**Commission on Science and Technology for Development**
Fourteenth session
Geneva, 23–27 May 2011

# Intersessional panel meeting on

## Technologies to address challenges such as agriculture and water;

## Measuring the impact of ICTs for development; and

## The follow-up to the World Summit on the Information Society at the international and regional levels

Palais des Nations
Geneva, Switzerland, 15–17 December 2010

**Summary report prepared by the UNCTAD secretariat**[1]

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[1] This paper summarizes the panel's discussions; it does not necessarily reflect the views of the UNCTAD secretariat.

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# Introduction

1.      At its thirteenth session, held in May 2010, the Commission on Science and Technology for Development (CSTD) selected the following priority themes for its 2010–2011 intersessional period:

(a)      Technologies to address challenges such as agriculture and water;

(b)      Measuring the impact of information and communication technologies (ICTs) for development; and

(c)      Progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society at the international and regional levels.

2.      To help address these themes, the CSTD secretariat held a panel meeting in Geneva, Switzerland, from 15 to 17 December 2010. The aim of the panel meeting was to study in depth the various issues related to the substantive themes, with a view to contributing to items for consideration by the Commission at its forthcoming fourteenth session.

# I.    Organization of work

3.      The CSTD panel meeting was attended by members of the Commission, other national representatives (non-members of the Commission), representatives of United Nations entities and other international organizations, representatives of non-governmental organizations (NGOs) in consultative status with the Economic and Social Council, and representatives of civil society and business entities accredited to the World Summit on the Information Society (WSIS) (please see the annex for the full list of participants).

4.      The documentation for the meeting included issues papers prepared by the CSTD secretariat and presentations and policy papers given by participants. All the meeting documentation is available online from the CSTD website at http://www.unctad.org/cstd.

# II.    Theme 1: Technologies to address challenges such as agriculture and water

## A.    Technology and innovation for sustainable agriculture

5.      The Head of the CSTD secretariat[2] introduced the first priority theme with an overview of the issues paper entitled "Technology and innovation for sustainable agriculture", which describes multiple ways in which science, technology, and innovation can help alleviate hunger by improving how food is produced and distributed locally.

6.      Seventy per cent of the poor in developing countries live in rural areas and directly or indirectly depend on agriculture for their livelihood. The majority of the chronically hungry in developing countries are smallholder farmers, most of whom reside in Africa and Asia. They manage most of the farmland and supply most of the food consumed in the developing world. Science, technology, and innovation in sustainable agriculture hold the promise to address many of the challenges faced by resource-poor farmers, such as a lack of knowledge and skills, crop wastage, labor-intensive tasks like water lifting and weed

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[2]  Mr. Mongi Hamdi, UNCTAD.

removal, and marginal lands at increased risk of soil degradation, droughts, floods, storms, pests, and erratic rainfall.

7.     A wide range of existing science and technology applications and farming practices can support sustainable agriculture, particularly in areas such as water management, soil health, biotechnology, ICTs, and post-harvest enhancements. Sustainable agricultural systems, including organic agriculture, provide multiple soil, environmental, and economic benefits.

8.     Although a number of relatively inexpensive and sustainable technologies and farming practices that can help smallholder farmers increase agricultural productivity already exist, further effort is required to make these technologies and practices accessible. Agricultural innovation systems need to be strengthened to connect farmers with information, make research more applicable to smallholder farming in developing countries, and disseminate local knowledge.

9.     Healthy agricultural innovation systems have both strong components and strong linkages among components. Two particularly important components of agricultural innovation systems are extension services and research institutes and education systems; there is substantial room for additional public funding for these programmes in developing countries. Successful research programmes and extension services can strengthen capacity, find new ideas to improve local agricultural productivity, and connect smallholder farmers with researchers and markets.

10.     Financing is essential in order for smallholder farmers to adopt new technologies or farming practices. Key areas for increased investments in rural development include infrastructure, telecommunications and processing facilities. Smallholder farmers can also benefit from increased access to markets, public-private partnerships, favorable procurement practices, brokered long-term contractual agreements, and farmer groups or cooperatives.

11.     In addition to increasing funding for public research, extension services, and official development assistance in agricultural science, technology, and innovation, governments and the international community can assist smallholder farmers in implementing sustainable technologies and farming practices through a number of means including (a) greater democratic control; (b) security of tenure and access to land; (c) modifications to tax or pricing schemes that incentivize the overuse of pesticides, fertilizers, water, and fuel and land degradation; (d) appropriate intellectual property rights policies; (e) lower costs of sustainable outputs; (f) increased farm-gate prices; and (g) improved global market access.

12.     Adding additional insights into this theme, a resource person[3] gave a presentation entitled "Technologies to address challenges such as agriculture and water", which introduced key findings of the International Assessment of Agricultural Knowledge, Science, and Technology for Development (IAASTD) and sustainable options for food security.

13.     Agriculture contributes directly to several Millennium Development Goals (MDGs) and is related to challenges such as population and demand growth, shrinking natural resources, energy concerns and climate change. The way agriculture is done today is part of the problem: the use of synthetic fertilizers, irrigation, and pesticides that was a hallmark of the Green Revolution is unsustainable and agricultural soils now show signs of degradation.

14.     More than enough food is produced globally. In fact, 30–40 per cent of food is wasted, much of it post-harvesting. It could be argued that food is too cheap in

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[3] Mr. Hans R. Herren, Millennium Institute

Organization for Economic Cooperation and Development (OECD) countries as in those countries people can afford to throw it away. The presenter commented that we do not need to produce 70 per cent more food or to set aside more land for agriculture, but rather rethink where and who produces food and what we do with all the food when it is produced.

15.     The IAASTD report calls for a fundamental shift in agricultural knowledge, science, and technology and the linked agrifood system policies, institutions, capacity development and investments. This paradigm change should involve a transition to sustainable, organic, agro-ecological and resilient agriculture that addresses multifunctionality, meets needs of smallholder farmers, entails a systemic and holistic approach, and contributes to solutions for hunger, poverty, health, and climate change. Despite misconceptions to the contrary, organic farming involves a lot of science, knowledge, and innovation, as illustrated by the push-pull method (using complimentary plants to repel and trap pests) and the use of wasps to control pests threatening cassava.

16.     Areas for action include (a) empowering, involving and supporting smallholder farmers; (b) using natural systems to regulate pest outbreaks; (c) putting animals back on farms; (d) supporting agroforestry; (e) improving mechanization; and (f) improving water management. Pro-poor development requires creating opportunities for innovations and entrepreneurship which target smallholder farmers and increasing investment in public research and extension. Farmers have a lot of knowledge. The presenter argued the need for more investment in public research and more people working agriculture.

17.     The resource person argued that, thus far, biotechnology has had little impact on IAASTD development and sustainability goals. There are methodological limitations in efficacy and safety testing. Additionally, intellectual property issues include increased costs for farmers, restricted experimentation and undermining local practices that would assure food security and economic sustainability, as well as exposure of farmers to liabilities and long term dependencies. In addition to these various concerns, biotechnology does not produce more food and genetically modified organisms represent a very small part of global commodities.

18.     In discussing the presentations on this priority theme, participants emphasized that most benefits in agriculture and water can be obtained from technologies that already exist, like crop storage. Promising examples include stem resistant wheat and drought tolerant maize. We need to find ways to put these technologies in use under systematic approaches that take into account the unique local needs of smallholder farmers.

19.     One participant observed that there are two ways of looking at the use of technology – a top-down approach and a bottom-up approach. Examples of bigger, top-down systems are early warning systems involving GIS or national support of industries so that they become internationally competitive. The participant felt there should be more bottom-up approaches, training, easily operable and maintained systems and technologies for smallholder farmers, and support for small research centers. Participants also affirmed the importance of women farmers and extension services and expressed the need to build human capacity and share best practices.

20.     It was noted that one area of importance is how to get information to farmers. Farmers can do a lot if information is available to them at the right time and in the right format. Research publications are not accessible to them and the information needs to be pre-digested and presented in local languages with drawings—for example, how to compost or do mixed cropping.

21.     Several participants commented on the need to overcome the digital divide inside agriculture. A participant observed that one thing that would change agriculture would be to make Internet freely accessible to farmers – the current cost of Internet access is prohibitive for many smallholder farmers. Farmers need to organize in groups to afford subscriptions to

news, newsletters, and so on. Another participant commented that ICTs such as famine early warning system using GIS and other data can also be helpful. Additionally, as the Internet continues to evolve, more resources are available to developing countries.

22.     One participant reported on the Feed the Future Initiative by the United States of America to support agricultural research and innovation and invest in priority problems and institutions and capacity-building.

23.     Another participant noted that rapidly growing urban populations also have unique issues in agriculture and water that might also merit consideration by the Commission.

## B.     Additional contributions of country case studies

24.     In consultation with the public sector, the Ministry of Agriculture of Jordan has issued a cohesive document to serve as a roadmap and action plan to develop Jordan's agricultural landscape in different sectors in cooperation with different stakeholders as partners for development. In implementing related measures, the Ministry launched two information technology based projects to assist partners and end users. The Ministry of Water and Irrigation has also stipulated that information technology shall be used as an important tool to develop the water and irrigation sector in Jordan. An R&D unit was established to engage in technology transfer and technical cooperation mechanisms in groundwater exploration, management, and quality control and promote the use and adoption of modern technologies by farmers for irrigation, water protection, use, reuse, and distribution.

25.     El Salvador observed that the substantial quantity of pesticide used in agriculture in that country has resulted in the loss of biodiversity, water pollution, and human toxicity. Policymakers have recognized the need to foster research in sustainable agriculture.

26.     Uganda reported that Ugandan agriculture is characterized by low production and productivity across all subsectors of crops, livestock and fisheries. Major constraints hindering enhancement of production and productivity include (a) very low yields, partly as a function of low application of modern technology; (b) poorly functioning control of pests, vectors and diseases; (c) dependency on rain-fed agriculture; (d) challenges with agricultural technology and services delivery and adoption; and (e) farm power constraints. Additionally, an increasing demand for fish due to rising demand for exports and local consumption has led to overfishing within natural lakes, a shortage of fish and approaching collapse of the capture fish industry. To address these challenges, Uganda has formulated an Agriculture Sector Development Strategy and Investment Plan with four pillars: enhancing production and productivity, market access and value addition, improving the enabling environment, and institutional strengthening in the sector. Uganda has also prepared a National Irrigation Master Plan.

## C.     The use of water in agriculture

27.     Another resource person[4] made a presentation entitled "Water for food: innovative water management for food security and poverty alleviation", focusing on the use of water for agriculture.

28.     Water is crucial to food production and global food production accounts for 70 per cent of all water withdrawn from rivers and aquifers. There is enough water but only if we

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[4]  Mr. Melvyn Kay, RCTS.

make better use of existing supplies. Technology will be crucial to meeting agricultural challenges, especially technologies that benefit smallholder farmers; the most benefit will come from existing technologies related to rain-fed and irrigation farming.

29.    Much greater capacity will be needed in agricultural water management. The resource person noted that in his experience, training is often a minor add-on item for projects as infrastructure attracts the money but not the people required. He suggests setting aside more funding for the training required. Additionally, there is a need for more R&D and aligning it with development goals. Incentives should not be for just publishing papers but rather disseminating ideas and getting them into practice. Public-private partnerships offer new opportunities for smallholder farmers and institutional structures and technologies must recognize the role of women and youth.

30.    An expert [5] gave a presentation entitled "Irrigated agriculture—the Israeli experience", summarizing irrigation efforts in Israel since the 1950s.

31.    In Israel, land and water are public assets allocated by quotas. Israeli policymakers do not consider irrigated agriculture and agricultural technology as independent issues but rather have made integrated water management an integral part of agricultural technology management requiring coordinated attention. Close contact, participation and cooperation among all stakeholders allow for identifying constraints, solutions, know-how adoption, and diffusion.

32.    From the 1950s to the mid-1960s, Israel established and enlarged water sources and irrigated agriculture. Then Israel shifted to more efficient irrigation by transitioning from surface to pressurized irrigation. Subsequently Israel increased the use of brackish water and further developed metering, automation, filtration and fertilization technologies. Consecutive droughts led to the increased rate of collection, treatment and recycling of treated wastewater. Now there are new national regulations for unlimited use of recycled, treated wastewater, and desalinated water is being introduced into the national water system. There is also a current emphasis on efficient and economic yet sustainable management.

33.    The presenter emphasized that the advances in irrigation in Israel were not strictly achieved through one-off technological events but rather through an ongoing, incremental process. She expressed that not all technology is the answer – the end user or client should be consulted and engaged with regard to technology choices and development.

34.    In discussing these presentations, participants noted that one of the key issues in water is information flow. The asymmetry of information disadvantages those who are poor and powerless. Water connects us all and vast amounts of water are imported every year and challenges experienced by smallholder farmers can escalate into larger scale problems. Participants suggested that water is the next source of conflict of the world and armies will march if water supplies are insufficient. Several participants commented that water management depends very much on information technology management and that there is potential for the use of ICTs for better irrigation techniques and developing countries could make real use of information from GIS, remote sensing, and mobile phones.

35.    One participant described how isotope techniques developed in cooperation with the IAEA can be used to study groundwater.

36.    Another participant drew attention to how electronic waste makes rich water resources potentially useless and the fact that there are diminishing forest monocultures.

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[5]  Ms. Anat Löwengart-Aycicegi, Israel

### D. WIPO resources

37. An expert[6] gave a presentation entitled "Patent landscape reports and other WIPO services in the area of food and agriculture". The World Intellectual Property Organization (WIPO) offers patent landscape reports that present general innovation or technology trends in different fields such as food and agriculture, patent activity by sector or type of organization, brain exchange (gain/drain), and the correlation between R&D investment and patenting activity. These reports are customizable support tools that can be used to prioritize areas for R&D and investment, set up collaborations, facilitate technology transfer, or identify technology in the public domain.

38. WIPO can also provide state-of-the-art searches to identify known solutions for technical problems or similar or alternative solutions to given solutions. For developing countries, WIPO offers these searches for free as well as other resources for free or low cost.

39. In discussing the WIPO presentation, a participant noted that much innovation comes because of intellectual property. Developing countries were encouraged to take advantage of unique opportunities such as those described by WIPO.

## III. Theme 2: Measuring the impact of ICTs for development

40. An expert[7] presented the issues paper on the second priority theme: Measuring the impact of ICTs for development. The main objective was to examine the importance of measuring the impacts of ICTs, identify key challenges, and present empirical evidence on impacts of ICTs in areas such as economic performance, health, education, employment, and the environment.

41. The Tunis Commitment from the second phase of the WSIS reaffirms the strong belief in the benefits that ICTs can bring to humanity and the fulfillment of the MDGs. From the 10 WSIS targets to be achieved by 2015, some important impact areas were inferred: ICT access for poor and rural communities, ICTs in education, ICT networks in health, availability of e-government services, and electronic access to knowledge and information. In their various forms, ICTs affect many aspects of (a) how businesses and governments operate; (b) how individuals live, work, and interact; and (c) the quality of natural and built environments. Considering these many different impacts of ICTs, measuring the impact of ICTs for development is important.

42. The formulation of internationally comparable ICT statistics is essential for governments to be able to adequately design, implement, monitor and evaluate ICT policies. However, the metrics used to measure ICT impact are possibly the most important but also the most challenging to determine. In particular, there are difficulties in measuring the impact of ICTs due to (a) variety of ICTs with different impacts in different contexts and countries; (b) indirect impacts of ICTs because many are general purpose technologies which facilitate change; (c) difficulty to define impacts; and (d) difficulty of determining causality.

43. Much of the progress in measuring ICTs to date is linked to the work of the Partnership on Measuring ICT for Development and its member organizations.[8] The

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[6] Ms. Irene Kitsara, WIPO.

[7] Ms. Sheridan Roberts, InfoSocietyStats.com.

[8] The International Telecommunication Union (ITU), UNCTAD, the United Nations Department of Economic and Social Affairs (UNDESA), the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS), the World Bank, OECD, Eurostat and four

Geneva Plan of Action refers to the development of statistical indicators for "international performance evaluation and benchmarking" (para. 28). The Partnership was subsequently launched at UNCTAD–XI in June 2004 and its work is directed towards achieving internationally comparable and reliable ICT statistics which will help countries assess ICT impact.

44.     The resource person proposed a model of ICT impact assessment which highlights that ICT impacts arise through ICT supply and demand and, at a country level, are likely to be influenced by (a) existing ICT infrastructure; (b) national levels of education, skills and income; (c) government ICT policies and regulations; and (d) the state of e-government.

45.     The expert provided an overview of different methodologies and data sources used to measure the impact of ICTs as well as strengths and weaknesses. The analytical approaches and data sources considered were (a) analytical techniques (for example, econometric modeling using regression, growth accounting, and input-output analysis); (b) case studies; (c) statistical surveys; (d) panel studies; (e) controlled experiments; and (f) the use of administrative data.

46.     The expert presented empirical evidence on the impact of ICTs on economic performance which shows positive macro economic impacts of ICTs in terms of increases in the size and productivity of the ICT sector, capital deepening, increased labour productivity, and multi-factor productivity growth.

47.     The expert drew attention to the role of ICTs in poverty alleviation through the creation of employment and self-employment opportunities. Specifically, the growth of the ICT sector and ICT-dependent industries has a direct impact on employment – especially through telecommunications services for developing countries – and an indirect impact through multiplier effects.

48.     Studies of impacts of ICTs on education show positive outcomes in certain conditions. Studies from the Programme for International Student Assessment (PISA) identified positive impacts of ICTs when there is computer use at home but not necessarily at school. The PISA also observed that quality of ICT use is more important than quantity and there are other important social, economic, cultural, and technological factors.

49.     Evidence from case studies indicates positive impacts of ICTs in health by benefits to individuals through broadband-enabled telemedicine, cost-saving benefits to health systems, and interoperability between electronic health records and other clinical and non-clinical systems.

50.     It was noted that ICTs can facilitate democratic processes and increase participation by citizens. In addition, many impacts on individuals concern how ICT is changing activities such as Internet commerce and time spent using ICTs. However, there are also negative impacts such as Internet-based crime, including fraud and copyright infringement, child exposure to undesirable content and overuse of Internet applications and games, use of the Internet to disseminate pornographic images, and security and privacy concerns.

51.     There are positive and negative links between ICTs and the environment. Recognized positive environmental impacts of ICTs include (a) the potential of ICTs to improve efficiency of energy-consuming processes and equipment; (b) facilitation of dematerialization; (c) climate change monitoring and modeling; (d) dissemination of

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United Nations Regional Commissions (the United Nations Economic Commission for Africa, the United Nations Economic Commission for Latin America and the Caribbean, the United Nations Economic and Social Commission for Asia and the Pacific, and the United Nations Economic and Social Commission for Western Asia).

information; and (e) administration of carbon pollution reduction schemes. Nevertheless, negative impacts arise from energy usage and greenhouse gas emissions due to use, manufacturing and transport of ICT products and pollution from e-waste disposal.

52.     The resource person suggested to the panel key issues for discussion: (a) Should the measurement of impact in certain areas be given higher priority than others in the years leading up to 2015? (b) Bearing in mind the importance of producing relevant and internationally comparable data needed to undertake impact studies, what can governments, development partners, and international organizations – especially members of the Partnership – do to extend ICT impact indicators? (c) From a policy perspective, what types of impact studies are the most useful? (d) What can be done to raise awareness among different stakeholders of the need to measure the impact of ICTs?

53.     Another expert[9] made a presentation entitled "Partnership on measuring ICTs for development", explaining the importance of impact assessment and citing examples of possible impact study approaches.

54.     Growth accounting was cited as an example of a means to assess ICT impact showing the positive contribution of ICTs to gross domestic product (GDP) growth in developed countries. This approach is based on a production function and looks at the contribution of ICTs to GDP growth.

55.     A second example of an approach to assessing ICT impact is the multiplier effect, which is used to look at the impact on the overall economy. It was found that, on average, ICTs accounted for 2.1 percentage points of the annual growth of total output of the countries observed (between 2001 and 2006).

56.     An additional methodology using micro-data suggested that ICT use increases the probability of innovation. The last example showed that an increase in computer use increases student performance. However, based on a capital index including skills, interests, attitudes and resources, it was illustrated that ICT benefits depend on the student's capital. Specifically, impact of ICT use is higher for students with high capital.

## Discussion

57.     A number of participants underscored the importance of public-private partnership in measuring ICTs for development. Specifically, it was noted that the private sector could contribute to data collection, monitoring, and calculating indicators. However, there was concern regarding private sector involvement in collecting ICT data, as it might compromise data integrity and accuracy.

58.     Several participants highlighted the opportunities that ICTs provide to achieve economic and social goals. But at the same time it was also acknowledged that developing countries face significant challenges such as the digital divide in fixed broadband Internet access. Other obstacles to implementing ICTs include (a) insufficient financial resources impeding investment in ICTs in developing countries; (b) energy limitations on the diffusion and implementation of ICTs; (c) differences in education and skills which influence ICT adoption; and (d) distribution issues and inequality of ICT access.

59.     Participants argued that analysis of ICTs should not only assess impacts on poverty but also address other segments of the population such as the middle class. This is because education, skills, financial resources, and other capacities to adopt new technologies vary among different segments of the population, therefore affecting ICT implementation.

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[9]  Mr. Pierre Montagnier, OECD.

60. Participants noted that in developing countries, entities involved in impact assessment need capacity-building. Additionally, a number of participants highlighted the need to identify the kinds of knowledge, skills and ICTs that are required to boost the positive impacts of ICTs.

61. A resource person highlighted the importance of assessing whether the relative timing of ICT adoption makes a difference on impact. When a country, community or individual adopts a new technology before others, it gains a "first mover advantage", enabling it to use that technology to do things differently (and often better) than others that have not adopted that technology. It has been argued that many early adopters thus have a significant competitive advantage over late adopters. It has also been argued, however, that later adopters can benefit from leapfrogging outdated technologies. It would be useful to study the empirical evidence to date.

62. Participants emphasized the need to collect information about ICT and micro-data development and usage in different countries, share best practices, benchmarking ICT policies, and consider leading technologies appropriate to each country. For example, it was observed that mobile phones can help achieve high rates of IT literacy.

63. A number of participants supported the proposal to set up an ICT capacity-building exchange programme. It was argued that different countries have different needs and ways of using ICTs; hence, it would be useful to identify the countries that are ahead and able to train or transfer skills, promote collaboration between countries, and share best practices. It was suggested that the exchange programme could be run by the CSTD secretariat and with financial support by donors.

64. In addition, participants mentioned that most studies conducted to date are on developed countries. Therefore, there is a need to develop more impact studies in developing countries. In this regard, an expert cited a firm-level study of Thailand.

65. UNCTAD highlighted the need of impact studies but also drew attention to the importance of collecting basic data in the first place, arguing that, within the areas of the core indicators, there are still huge gaps. In Africa, for instance, only four countries provide data, showing the need for capacity-building.

66. The resource person from OECD proposed exploring the possibility of the CSTD and the Partnership on Measuring ICT for Development collaborating to organize an international conference a year from now dedicated to measuring the impacts of ICTs. This conference would involve participation of different stakeholders and establish a process to check data availability, develop impact assessments, and share country case studies.

67. ITU announced that its World Telecommunication/ICT Indicators meeting will take place in December 2011, and offered to consider dedicating some time of the meeting to discuss the topics mentioned in this inter-sessional panel meeting on measuring the impact of ICTs for development.

**Contributions of country case studies**

68. Pakistan noted that ICTs have created employment opportunities and cited examples of progress in e-learning, e-banking, e-health, e-commerce, e-governance and e-employment, and combating e-crimes. The country has also been working on modernizing the economy and creating an exportable software industry. Meanwhile, Pakistan is still experiencing difficulties getting fixed-line service to rural areas. Broadband access is still limited but is expanding at a rapid pace.

69. The Philippines reported how the country has become the texting capital of the world because of its information systems including social networking and other technologies. However, some issues are of great concern: cyber-security, illiteracy, the

digital divide (including affordability and accessibility), and a lack of funds and project expertise. The Philippines also acknowledged the need to improve IT infrastructure at the local level.

70.     The United States of America noted its work on making net neutrality a domestic policy, fostering more broadband access globally, and supporting infrastructure to improve general access. In addition, a broad array of programmes were mentioned in the following areas: ICTs for education and training, extending Internet coverage for developing countries, promoting telemedicine and e-health, geospatial tools for sustainable development, the role of women and development, and public-private partnerships. The United States of America also reported on a programme recently launched to address key barriers to women's access to mobile phones, including total cost of ownership, technical literacy and cultural barriers to adoption.

71.     Jordan's Economic and Studies Department, within the Ministry of Information and Communications Technology, is in charge of collecting statistics, monitoring, and conducting studies with respect to the country's e-readiness and the National ICT strategy Key Performance Indicators. They have been harmonizing data from different sources and conducting surveys. In addition, they plan on conducting several surveys and assessments to measure the impact of ICTs for development.

72.     Uganda presented its ICT policies, strategies, and initiatives. These include the establishment of the National Information Technology Authority (NITA-U) in 2009, and the Uganda Communications Commission (UCC) under the Ministry of Information and Communications Technology. The NITA-U has the mandate to "coordinate, promote and monitor IT development within the context of national social and economic development." The UCC was established with a principal goal of developing a modern communications sub-sector and Infrastructure in Uganda. The country also highlighted the launch of the banking sector through mobile banking service. This service product is intended to address the challenge of the very low penetration rate of the banks in rural areas.

73.     The Islamic Republic of Iran highlighted the role of small and medium enterprises (SMEs) in their economy. It was argued that the country needs to encourage R&D and innovation in SMEs. To do so, they presented their needs in terms of better linking the science and technology infrastructure to the needs of the productive sector generally and in particular building up capabilities in high technology areas. They have adopted several policies to stimulate technology development: (a) the Government has established free zones where foreign companies can locate operations, which can create new opportunities for foreign direct investment, leading to spill-over effects and diffusion of new technologies into the wider economy; (b) the Government is gradually opening up the economy to competition in order to drive forces for innovation and technological change; and (c) the Iranian research organization for science and technology provides technical and some financial support to SMEs.

74.     Brazil reported its advances and programmes relevant to the information society. It was noted that programmes on digital inclusion in ICTs are contributing to socioeconomic development, reductions in regional inequalities, universal access to communications technologies, and the generation of employment and income. The Government implemented programmes in several areas including education, infrastructure and access, health and public management (e-GOV), and promoted the use of ICTs and access to information. The country also highlighted the importance of broadband to give its population access to ICT tools. Some examples of Brazil's progress in ICTs are (a) the important role carried out by Brazil in relation to the production of free software; (b) the level of digitalization of services and commercial banking; and (c) digital elections. The country also cited the project "Casa Brasil" as an example of the effort of the Brazilian Government to stimulate South-South cooperation. The project is constituted as a multi-

modular structure with multiple uses including: telecentre, library, laboratory, recycling center, and recording studio, and was deployed in locations with high poverty and social exclusion.

75. Cuba noted that the country has made significant achievements in meeting the Millennium Development Goals and continues to achieve results in education and health equal to or even higher those of developed countries. Cuba pointed out that a recent ITU study ranked Cuba first in the Americas and sixth worldwide in preparing the population for the use of ICTs.[10]

## IV. Theme 3: Progress made in the implementation of and follow-up to the outcomes of the WSIS at the international and regional levels

76. An expert[11] gave a presentation entitled: "WSIS outcomes: CSTD 5-year review", summarizing the WSIS targets and progress towards achieving the targets to date.

77. Technologies continue to evolve quickly and some of the targets were challenging to measure to begin with. (For example, it is not clear what "connect" means, at what level, with what ICTs and services, and entailing what kinds of community access.) Since WSIS, there has been increased global submarine cable connectivity and investment in national backbones as well as a transition from PSTN to NGN and broadband. There have also been new developments in wireless access networks, fibre networks, and regulatory approaches. Additionally, since WSIS, there has been mass access to mobile voice service and new but unequal access to broadband.

78. Internet growth has led to constraints in fixed networks, rapid but uncertain growth in mobile Internet service, and transition in community access models. Now there is a new emphasis on quality of access rather than simply access.

79. Information society capabilities are also changing. There is a pervasiveness of ICTs in social and economic behaviour and a transition to more complex uses. For example, ICTs are contributing to economic growth and globalization such as international trade and related SMEs.

80. New and emerging issues include new technologies such as cloud computing and implications for manufacturing, networks, service delivery, user devices, costs and relationships among government, business, citizens, security, and privacy. Access devices and modes are changing. Web 2.0 and social networking have emerged since 2005 to become leading uses of the Internet with wide-ranging implications. Now there are 1 billion Facebook users and very high levels of use—this dramatically changes the way in which people relate to the Internet and raises new questions such as data management, security, and provision of local content.

81. Mobile transactions have also emerged as a major application innovation with significant potential value as well as regulatory challenges. New and emerging issues also include relevance to MDGs and poverty reduction, environmental impact, and governance.

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[10] Based on Chart 4.10: "Top ten countries on IDI skills subindex (2007)," from the ITU study "Measuring the Information Society—the ICT Development Index" (2009), available at http://www.itu.int/ITU-D/ict/publications/idi/2009/material/IDI2009_w5.pdf. Cuba's relatively high adult literacy and school enrollment rates suggest the Cuban population is highly skilled for the use of ICTs.

[11] Mr. David Souter, ICT Development Associates.

## Discussion

82.     One participant observed that there still is a lot of effort needed in convergence. Cloud computing has emerged since WSIS and Indonesia now has the third largest number of Facebook users worldwide – many people in Indonesia do not have e-mail accounts but use Facebook. Additionally, it would be good to determine what would be appropriate thresholds to classify success of transitioning to the information society, such as thresholds for broadband and penetration.

83.     One participant commented that it is important to look at the change of the landscape and invited the CSTD Secretariat to consider how these efforts fit in the core mandate and traditional responsibility of the CSTD.

84.     Another participant observed that there is a strong need for international cooperation on cross-jurisdictional nature of cybercrime and transfer of private information.

**The Internet Governance Forum**

85.     Mr. Frédéric Riehl, CSTD Vice-chair, who had been tasked by the CSTD Chair to assist her with establishing a working group on improvements to the Internet Governance Forum (IGF),[12] gave an account on steps taken towards the setting up of the group. Two informal consultations (one in Vilnius, Lithuania on 16 September[13] and one in Geneva, Switzerland on 24 November[14]) as well as online consultations[15] had been organized by Mr. Riehl to discuss issues related to the mandate of the Working Group as well as modalities of its work with a wide range of stakeholders. Mr. Riehl had also met with representatives from the Permanent missions to the United Nations Office in Geneva that are members of the CSTD in Geneva on 6 December to discuss the composition of the Group.

86.     During the meeting of 6 December, the member States present had decided that the Group shall include 20 member States and be composed as follows: 15 CSTD member States, with 3 members from each of the Economic and Social Council's regional groups,[16] plus the 5 countries that have previously hosted IGF meetings.[17] At that meeting, the representatives of Portugal and of the United States had expressed their countries' reservations regarding the decision on the composition of the working group and stressed

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[12]  On 19 July 2010, the Economic and Social Council adopted by consensus resolution 2010/2 on the "Assessment of the progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society". By this resolution, the Economic and Social Council "invites the Chair of the Commission on Science and Technology for Development (CSTD) to establish, in an open and inclusive manner, a working group which would seek, compile and review inputs from all Member States and all other stakeholders on improvements to the Internet Governance Forum (IGF), in line with the mandate set out in the Tunis Agenda, and which would report to the Commission at its fourteenth session in 2011 with recommendation, as appropriate". This report is to constitute an input from the Commission to the General Assembly, through the Economic and Social Council, should the mandate of the IGF be extended.

[13]  Summary of this meeting available at http://www.unctad.org/sections/un_cstd/docs/cstd2010d01_en.pdf.

[14]  Summary of this meeting available at http://www.unctad.info/upload/CSTD-IGF/IGFsummary.pdf.

[15]  Summary of responses to a questionnaire available at http://www.unctad.info/upload/CSTD-IGF/IGFsummary.pdf.

[16]  African States; Asian States; Latin American and Caribbean States; Eastern European States; and Western European and other States.

[17]  Greece, Brazil, India, Egypt and Lithuania.

the need for multi-stakeholder participation and contribution to the work of the CSTD Working Group on the Internet Governance Forum.[18]

87.    The Chair of the CSTD invited member States to share their views regarding the decision taken on 6 December concerning the composition of the Working Group. A proposal to include not only the five member States that have previously hosted IGF meetings but also the hosts of the two phases of the WSIS, Switzerland and Tunisia, thereby raising the number of member States represented in the Group to 22, was endorsed.

88.    Following the endorsement of the decision on member States composition of the Working Group, the Chair opened the discussion regarding the participation of other stakeholders in the Working Group. This discussion revolved mainly around interpretation of Economic and Social Council Resolution 2010/2 as well as the applicability of the Rules of Procedures of the Economic and Social Council on the composition of the working group and the involvement of other stakeholders.

89.    Some CSTD members stressed that Economic and Social Council Resolution 2010/2 invited the Chair of the CSTD to establish the Working Group in an open an inclusive manner and as such the composition of the Working Group should also be inclusive, with representatives of other stakeholders participating on an equal footing with representatives of governments. Furthermore, parity in participation would provide more credibility and expertise to the working group. The Working Group on Internet Governance (WGIG) was cited as a successful example of such an approach.

90.    Other States insisted that the intention behind Resolution 2010/2 was to involve stakeholders in the work of the Working Group, but not on the same level as governments. It was important to maintain the intergovernmental character of the work pursuant to relevant Economic and Social Council rules on participation, which allow other stakeholders to voice their views during meetings of Economic and Social Council committees but do give them the right to vote on decisions. Instead, innovative ways should be found to allow for a meaningful participation and involvement of other stakeholders.

91.    The Chair then proposed that, in addition to 22 member State representatives, five representatives each from civil society, the business sector, academia and the technical community and intergovernmental organizations be allowed to participate in the Working Group.

92.    Following some serious discussion regarding this proposal, member States agreed on the following text to establish the Working Group:

"The Chair of the CSTD establishes a Working Group of 15 member States plus the five member States which hosted the IGF meetings plus the two member States which hosted WSIS. This Working Group will seek, compile, and review inputs from all member States and all other stakeholders on improvement of the Internet Governance Forum, in an open and inclusive manner throughout the process.

"The Chair invites the following stakeholders to interactively participate in the Working Group, bearing in mind the established rules of procedure of the Economic and Social Council, who will remain fully engaged throughout the process:

- 5 representatives from the business community
- 5 representatives from civil society
- 5 representatives from the technical and academic community
- 5 representatives from intergovernmental organizations

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[18] A full summary of the meeting is available at http://www.unctad.org/sections/un_cstd/docs//cstd2010d08_en.pdf

"Pursuant to the Economic and Social Council decisions 2010/226, 2010/227, and 2010/228, maximum possible assistance, diversity of ideas, and equal representation of stakeholders from developing and developed countries in the Working Group should be ensured in consultation with the stakeholders.

"The report of this Working Group will be adopted by consensus."

93.    The stakeholders invited to participate are requested to coordinate among themselves and propose five representatives which should reflect the diversity of every stakeholder category, with a view to providing a balanced representation.

# V.    Findings and suggestions

94.    The following main findings and suggestions are based on the intersessional panel and written input from participants and are hereby put forward for consideration by the Commission at its fourteenth session, scheduled to take place in Geneva from 23 to 27 May 2011.

## A.    Main findings

### 1.    Technologies to address challenges such as agriculture and water

95.    The main findings concerning technologies to address challenges such as agriculture and water include:

(a)    Sustainable agricultural systems with an emphasis on supporting smallholder farmers can contribute to the achievement of the MDGs.

(b)    Most sustainable technologies required to improve local agricultural productivity of smallholder farmers already exist. The international community has a key role to play in assisting governments to make these technologies accessible to smallholder farmers, overcoming the digital divide, and strengthening agricultural innovation systems.

(c)    Intergovernmental forums such as the CSTD could provide a platform for the sharing of best practices and promoting North-South and South-South partnerships in agricultural science, technology, and innovation.

### 2.    Measuring the impact of ICTs for development

96.    The main findings concerning measuring the impact of ICTs for development include:

(a)    Measurement of the impacts of ICTs is very important. However, difficulties include the diverse and changing nature of ICTs, the complexity of ICT impacts, and the more general difficulties of illustrating a cause-and-effect relationship between dependent and independent variables.

(b)    Reflecting the complexity of measuring ICT impacts, there is a variety of methodological approaches which are not mutually exclusive. Particular approaches appear to be generally suited to measuring a particular type of impact. For example, econometric regression models are well suited for analyzing firm level impacts of ICTs and case studies are well suited for evaluating small scale ICT projects.

(c)    Most of the empirical research examined had found positive impacts of ICTs for economies, businesses, poor communities, and individuals. Impacts are direct and

indirect and include impacts across the economic, social, and environmental realms, and therefore contribute to achieving several MDGs.

(d) Case studies and some macro-level evidence indicate that ICTs may contribute to poverty alleviation. Mechanisms include "trickle down" effects from overall economic growth, employment and self-employment opportunities, establishment of microbusinesses that are in the ICT or related sectors (such as retail of mobile phone cards), and the use of ICTs such as mobile phones by small businesses or in rural areas.

(e) While there are negative impacts of ICTs, there has been less research in this area. Evidence of negative impacts to date is more likely to be anecdotal and includes adverse economic and social impacts on individuals and organizations, and negative impacts on the environment.

(f) Many data gaps remain in the area of ICT impacts, particularly with regards to developing countries. Evidence for developed countries has tended to focus on macro- and micro-level analyses, usually supported by extensive statistical datasets. Much developing country evidence is of a local "case study" nature. While this is useful, the extension to different situations or to a country level is challenging.

(g) It appears that evidence from developed countries may not apply to developing countries, although the methods of investigation may. In developing countries, access to more advanced ICTs is problematic, leaving a much greater role for ICTs developed earlier such as radio, television, and mobile phones to have important economic and social impacts, at least in the short term.

(h) Few studies or surveys provide internationally comparable data on the impacts of ICTs. The main exceptions are macro-economic analyses carried out by the OECD and the World Bank, firm-level analyses covering mainly European countries, the OECD's PISA study, and data on ICT impact perceptions from surveys that are harmonized internationally.

(i) There are internationally agreed standards for many aspects of ICT measurement. While these are necessary for measuring the impact of ICTs, they need to be complemented by standards specifically targeted at measuring the impact of ICTs. These could include methodologies for econometric approaches and model questions for perceived impacts. The findings of the Partnership Task Group on Impacts will be important in overcoming this lack of measurement standards.

## B. Suggestions

### 1. Technologies to address challenges such as agriculture and water

97. Suggestions concerning technologies to address challenges such as agriculture and water include:

(a) Governments should review their agricultural science, technology and innovation system with a view to strengthening the support to smallholder farmers through sustainable agriculture, and integrating a gender perspective in the design of these policies.

(b) Governments and the international community should consider an increase in the share and effectiveness of public expenditure for agricultural development.

(c) Public investment should be carefully targeted towards improving physical and R&D infrastructures (including rural road networks, power and Internet connections, education and health), linkages among farmers, agricultural product processing and marketing, and extension education and services, primarily supporting sustainable, regenerative production methods.

(d)     There is a need to review research and education systems to ensure that they adequately address the challenges faced by smallholder farmers through sustainable agriculture.

(e)     Participatory research which engage farmers, especially women, should be encouraged.

(f)     Sustainable agriculture can be supported by removing or modifying tax and pricing policies that incentivize overuse of pesticides, fertilizers, water, and fuel or encourage land degradation; as well as internalizing the health, environmental, and social costs of agricultural products.

(g)     There is a need to re-examine international trade policies so that they support sustainable agriculture including effective agreements and biosecurity measures involving transboundary water, emerging human and animal diseases, agricultural pests, climate change, environmental pollution, food safety, and occupational health.

(h)     Developed countries can consider reducing domestic support and export subsidies while improving market access for developing country producers.

(i)     Developing countries can consider reducing tariffs on imported pump sets or other irrigation and soil improvement technologies to lower costs and make agriculture more profitable for smallholder farmers.

(j)     Agrarian reform to assure stability in land management and tenure systems should be at the top of governments' political agenda.

(k)     Recognizing the important role of intellectual property in innovation, developing countries are encouraged to make use of existing information resources, such as the Global Information Services of the World Intellectual Property Organization.

(l)     The CSTD is encouraged to:

- Provide advice, upon request, on how to strengthen national agricultural innovation systems, in collaboration with UNCTAD;
- Promote the exchange of best practice examples in the area of agricultural science, technology, and innovation; and
- Promote an integrated, sustainable, international, and collaborative approach to agricultural innovation to meet the needs of smallholder farmers.

## 2.    Measuring the impact of ICTs for development

98.     Suggestions concerning measuring the impact of ICTs for development include:

(m)     Explore the possibility of organizing an international conference dedicated to the measurement of impacts of ICTs, arranged jointly by the CSTD and the Partnership on Measuring ICT for Development. This conference would set in train a process to check data availability and develop impact assessments. Member States are encouraged to express interest in hosting and supporting such an event.

(n)     Call on the Partnership on Measuring ICT for Development, which is a key player in enhancing the availability and quality of internationally comparable ICT data worldwide, to further develop its work on measuring the impact of ICTs. This also includes the development of practical guidelines, methodologies and indicators.

(o)     Encourage research on measuring the impact of ICTs in developing countries.

(p)     Promote impact assessment in the following main areas: economic performance, employment, education, health and the environment.

(q)     Promote impact assessment of ICTs on poverty and identify the kind of knowledge and skills that are needed to boost impacts.

(r)     Call on governments to share information about country case studies and the use of micro-data. This could be done through online consultations among countries.

(s)     Promote collaboration between countries through a capacity-building exchange programme in the area of ICT for development. The objective of the programme would be to promote the sharing of skills and knowledge between participating countries.

(t)     Call on governments to collect relevant data at the national level on ICTs, in particular the core ICT indicators established by the Partnership on Measuring ICT for Development and endorsed by the United Nations Statistical Commission. Capacity-building and allocation of sufficient funds are also needed to undertake surveys.

(u)     Call on development partners to provide financial support needed to facilitate more capacity-building and technical assistance from relevant international organizations to developing countries, and especially the LDCs.

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