

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

***Roundtable 2: Emerging science, frontier technologies, and the SDGs –
perspectives from UN system and science and technology communities***
(13:15-14:10 EDT, 6 May 2022; fully virtual)

Background

This roundtable is being organized in the spirit of General Assembly resolutions 73/17 and 75/316 which called for collecting information, analyse and disseminate the findings on the impact of rapid technological change on the achievement of the SDGs from which specific STI policies and feedback systems can emerge, as well as A/RES/76/213 which established a framework for these STI4SDGs endeavours.

The event will explore the latest developments in science and technology and their current and potential future impacts on sustainable development and the SDGs. The session will explore technology convergence and the multiple technology divides, including gender digital divide, and other challenges associated with these trends related to clusters such as blockchain, biotechnology, nanotechnology, artificial intelligence and quantum technologies.

A key idea for the establishment of the UN Technology Facilitation Mechanism was to bring decision-makers closer to the pulse of scientific and technological progress, and the event will also explore the best means and ways to achieve that. In particular, the interagency task team IATT will present its report, an update to the “TFM findings on the impacts of rapid technology change on the SDGs”, and science-policy briefs submitted by scientists and engineers from academia, private sector, UN systems and governments. The informal event will feature focused conversations on selected issues and allow a frank discussion of policy suggestions. The discussions will also build on work by CSTD on industry 4.0 and insights from the SG’s Special Envoy on Technology.

A network of permanent and independent multidisciplinary and multisectoral groups of STI experts has been proposed to support the work of IATT and the 10-Member-Group of High-level Representatives. Open forums structured from the bottom up and integrating civil society, academia, and the public and private sectors could support this endeavor. It could facilitate systematically collecting information on the development and application of emerging technologies; on their disruptive, positive and negative effects; on best practices; and on prevailing governance, legal framework and dynamic capacities in each country and region. It could gauge the properties, capabilities and reach of each line of emerging technologies, such as investigating the degree of absorption of AI systems in business and governments. The network could also map R&D projects; identify on-going research and existing studies on the probable socioeconomic impact of specific emerging technologies and their implications for making progress towards the SDGs; propose mission-oriented approaches and innovation projects.

“Intelligent digitalisation” is beginning to unleash its full potential in many companies and governments. The more its impact is spread and optimized, the greater its scalability, reach, learnability, and capture and creation of useful information, innovations and emerging technologies. This is increasingly transforming operating models of businesses and the efficacy of public policies. All main general-purpose technologies should be explored, particularly IA, IoT, cognitive and physical-cybernetic systems, autonomous vehicles, drones and intelligent logistics, clean energy technologies, hyper-connectivity systems, 3D and 4D printing, Big Data and high computational capabilities, nanotechnology, VR and AR, blockchain, brain-machine interface, and others.

In support of the STI Forum 2022, the interagency task team IATT organized a call for inputs, in the form of science-policy briefs, similar to previous years. Following peer-review, 64 such briefs were accepted for inclusion in the annual IATT report, entitled “Emerging science, frontier technologies, and the SDGs - Perspectives from the UN system and science and technology communities”. As in previous years, during the present session the task team will propose “TFM findings on the impacts of rapid technological change”, drawing on these submissions and other suggestions by TFM partners.

Objectives

The roundtable will present a range of perspectives from scientists and engineers in academia, NGOs, the UN system and the private sector on issues in emerging science, frontier technologies and the SDGs. It will hear policy proposals by experts who submitted science-policy briefs to the STI Forum and broader perspectives on policy implications related to recent science and technology trends.

Format

The roundtable will be structured in the form of presentations, followed by a moderated panel discussion and responses and feedback from other stakeholder experts.

Guiding questions

The discussion will be guided by the following questions:

- What opportunities and risks does recent rapid technology change have for developing and developed countries? What have been the wider societal impacts since 2015? What are the implications for SDG pathways? How can countries best prepare for these changes?
- What have been the achievements and failures of emerging science and frontier technologies during the COVID-19 crisis? What lessons can we learn for other sustainability crises?
- How can the world close global science and technology divides and achieve the SDGs by 2030? What are the implications of technology convergence for sustainability?

Supporting documents/publications

IATT (2022). *Emerging science, frontier technologies, and the SDGs - Perspectives from the UN system and science and technology communities*. New York: United Nations Interagency Task Team on Science, Technology and Innovation for the Sustainable Development Goals, 6 May 2022, <https://sdgs.un.org/tfm/STIForum2022>

IATT (2021). *Emerging science, frontier technologies, and the SDGs - Perspectives from the UN system and science and technology communities*. New York: United Nations Interagency Task Team on Science, Technology and Innovation for the Sustainable Development Goals. May 2021, <https://sdgs.un.org/sites/default/files/2021-05/IATT%20report%20on%20emerging%20techs%202021.pdf> .

The following *science-policy briefs* have been prepared by TFM stakeholders on emerging science and technologies, see <https://sdgs.un.org/tfm/STIForum2022> :

- **The big picture: science and technology policy, future scenarios and roadmaps**
 - **The big picture – science and technology policy**
 - *Avenues for using Science for Smarter Development*, by Susan Schneegans and Tiffany Straza (UNESCO)
 - *Building Ecosystems for Innovation towards the SDG*, by José Ramón López-Portillo Romano (Q Element)
 - *Expanding Engineering Capacity for Sustainable Development*, by William E. Kelly (Asian Civil Engineering Coordinating Council)
 - *Engineering Standards for Sustainable Infrastructure*, by William E. Kelly (Asian Civil Engineering Coordinating Council)
 - *Anticipatory governance of emerging and disruptive technologies with dual-use potential*, by Georgios Kolliarakis (German Council on Foreign Relations)
 - *Carbon Implications of COVID-19*, by Kehan He and Zhifu Mi (The Bartlett School of Sustainable Construction, University College London, London, UK)
 - *Firm-level impacts of automation may be labour-friendly*, by Giacomo Domini (Erasmus University Rotterdam), Marco Grazzi (Catholic University of the Sacred Heart, Milano), Daniele Moschella (Sant'Anna School of Advanced Studies, Pisa), Tania Treibich (Maastricht University)
 - *Technology and sustainability*, by Stephane Louise Boca Santa; Cesar Duarte Souto-Major; Maria Gabriela Mendonça Peixoto; Brenda Carolyne Geraldo Castro; Robert Samuel Birch; José Baltazar Salgueirinho Osório de Andrade Guerra (University of Southern Santa Catarina, Brazil)
 - *Technological changes and their social impacts*, by Felipe Fernandez; Raissa Mariana Rita; José Baltazar Salgueirinho Osório de Andrade Guerra (University of Southern Santa Catarina, Brazil)
 - *Circular economy as a strategy in European automotive industries to achieve Sustainable Development: A qualitative study*, by Monica Del Angel Hernandez and Venkat Bakthavatchalam (University of the West of England, UK)
 - *SDG 15, Solution for the 17 Goals: Nature is transboundary, as are its riches and problems*, by Jéssica de Mello Dondoni.
 - **Visions, scenarios, and roadmaps**
 - *Role of Hydrogen in Attaining Carbon Neutrality - Reality check and rationale for considering hydrogen technologies*, by Iva Brikic (UNECE)
 - *Eliminating multidimensional poverty by providing decent living standards for all*, by Jarmo S. Kikstra, Setu Pelz, and Shonali Pachauri (IIASA)
 - *Closing cooling gaps in a warming world*, by Alessio Mastrucci, Bas van Ruijven, Shonali Pachauri (IIASA)
 - *SCP Policy Design for the Post COVID-19 Society: Envisioning-based Policy Making (EnBPM)*, by Yasuhiko Hotta (Institute for Global Environmental Strategies, Japan), Tomohiro Tasaki (National Institute for Environmental Studies, Japan), Masahiko Hirao (University of Tokyo, Japan)
 - *Conceptualizing future scenarios of artificial intelligence – from energy servants to AI servants*, by Richard A Roehrl (DESA)

- *Enhancing the sustainable development component in the Action Plan of the STI for SDGs Roadmap in Serbia*, by Alessandro Rainoldi, Liliana Pasecinic, Monika Matusiak, Angela Sarcina (EC-JRC); Olga Bolibok (expert); Viktor Nedovic, Tijana Knežević, and Lazar Zivkovic (Serbian Smart Specialisation Team).
 - *Localised Science, Technology and Innovation (STI) for SDGs Roadmap in Ukraine: defining the governance and policy frameworks*, by Monika Matusiak, Angela Sarcina (EC-JRC); Olga Bolibok (expert); Darya Chayka (Ministry of Education and Science of Ukraine); Lyudmila Musina (Ukrainian Institute of Scientific and Technical Expertise and Information).
 - *Technology upgrading in the UN Global Pilot Programme on STI for SDGs Roadmaps countries: Serbia, Ukraine, Ghana, Kenya, Ethiopia, and India*, by Randolph Luca Bruno, Monika Matusiak, Kirill Osaulenko, Slavo Radosevic
 - **Issues in emerging science and frontier technologies**
 - **Digitalisation, artificial intelligence and robotics**
 - *Digital Public Goods for an Inclusive Digital Future: A Roadmap Towards 2030*, by Anita Gurumurthy, Nandini Chami and Tanay Mahindru (IT for Change)
 - *Strike Mission: El Salvador, Blockchain Technology, and Sustainable Development*, by Daniel Cooper (California State University San Marcos, U.S.A) and Nina Kruglikova (University of Oxford, U.K.)
 - *TinyML: Applied AI for Development*, by Marco Zennaro, ICTP/UNESCO; Brian Plancher, Harvard University; Vijay Janapa Reddi, Harvard University
 - *Metaverse for UN SDGs – An Exploratory Study*, by Amjad Umar (Harrisburg University of Science and Technology and ICT4SIDS)
 - *Beyond a black-box approach to artificial intelligence policy – a simple guide to definitions, functions and technology types*, by Richard A Roehrl (DESA)
 - *Towards a New Social Contract: Reducing Inequalities through Digital Public Goods and Youth Collaboration for the Sustainable Development Goals*, by Mauricia Abdol Tshilunda, Mohammad Atif Aleem, Eileen Cejas, Marta Galambos, Fernando García, Aleksandra Ivankovic, Victoria Lovins, Oumaima Makhoul, Elliott Mann, Tristan Norman, Juliana Novaes, Aoife O'Mahony, Carolina Rojas, Gustavo Souza (Youth Coalition on Internet Governance; UN Major Group for Children and Youth; Science-Policy Interface Platform; and DESA)
 - **Biotech and pharmaceuticals**
 - *Metabolic engineering of plants – Molecular Pharming*, by Vinaya Roehrl (University of Oxford)
 - *Technology in medical cannabis production: Challenges and opportunities for development in Lesotho*, by M. Sabrina De Gobbi (International Labour Organization), and Motselisi C. Mokhethi, Regina M. Tetsane, Maseabata Ramathebane, Mpheteli Malunga (National University of Lesotho)
 - **Data systems, big data, and remote sensing**
 - *Big Data and A.I. for the SDGs: Private corporation involvement in SDG data-driven development, policy and decision-making*, by Ciarán O'Brien (UCD Centre for Sustainable Development Studies)
 - *Digital technologies to empirically measure the underpinning of public goods in each locality*, by Alexander Dill (World Social Capital Monitor)

- *Democratizing Data: Insights and Lessons on Standardization and Interoperability as a Foundation for Humanitarian Action*, by Oscar Maria Caccavale, Valerio Giuffrida, Anna Ong and Nynne Warring (World Food Programme, Research, Assessment and Monitoring Division)
- *Realising the Potential of Space-Based Data and Services for Sustainable Development*, Xing Yi Ang and Luc St-Pierre (OOSA)
- *Indigenous Knowledge Research Infrastructure (IKRI): A Tool to Achieve Sustainable Development Goals and Lessons from the COVID-19 Pandemic*, by Milind Pimprikar (CANEUS); Myrna Cunningham and Gabriel Muyuy (FILAC); Simonetta Di Pippo and Shirish Ravan (OOSA)
- *Structuring indicators for the development of a smart city plan*, by Rafael de Lima, Valdemiro da Rocha Júnior, Felipe Teixeira Dias, Manoel Honorato Filho, José Baltazar Salgueirinho Osório de Andrade Guerra (University of Southern Santa Catarina, Brazil); and Robert Samuel Birch (University of Liverpool, UK)
- *Lessons learned about the effect of reduced anthropogenic activities on water quality in a large lake system and opportunities towards sustainable management*, by Gemma Kulk (Plymouth Marine Laboratory, UK), Grinson George (ICAR-Central Marine Fisheries Research Institute, India), Anas Abdulaziz (CSIR-National Institute of Oceanography, India), Nandini Menon (Nansen Environmental Research Centre, Kerala University of Fisheries and Ocean Sciences, India), Varunan Theenathayalan (Plymouth Marine Laboratory, UK), Chiranjivi Jayaram (Indian Space Research Organisation, India), Robert J. W. Brewin (University of Exeter, UK), Shubha Sathyendranath (Plymouth Marine Laboratory, UK)
- **Environmentally compatible frontier technologies**
 - *Recycling Materials to Transform Construction Industry and Address Climate Change*, by Shrish Patel and Alexander Orlov (Stony Brook University, USA)
 - *Certified biodegradable and biobased materials are targeted enablers for a circular economy and a closed nutrient loop*, by Jens C. Otte, Glauco Battagliarin, Afsaneh Nabifar, Andreas Kuenkel (BASF SE, Ludwigshafen am Rhein, Germany)
 - *Integrated advanced oxidation processes (IAOP) for city water sanitation*, by Abraham Avrah, Alexandra Hillesheim and Chaandi Malhotra (Wageningen University, The Netherlands)
 - *Modular 3D printing construction: towards affordable, adjustable and climate-resilient housing*, by Justine van den Bergh, Christle Nieuw, Wietse Slob, Myrka Escalante Suarez, Pia Lou Velema (Wageningen University, The Netherlands)
 - *Bioplastics from urban organic waste*, by Jess Proctor and Ashmita Das (SUNY, USA)
 - *Circular economy in the clean technology industry and its role in reviving local manufacturing*, by Bartłomiej Kolodziejczyk (University of Gothenburg)
 - *The road to sustainable e-mobility batteries*, by Pacome David-Mauduit, Layla Gegout, Emma Jacoby, Anetta Oksiutycz-Munyawiri Gijs Romijn (Wageningen University, The Netherlands)
 - *Hydrometallurgy for EV batteries*, by Atif Ali, Marcellin Manzan Andre Adjoumane (SUNY, USA)
 - *Bladeless wind turbines*, by Tuan Viet Nguyen, The Kiet Tran, Hong Huy Dinh, Ngoc Hai Binh Ho (Van Lang University, Viet Nam)

- *Application of solar energy for traffic light system in developing countries*, by Hoang Hieu Ha, Thi Ngoc Thuy, Quang Khai Pham, Minh Man Tran (Van Lang University, Viet Nam)
 - *Innovative and Sustainable Approach to Clean Solar Panel and Increase Solar Energy Generation*, by Shrish Patel, James St. John, Alexander Orlov (Stony Brook University)
 - *Urban aquaponics in the European Union*, by Laura van der Doorn, Marieke Heer, Marina Huertas Garcia, Paloma Soriano (Wageningen University, The Netherlands)
 - *Utilizing urban food forests to improve nutrition*, by Angeal Lorene Junbeck, Mary Mackenzie Proud, Pratik Vijay Parihar (SUNY, USA)
 - **Specific solutions, news and updates**
 - *The Philippines' advances in emerging frontier technologies*, by the Department of Science and Technology, The Philippines
 - *Utilizing the Technology Readiness Level scale (TRL) for measuring social impact startups*. Guatemala's National Innovation Prize, by Loren Boburg and Carlos Mazariegos (Secretaría Nacional de Ciencia y Tecnología, Guatemala)
- **Gender and STI**
 - **Gender dimensions of technology**
 - *Women in Science*, by Anelise Leal Vieira Cubas; Milena Kemper; Raissa Mariana Rita; Priscila Cembranel; José Baltazar Salgueirinho Osório de Andrade Guerra (Centre for Sustainable Development, University of Southern Santa Catarina, Brazil)
 - *Replicating Gender Bias from Above: Earth Observation, Machine Learning and SDG 5*, by Anthony Deen, Mateo Rojas Guerrero, Juan Enrique Bonilla Morales, Zinnya del Villar (Data-Pop Alliance)
 - *Encoding Digital Technologies for a Feminist Social Contract*, by Anita Gurusurthy, Anuradha Ganapathy, Nandini Chami (IT for Change, India)
 - *Leveraging online advertising data for measuring the Sustainable Development Goals: applications for gender gaps and SDG5*, by Reham Al Tamime, Masoomali Fatehkia, and Ingmar Weber (Qatar Computing Research Institute, Hamad Bin Khalifa University), Ridhi Kashyap (University of Oxford)
 - *Women's unique strength in scientific research and social development should be fully emphasized*, by Wang Haiyan, University of Chinese Academy of Sciences, member of China Association for Science and Technology (CAST) UN Consultative Committee, China Women's Association for Science and Technology
- **COVID-19: policy lessons, technology solutions, and national experiences**
 - **Lessons from COVID-19 for policy and the science-policy-society interface**
 - *COVID19: Lessons for a better use of digital technologies*, by Maryline Mangenot, MSc Sustainable Development, University College Dublin
 - *Governing uncertainty in pandemic times: connecting national standards to the world*, by Doyoung Lee, Korea Research Institute of Standards and Science, Republic of Korea
 - *COVID-19 and computational sciences: data variety can be an enabler for good science– if properly utilized*, by Mayank Kejriwal, Research Team Leader / Research Assistant Professor, Viterbi School of Engineering, University of Southern California
 - **Specific technologies and solutions**

- *What can be done about the discarded face mask pandemic? An innovative engineering solution*, by Omar Elhawary and Venkat Bakthavatchalaam (University of the West of England, UK)
 - *COVID-19 Impacts on Community Littering: A Strategy for Mitigation*, by Miranda Kemp, Cher Zheng, April (Yueyang) Wu, Paige Flanery (Pratt Institute)
 - *GreenPath*, by Bradley Ahmic, Owen Beitel, Jessica Kayll & Jade Carter (Pratt Institute)
- **National and local experiences and news**
 - *The Philippines' science-based support in the middle of the pandemic*, by the Government of the Philippines
 - *Policy recommendations to reduce food insecurity in New York City*, by Judith-Faith Williams Cadet, Kathryn Miller, Skye Prosper, and Xin Xu (Pratt Institute)
 - *COVID-19 and social conflicts: policies from South Korea's experience*, by Min, Jeehye, Science and Technology Policy Institute, Republic of Korea
 - *Workplace Well-being*, by Yishi Wang, Richa Verma, Sabrina Casilla, Tito Nawat and Lucy Vitale (Pratt Institute)