT members. For example, it was proposed to encourage them to feature their work. Some suggested each UN entity to provide two-pagers for each of the session topics, others said they should rather prepare a joint book of the many activities.

141.   *Member State engagement*: The Group emphasized the importance of early engagement of Member States, beyond the two Forum co-chairs designated by the ECOSOC President. This should involve early Member State briefings, and including giving them "homework" in preparation for the Forum, for example, in the form of requesting them to document their successful innovations (two to three success stories).

142.   *Associating STI meetings and regional forums to the Forum*: The Group agreed to further formalize the process of associating and linking suitable meetings with the STI Forum. In this regard, the IATT could review the draft criteria and process prepared by DESA. As requested by the first two STI Forums, associated meetings would become intersessional and directly contribute to the Forum and engage various communities. Besides the STI Forums by the Regional Commissions, there is a growing number of meetings that are interested in such association, including G-STIC, and many more.

143.   *Cooperation between CSTD and STI Forum*: The Group suggested further efforts to bring the CSTD and STI Forum processes together in a more coherent, symbiotic way. It was suggested that the current co-convenorship of DESA and UNCTAD provides a good chance for progress in this regard.

Content

144.   *SDG-specific sessions:* The structure of the Forum's programme should follow last year's successful formula and thus closely resemble the sessions of the present Workshop. This will include sessions on the SDGs under review at HLPF 2018 (SDGs 6, 7, 11, 12, 15, and 17) and adequate space for a discussion of their interlinkages. The illustration of interlinkages should be easier this year due to the strong integration/nexus among the closely connected SDGs under review this year. Yet, the group suggested to keep SDG-specific sessions, in order to allow for SDG "deep-dives".

145.   *Cross-cutting sessions:* This would be complemented by cross-cutting sessions similar to sessions 3 to 6 in this Workshop comprising: (a) local and indigenous knowledge; (b) emerging technologies and their impacts on the SDGs; (c) STI roadmaps for the SDGs and capacity building, and (d) the TFM online platform. The Group emphasized the importance of these crosscutting themes as an added value compare to SDG specific STI discussions in other forums. The Forum should pay attention to traditional and indigenous people's knowledge and link it systematically to scientific insights. This might be most obvious for SDG15 on terrestrial ecosystems, but also important – to varying degrees - for the discussions on STI roadmaps, the TFM platform and all other issues. STI Roadmap discussions might want to focus on VNR countries and the 10-Member Group might want to engage with them.

146.   *Technology solutions and innovations*: The Group emphasized the importance of featuring real-life technology solutions and innovations from scientists, engineers, and entrepreneurs from all walks of life.

147.   *Substantive report and policy briefs:* The Group suggested to organize a call for policy briefs on science, technology and innovation for the SDGs with a focus on key issues at the STI Forum 2018 and to produce a first informal publication to bring together these and other online inputs, including specific technology solutions, in support of the Forum. This is a suggestion that had been made in earlier years by the 10-member group and DESA and might build on the earlier "vision" document of the Group.

Meeting format

148.   *Overall format:* The Group proposed building the programme in 2018 on the successful format of 2017 which included both SDG-specific sessions and four recurring cross-cutting sessions. This would be complemented with a coherent series of special panels, side events, exhibitions and demonstrations of solutions.

149.   *Special panels and meetings:* It was suggested to convene a panel of ministers, a panel of science advisors and a panel of STI funders, as well as to arrange special meetings for them in conjunction with the STI Forum, e.g., on 4 June 2017. In this regard, the example of the ICSU-initiated meeting of funders right before the STI Forum 2017 was lauded as a good example.

150.   *Role of Governments in the Forum:* The Group that it is very important to engage Member States by giving them tasks, for example, by announcing questions for them to answer or giving them other work. Some of this might be submitted in writing before the meeting and speakers could then address this submissions by asking questions or making references. We need to invite right private sector to see best innovations.

151.   *Young innovators:* Similarly, the invitation to young innovators in 2017 from around the world was appreciated, but it was suggested organize their engagement in a more systematic fashion. In addition to short pitches like in 2017, it will be important to bring young innovators' messages to a much wider audience, using communication tools during, before and after the Forum. Young innovators should have either their own session in the STI Forum or parallel space or communication zone to allow for 30 min. in-depth presentations of their ideas and subsequent discussions with funders, innovators, entrepreneurs, beneficiaries, and Governments. Young innovators could also have their own meeting on 4 June 2017. Short videos could be developed to explore what happened with the innovators from previous years, to document whether the STI Forum was instrumental for technology match-making. Finally, it was suggested to include "pitches" not only from innovators but from beneficiaries of their innovations, in order to document how they have transformed lives.

152.   *Side events integration:* The Group suggested to start planning for the side events early on, in order to ensure well-structured events, in order to mobilize key communities and complement the main sessions in a systematic way. A formal reporting mechanism or session might be explored.

153.   *Increased interactivity:* Several members of the Group proposed to move further away from the "UN format" of previous years, in order to have much more interactive and really innovative sessions. The Group, inert alia, proposed to organize an open challenge or commission work on a special APP for smart phones to promote interactivity with the offline and online audience of the STI Forum. The Group offered their help to meet with a potentially new 10-Member Group to ensure continuity.

154.   *Unified session format:* The Group agreed to think of a unified format for the sessions, in order for the STI Forum to have its own "signature". In this context, it was suggested to limit speakers to three slides per each and to propose ways to engage all with the audience and particularly the Member States.

155.   *Videos:* The Group emphasized the value of using videos to kickstart each panel with a brief presentation of key issues and challenges, so that the panel discussion could focus on interactive discussion on policy, actions and pathways forward. Panelists, young innovators and organized science/engineering communities should ideally be involved in the preparation of the videos. Alternatively and if the budget remains a big issue, videos could be re-used and cut from various sources and obtain through a UN open challenge competition with winners selected by a committee. Videos should be made available online in advance of the meeting to engage a wider online community from which questions and recommendations should be collected and synthesized by IATT in preparation for the Forum.

Recommendations submitted by the UN MGCY to the Workshop

156.   The Group expressed their appreciation for the contributions by the UN Major Group for Children and Youth to the TFM process since the very beginning and suggested to consider the recommendations submitted by UN MGCY to this Workshop, highlights of which are reproduced here:

Building on earlier suggestions by the 10-Member Group:

157.   The following provide a summary of suggestions made by the 10-Member Group stakeholders at the debriefing after STI Forum in May 2017.

Suggestions made by the 10-Member Group at the debriefing after the STI Forum in May 2017		
	Key message	**Follow up Actions**
Meeting format	Side events were excellent and need a way to bring their messages into the final outcome.	Solicit recommendations from organisers for inclusion in final summary Consider reporting back to plenary after side events
	The 90 seconds pitches by innovators were impactful as concrete showcases of innovations. Need to capture the impact that the participation in the STI Forum had on the innovators; need for systematic follow-up and evaluation of their experience and needs (also with the innovators from 2016)	Using video or slides as a background for pitches for more visualization. Solicit feedback from Innovators selected in 2016 and 2017 on how STI Forum has contributed in matching, financing, upscaling, etc. innovations, if any.
	Moderation style of Ambassador Kamau was highlighted as very positive and engaging member state contributions beyond read-out statements (especially PGA event on 17 May)	Make it clear to all participants, moderators and panellists that the importance of STI for SDGs is taken as given. The discussion should concentrate on how, where and what is needed to scale up STI for SDGs.
	Suggestion to experiment with different session formats/tools. Need to ensure coordination and communication among the speakers and moderators prior to the STI Forum, which can be done by Skype.	Exploring the following options: (1) Roundtable, instead of panel discussion. No prepared presentations by panellists, but only moderated discussion around key questions (need for a very good moderator for that); (2) Encourage professional audio-visual aids (pictures, short videos etc.); (3) Smaller break-out sessions (e.g. on first day of the Forum instead of large plenary sessions) to allow for more focused and interactive discussions and better networking possibilities
	This year Forum brought more interest and interaction, but less significant MS participation. Last year was more interactive, but had less engagement from Member States.	Need to find balanced approach to engage MS and government machineries through statements, while engaging them in interactive discussions.
	Side events were useful.	Extra day of side events or affiliated event
	Connection between the day focused on SDGs under review and the cross-cutting areas could have been improved.	Need for better coherence in the agenda/topics in the two days of the Forum.
Participation	Indigenous systems of knowledge not represented in innovators.	Identify suitable cases that present diverse sources of STI and knowledge through alternative networks in advance.
	Need for balance among speakers: background, gender, regions, indigenous knowledge and need for higher transparency in selection. There is much less gender balance among speakers this year.	Explore additional resources to support travel of speakers, well before the meeting. Encourage IATT members to increase their support to travel of speakers. Ensure balance in various aspects among speakers.
	Need for higher diversity among innovators: gender, indigenous knowledge. Suggestion: call for innovations by girls/women.	Launch the call for innovations well in advance. Explore other forms of reaching out to groups of innovators that are underrepresented.
	Create more lively/controversial discussions in the sessions through invitation of panellist(s) with more critical viewpoints (e.g. sceptic of role of STI and what kind of STI for the SDGs)	Make an effort to have different viewpoints represented in each session.
	Expand exhibition site of innovations to allow for more diversity	Make an effort to expand exhibition

Suggestions made by the 10-Member Group at the debriefing after the STI Forum in May 2017		
	Key message	**Follow up Actions**
Process	Closer cooperation with 10-Member Group (including meeting in Paris in January 2017) was helpful and appreciated Less coordination of 10-MG with the co-Chairs, not even a short meeting in NYC like last year.	Continue to organize calls between the 10 Member group and IATT. Explore the possibility of organizing meetings between the two groups. Improve coordination between the 10-MG/IATT with the co-Chairs.
	Need to build stronger links across the STI Forums over the years; ensure that conversation continues between the Forums.	Plan and implement an intersessional programme of work that respond to the findings and recommendations of one STI Forum and will serve as input to the next. Pursue idea of more strategic planning for STI Forum, not just year by year, especially with the review of the 2030 Agenda/SDGs in 2019.
	Suggestion to use pool of STI participants to reach out to them with request for inputs in order to map existing STI initiatives, hubs or activities.	Plan and implement this outreach using the list of email of registered participants and IATT.
	Apart from organizing formal briefings to all Member States, need to explore options for more effectively engaging MS, in particular, including to address resource constrains.	Discuss innovative format for regular engagement of Governments.
	Need for more congruence among the speakers' inputs; preparation meeting (e.g. via skype) ahead of the Forum suggested to increase coherence among interventions, e.g. by asking all speakers to focus on giving answer to a particular question etc.	Make further efforts to hold prep-meetings (remotely) to coordinate messages. Engage speakers who have participated in intersessional work
	Need to showcase Forum's impact on making innovation for the SDGs work in real life.	Follow up with invited innovators, to connect them to solutions seekers and resources – this will make the Forum more attractive
Content	Need for more feedback and engagement of interested stakeholders, online discussions are insufficient in this regard. Allow participants to send one pager with their inputs to be posted online. The systems view and interlinkages among SDGs was underrepresented. Need to find ways to make the Online Forum more active and attract more participants who are involved in various aspects of STI for SDGs.	Make an effort to improve participation of speakers with background in integrated systems analysis. Active outreach to start now, one year before the Forum. Consider producing an annual analytical, empirical report on STI for the SDGs as a background on the topic.
	Need to strike a balance between big high-tech innovators and small start-ups; suggestion to ask "big" innovators to sponsor the participation of one or several "small" innovators (e.g. as a default option when they register/apply for the forum Need to be more cautious about the political implications of panels that are dominated by corporate/formal views without representation from key affected sectors, i.e., Agriculture panel with Big Ag, without farmers and all males.	Explore this idea in consultation with EO and legal office. Exert more efforts to ensure balance among panel speakers, including political, geographic, formal/informal background, and gender.
	Put more emphasis on development, less on high technology. Lack of social dimensions and non-tech aspects	Prepare concept note for the next Forum now. Put out for public comments and review.

Programme

Day One - 29 November 2017	
9:15 – 9:30	*Registration*
9:30 – 10:00 (Room 113-114)	**Opening** • Welcome remarks and moderation by Dr. Jong-Soo Yoon, Head of the UN Office for Sustainable Development, DESA, Republic of Korea • Dr. Vaughan C Turekian, Co-Chair of STI Forum 2016 and 2017, and Senior Board Director, Science, Technology and Sustainability, National Academy of Sciences, Engineering and Medicine, USA • Congratulatory remarks by Dr. Young Sook Yoo, Korea Institute of Science and Technology, Former Minister of Environment, Republic of Korea
Group photo (10:00 – 10:15)	
10:15 – 10:45	**Session 1: Introduction to the STI Forum** Remarks: • Mr. Shantanu Mukherjee, Chief, Policy Analysis Branch, Division for Sustainable Development, DESA • Ms. Dong Wu, Chief, Science Technology and innovation Policy Section, DTL/UNCTAD • Dr. Bill Colglazier, co-chair of the 10-Member Group, Senior Scholar, Visiting Scientist, Center for Science Diplomacy, American Association for the Advancement of Science, USA
10:45 – 11:00	*Break*
	Session 2: STI challenges and solutions for the five selected SDGs *These sessions will address key SDG challenges and potential STI solutions for each of the five goals (6, 7, 11, 12 and 15) that will be on the agenda of the High-level Political Forum on Sustainable Development in 2018. Sessions for the SDGs 6 and 7, and 11 and 12 will be held in parallel. The sessions will be structured as interactive panel sessions followed by Q&A and moderated discussion.* Guiding questions: • What are the most effective ways that STI could support the achievement of the selected SDGs? • What are the main challenges for developing, adopting, disseminating or scaling these STI solutions? • What are the knowledge/implementation gaps requiring more research and technology development? • How to structure and organize a session on STI for the selected SDGs in the 2018 STI Forum to facilitate discussion and the identification of relevant recommendations in that area? • What should be the expected concrete outcomes and recommendations that should result from the Forum in relation of STI for the selected SDGs?

	• What are the key partners, stakeholders and communities that should be involved in the preparation of the STI Forum 2018 in relation to STI for the selected SDGs?
11:00 – 12:30	**Session 2a: STI for ensuring availability and sustainable management of water and sanitation for all (SDG 6)** (Breakout session – Room 113-114) Moderator: Ms. Dong Wu, Policy Review Section, Division on Technology and Logistics, UNCTAD • Prof. Eun Namkung, Seoul National University, Republic of Korea • Dr. Hans Thulstrup, Senior Programme Specialist, Water and Environmental Sciences, UNESCO Regional Science Bureau for Asia and the Pacific • Dr. George Essegbey, Director of the Science and Technology Policy Research Institute (STEPRI) of the Council of Science and Industrial Research
11:00 – 12:30	**Session 2b:** **STI for making cities and human settlements inclusive, safe, resilient and sustainable (SDG 11)** (Breakout session – Room 110-111) Moderator: Ms. Hayat Sindi, Founder and President, Institute for Imagination and Ingenuity (i2institute), Saud Arabia Panelists: • Mr. Eugene Atiemo, Director, Building and Road Research Institute of the Council for Scientific and Industrial Research of Ghana • Mr. Richarlls Martins, coordinator of the Brazilian Network of Population and Development in Brazil, representative of Brazil in the Latin American Network of Equality and Social Justice • Ms. Shrimoyee Bhattacharya, Senior Research Scientist Centre for Study of Science, Technology and Policy (C-STEP), Bengalaru, India • Mr. Justin Henceroth, Project Manager and Co-Founder, FieldSight, UNOPS Nepal, and World Vision Innovation Lab
12:30 – 14:00	*Lunch break*
14:00 – 15:30	**Session 2c: STI for ensuring access to affordable, reliable, sustainable and modern energy for all (SDG 7)** (Breakout session – Room 113-114) Moderator: Mr. Richard A. Roehrl, Senior Economic Affairs Officer, DESA. Panelists: • Dr. Jim Watson, UK Energy Research Centre and University of Sussex, UK • Dr. Woosung Lee, Director of Global Policy Researches, Science and Technology Policy Institute, Republic of Korea • Prof. Nebojsa Nakicenovic, Deputy Director General and Deputy Chief Executive Officer, International Institute for Applied System Analysis (IIASA), Austria
14:00 – 15:30	**Session 2d: STI for ensuring sustainable consumption and production patterns (SDG 12)** (Breakout session – Room 110-111) Moderator: Mr. Clovis Freire, Economic Affairs Officer, Policy Analysis Branch, DESA Panelists: • Dr. Jonghwan Kim, Director, Korea Environmental Industry and Technology Institute, Republic of Korea • Ms. Sujaya Rathi, National Faecal Sludge and Septage Management (NFSSM) Alliance, India
15:30 – 15:45	*Break*

15:45 – 17:00	**Session 2e: STI for preserving and sustainably using terrestrial ecosystems (SDG 15)** (Plenary session)
	Moderator: Ms. Elenita Daño, Asia Director, Action Group on Erosion, Technology and Concentration (ETC Group)
	Panelists:
	• Dr. Wooyeong Joo, Senior Researcher, National Institute of Ecology, Republic of Korea
	• Mr. Eduardo Krempser, Institutional Platform of Biodiversity and Health, Fiocruz, Brazil
	• Ms. Lucinda Longcroft, Chief, WIPO New York Office, USA
17:00– 18:00	**Session 2f: Harnessing the crosscutting nature of STI for resilience and inclusion** (Plenary session)
	This session will take stock of the key messages and recommendations highlighted in the breakout sessions and discuss the common elements and ways to harness the crosscutting nature of STI for the achievement of the SDGs. It will also provide recommendations on how to structure a discussion on that theme during the STI Forum 2018.
	Moderator: Dr. George Essegbey, Director of the Science and Technology Policy Research Institute (STEPRI) of the Council of Science and Industrial Research, Ghana
	Panelists:
	• Dr. Michiharu Nakamura, Former President and Advisor, Japan Science and Technology Agency, Japan
	• Ms. Erika Kraemer-Mbula, Senior Lecturer and Research Fellow at the Institute for Economic Research on Innovation at Tshwane University of Technology, South Africa
	• Mr. Jean-Eric Aubert, International expert on STI Policies, former staff of World Bank and OECD, France
	Guiding questions:
	• What are the most important trade-offs and synergies of key technology applications, in terms of the SDGs under review? In particular, what are disruptive technologies that could change the paradigm in the field and transform the way to reach the SDGs as a whole? Which of these technologies should be featured in the STI Forum and how?
	• How to structure and organize a session on interlinkages during the 2018 STI Forum to facilitate discussion and identification of relevant recommendations? What would be desirable deliverables?
18:30-20:00	*Reception*

Day Two - 30 November 2017
8:30 - 9:30	Closed meeting of the 10 MG
9:30 – 10:45	**Session 3: Harnessing local and indigenous knowledge for the achievement of the SDGs**
	This session will discuss how to harness indigenous and traditional knowledge relevant to the achievement of the SDGs. It will also present recommendations on how better highlight and mainstream the role of indigenous knowledge in the 2018 STI Forum.

	Moderator: Dr. Myrna Cunningham, President, Center for Autonomy and Development of Indigenous Peoples (CADPI), Nicaragua
	Panelists:
	- Prof. Eun Mee Kim, Ewha Womans University, Republic of Korea - Ms. Elenita Daño, Asia Director, Action Group on Erosion, Technology and Concentration (ETC Group), the Philippines - Mr Daniel Olomae Sapit, IP Hub Africa and Indigenous Peoples Major Group for SDGs
	Guiding questions:
	- How to harness local and indigenous knowledge and grassroots technologies for achieving the selected SDGs? - How to ensure that STI for SDGs leaves no one behind? - How to structure and organize a session on harnessing local and indigenous knowledge for achieving the SDGs during the 2018 STI Forum to facilitate discussion and identification of relevant recommendations?
10:45 – 11:00	*Break*
11:00 – 12:45	**Session 4: Emerging frontiers: evolving STI developments with implications for SDGs**
	This session will discuss emerging technologies and their impact on the 2030 Agenda. It will also present recommendations on how to structure and organize a discussion on that topic during the 2018 STI Forum. Various emerging technologies such as AI, biotechnology, new materials etc. can be discussed.
	Moderator: Dr. Bill Colglazier, co-chair of the 10-Member Group, Senior Scholar, Visiting Scientist, Center for Science Diplomacy, American Association for the Advancement of Science, USA
	Panelists:
	- Dr Catherine Adeya-Weya, ICT4D Consultant/Senior Representative Fieldstone Africa (Former Ag. CEO Konza City, Kenya) - Prof. KyungBae Park, Professor of Business Administration at Sangji University, Republic of Korea, Vice President of Society of Open Innovation: Technology, Market, and Complexity(SOItmC) - Prof. Michael Zichy, University of Salzburg, Austria - Prof. Edward Lorenz, Professor of Economics, University of Côte d'Azur - Prof. Keun Lee, Professor of Economics at Seoul National University, Director of the Center for Economic Catch-up, Member of the UN Committee for Development Policy
	Guiding questions:
	- What have been the results and lessons-learnt from work on this topic in the TFM? - What are the new disruptive technologies that could change the paradigm in the field and transform the way to reach the SDGs as a whole? What kind of technology assessments would be needed? - How to structure and organize a session on emerging technologies during the 2018 STI Forum to facilitate discussion and identification of relevant recommendations? What would be desirable deliverables? Which speakers do you recommend for the respective session of the Forum?

12:45 – 13:30	*Lunch break*
13:30 – 18:00	**Study visit to the Sudokwon landfill site**
18:30	**Departure from Seoul to Songdo, Incheon**

Day Three - 1 December 2017	
9:00 – 10:45	<u>**Session 5:**</u> **STI roadmaps incorporating SDGs and their implications for policy and capacity building** *The session will discuss STI policy and roadmaps and explore options for more efficient governance approaches, including the responsible research and innovation approach. It will also present recommendations on how structure and organize a discussion on that topic during the 2018 STI Forum.* Moderator: H.E. Ambassador Inga Rhonda King, Vice-President of ECOSOC, Permanent Representative of St. Vincent and the Grenadines to the United Nations Panelists: • Mr. Tateo Arimoto, Professor of Science, Technology and Innovation Policy Program, National Graduate Institute for Policy Studies (GRIPS) / Senior Fellow, Center for Research Development Strategy (CRDS), Japan Science and Technology Agency (JST), Japan • Mr. Klaus Tilmes, the Global Practice Director for Trade and Competitiveness (T&C) at the World Bank Group, USA <u>Guiding questions:</u> • What is the status of discussions and implementation of national STI roadmaps and plans for the SDGs? What are the lessons learnt? What are current gaps and high priority actions? What role can scientific and engineering communities play in this regard? • How to structure and organize a session on this topic during the 2018 STI Forum to facilitate discussion and identification of relevant recommendations? Which speakers do you recommend for the respective session of the Forum? • What are the concrete recommendations for action by the United Nations system, governments, businesses, scientists, civil society, and others that could result from such a discussion at the 2018 STI Forum? What would be desirable deliverables of the Forum?
10:45 – 11:00	Break
11:00 – 12:30	<u>**Session 6:**</u> **TFM Online Platform** *This session will discuss key elements for the implementation of the TFM Online Platform, including: a standard classification of STI for facilitating matchmaking of supply and demand of STI for SDGs; the types of technologies that would be more suitable to be disseminated through the platform, and the user requirements for effective use of the platform.* Moderator: Dr. Paulo Gadelha, former President of Fundação Oswaldo Cruz (Fiocruz)

	Panelists: • Ms. Nina Harjula, Chairman of the board, NIA, Co-founder & Board member, GCCA, Finland • Dr. Satoru Ohtake, Senior Executive Director, Japan Science and Technology Agency, Japan • Mr. Jonathan Wong, Chief, Technology and Innovation Section, ESCAP • Dr. Jong Gun Lee, Data scientist, UN Pulse Lab Jakarta, Indonesia • Mr. Clovis Freire, Economic Affairs Officer, Policy Analysis Branch, DESA and Mr. Jorge Martinez Navarrete, UN OICT Guiding questions: • In relation to the selected SDGs, what are the relevant technologies that are more suitable for dissemination through the online platform? • What are the potential users of the platform? How to facilitate their use by assisting the matchmaking process? • What are the main risks for the successful implementation of the online platform and how to minimize them? • What are the recommendations in relation to standard classifications of STI for facilitating matchmaking of supply and demand of STI for the selected SDGs?
12:30 – 14:00	*Lunch break*
14:00 – 15:15	**Wrap up and next steps** *This session will wrap up the discussions by highlighting some of the main recommendations of the meeting. It will also discuss the follow up steps to incorporate those main messages and recommendations as inputs to the preparation of the 2018 STI Forum.* Moderator: H.E. Ambassador Inga Rhonda King, Vice-President of ECOSOC, Permanent Representative of St. Vincent and the Grenadines to the United Nations • Dr. Bill Colglazier, co-chair of the 10-Member Group, Senior Scholar, Visiting Scientist, Center for Science Diplomacy, American Association for the Advancement of Science, USA • Ms. Dong Wu, Chief, STI Policy Section, DTL/UNCTAD • Dr. Shantanu Mukherjee, Chief, Policy Analysis Branch, Division for Sustainable Development, DESA **Closing** • Statement by the UN Major Group for Children and Youth (presented by Richard A. Roehrl) • Closing remarks of behalf of the ECOSOC President by H.E. Ambassador Inga Rhonda King, Vice-President of ECOSOC, Permanent Representative of St. Vincent and the Grenadines to the United Nations • Acknowledgment and thanks (DESA)
15:30 – 17:00	Closed meeting of IATT and the 10 MG **STI Forum 2018** *co-lead: DESA and UNCTAD*

	This session will discuss the draft concept note, innovative ideas and proposals for the STI Forum, potential partners, and outreach plans.

	• Review of concept note/programme
	  Key guiding questions
	  Plan for the background papers and briefs
	  Format of the sessions
	  Potential speakers for each session
	  Identifying potential partnerships and the role of the 10-MG
	
	Next steps

List of Participants

EXPERTS

Dr Vaughan Turekian, co-Chair of STI Forum 2016 and 2017, and Senior Board Director, Science, Technology and Sustainability, National Academy of Sciences, Engineering and Medicine, USA

Dr. Young Sook Yoo, Principal Research Scientist, Molecular Recognition Research Center, Korea Institute of Science and Technology (KIST); President, Korean Society for Biochemistry and Molecular Biology (KSBMB) ; Co-President, Climate Change Center ; Former Minister of Environment, Republic of Korea.

Prof. Elmer William Jr Colglazier, co-chair of the 10-Member Group, Senior Scholar, Visiting Scientist, Center for Science Diplomacy, American Association for the Advancement of Science, USA.

Prof. Eun Namkung, Institute of Construction & Environmental Engineering at Seoul National University, Seoul, Republic of Korea.

Dr. Hans Dencker Thulstrup, Senior Programme Specialist, Water and Environmental Sciences, UNESCO Regional Science Bureau for Asia and the Pacific, Indonesia.

Mr. George Essegbey, Director of the Science and Technology Policy Research Institute (STEPRI) of the Council of Science and Industrial Research, Ghana.

Dr. Hayat Sindi, Founder and President, Institute for Imagination and Ingenuity (i2institute), Saudi Arabia.

Ing. Dr. Eugene Atiemo, Director, Building and Road Research Institute of the Council for Scientific and Industrial Research, Ghana.

Mr. Richarlls Martins, coordinator of the Brazilian Network of Population and Development in Brazil, representative of Brazil in the Latin American Network of Equality and Social Justice, Brazil.

Ms. Shrimoyee Bhattacharya, senior Research Scientist Centre for Study of Science, Technology and Policy (C-STEP), Bengalaru, India.

Justin Henceroth Project Manager and Co-Founder, FieldSight, UNOPS Nepal, and World Vision Innovation Lab.

Professor Jim Watson, Director of the UK Energy Research Centre and a Professor of Energy Policy at the University of Sussex, UK.

Dr. Woosung Lee, Director of Global Policy Researches, Science and Technology Policy Institute, Republic of Korea.

Prof. Nebojsa Nakicenovic, Deputy Director General and Deputy Chief Executive Officer, International Institute for Applied System Analysis (IIASA), Austria.

Dr. Jong-Hwan Kim, Director of Chemicals Management Office, Korea Environmental Industry and Technology Institute or KEITI and in charge of Task Force for the legislation of Biocidal Products Act, Republic of Korea.

Ms. Sujaya Rathi, National Faecal Sludge and Septage Management (NFSSM) Alliance, India.

Ms. Elenita Daño, Asia Director, Action Group on Erosion, Technology and Concentration (ETC Group), the Philippines.

Dr. Wooyeong Joo, Senior Researcher, National Institute of Ecology, Republic of Korea.

Mr. Eduardo Krempser, Institutional Platform of Biodiversity and Health, Fiocruz, Brazil.

Dr. Michiharu Nakamura, Former President and Advisor, Japan Science and Technology Agency, Japan.

Ms. Erika Kraemer-Mbula, Senior Lecturer and Research Fellow at the Institute for Economic Research on Innovation at Tshwane University of Technology, South Africa.

Dr. Jean-Eric Aubert, Expert on STI Policies, former staff of World Bank and OECD, France.

Dr. Myrna Cunningham, President, Center for Autonomy and Development of Indigenous Peoples (CADPI), Nicaragua.

Prof. Eun Mee Kim, Ewha Womans University, Republic of Korea.

Daniel Olomae Ole Sapit, Indigenous Peoples Major Group for SDGs, and Executive Director of IP Hub Africa.

Dr. Catherine Adeya, ICT4D Consultant/Senior Representative Fieldstone Africa (Former Ag. CEO Konza City, Kenya).

Prof. KyungBae Park, professor of Business Administration at Sangji University, Republic of Korea, Vice President of Society of Open Innovation: Technology, Market, and Complexity(SOItmC).

Prof. Michael Zichy, Assistant Professor for Philosophy at the University of Salzburg, Austria.

Professor Edward Lorenz, Professor of Economics, University of Nice-Sophia Antipolis, France; Member, University of Côte d'Azur; Assigned Professor, University of Aalborg, Denmark.

Prof. Keun Lee, Professor of Economics at the Seoul National University, founding director of the Center for Economic Catch-up.

Mr. Tateo Arimoto, Professor of Science, Technology and Innovation Policy Program, National Graduate Institute for Policy Studies (GRIPS), Senior Fellow, Center for Research Development Strategy (CRDS), Japan Science and Technology Agency (JST) . Mr. Arimoto served as Director General of Science & Technology Policy Bureau of the Ministry of Education and Science and held the position of Executive Research Fellow at the Economic and Social Research Institute of the Cabinet office.

Dr. Paulo Gadelha, Former President, Fundação Oswaldo Cruz (Fiocruz), Brazil.

Nina Harjula, Chairman of the Board, Nordic Innovation Accelerator (NIA), Co-founder and board member, Global Cleantech Cluster Association (GCCA), Finland.

Dr. Satoru Ohtake, Senior Executive Director, Japan Science and Technology Agency, Japan.

Dr. Jong Gun Lee, Data scientist, UN Pulse Lab Jakarta, Indonesia.

MEMBER STATES

Republic of Korea

Dr. Young Sook Yoo, Korea Institute of Science and Technology, Former Minister of Environment, Republic of Korea.

St. Vincent and the Grenadines

H.E. Ambassador Inga Rhoda King, Vice-President of ECOSOC, Permanent Representative of St. Vincent and the Grenadines to the United Nations

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Mr. Shantanu Mukherjee, Chief, Policy Analysis Branch, Division for Sustainable Development

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Mr. Clovis Freire, Economic Affairs Officer, Division for Sustainable Development

Ms. Maria Godunova, Associate Sustainable Development Officer, Division for Sustainable Development

Mr. Wei Liu, Sustainable Development Officer, Division for Sustainable Development

Mr. Jong-Soo Yoon, Head of the UNOSD, Republic of Korea.

United Nations Conference on Trade and Development

Ms. Dong Wu, Chief, Science Technology and innovation Policy Section, DTL/UNCTAD

Economic and Social Commission for Asia and the Pacific

Mr. Jonathan Wong, Chief, Technology and Innovation Section, ESCAP Jonathan is the Chief of Technology and Innovation at the United Nations Economic and Social Commission for Asia and the Pacific.

Office of Information and Communications Technology

Mr. Martinez Navarrete, Information Technology Officer at the United Nations Office of Information and Communications Technology, based in New York, USA.

UN System

Ms. Lucinda Longcroft, Chief, WIPO New York Office, USA.

Mr Klaus Tilmes, Global Practice Director for Trade and Competitiveness, World Bank Group.

Mr. Naoto Kanehira, World Bank Group

Mr. Justin Henceroth, Project Manager and Co-Founder, FieldSight, UNOPS Nepal, and World Vision Innovation Lab.