

**2019 High-level Political Forum on Sustainable Development**  
**Position Paper by the Scientific and Technological Community**  
**(STC)**  
**Major Group**

*Our world is empowered by science as never before. Scientific and technological advances are at a point where challenges to our health, environment and wellbeing may be defined and addressed in increasingly effective ways. Yet, despite these great strides forward, so many communities on our planet remain powerless and deprived of some of the very basic requirements for life, liberty and hope. So many more of our fellow human beings are at the mercy of fear, insecurity and instability in their lives and livelihoods. Additionally, the grave threats posed by climate and ocean change, pollution, and the inefficient management of natural resources and waste, continue to threaten our environmental, social and political stability at local, regional and global levels. (...) 'Science for Peace' recognizes the global nature of the challenges facing all humankind, and underlines our global responsibility to tackle them through robust science and evidence-informed policy. This must encompass energy, food, water and climate change, the alleviation of poverty and inequality, greater cultural and economic understanding between peoples, and the potential for science and research to create wealth and to provide opportunity within societies.*

From the Declaration of the 2017 World Science Forum  
"Science for Peace" (10 November 2017, Dead Sea, Jordan)<sup>1</sup>

## **I. Introduction**

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The Scientific and Technological Community (STC) Major Group, co-organized by International Science Council (ISC)<sup>2</sup> and World Federation of Engineering Organizations (WFEO)<sup>3</sup> actively contributes to the implementation of the SDGs and supports the 2019 theme "**Empowering people and ensuring inclusiveness and equality**".

International science and engineering organizations are well placed to foster equality and inclusiveness within the global society via enabling solutions-oriented knowledge for the benefit of all. The STC reaffirms the role of science (including natural, and social and human sciences) and engineering in sustainable development, as will also be discussed in the **2019 Global Sustainable Development Report**.

The STC highlights the importance of actions to "**advance science as a global public good and for enhancing engineering and technology in pursuit of sustainable development, and for the benefit of all. Scientific knowledge, data and expertise must be universally accessible and its benefits universally shared. The practice of science must be inclusive and equitable, also in opportunities for scientific education and capacity development**"<sup>4</sup>.

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<sup>1</sup> For complete text of the Declaration of the 2017 World Science Forum, see <https://worldscienceforum.org/contents/declaration-of-world-science-forum-2017-110045>.

<sup>2</sup> ISC Website at <https://council.science/>

<sup>3</sup> WFEO Website at <https://www.wfeo.org/>

<sup>4</sup> From the High Level Strategy of the International Science Council, accessed at <https://council.science/publications/high-level-strategy>

Key messages and recommendations:

1. **The integrated and interdependent nature of the SDGs, requires a significant increase in collaboration across disciplines and sectors, and engagement with policy-makers and stakeholders**, as also shown in international initiatives such as *Leading Integrated Research for Agenda 2030 in Africa* (LIRA 2030)<sup>5</sup> and the *Transformations to Sustainability* (T2S)<sup>6</sup>, supported by the Swedish International Development Cooperation Agency (Sida), and follow-up work to the 2017 ISC report on SDG interactions. The STC also calls for an enhanced science/technology/policy interface in the UN System.
2. **Inclusiveness and equality are enabled also by making knowledge more accessible in order to support decision-making, innovation and benefit-sharing**. The STC calls for Open Science and Open Innovation, and works towards effective operationalisation of the concept, as in the African Open Science Platform supported by the South African Department of Science and Technology, and directed by ISC CODATA<sup>7</sup>.
3. **The STC calls attention to the importance of strengthening critical skills and capacity in science and engineering and technology to design and implement solutions to advance the SDGs**. This is also required for promoting peaceful and inclusive societies and effective institutions, as demonstrated by WFEO's Committee on Anti-Corruption<sup>8</sup> which contributed to the ISO 37001 Anti-bribery management system standard<sup>9</sup>.
4. **Assessing the opportunities and implications of rapid technological change for science and for society, in particular with regards to digital transformations, the STC also addresses how wellbeing is impacted**, as addressed in the Report on "*Understanding wellbeing in the context of rapid digital and associated transformations – implications for research, policy and measurements*" developed by the International Network of Government Science Advice<sup>10</sup>.
5. **Aligning priorities and leveraging actions by connecting international agendas** (e.g., Agenda 2030, Sendai Framework, and Paris Agreement) requires strong and effective partnerships, mobilising data and information and science advisory capacities in integrated ways, in particular to address systemic and cascading risks. The STC with its global membership based organizations stands ready to contribute to the STI Forum, CSDT-22, UN SDG Summit, UN Climate Action Summit, and related international endeavours such as the upcoming UN Decade of Ocean Science for Sustainable Development (2021-2030).
6. **This STC MG thematic paper provides examples of activities by academies, scientific unions as well as international science organizations towards the implementation of the SDGs under review by highlighting relevant best practices and studies**.
7. **The STC MG recalls the importance of furthering the HLPF 2019 message to the upcoming UN Climate Action Summit and the UN SDG Summit which will also include the launch of the Global Sustainable Development Report; and the STC MG stands ready to contribute to these processes**.

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<sup>5</sup> For further information, see <https://council.science/what-we-do/funding-programmes/leading-integrated-research-for-agenda-2030-in-africa>

<sup>6</sup> For further information, see <https://council.science/what-we-do/funding-programmes/transformations-to-sustainability>

<sup>7</sup> For further information, see <http://www.codata.org/strategic-initiatives/african-open-science> and <http://africanopenscience.org.za/>

<sup>8</sup> For further information, see <https://www.wfeo.org/committee-anti-corruption-sdgs/>

<sup>9</sup> For further information, see <https://www.iso.org/publication/PUB100396.html>

<sup>10</sup> For report, see <https://www.ingsa.org/wp-content/uploads/2018/10/INGSA-Digital-Wellbeing-Sept18.pdf> ; for information on INGSAs, see <https://www.ingsa.org/>.

## **II. International science initiatives focusing on SDGs under reviews (SDGs Nos. 4, 8, 10, 13, 16 and 17)**

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International science and engineering organizations, including the International Science Council (ISC), the World Federation of Engineering Organization (WFEO), the Global Young Academy, and InterAcademy Partnership (IAP), together with the United Nations agencies (e.g., UNESCO and WMO), and many universities and think-tanks around the world have been collaborating towards implementing international initiatives on the science and technology underpinning the attainment of the SDGs.

An overview of some of the many initiatives related to the SDGs under review at the 2019 Session of the High-Level Political Forum under ECOSOC are reported here as example of best practices and to further possible cooperation with Member States, as well as fellow Major Groups and the Stakeholders Groups, on issues of common concerns towards the attainment of SDGs by 2030.

In reviewing progress towards achieving the six SDGs that are in focus at this year's HLPF, it is important to consider inter-linkages with the other goals and make sure to address underlying drivers of unsustainability. The STC has a key role to play in analysing how the SDGs are linked with each other, and to help target policy interventions to create synergies. When addressing the SDGs, it is important to account for trade-offs in achieving different goals. Unintended negative feedbacks are a key challenge<sup>11</sup>. Optimising synergies (e.g. between goals 4, 10 and 16) is important to identify the most effective policies.

### **II. a – SDG. 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all**

While there are different concepts of quality education and lifelong learning, the 2030 Agenda provides a crucial set of common standards. The STC stresses the importance of SDG. 4 within the framework of the HLPF 2019 Theme and the other SDGs under review, but also as the *sine qua non* to the implementation of Agenda 2030.

The STC also highlights that this goal seems largely underestimated in its importance towards a future economy that integrates concepts of circular and shared economy, as well as digitalization. These developments require a greater number of highly skilled people. This change is especially challenging in low-income countries, which may become even more dependent on developed economies. Education at primary, secondary, tertiary levels, as well as vocational and lifelong learning, can provide opportunities for all towards an inclusive and empowered global society. The STC works towards creating a favourable environment towards this aim.

Education is a key tool to empower people and ensure inclusiveness and equality; the scientific community has continued to foster equal opportunities at all levels with respect to narrowing socio-economic inequalities, gaps and divides within and beyond its communities. Here, at the interface with SDG 5, particular emphasis has been placed on furthering gender equality and women's empowerment from primary schools to tertiary education:

1. Several academies of sciences and international scientific unions are monitoring gender gaps in scientific and academic communities. For instance, the International Mathematical Union (IMU) via its Committee for Women in Mathematics works “to propose, encourage and facilitate activities of the IMU or other bodies which would tend to increase the visibility of women in mathematics and lead to an increase in their representation in the community at all

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<sup>11</sup> See e.g., DESA Working Paper No 141 at [https://www.un.org/esa/desa/papers/2015/wp141\\_2015.pdf](https://www.un.org/esa/desa/papers/2015/wp141_2015.pdf)

levels and in all parts of the world”<sup>12</sup>, and also leads with the International Union of Pure and Applied Chemistry (IUPAC) the collaborative project *The Gender Gap in Science: A Global Approach to the Gender Gap in Mathematical, Computing, and Natural Sciences: How to Measure It, How to Reduce It?*<sup>13</sup>. In this context GenderInSITE<sup>14</sup>, thanks to the generous support by Sida and collaboration with the Institute of Development Studies, UK, – has recently published a report on obstacles and challenges in pathways to success in scientific careers, including by providing several recommendations on how to improve the situation.

2. The Association of Science and Technology Centers (ASTC) has been working on programmes and resources that promote gender equality and equity in science, technology, engineering, and mathematics (STEM) learning. Among such programmes there are the SciGirls<sup>15</sup> as well as activities in partnership with IF/THEN<sup>16</sup> supporting women in STEM, also by empowering current innovators and inspiring the next generation of female pioneers.

The scientific and technological community has also been focusing on ensuring that education equips future generations to address socio-economic and environmental challenges such as climate change and the digital revolution. Here are some recent examples of such activities:

1. WFEO is also working on a project “Reviewing and Developing Standards for Engineering Education to meet current and future needs of industry and society”, and on a project “Capacity Building for Engineering Education Systems, accreditation and registration to meet the needs for engineers around the world”, also in collaboration with other international organisations and UNESCO category II centres involved in engineering education. )<sup>17</sup>.
2. The Royal Society in the UK is working towards “changing education” in order to ensure that “young people leave education with a broad and balanced range of skills they will need to flourish in a changing world of work”. This work also includes several comparisons with other countries so as to work towards long-term reform of post-16 education<sup>18</sup>.
3. Several International Scientific Unions – under the leadership of the International Union of Biological Sciences (IUBS) – and relevant organizations are fostering the interface between education and climate change via the TROP ICSU project<sup>19</sup>. The project brings Climate Change Science to students and to the general public through pedagogical intervention. The TROP ICSU project provides educational resources that are free to download and accessible across the world, thus ensuring inclusive and equitable access to learning opportunities for students, teachers, and the public. Its innovative digital resources promote lifelong learning through unrestricted and free access. Workshops for teachers and educators have also been held in India, Uganda and Bhutan.

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<sup>12</sup> For further information, see [www.mathunion.org/cwm](http://www.mathunion.org/cwm)

<sup>13</sup> For further information, see <https://gender-gap-in-science.org/>

<sup>14</sup> For further information, see <https://genderinsite.net/>

<sup>15</sup> For further information, see <http://www.scigirlsconnect.org/>.

<sup>16</sup> For further information, see [www.ifthenshecan.org](http://www.ifthenshecan.org)

<sup>17</sup> For further information, see <https://www.wfeo.org/wp-content/uploads/un/WFEO-ENgg-Plan.pdf#page=13>

<sup>18</sup> For further information, see the “Explainer” document which provides an evidence-based rationale for a broad and balanced curriculum, at <https://royalsociety.org/-/media/policy/Publications/2019/12-02-19-jobs-are-changing-so-should-education.pdf?la=en-GB&hash=CFE0514A843243C2A60823E76616E3>. The “Changing Education” Website page provides more information on this programme of work <https://royalsociety.org/topics-policy/education-skills/changing-education/>.

<sup>19</sup> For further information and online resources, see <https://tropicsu.org/>

4. The InterAcademy Partnership (IAP), in partnership with the Smithsonian Science Education Center (SSEC) and others, has also worked on (free) research-based science education materials for classrooms and communities, available in several languages. The first module *Mosquito! Community Research Guide*<sup>20</sup> addresses the problem of diseases transmitted by mosquitos, aimed at children between eight and 18 years of age and their teachers.
3. Many activities are also being developed within the context of the 2019 International Year of the Periodic Table of Chemical Elements (IYPT2019) proclaimed by UNESCO and by the UN, and lead by the International Union of Pure and Applied Chemistry (IUPAC)<sup>21</sup>.

The STC is also addressing the impact of the digital revolution and in particular of Artificial Intelligence (AI) within the education system. For instance, a recent example is the Symposium organized by Think Tank #Lesplusimportant on the role of AI towards a more inclusive education system (Paris, France, 25 March 2019)<sup>22</sup>, which underlined *inter alia* the role of AI in education allowing more opportunities for Persons with Disabilities, as well as a portfolio of ethical issues on the collection, analysis and use of data within education system. These dialogues are also to be considered important concerning the transfer of these technologies to education systems in developing countries.

Here, it is also important to highlight the role of the global scientific and technological community in enabling knowledge-exchanges and in narrowing knowledge gaps among countries, within the context of education systems. For instance, the World Federation of Engineering Organizations (WFEO) works to establish appropriate standards for engineering education and building capacity in engineering in countries most in need in Asia and Africa<sup>23</sup>; while the IAP, All European Academies (ALLEA), and Network of African Science Academies (NASAC) are jointly involved in the project of African, Mediterranean and European Academies<sup>24</sup> (AEMASE) to improve standards of teaching science and mathematics. The *Fondation La main à la pâte*<sup>25</sup> is also a partner. With this project's support, three Centres for Education in Science for Africa, the Mediterranean and Europe (CESAMES)<sup>26</sup> have developed a collaborative and intercontinental education support system.

Furthermore, there are many capacity-building initiatives aimed at strengthening the capacity of the scientific and technological community with respect to new challenges. All these activities rely on strong and effective partnerships and a transdisciplinary approach to research. Among them, it is important to recall the *Leading Integrated Research for Agenda 2030 in Africa* (LIRA2030) programme which is run by the International Science Council (ISC) together with its Regional Office for Africa and the Network of African Science Academies (NASAC), with financial support from the Swedish International Development Cooperation Agency (Sida). The programme supports early-career scientists across Africa to generate new solutions-oriented, integrated knowledge required in the practice of sustainable urban development in Africa. The LIRA research projects explore the development of new approaches and strategies towards the innovative re-thinking of urban futures, in partnership with local authorities, industry, communities, and government.<sup>27</sup>

<sup>20</sup> For further information, see <http://www.interacademies.org/47237/Mosquito-Community-Research-Guide-English>

<sup>21</sup> For further information on ongoing activities and quiz, see <https://www.iypt2019.org/ongoing-activities>

<sup>22</sup> For further information on the Symposium « Mettre l'intelligence artificielle au service des enseignants pour assurer le développement des capacités de tous les élèves au sein d'une école véritablement inclusive » (Paris, France 25 March 2019), see <https://leplusimportant.org/2019/02/04/25-mars-colloc-ia-au-college-de-france/>

<sup>23</sup> For further information, see [https://www.wfeo.org/wp-content/uploads/un/WFEO-ENgg-Plan\\_final.pdf](https://www.wfeo.org/wp-content/uploads/un/WFEO-ENgg-Plan_final.pdf)

<sup>24</sup> For further information, see <http://www.interacademies.org/Activities/23007.aspx>

<sup>25</sup> For information, see <https://www.fondation-lamap.org/>.

<sup>26</sup> For further information, see [https://www.academie-sciences.fr/pdf/conf/AEMASE3\\_CESAME.pdf](https://www.academie-sciences.fr/pdf/conf/AEMASE3_CESAME.pdf)

<sup>27</sup> For further information, see <http://council.science/what-we-do/funding-programmes/leading-integrated-research-for-agenda-2030-in-africa>

Other activities are coordinated by international scientific unions and academies of sciences, such as the activities of the International Union for Physical and Engineering Sciences in Medicine (IUPESM) which collaborates with other international scientific and professional bodies, including the ISC and the World Health Organization (WHO), towards providing channels for improving education and exchange of professional and scientific information between nations.

Recent waves of migration have also triggered the development and implementation of the educational and employment opportunities for refugees and refugee scientists. For instance, since February 2016, the TH Georg Agricola University (THGA) in Germany has been offering refugees the opportunity of managed access to extra-occupational university engineering studies, in cooperation with the Industrial Union for Mining, Chemistry and Energy (IGBCE) and Job Centers in the Ruhr metropolitan area<sup>28</sup>, and the GYA runs the “At-Risk Scholars” initiative to enable the re-integration of exceptional early-career at-risk and refugee scholars into research through a mentorship programme developed and led by GYA members<sup>29</sup>.

All these activities highlighted above are also the *sine qua non* towards the attainment of the SDGs under review including SDG 8.

## **II. b – SDG No 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all**

The 2030 Agenda offers a global consensus on how to deal with economic growth and related employment and work conditions. Progress on SDG 8 is expected to have many positive impacts, such as poverty alleviation and investment in education, cleaner technologies and more sustainable means of production. Its call for economic growth is however challenging in terms of potential negative trade-offs with other goals, both environmental and social. Such interactions with SDG 8 are often difficult to trace because impacts unfold along global supply chains, as also addressed within the “Trase initiative – Transparency for Sustainable Economies” by the Stockholm Environment Institute and the Global Canopy<sup>30</sup>.

Current economic growth trends are not on a sustainable pathway and have an impact on employment. Research is needed on alternative economic systems that are environmentally sustainable, socially just, create meaningful employment for all, and eliminate poverty. Countries should further invest in R&D to support these goals and support initiatives fostering transformation to sustainability such as the Transformations to Sustainability (T2S) programme which promotes research on the complex social transformations needed to address problems of global environmental change, as well as on interrelated societal problems such as poverty, corruption, migration, social discontent and conflict. The Programme is supported by the Swedish International Development Cooperation Agency (Sida), and contributes to the work of Future Earth, the global research platform on sustainability.<sup>31</sup>

In this context, universities should increasingly incorporate in-depth sustainable development education at the tertiary level, with introductory courses made available at earlier levels. Here it is important to

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<sup>28</sup> For further information, see <https://www.thga.de/>, <https://www.thga.de/studium/studienangebot/hidden-champions/> and <https://www.thga.de/studium/nach-dem-studium/eur-ing/>, <https://www.thga.de/studium/international/fluechtlingsinitiative/>, <https://www.thga.de/studium/beratung/competence-empowerment-center/>.

<sup>29</sup> For further information, see <https://globalyoungacademy.net/activities/at-risk-scholars-initiative/>.

<sup>30</sup> For further information, see <https://www.sei.org/featured/supply-chain-transparency-trase/>.

<sup>31</sup> For further information, see <https://council.science/what-we-do/funding-programmes/transformations-to-sustainability>

recall also the role of the International Sustainable Campus Network (ISCN) which “provides a global forum to support leading colleges, universities, and corporate campuses in the exchange of information, ideas, and best practices for achieving sustainable campus operations and integrating sustainability in research and teaching”<sup>32</sup>. The National Autonomous University of Mexico (UNAM) has been recently accepted as part of this network, implying engagement of the university campus nationwide to transform UNAM into a living laboratory to create the short cut to become a sustainable society<sup>33</sup>.

Furthermore, the STC would like to draw attention to the development of a new ecosystem of STI-based industries and start-ups providing new economic and employment opportunities. In 2017, the Academy of Sciences Malaysia (ASM) and the National Council of Professors (MPN) completed a study on New Economic Opportunities in STI-based Industries to Serve Emerging Markets, which explored strategies to expand global opportunities for economic growth by developing science, technology and innovation (STI)-based industries<sup>34</sup>. This is an area which requires attention towards the implementation of SDG 8.

As discussed also for SDG 4, in this context of social and technological transformations, educational and capacity-building programmes enable the basis for equipping learners with skills that could be useful for improved employment opportunities. Many young scientists’ and young engineers’ programmes work towards fostering the necessary capacity for current/future employment. It is important here to recall the WFEO Committee on Young Engineers/Future Leaders<sup>35</sup> as well as the Global Young Academy, which is involved in promoting decent and productive employment by investigating their employment conditions in order to highlight how to better support them in their career trajectories in line with SDG. 8<sup>36</sup>. WFEO is also working on promoting sustainable technologies for smart cities, such as the international symposium in Ipoh, Malaysia, held in May 2018.<sup>37</sup>

Furthermore, international science and technology organizations are increasingly working towards ensuring diversity in their workforce, as for instance exemplified by ASTC with its Diversity and Leadership Development Fellows Program and its Cultural Competence Learning Institute<sup>38</sup> and within activities to further understand and narrow the gender gaps in science and technology, such as the activities of the WFEO Committee on Women in Engineering<sup>39</sup>, GenderInSITE<sup>40</sup>, and the Organization for Women in Science in the Developing World (OWSD)<sup>41</sup>.

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<sup>32</sup> Source: <https://www.international-sustainable-campus-network.org/>

<sup>33</sup> For further information, see <http://cous.sdi.unam.mx/>

<sup>34</sup> See report at [https://www.akademisains.gov.my/download/NEO\\_Report.pdf](https://www.akademisains.gov.my/download/NEO_Report.pdf)

<sup>35</sup> See <https://www.wfeo.org/committee-young-engineers-future-leaders-sdgs/>

<sup>36</sup> The GYA has completed a precursory global study, a GloSYS ASEAN study and has almost completed a GloSYS Africa study which investigate the working conditions of early career researchers. The Global Young Academy has published two reports precursory global (2014), a GloSYS ASEAN (2017) on these. The findings of these reports reveal that many of the next generation of scientists work under precarious conditions – lack mentorship and institutional support, have inadequate funding opportunities, work overload, etc. Based on these findings, the GYA’s strategic response to achieving decent work and productive employment is through a number of initiatives. These include supporting and giving voice and leadership roles to early research careers through initiatives such as ASEAN Science Leadership Programme the Africa Science Leadership Programmes. For further information see <https://globalyoungacademy.net>

<sup>37</sup> For further information, see <https://www.wfeo.org/committee-information-and-communication/>

<sup>38</sup> Further information at <https://www.astc.org/professional-development/conference-fellows/> and <https://community.astc.org/ccli/home>

<sup>39</sup> For further information, see <https://www.wfeo.org/committee-women-in-engineering/>

<sup>40</sup> For further information, see <https://genderinsite.net/>.

<sup>41</sup> For further information, see <https://owsd.net/>

## II. c - SDG 10. Reduce inequality within and among countries

Inequalities within and among countries should not only be understood in terms of income and wealth: they are economic, political, social, cultural, environmental, spatial and knowledge-based<sup>42</sup>, and triggered by many different contexts, related to socio-economic and environmental challenges such as food and water security, access to health systems and geographic locations. Inequality constitutes a key challenge for all countries, and can jeopardize the sustainability of economies, societies and communities. Multiple inequalities have consequences for poverty and growth, conflict and access to justice; health, nutrition and education; and the environment and efforts towards sustainability. These areas are critical to the achievement of the 2030 Agenda. Inequality also tends to dissipate the impact of growth on poverty, and so the links to SDGs Nos. 1 and 8 must be underlined<sup>43</sup>.

Countries are also increasingly concerned with monitoring and fostering the individual and collective wellbeing of their populations. This has led to several indices on wellbeing (e.g., New Zealand Higher Living Standards, and Canadian Index of Wellbeing), as well as an increasing attention on how science and technology can benefit society (e.g., UK Council for Science and Technology's *Advice to the Prime Minister on how the government can encourage science and technology to deliver economic benefits that are shared across the UK*, October 2017<sup>44</sup>).

In this context, the STC works towards enabling solutions to overcome these challenges via promoting equality. For instance, the International Union of Food Science and Technology (IUFoST) works on furthering the understanding on the future sustainability of the food supply and improvements in global population health through diet by stressing the significant critical needs of the science and technology<sup>45</sup>, while the IUPEMS via its Health Technology Task Group (HTTG) assists countries in defining their health technology needs, and identifying and rectifying health system constraints for adequate management and utilization of health technology, particularly through training, capacity building and the development and application of appropriate technology. Here it is also important to recall those technology-based developments aimed at ameliorating the life of Persons with Disabilities, as exemplified by development of exoskeleton-robots<sup>46</sup>.

Specific scientific initiatives for marginalised geographic areas are also to be noted. In fact, empowering all, whilst also ensuring inclusiveness, also entails the localization of SDGs within the national context. Among them there is the Mountain Research Initiative which has recently released an Issue Brief titled "Leave no one in Mountains Behind"<sup>47</sup> which presents initial steps towards localization of the 2030 Agenda to mountain areas also building on expert assessments conducted in Nepal, Uganda, Kyrgyzstan, Ecuador, and Switzerland. Other initiatives have focused on rural areas and their communities, as for instance highlighted in the EASAC Report on "Findings and recommendations from the Smart Villages Initiative 2014-2017"<sup>48</sup>, which includes recommendations for governments and development agencies to build capacities in rural communities in Africa, Asia, and Latin America.

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<sup>42</sup> See ISSC, IDS and UNESCO (2016), World Social Science Report 2016, Challenging Inequalities: Pathways to a Just World, UNESCO Publishing, Paris [https://unesdoc.unesco.org/ark:/48223/pf0000245825\\_eng](https://unesdoc.unesco.org/ark:/48223/pf0000245825_eng)

<sup>43</sup> See Ravi Kanbur, Economic Growth and poverty reduction: the inequality connection, World Social Science Report 2016: <https://unesdoc.unesco.org/ark:/48223/pf0000245952>

<sup>44</sup> For further information, see <https://www.gov.uk/government/publications/science-and-technology-for-economic-benefit-across-the-uk>

<sup>45</sup> See Peter Lillford & Anne-Marie Hermansson, 2019, "Global Challenges and the Critical Needs of Food Science and Technology (FS&T)" <https://iufost.org/2019/02/23/global-challenges-and-critical-needs-2/>

<sup>46</sup> See e.g., Wandercraft <https://www.wandercraft.eu/en/exo/>

<sup>47</sup> See brief at <http://www.mountainresearchinitiative.org/en/mri-news/new-mri-issue-brief-leaving-no-one-in-mountains-behind>

<sup>48</sup> See report at <https://easac.eu/publications/details/findings-and-recommendations-from-the-smart-villages-initiative-2014-2017/>

Furthermore, specific attention has been placed on the impact of digital transformations on individual and collective wellbeing, as addressed in the Report on “*Understanding wellbeing in the context of rapid digital and associated transformations – implications for research, policy and measurements*” developed by the International Network of Government Science Advice<sup>49</sup>.

Here, it is also important to highlight inequalities are also found among countries also with respect to S&T capacities. The importance of regional engagement is stressed within the activities of ISC, IAP and WFEO thanks to a regional networks and offices.

Several ongoing and proposed international initiatives focusing on science cooperation provide the basis for reducing inequalities with respect to S&T capacity. Among them, we recall the role of UNESCO/TWAS-The World Academies of Sciences for Advancement of Sciences in Developing Countries, but also the many fellowships and exchange programmes such as for instance the Visiting Scholars Programme of the ISC Scientific Committee on Oceanic Research (SCOR)<sup>50</sup> or the GYA’s Young Scientist Ambassador Programme (YSAP)<sup>51</sup>, as well as thematic projects such as the LAAMP<sup>52</sup> (*Utilisation of Light Source and Crystallographic Sciences to Facilitate the Enhancement of Knowledge and Improve the Economic and Social Conditions in Targeted Regions of the World*) which under the leadership of IUPAP and International Union of Crystallography (IUCr) enhances Advanced Light Sources (AdLS) and crystallographic sciences in Africa, Mexico, the Caribbean, Southeast Asia and Middle East. Among recent events addressing inequalities among countries, it is important to recall the recent event held at UNESCO by WFEO on Capacity Building for Engineering in Africa (29 January 2019).

Knowledge, and particularly scientific knowledge, should be available to everyone: here, the STC highlights the importance of actions to “*advance science as a global public good. Scientific knowledge, data and expertise must be universally accessible and its benefits universally shared. The practice of science must be inclusive and equitable, also in opportunities for scientific education and capacity development*”<sup>53</sup>.

The STC calls for promoting Open Science and Open Innovation, so as to reduce inequalities among countries. This is a powerful paradigm that combines the historical imperative for scientists to expose their working, evidence and results to scrutiny by their peers, with the power of digital communication to open them to public access, scrutiny, and re-use, and to facilitate engagement with other public actors in collaborative learning, problem-solving and open innovation. Almost all national science systems are struggling to adapt to this new paradigm, with varying levels of investment and energy, and with varying definitions of its scope. Among best practice, it is important to recall the “*African Open Science Platform*” initiative (AOSP)<sup>54</sup>, funded by the South African Department of Science and Technology (DST) through the National Research Foundation (NRF), and implemented and managed by the Academy of Science of South Africa (ASSAf), is a pan-African project for Africa by Africa. Direction is provided by ISC CODATA.

Given the recent establishment of a of cOAlition S and related Plan S around the following main principle “By 2020 scientific publications that result from research funded by public grants provided by participating national and European research councils and funding bodies, must be published in

<sup>49</sup> For report, see <https://www.ingsa.org/wp-content/uploads/2018/10/INGSA-Digital-Wellbeing-Sept18.pdf> ; for information on INGSa, see <https://www.ingsa.org/>.

<sup>50</sup> For further information, see <https://scor-int.org/work/capacity/visiting-scholars/>

<sup>51</sup> For further information, see <https://globalyoungacademy.net/activities/young-scientist-ambassador-program/>

<sup>52</sup> For further information on ICSU/ISC funded project LAAMP, see <https://laamp.iucr.org/home>

<sup>53</sup> From the High Level Strategy of the International Science Council, accessed at <https://council.science/publications/high-level-strategy>

<sup>54</sup> Source and for further information, see [http://africanopenscience.org.za/?page\\_id=51](http://africanopenscience.org.za/?page_id=51)  
<http://www.codata.org/strategic-initiatives/african-open-science>

compliant Open Access Journals or on compliant Open Access Platforms”<sup>55</sup>, several discussions and statements have been developed on Plan S such as the statement by ALLEA, by National Young Academies in Europe in 2018 as a “Response to ‘Plan S’ on Open Access of Scientific Output”<sup>56</sup> as well as the blog-series managed by the International Science Council (ISC)<sup>57</sup>.

Furthermore, International Years and International Days – such as the 2019 International Year of the Periodic Table of Chemical Elements – also provide further dialogue and actions towards reaching out to everyone. For instance, during the International Science Centre and Science Museum Day 2018 the theme of “science as a human right” has been addressed also in line with the Universal Declaration of Human Rights which guarantees that everyone has the right to “*share in scientific advancement and its benefits.*” (Art. 27)<sup>58</sup>. Ongoing planning for an International Year of Basic Science for Development proposed by the International Union for Pure and Applied Physics (IUPAP), and for an International Day for Mathematics for Development (IDM) proposed by IMU, and for a World Engineering Day proposed by WFEO, are also other venues in which countries can maximize scientific cooperation and strengthen each other scientific capacity towards reducing inequalities.

#### **II.d. – SDG 13 Take urgent action to combat climate change and its impacts**

As one of the most pressing environmental challenges of the 21st century, climate change can only be adequately addressed by the involvement of all governmental and societal actors. Recalling the “Global warming of 1.5°C” - An IPCC Special Report (IPCC, 2018)<sup>59</sup> on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty; as well as the recent WMO Statement on the State of Global Climate in 2018<sup>60</sup> which includes inputs from national meteorological and hydrological services, an extensive community of scientific experts, and United Nations agencies, and reports of record sea level rise, and exceptionally high land and ocean temperatures over the past four years, the STC continues to reaffirm its commitment to work together with Member States and other fellow Major Groups and Other Stakeholders on the different challenges posed by climate change.

In order to take action to combat climate change, it is important to understand in detail the (interlocking of) resource-intensive (unsustainable) practices that cause climate change. Employing problem framings that address systems of social practices rather than technology and individuals may enable the needed radical, long-term transformations<sup>61</sup>. Here it is crucial to recall that climate change is interlinked with many SDGs, as also defined by the DC-SDG Connections which is a joint initiative of the German Development Institute (DIE) and the Stockholm Environment Institute (SEI) analysing connections

<sup>55</sup> See <https://www.coalition-s.org/about/>.

<sup>56</sup> See <https://globalyoungacademy.net/ya-plan-s-statement/>

<sup>57</sup> See e.g., <https://council.science/current/blog/scholarly-publishers-also-need-a-more-consistent-approach-interview-with-steven-inchcombe-of-springer-nature-on-plan-s-and-open-access>

<sup>58</sup> For further information, see <http://www.iscsmd.org/>. Article 27 states that: (1) Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits. And (2) Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.

<sup>59</sup> IPCC 2018. Report at [https://report.ipcc.ch/sr15/pdf/sr15\\_spm\\_final.pdf](https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf)

<sup>60</sup> See <https://public.wmo.int/en/media/press-release/state-of-climate-2018-shows-accelerating-climate-change-impacts>

<sup>61</sup> See e.g., <https://www.tandfonline.com/doi/full/10.1080/15487733.2018.1458815>  
<https://www.sciencedirect.com/science/article/pii/S0959378017304223>  
<https://www.sciencedirect.com/science/article/pii/S2214629618306819?via%3Dihub>  
<http://www.energise-project.eu/about-ENERGISE>  
<https://www.stanleyfoundation.org/publications/pab/SustainableConsPAB1118.pdf>

between climate change and the SDGs. By identifying synergies, the tool enables more effective and ambitious national action to implement both frameworks<sup>62</sup>.

Natural and social scientists and engineers need to continue to work towards providing inputs towards the attainment of this Goal and related Multilateral Agreements. The International Science Council (ISC) reaffirms its partnership with WMO and UNESCO Intergovernmental Oceanographic Commission within the context of initiatives such as the World Climate Research Programme (WCRP)<sup>63</sup> and the Global Climate Observing System (GCOS)<sup>64</sup> and WFE0 recalls its “Model Code of Practice: Principles of Climate Change Adaptation for Engineers”<sup>65</sup>. The InterAcademy Partnership, its regional networks and national members recall several reports by the European network (EASAC) such as the one on Negative Emission Technologies<sup>66</sup>, which evaluated the potential contributions of these technologies in reaching the Paris Agreement’s targets, as well as national programmes such as the one conducted by the Royal Society (UK), which aims to consider how transformational science and technology can help the UK transit to a low carbon future, whilst pursuing an active industrial strategy that creates growth and jobs in the short and medium term. This programme follows the commitments made in Paris at the 2015 United Nations Climate Change Conference<sup>67</sup>.

Furthermore, it is also important to highlight the role of universities beyond conducting research on sustainability issues and climate change, but also in taking actions. Calls for actions have been issued in Denmark<sup>68</sup> and in The Netherlands<sup>69</sup> towards calling upon new university polices to drastically reduce universities’ carbon emissions and to raise awareness of the fight against climate change. Initiatives such as TROP ICSU which provide educational resources to integrate climate education with existing curricula in different disciplines can also provide key solutions to such endeavors.

Within the context of 2019 HLPF theme, it is crucial to highlight the importance of preventing risks by mitigating and adapting to hazards. Important to recall here are the activities of Integrated Research on Disaster Risk (IRDR) Programme<sup>70</sup>, co-sponsored by the International Science Council (ISC) and the United Nations Office for Disaster Risk Reduction (UNISDR), as well as the SEI Initiative on Transforming Development and Disaster Risk (TDDR) which has been working to advance scientific knowledge and support policy and practice to enact transformations in disaster risk reduction (DRR) and sustainable development towards more equitable, resilient and sustainable societies<sup>71</sup>.

The STC is also focusing on different vulnerabilities and realities, as also discussed in the Sackler Forum on climate change and ecosystems (8-9 November 2018), which has examined the latest science on how climate change can affect terrestrial, aquatic and marine ecosystems, and consider scientific understanding of opportunities to assist and manage ecosystems to enhance both their resilience and

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<sup>62</sup> See <https://www.sei.org/projects-and-tools/tools/ndc-sdg-connections/>

<sup>63</sup> See <https://www.wcrp-climate.org/>

<sup>64</sup> See <https://gcos.wmo.int/en/home>

<sup>65</sup> See [https://www.wfeo.org/wp-content/uploads/code-of-practice/WFE0\\_Model\\_Code\\_of\\_Practice\\_Principles\\_Climate\\_Change\\_Adaptation\\_Engineers.pdf](https://www.wfeo.org/wp-content/uploads/code-of-practice/WFE0_Model_Code_of_Practice_Principles_Climate_Change_Adaptation_Engineers.pdf)

<sup>66</sup> Report at [https://easac.eu/fileadmin/PDF\\_s/reports\\_statements/Negative\\_Carbon/EASAC\\_Report\\_on\\_Negative\\_Emission\\_Technologies.pdf](https://easac.eu/fileadmin/PDF_s/reports_statements/Negative_Carbon/EASAC_Report_on_Negative_Emission_Technologies.pdf) other relevant reports and statements at <http://www.interacademies.org/31842/Publications>

<sup>67</sup> See <https://royalsociety.org/topics-policy/projects/low-carbon-energy-programme/>

<sup>68</sup> See climate letter at <http://sciencenordic.com/open-letter-danish-universities-let-us-show-way-towards-more-ambitious-climate-agenda>

<sup>69</sup> See climate letter at <https://klimaatbriefuniversiteiten.nl/open-letter-to-our-universities/>

<sup>70</sup> See <http://www.irdrinternational.org/>

<sup>71</sup> See <https://www.sei.org/projects-and-tools/projects/sei-initiative-on-transforming-development-and-disaster-risk/>

societal resilience to climate change<sup>72</sup>. Special attention is also placed on realities and vulnerabilities in the Global South and in Small Islands Developing States (SIDS)<sup>73</sup>.

The STC welcomes the upcoming UN Climate Action Summit 2019<sup>74</sup>, and stands ready to provide inputs to its preparatory works.

## **II.e. – SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels**

The quality, inclusiveness and effectiveness of public and social institutions will largely determine the ability of states to achieve the SDGs and promote human dignity, welfare and development. Armed conflict, violence, corruption and organized crime are broad-based threats to those processes. The STC is committed towards promoting peaceful and inclusive societies, also by addressing the concepts of peace and violence, as exemplified also by the publications by The World Academy of Art & Science<sup>75</sup>.

The role of science for peace has been raised in several venues, but also through dedicated events such as the 2017 World Science Forum, hosted by the Royal Scientific Society, Jordan, and focusing on the theme “Science for Peace”. The ensuing declaration highlights the use of science to connect people across borders, belief systems and social and cultural barriers<sup>76</sup>. The next World Science Forum will be hosted by the Hungarian Academy of Science (Budapest, Hungary, 21-23 November 2019) and will focus on the theme “Science, Ethics and Responsibility”, which will also be another venue to further discuss the role of science towards promoting peaceful and inclusive societies for sustainable development.

The importance of science diplomacy and international science cooperation are key conduits towards promoting peace and peaceful societies. The STC would like to draw attention to the activities of the International Network of Government Science Advice (INGSA), and in particular its *Science Policy in Diplomacy and External Relations (SPIDER) Network* and *The Foreign Ministries Science and Technology Advice Network (FMSTAN)*<sup>77</sup> as these can be considered as key venues to attain SDG. 16.

The STC also stands ready to further shed light on the functions and roles of institutions – broadly understood as organizations, regimes, and norms – to overcome collective action problems, especially in developing countries. The activities of the Earth System Governance Project of Future Earth<sup>78</sup> are to be recalled here as providing key inputs on such processes.

The issue of corruption is also addressed by STC, as corruption and bribery erode trust in government and institutions in addition to diverting scarce development funds and making it too risky for private sector to invest. As per Target 16.5 “Substantially reduce corruption and bribery in all their forms”, WFEO through its Committee on Anti-Corruption<sup>79</sup> has contributed to the ISO 37001 Anti-bribery management system standard<sup>80</sup>.

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<sup>72</sup> See <https://royalsociety.org/about-us/international/international-work/sackler-forum/sackler-forum-2018/>

<sup>73</sup> See e.g., recent study: Scobie, M. (2019). Chapter 4: Climate change governance and Caribbean SIDS Global Environmental Governance and small states: architectures and agency in the Caribbean (pp. 63-89). UK: Edward Elgar Publishing.

<sup>74</sup> See <https://www.un.org/en/climatechange/un-climate-summit-2019.shtml>

<sup>75</sup> See articles: [Peace, Security, Globalisation & Cultural Diplomacy](#), (2017) and

[Integrated Approach to Peace and Human Security in the 21st Century](#) (2016)

<http://cadmusjournal.org/article/volume-3/issue-2/peace-security-globalisation-cultural-diplomacy> and

<http://cadmusjournal.org/article/volume-3/issue-1/integrated-approach-peace-human-security-21st-century>

<sup>76</sup> See Declaration <https://worldscienceforum.org/contents/declaration-of-world-science-forum-2017-110045>

<sup>77</sup> See <https://www.ingsa.org/divisions/spider/> and <https://www.ingsa.org/divisions/fmstan/>

<sup>78</sup> See <https://www.earthsystemgovernance.org/>

<sup>79</sup> For further information, see <https://www.wfeo.org/committee-anti-corruption-sdgs/>

<sup>80</sup> For further information, see <https://www.iso.org/publication/PUB100396.html>

## **II.f - SDG 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development**

This is a key goal to achieve any SDG, and actors from science, policy circles and the private sector must radically rethink their partnerships and create platforms and experimental spaces to collaborate transformation pathways. International science and engineering organizations such as the International Science Council (ISC), the World Federation of Engineering Organizations (WFEO), the InterAcademy Partnership (IAP) and the Global Young Academy (GYA), provide an effective enabling environment towards creating new space and modalities for collaborations and partnership.

In fact, the STC has also continued to work on understanding the effectiveness of partnerships and *modus operandi* of partnerships.<sup>81</sup> A recent study by Stockholm Environment Institute identifies a set of research avenues that could contribute to advancing SDG 17. It explores four themes related to SDG 17 and summarize expert recommendations for the thematic area as a whole. The four themes are: (i) Public administration and the quality of government; (ii) Policy coherence; (iii) Technology access and capacity; and (iv) Multi-stakeholder partnerships<sup>82</sup>.

To facilitate partnerships and collaborations, a series of publications and tools are being developed, including the third edition of “A Guide for Transboundary Research Partnerships” by the Swiss Academy of Sciences, the “Supporting the Sustainable Development Goals: A Guide for Merit-Based Academies” by IAP<sup>83</sup>, as well as the booklet by the Royal Netherlands Academy of Arts and Sciences (KNAW) on the challenges and predicaments of international scientific cooperation so as to offer an analytical framework to assess the potential risks involved<sup>84</sup>.

Global governance through the UN system needs significant reform to make it effective, accountable and inclusive. Significantly strengthened scientific advisory processes should be incorporated in such reforms, along with technology assessment mechanisms to anticipate potential risks from new technologies ranging from geoengineering and nanomaterials to artificial intelligence<sup>85</sup>. As also further highlighted in a Report by SEI to the Swedish government research council for sustainable development, research has an essential role in achieving the 2030 Agenda<sup>86</sup>.

In addition, while the STC focuses on fostering the science/technology/policy interface within the context of the SDGs, as it will also be in upcoming IAP report on “Improving Scientific Input to Global Policymaking, with a focus on the SDGs”<sup>87</sup>, the STC Major Group also would like to stress the important role of the Major Groups and Other Stakeholders within the Global Partnership for Sustainable

<sup>81</sup> See e.g., Zondervan, Ruben, and Jonathan Volt. 2018. Why Does the United Nations Secretary-Generals Insist on Placing Partnerships at the Heart of the Post-2015 Development Agenda? Global Goals Yearbook; and other resources by the Earth System Governance Project of Future Earth at

<https://www.earthsystemgovernance.org/?s=partnership>

<sup>82</sup> See: Maltais, A., Weitz, N. and Persson, Å. (2018). SDG 17: Partnerships for the Goals. A Review of Research Needs. Technical annex to the Formas report Forskning för Agenda 2030: Översikt av forskningsbehov och vägar framåt. Stockholm Environment Institute, Stockholm. <https://www.sei.org/wp-content/uploads/2018/11/sdg-17-partnerships-for-the-goals-review-of-research-needs-1.pdf>

<sup>83</sup> See Guide at [http://www.interacademies.org/37864/IAP\\_SDG\\_Guide](http://www.interacademies.org/37864/IAP_SDG_Guide)

<sup>84</sup> For information see <https://www.knaw.nl/nl/actueel/publicaties/international-scientific-cooperation-challenges-and-predicaments>

<sup>85</sup> See e.g., <https://iefworld.org/governanceWG>

<sup>86</sup> See <https://www.sei.org/publications/forskning-for-agenda-2030/>

Persson, Å., Bell, L., Weitz, N., Chan, S., Maltais, A., Sturesson, A. and Sundin, A. (2018). Forskning för Agenda 2030- Översikt av forskningsbehov och vägar framåt. Forskningsrådet Formas.

<https://www.sei.org/featured/scientific-research-is-essential-to-accelerate-progress-on-2030-agenda/>

<sup>87</sup> See <http://www.interacademies.org/36061.aspx>

Development, and thus call for a strengthened voice of MGOS in all processes related to the attainment of the 2030 Agenda.

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