

Cover Memo: Volume 16, Special Issue on the Impacts of Emerging Technologies Inequality and Sustainability

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This Special Issue of the Journal of Science Policy & Governance has been sponsored by the United Nations Major Group for Children and Youth. Learn more at www.unmgcy.org.

Dear Colleagues,

Resolutions passed by the UN General Assembly in [2017](#) and [2018](#) called for more serious discussion around the impact of rapid technological change on the achievement of the [Sustainable Development Goals](#) as part of a 15-year framework to address poverty in all its forms and leave no one behind. We live in a time of growing prosperity alongside growing concerns about inequality across various social, economic, and environmental dimensions.

These resolutions were followed by two reports from the [United Nations Department of Economic and Social Affairs](#) and [United Nations Conference on Trade and Development](#). Building on this work, in 2018, the UN Secretary General launched a UN-system wide strategy on emerging technologies to better align them with the values enshrined in the UN Charter, the [Universal Declaration of Human Rights, and the norms and standards of international law](#).

Elevating the voices of early career researchers is critical to better identify and address risks, promote innovations that can capture the potential benefits in equitable and inclusive ways, and consider the values that guide decision-making about emerging technologies and futures they envision for the world. Submissions to this special issue aim to inform discussions at the 2020 Commission on Science & Technology for Development, including the deliberations around the 2020 Technology and Innovation Report (TIR) as well as the Multi-Stakeholder Forum on Science, Technology & Innovation on SDGs.

In the fall of 2019, the *Journal of Science Policy & Governance* and the United Nations Major Group for Children and Youth teamed up to launch a joint call for submissions for a special topics issue around the *"implications of emerging technologies on inequalities and sustainable development."*

Students, policy fellows, and early career researchers and professionals from around the world and a wide array of backgrounds developed compelling policy articles to address this timely and important topic.

Guiding questions included:

- Who benefits from frontier technologies? How do we make the benefits of frontier technologies more widespread? What measures should be put in place to counteract the possibility of frontier technologies to reinforce existing or create new inequalities?
- What are trends observed with emerging and frontier technologies?
- What implications do these emerging technologies have on social inclusion, equity, and empowerment? What implications do they have on planetary boundaries and climate change?
- How can technologies be designed, developed, commercialized, used, and discarded in a more sustainable way?
- What new skills, data, tools, and strategies are needed today to steer technology change towards the world we want?

This is the resulting issue. *JSPG* and UNMGCY would like to thank its entire staff, editorial board, and authors for their immense contributions to this new issue with special thanks to *JSPG* Editor-in-Chief, Christian H. Ross and *JSPG* Assistant Editor-in-Chief for Special Issues, Madeleine Jennewein, for their leadership in managing the editorial process for this issue. We would also like to thank *JSPG* Senior Advisor for International Engagement, Jean-Christophe Mauduit, for his support in connecting and bridging the UNMGCY and *JSPG* teams.

With regards,

Christian H. Ross, Editor-in-Chief, *Journal of Science Policy & Governance*

Donovan Guttieres, Organizing Partner for Policy Coherence, UN Major Group for Children and Youth

Shalin R. Jyotishi, Chief Executive Officer, *Journal of Science Policy & Governance*

Framing from distinguished leaders

To help frame this issue and elevate its profile, *JSPG* and UNMGCY asked three distinguished leaders with expertise in and at the intersection of emerging technologies, sustainable development, and science and technology policy.

Deborah L. Wince-Smith, *President & CEO, Global Federation of Competitiveness Councils and JSPG Advisory Board member*

Great S&T revolutions—biotechnology, nanotechnology, autonomous systems, AI, digital connectivity, and sensorization—are converging on the global economy and society. They hold vast potential for innovations to accelerate dramatically human progress and achievement of the Sustainable Development Goals.

The digital revolution provides developing countries with access to the world's businesses, supply chains, markets, and jobs, creating conditions for ascending the economic development curve and reducing poverty. Energy is a fundamental requirement for reducing poverty and raising living standards. Emerging technologies are poised to deliver more sustainable energy systems for the developing world (e.g., distributed energy, small-scale PV, geothermal, wind, water power, and biomass systems). With "smart" agriculture, and leveraging biotechnology, nations can sustainably increase agricultural production and save water. Vehicle electrification, autonomous vehicles, smart highways, and streets allow us to rethink moving people and goods more sustainably. Systematic use of these technologies, along with energy efficient buildings, smart infrastructure, and biomanufacturing can make a significant difference in the sustainability of production and consumption.

The private sector plays a pivotal role in developing and deploying sustainable solutions. It has the entrepreneur's spark, capabilities, and networks of talent, capital, and supply chains to create and deploy innovations to drive sustainable development and prosperity around the world. The Global

Federation of Competitiveness Council's (www.thegfcc.org) foundational Principles offer a framework for government policies to foster private sector-led, inclusive, sustainable solutions (citizen education/training, IPR protection, open trade, stable and transparent regulations, and an efficient and fair environment for business investment, formation, and growth).

While international partnerships are “force multipliers” for accelerating sustainable development, each nation must take responsibility for shaping its own future, and choose its own pathways of growth and change based on its distinct character and culture, natural resource endowments, state of development, and the will of its people.

Shamika N. Sirimanne, *Division on Technology and Logistics (DTL), UNCTAD*

Rapid technological change could be transformative in implementing the 2030 Agenda for Sustainable Development, and several frontier technologies have shown great potential to help to achieve the SDGs. There are numerous examples of developing countries using frontier technologies, even under conditions of low resources and capabilities; from the use of drones in Rwanda and Ghana to deliver blood to remote medical facilities reducing maternal mortality, to the use of artificial intelligence in India to analyse X-ray images and detect asymptomatic cases of the COVID-19.

At the same time, frontier technologies could also have unintended consequences, potentially widening inequalities or creating new ones. Some frontier technologies such as AI and robotics could affect jobs and displace workers, with resulting distributional effects. Initial disparities could be accentuated when frontier technologies are systematically adopted first by high-income users. Technological convergence also give rise to issues of citizen's rights, privacy, data ownership, concentration of market power and online security. And frontier technologies may also increase the technological gap between developed and developing countries.

The full picture that this process will produce may take a little longer to emerge, but it is safe to say that the long-term changes will be more far-reaching than we imagine. Governments and the other actors of development need to prepare fast to address the implications of frontier technologies for development along all its dimensions.

In this regard, I welcome this initiative by *JSPG* and UNMGCY to engage young researchers to improve our understanding of multidimensional implications of emerging technologies. UNCTAD and the UN Commission for Science and Technology for Development (CSTD), the focal point in the UN System for STI for development, support these efforts to foster an international dialogue on the pressing questions that frontier technologies raise about issues such as inequality, environment, economic stability and social cohesion.

Veerle Vandeweerd, *Co-Founder, Global Sustainable Technology & Innovation Conference*

This special issue is not only welcomed but it is also very much needed. Young people cannot and are not indifferent to the waves of technological innovation that are coming ever faster at us. Technology is, everywhere, changing people's lives and is transforming our day-to-day reality. Young people rightly demand that emerging technologies should be assessed with foresight into potential disruptions, both positive and negative, and that the entire life cycles of technology

products are assessed before they enter the market. They demand that technologies work for the benefit of all, and that transformations are not only driven by the profit imperative. They demand that the educational system is changed to provide them with the skills and knowledge needed to craft sustainable societies and economies in a rapidly changing and increasingly digital world. The technologies exist to do so, for example through using artificial intelligence to adopt the teaching to the capacities of every individual student, inserting computational science and social and emotional intelligence into the curricula from primary to tertiary education, and using blockchain to make remote learning and grading trustworthy. We need to hear the young people's voices and listen to them. The future is theirs.

Deborah L. Wince-Smith is the President & CEO of the Council on Competitiveness. During her 17-year tenure in the federal government, Ms. Wince-Smith held positions in the areas of science, technology policy and international economic affairs. She began her career as a program director for the NSF and later served as the nation's first Senate-confirmed Assistant Secretary of Commerce for Technology Policy under President George H.W. Bush. Under President Ronald Reagan, Ms. Wince-Smith was appointed as the first Assistant Director of International Affairs and Competitiveness in the White House Office of Science and Technology Policy. She served from 2005-2012 as a public Director of NASDAQ-OMX and was appointed by President George W. Bush as a Senate-confirmed member of the Oversight Board of the Internal Revenue Service. Following her government tenure, Ms. Wince-Smith became active in the governance of various national scientific laboratories and provided strategic counsel to several FORTUNE 100 companies. She has served on the Boards of the Department of Energy National Laboratories and serves on numerous boards, advisory and government committees. Ms. Wince-Smith is the president of Global Federation of Competitiveness Councils, whose creation she led. Further details can be found on the Council on Competitiveness's website.

Shamika N. Sirimanne, PhD has extensive experience in development policy, research and technical cooperation gained from international organizations, national governments, think tanks and universities. She served as Director of the ICT and Disaster Risk Reduction Division of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), where she spearheaded major regional cooperation programmes. Among them are the Asia-Pacific Information Superhighway initiative for seamless broadband connectivity, Regional Drought Mechanism for monitoring and early warning of drought through space technology applications, and the United Nations Network of Experts for Paperless Trade (UNNExT) initiated in collaboration with the United Nations Economic Commission for Europe. During her tenure with ESCAP, Ms. Sirimanne also served as the Secretary of the Commission, headed the trade facilitation programme, and led the macroeconomic policy work and ESCAP's flagship publication, Economic and Social Survey of Asia and the Pacific. Prior to that, Ms. Sirimanne was with the United Nations Economic Commission for Africa (ECA), where she led the economic policy team and the Economic Report on Africa, the flagship publication of ECA. Ms. Sirimanne also worked for the Canadian Department of Finance and the World Bank. Ms. Sirimanne holds a PhD in Economics.

Veerle Vandeweerd, PhD has more than 35 years of experience in sustainable development, including 20+ years in the United Nations system. Her work spans diverse fields — from assessments, green economic transformations and global environmental norm setting, to financial, regulatory and institutional capacity building in over 160 countries. She is currently engaged in setting up new

financial mechanisms to redirect private financing to new sustainable asset classes. She is the co-founder of the Global Science Technology and Innovation Conference Series and was its policy director for the first three editions, 2017-2019. She serves as a member on the boards or advisory committee of several international and national organizations, including CCICED (China). Before joining the UN, she taught at the University of Zambia, conducted research on African Sleeping Sickness, and headed the environmental reporting department in the Flemish Government, Belgium. She received her doctorate in Biochemistry from the University of Antwerp, Belgium, and a Master's in Chemistry from the University of Gent, Belgium.