E/CN.16/2012/CRP.1

Distr.: Restricted
10 April 2012

English only

**Commission on Science and Technology for Development**
**Fifteenth session**
Geneva, 21–25 May 2012

# Inter-sessional Panel Meeting on:

# Innovation, research, technology transfer for mutual advantage, entrepreneurship and collaborative development in the information society;

# Open access, virtual science libraries, geospatial analysis and other complementary ICT and science, technology, engineering and mathematics assets to address development issues; and

# Follow-up to the World Summit on the Information Society

New World Hotel
Manila, Philippines, 13–15 December 2011

## Draft summary report prepared by the UNCTAD secretariat[1]

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

# I. Introduction

1. At its fourteenth session held in May 2011, the Commission on Science and Technology for Development (CSTD) selected the following substantive themes for its 2011–2012 inter-sessional period:

- Innovation, research, technology transfer for mutual advantage, entrepreneurship and collaborative development in the information society
- Open access, virtual science libraries, geospatial analysis and other complementary ICT and science, technology, engineering and mathematics assets to address development issues, with particular attention to education, and
- 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, a panel meeting was organized by the CSTD secretariat and the Philippine Government in Manila, Philippines, from 13 – 15 December 2011. The aim of the panel meeting was to study in depth the various issues related to the substantive themes, with a view to contribute to considerations by the Commission at its forthcoming fifteenth session.

# II. Organization of work

3. The CSTD panel meeting was attended by members of the Commission; representatives of an inter-governmental international organization; representatives of NGOs in consultative status with ECOSOC; representatives of civil society, the technical and academic community, and business entities; and other observers. (See 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 the participants. All the meeting documents are available online at the Commission on Science and Technology for Development website: www.unctad.org/cstd.

# III. Theme 1
# Innovation, research, technology transfer for mutual advantage, entrepreneurship and collaborative development in the information society

5. The CSTD secretariat[2] introduced the issues paper on this theme, noting that advances in information infrastructure have raised expectations related to the improved possibilities of knowledge exchange and network creation, as well as the impact of the Internet in transforming ways of doing business and providing new avenues for commercial and entrepreneurial activity. On a more macro scale, with regard to pathways of economic development, this technological change has stimulated discussions about improved opportunities for leapfrogging, catching up, and technology transfer.

[2] Mr. Mongi Hamdi, UNCTAD.

6. An essential pre-condition for developmental transformations is building capacities for innovation, absorption, and production. The effective application of, and innovation in, information and communication technologies (ICTs) comes not from simply making technology available; but also from the development of capabilities to enable innovative processes. In an increasingly knowledge-centred society, multi-dimensional capacity building is essential for success in technology transfer and leapfrogging. Specifically, developments in technological infrastructure must be accompanied by developments in social infrastructure and a focus on capabilities is essential in order to manage and benefit from these dynamic and interdependent innovation processes.

7. A prerequisite for technology transfer or leapfrogging is the building of the right kind of science, technology and innovation (STI) capability. Development strategies should pay particular attention to both absorptive and productive capabilities. The Internet has provided a basis for interactivity and it is providing platforms which are transforming the way organizations organize their information and communication networks and practices. Capacity building pathways and opportunities are also fundamentally altered by the Internet, as exemplified by the notion of learning by collaboration.

8. ICTs can enhance value chains and international production networks by improving the coordination of supply networks and vertical chains of production across international and organizational boundaries. ICTs also offer ways for global 'open data' collaboration and important networks and services for knowledge exchange. Facilitating knowledge exchange is becoming a major new market, with opportunities emerging for 'knowledge brokers' and other intermediaries. These knowledge brokers can play an important role in addressing development issues – particularly in offering services such as virtual science libraries (VSLs).

9. The focus on developing capabilities must be accompanied by infrastructure developments. Enhancing global connectivity also involves important choices about trade-offs between infrastructure options, particularly between fixed and mobile connections. While there have been some developments in fixed networks, broadband connections and mobile access infrastructure, **t**here appears to be a proliferation of alternative 'work-arounds' rather than long term solutions.

10. Local facilities and networks offer important ways to pool resources and extend access to those most marginalized. Where universal Internet access is not feasible, physical sites which can provide access and equipment (such as cybercafés or telecentres) are an important means of extending access. However, the sustainability of these service delivery models is in need of review.

11. One resource person[3] of the theme spoke on the topic "Firm-level innovation: implications for policy and practice." She noted that developing countries need sound national innovation strategies to stimulate economic growth and development. There is no "one size fits all" approach for innovation policy, as socio-cultural conditions are important factors that impact innovation. Innovation is increasingly being affected by structural social capital and cognitive social capital (confidence to innovate and to be entrepreneurial); it is easier to build the former than to inculcate the latter. Policy circles tend to focus on radical and new innovations despite the fact that 90% of innovation is incremental. Influencing factors like Government policy and the socio-economic environment do not substitute for intra-firm processes.

12. Firms often start off with low levels or even the absence of innovation capabilities. For developing country firms, the process of innovation management often involves the

[3] Ms. Gillian Marcelle, University of the Witwatersrand.

firms first becoming familiar with various ways of acquiring knowledge even before they are able to apply this knowledge for production and then to innovation.

13. Firms learn how to innovate through experimentation. They accumulate production-based and innovation capabilities over time in a managed process. It is this capability building process that is central to a firm's innovation performance since it determines the types and levels of innovative activity that firms can undertake as well as the speed at which innovation improves.

14. Because firms, rather than countries, innovate, policy on its own is insufficient and in order to realise success, innovation strategies require firms to have financial resources, management savvy and know-how. For developing country firms, incremental innovation accounts for the largest proportion of innovation activity, which is undertaken in collaboration across a variety of actors including suppliers of equipment and customers. Industry factors and technology lifecycles matter and linkages and interaction with, and access to funding still pose major problems for developing country firms.

15. The firm-centred approach to designing and implementing innovation policy is highly recommended but is not an easy option, because it will require state actors to acknowledge that they are not in full control of the outcomes of the process. In this approach the state is required to adopt a posture of facilitation of an emergent process rather than controlling a rational and predetermined process and this takes confidence and organisation. It also requires the actors involved to work together with mutual trust and in partnership.

16. Policies that do not include firm-level perspectives are suboptimal. At national and regional levels these become blunt instruments which do not acknowledge or respond to variations in innovation positions, paths and processes. These undifferentiated policies result in the persistent challenge of funding innovation, even in areas that are earmarked for strategic focus such as the biotechnology industry.

17. These weaknesses despite Government intention call for a major departure from the current mode of operation – constraint-based or frugal innovation presents an exciting opportunity while large scale innovation programmes may be appropriate in areas such as renewable energies, waste management, housing and transportation. Making these reorientations in the scope and design of innovation programmes will not only foster improved partnerships between market and the state but will also contribute to the political problem of demonstrating the relevance of science, technology and innovation (STI) spending. The state can play a major signalling role and stimulate investment including through procurement and leveraging of public funds.

18. Participants debated the role of public policy. One participant commented that Governments have a role to play in building the infrastructure — the physical capacity — of innovation, including the power sources that drive ICTs. Electric power is vital to this and reliable sources of power are necessary, which is a real challenge in developing countries. Sustainable, scalable, off-grid power systems are required for ICTs.

19. The resource person concurred that the public sector can help in areas where the private sector under invests, such as renewable energy. Roles Governments can play also include: ensuring a high quality education system, providing pre-competitive information, having strong standards infrastructure, assisting with procurement, and providing information to improve the general state of knowledge such as basic research.

20. Participants described incentives, e-learning initiatives, and public-private partnerships. Both internal and external learning are equally important and have to be done simultaneously.

21. Another resource person[4] of the theme presented findings from research on knowledge transfer through production networks in East Asia. He found that ICTs have different effects for local firms and multinational corporations (MNCs). Local firms use ICTs to develop export markets while MNCs and joint ventures adopt them to improve quality and reduce costs. Local firms adopting ICTs generally do not depend on external sources of information, while MNCs mainly connect with multinationals.

22. How to increase linkages is very important for increasing innovation possibilities. Diversified sources of knowledge facilitate varied or more advanced innovations. ICTs help local firms to develop foreign markets, which will create channels for accessing knowledge. Foreign affiliates of MNCs provide knowledge to their partners according to their international divisions of labour and how to choose partners is a strategic matter for firms in Southeast Asia. ICTs can probably be used by local firms to make their internal management more efficient. On-line networks for collaborations by local firms are limited and they depend on "off-line networks" with local partners for product innovation; face-to-face communication is a key channel of international knowledge transfer. The structural change of knowledge flows should include considerations of how to make better use of ICTs.

23. At the firm level, although people in the capital regions have smartphones or laptops, local firms do not make full use of ICTs to re-organize business processes. Internal "inter-department" managerial practices (cross-functional teams) will be crucially important for enhancing absorptive capabilities. A real issue is how to bring off-line inter-firm networks "on-line."

24. At the country level, firm to firm communications are indispensable and in addition to facilitating trade and foreign direct investment (FDI), expert movement should be encouraged to foster innovation. ICT systems should be installed to improve immigration control and the operation of infrastructure such as ports, airports and railway and bus networks.

25. Another resource person[5] of the theme discussed "harnessing ICTs to hasten catching up." He commented that given the complex digital world of multiple divides and exclusion, development through catching up and leapfrogging calls for learning, innovation and competence building systems at the sectoral, regional, national and international levels wherein collaboration plays an important role. But if innovation is key to development, to foster inclusive development the underlying innovation system has to be inclusive. Historically, north-south collaboration has played a significant role in the catching up in many countries but "when only a spare set of clues is available regarding the solution to be recreated, efficient imitation requires more or less the same type of capabilities than innovation".[6]

26. Unlike earlier general purpose technologies, in the case of ICTs, substantial capabilities exist in the south and ICT priorities are different in the north and south. The strategy of promoting ICT use by neglecting ICT production has the potential danger of perpetuating technological dependence as in the Green Revolution.

27. A number of ICT solutions have arisen from the south addressing southern issues, such as hardware innovations like simputers (simple computers) and software applications

[4] Mr. Yasushi Ueki, Bangkok Research Centre of Institute of Developing Economies, Japan External Trade Organization.

[5] Mr. K.J. Joseph, Centre for Development Studies.

[6] Nelson and Winter, (1982) p. 124.

addressing issues specific to rural economy developing countries. E-auctions have reduced price variations for export oriented commodities.

28. South-south cooperation is not a substitute for but rather a compliment to north-south collaboration. South-south cooperation can be vertical or horizontal and there is a need for more broad-based approaches by harnessing southern innovation systems to hasten catching up.

29. Participants noted unequal inclusion and that we speak more about the use of ICTs and less about the production of ICTs; in order to leapfrog, countries have to be places of production as well and should encourage ICTs for the use of society. Some countries experience a trade flow that favours dependency because they primarily export basic products while importing mostly high and medium high technology products, which increases access to ICTs but also increases dependency at the same time.

30. Participants suggested organizing trade shows and promoting access to global markets; they also commended regional initiatives such as those by the Economic Commission for Latin America and the Caribbean (ECLAC) and Association of Southeast Asian Nations (ASEAN). Participants noted there is room for empirical research on the production of ICTs in developing countries.

31. An additional resource person[7] on this topic gave a presentation on "Biological and medical science research infrastructures and the future of medicine: global cooperation." He noted that medicine typically treats patients based on statistical information generated on large, heterogeneous groups, not as individuals. However a new data-driven ICT integrates multiple types of computer models and imaging with individualized results. Computer models or "virtual patients" derived from data from individual patients can be used to identify personalized prevention or therapy schedules and information on drug side effects.

32. Areas for policy support include global coordination of research programmes such as the Biobanking and Biomolecular Resources Research Infrastructure (BBMRI), implementation of IT for the future of medicine as a "lead initiative," harmonized and R&D-supportive ethical and legal frameworks, new models for public-private-partnerships, diagnostics and drug approval processes that consider latest developments and global harmonization and integration. Currently a legal or policy basis does not exist for collaborating with academics in an open innovation model and most of the data developed around clinical trials is not shared. A policy framework could support pre-competitive research.

33. Participants noted that challenges include funding and the large amounts of data involved. They proposed including developing countries in a pilot, perhaps with a developing country from each region. Participants suggested the model can facilitate prevention and look at sub-regional science research, such as West Africa and malaria. Virtually no clinical trials are conducted in Africa and doing this through ICTs can have an effect on cost and efficacy.

34. Article 66.2 of the Trade-Related Aspects of Intellectual Property (TRIPS) agreement and legislation governing intellectual property (IP) exchange are currently an impediment as they do not allow for cohorts to be developed. One participant suggested that perhaps policymakers should rethink IP legislation regarding open innovation.

35. Another participant noted that there must be a tracking system. Although one participant's country is approving personalized medicine in its e-health system, another

[7] Mr. Declan Kirrane, ISC.

participant expressed concern that high-tech personalized medicine might lead to more elite medicine that is more unaffordable.

*Discussion*

36. A participant reported that pillars for ICT research and development and innovation strategy include effective research infrastructure; ICT policy and institutional support; adequate funding; and effective international cooperation among Government, the research community, and industry. Innovation is a socially embedded, path-dependent, interactive, and cumulative process. It is necessary to balance the role of Governments and international organizations in addressing innovation. Companies are the executors of innovation and we need to follow a balance of Government, universities and companies not just to explain what happened but to show for those countries that need to develop some possible ways that we need to find a formal model that could be repeated albeit with some modifications. Benchmarks and models could be helpful for those countries.

37. Participants expressed concern that Latin America, Asia, and Africa are increasing in access to ICTs but are still facing dependence in the digital divide which has assumed another characteristic. One participant stressed that we need both the use and production of ICT products in every country.

38. One participant noted that ICTs are a special force for process innovations. Developing countries should be encouraged to take necessary steps to create a suitable environment that can attract FDI in R&D, including a skilled workforce, incentives, etc.

39. A participant recalled that 90% of innovation is incremental and emphasized that IP plays a role in this; similarly, addressing IP issues can also improve R&D efforts in medicine. Another participant suggested that S&T ministers describe firm-level innovation in terms of job creation so that finance ministers will understand its importance.

40. One of the resource persons noted that learning takes time, often longer than an electoral cycle. Governments need to know that learning and capability development requires long-term commitment.

41. One participant highlighted the need to transfer knowledge, skills, and competence to use technology, and proposed several suggestions:

(a) Encourage countries, especially developed ones, to transfer their research and scientific institutions to enhance cooperation and exchange with research and development institutions in developing countries, in particular least developed countries (LDCs);

(b) Explore IP-related policies and initiatives for technology transfer to the benefit of developing countries and to take appropriate measures to enable them to take advantage of this transfer;

(c) Multilateral mechanisms and standardization bodies of ICT and global networks need to be more democratic, coherent, and fair;

(d) Recognize the need to provide new and additional resources to developing countries in view of the current financial crisis.

# IV. Theme 2
# Open access, virtual science libraries, geospatial analysis and other complementary ICT and STEM assets to address development issues

42. Under the second priority theme, the CSTD secretariat[8] presented an issues paper. The presentation began by highlighting the important role of education at all levels in development and the potential of ICTs to bring significant change to education, including how we learn, teach, and manage education systems. It has been argued that effective educational policies are a prerequisite condition to the successful implementation and use of any technology in education. Furthermore, there needs to be a concerted effort to link educational policies with ICT and wider development policies. The issues paper focuses on Open Access (OA), VSLs and geospatial analysis.

43. Over the past two decades, there have been increasing calls for more "Open Access"to academic literature to address the barriers faced by those in lower income countries. OA offers many benefits for researchers, including increased visibility and presence on the Internet for individuals and institutions and greater reach of research. The OA movement has had a significant positive impact on the availability of scientific journal literature although there are significant differences between scientific disciplines in the uptake.

44. VSLs are gateways to academic journals and digitised monographs as well as online repositories. VSLs offer many benefits, including the availability of materials for download anywhere; the potential for multiple, concurrent users; enhanced search capabilities; and other value added such as bibliometric and citation information.

45. Building VSLs requires considerable planning and coordination across organisations. There are associated needs for capacity-building in terms of technology development and maintenance as well as management issues such as interoperability, metadata management, evaluating quality of content, user training, and maintenance.

46. OA initiatives and VSL development are part of a wider movement towards greater openness. It has been argued that greater openness can help to lower costs, improve accessibility, and advance prospects for long-term preservation of scholarly works. However, some challenges associated with OA and VSL include content, quality, information overload, plagiarism, publishing rights, prestige, and financial sustainability. Overall, policies that aim to achieve greater 'openness' of educational resources must balance commercial interests, IP rights, and social goals such as greater dissemination of knowledge.

47. Geographic information systems (GIS) are information systems that allow users to keep track, store, edit, and analyze geographic information. Geospatial analysis applies statistical analysis and other informational techniques to geographically based data, including GIS. It is the process of turning raw geographical data into useful information. GIS is useful in revealing patterns and anomalies and is very important to evidence-based decision making. There are tremendous possibilities for application in a wide range of development areas such as mapping malaria risk or water resource management.

48. Utilising GIS requires knowledge and skills from a range of disciplines. The collection and analysis of geographic data involves critical thinking and decisions about which details should be captured and how problems should be framed. GIS is important for

[8] Ms. Dong Wu, UNCTAD.

science, technology, engineering, and mathematics (STEM) education for understanding many STEM problems and associated tools and techniques. GIS can also stimulate interest in STEM education, offer additional ways to develop important spatial abilities and literacy in all subject areas, and prepare students to deal with complex issues.

49. One of the biggest barriers to widespread use of GIS in education is limited appreciation of the different ways of thinking and development of spatial abilities that GIS can offer. A lack of personnel with appropriate skills and training is a considerable problem and often GIS is not integrated into the curriculum. The large amounts of complex data needed to build up detailed GIS layers is very expensive, with a significant upfront cost as well as required maintenance. The complex array of technologies involved in using GIS requires electrical power; and the Internet and mobile telecommunication systems are integral to GIS, such as GPS and remote sensing. Lack of support from decision makers is often related to their limited awareness of the potential usefulness of GIS. There is a need for training for policy makers, greater understanding of the impact of GIS, teaching teachers, and setting up networks and partnerships, as well as support for the development of GIS applications tailored to education.

50. A key issue affecting OA, VSL, and GIS is the persistent gap in the distribution and use of ICT technologies around the world. In integrating ICT systems and tools in education, it is important to note that technology itself is not the answer to improved education. Without the human capacity and educational framework conditions in place, technology at best will have no impact and at worst may hinder education efforts.

51. A resource person[9] on the theme discussed "spatial thinking with or without GIS." Spatial thinking consists of concepts of space, representation tools, and reasoning. The resource person exhorted participants to make spatial thinking abilities a key educational objective in national curricula at all levels; education policy must be targeted toward training teachers to teach GIS and through GIS. If GIS or fundamental concepts of geography that lead to spatial thinking are not included in national curricula, then teacher training will not include spatial thinking or GIS and we will not be able to realize the potential of GIS to create more spatial thinking. Teachers also need to be trained how to lever this technology to the benefit of students. At the same time, there is a dearth of research on teaching in GIS including insufficient research on the benefits and how GIS enhances education. To help address these areas, a new international institute could be engaged in teacher training as well as fundamental research about the benefits and best practices in GIS.

52. One way of coordinating GIS data is to set up a Government body dedicated to obtaining, storing, and disseminating geographic data including remote-sensing data. In addition to many Government efforts, there are also private sector led initiatives such as community maps and open maps based on crowd-sourced data.

53. Although there have been several education-oriented GIS packages, they have not had a huge impact. There are several reasons why creating specialized desktop educational GIS software has not been successful. Desktop solutions for GIS also runs counter to trends in software today which is moving more towards the 'cloud' as well as mobile applications. Where the 'cloud' or computers are not available, there is still paper-based GIS such as neighbourhood mapmaking or looking at printed maps. The digital divide is no excuse for ignoring geography.

54. The resource person provided the following suggestions for CSTD members:

[9] Mr. David DiBiase, ESRI.

(a) incorporate spatial thinking into national curricula;

(b) train teachers to teach with GIS, and about GIS;

(c) make local-scale geospatial data freely available;

(d) foster networks and collaboration.

55. Participants pointed out that GIS is a good opportunity for leapfrogging, especially for developing countries, including LDCs. GIS can provide information about streets, different layers within a city, and infrastructure beneath streets, and enable users to follow the development of the city in its surroundings. Collaborative mapping efforts can map large amounts of unsurveyed land.

56. Geography is a fundamental course that brings together many disciplines, builds team thinking and critical thinking, and supports holistic approaches to sustainable development problems. GIS can be used to teach agriculture, biology, urban design, public administration, public health and many other subjects dedicated to local circumstances, such as crops and insects in different areas, forest pollution caused by mining industries, identification of water systems, and naming of streets. Participants were encouraged to share more case examples of GIS applications.

57. One participant asked about the financial implications of integrating GIS into curriculum and whether it can be done within frameworks or entails added resources. The resource person replied that expenses or financial implications relate to technology, infrastructure, and teacher training. The absence of technological infrastructure is not necessarily an impediment to GIS education. The real financial implication is in teacher training. An initiative for GIS teacher education for Africa would require enthusiastic cooperation of African member States. Private sector entities and other stakeholders would be interested in that and other global training programs.

58. Participants discussed open GIS data and collaborative approaches among the private sector, public sector, and academia. GIS can be used a lot in ‘citizen science’ and with crowdsourcing new maps can be created based on recent topics and with inputs from multiple schools such as compiling meteorological measurements by students throughout the world. Open source alternatives have matured in recent years. Now there are very robust open source databases and open source GIS and related software packages. The state of the art in the GIS profession right now is creating hybrid solutions that answer very particular needs for particular organizations and that often combine open source and closed source software tools in very creative ways.

59. One participant noted that public research data is in the public domain and funders are pushing researchers to put data into the public domain but there is no proper recognition of those who collect data or the cost of collecting data. For example, there is an expectation to gather data on progress in reaching the Millennium Development Goals but no funding for that. Institutions monitoring this are paid from different sources and then pushed to publish it in different domains.

60. Another resource person[10] on the theme shared experience in the institutionalization of a regional GIS network. Applications of their GIS network include risk reduction, climate change adaptation, harmonization of land use claims throughout the region, and exploring areas without access to roads or bridges or concentrations of foreign investment. The GIS network complements an existing system for earthquake related hazards. In some

[10] Ms. Graziella Harting, National Economic and Development Authority, Caraga, the Philippines.

municipalities the GIS network is also used for tax mapping and community based management system at the household level.

61. Another resource person[11] on the theme topic discussed OA, reporting that OA has made open education possible, which has led to open universities, and now there are now nearly 50 'mega universities' worldwide with at least 100,000 students. New ICTs have enabled open educational resources (OER) which have triggered the evolution of the OER University.

62. OA and ICTs on education fundamentally change the role of educational institutions. In OER universities, learner initiated pedagogy assigns the bulk of the responsibility of choosing learning resources to the learner. Certification is based on accreditation which is based on assessment. Open universities generally cater to graduate students rather than undergraduates as the rudiments of science, mathematics, and English and other basic education rely on a different set of assumptions. To prevent cheating, open universities can use several new applications to detect plagiarism and conduct on-line examinations in real time with web cams.

63. One participant stated that his country has the need to provide technical training to around 141,000 people between 18 and 21 years old. A limitation their open university faces is that training in digital technologies requires both a tutorial or classroom component and a hands-on component. Some open universities are also having challenges scaling up nationwide.

64. Another resource person[12] on the theme discussed experiences and lessons regarding using technology for disaster relief. When a crisis strikes, key objectives are to help disaster relief agencies get a sense of the terrain via satellite imagery, aggregate relevant information, and find people. A range of ICT tools exist to assist with each of these objectives.

65. Search engines can create "landing pages" or Web sites dedicated to the disaster. Satellite imagery can help aid agencies identify areas that need the most help. User-generated maps can display relevant information for daily living in disaster areas, such as locations with fresh water, agency outposts, ATMs in operation, transportation routes and garbage/debris collection sites.

66. In addition to crowdsourcing, search engine providers seek to make authoritative information available as quickly as possible. The goal is to provide more information faster while also ensuring the information is trusted, reliable and useful but not spreading panic. This requires trusted sources of information such as Governments and United Nations entities as well as a common 'language'. Faster adoption of a common standard for distributing alerts across the Web is needed. This standard would entail trusted sources of emergency data using the same language to share data in a secure, automated way. The proposed language, Common Alerting Protocol (CAP) is an XML-based data format for exchanging public warnings and emergencies between alerting technologies. CAP allows a warning message to be consistently disseminated simultaneously over many warning systems to many applications. CAP increases warning effectiveness and simplifies the task of activating a warning for responsible officials.

67. One participant mentioned that the International Red Cross also works during disasters to mobilize people, satellite phones, and so on. Search engines are not on the ground organizations but they try to link people with resources including those of the

[11] Mr. Alexander Flor, University of the Philippines, Open University.
[12] Ms. Ann Lavin, Google Asia Pacific.

International Red Cross. A landing page can point people to resources like the International Red Cross and other organizations. Making the information available on-line helps these relief agencies because it reduces the number of phone calls and the staffing requirements to answer the phone calls. At the same time, it directs users to resources including information on how to donate to these organizations, find out what they are doing, and reach them. On-line services can be very specific such as where Red Cross facilities are on the ground and what exact services they are providing.

68. Other participants described open source software developed in Kenya and Sri Lanka. These applications have been used in several countries such as Haiti.

*Gender and STI*

69. The secretariat[13] presented a recently published report entitled "Applying a Gender Lens to Science, Technology and Innovation".[14] The report advocates improving gender sensitivity throughout STI policy-making processes; and given that gendered interactions pervade all aspects of S&T, it argues that improvements in economic and human development will not be sustainable, or as far reaching, without addressing this key issue.

70. UNCTAD and the CSTD Gender Advisory Board have begun work on 'good practices' for gender sensitive policy-making, pursuant to an ECOSOC request. They are developing a survey of STI policy-making practices to identify strengths, weaknesses, and gaps. They intend to send this survey to all CSTD member States and are exploring avenues for further research and welcome partnerships.

71. A resource person[15] on this topic noted that over the last five years, there has been marginal improvement in women's enrolment in universities in India. Areas to be addressed include retention, recruitment, re-entry, R&D, recognition, reward, and remuneration. Regarding science for women, areas to be considered include perceptions, participation, programmes, partnerships, property rights, and policies.

72. Another resource person[16] on this topic discussed advances of women in science using the field of forensic science as an example. She reported that an increasing percentage of women study forensic science rather than men. In addition to forensics, other fields with science for women by women include agriculture, health, biodiversity, population genetics, ethics, and bioinformatics. She encouraged participants to include the social dimensions of science in education and to use the gender lens in STI when evaluating project success.

73. Participants discussed what contributes to the gender disparity and the various approaches to address it. In some countries the disparity is due to economic or cultural factors. Major conflicts in Europe had an impact on the status of women in European countries. In some countries, more girls are educated than boys. In Africa, there are problems with male chauvinism, high incidences of polygamy and high drop-out rates of girls. In Latin America, legislation has been seen as important to overcome old, traditional, subtle cultural arrangements and mindsets.

74. Some incentives and initiatives include gender parity in scholarships. However a resource person opined that scholarships should be based on merit, not simply to meet gender parity demands. If opportunities are equal such as equal access to education, she did not personally see a need to balance it by legislation; rather appointments and provision of scholarships should be by merit alone. On the other hand, she supported programs already

[13] Ms. Anne Miroux, UNCTAD.
[14] UNCTAD/DTL/STICT/2011/5.
[15] Ms. Sudha Nair.
[16] Ms. Maria Corazon De Ungria, University of the Philippines.

focusing on bridging the gender gap that were branded as such, like scholarship programmes for women, in which women compete against other women based on merit. Another participant commented that children — both boys and girls — lose interest in STEM subjects by fourth grade. So we have to attend to the youngest ages and capture imaginations by fourth grade. This begins at home and in the cultural sense, with mentorship in families and in classrooms.

75. One participant noted that development is for all – both men and women. Addressing gender issues should take into account the conditions of both men and women. One participant encouraged the secretariat to continue the research in this area. She proposed the CSTD could draw up a set of recommendations to promote gender equality and the role of women in STI. A resource person commented that there are not many other places within the United Nations system that can seriously address these issues. We need to have indicators that reflect changes over the past 20 years.

*Discussions*

76. A participant presented on OA in Jamaica and by extension the English-speaking Caribbean. The Jamaican Government has taken an active role in the e-learning part of OA and an open campus has evolved. The Caribbean Academy of Sciences is setting up an OA repository for scientific information in the Caribbean which seeks to look at all information on the Internet and elsewhere and select information with relevance and significance to the Caribbean region to spur research and discussions.

77. Another participant reported on activities in Turkey, including several OA activities and the national STI strategy for 2011–2016. The Scientific and Technological Research Council of Turkey (TÜBİTAK) has a coordinator role for this strategy which includes ICTs as a prioritized area. At the fourth United Nations Conference on LDCs, the Turkish Government presented plans for Turkish assistance to LDCs in the form of various mechanisms including technology transfer programs coordinated by TÜBİTAK, the exchange of scientists and researchers, and networking among scientific institutions. Plans include the establishment of an international STI centre dedicated to LDCs which would also serve as a technology bank. Turkey also plans to set up an international agricultural centre dedicated to LDCs to share best practices in agricultural production and to foster technology transfer modern irrigation techniques, seed sampling, fertilizer production, technical assistance in land use management, erosion control, and combating desertification.

78. Another participant recognized the need for a strong ministry or institution to track progress in S&T for development. The participant shared progress since the conclusion of the Science, Technology and Innovation Policy Review (STIP) review of Lesotho which included guidance to build on the current S&T department and turn it into a secretariat and from there form a commission which would be in a better position to coordinate activities in other ministries. Having only one ministry coordinating science and technology matters would also reduce duplication.

79. Another participant stated that ICTs and digital technologies are key tools in fighting the war against drug consumption and drug trafficking and this topic should be included in the future agenda of the CSTD. Other participants suggested the CSTD include environmental problems and space technology as issues for consideration.

80. Another participant encouraged delegates to publicize more widely the efforts of networks such as the UbuntuNet Alliance in south and east Africa and Africa Connect. He suggested that the 15th session of the CSTD could include the participation of experts on panels to focus on how these networks could be utilized for more countries.

# V. Theme 3
# 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

81. Mr. Peter Major, CSTD Vice-Chair, who had been designated by the CSTD Chair to assist him with the CSTD Working Group on improvements to the Internet Governance Forum (IGF),[17] shared an assessment of previous meetings of the Working Group and his expectations for the remaining meetings. The Working Group expects to prepare a list of recommendations based on consensus with conditions of implementation including a timeframe and responsibilities, as well as a list of recommendations with divergent views.

82. The Working Group has worked in a constructive manner with increased mutual trust and has made measurable progress. The fourth meeting will take place in January 2012, and if needed, a fifth meeting will be held at the end of February 2012. The Chair's summary and recommendations will be presented at the CSTD session in May 2012. A draft resolution on the World Summit on the Information Society (WSIS) follow-up will then be submitted for approval by ECOSOC and then endorsement by the General Assembly at the end of 2012.

*Discussions*

83. Participants expressed interest in improving the IGF and confidence that the Working Group would complete the report with recommendations for the 15th session of the CSTD. They encouraged delegates of CSTD member States to reach out and consult all stakeholder groups in their countries and to provide input to members of the Working Group in preparation for the next meeting of the Working Group in January 2012.

84. One participant expressed hope that the link between the IGF and the CSTD could continue to be strengthened. She stated that it was very important to improve the depth of information produced as outcomes of the IGF and to increase IGF participation from all stakeholders, particularly from developing countries.

85. Participants expressed a desire for further improved remote participation. It was noted that at the last IGF, there were about 800 people participating remotely compared to 2,000 people on-site. The main sessions of the IGF are translated simultaneously into all six United Nations languages. Sessions are also captioned and social media is widely used.

86. Several participants expressed concern about the vacancies in the IGF secretariat of the Executive Coordinator and the Special Advisor to the Secretary-General on Internet governance matters, noting that it has taken over a year to fill these positions.

87. Participants commented on the importance of the multi-stakeholder nature of the IGF. They particularly expressed a desire that the IGF have increased relevance to and involvement from Governments. Participants were urged to find ways to involve Governments more in the IGF and to engage in capacity-building to help Governments understand the importance of the IGF.

[17] ECOSOC resolution 2010/2 invites the Chair of the 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".

88. In response to GA resolution A/RES/66/184, the Chair of the CSTD proposed holding an open, interactive meeting on enhanced cooperation on public policy issues pertaining to the Internet on 18 May 2012, following the WSIS Forum and immediately prior to the commencement of the 15th session of the CSTD.[18]

89. The CSTD secretariat will ask the IGF secretariat to provide more detailed information about the costs of the IGF for the consideration of CSTD member States.

90. Appreciation was expressed to the Governments of Finland and Switzerland for their financial contributions which have enabled the CSTD secretariat to support the Working Group.

91. A participant informed the attendees that Brazil was a candidate for the 10th IGF in 2016.

92. Another participant shared information about a Global Innovation Summit which will take place in Silicon Valley, California, from 16–18 July 2012. The participant also noted that the Organization of American States held the Third Meeting of Ministers and High Authorities on Science and Technology in Panama, in November 2011. The adopted Plan of Action of Panama resonated with the work of the CSTD including the modern use of ICTs and the employment of STI for capacity building, economic growth, and addressing poverty. This was indicative of the general move globally to move STI into the mainstream of economic development.

93. The 15th session of the CSTD will be held in Geneva, 21–25 May 2012.

# VI. Findings and suggestions

94. The following main findings and suggestions were highlighted by the panel and put forward for consideration by the Commission at its 15th session, scheduled to take place in Geneva, from 21 to 25 May 2012.

## Main Findings

### 1. Innovation, research, technology transfer for mutual advantage, entrepreneurship and collaborative development in the information society

(a) Processes of learning by collaboration are central to innovation, research, technology transfer, and entrepreneurship. Collaborative learning involves a capacity building process which has two crucial dimensions – absorptive and productive capacities. These capacities are gained through a developmental process at the individual and organizational levels;

(b) Policy discussion needs to consider how innovation, research and technology transfer are supported through networked collaborative learning and the strengthening of

[18] A/RES/66/184 on "Information and communications technologies for development." invites the Chair of the CSTD to "convene, in conjunction with the fifteenth session of the Commission, a one-day open, inclusive and interactive meeting, involving all Member States and other stakeholders, particularly those from developing countries, including the private sector, civil society and international organizations, with a view to identifying a shared understanding about enhanced cooperation on public policy issues pertaining to the Internet, in accordance with paragraphs 34 and 35 of the Tunis Agenda, and requests the Secretary-General to include information on the outcome of the meeting when preparing his report on the status of the implementation of and follow-up to the present resolution."

absorptive and productive capabilities. It is crucial to understand the means by which people and organizations build the capabilities required to achieve greater capacities for entrepreneurship and collaborative development;

(c) In both practice and policy discussion, greater attention needs to be paid to the growing array of scientific and technical resources that are available online and that are relevant for global participation in scientific and technical communities;

(d) There is a need to gather and exchange information about the adaptation and use of open source software as well as the social networks by which capabilities are built in low and middle income countries. These could provide insight for other types of knowledge generation and exchange activities in support of development purposes;

(e) Research is needed that provides a critical and comparative insight into the role of community development in the use and sustainability of ICT initiatives;

(f) There is a need to strengthen the evidence base on the effectiveness and availability of commercial and non-commercial knowledge brokerages relevant to developing country needs, with a view to providing an improved foundation for public policy and private investment;

(g) Assessment of global information infrastructure development needs to be supplemented by an assessment of wireless developments, including a critical assessment of the opportunities for and limitations of mobile applications;

(h) The proliferation of various access arrangements and institutional forms provide important entrepreneurial opportunities, but also create complexities for solving remaining barriers;

(i) In recent years there has been increasing evidence of constraint-based innovation from the global South. There is a need to understand the factors which have contributed to their success and gain insight into implications for policy making.

**2. OA, VSLs, geospatial analysis and other complementary ICT and STEM assets to address development issues**

(a) OA and VSLs are two complementary mechanisms to increase and extend knowledge flows. They contribute to overcoming some limitations associated with obtaining data and research;

(b) GIS and geospatial analysis are used in many sectors of society and have important applications in addressing development challenges. Meanwhile, GIS can also be used in education to help develop spatial abilities required in a range of different subjects beyond geography;.

(c) Learning through GIS is not widespread and the transformational potential of GIS in education remains untapped;

(d) The effective introduction of ICTs in the learning process requires not only technology but also human capacity, educational framework conditions, infrastructure, and national policies.

## B. Suggestions

### 1. Innovation, research, technology transfer for mutual advantage, entrepreneurship and collaborative development in the information society

The CSTD should consider the following:

(a) Share and analyse evidence on development of innovative capacities at the firm level, with a view to understanding the social and economic dimensions of these processes and provide insights to the development of public policy;.

(b) Provide a forum for the sharing of good practices and experiences in the use of ICTs for capacity-building in education and research, with greater attention to the growing array of scientific and technical resources that are available online;

(c) Share and analyse empirical evidence on ICT production in developing countries as well as research on linkages between local firms and transnational corporations;

(d) Continue, in its role as a "torch-bearer" for innovation, to raise awareness amongst policy makers about the process of innovation and their role in it, and about the particular opportunities for developing countries in innovation. Special attention should be placed on new trends in innovation that can offer novel possibilities for developing countries.

Member States, especially developing countries, should consider the following:

(a) Encourage and support efforts of learning and capacity development at the firm and industry level through the provision of an enabling environment;

(b) Provide support to firm-centred organisational arrangements and training/learning facilities to strengthen the knowledge base needed by firms, both in advance of and subsequent to technology transfer projects, through such measures as meeting some of the costs of seconding local personnel for training, in collaboration with donors;

(c) Promote and support the development of capabilities that are 'fit for purpose' for the Internet age including through leveraging opportunities for collaborative learning;

(d) Identify, through a multi-stakeholder approach, the local needs of communities in order to design ICT access strategies within countries, balancing short-term and long-term considerations;

(e) Promote the dissemination of successful experiences, including of constraint-based innovations, to foster an innovative culture through mechanisms such as the creation of awards and mass media campaigns;

(f) Organize ICT trade shows and promote access to global markets;

(g) Promote the development of ICT platforms, involving national research institutes and universities, with a view to participating in international research networks and benefiting from the opportunities for collaborative learning.

(h) Encourage countries, especially developed ones, to support the exchange and collaboration between their scientific and research institutions and counterparts in developing countries, in particular LDCs;

(i) Recognize the need to provide new and additional resources to developing countries particularly in the current situation in which those countries have to spend additional resources to address the current financial crisis.

The international community should consider the following:

(a) Explore IP-related policies and new initiatives necessary to promote the transfer and dissemination of technology, benefiting developing countries in particular and adopt appropriate measures to enable developing countries to fully take advantage of such transfer;

(b) Ensure that multilateral governance mechanisms and standardization bodies of ICT and global networks are democratic, fair, and coherent, with effective participation of developing countries.

**2. OA, VSLs, geospatial analysis and other complementary ICT and STEM assets to address development issues**

The CSTD should consider the following:

(a) Continue to encourage multi-stakeholder consultations on ICT, development, and education partnerships.

Member States should consider the following:

(a) In partnership with other stakeholders, seek to overcome basic infrastructural constraints (e.g., ICTs, electricity, and other basic needs) which prohibit access to and use of these ICT assets;

(b) Collaborate to address the 'content divide' by exploring ways of increasing publication and accessibility of content in multiple languages;

(c) Encourage national research agencies and foundations to include OA in their funding mandates whereby publicly-funded research is made freely accessible;

(d) Ensure that public data and research, including raw data from publicly funded experiments, studies or investigations, is available for free and in an openly accessible format;

(e) Encourage international collaboration in digitizing publicly-funded research, making it available online for free and ensuring it is easy to find;

(f) In partnership with other stakeholders, ensure the logistical and financial viability of VSLs;

(g) Encourage the formation of national research and education networking (NREN) organizations, with local champions and high visibility, separating network ownership and service provision and ensuring that financial stability is achieved from the start;

(h) Adopt strong education policies including the integration of GIS or fundamental concepts of geography that lead to spatial thinking in national curricula and by supporting teacher training to include spatial thinking and GIS;

(i) Establish government bodies dedicated to obtaining, storing and disseminating geographic data, including remote-sensing data, to make GIS data available for public use at the lowest cost;

(j) Support international collaboration between education institutes to facilitate training in GIS for policy makers to help raise awareness of the technology and build capacity;

(k) Encourage the private sector to be involved in the process of increasing technology openness for geo-spatial data. For example, public sector organizations (e.g.,

government agencies, libraries) can collaborate with private sector firms to index geospatial information and make it easily searchable and available online;

(l) Expedite adoption of a common standard for distributing emergency alerts such as CAP.

### 3. Other areas

(a) The CSTD should consider including new topics in the future agenda, namely environmental problems, space technology, and the utilization of ICTs to combat drug consumption and drug trafficking.

# Annex

## List of participants

### State members of the Commission

**Austria**

Mr. A Min Tjoa, Director, Institute of Software Technology and Interactive Systems, Vienna University of Technology, Vienna

**Brazil**

Mr. Rômulo Neves, Head, Division for the Information Society, Ministry of External Relations, Brasilia

**Bulgaria**

Ms. Tsvetelina Georgieva, Junior Expert, Ministry of Foreign Affairs, Sofia

**Chile**

Mr. Roberto Mayorga, Embassy of Chile, Makati City, Philippines
Mr. Luis Alberto Palma, Embassy of Chile, Makati City, Philippines

**China**

Mr. Cai Zhiping, Coordinator, Department of International Cooperation, Ministry of Science and Technology, Beijing

**Costa Rica**

Mr. Alexander Mora, Advisor to Minister, Ministry of Science and Technology, San Jose

**Cuba**

Mr. Pablo Berti Oliva, First Secretary, Multilateral Affairs Division, Ministry of Foreign Affairs, Havana

**El Salvador**

Ms. Maritza Guerra, Jefe del Departamento de Financiamiento al Desarrollo Científico y Tecnológico, Consejo Nacional de Ciencia y Tecnología, San Salvador

**Finland**

Ms. Mervi Kultamaa, Counselor, Ministry of Foreign Affairs

**France**

Mme. Nathalie Brat, Chargée de mission à la Direction générale de la mondialisation, Ministère des Affaires étrangères et européennes, Paris

**Ghana**

Ms. Hanny-Sherry Ayittey, Minister of Environment, Science and Technology, Accra

**Hungary**

Mr. Peter Major, Special Advisor, Permanent Mission of Hungary to the United Nations Office at Geneva

**Jamaica**

Mr. Hawthorne Watson, Manager, Information Services, Scientific Research Council, Kingston

**Lesotho**

Mr. Mothetjoa Metsing, Minister of Communications, Science and Technology
Ms. Maseqobela Williams, Deputy Principal Secretary, Ministry of Communications, Science and Technology, Maseru
Mr. Elliot Lefa Thamae, Director, Department of Science and Technology

**Malta**

Mr. Ian Gauci Borda, Consultant, Malta Council for Science and Technology, Office of the Prime Minister

**Oman**

Mr. Yousuf Al Busaidi, Research Director for Culture, Basic and Social Science, The Research Council, Alathaiba

**Pakistan**

Ms. Mudassir Asrar, Chairperson, Science and Technology Ministry, Islamabad

**Peru**

Mr. Ramiro Silva-Rivera, Official, Division of Science and Technology, Ministry of Foreign Affairs, Lima

**Philippines**

Mr. Fortunato de la Pena, Undersecretary for Science and Technology, Department of Science and Technology, Manila
Mr. Mario G. Monetjo, Secretary, Department of Science and Technology, Manila
Ms. Amelia P. Guevara, Executive Director, Philippine Council for Industry, Energy and Emerging Technology Research and Development, Department of Science and Technology, Manila
Mr. Louis Napoleon C. Casambre, Information and Communications Technology Office, Department of Science and Technology, Manila
Ms. Lita Suerte, Department Legislative Liaison Specialist, Department of Science and Technology, Manila
Ms. Marian Jocelyn Tirol-Igancio, Executive Director, United Nations and Other International Organizations, Department of Foreign Affairs, Manila
Ms. Marie Yvette Banzon-Abalos, Director, United Nations and Other International Organizations, Department of Foreign Affairs, Manila
Mr. Manuel P. Oira III, Desk Officer, United Nations and Other International Organizations, Department of Foreign Affairs, Manila
Ms. Remedios Bernardo, Committee Secretary, House of Representatives, Quezon City
Ms. Joy M. Lazcano, Science Research Specialist I, Science and Technology Information Institute, Department of Science and Technology, Manila

Mr. Alan C. Taule, Senior Science Research Specialist, Science and Technology Information Institute, Department of Science and Technology, Manila
Mr. Bernie S. Justimbaste, Director, Planning and Evaluation Service, Science and Technology Information Institute, Department of Science and Technology, Manila
Mr. Roel A. Sancho, Planning Officer V, Planning and Evaluation Service, Science and Technology Information Institute, Department of Science and Technology, Manila
Mr. Art B. Laraño, Planning Officer III, Planning and Evaluation Service, Science and Technology Information Institute, Department of Science and Technology, Manila
Ms. Francisca B. Bicomong, Planning Officer III, Planning and Evaluation Service, Science and Technology Information Institute, Department of Science and Technology, Manila
Ms. Diane Marie C. Bernardo, Planning Officer II, Planning and Evaluation Service, Science and Technology Information Institute, Department of Science and Technology, Manila
Ms. Elenita M. Leus, International Science Relations Officer IV, International Technology Cooperation Unit, Department of Science and Technology, Manila
Ms. Glenda Dorcas T. Sacbibit, International Science Relations Officer III, International Technology Cooperation Unit, Department of Science and Technology, Manila
Ms. Roxanne E. delos Reyes, Science Research Specialist I, International Technology Cooperation Unit, Department of Science and Technology, Manila
Mr. Marco D. Melgar, Science Research Specialist I, International Technology Cooperation Unit, Department of Science and Technology, Manila
Ms. Anna Dominique H. Ortiz, Science Research Specialist I, International Technology Cooperation Unit, Department of Science and Technology, Manila
Ms. Marah A. Agaton, Science Research Specialist I, International Technology Cooperation Unit, Department of Science and Technology, Manila
Mr. Richard A. Purisima, Information System Analyst II, Department of Science and Technology, Manila

**Slovakia**

Ms. Iva Kleinova, Counselor, Ministry of Finance, Office of the Government of Slovakia's Plenipotentiary for Knowledge Economy, Bratislava

**South Africa**

Mr. Isaac Maredi, Acting Chief Director for Sector Innovation & Global Change and Director for ICT, National Department of Science and Technology, Pretoria

**Sri Lanka**

Mr. Vijaya Kumar, Chairman, Industrial Technology Institute, Colombo

**Sweden**

Mr. Sven Malmberg, Minister, Embassy of Sweden, Bangkok, Thailand

**Turkey**

Ms. Hande Akce, Scientific Programs Expert, Department of Science, Technology & Innovation Policy, The Scientific & Technological Research Council of Turkey, Ankara

**United Republic of Tanzania**

Mr. Hassan Mshinda, Director General, Tanzania Commission for Science and Technology, Dar es Salaam

**United States of America**

Mr. Andrew Reynolds, Senior Advisor, Space and Advanced Technologies, U.S. Department of State, Washington, D.C.

**Inter-governmental international organizations**

International Organization for Migration (IOM)
Mr. Ovais Sarmad, Chief of Mission and Director, Manila Administrative Centre, Makati, Philippines
Mr. Benjamin Lelis, Jr. Programme Assistant, Makati, Philippines

**Non-governmental organizations in consultative status with the Economic and Social Council, civil society, the technical and academic community, and business entitites**

International Chamber of Commerce (ICC) Basis
Ms. Marilyn Cade, CEO, ICT Strategies, mCADE, United States of America
Microsoft Corporation
Mr. Damian Domingo Mapa, National Technology Officer, Philippines
School Watch Enterprises
Ms. Nora Bing Gamolo, Editor, Philippines
SciDev.Net
Mr. Joel Adriano, South-East Asia and Pacific Co-ordinator
Technical and Academic Community
Ms. Samantha Dickinson, Internet Governance Specialist, Australia

**Resource persons**

Ms. Gillian Marcelle, Associate Professor, Strategy and Innovation, Wits Business School, University of the Witwatersrand, South Africa
Mr. Yasushi Ueki, Research Fellow, Bangkok Research Centre, Institute of Developing Economies, Japan External Trade Organization, Japan
Mr. K.J. Joseph, Professor and Ministry of Commerce Chair, Centre for Development Studies, Trivandrum, India
Mr. Declan Kirrane, Managing Director, ISC, Belgium
Mr. David DiBiase, Director of Education, Industry Solutions, Esri, United States of America
Ms. Graziella Harting, Senior Economic Development Specialist, National Economic and Development Authority, Philippines
Mr. Alexander G. Flor, UP Open University, Philippines
Ms. Ann Lavin, Head of Public Policy and Government Affairs (Southeast Asia), Google Asia Pacific
Ms. Sudha Nair, former Programme Director, M.S. Swaminathan Research Foundation, India
Ms. Maria Corazon A. De Ungria, University of the Philippines, Philippines

**UNCTAD**

Ms. Anne Miroux, Director, Division on Technology and Logistics
Mr. Mongi Hamdi, Head of the CSTD Secretariat and Science, Technology & ICT Branch
Ms. Dong Wu, Chief, Science and Technology Section
Mr. Jason Munyan, Associate Economic Affairs Officer, Science and Technology Section