The Role of Science, Technology and Innovation (STI) to Foster the Implementation of the Sustainable Development Goals

European Commission Expert Group "Follow-up to Rio+20, notably the SDGs"
Input to the Financing for Development Conference[1]

Background paper for the European Commission side event
"Towards better scientific evidence and support for policy-making on sustainable development. The role of Science, Technology and Innovation"

Introduction

The Expert Group *"Follow-up to Rio+20, notably the SDGs"* was established by the Directorate General (DG) for Research and Innovation of the European Commission with the purpose of providing advice to the European Commission on the role of science, technology and innovation (STI) for implementing the sustainability agenda agreed at Rio+20 and in particular the Sustainable Development Goals (SDGs), including the potential of research and innovation cooperation in this context. This paper is an intermediate step in the preparation of the full report that will be finalized and made publicly available in October 2015 and comments are welcomed[2].

1. 2015: A Crucial Year for the World

1.1 Towards the Adoption of Sustainable Development Goals

The year 2015 presents a historic and unprecedented opportunity to bring the countries and citizens of the world together to decide and embark on new paths to improve the lives of people everywhere. These decisions will shape the global course of action to end poverty, promote prosperity and well-being for all, while observing environmental and resources limits, and addressing climate change.

Since the Rio Conference in 1992, the world has tried to reconcile environment and development, stimulating a lot of important actions both at global and at national levels. With the Millennium Declaration in 2000, the United Nations have launched a strong Development Agenda, built around the Millennium Development Goals (MDGs).

Notwithstanding the progress made towards these objectives, economic, social and environmental conditions are still far from being satisfactory in large parts of the world and the concerns for the overall sustainability of the current and future pathways have considerably grown over the years. The Rio+20 Conference in 2012, and the outcome document "The Future We Want" launched a process to develop a strong "Post-2015 Development Agenda" around the concept of Sustainable Development (SD) and universally

[1] Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the following information. The opinions expressed are those of the expert(s) only and should not be considered as representative of the European Commission's official position.

[2] Comments can be sent to: silvia.donato@ec.europa.eu

applicable Sustainable Development Goals (SDGs) to be achieved by all countries in the world.

In September 2015 the United Nations are expected to agree on a new Global Agenda to take the world on a sustainable pathway. The work done by the Open Working Group (OWG) to develop a set of SDGs and the results achieved through other processes led the UN Secretary General to publish, at the end of 2014, the so-called Synthesis Report "The road to dignity by 2030", which represents a strong call "for the world to take historic action to transform lives and protect the planet". The Report also launched the final round of negotiations around three key events to be held in 2015: the Addis Ababa Conference on "Financing for Development" (July), the UN Special Summit to agree on SDGs (September) and the COP21 Conference in Paris on climate change (December).

1.2 Challenges and opportunities from the SDGs for the EU

While the European Union (EU) has a long-standing commitment to SD, also reflected in its Treaties and its efforts for mainstreaming it in policy and governance, the forthcoming SDGs represent a great opportunity to reinvigorate this commitment at EU and individual Member State levels. The EU has both the opportunity and an imperative to become the global forerunner of sustainable development by gearing its strategies and policies towards this goal and by integrating policies, tools and measures to achieve it, and minimising the costs of transition.

One of the key characteristics of the SDGs is their universality, a perspective that completely changes the way in which the policy agenda is being built. While the MDGs have been applied to developing countries only, with a certain focus on poverty eradication, the transition to SDGs implies a universal challenge, to be tackled by all countries at all levels of development.

The shift to the universal SDGs marks the need to bring the two perspectives together under one umbrella: from the perspective of development cooperation to deepen Policy Coherence for Development (PCD), and from the domestic perspective all relevant ministries to assume responsibility to act upon the SDG agenda in their own countries, to invigorate efforts for horizontal coordination and internalizing the international component. Within the European Commission, the lead responsibility of the First Vice-President for SD is an opportunity to engage also other relevant DGs and to fully integrate the international agenda in the revision of the Europe 2020 Strategy, to be completed after the adoption of the SDGs.

Bearing in mind the conclusions of the work done by the OWG, as well as the preliminary results of the ongoing negotiations, the adoption of the SDGs will require a fundamental change in the cultural and political approaches followed so far:

- The Post-2015 Development Agenda marks a shift in how the community of nation states looks upon itself and where it wants to go. The pursuit of "economic growth at all cost", i.e. the idea that the increase of income and wealth can fix all societal problems, without considering environmental consequences and addressing social inequalities, is coming to an end and a much more holistic understanding of development, where socially equitable and environmentally sustainable outcomes are valued just as highly. At the same time, this conceptual change requires both an in-depth revision of existing policies to incorporate, since the beginning,

environmental and social concerns when designing economic measures, and an ex-ante long-term assessment of the impact of policies or businesses' decisions.

- The SDGs cover a wide range of topics, from social (health, poverty, education, gender balance, etc.) to economic (consumption, jobs, etc.), from environmental (climate change, energy, etc.) to governance (policy coordination, transparency, effectiveness etc.). The new framework (including the "none left behind" principle) finally makes clear that:
  - development means much more than "economic growth" measured in terms of per capita GDP, as proposed over the last ten years by the "Beyond GDP movement";
  - sustainability means much more than "environmentally compatible";
  - inequality means much more than "fair income or wealth distribution".

  Therefore, a holistic perspective needs to be reflected in a policy framework that encompasses all dimensions of SD, and ways need to be identified to strongly embed the long-term perspective in decision-making of governments, businesses and people. Science, technology and innovations are fundamental ingredients of such a shift, as they allow improving efficiency in both economic and environmental sense, develop new and more sustainable ways to satisfy human needs, overcoming historical divides, as well as empower people to drive their own future. The announcement that the European Commission will develop, by the end of 2015, a package on the so-called "circular economy" is a good sign in this direction.
- The SDGs also mark a shift in the economic and political relationships between developing, emerging and developed countries, where the boundaries between them are becoming increasingly blurred and the priorities they pursue are more and more universal. This requires significantly rethinking not only international cooperation policies, but also domestic ones.
- This new agenda calls for the design of a new international co-operation policy based on the concept of "full partnership" and the use of a wide range of tools. Partnerships may be formed in many forms, ranging from alliances between businesses and non-governmental organisations, governments, multilateral development institutions and civil society with the aim to creating shared value for all stakeholders. International as well as domestic policies should embrace partnerships and collective action efforts that pool resources, share risks and aim to find solutions faster.
- As the transition towards a sustainable path of development requires the mobilization of all citizens, stakeholders, business and policy makers, these processes obviously need to be conducted in a participatory manner. There are still low hanging fruits, but many trade-offs as well. New business opportunities need to replace unsustainable ones, options for consumers need to be attractive and behavior may be further nudged towards sustainable choices, for which innovation (including social innovation) plays a central role.

From what has been said the SDGs pose new challenges to domestic and international policies, which can be clustered based on the SDGs in three groups:

1. *domestic policies to be pursued by all countries to improve their national conditions* (human rights, education, health, equality within nations, etc.);
2. *domestic policies and actions that have an impact on other regions and countries* (consumption and production patterns, GHG emissions, resource use, agriculture, environmental pollution, etc.);
3. *international policies* (development cooperation, trade, financial systems, etc.).

1.3 The role of science, technology and innovation to achieve SDGs

Science, technology and innovation (STI, as referred to in the UN context) have for a long time been recognized as one of the main drivers behind productivity increases and a key long-term lever for economic growth and prosperity. In the context of the Post-2015 development agenda and for achieving the SDGs STI plays an even more central role. STI features strongly both in Goal 17 on Means of Implementation, as well as cross-cutting one to achieve several sectoral Goals and Targets. Target 9.5 elevates the role of research and innovation (R&I) policy well beyond STI as one of the Means of Implementation.

Implementation of the SDGs domestically calls for unparalleled collaboration in key areas such as enabling policy environments, developing human skills and capacities, mobilization and effective use of public finance, stimulating trade, driving transformative change through science, research, technology and innovation, mobilization of the private sector and capital, harnessing the positive effects of migration and monitoring, accountability and review. For the international aspects of the SDGs STI can provide the grounds for a new global partnership that will eventually bring a new transformative spirit of solidarity and cooperation. This global partnership should be based on universally common principles such as shared responsibility, mutual accountability, respective capacity, human rights, good governance, enabling regulatory environments, inclusiveness and non-discrimination.

Development cooperation should work more synergistically with research and innovation actors in building STI capacities in developing countries in order to enable engagement in related international activities. In this context, increasing public and private spending and investment in research and development, including through public-private partnerships, should be supported.

Moving the world development onto a sustainable path will depend not only on scaling of existing appropriate technologies, but also radical innovations (including social ones) and changes in mindsets and behaviors. Technology alone is not sufficient for a sustainable pathway, inter alia due to rebound effects. Capacity for innovation is key, and (social) innovation is needed to induce changes in mindsets and behaviors attractive. Overall, STI:

- is vital to reduce the costs of transition, also in terms of job losses;
- can be directed to areas that stimulate transitional movements in the economy and the society;
- can become a common objective of the public and the private sectors, to mobilise all investments towards sustainable development.

In conclusion, STI policies should be seen as a key transformational force to change existing, clearly unsustainable, pathways.

2. Science, Technology and Innovation for Sustainable Development (STI4SD): What Role for the European Union?

The European Union and its 28 Member States have agreed that, by 2020, 3% of their total GDP (public and private combined) should be invested in research, development and innovation. As this is one of the five headline targets for the EU 2020 Strategy[3], STI is at the heart of the EU's strategic agenda. Moreover, the European Commission has set out overarching implementation principles in its Communication on the Post-2015 Agenda,[4] in which it emphasizes that solutions generated by STI are important drivers for the SDGs. Finally, several of the new European Commission's ten priorities, as well as some key recent initiatives (Innovation Union, Digital Single Market, etc.) heavily rely on STI to speed up the change and improve prosperity of the European Union, minimizing the transition costs.

Looking at the SDGs implementation, the following perspectives should be considered:

- **"Walk the talk" and ensure domestic integration of the SDGs in/with STI.** On the one hand, the SDGs should be fully integrated in the (implementation of the) EU Research and Innovation policy and its Framework Programme for 2014-2020 Horizon 2020, as well as in other EU policies related to sustainable development.
- **Develop tailor-made partnerships on STI for SDGs.** STI is vital to reduce the costs (also in terms of job losses) of transition towards environmentally sustainable societies and economies. This cost-saving aspect is essential for the discussion on the Means of Implementation for the SDGs. Some barriers to technology transfer have been also recognized by the OECD Forum on "Aligning Transition Policies" and need to be addressed. For example: while many technologies are available in principle without license fees, so far they have not been implemented for SD purposes in developing countries, and most technology transfer takes place in a North-North trade; the traditional Intellectual Property Rights – IPR – system; the absence of knowledge about availability of technology without license fees; the accessibility to knowledge on available relevant technologies for SDGs; capacity for a sustainable implementation and related social innovation that need to be overcome to make progress in this field. Moreover, it would be important to avoid rebound effects and adapt technologies to local contexts. This is why technology needs assessment are required as first step.
- **Move from technology transfer to building innovation capacity**. Technology transfer is essential but not enough. Development of innovation capacity should become one of the highest priority, a prerequisite to making societies and economies sustainable in the long run. A focus on building innovation capacity would be recommendable. Education and other forms of investment in human capital are a key accelerator and multiplier of STI4SD.
- **Stimulate thinking and behaving differently**. To tap the full potential of STI for moving countries on a sustainable path, changes in mind-sets and behaviour of politicians and policy makers, businesses, investors, consumers and civil society are needed. As mind-sets and behaviour are strongly culturally determined, differentiated governance approaches are recommendable. STI can itself foster this

[3] 2nd headline target of the Europe 2020 Strategy. http://ec.europa.eu/europe2020/targets/eu-targets/index_en.htm

[4] COM(2015) 44 final. A Global Partnership for Poverty Eradication and Sustainable Development after 2015.

by investing in areas that stimulate transitional movements in the economy and the society. Social innovation is as important ingredient of this process. The orientation of STI to SD has to become a common objective of the public and the private sectors, to mobilise all investments in this direction and deeply engage in this effort policy makers, private investors, consumers, etc.

- **Build up opportunities to fully benefit from the "Data revolution"[5]**. It is quite evident that economic and social innovations will be based on the use of an unprecedented amount and availability of data available for different purposes. In this context, data should be considered an "asset" whose development for pervasive use should be the objective of public policies, also protecting people from the misuse of personal data. Some areas of the world are investing huge public and especially private resources in this field (e.g. big data, data mining, software and applications dedicated to predictive modelling).

- **Set up monitoring, evaluation and assessments of STI4SD.** To ensure mainstreaming of sustainability in the EU's policies, a framework is needed which guides monitoring, evaluation and assessment of the contributions of STI to the achievement of the SDGs, at EU and Member States level, as well as for reporting to the international level. The just released "Better regulation package" features impact assessment and promotes enhanced procedures to "ensure that keeping the EU competitive and the EU's development sustainable remains a priority in all we do".[6] Moreover, it says that "Applying the principles of better regulation will ensure that measures are evidence-based, well designed and deliver tangible and sustainable benefits for citizens, business and society as a whole. This applies both to new and the large body of existing EU legislation. This legislation is essential for sustainable development, for the single market that drives our economy and for unlocking the investments needed to support jobs and growth".[7]

- **Improve policy coherence.** As stated in the guidelines issued in the context of the "Better regulation package", "policy preparation should be supported by both retrospective performance evaluations and forward looking impact assessments. Both look at how a problem is, or should be, addressed (and its underlying causes) to achieve the desired objectives taking account of costs and benefits. Both are based on an integrated approach that addresses impacts across the environmental, social and economic pillars of sustainable development and so contribute to the mainstreaming of sustainability in policy making at the Union level".[8] Therefore, all EU Member States should be encouraged to integrate the STI4SD perspective in their national strategies and monitoring processes, as well as ensuring policy coherence by integrating the SDGs in their (regulatory or comprehensive) impact assessments. At EU level, policy coherence could be further pursued by integrating the monitoring of the SDGs in the existing processes, like the "European Semester", the Europe2020 Strategy, as well as the Commission's Investment Plan based on the European Fund for Strategic Investments (EFSI).

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5 See the Report "A World that Counts: Mobilising the Data Revolution for Sustainable Development", www.undatarevolution.org.

6 COM(2015) 215 final "Better regulation for better results - An EU agenda", p.6.

7 COM(2015) 215 final, p.3.

8 SWD (2015) 111 final, p. 8.

3. Preliminary Recommendations to Implement a STI4SD Policy

In this section a preliminary set of recommendations are provided to foster the STI4SD approach.

3.1 Policy coherence for sustainable development and the role of STI policies

- Strengthen the importance of STI policies/systems in the FfD process and Post-2015 agreement in all countries of the world as part of the Means of Implementation and Global Partnership for Development, including both the promotion of appropriate regulatory frameworks and the creation of enabling environments for STI.
- Move beyond the issue of technology and technology transfer towards a more direct emphasis on innovation systems. In this perspective, the role of capacity building along the innovation chain (including the need for secondary and vocational training in areas such as engineering and environmental technology, higher education in science, and skills in entrepreneurship and technology-driven business development) should be strengthened.
- Improve the use of aid for STI purposes in the context of development cooperation taking into account the results of technology needs assessments.
- Strengthen efforts to develop education for innovation and entrepreneurship, including ICT vocational skills of scientists. Education is a key accelerator and a multiplier of the impact of STI. Particularly in relation to developing countries, support the establishment of capacity development mechanisms for STI, especially in LDCs, across the innovation system from laboratories to markets including entrepreneurship skills.
- Take into account the three principle impact spheres of SDGs related policies in the impact assessment framework of domestic policies.
- Review EU and national STI policies to mainstream SD in all of them. Policy coherence for SDGs indicators could be developed for the EU and national levels.
- Pursue strategic alignment of EU external policies with STI and SDGs, such as trade and innovation in international cooperation, and develop an intervention logic, supporting arguments, and options for models, as well as possible effects.

3.2 Harnessing STI policy and instruments towards the implementation of the SDGs

- Develop a framework to guide investments in STI on projects, programmes and initiatives with transformative potentials, taking into account criteria such as urgency, severity and irreversibility of the problem ("if no action is taken"). Institutionalize a "high-impact logic", allowing the prioritization of "impact investments" from the banking and investment sectors.
- Streamline the deployment of various STI instruments and align them within a SDGs thematic focus.
- Develop a strategy to make businesses and people fully benefitting from the "Data revolution", overcoming existing barriers for data exchange and use, fostering investment in human capital at all levels, to both create appropriate skills to support these processes (for example, investing on the training of "data scientists") and allow people to be informed consumers and citizens. As data will drive most of the economic and social innovations, promote the full availability of data and analytical tools

developed through projects funded by the EU. Moreover, the EU should help non-EU countries to implement the policies aimed at implementing the "Data revolution".

- Increase the share of funds allocated to SDGs oriented projects, including those aimed at supporting open-ended science and technology research to discover the future technologies and innovations that will drive the next generation of implementation towards SDGs achievement.
- Strengthen the capacity of cities to achieve policy coherence and use EU tools such as structural funds to this end. Cities are important hotbeds for experiments, pilots, niche development and their scaling up with respect to using STI for fostering behavioral change. With their direct link to citizens, they are particularly suitable for transdisciplinary approaches and STI's transformational role therein (for example, social engineering and nudge towards SD).

3.3 Research and innovation in support of sustainable development

- Conduct more research about interdependencies between problem areas (i.e. also between the SDGs) and solutions, also to identify win-win solutions and possible multipurpose actions. Insights in both areas will impact the criteria for prioritization.
- Orient some STI efforts to behaviour changes. There are only few areas where a purely "technology fix" approach will suffice; hence, changes in mind-sets and behaviour to re-orient consumption and life-styles become key for transitions towards sustainable development. Behaviour change requires both technological and social innovation, and adaptation to different contexts, cultures and traditions.
- Conduct more systematic and transdisciplinary research on governance for the SDGs, including comparative research in order to enable taking-up of (social) innovation and good practice. The research could look into, inter alia, horizontal and vertical coordination mechanisms, meaningful and practicable participation of civil society, translation of the long-term perspective in short-term decision-making processes, in order to achieve better design and manage strategies and policies for implementing the SDGs.
- Fund a project to improve the availability and especially the timeless of data necessary to develop a new class of analytical tools (including world and regional models) to evaluate trade-offs between policies aimed at achieving specific SDGs.

3.4 Options for international cooperation in STI in support of the SDGs

- Take the lead in international collaboration on few Post-2015 agenda topics, carefully selected building on EU recognized strengths and leadership (such as sustainable energy, water and sanitation, health and diseases, agriculture and food security).
- Orient international cooperation in STI more explicitly towards inducing private sector involvement, as well as leveraging and steering private investments into STI domains of relevance for the Post-2015 Agenda.
- Harness leading European experts in science, technology and innovation programmes (and in particular those funded through FP7 and H2020) to engage in the Post-2015 development agenda follow up and implementation process.
- Take stock of the developments in Future Earth, the Scientific Advisory Board to the UN, the Global Sustainable Development Report, and the High Level Political Forum.

Abbreviations

ATP	Alignment Transition Policies
COM	Communication
COP	Conference of the Parties
DAC	Development Assistance Community
DEVCO	Development and Cooperation
DG	Directorate General
EC	European Commission
EIB	European Investment Bank
ERA	European Research Area
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
FfD	Financing for Development
FP	Framework Programme
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GHG	Green House Gas
H2020	Horizon 2020 Framework Programme
IA	Impact Assessment
ICT	Information Communications Technology
IFSA	European Fund for Strategic Investments
ILO	International Labor Organization
IPR	Intellectual Property Rights
JRC	Joint Research Centre
KICs	Knowledge and Innovation Communities
LDC	Least Developed Countries
MDGs	Millenium Development Goals
NGO	Non-Governmental Organization
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
OWG	Open Working Group
PCD	Policy Coherence for Development
R & I	Research and Innovation
SD	Sustainable Development
SDGs	Sustainable Development Goals
SIA	Sustainability Impact Assessment
STI	Science, Technology & Innovation
STI4SD	Science Technology and Innovation for Sustainable Development
TTIP	Transatlantic Trade and Investment Partnership
UN	United Nations
WTO	World Trade Organization