STI FORUM

Science, Technology & Innovation for the Sustainable Development Goals

Background note for the 10th Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals

Prepared by the UN Group of Ten High-level Representatives of Civil Society, Private Sector and Scientific Community to Promote Science, Technology and Innovation for the SDGs ("10-Member-Group")[1] [2]

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In the face of rapid scientific and technological change new opportunities are emerging to improve lives, transform economies, and strengthen global cooperation. While these shifts challenge traditional development models and present formidable challenges, they can also open new pathways for progress that does not leave people behind. In today's fast-changing world, international collaboration on science and technology is more important than ever to find solutions to shared challenges.

Advances in innovation can accelerate progress across health, education, energy, and climate action. From AI-enabled healthcare and digital learning to clean energy and sustainable agriculture, science and technology are helping to drive progress toward the 2030 Agenda for Sustainable Development (A/RES/70/1) - a vision for people, planet, prosperity, peace, and partnership – which includes the Sustainable Development Goals (SDGs). To ensure these benefits reach everyone, the world must work together to share knowledge, build capacity, and use technology responsibly.

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[1] https://sdgs.un.org/tfm/ten-member-group

[2] *Disclaimer:* The present technical note provides informal background information in support of the deliberations at the STI Forum 2025. The views expressed here are those of the authors and do not necessarily reflect those of the United Nations or its senior management, nor those of the organizations the 10-Members are affiliated with.

The Pact for the Future offers a timely way forward to align innovation with the SDGs and other shared global goals and deliver a better future for all, leaving no one behind. Building on a decade of experience through the STI Forum and the Technology Facilitation Mechanism, today the UN has a stronger foundation than ever to align frontier science and technology with the SDGs, strengthen global cooperation, and ensure that breakthroughs empower all societies—not just a few.

Against this background, the pursuit of the aspirational SDGs is more urgent than ever. As governments, the private sector, and the academic science and engineering communities come together at the UN Multi-stakeholder Forum on Science, Technology, and Innovation for the SDGs (STI Forum), the focus is on harnessing the transformative power of science, science advice, and a wide range of technology solutions and innovations, most notably AI and space technologies as well changing governance innovations such as the treating the environment as a commons and harnessing the power of international law, to achieve the SDGs by 2030 and build a better science and technology-enabled future for all.

This background note outlines key issues, actions, and policy challenges, and provides an initial framing for the discussions at the Forum. It reflects on the 10th anniversary of the Forum and highlights key STI opportunities related to SDGs 3 (good health and well-being), 5 (gender equality), 8 (decent work and economic growth), 14 (oceans) and 17 (means of implementation, partnerships), the wider implications of frontier science and technologies for advancing the SDGs, and issues of R&D and STI financing, research infrastructures, and capacity building

Tenth anniversary of the STI Forum – learning from 10 years of leveraging STI for the SDGs

This year celebrates the 10th anniversary of the STI Forum which was created by the Addis Ababa Action Agenda and launched by the 2030 Agenda for Sustainable Development, as one component of a UN Technology Facilitation Mechanism to harness STI for the SDGs. The annual STI Forum was envisioned as a platform to bring the UN and its Member States closer to the pulse of rapid technological progress by convening scientists and engineers in labs in academia and private sector, with government representatives and wider stakeholders.

The anniversary is a good time to take stock and reflect on lessons learnt since the inception of the Forum, in order to continue strengthening contributions of science and technology to SDG progress in the next five years to 2030. To achieve the SDGs will require bold and creative action to overcome persistent impediments to innovation nurturing, technology diffusion and science collaboration. SDG achievement depends on an enabling environment for harnessing STI solutions.

Looking back - STI Forums from 2016 to 2024

The STI Forum has become the UN's principal hub for bridging science and policy to advance the SDGs. As the flagship annual event of the UN Technology Facilitation Mechanism (TFM), it has fully reintegrated STI discourse into UN Headquarters after decades of absence, catalyzing a wave of related initiatives across the UN system. The Forum has uniquely convened governments with thousands of innovators, researchers, and entrepreneurs - many new to the UN - stimulating cross-disciplinary, cross-sectoral dialogue. It has fostered multistakeholder collaboration, generating a wealth of recommendations and showcasing practical solutions.

Technically, the Forum has helped surface and scale innovative solutions aligned with SDGs - ranging from solar-powered health diagnostics to AI for sustainable agriculture. It has addressed frontier areas like AI,

synthetic biology, digital public goods, and carbon removal, while also addressing the social SDGs through governance innovations. The TFM's Inter-Agency Task Team now spans 51 UN entities working collaboratively on a wide range of science and technology issues, notably on capacity building and national STI4SDG roadmaps, on research & analysis to understand the wider impacts of frontier science and technology, and on gender and STI. Importantly, the Forum fosters inclusivity, with high participation from women scientists and stakeholders from developing countries, ensuring global technological progress is informed by diverse voices.

A consistent theme across the Forums has been the need to move beyond isolated technological fixes and promote integrated STI solutions that address multiple SDGs simultaneously. While hundreds of innovations have been surfaced through UN-led calls, scaling the best and most appropriate of them and making them accessible and affordable for all countries and groups, requires strategic partnerships and investment. This was underscored in the Pact of the Future and in discussions leading up to the Fourth International Conference on Financing for Development (FfD4).

Scientific evidence has also emphasized that achieving the SDGs within planetary boundaries and ambient quality standards demands systemic transformation. A quarter of all health risks and 60% of infectious disease can be attributed to the way our environment is changing. With antibiotics, PFAS and plastics polluting soils, rivers and oceans, we are creating new and changing risks. These changes are creating vulnerability and marginalization worldwide among small holder farmers and fishers; when family income is threatened this leads to gender-based violence including exacerbating the incidences of child marriage.

The Forums have underscored the importance of STI cooperation on climate action, calling for cross-sector collaboration, knowledge and technology transfer, capacity building, and support for countries managing stranded assets. However, persistent digital divides limit equitable participation in AI and frontier technologies, especially from developing countries. Moreover, while AI can support action, it does not (yet) take action, it can be used to promote misinformation and disinformation (the world’s number-one security risk), and AI itself is energy and resource-intensive incentivizing companies using AI to withdraw from their net zero targets. Furthermore, while basic digital access has improved, emerging divides in AI, biotech, and advanced infrastructure continue to widen.

Inclusive innovation has been a core concern. The Forums repeatedly stress that STI systems must engage and learn from women, youth, and Indigenous communities. Gender gaps in STEM education and leadership, along with the marginalization of traditional knowledge systems, hinder sustainable innovation. Calls have been made for gender-responsive education, participatory policymaking, and inclusive design across the tech lifecycle.

Structural constraints in Small Island Developing States (SIDS), Least Developed Countries (LDCs), and African countries—such as limited R&D funding, weak infrastructure, and data gaps—require tailored, demand-driven STI strategies. Proposals to transform SIDS into “Small Island Digital States” and to scale regional cooperation have gained traction.

National STI4SDG roadmaps have emerged as key tools for aligning science and technology with development. These should incorporate interdisciplinary and local knowledge, foster South-South collaboration, and include mechanisms for continuous learning. The Forums have warned against extractive models like "helicopter research" and instead advocate capacity-utilization and co-creation.

Financing remains a critical bottleneck. The Forums have called for increased public and private investment, recommending annual SDG-focused research budget growth of at least 3.7% from 2025 to 2029. Blended finance, impact investing, and support for women-led and grassroots innovation are crucial enablers provided they are designed to avoid exacerbating the global debt crises.

The rapid evolution of technologies such as AI, digital currencies, and gene editing has led the Forums to call for global norms grounded in human rights and environmental law. This call was reiterated by leaders in the Pact of the Future. Governance must address data privacy, algorithmic bias, and equitable access while enabling innovation. The COVID-19 pandemic highlighted both STI's potential in crisis response and the inequalities in access to technology and trust in science.

Forward-looking governance and foresight are essential to anticipate and manage the impacts of disruptive technologies. National strategies must link engineering and climate goals to enable green and digital transitions. Inclusive capacity-utilization, investment in digital infrastructure, and integration of STI into resilience planning are key priorities.

Finally, all Forums called for strengthening the UN Technology Facilitation Mechanism (TFM). While it has grown into a credible platform, it requires adequate resources, stronger governance, and continued political support. Expanding its online hub, regional reach, and multi-stakeholder engagement, especially in developing countries, will be essential. The TFM should also lead on global STI foresight and real-time policy research collaboration and advice.

In sum, the STI Forums have laid a strong foundation for leveraging STI for sustainable development, but the next phase calls for better communication of scientific results and harnessing of new technologies, strengthened monitoring and evaluation, bolder commitments, strategic investment, inclusive and environmentally sustainable governance, and partnerships to ensure that innovation truly benefits all.

Global STI landscape at a pivotal moment in 2025

Today, the world stands at a pivotal moment in its pursuit of sustainable development, marked by both significant progress and pressing challenges. Scientific research has become increasingly globalized, with low- and middle-income countries (LMICs) now producing more scientific publications than high-income countries (HICs), reflecting growing academic capabilities. Capacity building efforts in many LMIC are bearing fruit, so that in 2024, as many as 56% of the authors of research publications worked in LMICs. However, LMICs still struggle with limited visibility, collaboration, and resources, particularly in private-sector R&D, highlighting the need for equitable participation in solving global issues.

Despite advancements, planetary health and human wellbeing are declining as Earth's natural systems—such as climate, freshwater, and nutrient cycles - face accelerating degradation. Biodiversity loss is so high that we are arguably in the midst of the sixth extinction event. Exceeding these critical boundaries threatens ecosystems, global stability, current human health and livelihoods, political crises and future generations may grow up in a world with unstable climate and water systems, while suffering from the deteriorating quality of our air, water and soil through unprecedented pollution from medicines, chemicals, PFAS, plastics, electronics and other wastes. Scientific understanding of Earth system processes is therefore critical. Fossil fuel combustion contributes significantly to these impacts, with climate change causing deaths, chronic disease, displacement and loss of well-being from high wet bulb temperatures, shifting vectors, extreme weather events, sea level rise and melting glaciers affecting tens of millions of people worldwide today. Worse, it aggravates the biodiversity crises and indefinitely affects the water

cycle and acidifies the oceans making it much harder to meet the SDGs that depend on these. STI strategies need to support a just transition from fossil fuels while aligning with the SDGs, particularly the goals to end poverty and hunger. This means prioritizing technologies that meet essential needs in energy, food, and urban systems, and promoting fair resource distribution to ensure inclusive and sustainable outcomes. Progress in this regard remains slow due to ignorance of science, lack of accountability and liability, economic and political barriers, as well as financing gaps and limited access to crucial technologies that disproportionately impact regions like Africa and Latin America.

Emerging technologies, such as artificial intelligence, biotech, and quantum computing, offer promising solutions to challenges in agriculture, healthcare, and urban development. For example, AI can optimize crop yields and precision farming, while biotech supports resilient food systems. This depends on the quality of the information fed into these systems, the quality of which may differ greatly between quantitative vs. qualitative information on how societies function. Moreover, AI scrapes knowledge without acknowledgement of the authorship and copyrights and without a full "understanding" of underlying assumptions and approaches. These technologies thus also bring challenges, including that they do not in themselves address problems – resources have to be generated to adopt the solutions proposed, increased resource use, inequalities in access, and risks such as misinformation, which necessitate robust governance frameworks to ensure ethical and inclusive use.

Addressing gender disparities in STEM is equally important, as persistent gaps in leadership and retention hinder inclusive innovation. Policies promoting gender diversity must be expanded to unlock talent, build on gender-based different scientific approaches and priorities and foster sustainable well-being.

To accelerate progress, targeted investments in STI infrastructure, funding, and governance are critical, particularly in developing regions like Africa. Global collaboration is needed to scale carbon removal technologies, phase down/out fossil fuel, transition to renewable energy, and establish mechanisms for resource redistribution within safe and just boundaries and ambient quality standards. Coordinated STI strategies, such as public education and awareness building, national roadmaps, global innovation hubs, and increased funding commitments, are essential to support the SDGs.

Achieving sustainable development requires systemic transformations of the economic, legal and governance systems supported by appropriate and sustainable technological solutions, and a commitment to justice and equity. By fostering global cooperation and leveraging science, technology, and innovation, humanity has the tools to address climate change, poverty, and inequality, creating a more sustainable and equitable future for all by 2030.

Looking ahead – making implementation of the Pact for the Future future-proof

As the STI Forum marks its tenth year, the adoption of the Pact for the Future presents a timely opportunity to align and elevate STI in support of the 2030 Agenda during its final implementation phase. Chapter 3 of the Pact emphasizes the need for STI to serve as a powerful, inclusive and ethical force to drive sustainable development, enhance global cooperation, and ensure that no one is left behind. Translating this vision into practice will require deepening multilateral coordination, expanding capacity-building efforts, and scaling up innovation ecosystems—particularly in low- and middle-income countries.

Central to this agenda is the call to strengthen the UN Technology Facilitation Mechanism (TFM), including the work of the Inter-agency Task Team (IATT), the 10-Member Group of High-level Representatives, and the STI Forum itself. These TFM components can anchor global STI cooperation, knowledge sharing, and

policy dialogue. Ensuring stronger linkages with national science-policy interfaces, such as through UN country teams and voluntary national reviews, could reinforce policy coherence and accelerate uptake of science-based approaches.

The STI Forum can also play a key role in aligning digital and physical research infrastructure investments. This includes expanding open access to scientific data, supporting the development of AI-powered research platforms, and promoting virtual science hubs. Tools like Earth observation systems and Digital Twins of the Ocean (DTO) are examples of how digital innovation can be leveraged to enhance global environmental monitoring and support decision-making under uncertainty. These capabilities are essential to track progress toward sustainable development, assess climate risk, and promote resilience—especially in regions most vulnerable to environmental degradation.

However, there is a growing consensus in the scientific community that achieving sustainability requires more than technological advancement alone. The Earth Commission's framework for "safe and just Earth system boundaries" demonstrates that leaving no one behind by meeting the minimum needs of all, while achieving the SDGs and staying within planetary possibilities will require major shifts in governance, equity, and resource allocation. Achieving this "corridor" of sustainable and just development calls for resolving trade-offs and targeted adoption of clean technologies, such as low-carbon cement and energy-efficient AI systems.

Justice, equity, and rights-based governance should therefore underpin the future of STI. As the Pact notes, innovation should be ethical and leave no one behind, yet even stronger action in this regard on global governance may be needed. Without addressing fairness in access to resources, knowledge, and technologies, multilateral cooperation risks losing legitimacy and impact—particularly among developing countries holding the bulk of untapped fossil resources and biodiversity.

To operationalize the Pact's vision and avoid fragmented implementation, the STI Forum should support the creation of integrated STI strategies that align with both SDG targets and emerging frameworks under the Pact. This includes enhancing national STI4SDG roadmaps, embedding gender equity, and mobilizing blended finance in support of transformative research. The UN Decade of Sciences for Sustainable Development offers a further window for coordination and investment.

In the final five years toward 2030, the STI Forum should help align knowledge, innovation, and cooperation with the shared commitments of the 2030 Agenda and the Pact for the Future—helping build a future where STI drives sustainable, inclusive, and equitable progress at scale.

Making frontier science and technologies accessible, inclusive and beneficial for all

Frontier technologies like artificial intelligence, space applications and sustainable building materials hold great promise for advancing the SDGs. To realize their full potential, they must be made accessible, inclusive, and aligned with the needs of all communities, and they must be governed and deployed to deliver broad, equitable benefits for all.

Artificial intelligence (AI)

AI represents a transformative force across all domains of sustainable development. From agriculture and healthcare to energy, education, transportation, job creation, and governance, AI offers unparalleled opportunities to advance human knowledge, improve decision-making, and address global challenges

with unprecedented precision and speed. This of course depends on how AI is trained and what knowledge is fed to it. Given the existing data imbalance in the world and lack of epistemic justice, AI may also risk aggravating injustices. Currently AI takes knowledge from scientists without acknowledgement or payment. This runs the risk of creating inappropriate knowledge and sidelining new knowledge creation by scientists. As a general-purpose technology, AI has the potential to enhance efficiency, stimulate innovation, and catalyze inclusive economic growth—if deployed equitably. Its applications are already shaping solutions for climate forecasting, pandemic prediction, crop optimization, personalized medicine, and multilingual education. However, to ensure that AI serves as a tool for sustainable development rather than a driver of exclusion, it must be made based on inclusive knowledge including the social sciences, and then accessible, inclusive, affordable, and governed responsibly. AI applications are known to replace young employees (e.g. in law firms) who lose income and training opportunities.

AI's power lies in its ability to analyze complex data patterns, predict outcomes, and automate or augment human decision-making. Subject to some of the caveats mentioned above, this can accelerate progress toward achieving the SDGs, particularly through enabling evidence-based policies, optimizing public service delivery, and expanding opportunities for marginalized communities. A growing ecosystem of "AI for Good" initiatives is emerging globally, including AI-supported diagnostics in rural clinics, automated crop monitoring for smallholder farmers, and natural disaster prediction systems that assist first responders. These use-cases demonstrate how AI can empower local actors, expand livelihoods, and reduce inequalities. However, this transformative potential will remain limited if AI capabilities remain concentrated in a few countries and firms.

One of the core technical challenges is democratizing how knowledge is used in AI as well as access to AI resources. The development of AI models - particularly large language models and advanced computer vision systems - requires massive computational power, large volumes of curated data, and technical expertise. If the data is biased towards the wealthy countries, the results will also be biased. Such requirements in terms of providing data for the development of such models are largely out of reach for many low- and middle-income countries. The question also arises – who owns these data? Open-source models, shared computing infrastructure, public datasets, and AI research partnerships are among the most promising solutions for reducing entry barriers. At the same time, public investments are needed to use local capacity in AI development, adaptation, and governance.

Policy frameworks must address the widening global AI divide and mitigate the risks of "winner-takes-all" dynamics. If left unregulated, AI may enrich a few actors while displacing millions of workers and deepening structural inequalities, including gender inequality. Estimates suggest AI could displace around 400 million jobs by 2030, even as it creates new ones, though the net impact and distribution across demographics remain highly uncertain. Furthermore, AI's projected market value may reach 7% of global GDP by 2030. Without coordinated efforts to ensure inclusivity, affordability, and shared benefits, AI risks becoming a driver of global inequality rather than a remedy for it.

Particularly in developing contexts, AI deployment must be accompanied by governance mechanisms that prevent brain drain, encourage responsible innovation, engage women in STEM, and strengthen national capacity as well as reward the science that is used. Inclusive skill-building, ethical AI education, and regulatory frameworks that address data sovereignty and algorithmic accountability are essential. The UNESCO Recommendation on the Ethics of AI and the OECD AI Principles provide a foundation for developing localized standards and oversight systems. Governments must support AI innovation

ecosystems—through incubators, SME support, and public procurement—while ensuring transparency, explainability, and fairness in AI systems.

There is also a growing need to anticipate and address the darker sides of AI. The design of AI systems can influence not only outcomes but also societal trust. Poorly trained or biased AI models can perpetuate and amplify systemic discrimination. Automated decision systems may affect access to welfare, education, employment, or justice, often without users understanding how decisions were made. In fields such as healthcare and education, while AI tools can assist in diagnostics or address shortages, they must not be seen as substitutes for trained professionals. Medical AI, for instance, may interpret imaging data quickly but cannot replace the clinical judgment and ethical care delivered by doctors. Similarly, AI-supported learning platforms cannot (yet) replace the critical role of educators in guiding context-specific and emotionally nuanced learning experiences.

Emerging research also highlights the environmental and social justice implications of scaling AI systems. The energy demands of training large AI models contribute significantly to carbon emissions, with a single training run releasing emissions equivalent to multiple transatlantic flights. Without sustainability safeguards, such practices risk undermining climate and public health goals. Simultaneously, AI's disruption of job markets (particularly the loss of mid-skill jobs) worsens economic polarization and undermines decent work. AI can also lead to the concentration of wealth in the hands of those who control it, even though the data and knowledge used to train the models comes from millions of scholars and data providers. A preemptive governance approach is urgently needed to ensure AI development aligns with environmental thresholds, gender equality, labor rights, and human rights across the SDGs.

A major area of concern continues to be the amplification of misinformation and disinformation. AI tools are increasingly capable of generating convincing but false narratives, images, and videos at scale. According to the World Economic Forum, misinformation and disinformation represented a top global security risk in 2024. AI-generated content can undermine trust in public institutions, democratic processes, and scientific expertise. Social media algorithms, often optimized for engagement, have been shown to polarize discourse and spread health misinformation, such as vaccine skepticism, with potentially fatal consequences. Governance systems must include algorithmic transparency, ethical content moderation, and media literacy initiatives to mitigate these risks.

Surveillance and misuse of AI tools also raise ethical concerns. In some contexts, AI has been deployed for mass surveillance and behavioral monitoring, which may erode civic space and fundamental freedoms. Facial recognition systems and predictive policing applications are controversial examples where unchecked use of AI can lead to systemic abuse and discrimination. Robust safeguards and legal frameworks are essential to prevent misuse and ensure AI is aligned with human rights and privacy standards.

In addition to governance, funding models play a central role in scaling AI for development. Blended finance, public-private partnerships, and challenge-based funding programs can help de-risk investment in inclusive AI solutions. National AI strategies must integrate support for research and innovation ecosystems, particularly those rooted in universities, start-ups, and social enterprises. Investment must also target open data infrastructure and support for SMEs and public institutions experimenting with AI to improve service delivery and development outcomes.

Ultimately, international collaboration is vital. No country can single-handedly build or govern the global AI ecosystem. Regional AI centers, open science platforms, cross-border regulatory cooperation, and multilateral research funds can support inclusive development. Global initiatives must include a wide range of voices, including from the Global South, women, youth, and indigenous communities, not only as users of AI but as co-creators and ethical stewards of these technologies.

AI holds the potential to accelerate SDG progress and address humanity's most complex challenges. But this potential will only be realized if AI is governed ethically, developed inclusively, and made accessible to all. Ensuring equitable access to AI capabilities, preventing harm, and promoting international cooperation are not only technical tasks - they are essential for a just, sustainable, and resilient global future.

Space technology applications

Space-based technologies are increasingly recognized as essential tools for advancing global sustainable development. Applications such as Earth Observation (EO), navigation via Global Navigation Satellite Systems (GNSS), and satellite telecommunications offer unique capabilities for environmental monitoring, disaster response, and improved service delivery. These technologies are especially relevant to Sustainable Development Goals (SDGs) 3, 5, 8, 14, and 17, where they provide critical support in generating spatially explicit, timely, and actionable data.

For SDG 3 (Good Health and Well-being), space applications contribute through spatial analysis for disease epidemiology, enabling the identification of environmental factors influencing disease outbreaks. Satellite communications support remote healthcare and telemedicine, improving access to medical expertise in underserved areas. Satellite imagery is also instrumental in coordinating medical logistics during emergencies, monitoring air quality, and enhancing urban planning by quantifying access to green infrastructure. Further, wearable devices integrated with satellite data help monitor health indicators and support disease prevention efforts.

In the context of SDG 5 (Gender Equality), space-based services expand educational access in remote areas, support digital inclusion, and facilitate safe, flexible environments for women's entrepreneurship. Satellite-enabled platforms help raise awareness of gender issues globally and open career opportunities for women in STEM fields.

With regard to SDG 8 (Decent Work and Economic Growth), space technologies support GDP tracking and sectoral monitoring, particularly in agriculture, utilities, communications, and finance. Satellite data contributes to monitoring infrastructure development, industrial activity, and natural resource management. Enhanced connectivity through satellite internet enables entrepreneurship and access to global markets, even in remote areas. GNSS also improves workplace safety by enabling real-time monitoring of lone workers.

For SDG 14 (Life Below Water), EO satellites monitor marine ecosystems, map protected areas, track fishing vessels, and detect illegal fishing activities. Satellite sensors detect marine pollution such as oil spills and plastic debris and monitor climate-related ocean indicators including sea level rise and water temperature. These capabilities are critical for resource management and marine biodiversity conservation.

Finally, SDG 17 (Partnerships for the Goals) benefits from space technologies through enhanced data sharing, open-source platforms, and international cooperation. Capacity-building efforts in developing

countries can be strengthened by space-enabled training, infrastructure sharing, and coordinated monitoring of SDG indicators.

In sum, space applications offer unparalleled capabilities for achieving the SDGs. Greater strategic alliances, open access to space-derived data, and investment in space-based infrastructure are key to scaling their contribution across sectors and geographies. However, such technologies need to be aligned to other governance frameworks in order to optimize the outcomes.

Sustainable building materials

As the global population grows and urbanization accelerates, especially in the Global South, the demand for housing and infrastructure is projected to surge. Meeting these needs sustainably is a major challenge, particularly given that buildings and infrastructure already account for approximately 40% of global carbon emissions. A large and growing share of these emissions comes from “embodied carbon” released during the production, transportation, and construction phases of building materials. Cement, in particular, is a major contributor, responsible for around 8% of global CO_2 emissions.

Decarbonizing building materials is therefore essential for meeting climate goals and advancing SDG 11 on sustainable cities and communities. In regions such as Africa, Southeast Asia, and South Asia, where urban expansion is most intense and many people still lack adequate housing, demand for construction materials is growing rapidly. However, the continued use of carbon-intensive clinker in cement manufacturing exacerbates affordability issues and environmental pressures, especially in countries that must import clinker due to a lack of domestic limestone resources. Retrofitting buildings and transport systems in cities of the global North and around the world is key to ensuring that these building are not dependent on fossil fuel use for lighting, heating, cooling and cooking. This requires sometimes house to house visits to enable people understand how to become fossil free and why this is beneficial to them. Subsidies are urgently needed for poorer households even in rich countries to enable the energy transition.

Innovative low-carbon alternatives such as Limestone Calcined Clay Cement (LC3) offer a scalable, affordable solution. LC3 reduces clinker content by up to 50% by incorporating abundant materials like calcined clay and limestone. This reduces emissions, enhances energy efficiency, and promotes local economic development through job creation and decreased reliance on imports. Complementary solutions include optimized structural design to reduce material overuse and the deployment of digital tools for lifecycle emissions tracking.

Policy incentives will be critical to scaling these technologies. Public procurement policies can drive demand for low-carbon materials in government-funded infrastructure. Fiscal tools such as tax credits, grants, and carbon pricing mechanisms can stimulate research and market adoption. Investment in local manufacturing capacity and knowledge-sharing platforms will ensure these technologies are tailored to regional contexts and contribute to inclusive industrial development.

Decarbonizing construction and retrofitting existing buildings and transport systems is not just a technical imperative, it is a developmental necessity. Sustainable building materials can serve as an entry point for climate mitigation, economic inclusion, and resilience in fast-growing cities. As the STI Forum looks to the future, accelerating innovation in construction materials must be a core element of inclusive, sustainable industrial transformation.

The role of STI in ensuring healthy lives and promoting well-being for all at all ages (SDG 3)

SDG 3 aims to ensure healthy lives and promote well-being for all. While some progress has been made, many SDG 3 indicators are off-track, and persistent health inequities remain. STI is central to building resilient, equitable, and data-driven health systems, especially in the face of systemic risks such as pandemics, climate change, and demographic transitions.

Prevention is critical for improving human health. Given that 25% of all health risks comes from environmental causes and 60% of all disease is zoonotic, reducing air, water and soil pollution is critical. Moreover, reducing nutrient pollution, climate change, and biodiversity loss is essential for reducing heath challenges and the pressure on health systems. This calls for better collaboration between health care systems and environmental health – often referred to as planetary health.

Universal Health Coverage (UHC) is key, and technological innovations can play a transformative role in this regard. Although service coverage improved between 2000 and 2021, progress has slowed since 2019, and financial protection is still lacking. Digital health tools, mobile diagnostics, and telemedicine can be pivotal in reaching underserved populations. However, inclusive access, digital literacy, cultural sensitivity, and safeguards for privacy and consent are essential for these technologies to reduce, rather than deepen, health disparities.

STI has an important role in addressing the projected global shortage of 11.1 million health and care workers by 2030. Digital platforms for training, AI-assisted clinical tools, and electronic health records can enhance efficiency and support healthcare delivery in low-resource settings. Yet, such tools must complement rather than replace well-trained and fairly compensated human workers. Addressing gender equity in the health workforce is equally critical, as women dominate the sector but remain underrepresented in leadership and decision-making roles in some parts of the world.

Health information systems remain weak in many countries, limiting the availability of reliable, disaggregated data. STI offers tools such as AI-enabled analytics, geospatial technologies, and participatory data platforms to close these gaps. Real-time health monitoring can support early warning systems, track service delivery, and improve emergency preparedness. However, these approaches must be governed transparently, with strong public trust and ethical oversight.

Recent global responses to the resurgence of Mpox (monkeypox) illustrate the role of STI in outbreak preparedness and public health resilience. The rapid deployment of the live-attenuated LC16m8 vaccine—originally developed for smallpox—highlighted how repurposed technologies can meet urgent health needs, especially among vulnerable populations. Supported by WHO Emergency Use Listing and international collaboration, the vaccine demonstrated broad immunogenicity, cross-clade effectiveness, and safety in children. It contributed to the goals of the 100 Days Mission by enabling rapid intervention in the Democratic Republic of Congo, where pediatric mortality was high. This case underscores the value of sustained R&D investment, vaccine adaptability, and coordinated international response mechanisms in achieving SDG 3.

Fragile and conflict-affected settings - where much of the global poor will reside by 2030 - require STI interventions tailored to extreme conditions. Mobile health units, portable diagnostics, and digital IDs that preserve patient data across borders can improve continuity of care. However, these must be deployed alongside investments in human infrastructure, trust-building, and community ownership.

STI can help mitigate emerging risks from climate change and aging populations. Tools to prevent such challenges such as phasing down fossil fuel, less meat consumption are important. In addition, disease surveillance, air quality monitoring, and early warning systems can enhance preparedness. Investment is needed in technologies that manage noncommunicable diseases, support elderly care, and enable cross-sector collaboration under a "One Health" approach that integrates human, animal, and environmental health systems.

Equitable STI governance is fundamental. Intellectual property regimes and global health R&D financing structures must be aligned with the goals of universal access. The UN system can serve as a key facilitator of multilateral cooperation, ethical standard setting, and inclusive regulation. Inclusive partnerships among governments, civil society, and the private sector are needed to scale innovation that reaches the most vulnerable.

Financing for STI in health must be increased, particularly in low- and middle-income countries. Data-driven budgeting, health impact bonds, and pooled procurement were discussed as mechanisms to align financial flows with equity outcomes. Public investment in affordable, quality-assured technologies is necessary to close persistent gaps in access.

STI must be at the heart of efforts to achieve SDG 3. Innovation in diagnostics, service delivery, workforce support, and health monitoring can drive transformative improvements, provided it is designed and implemented inclusively. SDG 3 stands as a reminder that technology must not only be effective but also equitable and ethically governed if we are to achieve health and well-being for all.

The role of STI in achieving gender equality and empowering all women and girls (SDG 5)

Progress on SDG 5—Achieve gender equality and empower all women and girls—remains a far behind target. While some advances have been made, none of the SDG 5 targets have been fully achieved. Transformative progress will require integrated and gender-responsive action across all sectors. The STI Forum presents a timely opportunity to elevate the role of innovation in removing structural barriers and enabling meaningful progress for women and girls globally.

There is an urgent need to bridge the gender digital divide. Women and girls, particularly those in rural and low-income communities, continue to face unequal access to digital technologies, skills training, and connectivity. These gaps hinder their participation in education, employment, and civic life. Expanding access to STEM education and digital literacy for women and girls is essential to closing these disparities. With women comprising only 35 percent of STEM graduates and just over 30 percent of global researchers, targeted investment in digital skills and inclusive infrastructure is urgently needed. Tailored support, such as bundled training programs and women-centered innovation hubs, can build equitable pathways into the digital economy. Evidence from Africa also shows that women are significantly less likely than men to access mobile internet or use digital financial platforms, underlining the importance of gender-responsive connectivity strategies and subsidized access.

Women should not only be end-users of technology but also leaders in its design and development. Greater representation of women in AI and data science is critical, particularly as gender bias continues to be replicated in algorithmic systems. Embedding gender-transformative design principles into technology development, promoting gender-diverse teams, and adopting accountability frameworks are necessary to ensure inclusive and ethical innovation. Data from the Republic of Korea and elsewhere shows that women

are underrepresented in high-level research positions and large-scale project leadership, despite producing proportionally higher impact in published research. The inclusion of gender goals in global digital governance, such as through the Global Digital Compact, can be useful, alongside initiatives such as gender-responsive budgeting and monitoring in STI policy.

Technology also plays a dual role in addressing gender-based violence (GBV). While digital platforms can offer innovative tools for prevention (such as reporting apps and AI-enabled content moderation) they can also expose women to new risks. Integrated GBV strategies are needed that include technology while promoting safety, accountability, and the transformation of harmful gender norms, particularly in online spaces. Engaging boys and men in these efforts remains vital to dismantling digital misogyny and promoting inclusion.

Climate resilience is a critical area where STI can empower women as change agents. Women, particularly small-scale farmers and informal workers are disproportionately affected by climate change. This is not only because of the direct impacts of climate change on their health, but also because of the increasing incidences of violence in households and child marriage. Providing access to renewable energy, climate-resilient agricultural tools, and credit can enhance women's economic participation and environmental leadership. Some have called for the establishment of a global climate resilience fund to direct resources to women-led, climate-smart innovations.

STI is also a lever for addressing persistent gender gaps in employment and unpaid care. Technological solutions that support flexible work, social protection access, and digital caregiving tools can reduce barriers to women's full economic participation. In addition, real-time data systems are needed to track gender wage gaps, workplace safety, and other critical indicators, helping drive accountability and reform in labor markets. Insights from Sub-Saharan Africa show that digital platforms, when tailored and inclusive, have enabled access to financial services and markets, increasing women's autonomy and resilience.

High-quality, disaggregated, and intersectional data is fundamental to effective STI policy. Gender data ecosystems need strengthening, including through mobile data collection, satellite tools, and community-led initiatives. These approaches should be supported by national statistical systems and used in policymaking to ensure that no group is left behind. Regional experiences, including from science granting councils across Africa, also highlight the need to improve women's leadership in research systems and to mainstream gender in STI strategies.

STI should be supported by gender-responsive funding and policy frameworks. With an estimated US$360 billion annual financing gap for gender equality, new funding models such as gender bonds and blended finance are needed to catalyze progress. Legal and institutional frameworks (including ILO Convention 190 and CEDAW) should be implemented and aligned with national STI strategies to sustain inclusive innovation ecosystems. Global initiatives such as UNESCO's SAGA initiative and its Gender Equality Plans linke to Horizon Europe are demonstrating how institutional change can be incentivized through policy and funding alignment.

In sum, gender equality should ideally be embedded at the core of STI agendas. From AI to climate technologies, innovation must be inclusive, intersectional, and governed by rights-based principles. As the STI Forum marks its tenth year, it offers a unique opportunity to forge a global compact on gender-responsive innovation, ensuring that women and girls are not only included but empowered to lead in shaping the technologies of the future.

The role of STI in promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (SDG 8)

SDG 8 - promoting sustained, inclusive, and sustainable economic growth and decent work for all - is central to the 2030 Agenda, yet it remains one of the most off-track. The global labor landscape is shaped by persistent informality, youth unemployment, wage stagnation, and weakened labor protections. In this context, STI are increasingly recognized as powerful tools to address these challenges, while also requiring robust governance to ensure equitable outcomes.

There is a need to harness STI to support decent work and inclusive growth, particularly in the face of rapid technological change. Technological innovation, including digital platforms, artificial intelligence, and automation, is transforming employment structures. In many cases, new opportunities for entrepreneurship and job creation have emerged, especially for youth and women. However, platform and gig work often involve low pay, limited protections, and algorithmic oversight that can perpetuate vulnerability. Informal work, still the norm for nearly 2 billion workers globally, is increasingly shaped by digital intermediaries that can entrench, rather than resolve, precarious conditions. Moreover, phasing down fossil fuel will imply the closing of mines and factories that were fossil based; this needs a just energy transition to cushion the impacts of this action on these employees.

To address this situation, STI policies must actively promote decent work. This requires investment in digital infrastructure, widespread digital and green skills training, and the regulation of platform economies to ensure labor rights are upheld. Scientific and technological capacity is rising in low- and middle-income countries, offering an opportunity to localize innovation, drive inclusive industrialization, and support South-South cooperation. However, disparities in access to R&D, knowledge systems, and global innovation networks persist, limiting productivity and wage gains in under-resourced regions.

Knowledge equity could be a guiding principle. This entails open science, inclusive research partnerships, and greater support for public research institutions, particularly in countries and communities that have been historically left at the sidelines of global innovation systems. STI should be geared toward social inclusion and job creation, not solely technological advancement.

Transitions to green and digital economies must be proactively shaped to be fair and to avoid reinforcing inequality. This includes supporting displaced workers, enabling participatory policymaking, and ensuring new technologies, such as AI systems and public digital goods, are transparent and accountable. Green transitions should prioritize labor-rich investments in sectors like renewable energy, climate adaptation, and the circular economy, with strong attention to gender equity and local development.

Inclusion of the informal economy is also crucial. Digital tools such as mobile registration platforms, e-tax systems, and digital IDs may offer pathways to extend social protections and market access to informal workers. However, technology alone is insufficient. Effective formalization strategies must be rights-based and integrated into broader policy frameworks, including education, infrastructure, and legal empowerment.

Addressing data gaps remains essential. Many countries lack reliable information on job quality, labor rights, and the informal sector. STI can help fill these gaps through innovations in satellite imagery, AI-based analytics, and participatory data systems. Yet data use must be governed ethically, with clear safeguards for privacy, transparency, and accountability.

Financing innovation aligned with SDG 8 remains a priority. While digital finance has expanded basic service access, credit and insurance remain out of reach for many small and informal enterprises. The EGM called for targeted funding in employment-intensive STI sectors—such as care work and rural infrastructure—as well as public procurement tools and social bonds to steer STI investments toward inclusive labor outcomes. Global financing systems must be reformed to provide low-income countries with the fiscal space needed to develop their STI ecosystems.

The success of STI for decent work depends on collaboration. The EGM emphasized multistakeholder partnerships across government, private sector, civil society, and academia. Public–private–people partnerships (PPPPs) can advance inclusive digital and green employment strategies. South-South and triangular cooperation also play a vital role in sharing technologies, business models, and labor protections that reflect local realities.

International frameworks on digital trade, intellectual property, and platform governance must also evolve to expand access to innovation while safeguarding workers' rights. As the STI Forum marks a decade of fostering innovation for sustainable development, SDG 8 calls for STI strategies that are grounded in rights, responsive to inequality, and embedded within a broader vision of economic justice.

STI must not only boost productivity but shape a future of work that is inclusive, resilient, and sustainable. The next five years offer a critical window to reimagine labor markets, address structural inequalities, and realize the promise of decent work for all.

The role of STI in conserving and sustainably using the oceans, seas and marine resources for sustainable development (SDG 14)

Small Island Developing States (SIDS) play an outsized role in the stewardship of ocean health and biodiversity, despite comprising less than 1% of the global population. With Exclusive Economic Zones (EEZs) that, on average, are 28 times the size of their land masses, SIDS collectively control 16% of the world's total EEZ area and are custodians of more than 20% of global biodiversity and 40% of the world's coral reefs. For many SIDS, the ocean is their most valuable resource and is vital to food security, livelihoods, and economic development. STI are indispensable tools for advancing SDG 14 ("Life Below Water"), especially when aligned with strategies that reflect the unique vulnerabilities and comparative advantages of SIDS.

The inherent challenges faced by SIDS—including small populations, limited fiscal resources, geographic isolation, and high exposure to natural disasters and external shocks—create structural constraints on STI capacity. At the same time, SIDS are being made vulnerable to the impacts of climate change, including sea level rise, saltwater intrusion, and coral bleaching which affects livelihood prospects and is mostly caused by people elsewhere in the world. Investment in research and development (R&D) in LDC SIDS remains far below 1% of GDP, and institutions often operate in silos, disconnected from the private sector, academia, and international policy think tanks. These challenges are further compounded in West African SIDS, where infrastructure deficits in energy, telecommunications, and transport hinder innovation and digital transformation.

Yet, these same constraints also present unique opportunities. The absence of legacy infrastructure enables SIDS to leapfrog directly into green and digital solutions. Their smaller scale can facilitate rapid dissemination of innovations, and their rich tradition of community-based and indigenous knowledge

offers a foundation for contextually grounded STI. In Vanuatu, for instance, local communities monitor climate change and biodiversity through mobile apps that integrate traditional knowledge with modern data tools. Citizen science initiatives such as these also help bridge data gaps where international research is lacking.

Two leading examples demonstrate how SIDS are leveraging STI to enhance ocean health and resilience. The Seychelles Marine Spatial Plan (SMSP) is a government-led initiative supported by scientific modelling, stakeholder engagement, and international funding through mechanisms such as debt-for-nature swaps. Covering over 1.35 million square kilometres, the SMSP is one of the most advanced ecosystem-based planning tools for marine biodiversity protection and blue economy development.

Similarly, the COASTS project in the Maldives, led by the Maldives Space Research Organisation and EOMAP, applies earth observation technologies, digital mapping, and local engagement to monitor blue carbon ecosystems and coastal resilience. It provides actionable data to guide marine conservation, early warning systems, and coastal planning, and serves as a model for other regions seeking to integrate STI into ocean governance. SIDS like the Maldives also need to ensure that their boating infrastructure becomes fossil free, which may become increasingly feasible due to revenues derived from tourism.

These efforts highlight how SIDS can convert geographical comparative advantage into sustainable development gains through STI. However, doing so requires comprehensive STI governance frameworks, increased investment in STI infrastructure, and stronger regional and global partnerships. SIDS must also build robust STI policy strategies, equipped with measurable indicators to guide implementation and track contributions to SDG 14.

In sum, SIDS have a critical role to play in achieving SDG 14, not only through conservation but also through innovation. When supported by enabling environments and international cooperation, STI becomes a lever for strengthening ocean health, enhancing coastal resilience, and securing sustainable livelihoods for SIDS communities.

STI financing and cooperation to deliver the SDGs - Scaling up the means of implementation (SDG17)

Delivering the SDGs by 2030 requires a significant and sustained increase in investment in STI, particularly in developing countries. In the context of the Pact for the Future and preparations for the Fourth International Conference on Financing for Development (FfD4), scaling up STI financing and enhancing global cooperation are essential for addressing complex global challenges, ranging from climate change to equitable digital transformation.

Global spending on research and development (R&D) has reached approximately US$2.5 trillion annually, or 2.5% of global GDP. However, this funding remains highly concentrated, with just 20 countries accounting for 95% of global R&D expenditure. African spending on R&D is less than 0.5% of its GDP. To align STI systems with sustainable development needs, both the scale and distribution of investment must shift. Increasing global R&D investment to 3% of GDP, alongside ensuring more equitable allocation to low- and middle-income countries and targeting sustainable development and climate priorities, is critical. Funding mechanisms must prioritize interdisciplinary, solutions-oriented research that bridges science, technology, and policy while promoting scalable, transferable innovations.

On the bright side, capacity building efforts enacted in several, if not all, Low- and Middle-Income Countries are bearing fruit. When the SDGs were approved, 10 years ago, only 37% of the authors of scientific publications worked in LMI Countries and, in 2024, the share of authors working in LMI Countries rose to 56%. Additionally, funders in LMIC have been active in SDG related research, including in collaborative ways. Among the 38 research funding organizations in the World that were acknowledged in more than 10,000 research publications between 2020 and 2024, 20 were in LMI Countries. The geography of research in the World is changing rapidly, and this paves the way for advances in SDG advancement through scientific and technological research. The TFM roadmaps must take note of this important development.

National STI4SDGs roadmaps have emerged as strategic instruments to align innovation priorities with development planning. These roadmaps, developed with support from the TFM, can help policy makers identify national challenges and opportunities for STI investment and policy coherence. To translate these into action, enhanced financing, institutional coordination, and inclusive governance are necessary. Public budgets alone cannot meet these demands, making blended finance, catalytic capital, and multilateral mechanisms vital to closing the STI investment gap.

Successful initiatives have demonstrated how governments, multilateral development banks, and the private sector can co-invest in research infrastructure, innovation hubs, and technology diffusion platforms. However, such models remain limited in reach, particularly in the Global South. Strategic public-private partnerships, supported by transparent regulatory frameworks and incentives, are essential to scale such efforts and ensure they contribute to both national development goals and the global commons.

Strengthening STI capacity requires a parallel focus on infrastructure and human capital. This includes expanding engineering and technical education, improving research facilities, and building institutions capable of managing and regulating innovation ecosystems. Digital infrastructure plays a pivotal enabling role. Investments in broadband connectivity, open-access research platforms, and AI-powered analytical tools can democratize participation in science, particularly through virtual science hubs and collaborative research networks. These systems should be designed with equity, interoperability, and data sovereignty in mind.

Data analysis tools can support countries in evaluating STI investments and performance across complex indicators, particularly where financial or institutional capacity is constrained. These tools help ensure alignment between STI planning and SDG delivery.

Enhancing global research cooperation is not only a matter of increasing funding, but also of fostering inclusive and equitable partnerships. It requires strengthening global research networks, encouraging joint ventures across borders and disciplines, and investing in collaborative mechanisms that address shared climate and development challenges. This includes institutional support for South-South and triangular cooperation, as well as alignment with initiatives such as the UN Decade of Sciences for Sustainable Development.

Strengthening multilateral governance of STI, through coherent funding frameworks, improved knowledge sharing, and greater representation of developing countries in global research agendas, is essential to ensuring that STI benefit all, in support of a just, inclusive, and sustainable future.

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