Report of the E-Discussion

BUILDING THE FUTURE WE WANT WITH SCIENCE, TECHNOLOGY AND INNOVATION (STI) AND CULTURE

18 February – 19 March 2013

Organized by the United Nations Development Programme (UNDP), United

Nations Department of Economic and Social Affairs (UNDESA), and

United Nations Educational, Scientific and Cultural Organization (UNESCO)

1. INTRODUCTION

This is a summary report on the first part of e-discussion, which took place from 18 February to 19 March 2013, focused on the critical role of science, technology and innovation (STI), as well as culture in tackling global development challenges.

This e-discussion was organized jointly by UNDESA, UNDP and UNESCO and moderated by Lidia Brito (UNESCO) and Selim Jahan (UNDP) with the assistance from Ernesto Fernandez Polcuch (UNESCO), in Phase 1; and by Giovanni Boccardi and Guiomar Alonso Cano (UNESCO) and Sara Ferrer Olivella (MDG-Fund) in Phase 2.

The discussion benefited from the active participation of experts on STI and culture (researchers, academics, policy advisors and practitioners). The e-discussion benefited from the participation of more than 1550 registered members, generating 123 comments and more than 780 views, from 50 countries. Additional contributions were received by email from experts not formally logged into the Teamworks system. E-dcisussion participants participated in English, Spanish and Portuguese. (See Annex for full list of participants).

Contributors´ institutional backgrounds included UN agencies, universities, research institutes, governmental institutions, civil society organizations and non-affiliated individuals. The e-discussion participants shared their personal and professional experiences, in English, Spanish and Portuguese, on all three main discussion threads posted.

This report aims to provide a synthesis of the E-Discussion including key points, purpose, main contributions and examples of practices as described by the contributors.

2. CONTEXT

The E-Discussion was organized as part of the preparatory process for the 2013 Annual Ministerial Review of the UN Economic and Social Council. Arranged in partnership between UNDESA, UNDP and UNESCO, the e-discussion served as an open, multi-stakeholder forum for practitioners, experts and researchers to share new ideas and formulate critical policy messages to the UN intergovernmental negotiations on the potential of STI and culture for sustainable development solutions.

The E-discussion covered a large range of topics related to Science, Technology and Innovation (STI), and culture. The key messages of the e-discussion include:

1. STI is critical to sustainable development. It is through innovation in science and technology that humanity will be able to better address the issues of

sustaining our environment for future generations, while contributing to poverty alleviation and socio-economic development.

2. The Post-2015 Development Agenda should include Science, Technology and Innovation in an explicit, cross-cutting manner, while incorporating relevant, sound and quality indicators for measuring and monitoring STI.

3. Human resources are key for societies to move towards sustainable development. Science, Technology, Engineering and Mathematics education is a central tool. Women's potential needs to be fully exploited in STI.

4. Developing countries need to establish STI capacities to be active participants in the move towards sustainable development. Technology transfer mechanisms need to be improved and made more flexible.

5. The interface between science and policy needs to be strengthened, by fostering STI capacities and establishing proper, participative institutions for STI advice.

6. Culture, at different levels, can effectively contribute to address current and emerging sustainable development challenges that range from persistent poverty, increasing inequalities, population growth, urbanization, environmental degradation, natural disasters and climate change.

7. There is today a substantive body of experience across regions that demonstrates how culture, both in its narrow and wider sense, is linked to each of the eight Millennium Development Goals. Culture-based projects have played a positive role in achieving the MDGs, have built ownership of communities and have contributed to the sustainability of development objectives. These experiences, practices and research need to be replicated, expanded and scaled up in future development interventions.

8. Culture plays different roles at different levels; in its narrow sense, the culture sector in low and middle-income economies is driving more equitable and inclusive forms of growth, benefiting a large spectrum of economic actors and bringing in other positive externalities. Culture is also helping to rebuild trust and improve social cohesion particularly in fragile and post-conflict states. In its wider sense -- as the norms, values and beliefs that guide human action – culture contributes to the sustainability of development interventions as well as to a more sustainable use of natural and cultural resources. It enables people to truly take ownership of development interventions, makes changes more sustainable over time and thus increases the efficiency of projects and policies. Cultural resources are also a valuable reservoir of knowledge to tackle the scarcity of natural resources, mitigate the impacts of climate-change and strengthen the resilience of communities. Finally, culture is an integral part of human rights, and thus - within the respect for other fundamental rights - communities and individuals must be able to create, participate, access and enjoy their culture and that of others free from fear.

9. Efforts need to be made to further increase the visibility of outputs of culture-based projects, expand the knowledge base, and provide evidence that "soft" interventions from culture at project/program level can also address pressing issues and needs and yield concrete results. It is also urgent to build capacities to pursue the measurement of the contribution of culture to development processes at a macro level with global indicators.

3. MAIN CONTRIBUTIONS TO THE E-DISCUSSION

PHASE 1 – Science, technology and innovation

STI, its relevance and importance

In many circles, Science, Technology and Innovation (STI) are recognized as critical for sustainable development. However, there is still a need for further arguments to be developed towards major stakeholders for this idea to become completely mainstreamed. Moreover, in its application, it is fundamental to look closer to the next level of detail. STI activities are varied and involve different actors. Different types of STI activities (such as R&D, technology transfer, adoption, or adaptation) respond to different needs and have to be promoted in a balanced way in developing countries. None of these, however, can be set aside if societies aim at achieving sustainable development with the support of STI, particularly to put in place evidence-based policies for this aim.

There was a general agreement amongst participants that STI is critical to sustainable development and is an especially important subject for the development of countries and the potential elimination of opportunity gaps, and can play a critical role to solve global problems related to sustainable development.

Technology can be a double-edged sword for human kind, bringing positive and negative impacts in life. Technology helps us solving complicated and time-consuming problems in easier and simpler ways. However, if it is not used properly, technology could be harmful for human being. For example, nuclear energy could bring advanced energy source in one hand, but it could destroy humankind in a blink of an eye. In the end, technology is only a tool; the most important is the one who use or hold the control over it. Therefore, norms in society are important to remind people the boundary of proper use of a technology. Before adopting a new technology, proper technology assessment needs to be carried out, possibly by governments.

The ability of STI systems to deliver depends on continually improving capacity. Yet, capacity is multidimensional and has interrelated characteristics and related challenges. Strong and sound STI systems can reduce dependence on foreign technologies and can increase countries´ capacities to produce and to market technologies to foreign countries or global markets.

It was also largely acknowledged that STI should be integrated into the Post-2015 development agenda, because this would serve as a means of keeping the focus on STI on the front burner for policy makers.

It has been cautioned, however, that increased resources devoted to innovation and technology should not imply greater demand on natural resources. STI activities need to be further oriented towards sustainability and sustainable development. The sustainability science approach could provide orientation towards this goal. In this sense, new science, technology and innovation policies will need to be designed at all levels, aiming at establishing STI policies for sustainable development.

Monitoring and evaluation is one of the major challenges identified. For many respondents, the absence of proper accountability mechanisms was pointed out as one of the main deficiencies of the MDGs. The Post-2015 development agenda should ensure sustained new indicators and accountability. In addition, indicators need to improve quality, in its wider sense, including relevance, timeliness and policy-orientation.

STEM Education and popularization

Human Capital is seen as one of the key factors for STI development in the countries, leading towards the importance of education at all levels, particularly science, technology, engineering and mathematics (STEM). A Knowledge Society requires knowledge workers, but especially knowledge citizens. Access to quality education for all is the first step in this process.

Education for all has been successful in increasing primary and secondary school education and skills development. But particularly for African countries to contribute more effectively to global sustainability will require investing in higher education and STI. African countries need to tap the innate innovative capability of its 50% population the youth through research and development in education science, technology and engineering. Emphasis in education in Post 2015 must be in higher education and science for society.

Universal primary education though essential is not enough given the rapidly changing scenarios where only specialised skills and knowledge will ensure fruitful employment. At one end of this *continuum* will be vocational skills and at the other end will be hyper-specialized but interdisciplinary skills needed in the knowledge economy. Thus some participants proposed that the MDG goal of universal primary education might transition to a broader approach, such as for example "universal skills education". There is a need for building more technical and vocational schools, particular in poor areas, both rural and urban. Such schools should seek for orientations according to the needs of the area, including its natural resources, in order to be close to the job market

Schools need to further incorporate ICTs and its application to the classroom. This process, combined with quality science education, can support sustainable development in its various pillars, by educating critical citizens, aware of laws and rights and capable of exercising their rights, in fields such as education, health, or livelihoods.

One of the key aspects to link STI and sustainable development is through Education for Sustainable Development (ESD). ESD gives children, youth and adults the knowledge, information and tools they need to make smart decisions to create a sustainable future for all. It is the collective contribution of the world's education and learning systems (formal, informal and non- formal) including preschool to higher education, the world's public awareness and information sharing systems, and the world's public and private sector's training systems.

ESD focuses on concerted activities in five major spheres:
10. Access and retention in quality education.
11. Reorienting the current formal education systems from the current underlying focus on traditional development to one focusing on sustainable development. The engagement of higher education is particularly necessary.
12. Engaging and building public awareness and understanding to build an informed society that not only understands the need for wise reform, but also recognizes current or emerging unsustainable policy and practice.
13. Training and re-orienting current practice in all sectors of society, to achieve sustainability and to address deep-seated attitudes and perspectives to social, economic and environmental issues in order to facilitate future training and professional growth.
14. Youth and their Empowerment as key stakeholder for sustainable development pathways to address the global crisis of youth disempowerment and disengagement.

In terms of STEM Education, one of the most concerning issues is the diminishing interest of young people in taking science courses or going into scientific or technical fields. This trend is resulting in low quality and quantity of science human resources, and overall deterioration of scientific and technology literacy in the region. Some of the reasons are the young people's mind-set of seeing S&T as a complicated field with low reward and lack of job availability.

Some recommendations are to change the perception of young people and raise their curiosity in S&T. Government also should increase reward and salary for scientists and engineers, offer more and better scholarships for science and technology students, support funding for S&T research and equipment in schools and universities, redesign the S&T education curriculum, and add more entrepreneurship programmes in S&T majors to increase students' entrepreneur skills in order to create more job opportunities.

In this context it is also important to promote the popularization of science, ensuring equitable access to and use of techno-science, through improved science journalism, as well as networks of STI centres and museums.

One of the keys to success in STI is the development of sufficient quality human resources. Incentives or rewards for STI activities must be increased or improved to motivate more students to pick a researcher career, in universities, government institutions, the non-governmental sector, and in firms.

Technology transfer

The value of Technology transfer and the importance of combining technology transfer and business model innovation were underlined. Technology transfer has been identified as one of the key elements for a more balanced approach to sustainable development between the developed and the developing world. For cross country technology transfer, it is of particular importance to consider institutional design, since the technology is also being transferred between different types of institutions with different degrees of consolidation. Technology transfer at a very large scale requires proper institutional analysis and design for its success, based on systemic analysis of the STI situation in the country. It needs to be noted, however, that development and transfer of technology no longer follows a North-to-South path. Similarly, knowledge and technology exchange in agricultural sector between the countries of the South will likely continue to increase in the coming years. Another aspect to consider in the technology transfer process is the need for adequate business capacities, particularly in terms of knowledge management.

STI activities, technology transfer, adoption and adaptation in developing countries will be more warmly received if they fit into the lifestyles of the larger part of the population that reside in rural communities. Key in this process is the building of STI capability at all stages of the innovation system to enhance new ideas, processes and products for sustainable development. Technology empowers people by allowing them to expand the choices in their daily lives with a spill over effect in harnessing such technologies to upgrade subsistence livelihoods to income generation, thus improving the prospects of innovation and prosperity. Local and indigenous knowledge systems need to be taken into account and incorporated into STI activities.

Technology transfer mechanisms need to consider that there are invaluable and undiscovered resources in developing countries, not only technological, but also cultural diversities, which bring up the foundation for sustainable development.

Importance of research and experimental development (R&D)

In a complementary matter, human, institutional, and financial capacities for carrying out R&D need to be promoted worldwide. R&D capacities are not only central to the capacities to adopt and adapt technologies through technology transfer, but also contribute to top level higher education, which spills over into society, wide innovative capacities as well as to issues such as confronting trade barriers with science-based arguments, and approaching local problems in fields such as health (neglected diseases), agriculture or other socio-economic priority areas.

Furthermore, it is important to underline the importance of interdisciplinary and trans-disciplinary research and even "post-normal" science that may assist to discover new approaches and knowledge in this challenging and multidisciplinary field, linking the STI issues to culture and sustainable development. One of the major challenges to achieve the aims of sustainability is the sectoral policies and disciplinary boundaries.

Intellectual property (IP) and access to scientific information

Intellectual property (IP) rights often directly exclude the world's poor from accessing the end products of investments in STI, constituting a barrier to equitable distribution of existing STI. Furthermore, IP rights are a key issue for technology transfer.

The WTO Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS Agreement) sets minimum standards for intellectual property, under which all WTO members must comply (with some exceptions). Unfortunately, these minimum standards often result in the fruits of STI being not accessible to the neediest. IP rights might act as inhibitors for poverty ridden societies but there are also opportunities. In fact there are also voices in total disagreement with the present approach of granting and approving patents.

In recognition of the social and economic needs of all countries, the TRIPS Agreement contains a number of flexibilities countries can use to ensure the benefits of STI are more evenly shared. Countries need to explore these and build capacities for properly making use of the TRIPS agreement, as well as ensuring that enabling national legislation and frameworks for the use of the flexibilities are ready and in-place for their timely use.

At the same time, in order to improve accessibility to scientific research results, open access to research should be encouraged. In particular, it is noted that all publicly funded research should be made available freely and openly in digital repositories. Digital libraries also improve efficiency, requiring adequate internet access and bandwidth.

Gender Issues in STI

Women are still a minority in science and engineering careers, and in particular in decision making positions. The sub-representation of gender represents a violation of the general principle of justice or equity, but it is also a problem of efficiency because it determines the functioning of society at a less than optimal level. In this way, it undermines the functioning of the main rules of the scientific community. It also involves lower investment in education. Moreover, this scenario coincides with the persistence of institutional and socio-cultural barriers for female researchers, which restrict their career opportunities. Still, dates from previous investigations show that, in the last years, at highest levels the gender gap has decreased.

It the last years the position of women in our society and their role in the STI has improved, especially in the education sector, where most national and regional data show that the gap

between men and women has decreased. In many countries, women's educational situation has become equal or higher than men's one. Latin America in particular is the region with the highest proportion of female researchers (45% according to the UNESCO Institute for Statistics).

On the other hand, despite the significant improvements made in recent decades, women holding significant positions related to the STI are far from gender parity.

Many reasons can be identified to explain the current situation, amongst them, cultural issues referring to the role and typical trajectory of women in a given society, joint to the difficulties in proper establishing a balance between career and personal life. In certain male-dominated professions, gender discrimination is still widely present.

There is still need to carry out further studies and develop proper indicators to analyze the causes of this phenomenon, identifying good practices of policies and policy-mechanisms which have influenced the participation of women in STI.

STI and sustainable development

Clean technology is outpacing biotech and ICT in global investment, achieving a record $386 billion market capitalization in 2010 for example, led by science, innovation and technology investments towards goals such as food, energy and water security. Continued innovations are needed as a base for the next clean tech revolution, as a new wave of industrial transformation, particularly across the Emerging South where it can spur new sources of economic growth and deliver the knowledge economy jobs of tomorrow.

The central importance of STI for development can be analysed from two different points of view. In the framework of economics of innovation it is argued that developing countries should establish successful innovation systems that will enhance the competitiveness of their economies, increasing the value of its exports, requiring more skilled labour and improving the living conditions of its citizens. On the other hand, the social studies of technology and similar academic views have argued for a more direct way of promoting development through science and technology, by recovering the concept of "appropriate technology" and incorporating newer concepts such as "social innovation", highlighting the role of technologies in social inclusion and exclusion. Technologies should meet specific local needs, and have an open design allowing users to appropriate and modify them to optimize their use and application.

Both perspectives can be potentially conducive towards sustainable development, either through promoting economic development compatible with green economy principles, or through small-scale solutions that adapt to the way of life of communities and respect the environment, with an approach closer to the more comprehensive "green societies" idea. Both views are not antagonistic, and can be combined by decision makers and stakeholders to properly guide STI towards sustainable development, particularly in developing countries.

However, it is argued that not only STI can be oriented towards sustainable development, but that it is actually critical to attain sustainable development at all. A consensus exists that it is through innovation, based on science and technology, that society is better prepared to address the issues of sustaining our environment for future generations, while improving quality of life for all.

STI and poverty eradication

Respondents all agreed that STI can remove poverty and reduce inequality in developing countries. Furthermore, STI is also vital to minimize the ever increasing gap between rural and urban area. However, remarks were made that in-depth studies need to be conducted to better understand these processes. STI policies should be targeted therefore not only to create wealth but to also produce direct social benefits through social inclusion. Apart from Government policies and strategies required for STI to be accessible for those living in poverty, the design of delivery projects is also important, using existing opportunities and providing new ones.

STI needs to become an integral part of development-oriented projects. However, this should not come with an externally-guided one-shoe-fits-all approach. Any development initiative should work with local stakeholders to determine appropriate technologies, including building a local knowledge-base and the human resources needed to support and give sustainability to the project. Moreover, local development problems require local solutions and perspectives. Technological solutions are socially and cultural embedded and must take indigenous knowledge systems into considerations, incorporating technologies that do not damage culture, society and local expertise (appropriate technology) to eradicate poverty. The success of STI in contributing to reducing poverty among poor households must be based on ability to appropriately build or package support to inform policy on the basis of three key market objectives of demand, supply and enabling environment.

STI is also a tool to create jobs both in the urban and rural areas, if adequate environments are put in place where STI systems encourage investment, with better infrastructure, fast commercial courts, reform of market institutions and various types of incentives, coupled to adequate STI capacity in universities and research centres, and enhanced linkages between all the institutions part of the systems.

One of the main instruments of reducing poverty in Africa is the development and application of appropriate technologies for transformation of the vast informal sector. The acceleration of communities' ability to harness for its own use and welfare simple and common technologies such as improved soap making, beekeeping or Shea butter processing (based on traditional technology) adapted from elsewhere has improved the quality of life and wealth creation through the establishment of viable enterprises in many West African countries. Such synergistic partnership between STI stakeholders has the potential in making STI work for society and sustainable development,

E-Science can also act as an important tool in the development of applications in sectors critical to society such as natural disasters, agriculture, water security, health, poverty, education, research and innovation and intellectual property. Many societal opportunities have arisen as a result of the application of e-Science tools, including in relation to dealing citizen choices and science-based evaluation of issues at the heart of society's priorities and preoccupation. Science can contribute to policy design, choice and making, by providing sound, reliable, update information about the natural, social, cultural and economic settings that require intervention and by providing sound and reliable means to measure objectives, strategies, resources and results to all the involved stakeholders.

STI and key Sustainable Development issues

Some of the key focus areas for innovation strategies are ensuring food security by increasing investment in agricultural technologies to raise productivity, finding solutions for reducing costs of medical care, designing low cost housing facilities and provision of water, energy and other infrastructure technologies to the poorest people in each country.

In terms of sustainable energy, the role of STI is quite evident. New knowledge and technological developments are needed to meet the challenges of sustainable energy for all, particularly in address the need of the poor in developing countries while ensuring the new energy sources are environment-friendly.

Renewable energy, especially clean energy in the form of solar, wind, and biofuels abounds in Africa with great potential to provide efficient energy and energy access to rural communities. This abundant clean energy is not being adequately harnessed due to lack of synergy between stakeholders (scientists, engineers, policy makers, private sector, financial investors and local communities). The creation of an active and dynamic synergy of partnership that is based on two principles for engagement: i) improve access and ii) diversifying the energy mix, are crucial for creating employment, reducing poverty, triggering economic growth, maintaining peace and building resilience. STI is critical in all these and must be galvanized to lead in this process of innovation and policy for sustainability.

According to FAO, a 70% increase in agricultural production will be needed by 2050 to keep up with the population growth. Concurrently, as a result of climate change, in many regions farmers' yields are jeopardized by ever more frequent droughts and flooding. For smallholder farmers, the decline in yields of staple crops (wheat, rice, maize) means not only smaller income but threatens their very livelihoods. The question is thus how we can harness STI to help feed the world, adapt the agricultural production to climate change and preserve the environment for us and future generations.

Food security could be better with the use of methods of science, technology and innovation, which should always be done to fulfil the need for food and food security controls. But this must be done with a system that is really appropriate for the benefits actually felt by people in need. Agricultural innovation systems should be built by involving at least four stakeholders: government, education institutions, private sector, and farmers. What usually has happened is that many invention could only "stacked up" in education institutions library, due to lack of funds for implementation or further research.

For many years, farmers in developed countries have benefited from the most current technologies to increase their harvest, improve the production of livestock and decrease the time and effort needed to cultivate the land and the livestock. Even within the developing world, we observe big differences in productivity levels from the highest in the Latin America and the Caribbean region to the lowest in sub-Saharan Africa pointing to massive underinvestment in this sector. STI have an important role to play in bridging the existing productivity gaps between regions and countries.

The existing and future technologies need to become more affordable in order to be adapted by the rural poor in developing countries. Innovative solutions, such as decentralized energy options that expand access to energy to underserved populations in rural communities are another example of technology coming to aid for rural development. In recent years, off-grid, decentralized energy options - often based on renewable energy sources (such as solar, wind, hydro or biofuels) – have become more available and offer new opportunities for providing energy access among dispersed underserved rural populations.

Rural communities increasingly see their land and natural resources degraded due to climate change, which further weakens their food security. According to a study by the International Food Policy Research Institute, climate change could increase the number of malnourished children by 9.8 % by 2050. In the same vain, unsustainable agricultural practices, e.g., overreliance on harmful fertilizers and pesticides for food production pollute groundwater and soil damaging the local ecosystems.

Integrated solutions for food security and energy issues also depend fully on STI. Using environmental friendly technologies to enhance food production, while at the same time exploring technologies and business models to use the agricultural residuals to produce bio-fuel, is a promising option. In carbon sink projects further create value though VER (Voluntary Emission Reduction) trading. Environmental considerations fully included into development strategies are not only an obligation, but also an asset, producing additional revenue.

Interface between science and policy

Enhancing the interface between science and policy requires the establishment, consolidation and empowerment of mechanisms for providing STI advice to governments. STI advice is particularly relevant for risk management, early warning and monitoring systems for new and emerging challenges, natural disasters and extreme events. STI advice mechanisms should be integral to government departments, parliaments and their corresponding commissions, and the justice system, allowing policy to be more evidence-based. STI advisors would act as focal points and linkages with the wider STI community, enhancing dialogue between the stakeholders by communicating in two ways: top-down (from government to science community - academies, NGOs, societies for advancement of science, scientific unions and international scientific organizations) and bottom-up (from science community and civil society to the government). Advice should be "independent", focussed and balanced, and take into account the different cultures between science and policy, including different time requirements on policy needs and provision of scientific advice. Foreign Affairs are one of the key areas for sustainable development; in this field STI advice would become STI diplomacy. Capacity building for STI advisors and STI diplomats is needed, as well as exchanges (Fellowships) between STI institutions and government departments. For the science-policy interface to adequately work, STI advice mechanisms should be well funded.

For the interface between science and policy to work properly, research facilities, particularly at Higher Education institutions, need to be strengthened, down to the grass root levels to inform policy formulation and public awareness about important issues affecting people's lives such as environmental, social and economic issues.

Better use of academic research tools by government at both national and sub-national level sought to lead to a stronger partnership working between line ministries at the national level, and municipal authorities and college/schools at the regional and local levels. Only through mutual recognition can such a partnership lead to an effective policy formulation informed by scientific discourse. The research centres are not isolated from, but connected to, its local civic community, which can be a source of huge input and knowledge. It's the civic community and its different strands that set the debate agenda, always with an eye for new challenges and opportunities.

Further research on more participative models of governance could be a key feature to strengthen the interface between science and society. So far, institutional tools have frequently been inadequate and in some cases it often happens that the civil society is not sufficiently involved in the decision-making processes. The new challenges require an effective system of governance in which participation is an act of shared responsibility in decision making. This process should start from identification of problems and needs, analysing potential solutions, resources available, priority and options to establish the mode of response and the actions to carry out in order to identify the needs. This could be one possibility to strengthen the interface between science and society and create knowledge societies which might give to everyone equal access to essential living resources. Moreover, managing environmental problems efficiently requires well-designed public policies or

coordination among stakeholders and synergies between university-laboratory-policy makers and civil society, through the creation of networks and associations.

STI and the Post-2015 Development Agenda

While STI could be integrated into the 2015-post development agenda in a cross-cutting manner –much as it has been in the MDGs-, there is an opportunity to give it a stronger presence, recognizing it not only as transversal, but as one of the basic building blocks for achieving sustainable development.

Formulation and adoption of a post-2015 framework should definitely not following top-down or donor-driven approach. However, one of the means for giving STI proper visibility could include a global meeting of heads of states to discuss STI.

Appropriately incorporating STI into the Post-2015 development agenda should include incorporating goals and the corresponding indicators for monitoring, evaluation and accountability. Indicators selected should relevant, sound and of high quality. New goals and indicators will have to include tools to recognize disparities between regions, and between population groups within particular countries. Besides, new measures of accountability are needed.

Examples of good practices

In Uzbekistan, projects sponsored by agencies such as UNDP, aimed at achieving MDGs as well as other national strategic goals, have incorporated piloting and dissemination of new technologies, such as solar energy systems for remote villages, bio-gas, livestock breeding and management, ICT technologies for increasing the efficiency of public services and public administration, showing clear linkages between STI and sustainable development.

The UN System is supporting developing countries in developing their STI policies. An example is the UNDP-Government of Uzbekistan joint project aimed specifically at supporting the innovation policy and technology transfer in the country. The goal of the project was to strengthen the capacities of the central government and relevant authorities to develop, implement and monitor innovation policies. One of the key components of the project has been increasing the capacities of responsible authorities to gather and analyse STI indicators in line with best international practices, as proposed by UNESCO and OECD. This component, implemented with the technical assistance of UNESCO, was aimed at supporting policy formulation and implementation through quality evidence and data (statistics), gathered to produce baselines and monitor progress towards specific, measurable, achievable, relevant and time-bound targets. Similar projects have been carried out throughout many African countries in cooperation between UNESCO and the corresponding National authorities. In Latin America and the Caribbean, UNESCO has set up a science policy information platform (spin.unesco.org.uy) to support evidence based policy making.

Using technology to study has been identified as another key opportunity. Mexico City's government used UNAM's Virtual High School in order to serve more than 50,000 out-of-school teenagers and adults in five years. Although almost no student had any previous experience of studying online, this delivery mode has become popular due to its success.

The use of the Internet to access development projects and get in touch with world markets is a technology that can contribute to a sustainable and equitable development. New technologies can increase the access to information of disadvantaged people and, also, can help to create new job opportunities for people living in poverty.

The Forum on China-Africa Cooperation is an example of connecting innovations in clean tech to the goal of poverty reduction through south-south cooperation. Plans focus on areas such as electronics, textiles, machinery, and mineral resource processing. Mainstreaming clean tech science, innovation and development into future economic zones could become a new source of investment and growth in Africa, a base for innovation towards the goal of clean tech for inclusive and sustainable development. Examples of successful policy dialogue can be taken from the case of the dialogue between China and Ethiopia, which helped bringing together the very different perspectives of innovation-producing and innovation-consuming countries. Knowledge suppliers and knowledge consumers have very different perspectives for the knowledge and cooperation is needed to produce joint new knowledge.

Interesting examples are also projects in China under which companies in developed world and companies in China work together to produce innovations with joint IPRs and then transfer the technology to other countries with joint benefits.

A case of reconversion of a company from a traditional industry (textiles) to a green industry (wind turbines) is India's Salon. This conversion has led Suzlon to a very quick grow, installing technology in 28 countries. Its R&D facilities are in China, Germany, India and The Netherlands, co-operating with local universities and R&D centres. At its headquarters, Suzlon reports recycling all water and waste and using only wind and solar as well as low-energy air-conditioning.

Examples of new industrial hubs for innovation in clean tech have emerged in places like Masdar City in United Arab Emirates (UAE), and the innovative green economy activities being undertaken in South Korea. One idea could be to explore ways to integrate clean tech science, innovation and product development hubs within new special economic zones, towards rise of "green economic zones (GEZs)".

A community-forestry project in India included literacy training of poor illiterate women, and was implemented in Public Private Partnership through a computer-based training programme. Not only did the women achieve literacy skills in record time through interactive software, but in the process they also acquired computer skills and improved their social standing. Low caste women were envied as the vanguard of technical innovation since the computers used were the first to be seen in the village.

UNDP assisted cash-for-work project in Bangladesh, targeting destitute widowed, divorced and abandoned women who were marginalised in the local community. Baseline data revealed that only 0.3% of them owned a mobile phone. Currently, five years later, 40% of the women own cell phones, to stay connected with each other, NGOs, service providers, suppliers and customers of the micro-enterprises they are now engaged in. This has given a significant push to women's empowerment. In the design of a follow-on project, m-banking is being considered as a means for transferring cash transfer wages.

Science House Foundation, have found that informal science and technology education has an amazing transformational power on children from underserved communities around the world. As part of the MicroGlobalScope project, provide microscopy kits to schools in 26 countries and engage scientists, teachers and local NGOs to participate in the project. The children explore their environment and share their discoveries in an online platform for them to learn the principles of peer-review, critical thinking and intercultural understanding. This represents an example of the intersection between STI and education and culture for sustainable development and achieving the MDGs.

In India, the Government has announced Akaash Tablets to be made available to each and every student. Various challenges remain, such as the need to equip every school with Wi-Fi

and providing enough charging points. Furthermore, in India it is there in IITS with SIDBI, proposed for technical skill development centre. These technical institutes may also link with customer care so that their expertise could be used for established and new enterprise after post sale services.

STI have an important role to play in bridging the existing productivity gaps between regions and countries. For example, innovations in crop and plant breeding and in irrigation techniques that help smallholder farmers increase their yields will need to be scaled up (some successful examples include hybrid maize in Zambia and Zimbabwe; cassava varieties in Uganda that are resistant to severe weather and pest; Nerica rice in West Africa or micro-irrigation in India).

Mobile phones are a prime example of an affordable technology that has opened communication channels for poor people in rural communities. In addition to the relatively low cost, mobile phones also can be operated with basic literacy skills, making their adoption easy. The application of mobile phones in rural settings to obtain market information and reduce transaction costs has been well documented. But mobile applications are also used to provide early pest or disease warning and even to help farmers keep track of the milking schedule. With Kenya at the forefront of mobile technologies innovations, it is to be expected that they will continue to thrive throughout the developing world.

STI can bring about a real change such as, for example, the adoption of green farming technologies to ameliorate adverse impact of the changing environment. This will require public investments (e.g., in necessary infrastructure, but also in training and education) that would incentivize farmers to adopt to sustainable agricultural practices.

In Somaliland, the issue of dangerous deforestation and resulting desertification as a result of a run-away charcoal processing for local consumption (and overseas commercial) purposes was being discussed country wide. At the local level, the discussion came up with very interesting propositions such as the introduction of the use of slaughterhouse refuse (animal gut waste) as a source of energy. The question was whether the appropriate technology and know-how to extract biogas from this readily available resource can be gotten locally. As this was a wholly new idea that has not been tried in the area before, the University of Burao was asked to look at the feasibility of the scheme in a holistic way (technological, health, economics etc.). The outcome was a positive one with the University research centre championing the viability of such a scheme. The technology was designed locally and tested for accuracy working and proved flawless.

PHASE 2 - Culture

What do we mean by culture? Establishing a common language

'Culture' has been defined in literally hundreds of ways. To set a common ground for the debate, participants in the e-discussion agreed to refer to culture in two distinct but related senses that draw inspiration from the 2001 Universal Declaration on Cultural Diversity[1]:

> First in its narrow, functional sense, as an organized sector of activity dealing with the different manifestations of human intellectual and artistic creativity, past and present: The arts and cultural expressions, together with the individuals and institutions responsible for their transmission and renewal constitute what is commonly regarded as the "cultural sector", a demarcated policy domain concerned mainly with heritage and creativity.

> Second, in its wide, anthropological sense, as reflected in the people's ways of life; the different values, norms, knowledge, skills, individual and collective beliefs that guide individual and collective action. This definition refers to the diverse stock of "intangible cultural capital", renewable resources upon which the people draw inspiration and through which they express the meaning they give to their existence and its development.

Participants also agreed to refer to the framework of existing international legal instruments in the field of culture, which form an overarching system of cultural governance, based on human rights, that deals with heritage, diversity and creativity. These legally binding agreements engage Member States in a continuous process of dialogue and cooperation at the international level. [2]

Why should culture be part of the future sustainable development agenda?

Progress in documenting and producing hard data on the linkages between culture and development has been slow. Participants in the e-discussion helped to fill the gap and systematize the experience they have accumulated over the years. They offered a three-tiered approach to the arguments supporting the role of culture in fostering inclusive social and economic development, environmental sustainability, as well as peace and security:

> ***First, because culture contributes to the sustainability of development interventions and can ensure more sustainable use of resources***

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[1]   Accessible at : http://unesdoc.unesco.org/images/0012/001271/127160m.pdf

[2] The UNESCO Conventions concern the protection of tangible heritage (1972 *Convention concerning the Protection of the World Cultural and Natural Heritage*, ratified today by 190 States) the safeguard of intangible heritage (2003 *Convention for the Safeguarding of the Intangible Cultural Heritage*, ratified today by 153 States) as well as the protection of underwater cultural heritage (2001 Convention). The UNESCO normative framework includes also the struggle against the illicit international trafficking of cultural property and the protection of cultural property in the event of armed conflict (1954 *Convention on the Protection of Cultural Property in the Event of Armed Conflict* and the 1970 *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property*). Finally the UNESCO 2005 *Convention on the Protection and Promotion of the Diversity of Cultural Expressions* (ratified today by 128 parties) is concerned with diversity, creativity and development

Contributions to the e-discussion emphasized the intrinsic connection between culture and the very notion of a sustainable development: culture is the "life-giving filter…through which sustainable development flows", and the "site of problem solving", where solutions can be experimented and people can be empowered. Many used the image of culture as "glue" that binds people together, and stressed that this contributes to the resilience of a society. They also referred to cultural diversity as a basic resource or capital which we are bound to pass to future generations.

There was wide agreement among participants on the need to integrate culture, defined in its wider sense, as an essential component of development interventions in order to generate, facilitate and sustain positive change. It was stressed, in this regard, that understanding and promoting this approach is, in itself, a complex exercise that requires the full participation of individuals and communities to ensure that different voices, views and priorities are considered and negotiated.

Taking culture into account in environmental, gender, nutrition, infrastructure and many other types of development interventions, requires accepting that cultural values, norms and beliefs guiding individual and collective action are extremely heterogeneous. Yet, recognizing local cultural aspirations and negotiating common objectives enables people to truly take ownership of interventions, makes change more sustainable over time and increases the efficiency of projects and policies.

Participants provided different examples from various countries and regions in which culture had proven to be a key factor for enhancing sustainability. Whereas a systematic effort to document and asses the transversal role of culture remains to be carried out, this evidence tends to suggest that:

- Initiatives promoting gender equality that, when appropriate, analyze and include cultural considerations in their conception and implementation, are generally successful in promoting change in certain traditional practices that limit women and girls´ access and participation in education or in other areas of public life.

- Education approaches that promote multilingualism through local/indigenous languages, foster the value of diversity, mainstream cultural assets in curricula and support creative and artistic education help overcome barriers to education based on cultural exclusion and provide boys and girls competencies to learn to live together.

- Culturally-sensitive approaches to health that integrate traditional practices into health services delivery and sexual and reproductive health programs have shown to increase the effectiveness and sustainability of interventions.

- Culture-aware projects delivering heritage and arts-related activities in post-conflict situations and fragile states that promote dialogue, the recognition of and respect for cultural diversity, contribute to setting the ground for reconciliation, peace and social cohesion, enabling affected communities to renew their identity, regain a sense of dignity and normalcy rebuild trust and begin to heal the scars of war.

When considering the sustainability of natural resources and the management of disaster risks, discussions also underlined the nexus between culture and the environment. There was agreement in seeing the environment as closely inter-linked with the activities of human groups, their use of natural resources and the value and meaning they ascribe to their ecosystems. Some of the example shared included the adaptation of traditional knowledge in environmental conservation, of education programmes bringing about the social and

cultural changes needed to advance sustainable consumption and lifestyles, as well as of the use of cultural assets of communities to effectively manage scarce resources. This is particularly relevant in the context of growing urbanization where the resources of culture can contribute to more sustainable forms of urban development and management. Participants in the e-discussion noted that the safeguarding of historic urban and rural areas and of their associated traditional knowledge and practices reduce the environmental footprints of societies and promotes more ecologically sustainable patterns of production and consumption and sustainable urban and architectural design solutions

The analogy between cultural diversity and bio-diversity underscores the fact that culture in its wide sense provides a diverse and useful stock of resources for climate change mitigation and adaptation.

Second, because the culture sector, including heritage, contemporary creation and creative industries contribute to more equitable growth

Contributions to the e-discussion presented experiences and identified recurring patterns across regions on how the cultural industries and heritage/tourism-related activities are promoting equitable growth. As a sector of organized activity, the culture sector is effectively contributing to generating employment, promoting exports and diversifying economic production as well as also generating valuable spin offs for cultural and social development. The culture sector not only contributes to growth, but also—given its productive structure-- lends itself to more inclusive and equitable forms of growth. Employment in this sector has also proven quite resilient relative to other sectors of the economy.

The economic performance of the culture sector varies across countries and depends on the particular combination of cultural assets, creative talent, market structure and maturity as well as the degree of public support for culture, educational opportunities, legal frameworks and investments.

Despite great variability, evidence produced in recent years shows that in countries as different as Cambodia, Colombia, Ecuador or Bosnia and Herzegovina, the contribution of formal cultural activities to GDP is quite significant and ranges between 1,53% and 5,72%. Formal employment in the private sector ranges between 0, 53% to 4.7%. These figures represent only the tip of the iceberg of what is likely a much larger contribution given the high levels of informality within the culture sector in low-middle income countries.[3] Studies of the culture sector developed in the framework of large scale interventions, such as the 18 MDGF culture and development projects in Mozambique, Namibia, Senegal, Egypt, China, Turkey, Honduras, Nicaragua, or Costa Rica, point in the same direction.

Exchanges among participants also stressed the specific, distinctive elements of the culture sector, namely as it:

- *Tends to generate inclusive forms of development*: Entry barriers to economic activity in the cultural sector are relatively low. Cultural economy models tend to be employment intensive—through micro and small and medium enterprises (SMEs)—

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[3] Data generated by the UNESCO Culture for development Indicators (CDIS) www.unesco.org/culture/CDIS

and redistributive, thereby improving living conditions, fostering community-based economic growth and empowering individuals.

- *Promotes creativity and innovation*: Creativity is particularly important along the full spectrum of subsectors, from technology to design or handcrafts. Technology, and in particular the widespread use of the Internet, is a major driver for growth in the culture and creative industries. In turn, the development of new technologies is largely dependent on the attractiveness of the content provided by artists and other creative people. Moreover, because a sizeable part of the creative economy focuses on the production of immaterial services and content, it tends to support green growth.

- *Brings measurable social and individual benefits*: Activities and industries in the culture sector help developing the capacity to handle and respond to change. They tend to strengthen social cohesion and individual critical thinking; foster the appreciation of different forms of expression and a diversity of world views; assist in personal development; increase personal confidence and improve life skills. They can also create common ground between people of different ages. All these are positive externalities that not many other economic sectors deliver.

- *Fosters local development, quality of life and tourism:* Heritage-based urban revitalization stimulates local development, fosters creativity and attracts tourism that, if properly managed, allows the local population to benefit from job opportunities and improved incomes. It also can increase empowerment of communities by celebrating and sharing with others their cultural heritage.

- *Requires enabling conditions for growth*. The culture sector presents considerable potential for further development with the help of adequate legal frameworks and targeted investments. This, however, will require the establishment of a positive enabling environment that can foster public-private partnerships (PPPs), the leveraging of multiple funding sources, and the promotion of professional training.

Third, because culture is a critical component of basic human rights

The right to take part in cultural life, the ability to express oneself, to refer to collective images and identities, to access and enjoy culture, the right to education, the freedom to pursue creative activities as well as the right to benefit from the protection of literary or artistic production are, among others, fundamental rights enshrined within the International Covenant on Economic, Social and Cultural Rights.

Participants in the e-discussion considered these issues as part of an overarching rights-based approach to development. While recognizing the complexities involved in undertaking such an approach, the focus was put on the alignment of cultural rights with fundamental freedoms and on the positive impact of these rights on the development of the culture sector, on the consolidation of values of democratic governance on social cohesion and the capacity to establish dialogue between individuals and communities.

Examples of implementing a rights-based approach in this field pointed at:

- *Strengthening governance* through inclusive policies that recognize the legitimacy of different social groups, including indigenous peoples and minorities, to take part in legislative and policy making processes, allocation of resources and implementation.

- *Empowering individuals, communities, organizations* and their representatives to manage their cultural resources and assets, thereby fostering personal fulfillment while also strengthening social cohesion through an increased sense of belonging.

- *Supporting the culture sector* through new and improved cultural policies, better implementation of the legislative and regulatory frameworks and capacity building of cultural institutions.

- *Ensuring equal access* to and enhancement of basic cultural services and infrastructures as well as the capacity of individuals to enjoy to their own cultural products and expressions as well as that of others.

- *Encouraging creativity, innovation and cultural industries* through an enabling environment that protects the capacity of to create.

- *Providing cultural competencies*, through different educational systems and programs, to understand cultural diversity, acknowledge and respect others, engage in dialogue and learn to live together through open engagement with other cultures, heritage and expressions.

Questions and challenges regarding culture

The arguments presented above take a deliberate position of presenting culture in a positive manner. They reflect the overall tone of the e-discussion. However, exchanges did not avoid or sideline complex issues related to culture.

The challenges of culture, or rather arguments put forward in the name of culture, were also discussed, notably in relation to conflict, power relations and abusive practices. In this regard, participants advocated for an open, dynamic and interactive view of culture that evolves and seeks to change practices from within. They agreed that tackling culture is difficult, sensitive and time intensive, but on the final analysis it produces more benefits than costs.

The complexities and ambiguities of the term "culture" in its wide sense - as norms, values and beliefs that orient individual and collective action - were also discussed, and particularly the challenge of identifying a community with a single culture, or the tendency for some to perceive cultures as fixed and homogeneous. As someone stated, "there is no such thing as 'cultures' in abstract terms, but only 'somebody's culture'", which, as it was noted, can be the composition of multiple influences. The risk of an exclusive focus on local traditional cultures as the only method of truly sustainable development was also highlighted, noting that massive urbanization and migration patterns will present major challenges in this regard. Another challenge raised was the appropriate use of culture to foster a gender-sensitive sustainable development agenda.

Another critical angle discussed was that of culture as a major issue in addressing the challenge of "living together" in the context of globalization and the identity challenges and tensions it can create. Participants agreed on the need to foster cultural competence, that is, the capacity to understand and adapt to a multi-cultural environment, notably through education.

The issue of measuring culture and its contribution to development was identified as a central challenge. Culture still struggles to legitimize its place within development discourses, as shown by the absence of culture in prominent development indicators[4] that set the standards of development policymaking. The same holds true for systematic

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[4] Such as the WB´s Development Indicators, UNDP's HDI or the OECD's Better Life Index,

qualitative evidence. The growing body of information generated by projects worldwide is still to be assessed, compiled, analyzed, presented and made available in different languages.

Two pioneering initiatives, in this regard, were shared and discussed. The first one concerns the 18 MDG-F Culture and Development large-scale projects, implemented over the last five years. A comprehensive knowledge management strategy has been put in place and program achievements, impacts and success factors have been systematized in thematic[5] and regional studies[6].

The second initiative is the UNESCO Culture for Development Indicators (CDIS). Its methodology allows measuring how culture contributes to development at the national level. The global CDIS matrix is based on 22 indicators that provide evidence of major opportunities and challenges in seven policy areas ranging from economy, participation, education, communication, gender equality, heritage, to governance and institutionality. Launched in 2009, tested and validated in 10 low-middle income countries, the CDIS is proving to be a valuable tool for policymaking and benchmarking for development interventions[7].

Finally, an important challenge to bringing culture more squarely into the development agenda is the lack of a specific internationally agreed goal and targets on culture. A specific goal could facilitate the task of raising the profile of culture, establishing a clear framework supported by statistics, and documenting the sound implementation of cultural rights. Some participants proposed culture as the fourth pillar of sustainable development. References were made to the Agenda 21 for Culture and the role of global/local actors such as United Cities and Local Government.

Culture can contribute to a more equitable, inclusive and sustainable form of development for all. Understood both in its narrow sense – as an organized sector of activity – and in its wider sense – as the different values, norms, knowledge and beliefs that guide individual and collective action – culture can provide the transformative change that is much-needed in development approaches by placing more emphasis on the humanistic dimension of progress and on a wider notion of wellbeing beyond economic growth.

Experience and practice from projects across the world provide evidence that activities associated to culture deliver a range of concrete benefits to communities in social, economic and environmental terms, thus driving and enabling sustainable development.

In its diversity and complexity, culture offers different entry points that are particularly efficient in addressing the full gamut of development challenges from fragile states to emergent leading economies.

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[5] http://www.mdgfund.org/sites/default/files/Culture_Thematic%20Study.pdf.
[6] http://www.unesco.org/new/en/culture/achieving-the-millennium-development-goals/knowledge-management/publications/
[7] www.unesco.org/culture/CDIS

In redefining the future post-2015 development agenda, priorities need to explicitly factor in culture, ideally through a specific development Goal focused on culture, including objectives, clear targets and indicators that relate culture to all dimensions of sustainable development.

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