Position Paper by the Scientific and Technological Community (STC) Major Group

A. Introduction

The Scientific and Technological Community[1] (STC) greatly welcomes the theme for the HLPF 2017 "*Eradicating poverty and promoting prosperity in a changing world*" and highlights the important role of sciences – natural, social, health and engineering sciences – in poverty eradication and in fostering prosperity.

As highlighted in dedicated sessions at the 2016 HLPF and via the Prototype Editions of the Global Sustainable Development Report, scientific knowledge provides the basis for evidence-based decision-making on sustainable development at all levels. Agenda 2030 needs science, technology and innovation at every step.

The STC welcomes the set of Goals to be reviewed in depth at this session, and stands ready to provide support to foster the science/policy interface to ensure implementation, monitoring, reviewing of these and other Sustainable Development Goals (SDGs). The STC provides specific scientific inputs related to each Goal, but also an integrated approach by addressing synergies and trade-offs among the Goals.

B. International science initiatives: on ocean, health and gender

International science organizations, including ICSU, the International Social Science Council (ISSC), the World Federation of Engineering Organization (WFEO), and the InterAcademy Partnership (IAP), together with the United Nations bodies have been collaborating towards implementating international initiatives on the science underpinning the attainment of the SDGs.

Goal 3. Ensure healthy lives and promote well-being for all at all ages
Given international priorities related to Agenda 2030 and Habitat III, the STC focuses on addressing health from a system approach related to global change phenomena. An example is provided by the international programme addressing urban health and wellbeing.

- **The Programme on Health and Wellbeing in the Changing Urban Environment - a Systems Approach[2]**, co-sponsored by ICSU, UNU, and the InterAcademy Medical Panel[3], proposes a new conceptual framework for considering the multi-factorial nature of both the determinants and the manifestations of health and wellbeing in urban populations. The programme generates knowledge which is relevant to people and policy-makers for improving health status, reducing health inequalities and enhancing the wellbeing of populations living in urban environments.

Goal 5. Achieve gender equality and empower all women and girls
The STC Community is addressing Gender Equality and Empowerment of Women (GEEW) by promoting campaigns and specific initiatives related to gender mainstreaming in governance and operations; the study of the GEEW issues in sciences; and activities targeted specifically at women and girls in sciences. Some examples are reported below:

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[1] The Organizing Partners of the STC Major Group are: the International Council for Science (ICSU), the International Social Science Council (ISSC) and the World Federation of Engineering Organizations (WFEO) https://sustainabledevelopment.un.org/majorgroups/scitechcommunity.
[2] www.urbanhealth.cn
[3] IAMP – now IAP for Health

- **GenderInSITE,** Gender in science, innovation, technology and engineering (SITE), is an international initiative to promote the role of women in science, innovation, technology and engineering, and to demonstrate how applying a gender lens to SITE can provide deeper insights, more effective programmes and more sustainable outcomes in the context of development. Its mission is to inspire transformative actions and more effective development by understanding the impacts of SITE on women and men and how women and men can contribute to SITE. GenderInSITE is working with ICSU and ISSC towards furthering a gender-lens in international science production and coordination, also to further enable gender-lens in transdisciplinary science for sustainable development and to promote gender-transformative actions, also taking into account ICSU Committee on Freedom and Responsibility in the conduct of Science's advisory note on "Mobility and Field Research in the Sciences: Gender Equality and Prevention of Harassment[4]".

- WFEO via its Women In Engineering Standing Committee has developed awareness-raising material concerning gender-biases and gender-transformative actions, for instance related to equal opportunities within the engineering profession and corporate programs to attract, retain and promote women engineers.

- IAP has conducted a first comprehensive survey of IAP member academies to ascertain the inclusion and participation of women scientists and the results were published in the report 'Women for Science: Inclusion and participation in academies of science'[5].

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
The international scientific community has focused on the study of oceans for many decades. Here are some example of such activities:

- **The Scientific Committee on Oceanic Research (SCOR)[6]** was established by ICSU in 1957 to further international scientific activity in all branches of oceanic research. SCOR examines problems and identifies elements that would benefit from enhanced international action, including improvement of scientific methods, design of critical experiments and measurement programmes, and relevant aspects of science policy; fosters recognition of individual marine scientists and laboratories; presents the views of marine scientists to the appropriate international community; and co-operates with national and international organizations concerned with scientific aspects of ocean research and inter-related activities. Among its current projects, there is the Second International Indian Ocean Expedition (IIOE-2) with its objective "to advance our understanding of the Indian Ocean and its role in the Earth System in order to enable informed decisions in support of sustainable development and the well-being of humankind.
- The **Global Ocean Observing System (GOOS)[7],** established in 1992 and co-sponsored by ICSU, IOC of UNESCO, WMO, and UNEP, enables the state of the ocean to be described, its changing conditions to be forecasted, and its effects on climate change to be predicted, and to facilitate sustainable development by ocean users and managers. GOOS helps nations meet their commitments under the UN Conventions on Climate Change and on Biodiversity, Agenda 2030 and of the UN Global Plan of Action for the Protection of the Marine Environment from Land Based Sources of Pollution, as well as national obligations under the conventions and action plans of UNEP's Regional Seas Programme.
- The recently established multi-stakeholder platform **Ocean Knowledge-Action Network,** led by Future Earth, facilitates the formation of transdisciplinary teams and new integrative initiatives for knowledge generation and implementation of SDG14.

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[4] http://www.icsu.org/freedom-responsibility/advisory-documentation/mobility-and-field-research-in-the-sciences-gender-equality-and-prevention-of-harassment
[5] http://www.interacademies.net/Publications/29832.aspx
[6] www.scor-int.org
[7] http://www.ioc-goos.org/

These are some examples of flagship activities on thematic issues, but it is important also to recall here other international initiatives which encompass the broader scope of Agenda 2030, namely Future Earth which promotes co-designed integrated research across all of the SDGs[8] domains, the International Network of Government Science Advisors (INGSA) which enhances global science-policy interface as well as the ongoing Science International's Open Data Campaign[9].

C. Enhancing integrated approaches by addressing trade-offs and synergies

Following an integrated approach to implementing the SDGs is, first of all, necessary as the economic, social and environmental dimensions addressed under each individual SDG must be addressed in an integrated, policy coherent manner. Second, there are significant interactions between most of the goals: interactions can be positive in terms of synergies or negative as possible trade-offs. Some of these interactions (e.g., "food-water-energy nexus") have been widely studied; others are less known. The greatest concern is that implementation of the SDGs at local, national and regional levels does not address possible trade-offs, for example on climate change, economic growth and energy. Indeed, one of the key findings of the "Review of Targets for the Sustainable Development Goals"[10] by ICSUand ISSC found that there remain major challenges in ensuring an integrated approach and avoiding a siloed implementation of the goals.

The STC has been specifically outspoken in referring to the 2030 Agenda as an "integrated agenda". A science-informed analysis of interactions across SDG domains is currently lacking. However a better understanding of possible trade-offs as well as synergistic relations between different SDGs is crucial for ensuring long-lasting sustainable development outcomes. To fill this gap, ICSU in collaboration with a number of other international and national scientific organizations has completed a report testing ways to systematically identify and score interactions across the 17 SDGs and their targets using a common methodology. Using a seven-point scale this methodology takes the analysis of interactions beyond the simple categories of "synergies" and "trade-offs". The report entitled "A guide to SDG interactions: from science to implementation" presents a pilot application of the methodology by analyzing four SDGs in detail (SDG2, SDG3, SDG7 and SDG14). The intended audience of this report are policymakers, practitioners and scientists working at the global, regional, national and local level on implementing or supporting the implementation of the SDGs. The report will be available on the ICSU website[11].

The analysis is based on key underlying principles, namely:

- All SDGs interact with one another, as by design they are an integrated set of global priorities and objectives that are fundamentally interdependent.

- Understanding the range of positive and negative interactions among SDGs is key to unlocking their full potential at any scale, as well as to ensuring that progress made in some areas is not made at the expense of progress in others. The nature, strengths and potential impact of these interactions are largely context-specific and depend on the policy options and strategies chosen to pursue them.

- SDG16 and SDG17 are key to turning the potential for synergies into reality, although they are not always specifically highlighted as such throughout the report. For many if not all goals, having in place effective governance systems, institutions, partnerships, and intellectual and financial resources is key to an effective, efficient and coherent approach to implementation.

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[8] http://www.futureearth.org/

[9] Accord at www.icsu.org/science- international/accord; endorsement-form at
https://docs.google.com/forms/d/1LGAoUnS3vJ1-3yc5d-PZNlMyGoeKRNm4fbwXnL1qw78/viewform

[10] ICSU/ISSC Report at http://www.icsu.org/publications/reports-and-reviews/review-of-targets-for-the-sustainable-development-goals-_the-science-perspective-2015.

[11] www.icsu.org

The report builds on the methodological framework for understanding SDG interactions proposed in *Nilsson, M., Griggs, D. and Visbeck M, 2016. Map the interactions between Sustainable Development Goals. Nature, 534:320-322.*

A key objective of the scoring approach to interactions is to stimulate more science-policy dialogue on the importance of interactions, to provide a starting point for policymakers and other stakeholders to set their priorities and implementation strategies, and to engage the policy community in further knowledge developments in this field.

In the new ICSU report, using the 7-point scale, a team of scientists evaluated the key target-level interactions between an 'entry goal' and all other goals, and attributed a score to these interactions based on their expert judgment and as justified through the scientific literature.

Interactions for Food/Agriculture (SDG2), Health (SDG3), Energy (SDG7) and Oceans (SDG14) were tested using the scoring framework. This selection represents a mixture of key goals aimed at human wellbeing, ecosystem services and natural resources – it does not imply any prioritisation. Each of these goals exhibits both positive and negative target-level interactions with the other SDGs. The four SDGs analysed in detail in this report are mostly synergistic with the other SDGs. Main findings from the perspective of SDG2 are in Box 1

Box 1

"SDG2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Together with ending poverty, eradicating hunger around the world is central to the 2030 Agenda. SDG2 frames this in the context of eradicating malnutrition through increasing agricultural production sustainably. SDG2 in itself is a compelling case for recognising and managing interdependencies: achieving food and nutrition security, and increasing agricultural production and income for farmers, while achieving resilient and sustainable food systems will be challenging to achieve simultaneously.

Key interactions with other goals

SDG2-SDG1 Eradicating poverty cannot be achieved without ensuring food and nutrition security for all. While SDG2 is a strong enabler for SDG1, increasing agricultural production, productivity and incomes require complementary policies that benefit the poor and vulnerable communities in rural areas and reduce their exposure to adverse environmental shocks.

SDG2-SDG3 Health and wellbeing cannot be achieved without access to a sufficient quantity and quality of food. How the SDG2 targets related to increasing agricultural production and productivity are implemented, will have a major influence on soil and water quality, land use, and ecosystem health and functioning, which are key environmental determinants of health. Other factors such as rural income stability from agriculture and related sectors are also important. Achieving SDG3 supports SDG2, because a healthy population is essential for achieving nutrition and agricultural production targets.

SDG2-SDG5 Achieving the targets related to access to food, quality nutrition for all, and agricultural incomes will provide key enabling conditions for women's empowerment and gender equality as it opens up development opportunities for women. Conversely, gender equality and enhancing women's rights can help achieve the targets related to sustainable, increased food production and nutrition, and can enhance the role of women in agriculture.

SDG2-SDG6 Food production is strongly dependent on and affects the quality and availability of water, because boosting agricultural production can increase water withdrawals and worsen land and water degradation. Moreover, achieving nutrition targets requires access to clean water and sanitation. Counteracting these potential trade-offs will require sustainable agricultural systems and practices, and enhanced water governance to manage growing and competing demands on water resources.

SDG2-SDG7 Agriculture, food production and consumption are strongly dependent on energy services; conversely biomass and agricultural waste are potential sources of renewable energy. However, competition over the same resources (land, water) can result in trade-offs between both goals.

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SDG2-SDG13 Agriculture is an important source of greenhouse gas emissions and so contributes to climate change. Conversely, climate change has wide-ranging impacts on agriculture and food security through extreme weather events as well as long-term climatic changes (such as warming and precipitation changes) and will significantly constrain the achievement of SDG2. Sustainable agricultural practices play an important role in climate adaptation and mitigation (such as improving soils and land quality, genetic diversity, and bioenergy).

SDG2-SDG15 Healthy ecosystems provide vital services from soil and water quality, to genetic diversity, and pollination. Agriculture is a key driver impacting ecosystems. Sustainable agricultural systems and practices contribute to ecosystem health. However, increased agricultural production and productivity, if not sustainable, can result in deforestation and land degradation, jeopardising long-term food security. A careful balance is needed between achieving food for all and conserving and restoring ecosystems.

75 target level interactions: 50 (positive), 1 (neutral) and 24 (negative)

Implications for implementation

Eradicating hunger and ensuring food security is a bottom-line requirement for achieving sustainable development and wellbeing. This will require a careful and context-sensitive assessment of the needs and critical trade-offs that may occur with other goals and targets. Multi-level governance and multi-stakeholder partnerships, capacity development from the institutional to the individual level, resource mobilisation towards research, innovation and technology development to mitigate trade-offs and supportive policies and investments are needed to realise the full potential of SDG2 and related targets and goals."

[from: ICSU, 2017. A guide to SDG interactions: from science to implementation.]

This analysis found no fundamental incompatibilities between goals (i.e. where one target as defined in the 2030 Agenda would make it impossible to achieve another). However, it did identify a set of potential constraints and conditionalities that require coordinated policy interventions to shelter the most vulnerable groups, promote equitable access to services and development opportunities, and manage competing demands over natural resources to support economic and social development within environmental limits.

The process of systematically identifying and scoring interactions across the 17 SDGs using a common terminology is very valuable. It allows broad multi-disciplinary and multi-sectoral conversations, makes it possible to synthesise knowledge and to scope knowledge needs, and provides rational and concrete focal points (clusters of targets that need to be addressed together) for an integrated approach to implementation and monitoring.

This approach provides a basis for a science-policy dialogue on translating integrated science for the achievement of the SDGs. As a tool for policy coherence, it provides an understanding of the conflicts and synergies to be managed across government departments and sectors, understanding where the emphasis should be put for efficient and effective action, and identifies who needs to be brought to the table to achieve collective impacts across multiple interacting policy domains.

D. Enhancing science and technology - means of implementation for the SDGs

As part of the means of implementation and enabling conditions for achieving the Agenda 2030, an enhanced partnership between policy-makers, practitioners, scientists and other sectors of civil society is key to jointly identify critical questions that need to be addressed; co-produce knowledge that effectively supports decision-making at different scales; and co-deliver solutions supported by scientific evidence.

There is a critical need for much enhanced harnessing of both science and technology for sustainable development. We urge developing and developed countries alike to scale up national science and technology activities and capacity targeted on sustainable development, and encourage stronger

collaboration across scientific and policy communities. Governments should also enhance support for international cooperation in relevant scientific research, scientific and technological capacity building, knowledge sharing and innovation, and in further applying a gender-lens to the scientific enterprise.

Furthermore, recalling the Appel for Peace from the United Nations Secretary-General[12], the STC would like to underline the key role that science, technology and innovation can play in furthering peace and international dialogue, as underlined by the theme "Science For Peace" of the upcoming World Science Forum[13] which will be held in the Kingdom of Jordan (7-11 November 2017).

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[12] https://www.un.org/sg/en/content/sg/statement/2017-01-01/appeal-peace-un-secretary-general-antonio-guterres

[13] http://worldscienceforum.org/