STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals

New York, USA

5 – 6 June 2018

draft

Background information and notes for all sessions

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 1:

Impact of rapid technological change on the achievement of the Sustainable Development Goals

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals

UN headquarters, New York, USA, 5 June 2018, 11:00 – 12:15.

1. Background

This session highlights global trends and responds to General Assembly resolution A/RES/72/242 OP4 which mandates the 3rd Multi-Stakeholder Forum to include a session on the impact of rapid technological change on the achievement of the Sustainable Development Goals, including cases in which changes may occur at an exponential pace.

The first annual Multi-Stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals in 2016 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 ICTs, energy technology, biotechnology, nanotechnology, and neuro-technology, including big data, artificial intelligence, automation, robotics, and 3D printing, among others.[1]

Recognizing that some technologies are disruptive in nature, the Forum noted that technology change is not neutral and that in the short term it may create winners and losers. Such disruptive technologies are essential for achieving the SDGs, but there is a risk that their benefits may be disproportionally distributed across countries and segments of the population, which could perpetuate and exacerbate inequalities.

For example, rapid technology change that leads to automation impacts employment and the capacity of developing countries to catch up with the countries at the frontier of technological development.[2,3] 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.[4] 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.

Related but separate issues include artificial intelligence (AI) technologies which have increasingly managed to replace cognitive tasks previously carried out by humans. The AI field 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. Some experts have also raised concerns about the potential emergence of machine super-intelligence - "an intellect that is much smarter than the best human brains in practically every field, including scientific creativity, general wisdom and social skills"[5] - which might be realized sometime between 2024 and 2070.[6]

Biotechnology is another area which has advanced rapidly with many new applications emerging in recent years. Biotechnology refers to the set of capabilities to decode and manipulate DNA to endow new characteristics in an organism. It allows the development of completely new products. In order to harness the benefits and reduce any

[1] Table 3-3 in "Perspectives of scientists on technology and the SDGs" and Annex 3 in the Global Sustainable Development Report 2016

[2] Technology at work v2.0. The future is not what it used to be. Citi GPS and Oxford Martin School, Jan. 2016.

[3] Economist (2016). March of the machines – What history tells us about the future of artificial intelligence – and how society should respond. Economist magazine, 25 June 2016.

[4] There is evidence that automation has started reversing offshore outsourcing and relocated economic activities back to high-income countries that are technology leaders.

[5] Bostrom, Nick (2006). "How long before superintelligence?" Linguistic and Philosophical Investigations. 5 (1): 11–30.

[6] Müller & Bostrom (2016), pp. 3-4, 6, 9-12.

downside negative risks, countries need to develop a whole set of scientific capabilities, tools, and expertise. For strategic capacity building in this respect, an understanding of the broad contours of the future landscape of biotechnology products is needed. New risks and frameworks for risk assessment need to be identified and areas in which the risks or lack of risks relating to the products of biotechnology need to be well understood.

Transformational change can arise from visionary plans of scientists, business and governments and the scale-up of technologies. Partnerships between these groups might determine the direction of such transformational change. Will it lead to widespread human well-being and sustainable development or jeopardize it?

In STI Forum 2017, a session on this topic discussed opportunities and threats of transformative change arising from the new and disruptive technologies. Within this broad context, it identified key issues related to emerging technologies and their present and future impacts on sustainable development, and proposed actions to be taken by the international community, governments, businesses and relevant stakeholders in the context of achieving the SDGs. The recommendations included:

> *"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…..*
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> *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 preparation for the STI Forums, the IATT and the 10-Member Group have worked towards assessing the impacts of accelerated technological change (in interlinked technology clusters in the bio-, nano-, neuro and digital technology) on the SDGs, including through UN expert group meetings in Mexico City in Dec. 2016 and April 2018; Paris in Jan. 2017; and Incheon in Nov. 2017, as well ITU's AI for Good Summit 2017. These meetings have mobilized many scientists and experts – a work that continues. Their interim findings became also inputs for the recent frontier Issues report prepared by DESA/DPAD, in collaboration with UNDP, ILO and UN Women on "The impact of the technological revolution on labour markets and income distribution" as requested by the Executive Committee. The ECLAC report 2018, UN World Economic and Social Survey 2018, the UNCTAD Trade and Development Report 2017, UNCTAD Technology and Development Report 2018, and a series of other UN publications also address this topic.

In Dec. 2017, General Assembly resolution A/RES/72/242 on the "Impact of rapid technological change on the achievement of the Sustainable Development Goals" requested that the UN Technology Facilitation Mechanism present its findings on this topic at the present STI Forum, with a provision to also continue the discussion at next year's STI forum in 2019. IATT co-convenors DESA and UNCTAD have worked with all interested UN system partners and the TFM 10-Member Group to prepare such presentation bringing together lessons learnt from the TFM's work.

More recently, under the IATT umbrella, DESA, UNCTAD and ECLAC organized an Expert Group Meeting on Rapid Technological Change, Artificial Intelligence, Automation, and Their Policy Implications for Sustainable Development Targets in Mexico City from 26-27 April 2018. The Meeting highlighted the great potential of rapid technology change for the SDGs, but also the need to address a number of risks that could jeopardize SDG progress.

The subject was also discussed at the Commission on Science and Technology for Development (CSTD)by GA resolution A/RES/72/242, at its twentieth-first session in Geneva from 14 to 18 May 2017. The discussion was informed by UNCTAD's Technology and Innovation Report 2018. Consistent with discussions and reports originating elsewhere, the key messages from this report included that frontier technologies hold the promise of reviving productivity and making plentiful resources to end poverty for good, enable more sustainable patterns of growth and mitigate or even reverse decades of environmental degradation. However, technological change and innovation need to be directed towards inclusive and sustainable outcomes through a purposeful effort by governments in collaboration with civil society, business and academia.

There is a need for continuous broad discussion with the involvement of all stakeholders on the impacts of new technologies on developing and developed countries and in their prospects to achieve the SDGs. There is also the need for technical assessments of these impacts that systematically use models, scenarios and foresight exercises to highlight the dominant causal mechanisms or channels at work, make clear the assumptions, and identify most relevant policy areas when considering the effects of these technologies.

2. Objectives

This session will discuss emerging technologies and their impact on the SDGs. Various emerging technology clusters such as AI, biotechnology, and nanotechnology will be discussed.

3. Format

The session will be organized in form of two plenary presentations (from the lectern) followed by a panel discussion (including questions from the moderator), and an interactive dialogue with the audience. Each panellist will speak for 5-7 minutes.

The session will close with a brief presentation of main outcomes of the discussion by the moderator.

4. Questions for discussion

The discussion will be guided by the following questions:

- What opportunities and risks does recent accelerated technology change have for developing and developed countries? How would these transform the pathways toward the SDGs?
- What have been the results and lessons learnt from work on related topics, including earlier examples of rapid and global technological change such as ICT, that are relevant for this discussion?
- How can countries best prepare for these changes?
- What are your three most important recommendations for policy and concrete action?

5. Supporting documents/publications

UN (2016). GSDR "Perspectives of scientists on technology and the SDGs" and Annex 3 in the Global Sustainable Development Report 2016, https://sustainabledevelopment.un.org/content/documents/10825Chapter3_GSDR2016_booklet.pdf

Co-chair's summaries of the STI Forum 2016, UN document E/HLPF/2016/6, http://www.un.org/ga/search/view_doc.asp?symbol=E/HLPF/2016/6&Lang=E

Expert Group Meeting on Exponential Technological Change, Automation, and Their Policy Implications for Sustainable Development, organized by DESA, ECLAC and the Government of Mexico, 6-8 Dec. 2016, https://sustainabledevelopment.un.org/unsystem/index.php?page=view&type=13&nr=2042&menu=23

Co-chair's summaries of the STI Forum 2017, UN document E/HLPF/2017/4, http://www.un.org/ga/search/view_doc.asp?symbol=E/HLPF/2017/4&Lang=E

UN DESA (2017). The impact of the technological revolution on labour markets and income distribution. Frontier Issues paper, July 2017. https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/2017_Aug_Frontier-Issues-1.pdf

ITU (2017). AI for Good Summit, Geneva 7-9 June 2017, https://www.itu.int/en/ITU-T/AI/Pages/201706-default.aspx

UNCTAD (2017). Chapter III: Robots, Industrialization and Inclusive Growth. Trade and Development Report 2017, http://unctad.org/en/PublicationChapters/tdr2017ch3_en.pdf

UNCTAD (2018). Technology and Innovation Report 2018: Harnessing Frontier Technologies for Sustainable Development. http://unctad.org/en/PublicationsLibrary/tir2018_en.pdf

ILO (2017). The Future of Work We Want: A Global Dialogue. http://www.ilo.org/global/topics/future-of-work/dialogue/WCMS_570282/lang--en/index.htm

Workshop on Science, technology and Innovation for the SDGs, Republic of Korea, 29 Nov – 1 Dec 2017, co-organized by DESA, UNCTAD and UNOSD, https://sustainabledevelopment.un.org/content/documents/17745Meeting_report_final.pdf

ECLAC (2018). Data, algorithms and policies – redefining the digital world. https://repositorio.cepal.org/bitstream/handle/11362/43515/4/S1800052_en.pdf

Expert Group Meeting on Rapid Technological Change, Artificial Intelligence, Automation, and Their Policy Implications for Sustainable Development Targets, Mexico City, 26-27 April 2018

ITU (2018). AI for Good Summit 2018, https://www.itu.int/en/ITU-T/AI/2018/Pages/default.aspx

UN (2018). *Impact of rapid technological change on the achievement of the SDGs.* Presentation on findings by the Technology Facilitation Mechanism in response to GA resolution A/RES/72/242.

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 2:

Interactive Dialogue with the 10 Member Group to support the Technology Facilitation Mechanism

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
UN headquarters, New York, USA, 5 June 2018, 12:15 – 13:00.

1. Background

One of the three components of the UN Technology Facilitation Mechanism comprizes the UN Interagency Task Team on Science, Technology and Innovation for the SDGs ("IATT") - which at present brings together 35 UN entities and 80+ UN system staff - and the 10-Member Group of representatives the scientific community, the private sector and civil society ("10-Member Group") appointed by the UN Secretary General. The IATT and the 10-Member Group are mandated to work closely together in support of the STI Forum and the online platform under the Technology Facilitation Mechanism.

Upon the conclusion of the two-year term of the first such Group, a new Group was announced by the Secretary General earlier this year, and will be attending the STI forum for the first time in that capacity.

2. Objectives

The present session will introduce the members of the 10-Member Group 2018-2019 to the audience at the STI forum, and allow them to discuss their vision and objectives for the TFM with the audience through a brief, moderated discussion.

3. Format

The session will be organized in form of an interactive, moderated roundtable dialogue among 10-Members.

4. Questions for discussion

The discussion will be guided by the following questions:

- How do you see the Technology Facilitation Mechanism accelerating progress towards the SDGs?
- What would it take to achieve your vision?

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 3:

Science, Technology and Innovation for sustainable management of water and sanitation for all (SDG 6)

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
Conference Room 4, UN headquarters, New York, USA, 5 June 2018, 15:00 – 16:00

1. Background

Worldwide, water demand is projected to grow by over 40 percent by 2050, with two thirds of the world's population living in water-stressed countries already by 2025. Growing populations, pollution and human development result in a higher demand in water. At the same time, climate change contributes to an increasing variability of the amount of rain and its pattern (when, how often and for how long it falls), which makes water one of the most significant factors affecting social, economic and environmental dimensions of sustainable development.

Today, over 2 billion people drink unsafe water and more than 4.5 billion people do not have safely managed sanitation services. Roughly 80 percent of wastewater is discharged untreated into water bodies, with a widespread negative impact on human and environmental health. The agricultural sector currently accounts for 70% of global water withdrawal and competition between sectors for water is increasing. With the world population reaching almost 10 billion by 2050 and food demand predicted to increase by 60%, current unsustainable production and consumption patterns will deplete our freshwater resources causing a global water crisis. At the same time, worldwide flood damage amounted to over US$50 billion in 2013 and is increasing.

Facing these global water challenges, UN Member States have committed through Goal 6 of the 2030 Agenda for Sustainable Development to ensure availability and sustainable management of water and sanitation for all. Achieving the water and sanitation sustainable development goal (SDG 6) will be a critical determinant of success in achieving most other SDGs, as it links to energy, cities, health, the environment, disaster risk management, food security, poverty, and climate change among others. And vice versa, progress in the other SDGs will underpin achieving 'the water goal'.

SDG 6 will be under in-depth review during the High-Level Political Forum (HLPF) in July 2018. In support, UN-Water has produced the SDG 6 Synthesis Report 2018 (launch in June 2018). The first Synthesis Report of SDG 6 seeks to inform discussions among Member States on the current global status of SDG 6, and it explores the linkages between SDG 6 and the other SDGs of the 2030 Agenda, which is essential to establish a coherent and effective policy framework. The report demonstrates knowledge gaps and significant need to upscale STI needs and demonstrates that evidence-based and management of water and sanitation, is supporting social development, economic growth and environmental health. The report of the HLPW co-convened by the SG and the President of the World Bank presented in March to SG Guterres, with the support of DESA, should be taken as a another source of recommendations.
Clearly, business as usual will not suffice to achieve this goal, if current trends prevail. The amount of available water is finite and remains the same contrary to the increasing demand. Creative breakthroughs have been made and while their replication is necessary, new ideas, innovations, are still urgently needed.

Water efficiency must be improved in all sectors. Water resources have to be diversified. Smart water management systems in an urban setting can ensure quality of water while minimizing losses in the systems. Water management can be improved by Internet of Things devices such as sensors, meters and mobile phones. Similarly, drip irrigation systems and smart irrigation controllers contribute to great water savings. New technologies can help view wastewater as a resource to be utilized rather than something to dispose of. Early warning systems such as water purification

systems based on nanostructured, activated filters and membranes could save lives and minimize losses and damages, offering a buffering capacity to countries when dealing with water-related disasters. Nature based solutions can be proved innovative and environmentally friendly. Water information systems need to be available to manage data and information on the resource and allow for science based decision making.

Therefore, science, technology and innovation (STI) plays and will continue to play a critical role in the implementation and monitoring of SDG 6 and water related targets of the 2030 Development Agenda. A better combination of technical solutions and political commitment as well as South-South and North-South cooperation and agreements can provide viable, sustainable options to sustainably meet competing demands of multiple users in the future.

2. Objectives

The session will discuss the status of existing knowledge and technology, and explore the potential for how science, technology and innovation can support the achievement of SDG 6 on water and sanitation. The session will help identify good practices and policy recommendations, as well as challenges and needs, especially as they relate to international cooperation, innovation and capacity-building, with a view to facilitate the development, scaling up adoption and dissemination of relevant technologies for SDG 6.

3. Format

The session will be structured as a moderated panel followed by questions and answers, and an interactive dialogue with the audience. Each panellist will speak for 5-7 minutes.

The session will close with a brief presentation of main outcomes of the discussion by the moderator.

4. Questions for discussion

The discussion will be guided by the following questions. Panellists are encouraged to draw from their own experiences.

- What are the most effective ways in which science, technology and innovation could support the achievement of the SDG 6? What are the main challenges and constraints for large-scale application of these STI solutions?
- What are the main knowledge gaps and missing solutions that call for more research and technology development? How to engage scientists and private sector at national and local levels?
- What are your three most important recommendations for policy and concrete action?

5. Related SDG targets

SDG 6	Targets under SDG 6
Ensure access to water and sanitation for all	6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all 6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity 6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

	6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies 6.b Support and strengthen the participation of local communities in improving water and sanitation management

6. Supporting documents

- Achieving Sustainable Development Goals from a Water Perspective (2015): https://www.frontiersin.org/articles/10.3389/fenvs.2016.00064/full
- GLAAS report (6a and 6b): http://apps.who.int/iris/bitstream/10665/254999/1/9789241512190-eng.pdf?ua=1
- High and Dry: Climate Change, Water, and the Economy (World Bank): http://www.worldbank.org/en/topic/water/publication/high-and-dry-climate-change-water-and-the-economy
- High Level Panel on Water (2018): https://sustainabledevelopment.un.org/content/documents/17825HLPW_Outcome.pdf
- HLP on Water and Peace (SDG 6 and 16): https://www.genevawaterhub.org/sites/default/files/atoms/files/A_Matter_of_Survival_FINAL.pdf
- JMP report (6.1 and 6.2): http://www.who.int/mediacentre/news/releases/2017/launch-version-report-jmp-water-sanitation-hygiene.pdf
- Smart Sanitation Solutions (2006): http://www.arcworld.org/downloads/smart%20sanitation%20solutions%201.pdf
- UN Environment – DHI Centre, Climate Technology Centre and Network (CTCN) and the UNEP DTU Partnership: *Climate Change Adaptation Technologies for Water: A practitioner's guide to adaptation technologies for increased water sector resilience*. **https://www.ctc-n.org/resources/climate-change-adaptation-technologies-water-practitioner-s-guide-adaptation-technologies**
- UN SDG Report 2017: https://unstats.un.org/sdgs/files/report/2017/TheSustainableDevelopmentGoalsReport2017.pdf
- UNSD List of all SDGs indicators and tiers: https://unstats.un.org/sdgs/files/Tier%20Classification%20of%20SDG%20Indicators_20%20April%202017_web.pdf
- UN-Water SDG 6 Synthesis Report 2018 on Water and Sanitation: http://www.unwater.org/publication_categories/sdg-6-synthesis-report-2018-on-water-and-sanitation/
- UN-Water Publication on Interlinkages between SDG 6 and other SDGs: http://www.unwater.org/publications/water-sanitation-interlinkages-across-2030-agenda-sustainable-development/
- Urban Challenges in the Americas: a perspective of the Academia of Science http://www.ianas.org/books/books_2015/water/urban_water_210315.pdf
- Urban Water Management Programme (UWMP) https://en.unesco.org/uwmp/resources
- Water, Megacities and Global Change http://unesdoc.unesco.org/images/0024/002454/245419E.pdf
- World Water Development Report Series: http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/wwdr/ .
- In particular: WWDR 2014 http://unesdoc.unesco.org/images/0022/002257/225741e.pdf and WWDR 2017 http://unesdoc.unesco.org/images/0024/002471/247153e.pdf

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 4:

Science, Technology and Innovation for sustainable consumption and production patterns (SDG 12)

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
Conference Room 4, UN headquarters, New York, USA, 5 June 2018, 16:00 – 17:00

1. Background

Achieving Goal 12 requires strong national frameworks for sustainable consumption and production that are consistent with national and sectoral plans, sustainable business practices and consumer behaviour, together with adherence to international norms on the management of hazardous chemicals and wastes.

Decoupling economic growth from natural resource use is fundamental to sustainable development. Global figures, however, point to worsening trends: domestic material consumption (the total amount of natural resources used in economic processes) increased from 1.2 to 1.3 kg per unit of GDP from 2000 to 2010. Total domestic material consumption also rose during the same period — from 48.7 billion tons to 71.0 billion tons. The increase is due in part to rising natural resource use worldwide, in particular in Eastern Asia.

Countries continue to address challenges linked to air, soil and water pollution and exposure to toxic chemicals under the auspices of multilateral environmental agreements. Almost all States Members of the United Nations are 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.

The prevailing economic growth paradigm is 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. A circular economy approach combined with modes of sustainable consumption and production could improve the resilience of the whole global socio-economic system.

The SDGs will not be attainable without decoupling natural resource use and environmental pressures from economic growth and improvements in living standards. Governments and business leaders understand that improving resource efficiency along with inclusive economic growth are necessary means for better living quality.

Continuation of existing policies is not compatible with reaching the SDGs. Instead, resource efficiency and environmental resource management need to substantially improve. 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. 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. Economic and technology transfer mechanisms combined with smart SDG policies can create net positive outcomes for all countries. In fact, currently existing technologies are not

sufficient to attain multiple SDGs or even ambitious formulations of single SDGs. Against this background, technology gaps need to be 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.

Preparatory meetings for this session have shown that: (a) 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. (b) resource efficiency and environmental resource management need to substantially improve. 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; and (c) economic and technology transfer mechanisms combined with smart SDG policies could create net positive outcomes for all countries. 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.

2. Objectives

The session will discuss the status of existing knowledge and technology, and explore the potential for how science, technology and innovation can support the achievement of SDG 12 on sustainable consumption and production. The session will help identify good practices and policy recommendations, as well as challenges and needs, especially as they relate to international cooperation, innovation and capacity-building, with a view to facilitate the development, scaling up adoption and dissemination of relevant technologies for SDG 12.

3. Format of the session

The session will be structured as a moderated panel followed by questions and answers, and an interactive dialogue with the audience. Each panellist will speak for 5-7 minutes.

The session will close with a brief presentation of main outcomes of the discussion by the moderator.

4. Questions for discussion

The discussion will be guided by the following questions. Panellists are encouraged to draw from their own experiences.

- What are the most effective solutions and ways in which science, technology and innovation can support the achievement of SDG 12?
- What are the main challenges for developing, adopting, disseminating or scaling these solutions? What are key knowledge and implementation gaps that could benefits from more research and technology development?
- What are your three most important recommendations for policy and concrete action?

5. Related SDG targets

SDG 12	Targets under SDG 12
Ensure sustainable consumption and production patterns	12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries 12.2 By 2030, achieve the sustainable management and efficient use of natural resources 12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses 12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the

	environment 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse 12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle 12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities 12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature 12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production 12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products 12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 5:

Science, technology, and innovation for sustainable terrestrial ecosystems (SDG 15)

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
Conference room 4, UN headquarters, New York, USA, 5 June 2018, 17:00 – 18:00.

1. Background

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 fall due in 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 are 'Tier I'[1]. The Secretary General's annual monitoring report on the SDGs has already flagged the rate of biodiversity loss as alarming and progress towards this target as 'off-track'.

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 threatened.

Therefore, the role of science, technology and innovation (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 5; as well as how to accelerate implementation for those that may be off-track or have imminent deadlines.

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 local and indigenous knowledge towards attaining these targets.

2. Objectives

The session will discuss the status of existing knowledge and technology, and explore the potential for how science, technology and innovation can support the achievement of SDG 15 on sustainable terrestrial ecosystems. The session will help identify good practices and policy recommendations, as well as challenges and needs, especially as they relate to international cooperation, innovation and capacity-building, with a view to facilitate the development, scaling up adoption and dissemination of relevant technologies for SDG 15.

3. Format

The session will be structured as a moderated panel followed by questions and answers, and an interactive dialogue with the audience. Each panellist will speak for 5-7 minutes.

The session will close with a brief presentation of main outcomes of the discussion by the moderator.

4. Questions for discussion

The discussion will be guided by the following questions. Panellists are encouraged to draw from their own experiences.

- What are the most effective solutions and ways in which science, technology and innovation can support the achievement of SDG 15?
- What are the main challenges for developing, adopting, disseminating or scaling these solutions? What are key knowledge and implementation gaps that could benefits from more research and technology development?
- What are your three most important recommendations for policy and concrete action?

5. Related SDG targets

SDG 15	Targets under SDG 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	15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements 15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally 15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world 15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development 15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species 15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed 15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products 15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species 15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts 15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems 15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation 15.c Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 6:

National science, technology and innovation roadmaps for the SDGs and capacity building

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
Conference room 4, UN headquarters, New York, USA, 6 June 2018, 10:00 – 11:00.

1. Background

Science, technology and innovation (STI) policies and improved STI governance are critical for progress toward the Sustainable Development Goals (SDGs). However, traditional STI policy design principles and processes that are primarily based on the linear model of innovation are of limited usefulness when applied to complex interrelated challenges.

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.

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.

The challenge is how to redefine the science policy agenda, and re-think international cooperation in the field of STI policy, in a coherent way in *order to* ensure that "*no one* is *left behind.*"

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.

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 2016: Notably, there was a dedicated session in the first STI Forum 2016 and a prominent section was dedicated to "*Science, technology and innovation action plans and technology road maps*" alongside complementary sections on "*Enhancing the coherence of STI policy*" and on "*Creating robust science advisory ecosystems at all levels*". In particular:

> *"24. Science, technology and innovation policies need to do a better job of linking to and tackling development challenges. Flexible science, technology and innovation action plans and technology road maps at the national and global levels are needed to support the achievement of the Goals. They could be a means of uniting all interested stakeholders, including financiers, to work towards common goals and to benefit from periodic scientific analysis. They require leadership and need to be adequately resourced. Whole-of-economy approaches will be needed. Innovation ecosystems have to function effectively, be economically sustainable and provide shared value. For example, Mauritius has made major strides in defining a strategy for a transition to an ocean-based economy, based on the precise identification of the required economic activities (including shipping, aquaculture, the seaweed industry, tourism and new energy and water technologies), underlying*

technology developments and social requirements. The design of science, technology and innovation action plans should be inclusive and involve all stakeholders from the outset.

25. Participatory technology assessment and prospective analysis (e.g., of the impact of technologies on employment) could be useful. There is a role for foresight and horizon scanning exercises going forward, including for examining technologies that are currently risky and unproven. A project on the world in 2050 was mentioned in that context." (E/HLPF/2016/6)[7]

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.

"39. Most countries have development plans that mention the role of science, technology and innovation, and some knowledge infrastructure is in place through institutions and ministries. However, developing countries face a severe lack of capacity in science, technology and innovation systems, infrastructure, trade and investment policy. In addition, despite significant capacity-building efforts, many poor countries fail to make significant progress, as maintaining and retaining newly established capacities remain serious challenges. Against this background, Governments, the United Nations development system and development partners should prioritize open and inclusive capacity-building in science, technology and innovation policymaking, including related policy research, especially on demand-side innovation policies that trigger knowledge use, as well as private sector training. Investors should support comprehensive science, technology and innovation policies that take the Sustainable Development Goals' interlinkages into account. ….

Strategies, approaches and road maps

71. The cross-cutting nature of the Sustainable Development Goals (their interdependencies, potential trade-offs and synergies) and of science, technology and innovation requires holistic approaches and strategies. In this context, multidisciplinary and integrated approaches are necessary to take into account different sources of knowledge (including traditional knowledge). Recent large-scale disease outbreaks are a case in point, as early warnings have been made more difficult by institutional silos between animal health monitoring and human epidemiology.

72. Science, technology and innovation road maps and action plans that have a particular focus on accelerating progress towards the Goals are essential. They are needed at the subnational, national and global levels, and should include measures for tracking progress. These road maps incorporate processes that require feedback loops, evaluate what is working and not working, and produce continual revisions that create a real learning environment. They are most effective if built up with stakeholder engagement and when they contribute to "smart Government".

73. "Deep dives" are needed for each Goal for which road maps could help prioritize actions and promote cross-sectoral collaborations, as was illustrated by the forum's dedicated sessions on Goals 1, 2, 3, 5, 9 and 14." (E/HLPF/2017/4)[8]

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 could details of a specific way forward in this regard.

Under the IATT umbrella, UN DESA, World Bank, UNCTAD, and UNESCO, in collaboration with Japan Science and Technology Agency organized an EGM on Science, Technology and Innovation Roadmaps for the SDGs in Tokyo from 8 to 9 May 2018 experts and practitioners. The meeting discussed countries' visions and practices in designing and implementing STI policies and action plans. The meeting the value-added of roadmaps as multi-stakeholder engagement tool and as integral element of national sustainable development strategies.

In relation to capacity building, the IATT has worked to develop a pilot training with contributions of several UN agencies that could be scaled up to assist Member States to enhance their capacity to use STI for SDGs. As a result,

[7] http://www.un.org/ga/search/view_doc.asp?symbol=E/HLPF/2016/6&Lang=E
[8] http://www.un.org/ga/search/view_doc.asp?symbol=E/HLPF/2017/4&Lang=E

ESCWA and other IATT members, in cooperation with the Jordanian Higher Council for Science and Technology (HCST), organized from 15 to 19 April in Amman, Jordan a Capacity Building Workshop on Innovation Policies for SDGs in the Arab Region. Seven UN agencies also collaborated in organising this workshop, namely UNDESA, UNIDO, UNESCO, UNCTAD, ITU, WIPO and the UNU-Merit. The Workshop provided the participants with a comprehensive framework to be applied during the formulation, implementation and update of their innovation policies and strategies through examining the methodologies, collection approaches and standards for STI indicators frameworks. The STI Forum 2018 will be an opportunity for STI stakeholders to discuss how such initiatives could be scaled up.

2. Objectives

The session will discuss STI roadmaps, policies and related capacity building needs in the context of the SDGs, as seen from a range of country perspectives and present alternatives for how these could become more effective vehicles for driving STI development for the SDGs.

3. Format

The session will be structured as a moderated panel followed by questions and answers, and an interactive dialogue with the audience. Each panellist will speak for 5-7 minutes.

The session will close with a brief presentation of main outcomes of the discussion by the moderator.

4. Questions for discussion

The discussion will be guided by the following questions. Panellists are encouraged to draw from their own experiences.

- How can STI roadmaps and plans for the SDGs become effective at driving policy action and multi-stakeholder collaborations? What role can scientific and engineering communities play in this regard?
- What lessons have you learnt from your experience with these tools?
- What are your three most important recommendations for policy and concrete action?

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 7:

Realizing the full potential of local and indigenous knowledge, and homegrown innovations for the achievement of the SDGs

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
Conference room 4, UN headquarters, New York, USA, 6 June 2018, 11:00 – 12:00.

1. Background

The role of local and indigenous knowledge for achieving the SDGs has been repeatedly emphasized in the STI Forums 2016 and 2017. Science, technology and innovation are rooted in diverse sources of knowledge. These diverse sources should be considered when developing solutions to sustainable development challenges and in the promotion of evidence-informed decision-making. Synergies can be created between different knowledge systems, i.e. local and indigenous knowledge and science in implementing the Sustainable Development Goals.

According to the Co-chairs' summary of the STI Forum 2017, all stakeholders should strengthen linkages between science and societies to reframe the questions around the problems to be solved, to develop local research capacities, to mobilize financing and to establish partnerships that facilitate the development of local innovation capacities. It is important to support the participation of local communities and indigenous peoples in the co-creation of innovations, which can help in identifying unaddressed needs, to develop simple and affordable solutions sensitive to the local and indigenous context.

Local and indigenous knowledge refers to both knowledge and know-how, including technologies, developed by local communities and indigenous peoples in their innumerable interactions with their surrounding environment. Accumulated across generations, and renewed by each new generation, for many rural and indigenous peoples, local knowledge informs decision-making about fundamental aspects of day-to-day life including in health, food security, management of natural resources, and preparing and responding to disasters. By bridging scientific knowledge and local and indigenous knowledge, solutions can be found where priorities and needs of communities, for example those dependent on small-scale and subsistence livelihoods, can be at the centre of agricultural innovation.

Also, throughout the world regions, indigenous peoples and local communities are engaging with different technologies, taking the lead to adapt it to their needs. In some cases, this may involve the development of locally appropriate content for learning and education. In others, this may involve the intergenerational transmission of their knowledge and language. Finally, these may also provide tools to strengthen local resilience including through management of natural resources and sustainable development.

The importance of local and indigenous knowledge is recognized across the international system, particularly when addressing complex environmental challenges e.g. biodiversity loss, climate change and desertification. In many of these areas of international cooperation, the role of indigenous knowledge is explicitly recognized. This includes the development of policy guidance and methodologies to ensure appropriate use. By bringing together diverse experiences – starting with communities, to national and international good practice – we seek to understand what conditions and partnerships are necessary for local and indigenous knowledge to be appropriately mobilized, alongside science, to achieve the SDGs.

2. Objectives

This session will discuss what is currently known about how local and indigenous knowledge contributes to the SDGs, and how indigenous peoples and local communities can build synergies between their knowledge systems and that of science to achieve the SDGs. It will further identify needs and gaps with regard to policies and partnerships in this area.

3. Format

The session will be structured as a moderated panel followed by questions and answers, and an interactive dialogue with the audience. Each panellist will speak for 5-7 minutes.

The session will close with a brief presentation of main outcomes of the discussion by the moderator.

4. Questions for discussion

The discussion will be guided by the following questions. Panellists are encouraged to draw from their own experiences.

- How is the knowledge of indigenous peoples and local communities, including their technologies and innovations, contributing to the achievement of the SDGs? What are the main challenges and current barriers that limit the full mobilization of diverse knowledge systems?
- What are some examples of policy frameworks across the different Goals that support the mobilization of indigenous knowledge for the SDGs? How can indigenous peoples and local communities build synergies between their own knowledge/technologies and those based on modern science? What are some examples of good partnerships and practices?
- What are your three most important recommendations for policy and concrete action?

5. Supporting documents

SDG 2: Zero Hunger (tbc)

SDG 4: Quality Education

- UNESCO. 2016. Planet: Education for Environmental Sustainability and Green Growth. Global Education Monitoring Report Summary http://unesdoc.unesco.org/images/0024/002464/246429E.pdf
- Magni, Giorgia. 2016. Indigenous knowledge and implications for the sustainable development agenda. *Background paper prepared for the 2016 Global Education Monitoring Report.* UNESCO. http://unesdoc.unesco.org/images/0024/002456/245623E.pdf

SDG 6: Clean Water and Sanitation (tbc)

SDG 13: Climate Action

Paris Agreement

> Article 7.5 Parties acknowledge that adaptation action should follow a country-driven, genderresponsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate.

UNFCCC Decision. 1/CP. 21. Para 135.

> 135. Recognizes the need to strengthen knowledge, technologies, practices and efforts of local communities and indigenous peoples related to addressing and responding to climate change, and establishes a platform for the exchange of experiences and sharing of best practices on mitigation and adaptation in a holistic and integrated manner;

IPCC Fifth Assessment Report – Summary for Policy Makers

> Indigenous, local and traditional knowledge systems and practices, including indigenous peoples' holistic view of community and environment, are a major resource for adapting to climate change, but these have not been used consistently in existing adaptation efforts. Integrating such forms of knowledge with existing practices increases the effectiveness of adaptation.

- Nakashima, D.J., Galloway McLean, K., Thulstrup, H.D., Ramos Castillo, A. and Rubis, J.T. 2012. Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation. Paris, UNESCO, and Darwin, UNU, 120 pp.

SDG 15: Life on Land

- CBD Article 8(j)

  Each contracting Party shall, as far as possible and as appropriate:

Subject to national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge innovations and practices.

- IPBES Operating Principle 2(d)

  (d) Recognize and respect the contribution of indigenous and local knowledge to the conservation and sustainable use of biodiversity and ecosystems;

SDG 17: Partnerships for the Goals

- Scientific Advisory Board of the Secretary General of the United Nations. 2016. Indigenous and Local Knowledge(s) and Science(s) for Sustainable Development Policy Brief by the Scientific Advisory Board of the UN Secretary-General. http://unesdoc.unesco.org/images/0024/002461/246104E.pdf
- Nakashima, D. 2015. Local and indigenous knowledge at the science–policy interface in *UNESCO Science Report: towards 2030*. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/2015-WSR-LINKS.pdf
- UNESCO. 2017. Local Knowledge, Global Goals. UNESCO: Paris, 48 pp. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/ILK_ex_publication_E.pdf

Disaster Risk Reduction

- UNISDR. 2008. Indigenous knowledge for disaster risk reduction: good practices and lessons learned from experiences in the Asia-Pacific region https://www.unisdr.org/we/inform/publications/3646

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 8:

Supporting the implementation of the Technology Facilitation Mechanism – the way forward for joint action

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
Conference room 4, UN headquarters, New York, USA, 6 June 2018, 12:00 – 13:00.

1. Background

The 2030 Agenda for Sustainable Development[9] launched the UN Technology Facilitation Mechanism (TFM) in September 2015 following its establishment two months earlier by the Addis Ababa Action Agenda[10], in order to support the Sustainable Development Goals. The Mechanism is based on a multi-stakeholder collaboration between Member States, civil society, private sector, scientific community, United Nations entities and other stakeholders and will be composed of: a United Nations Interagency Task Team on Science, Technology and Innovation for the SDGs, a collaborative Multi-Stakeholder Forum on Science, Technology and Innovation for the SDGs and an on-line platform.

The TFM promotes coordination, coherence, and cooperation within the UN System on STI related matters, enhancing synergy and efficiency, in particular to enhance capacity-building initiatives. It serves as a gateway for information on existing STI initiatives, mechanisms and programmes, within and beyond the UN; facilitates dissemination of open access scientific publications; and facilitates access to information, knowledge, best practices and lessons-learned on STI facilitation initiatives and policies; as well as facilitates dissemination of open access scientific publications worldwide.

The TFM discusses STI cooperation around thematic areas for the implementation of the SDGs, congregating all relevant stakeholders to actively contribute in their area of expertise. It provides a venue for facilitating interaction, matchmaking and the establishment of networks between relevant stakeholders and multi- stakeholder partnerships in order to identify and examine technology needs and gaps, including on scientific cooperation, innovation and capacity building, and also in order to help facilitate development, transfer and dissemination of relevant technologies for the SDG.

Many relevant initiatives, platforms, and conferences exist or are under development with varying sectoral focus and geographical scope. The TFM is expected to bring this wide range of initiatives including those on technological development together, illustrate and facilitate access to their findings and resources. Partnerships, including association of meetings and platforms to the TFM components are essential, in line with the calls for systematic, multi-stakeholder intersessional work of the STI Forum, as repeatedly requested in the co-chairs' summaries of the STI Forums 2016 and 2017.

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. The TFM on-line platform was mandated to be developed on the basis of an independent technical assessment which would take into account best practices and lessons learned from other initiatives, within and beyond the United Nations, in order to ensure that it will complement, facilitate access to and provide adequate information on existing STI platforms, avoiding duplications and enhancing synergies.

[9] Paragraph 70 of General Assembly Resolution A/RES/70/1 Transforming our world: the 2030 Agenda for Sustainable Development, https://sustainabledevelopment.un.org/post2015/transformingourworld

[10] https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=2051&menu=35

Following an open call, experts from the Institutes of Science and Development of the Chinese Academy of Sciences, China; the Overseas Development Institute, UK; and of DNV GL, the Netherlands, prepared the mandated independent assessment of the online platform. The report of the assessment indicates that the platform will be best structured as a network of online platforms, which will distribute effort and service provision and also lower overall cost.

Based on the recommendations of the independent assessment, various IATT partners and experts have worked on a demonstration of the TFM online platform that illustrates functionalities and showcases possibilities, as presented at a side event on the margins of the Forum.

2. Objectives

This session will present a number of initiatives from across the world that support the science-based, solution-oriented, multi-stakeholder and collaborative approach of the Technology Facilitation Mechanism (TFM) including discussions on broadening their impacts and making them self-sustaining.

3. Format

The session will be structured as a moderated panel followed by questions and answers, and an interactive dialogue with the audience. Each panellist will speak for 5-7 minutes. The moderators will also present in brief the latest developments in the operationalization of the TFM online platform.

The session will close with a brief presentation of main outcomes of the discussion by the moderator.

4. Questions for discussion

The discussion will be guided by the following questions. Panellists are encouraged to draw from their own experiences.

- What have been your experiences with your specific initiative in terms of deploying STI to accelerate progress for the SDGs?
- How does the multi-stakeholder approach of the TFM enhance the impact? How can different stakeholders be engaged and mobilized towards this end?
- How should one build partnerships and mobilize the necessary resources for the further expanding the scope and impact of these initiatives?
- What are your three most important recommendations for policy and concrete action?

5. Supporting documents/publications

- Technology Facilitation Mechanism, https://sustainabledevelopment.un.org/TFM
- Independent assessment report on the TFM online platform: https://sustainabledevelopment.un.org/content/documents/16505Full_Report_Online_Platform_Assessment.pdf
- International Consultation on Science, Technology and Innovation in the Implementation of the 2030 Agenda for Sustainable Development and its Health-Related Goals, Rio de Janeiro, Brazil, 6-8 Nov. 2017, https://sustainabledevelopment.un.org/?page=view&nr=2514&type=13&menu=1634
- Workshop on Science, Technology and Innovation for SDGs, organized by DESA, UNCTD and UNOSD, Incheon, republic of Korea, 29 Nov – 1 Dec. 2017, https://sustainabledevelopment.un.org/index.php?page=view&type=13&nr=2518&menu=1634
- High-level Study Visit to China on Science, Technology and Innovation for the SDGs, Shanghai, 4 - 7 Dec 2017, https://sustainabledevelopment.un.org/index.php?page=view&nr=2504&type=13&menu=1634
- G-STIC 2018 :: Global Sustainable Technology & Innovation Conference, https://2018.gstic.org/ , https://2017.gstic.org/

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 9:
Science, technology and innovation for access to affordable, reliable, sustainable and modern energy for all (SDG 7)

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
Conference room 4, UN headquarters, New York, USA, 6 June 2018, 15:00 – 16:00

1. Background

Affordable access to essential services underpins 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.[11]

According to the UN Secretary General's report on progress towards the SDGs[12], 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.

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. These have serious implications for health and other human development outcomes.

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. The challenge is to increase the share of renewable energy 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.

[11] https://sustainabledevelopment.un.org/content/documents/1131Energy_SD21.pdf
[12] Source: Report of the Secretary-General, "Progress towards the Sustainable Development Goals", E/2017/66.

The costs of renewable energy technologies have fallen dramatically and there has been a rapid increase in the deployment of these technologies. These developments not only have the potential to increase the share of renewables in the global energy mix, but additionally can supply renewable energy to those who currently lack energy access altogether. Deployment of renewables has a substantial implication on income generation and other development outcomes, such as gender equality, health, and climate change. Countries have different renewable energy pathways depending on local contexts and thus, national development strategies should be incorporated accordingly. Additionally, to increase the share of renewables in the global energy mix, policy mixes and a systematic approach to innovation are necessary; including measures that target both the demand for and supply of renewables.

Furthermore, there are many accessible and affordable technological solutions available to achieve SDG 7. Important examples are in the areas of production and storage of renewable, distributed energy; conversion of brackish water; and lower costs of improved material science in solar photovoltaic cells. 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 of intermittent renewable sources. Science-based energy systems analyses can help quantify and prioritize viable and sustainable energy, water and transport infrastructure investments, and help identify obstacles and opportunities for successful investments. Incorporating spatial specificities into energy systems analyses can identify an optimal mix between on-grid or off-grid technology choices, in order to achieve 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. During our discussions lack of capacity was highlighted as one of the greatest obstacles for attracting investments. Micro-finance schemes, green bonds, and public private partnerships can be effectively used to overcome these barriers.

At the same time, there needs to be a greater recognition of the fact that the factors that have promoted or inhibited renewables development and deployment are both technological and non-technological. They include costs and affordability, financing, technical maturity, integration into electricity systems, environmental sustainability and skills.

2. Objectives

The session will discuss the status of existing knowledge and technology, and explore the potential for how science, technology and innovation can support the achievement of SDG 7 on universal access to modern energy services. The session will help identify good practices and policy recommendations, as well as challenges and needs, especially as they relate to international cooperation, innovation and capacity-building, with a view to facilitate the development, scaling up adoption and dissemination of relevant technologies for SDG 7.

3. Format

The session will be structured as a moderated panel followed by questions and answers, and an interactive dialogue with the audience. Each panellist will speak for 5-7 minutes.

The session will close with a brief presentation of main outcomes of the discussion by the moderator.

4. Questions for discussion

The discussion will be guided by the following questions. Panellists are encouraged to draw from their own experiences.

- What are the most effective solutions and ways in which science, technology and innovation can support the achievement of SDG 7?
- What are the main challenges for developing, adopting, disseminating or scaling these solutions? What are key knowledge and implementation gaps that could benefits from more research and technology development?
- What are your three most important recommendations for policy and concrete action?

5. Related SDG targets

SDG 7	Targets under SDG7
Ensure access to affordable, reliable, sustainable and modern energy for all	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix 7.3 By 2030, double the global rate of improvement in energy efficiency 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology 7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support

6. Supporting documents/publications

- GEA, 2012: Global Energy Assessment - Toward a Sustainable Future, Cambridge University Press, Cambridge, UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria. http://www.iiasa.ac.at/web/home/research/Flagship-Projects/Global-Energy-Assessment/Chapters_Home.en.html
- UN (2018). Accelerating SDG7 Achievement: Policy Briefs in support of the first SDG7 review at the UN high-level political forum 2018, https://sustainabledevelopment.un.org/content/documents/18041SDG7_Policy_Brief.pdf
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STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Session 10:

Science, technology and innovation for inclusive, safe, resilient and sustainable cities and human settlements (SDG 11)

Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
Conference room 4, UN headquarters, New York, USA, 6 June 2018, 16:00 – 17:00

1. Background

The 2030 Agenda for Sustainable Development addresses the urban dimension in its SDG 11, which aims at making cities and human settlements inclusive, safe, resilient and sustainable.

The scale and nature of human settlements at the beginning of the twenty-first century is unprecedented. Globalization, industrialization, and urbanization have led to the rapid growth of cities worldwide. More people than ever are living in urban areas, with the growth spread across mega-cities as well as thousands of new and emerging small and medium-sized cities. In 2015, close to 4 billion people — 54% of the world's population — lived in cities and that number is projected to increase to about 5 billion people by 2030. Rapid urbanization has brought enormous challenges, including growing numbers of slum dwellers, increased air pollution, inadequate basic services and infrastructure, and unplanned urban sprawl, which also make cities more vulnerable to disasters. Better urban planning and management are needed to make the world's urban spaces more inclusive, safe, resilient and sustainable. As of May 2017, 149 countries were developing national-level urban policies. [13]

The proportion of the urban population that lives in developing country slums fell from 39% in 2000 to 30% in 2014. Despite some gains, the absolute number of urban residents who live in slums continued to grow, owing in part to accelerating urbanization, population growth and lack of appropriate land and housing policies. In 2014, an estimated 880 million urban residents lived in slum conditions, compared to 792 million urban residents in 2000. As more and more people move to urban areas, cities typically expand their geographic boundaries to accommodate new inhabitants. From 2000 to 2015, in all regions of the world, the expansion of urban land outpaced the growth of urban populations. As a result, cities are becoming less dense as they grow, with unplanned urban sprawl challenging more sustainable patterns of urban development.

This 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 or the globalization and expansion of supply chains, also affect human settlements and societies in remote, rural, and other non-urban areas.

The safe removal and management of solid waste represents one of the most vital urban environmental services. 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 is 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.

There is significant opportunity within these processes of urbanization and development to improve society and standards of living around the world. More developed and advanced urban economies offer the opportunity raise improve livelihoods and provide better access to services such as education and healthcare. However, there is also significant risk. In much of the world, urbanization is happening faster than governments can build supporting

[13] Source: Report of the Secretary-General, "Progress towards the Sustainable Development Goals", E/2017/66

infrastructure, resulting in large parts of cities supported by informal and inadequate services. This urban expansion is also occurring on land that is exposed to a range of hazards which will only become more dangerous with climate change. Issues such as public health, social unrest, and poverty can be exacerbated in newly developed urban areas, while shifts from rural to urban lifestyles may disrupt both formal and informal social structures that often act as safety nets for people at the bottom.

Science, technology, and innovation can play a key role in shaping urbanization and development to create human settlements that are inclusive, safe, resilient, and sustainable. *The New Urban Agenda* adopted at Habitat III in Quito, Ecuador in 2016, which outlines global priorities for addressing the future of cities and human settlements, 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*." While there are critical, social, political, and economic processes that will shape the safety, inclusivity, resilience, and sustainability of human settlements, science, technology, and innovation can offer and create new pathways for designing, building, managing, maintaining, and engaging in cities and human settlements.

- **Designing and Building** – Science, technology, and innovation have been critical to the design and construction of increasingly large and inter-connected cities. Looking to the future, STI is 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. At the same time, enhancements in assessment technology, such as digital mapping and satellite imagery, can help ensure that new designs are more suited to the physical and environmental systems found in situ. Further, new innovations in transportation, energy, telecommunications, and other services can help deliver them more widely and at lower costs. Beyond new technologies, innovations in planning and design are also working to address questions of inclusion, diversity, and political engagement in increasingly large and multi-faceted cities.
- **Managing and Maintaining** – Beyond design and construction, science, technology, and innovation are opening up a range of new opportunities for considering how to manage and maintain cities and human settlements. The rise of digital infrastructure and smart cities technology is providing city managers and leaders new ways to monitor and respond to changes and conditions throughout the city. Large datasets emerging from this and other infrastructure is also helping innovators and scientists better understand the conditions and lifestyles in cities, which can feed back into urban design and development.
- **Engagement** – Science, technology, and innovation are also creating new pathways for people to engage with each other and governments in cities and human settlements. Internet and telecommunication have radically changed communication and social engagement in recent years, and there are many opportunities to use these technologies in cities. Citizen reporting apps, for example, have been used in cities around the world to help engage citizens in the process of managing and reporting on issues such as crime, trash, potholes, and flooding. In other ways, new technologies have supported community-wide conversations on development and are critical to inclusive urban planning.

While there are many opportunities for STI to shape and improve cities and processes of urbanization, there are also many ways in which STI can be used to improve the quality of life and standards of living in rural and remote areas. Improved communications technology, distributed energy production, and disaster-resilient building techniques are just a few examples of science, technology, and innovation that could dramatically improve the quality of life in both urban and non-urban areas. Indeed, new technologies may also help create new livelihoods and opportunities in remote areas, which could in turn help maintain traditional settlements and slow the flow of people into urban areas.

Science, technology, and innovation can support and improve design, construction, management, and engagement across all types of human settlements. Identifying the ways in which STI can help make settlements more inclusive, safe, resilient, and sustainable, can help in shaping the social and political conversations which are taking place every day in shaping the future cities, urban regions, and towns.

2. Objectives

The session will discuss the status of existing knowledge and technology, and explore the potential for how science, technology and innovation can support the achievement of SDG 11 on sustainable cities and human settlements. The session will help identify good practices and policy recommendations, as well as challenges and needs, especially as

they relate to international cooperation, innovation and capacity-building, with a view to facilitate the development, scaling up adoption and dissemination of relevant technologies for SDG 11.

3. Format and/or scenario of the session

The session will be structured as a moderated panel followed by questions and answers, and an interactive dialogue with the audience. Each panellist will speak for 5-7 minutes.

The session will close with a brief presentation of main outcomes of the discussion by the moderator.

4. Questions for discussion

The discussion will be guided by the following questions. Panellists are encouraged to draw from their own experiences.

- What are the most effective solutions and ways in which science, technology and innovation can support the achievement of SDG 11?
- What are the main challenges for developing, adopting, disseminating or scaling these solutions? What are key knowledge and implementation gaps that could benefits from more research and technology development?
- What are your three most important recommendations for policy and concrete action?

5. Related SDG targets

SDG 11	Targets under SDG 11
Make cities and human settlements inclusive, safe, resilient and sustainable	11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums 11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons 11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries 11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage 11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations 11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management 11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities 11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning 11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels 11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

6. Supporting documents/publications

- The New Urban Agenda, Habitat III, Quito, Ecuador 2016 -- http://habitat3.org/the-new-urban-agenda/
- World Cities Report 2016 – http://wcr.unhabitat.org
- Sendai Framework for Disaster Risk Reduction 2015 -- http://www.unisdr.org/we/coordinate/sendai-framework
- Bridging Global Infrastructure Gaps, 2016 -- http://www.un.org/pga/71/wp-content/uploads/sites/40/2017/06/Bridging-Global-Infrastructure-Gaps-Full-report-June-2016.pdf

STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background Note for Special event:
Roundtable of STI Innovators, funders and other supporters ---- "Impact Investing: Supporting the scaling of innovative solutions for the SDGs – new opportunities and challenges"
Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
Conference room 7, UN headquarters, New York, USA, 6 June 2018, 13:15 – 14:30

1. Background

The first meeting of the Multi-Stakeholder Forum on Science, Technology and Innovation for the SDGs ("STI Forum") in 2016 highlighted an existing gap between innovations that have the potential to serve the poor and contribute towards achieving the Sustainable Development Goals (SDGs) and the support to ensure their adoption at scale. To close that gap, the Forum suggested expanding participation to include the financial sector, especially providers of early-stage finance, who could be matched with participating innovators, as well as to include discussions around policy measures to support such scaling up.

Impact investing has been identified as a potential key source of financing these innovations. *"Impact investments"* are investments made into companies, organizations, and funds with the intention to generate social and environmental impact alongside a financial return. This allows investors to use their funds in goodwill to address global challenges to sustainable development, while also receiving a return on investment. Estimates based on industry survey suggest that over US$ 77.4 billion of impact investment assets were managed in 2015. Demand for impact investment continued to grow – from US$ 15.2 billion in new investment commitments in 2015 to USD 17.7 billion in 2016. According to The Global Sustainable Investment Alliance (GSIA) 2016 report: sustainable ESG Integration – investing that integrates Environment, Social and Governance criteria into investments decisions – has soared in 2016 to $10.37 trillion globally, and is growing annually at 25%. The growth rate of impact and sustainable investing is faster than any other area of professionally managed assets worldwide.[14] The Frontier Technology market of blockchain and digital assets is estimated to reach $1trillion in 2018: the opportunity is to leverage both markets together to accelerate capital and large-scale solutions delivery of the Sustainable Development Goals.

Now, for the first time in history we stand at the edge of a transition to a new "Internet of Value" that is being formed worldwide. The emerging Internet of Value integrates the power of frontier technology across blockchain and inclusive digital assets with market capacity of impact investing and large-scale systems solutions for last mile prosperity. Together this new frontier can enable us to make a paradigm shift in delivering last mile connectivity, prosperity and engagement in a new, value-based and decentralized global economy grown from trust, truth, transparency and

[14] http://www.gsi-alliance.org/wp-content/uploads/2017/03/GSIR_Review2016.F.pdf

dignified inclusion. This event is designed as a solutions event to bring together some of the world's foremost capital providers and technology pioneers that are delivering the exponential impact that will realize these gains.

2. Objectives

The main objective of the event is to discuss how to leverage the frontier technology, including by women and youth, to deliver impact investing and last mile prosperity for all. Consideration will be given to ways to develop and pilot technological solutions for the SDGs, and to support the enabling policies that may be needed for taking these to scale, particularly through impact investing.

The event will bring together innovators and entrepreneurs, those interested in financing solutions with positive impact for sustainable development, and those who support the scaling up of STI for SDGs. Representatives from the finance industry, foundations, institutional and individual investors, investment professionals, development finance institutions, policy makers and civil society will be invited to attend.

3. Format and/or scenario of the event

The event will be organized as a moderated roundtable, followed by questions and answers and an interactive plenary discussion.

4. Questions for discussion

The discussion will be guided by the following questions. Panellists are encouraged to draw from their own experiences.

- How to make technology solutions "ready" for impact investing?
- How can we better build digital competencies?
- How can blockchain and inclusive digital assets bring large scale solutions for last mile prosperity?
- What are the main challenges for developing, adopting, disseminating or scaling STI solutions and for commercial technology deployment for the SDGs?
- What financial instruments, investment funds and funding platforms are needed to stimulate institutional and other investors to finance technology and innovations for the SDGs?
- What would be effective UN frameworks and mechanisms for engaging with such private sector initiatives? Can the UN add value to such efforts?
- What are your three most important recommendations for policy and concrete action?

5. Supporting documents/publications

- Outcomes of the Global Solutions Summit 2016 and 2017. http://www.globalsolutionssummit.com/
- Financial Time's Innovative Finance as a Force for Global Change Event, https://live.ft.com/Events/2016/FT-Investing-for-Good-2016