United Nations Inter-agency Working Group on a Technology Facilitation Mechanism

An Overview of the UN Technology Initiatives

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1. Introduction

The importance of international cooperation on research, development, demonstration, market formation, diffusion of environmentally friendly technologies has been emphasized by many successive international conferences. Chapter 34 of Agenda 21 noted that "The availability of scientific and technological information and access to and transfer of environmentally sound technology are essential requirements for sustainable development" and that "There is a need for favourable access to and transfer of environmentally sound technologies, in particular to developing countries, through supportive measures that promote technology cooperation and that should enable transfer of necessary technological knowhow as well as building up of economic, technical, and managerial capabilities for the efficient use and further development of transferred technology". This call for urgent international collaboration to enhance the access of developing countries to environmentally friendly technologies was echoed in the Johannesburg Plan of Implementation which noted the "continued need for a dynamic and enabling international economic environment supportive of international cooperation, particularly in the areas of finance, technology transfer…".

In response, the United Nations Secretary-General in his synthesis report (2014) on the post development agenda has called for concerted actions and a proposal on options, including institutional arrangements, to improve coordination within the UN System on development, diffusion and transfer of clean and environmentally sound technologies.[2]

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[2] In the context of post-2015 development agenda, this paper also covers other technologies relevant to achievement of SDGs. See details about the scope in the next section.

This discussion paper provides a brief summary on technology-related initiatives that are currently in place in different institutional settings in the UN based on two UN surveys in 2015 by the informal Inter-agency Working Group on a Technology Facilitation Mechanism.[3]

This paper is not meant to be conclusive or prescriptive, but to be indicative of possible directions of deliberation, with an overview of the current landscape of UN technology-related initiatives, and an assessment framework to view the coverage, institutional arrangement, functions and the inter-linkages and coordination between these initiatives. The primary purposes are to inform the current inter-governmental processes in the context of post-2015 development agenda and finance for development, enrich the debates by providing evidence and information, and support stakeholders' decisions on improved coordination. As an initial step toward more comprehensive efforts in future, this paper focuses on the initiatives undertaken by the UN system at the global, regional and country levels, but does not cover other multilateral, bilateral, or private initiatives.

2. Scope, definition, data and an assessment framework

Given the purpose of this paper, the scope of technology-related initiatives that we review here are the ones directly or indirectly supporting the implementation of the post 2015 development agenda, and its sustainable development goals (SDGs). The key question would be why and how to strengthen the collaboration and coordination among the UN initiatives and increase complementarity with non-UN initiatives in support of the SDGs through a technology facilitation mechanism.

Before one can answer this question, one needs to be clear on concepts such as technology, technology facilitation, and technology facilitation mechanism.

Technology: the concept of "technology" can only be understood in relation to its context and scope. Given the breadth of SDGs and underlying ambitions, "technologies" for consideration include clean and environmentally sound technologies as well as other technologies to the extent relevant to achievement of the SDGs.

Facilitation: the concept of "facilitation" refers to both direct interventions to match supply and demand, transfer specific technologies, and indirect, broader policy interventions aimed at improving enabling environment for science, technology and innovation (STI).

Technology facilitation mechanism: the concept of "mechanism" describes a process or a system that has been set up to accomplish a particular goal. A technology facilitation mechanism refers to a process/system to enhance political will and facilitate meaningful and sustained capacity building and technical or financial assistance for developing countries on technology development, transfer and deployment as a core part of its activities, while also facilitating coordination of activities implemented by different UN agencies, private sectors, and other stakeholders.

[3] IAWG is comprised of UN-DESA, UNEP, UNCTAD, UNIDO, ITU, WIPO, the World Bank Group and UNESCO.

Methodology

To give due consideration to the diversity and complexity of existing technology-related initiatives in addressing this question, two rounds of surveys collected structured information as summarized in Figure 1.[4]

Figure 1: Information collected on existing technology-related initiatives

Input	Activity and Output	Outcome and Impact
• Institutional arrangements (e.g. underlying mandates) • Structure (mode of operation) • Budget, funding sources and staffing size • Decision-making process •	• Objectives • Coverage of countries • Coverage of SDGs and technology cycles • Functions, instruments • Policy areas	• Indicators, data, and/or anecdotal indication of success. • Implementation status

Questionnaires were sent to UNDESA, UNEP, UNIDO, UNCTAD, UNESCO, ITU, WIPO, WBG, FAO, WHO, UNU and UN Regional Commissions, as well as CBD, GEF, IAEA, IMO, ITC, OHRLLS, OSA, UNCCD, UNDP, UNOSSC, UNFCCC, UN-Habitat, UNICEF, UNISDR, UNV, and WMO. Structured information was collected from 22 responses received, which covered 70 initiatives. Of these 70 initiatives submitted, 40 have included detailed information and have therefore been included in the analysis.

Based on the information collected, this paper describes the landscape of technology-related initiatives by referring to the following assessment framework:

- **Institutional arrangement**, according to underlying international conventions/treaties or respective institutional mandates;
- **Coverage**, according to SDGs[5], technology cycle[6], and budget and funding;
- **Functions,** according to types of initiatives such as convening, knowledge generation/exchange/sharing, and financing, and recipient countries or types of targeted audience (from general public to specific public agencies or entrepreneurs);
- **Inter-linkages,** highlighting a coordinated approach, with a focus on capacity building activities according to the information of results reported in respective third party evaluations or self-evaluations.

This framework is intended to bring some conceptual clarity to the complex institutional roles and initiatives at the international level, and to provide an assessment framework to examine options to meet technology needs for achieving SDGs. This framework is also adopted as the organising principle for the remainder of the paper.

[4] Survey instrument and a preliminary inventory of identified initiatives are attached in the Annex (available upon request).

[5] We mapped the technology-related initiatives according to three types of SDGs: sectoral, cross-cutting and global commons.

[6] The technology cycle consists of research, development, demonstration, market formation and diffusion.

3. Institutional arrangements

There are more than hundreds of technology initiatives in various contexts at the global and regional levels, which are linked to international agreements related to environment, health and safety among others (Box 1), and many more at national and local levels. This section initially categorizes the existing initiatives according to their institutional arrangements (Diagram 1).

Box I: International Agreements and Conventions with Technology Provisions

In the areas of environmental, health and safety technologies, at least 18 international agreements, conventions, and protocols contain technology provisions, including the following:

- Convention on Biological Diversity
- United Nations Framework Convention on Climate Change
- United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity
- Vienna Convention for the Protection of the Ozone Layer
- Montreal Protocol to the Vienna Convention for the Protection of the Ozone Layer on Substances that Deplete the Ozone Layer
- Convention on the Transboundary Effects of Industrial Accidents
- Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to the Convention on Longrange Transboundary Air Pollution
- Protocol on Persistent Organic Pollutants to the Convention on Long-range Transboundary Air Pollution
- Protocol on Heavy Metals to the Convention on Long-range Transboundary Air Pollution
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
- Convention on Nuclear Safety
- Convention on the Law of the Sea
- International Undertaking on Plant Genetic Resources
- International Treaty on Plant Genetic Resources for Food and Agriculture

Source: UN SG's report: Options for a facilitation mechanism that promotes the development, transfer and dissemination of clean and environmentally sound technologies, A/67/348., 2012.

From institutional arrangement perspectives, in general, the technology-related initiatives can be categorized into

1) global/regional initiatives supporting/ related to specific treaties, conventions or other agreements between/across member states. They relate to environment, trade, investment, intellectual property or other policy areas affecting technology needs;

2) institutional partnerships, established, governed and/or maintained by multiple UN agencies not related to specific treaties, conventions or agreements; and

3) initiatives managed solely by an UN agency with time-bound tasks, without partnership arrangement.

Sub-group 1: initiatives related to environmental treaties or related conventions, or other legally binding agreements

This group of technology-related initiatives are the ones directly supporting the Rio conventions, environmental treaties or other legally binding agreements.

They are typically associated with specific international conventions that contain technology provisions and economic partnership agreements.
This sub-group can be further categorised into (1A) multilateral global initiatives; (1B) regional initiatives or initiatives covering a group of specific countries; and (1C) bilateral initiatives. The above mentioned examples are multilateral global initiatives.

Examples of multilateral global initiatives include Technology Executive Committee (TEC) and Climate Technology Centre and Network (CTCN), some of which include a technology development fund to support their operational elements on the ground.

Sub-group 2: initiatives, established, governed and/or maintained by UN agencies with partnerships but without specific treaties, conventions or legally binding agreements.

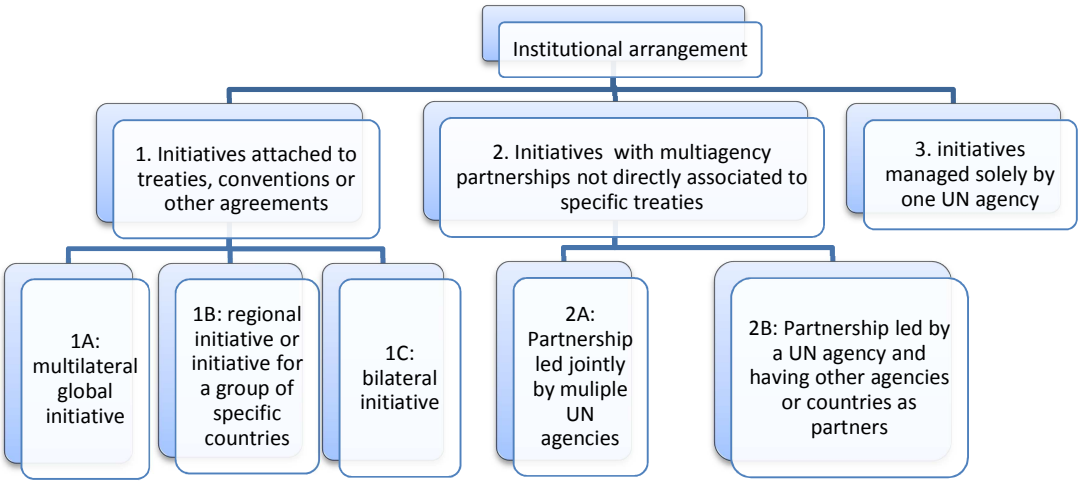
This group includes technology-related initiatives that do not associate with specific treaties, conventions or legally binding agreements which have direct signing parties. They are established, governed and/or maintained by existing UN agencies but do not operate directly under specific treaties, conventions or legally binding agreements.

This sub-group could be further categorized in: (2A) initiatives governed jointly by multiple UN agencies; (2B) initiative administered by an UN agency with participation of other agencies or countries as partners. Examples include multi-donor partnerships administratively supported by existing international organizations, such as the Climate Investment Funds/Clean Technology Fund (CIF/CTF), the Innovation Policy Platform (IPP).

Sub-group 3: initiatives managed solely by one UN agency with time-bound tasks

Some programmes/ initiatives were started at member States' requests for time-bound tasks. They often refer to country level activities and do not include multi-donor / stakeholder partnerships. For example, the World Bank has lending operation for investment and policy reforms to strengthen specific elements of national innovation systems, such as technology commercialization and incubation centers, venture capital funds, vocational and technical training, agricultural extension research and industry cluster development, according to country circumstances and priorities.

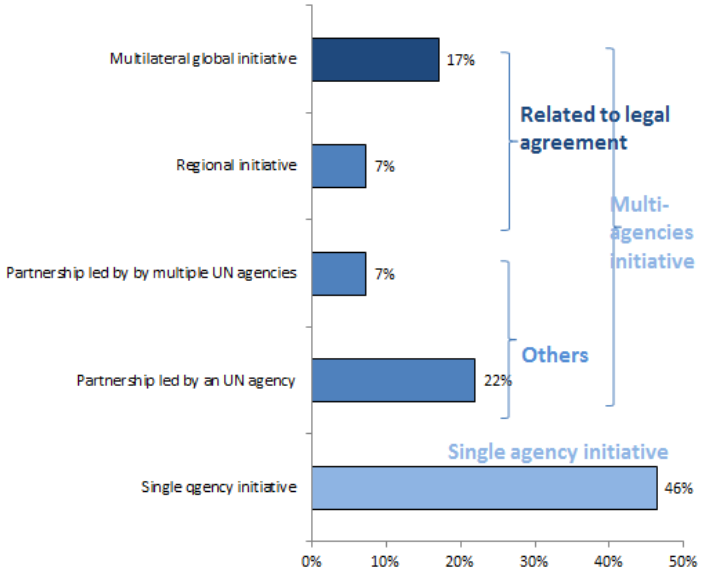
Diagram 1: Institutional arrangement - An illustration of typology



Source: authors' elaboration based on inputs from the Task 3 team (UNIDO, WIPO, and the World Bank) of the Inter-agency Working Group on a Technology Facilitation Mechanism.

Chart 1 summarizes the distribution of the 40 initiatives analysed through the survey according to the above mentioned typology. Approximately half of the initiatives are managed solely by one UN agency, as single agency initiatives; the rest is split between initiatives related to legally binding agreements and other multiagency partnerships. Notably, large proportion of single agency initiatives highlights a possibility of a larger space for inter-agency partnerships which could bring together UN entities in a joint endeavour in the area of technology facilitation for sustainable development.

Chart 1: Typology of initiatives with respect to institutional arrangement (% share out of total 40 initiatives)



Data source: UN Survey (2015).

Points for Discussion

When considering enhanced coordination between the UN technology-related activities, these different institutional arrangements, as well as the broader governance perspective, will need to be taken into account in the assessment of synergies and constraints for a more effective collaboration. The above mentioned types of institutional arrangements highlight agencies' starting point or establishment, when considering multi-agency coordination.

Further research will involve the development of the typology by looking at a broader governance perspective, such as key partners and stakeholders, nature of engagement and coordination mechanisms. This may be used as an assessment tool to discuss alignment of institutional mandates/or work programme, and assess areas of potential failure as well as areas that may be working well.

4. Coverage

Significant differences exist across the proposed 17 SDGs in terms of the stage of development of and access to relevant technologies, as well as maturity of international community's experience in their application and impact assessment.

In addition, countries, UN Agencies, private firms and other actors (who develop, facilitate, own or adopt technologies) vary in terms of the extent to which they exploit full technological potential in delivering on SDGs[7].

To accommodate these differences, we propose to first differentiate four types of SDGs, as summarized in Table 2.

Table 2: Types of SDGs

Types of Goals	Goals included	Remarks
"Sectoral"	**Goals #2, 3, 4, 6, 7**: agriculture and food security; water and sanitation; energy; health; education	Mostly **built on MDGs**, with **specialized agencies** to implement. Key outcomes could be relatively **attributable** to specific technologies (e.g. antiretroviral treatment for HIV/AIDS).
"Cross cutting"	**Goals #8, 9, 11, 12**: inclusive growth and jobs; infrastructure, industrialization and innovation; safe and resilient cities and human settlements, and sustainable consumption and production	**Newly added** to SDGs, mostly do not have dedicated UN agencies for implementation; Key outcomes are less attributable to specific technologies but rather to **national and subnational policies** on innovation systems & broader.
"Global commons"	**Goals #13, 14, 15:** climate change; oceans; forests, ecosystems and biodiversity	**Underpinning global sustainability challenges** and calling for developed and developing countries, public and private actions. Key outcomes could be attributable to global and national policies as well as specific technologies.
"Overarching" (not analysed)	Goals #1, 5, 10, 16, 17: poverty[8]; gender; inequality within and among countries; accountable and inclusive institutions; means of implementation and global partnership	Contribution of technologies to achievement of these goals are important but only through longer chains of cycles, presenting limited scope for discussions on specific initiatives related to technology facilitation initiatives.

Source: authors' elaboration.
Note: the purpose of 'grouping' 17 SDGs is solely for the convenience of simplified presentation of analytical results. It does not represent the views of the United Nations, World Bank Group or any of Member States/political groups.

For the initial mapping of the existing facilitation initiatives according to types of SDGs (except for "overarching"), following elements of the survey responses were assessed:

- Coverage of all surveyed initiatives with regard to types of SDGs and the stages of the technology cycle[9].

[7] Innovation literature applies the concept of *Distance to Frontier* when analyzing technological innovation and absorption affecting productivity of firms or economies, which inspired this paper in its attempt to analyze the effectiveness of international community in achieving SDGs. For reference, see Acemoglu et al. (2006).

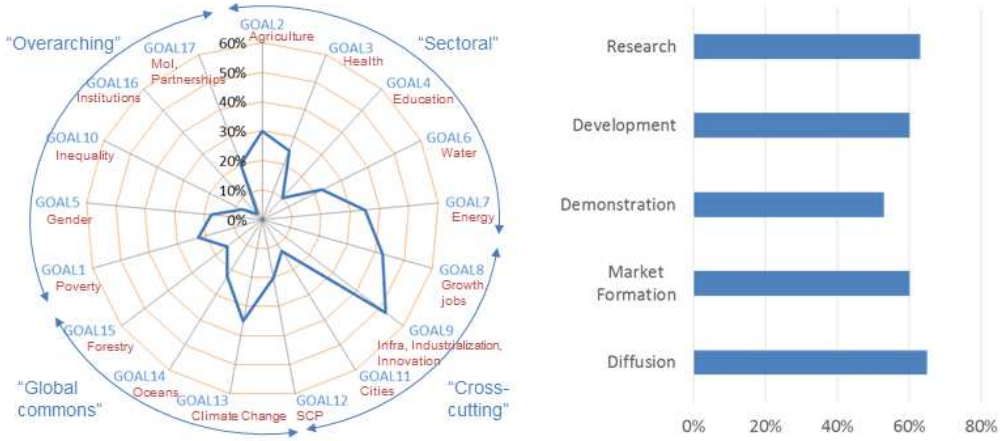
[8] Contribution of specific technologies to poverty reduction not necessarily through "sectoral" policy interventions, and need for further strengthening of science, technology and innovation in this regard, obviously require in-depth analysis of country experiences (e.g. role of management information systems in scaling-up conditional cash transfer programs) beyond immediate scope of this paper to provide an overview of the landscape and assessment framework.

[9] A total of 70 initiatives have been analysed based on self-reported links with SDGs and coverage of technology cycle.

- Distribution of resources across the types of SDGs and technology cycle[10].

Distribution of the submitted initiatives is summarized in Chart 2. Limited coverage of some of the SDGs (e.g. education, cities) may reflect limitation of the survey[11]. Note that these initiatives can cover multiple SDGs and technology cycles. Coverage of technology cycle indicate more initiatives tend to cover upstream (R&D) and/or downstream (diffusion) than mid-stream (demonstration to market formation), corresponding to generally observed bottlenecks in innovation processes, commonly referred to as "death valley" or the gap between laboratories and markets.

Chart 2: Coverage of SDGs and Technology Cycle



Data source: UN Survey (2015).

Combination of these two characteristics, together with the resources allocated, are summarized in Diagram 2 and illustrates diverging patterns across SDGs types. Most notably:

- For "Sectoral" Goals, more initiatives exist in downstream (market formation and diffusion) than in upstream (research, development) along technology cycle. Initiatives with large resource are concentrated in this Goals area (e.g. $1bn CGIAR) and especially in downstream (e.g. $5bn Clean Technology Fund). Country level impact attributable to technology adoption or relevant policy interventions, is most demonstrably achieved and rigorously assessed/reported in this area (e.g. energy consumption saved, emission reduced/avoided, cropping intensity multiplied).

- For "Cross-cutting" Goals, initiatives and resources are scarce in midstream ("death valley" most pronounced). Success is reported mostly on intermediate outcomes (e.g. Technology Needs Assessment informing national priority setting) while their outcome and impact are less understood.

- For "Global commons" Goals, initiatives are concentrated in upstream and overall resources are limited. Most initiatives focus on the global level outcomes which are

[10] For the 40 initiatives submitted through the 2nd round of the survey, information was collected on the annual administrative budget, staff size (both permanent staff as well as contractors), and financial capitalization.

[11] UN-HABITAT, known for initiatives related to technologies and urbanization, was not covered by the current survey; submissions through the 2nd round survey did not include ITU's nor UNESCO's initiatives on ICT for education.

related to research and development, such as IETC-SAT (International Environmental Technology Center's "Sustainability Assessment of Technologies").

The above pattern of coverage and resource allocation by UN-affiliated initiatives does not necessarily indicate gaps for UN system to fill. Adequate attention should be paid to initiatives outside the UN system, in particular in the private sector, which is not in the scope of the current mapping exercise.

For example, there is increasing recognition of innovative private-led or multi-stakeholder initiatives by major actors (e.g. Gates Foundation and GAVI on health) as well as emerging intermediaries and social entrepreneurs (e.g. technology-focused crowdfunding platforms), in many cases around "sectoral" Goals.

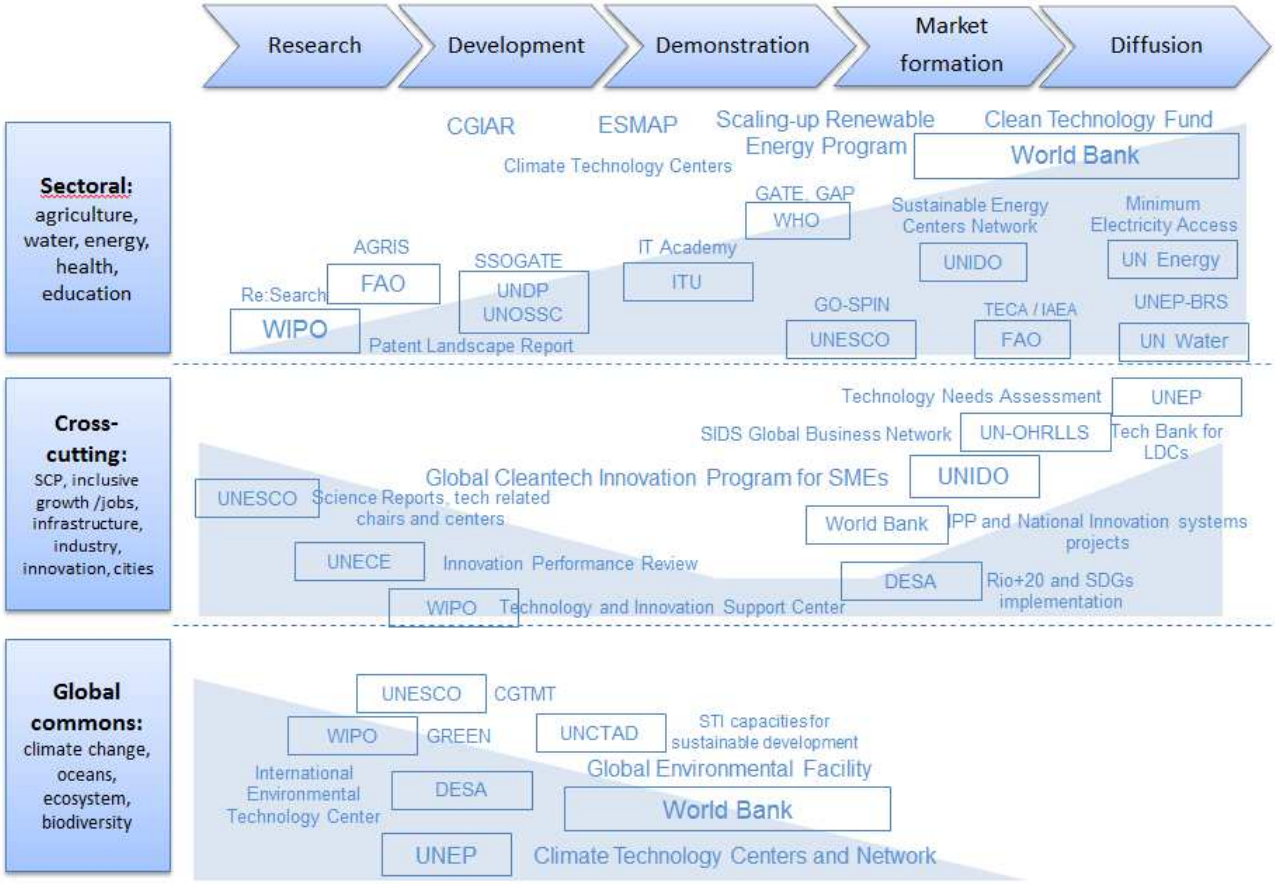
In addition, STI-related bilateral initiatives, such as Global Innovation through Science and Technology (GIST), Building Opportunity Out of Science and Technology (BOOST) and the Global Innovation Fund, are well-recognized in policy areas under "cross-cutting" Goals. Newly established IFIs (NDB, AIIB) are expected to facilitate flows of technologies through infrastructure FDI, South-South trade and exchanges.

Finally, policy coordination and norms/standards setting around "global commons" are increasingly undertaken by other international or civic forums (e.g. G20 on infrastructure, Global Economic Forum on sustainability).

Points for Discussion

Taking into account the above analysis, and considerations, the discussions on UN system's contributions toward achievement of the SDGs through better coordination of technology-related initiatives should be informed by i) results demonstrated and lessons learned from both the UN's and others' initiatives; ii) consideration of resource efficiency (opportunity costs, crowding-out private initiatives); and iii) the assessment of "fit for purpose" to meet global and country needs with the UN system's comparative advantages. Additional work with broader scope is needed for informed deliberation.

Diagram 2: Resource Mapping According to Coverage of Technology-Related Initiatives



Note: Size of box/text indicates respective agencies' size of relevant activities, by administrative budget and financial disbursement. Three size classes are defined as: large ($10m or more annual admin budget, or $1bn or more annual financial disbursement); medium ($1m-10m budget or $100m-1bn disbursement); small (less than $1m budget or $100m disbursement). For presentational simplicity, agencies and activities covering multiple stages of technology cycle are mapped to most relevant stages. Source: authors' elaboration based on the mapping surveys to UN Agencies in 2015; and United Nations (2012), A/67/348.

5. Functions

In this section, we have categorized technology-related activities according to three broad functions: convening (networking, agenda shaping, consensus building); knowledge (creation, sharing and exchange of data, research, policy advice, practical experiences); and resource mobilization (financing, matchmaking, installation). Capacity building is considered an integral part of the initiatives across these functions.[12]

The initiatives analysed can address needs at the global, multi-national, or national levels. We define the following 9 functional types by combining the functional categories and levels of needs:

- Initiatives addressing global needs by:
  - Aligning political will, catalysing partnerships across countries/stakeholders
  - Analysing global STI landscape, filling knowledge gaps, setting norms/standards
  - Mobilizing and channelling funding for agencies to address national needs
- Initiatives addressing multi-national and regional needs by:
  - Harmonizing STI-related policies at regional level or with specific country groups
  - Documenting experiences and exchanging lessons from countries' activities
  - Match-making transactions, transferring and adapting technologies
- Initiatives addressing national needs by:
  - Convening national agenda, promoting networking and facilitating dialogues
  - Diagnosing national STI landscape, advising on design of STI policies
  - Providing finance or other assistance to implementation by public and private

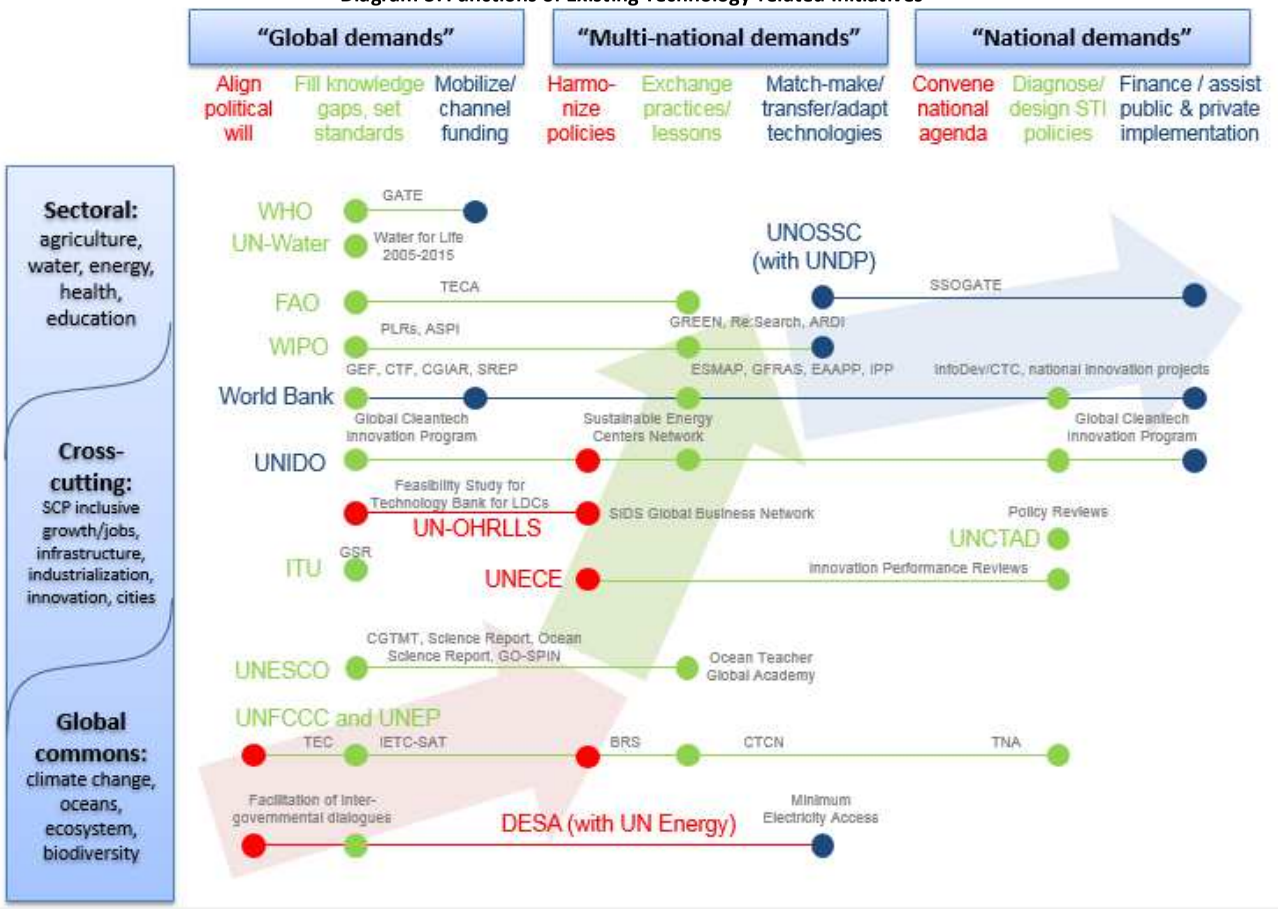
According to this typology, Diagram 3 summarizes functional distribution of technology-related initiatives and implementing agencies.

The observed patterns reiterate can be summarized as follows:

- At the global level, almost all surveyed agencies produce and disseminate tools / reports on STI in areas of their mandates (green). A few agencies also cover other functions. DESA/UNFCCC facilitate inter-governmental processes on STI (red). World Bank and WHO administratively support conventions or related funding mechanisms (blue).

[12] Most of the initiatives (30 out of the 40 covered by the 2nd round survey) reported capacity building as its function element, though the definition of capacity building appeared to vary. More in-depth analysis of capacity building is presented in the later section of this paper.

Diagram 3: Functions of Existing Technology-related Initiatives



Note: Location and colour of dots and lines indicate primary focus of technology-related activities by respective agencies. For presentational simplicity, agencies covering multiple SDG areas are consolidated to an area where their activities were most represented through their survey response. Specific initiatives corresponding to each dot and agency are listed in Annex.
Data source: UN Survey (2015). Legend: Blue = political will and policy frameworks; Green = knowledge and policy lessons; Red = financial and technological resources.

- At multi-national level, division of work is more distinct. A number of initiatives focus on policy harmonization (red) such as UNIDO's sustainable energy centres network through Regional Economic Communities, and UN-OHRLLS's work on SIDS Global Business Network. Matchmaking of research and technologies (blue) include UNOSSC's SSOGATE and WIPO's GREEN, Re:Search, and ARDI. Knowledge functions (green) tend to build the STI capacity (UNESCO centers and chairs), aggregating national experiences or tailoring global knowledge for country circumstances, are undertaken largely by those not involved in the above two.

- At national level, two visible groups of activities are STI policy assessments and reviews (green, e.g. UNEP's Technology Needs Assessments, UNECE's Innovation Performance Reviews, and UNESCO and UNCTAD's Policy Reviews) and implementation/installation (blue, e.g. World Bank on national innovation systems, UNIDO's Cleantech Innovation Program).

Points for Discussion

Observed patterns may inform Member States' consideration of comparative advantages of UN system as a whole, underpinned by its global-to-country connectivity, convening power, norm setting and knowledge sharing, financial capabilities, and comprehensive coverage of agenda and expertise, in mobilizing and catalysing efforts across domestic and international, public and private efforts, to strengthen STI toward achievement of the SDGs.

In realizing these advantages, fragmentation, potential duplication and the need for enhanced coordination will need to be addressed, based on the observations such as:

- **Few initiatives address political will and policy frameworks across global, multi-national and national technology-related agendas.**
- **There appears to be room to synergize global knowledge; broaden exchanges of experience and expertise; and extend diagnostic work to support implementation.**
- **Funding and matchmaking channels may be too narrow/concentrated.[13]**

History indicates that the process from global political alignment and resource mobilization to national actions tends to be one-way and gradual (indicated in the Diagram with three "big arrows"). Time-bound nature of SDGs presses clear need to enhance and accelerate the connection between global and national actions. Achieving the SDGs may call for alternative or diversified models[14] of connections between global frameworks and national actions. (Box 2).

[13] Diagram 3 illustrates that global public resources were channeled through WHO and the World Bank. It also shows only UNOSSC, WIPO and DESA play somewhat matchmaking roles.

[14] In innovation literature, "disruptive innovation" refers to emergence of new products or services, often simpler, more accessible and affordable, transforming existing markets where complication and high cost are the status quo. Multiple sector experiences have been documented on how niche markets, initially unattractive or inconsequential to incumbent actors, eventually overtook and eliminated existing industries. For reference, see Christensen (1997).

Box 2: Technology and Local Capacity

In 1963, Dr. Norman Borlaug visited India, with 100kg of wheat seeds he had cross-bred in Mexico – the beginning of "Green Revolution," later saving millions lives from famines through adoption of high-yielding varieties seeds and modern agricultural techniques such as irrigation and fertilizers.

India's combat with rural poverty, however, was on winding roads. For a decade, Mahatma Gandhi's "Village Republics" vision had sought indigenous capacities for "folk solutions." Piloted in Etawah District, national community development program had prioritized agriculture and reached 16,300 villages by late 1950's, alongside over 60 countries on similar paths supported by international aid.

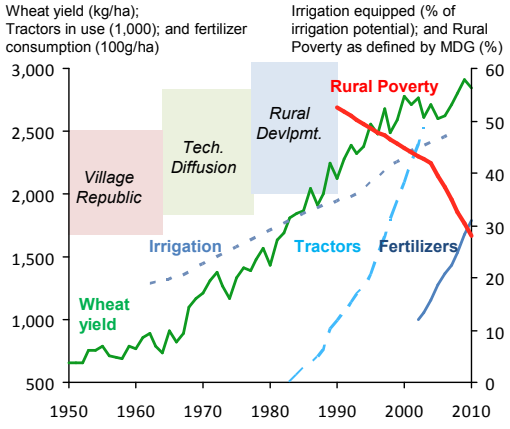
Success of this approach is debatable. Some observers point to failure to learn from and mitigate elite capture, or local political dynamics and non-poor interests taking over resources and decisions. India's Green Revolution and many countries' discontinuation of community development projects were followed by periods characterized by centralized agricultural and industrial growth. By 1980's, policy-makers with renewed focus on multidimensionality of poverty (e.g. Amartya Sen) turned back to participatory approach when India also launched Integrated Rural Development Program.

Developing and using technologies to achieve development outcomes, and building conducive capacities at multiple levels of societies, face common challenges of identifying and scaling workable solutions, often through global, national and sub-national exchanges of political, knowledge and financial resources.

HIV/AIDS is another case in point – since late 1970's when African doctors observed opportunistic infections, followed by the first HIV clinical case identified in the US in 1981. Progress was limited for 15 years in developing countries, with communities and national authorities faced devastating denial and stigma attached to the unfamiliar disease. When antiretroviral therapy was shown to be effective in 1996, critical developments coincided – creation of UNAIDS (promoting international dialogues and resource mobilization) and publication of instrumental researches. E.g. the World Development Report helped to convince Bill Gates to create the Gates Foundation. As the Global Fund and bilateral aid started to fill financing gaps, multilateral agencies shifted focus to strengthening capacities across relevant ministries to plan and implement national programs, toward 2005 when the increase of HIV-related death was reverted.

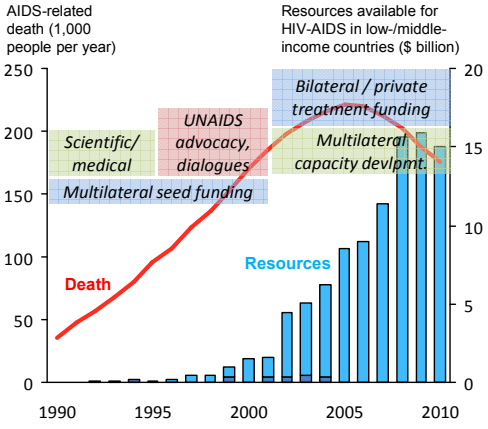
Lessons can be drawn from these examples – on sequencing and coordination of efforts on political alignment, technology development/dissemination, and on relevant capacities at sub-national, national and international levels. Toward achievement of SDGs, questions on time might be pressing – how many lives could have been saved if efforts moved 10 years faster? What would it take to have technologies reach the poor and improve productivities in a sustainable manner not in decades but within 15 years?

India policies, agro-technologies and outcomes – before and after Green Revolution



Source: Author's elaboration on FAOSTAT; AQUASTAT; India MDG Report; Mansuri and Rao (2012); and Immerwahr (2015).

World Responses to HIV/AIDS – political will, knowledge, and finance



Source: Author's elaboration on Global Fund-World Bank HIV/AIDS Programs Study (2006); and UNAIDS Global HIV/AIDS Report (2010)

Source: authors' elaboration based on Mansuri and Rao (2012), Immerwahr (2015), Shakow (2006) and UNAIDS (2011).

6. Inter-linkages and Coordination

To highlight specific linkages across surveyed initiatives, Diagram 4 builds on the previous diagram and summarizes the distribution of capacity building elements, and visualizes all linkages as specified in the survey responses. Institutional arrangement types, as analysed in earlier section, is shown with circles with the initiatives involved in capacity building. The solid circle lines indicate the initiatives related to legally binding agreements, and dotted circle lines represents activities associated with institutional partnerships. The lines between dots show the inter-linkages between capacity building initiatives.

As far as the survey identified, many capacity building initiatives work in isolation. However, there are some initiatives with multiple inter-linkages. Two major intersections of linkages are World Bank (with GEF, CGAIR, ESMAP, CTF and SREP, providing funding to other implementing agencies) and UNOSSC with UNDP (with SSO-GATE, jointly creating regional facilities and promoting policy harmonization with partner agencies). These bridges or "hubs" have coordination mechanisms embedded in their institutional arrangements, and in many cases, attached to funding channels. These existing coordination mechanisms can be leveraged as operational arms to enhance the links between the different initiatives at global and national levels and across functions and levels within the UN system and beyond.

The observed patterns also vary across "SDG types" and "institutional arrangements", posing different coordination challenges:

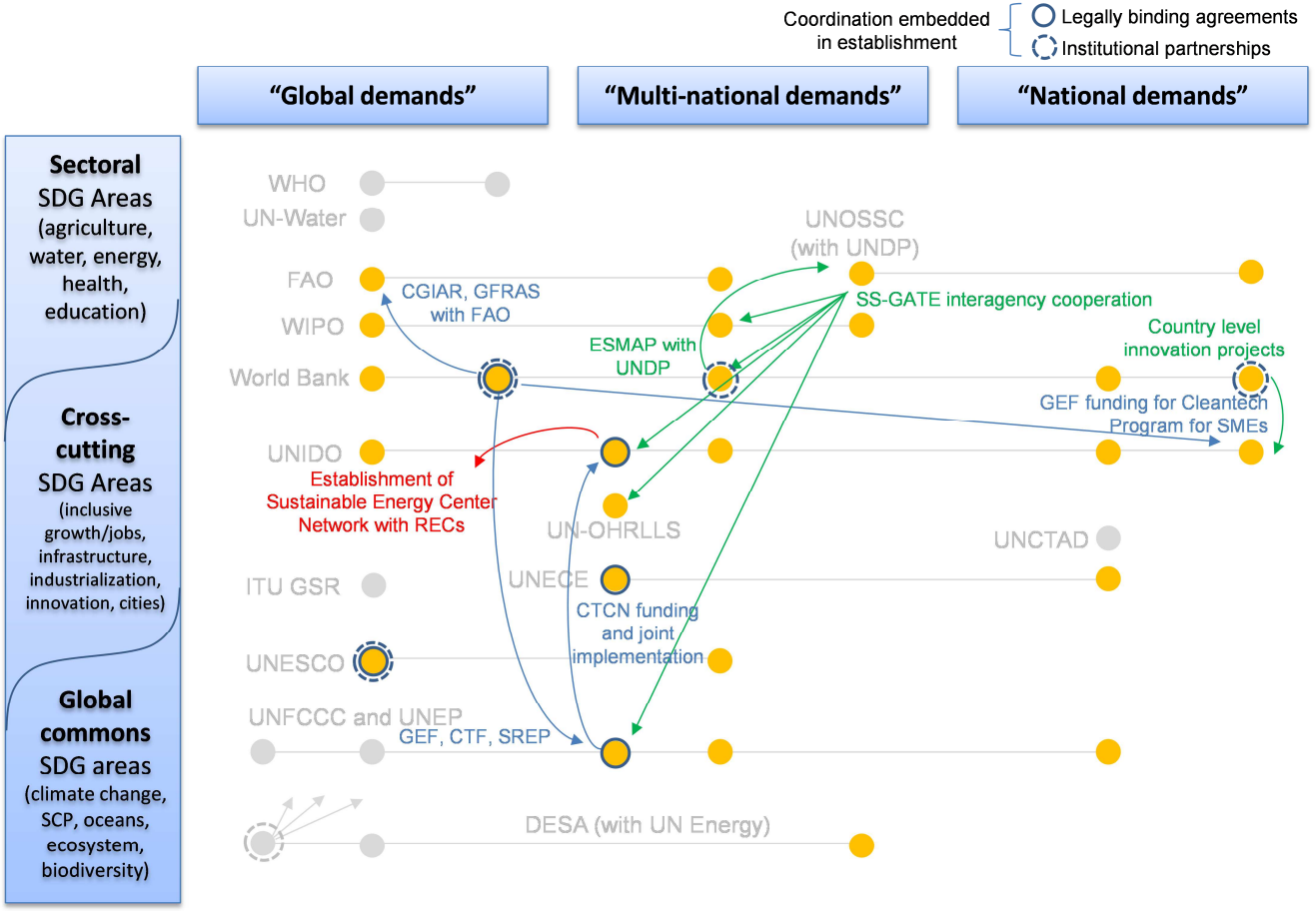
- The initiatives on "global commons" are largely related to multilateral agreements – often encompassing a distinct mandate for each initiative, such as GEF as a financial mechanism for several conventions (e.g. Convention on Biological Diversity, Stockholm Convention on Persistent Organic Pollutants, UN Convention to Combat Desertification), and CTCN as a technology transfer/facilitation channel as mandated at COP19. But there seems to be a lack of a coordination structure across the board for collective and coordinated responses to broader inter-linked challenges across SDGs.

- The initiatives relating to the "cross cutting" cluster of SDGs are in many cases addressed through institutional initiatives not involving multi-donor or multiagency partnerships, and often facing high coordination cost due to agency-specific combinations of internal expertise due to lack of harmonized frameworks, well accepted taxonomies or other coordination mechanisms.

- The initiatives relating to the "sectoral" cluster of the SDGs involve initiatives spanning in all forms of institutional arrangements. Many of them have dedicated financial resources which are concentrated to support downstream of technology cycle. This pattern shows the diversity of challenges and the level of the efforts. Importantly, many technology-intensive "sectoral" issues require "cross-cutting" or "global commons" characteristics and holistic approaches as broader challenges evolve[15]. Accordingly, identification of needs for better coordinated responses should be informed by deeper, cross-sectoral examination, which is beyond current coverage of survey responses.

[15] For example, energy efficiency for climate change mitigation, transport for health through communicable diseases or road safety, agricultural practices and rural non-farm activities resilient to natural disasters.

Diagram 4: Existing Capacity Building Activities and Coordination



Note: the lines between the dots indicate the inter-linkages based on the survey results on the capacity building activities. Legend: The yellow dots are the ones submitted capacity building programmes, while the grey ones represent the ones didn't. Blue arrows refer to coordination through funding and results reporting; green arrows refer to coordination through policy and knowledge cooperation. Data source: UN Survey (2015).

In addition, we found

- Broadly, existing technology-related initiatives may have rooms to strengthen monitoring and evaluation (M&E) systems for tracking their outcomes and impact. The majority of the initiatives only reported "success" in securing funding (input); delivering training or building centers (outputs); and influencing global debates or national policies (intermediate outcomes). A few reporting impact included: CGIAR on agricultural productivity and sustainability as well as economic benefit generated ($1 for CGIAR produces $9 for farmers); and the Clean Technology Fund on installed capacity, energy saved, and emission avoided. None of the initiatives responded with measurable outcome indicators for capacity building.

- None of the initiatives responded to the question to "identify success factors relating to governance and interagency cooperation (if applicable)."

- Initiatives reporting on impact should correspond with the bridges as sources of funding in Diagram 5.

In sum, the patterns of mapping inter-linkages of capacity building initiatives show:
1) There is a need to enhance the links between the different initiatives at global and national level and across functions and levels;
2) UN initiatives need to be better coordinated in accordance with different coordination challenges, due to factors such as SDGs types and institutional arrangements;
3) In particular, capacity building initiatives call for better coordination and M&E.

Points for Discussion

It is important to emphasize that better coordination should mean jointly achieving better outcomes. To assure the contribution of coordination within UN system to the desired outcomes, the initiatives' monitoring and evaluation frameworks and indication of success should be informed on their coordination patterns.

For further deliberation on Inter-UN coordination, it will be important to tackle the issues related to outcomes, with due attention paid to monitoring and evaluation around technology-related global, regional and national targets in context of the SDGs.

7. Findings

This paper provides an initial mapping of the existing UN technology-related initiatives. It also examines the institutional arrangements, coverage, functions and the inter-linkages and coordination between these initiatives. With caveats on the limitation of the underlying data collected through ad-hoc initial surveys, key findings as summarized in this section may inform the inter-governmental processes on various aspects of a Technology Facilitation Mechanism and follow-ups.[16]

[16] Again, it is solely for illustrative purposes to stimulate and inform substantive discussions possibly building on the findings presented in this paper. The examples of perspectives do not represent institutional views of any of the UN agencies participating in the study.

Firstly on **institutional arrangements**, treaty-based mechanisms, other partnerships and funding sources were identified as bridges for inter-agency coordination.

In this context, when considering enhanced coordination between the UN technology-related activities, the following points shall be considered in the assessment of synergies and constraints for a more effective collaboration:

- Various forms of institutional arrangements in terms of the scope and decision-making process of the (interagency) institutional arrangement; and
- Broader governance perspective, in terms of key partners and stakeholders, nature of engagement, and coordination mechanism(s) under which initiatives are undertaken.

Secondly on **coverage**, technology-related initiatives are at different stages of maturity, in terms of coverage of the technology cycle and resources mobilized and allocated, according to the nature of challenges they aim to address based on the "types of SDGs".

Patterns are identified as follow:

- For "sectoral" goals, more initiatives exist in downstream (market formation and diffusion) than in upstream (R&D); large resources concentrated in downstream;
- For "cross cutting" goals, initiatives and resources are scarce in mid-stream (demonstration to market formation); a gap commonly seen as "death-valley";
- For "global commons" goals, initiatives are in upstream and resources are limited.

To strengthen UN systems' complementarity with other public and private initiatives and improve overall efficiency and effectiveness, further efforts are needed in terms of mapping of country needs and non-UN initiatives, exchange of expertise and enhancing synergies between UN agencies and with non-UN initiatives. More concerted efforts are also needed in terms of resource allocations for promotion of the relevant technology exchanges and for furthering a broader dialogue on translation of global STI policy frameworks to national STI actions in view of achieving the SDGs.

Building on the findings, areas for further deliberation may be highlighted as follows.

- Would decision makers be better informed by using the resource map, on financial resource implications of promotion of technology transfers, including through facilitation of preferential or concessional access to technologies? Any other information would be needed for discussion?
- Are there rooms to further collaborate, exchange expertise, and synergize individual agencies' efforts on improving knowledge generation for innovation policies and enabling environment, including local capacity building?
- For transformative changes addressing challenges of SDGs, do we have adequate forums to further and broaden dialogues on the international policy frameworks, and connect global frameworks with national actions?

Thirdly on **functions**, technology-related initiatives currently cover a wide range of activities, such as convening, knowledge generation, sharing and exchanging experiences, and resource mobilization, at multiple levels addressing global, inter-national and national needs.

A successful implementation of the SDGs and the post 2015 development agenda may require shorter cycle from political will to resource mobilization and enhanced connections between global frameworks and national actions.

Finally on **inter-linkages and coordination**, patterns of inter-linkages varied across types of SDGs, representing different coordination challenges.

As better coordination should mean jointly achieving better outcomes, further discussion on this matter should also include considerations of collective desired outcomes as well as monitoring and evaluation frameworks to measure progress on technology-related targets.

8. The Addis Outcome and the Way Forward

To further inform policy deliberation by Member States, data and analysis as presented in this paper can be strengthened through the below four inter-linked elements of future work:

- Improve **coverage** (comprehensive and/or more representative) and **data quality** (with harmonized definitions) building on the structured information collected on technology-related initiatives within UN system;
- Identify relevant **non-UN initiatives** (i.e. partnering with technology-related initiatives within UN system; member states' bilateral efforts with similar or complementary objectives) for collection of comparable information;
- Better understand STI **needs** by taking stock of available information (and if needed, collect new information to supplement), at country level as well as global, regional levels or for specific country groups;
- Undertake **systematic reviews** on selected topics for further deliberation (e.g. specific SDGs, technology clusters, or policy areas) to examine UN system's initiatives and their outcomes, identify success factors and/or lessons, including on responsiveness to needs, comparative advantages, and contribution to achievement of the SDGs.

In addition, taking into account the technology-related elements decided in the Addis Ababa Action Agenda of the Third International Conference on Financing for Development, the following key areas of work have been highlighted.

Online platform and knowledge hub

The platforms submitted through the above mentioned surveys, are operated largely in isolation from each other and serve a range of different communities, mostly focused on particular sectors, themes or country groups. Most of these platforms do not share formal coordination or joint governance arrangements. Furthermore, they are operated based on a range of technologies.

In response to the challenges, the initial work and thinking on options for an online knowledge hub and information platform has been carrying out by the UN, which may provide a basis for discussion to guide future work in this area (see IAWG, 2015).

Annual forum on STI for SDGs

The above mentioned surveys identified 11 relevant global forums for the discussion of various STI issues, including a biennial Ministerial Forum on Science, Technology and Innovation in Africa (2014, Rabat) though there are most likely others not covered by these responses (e.g., the OECD Global Science Forum). In addition, there are legislative meetings associated with all of the 18 international agreements, conventions, and protocols with technology provisions that were identified in the areas of environment, health and safety. These forums have varied functions to carry out their mandates for the relevant processes. Some forums are focusing on global policies and policy frameworks, while others are more technical in nature, focusing on specific area of works for filling knowledge gaps and agreeing on global technology-related standards. Few forums are focusing on mobilizing or channelling resources, match-making, transferring technologies, and assisting public and private implementation in a local context.

One lesson from this work is that there is a need for a regular forum for exchange of experience and for forging of partnerships on STI for the SDGs among public and private actors in developed and developing countries alike.

The annual forum on science, technology and innovation for SDGs provides a venue for facilitating interaction, matchmaking and the establishment of networks between relevant stakeholders and multi-stakeholder partnerships. The forum would identify and examine technology needs and gaps, including on scientific cooperation, innovation and capacity-building, and also in order to help facilitate development, transfer and dissemination of relevant technologies for the sustainable development goals.

Coordinated approach to capacity building

In substantiating responses to member States' call for more coordination within UN system, it is important to consider the observed functional distribution of STI initiatives. Donors may wish aligned, single UN voice at the global front; recipient countries may wish coordination with synergies and complementarities at country level. Links between global and country levels, as well as across functions (i.e. political, knowledge, resources), shall have rooms for strengthening.

As a result, work on comprehensive stocktaking is a mid-term agenda, to be pursued in parallel with implementation of the Science Technology Innovation-related decisions contained in the Addis Ababa Action Agenda. . Building on the findings from the initial mapping exercise in this paper, special effort will be need to a joint undertaking toward coordinated approach to capacity building programme, in response to calls from member states.

Above all, a strengthened UN system interagency coordination mechanism in the form of Inter-agency Working Group or Task Team on STI for the SDGs could play an important role in effective delivery, in support of the future implementation of the post-2015 development agenda and the SDGs.

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