Information & Communications Technologies: Critical Foundation for a Sustainable Common Future

In the twenty-one years since the initial PrepCom for the UN Conference on Environment and Development, no industry has come close to the exponential growth, rapid technological innovation, widespread adoption and affordability than the information & communications technology (ICT) sector; nor has any industry in human history so rapidly transformed the path of development and the global financial, economic and social landscapes.[1]

However, the significance of ICT in relation to sustainable development has gained scant attention, yet its growth and evolution continues to have profound impacts on a wide range of processes critical to the transition to a sustainable common future - including opportunities for access to information and citizen participation in decision-making[2], technology transfer, access to education and health care, real-time monitoring of industrial processes and of the environment, early warning systems for natural disasters and disaster relief.

The second key concept in the rarely-cited second sentence of the Brundtland Report's definition of sustainable development[3] - i.e. *"the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs"* - provides a valuable framework for understanding ICT's significance for sustainable development. That ICT has enabled unprecedented new, networked forms of social organization is undeniable, and the very idea of limitations has been transcended in a digital environment in which the constraints of the material world - imposed by the laws of conservation of mass and conservation of energy - no longer apply, for information has zero mass, zero physical size and takes virtually zero time to travel. Free access to knowledge is key to sustainable use of the environment.

The combination of the characteristics of information and rapidly increasing computing power, storage capacity, bandwidth, affordability and portability[4] has provided unprecedented access to knowledge - the key to a sustainable common future.

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1. When the UNCED preparations began in March 1990, the World Wide Web did not exist. It was not until August 6, 1991, a few days before the 3rd UNCED PrepCom, that Tim Berners-Lee posted a short summary of the World Wide Web project on the alt.hypertext newsgroup, announcing the debut of the Web as a publicly available service on the Internet. Twenty years later, the number of web pages has been estimated to be more than 1 trillion.

2. See the *Rio Declaration on Environment and Development, Principle 10*, UN Conference on Environment and Development, Rio de Janeiro, June 1992.

3. "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and **the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs**." (emphasis added). Our Common Future, Chapter 2: The Concept of Sustainable Development, World Commission on Environment and Development, Geneva, 1987.

4. While the spectre of a growing "digital divide" had been a major concern for many, the rapid expansion of mobile phones and smart phones - with computing power and data storage far in excess of PCs used during the UNCED preparatory process - in the developing world is rapidly making it possible for the divide to be bridged.

The recognition in the Brundtland Report of the interlocking nature of the crises relating to sustainable development[5] represented a major breakthrough in understanding; in this regard, advances in ICT have made possible analyses, models and presentations based on massive sets of data from the nature and specifics of relationships between the different sectors in ways that were ot previously possible.

Green Economy

* **A Networked Information Economy**: The key features of the information economy - virtually zero marginal cost of production, unprecedented opportunities for collaborative peer production free from constraints of time and distance, the emergence of new forms of intellectual property including Open Source software and Creative Commons licenses - have given rise to a new culture of cooperation, a transformation of markets in a platform that is essentially carbon-free, and a rapidly growing and freely accessible global digital commons.[6]

* **Access to Markets**: There are countless ways in which ICT has transformed access to markets, from the use of cell-phones and text messaging for agricultural producers in rural areas to current market prices and conditions to online payment systems and the availability of free templates and hosting services that enable individual or community-based enterprises to establish an online "storefront" to sell products and services - including, but not limited to, digital products - in the global marketplace of the World Wide Web.

* **Education and ICT**: Access to all levels of education is a central prerequisite for a sustainable common future and ICT is transforming access to education - whether elementary education, education in methods of sustainable agriculture, or graduate level courses from major universities.

* **Technology Transfer**: ICT has played a vital role as a *medium* for the transfer of technology, especially in the free access to the transfer of the information technology itself - in conjunction with Free/Libre Open Source Software (FLOSS) - thus enabling free use of an extensive set of tools for building in a digital economy.

* **Open Source Construction Templates**: Among recent development has been the dissemination of freely available templates with detailed designs for the construction of goods and products, especially with locally available resources.

* **Wireless Communications**: The exploding use of wireless / wi-fi communications enables unparalleled and timely access to information, markets, tele-medicine, and much more in areas and conditions where communications

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5. "Until recently, the planet was a large world in which human activities and their effects were neatly compartmentalized within nations, within sectors (energy, agriculture, trade), and within broad areas of concern (environment, economics, social). These compartments have begun to dissolve. This applies in particular to the various global 'crises' that have seized public concern, particularly over the past decade. These are not separate crises: an environmental crisis, a development crisis, an energy crisis. They are all one." Our Common Future: From One Earth to One World, World Commission on Environment and Development, Geneva, 1987.

6. **The Wealth of Networks: How Social Production Transforms Markets and Freedom**, by Yochai Benkler, Yale University Press, 2006. In keeping with the spirit of Benkler's analysis, The Wealth of Networks was released under a Creative Commons License.

were previously minimal or non-existent, this breakthrough in modality of communications offers numerous savings in energy and CO_2 emissions.[7]

* **Information Infrastructure**: The development of affordable, broadband information infrastructure - especially wireless infrastructure - deserves much greater recognition as a foundation for sustainable development. Wireless infrastructure - for example, combining satellite access and mesh networking in conjunction with improvised "last-mile" information delivery. In many respects, the establishment of universally accessible information infrastructure can allow developing countries to leapfrog the wired technology of developed countries.

* **Full Cost Accounting**: The failure of markets to incorporate external costs has long been recognized as a key impediment to sustainability. The application of ICT to, *inter alia*, monitoring of energy use and waste generation in production and accounting for external cost throughout a business's value chain is a *sine qua non* of full cost accounting. The adoption and implementation of full cost accounting policies and procedures needs to be actively supported, through voluntary and/or mandatory guidelines.[8]

* **External Costs of ICT**: While there are many positive ways in which the ICT sector can and does support a sustainable development path, the manufacture of computers and mobile phones is not without a substantial ecological and social footprint, including toxic wastes and toxic working conditions to which much greater attention must be provided. There is also a vital need for greatly strengthened provisions and requirements for recycling used electronic equipment to reduce the impact on landfills and to recover valuable minerals for re-use.

Institutional Framework for Sustainable Development

* **Access to Information and Participation**: During the UNCED preparations, the use of email and "electronic conferences" became established as the default modality for access to information and the participation of NGOs in UN proceedings; since then, ICT has become an essential medium for Member States participation in the United Nations system as well as for civic participation at loca, national and international levels.

* **Common Framework for Multilateral Agreements**: The adoption of a common framework for the administration of multilateral agreements can provide greatly increased coherence between the different agreements. The characteristics of a common framework - ideally based on an Open Source software platform - needs to include a common data warehouse, and a common online template for managing and organizing the work and meetings of multilateral agreements.

* **Environmental Monitoring**: From high-resolution satellite images through real-time monitoring of air and water quality and weather conditions, systematic monitoring of environmental conditions is essential to intelligent responses to environmental conditions.

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7. See, for example, *Wireless and the Environment: A Review of Opportunities and Challenges*, BSR & CTIA, October 2011.

8. See, for example, *Corporate Value Chain Accounting and Reporting*, World Resource Institute & World Business Council for Sustainable Development, September 2011.

* **Open Government & Open Data**: Openness and transparency in government play a key role in enabling broad-based an informed participation in decision-making in sustainable development. The growth of ICT has been a principle driving force in a growing movement for open government, including the recently launched Open Government Partnership.[9] A key element of open government is the provision of open access to governmental data, in conjunction with encouragement for provisions that enable the independent development of "Apps" that can provide access to government information in more useful and usable forms than are available on government web sites.

* **Online Meeting Spaces**: One area of ICT that has gained greater appreciation concerning sustainable development is the use of videoconferencing and the use of collaborative documents for meetings - by governments, businesses and social organizations - providing substantial savings in travel, time and energy & resource use. The use of online meetings needs to be actively promoted, in conjunction with the development and strengthening of broadband information infrastructure.

* **Natural Disaster Early Warning Systems and Disaster Response**: In the context of predictions of increasing frequency and intensity of natural disasters, ICT-based early warning systems can play a vital role, and mobile phones and GPS-enabled smart phones have a crucial role in disaster recovery.

Conclusion

This paper barely begins to do justice to the scope of actual and potential relevance of ICT with respect to sustainable development, a green economy and an institutional framework for sustainable development. It is essential that greater attention be given to this issue, for example through the establishment of an Ad Hoc Working Group on ICT and Sustainable Development.[10]

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Submitted by **Information Habitat: Where information Lives**, NGO in Special Consultative Status with ECOSOC, pioneered and supported the use of information & communication technology by the UN NGO community, beginning with preparations for the 1992 Earth Summit.

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9. See http://www.opengovpartnership.org/

10. A similar Working Group was proposed in the Information Ecology recommendations, in Towards Earth Summit II: NGO Recommendations for Actions and Commitments at Earth Summit II, Non-Governmental Organization Background Paper, June 1997. New York, NY.