The Information Society and Sustainable Development
Exploring the Linkages

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List of Acronyms Used

EIS   Environmental Information Systems

GeSI   Global e-Sustainability Initiative

GIS   Geographic Information Systems

ICT   Information and Communication Technology

IDRC   International Development Research Centre

IS   Information Society

MDGs   Millennium Development Goals

OECD   Organization for Economic Cooperation and Development

SD   Sustainable Development

UNDP   United Nations Development Programme

UNEP   United Nations Environment Programme

UNESCO   United Nations Educational, Scientific and Cultural Organization

UNICEF   United Nations International Children's Emergency Fund

USAID   United States Agency for International Development

WBCSD   World Business Council for Sustainable Development

WRI   World Resources Institute

WSIS   World Summit on the Information Society

WSSD   World Summit on Sustainable Development

WWF   World Wide Fund For Nature

1.0   Introduction

According to the organizers of the World Summit on the Information Society (WSIS), "We are in the midst of a revolution, perhaps the greatest that humanity has ever experienced. To benefit the world community, the successful and continued growth of this new dynamic requires global discussion and harmonization in appropriate areas." Unfortunately, until recently, few discussions have focused on harmonizing the visions of the emerging information society with the principles and priorities articulated by the United Nations' Millennium Development Goals (MDGs) and the World Summit on Sustainable Development (WSSD).

Meaningful discussions about national policy coherence between these processes have been limited by restricted thinking about the information society (IS) and sustainable development (SD). Each has emerged from a different community with a different vocabulary and process for determining national priorities. Information society specialists within national governments have primarily been drawn from the fields of telecommunications and economic development. Meanwhile, sustainable development has been delegated primarily to environment ministries despite the best efforts of its practitioners to articulate a holistic vision of integrated economic, social and environmental decision-making.

The lack of interaction between these two policy communities is currently serving to reinforce stereotypes of both fields. Sustainable development is seen as pertaining primarily to environmental issues and grassroots social development, while the information society is perceived as being more relevant to the economic development potential of urban elites. These stereotypes miss the reality that sustainable development and the information society are operationally interconnected. Both terms are increasingly used by civil society and academics to refer to a desired global future that is casting its shadow upon our current time and decisions. For sustainable development to be effective and efficient, it must harness the institutions and tools of the information society. And for the information society to sustain itself, it must pay careful attention to the stocks and flows of resources (material and human) and energy that underpin it.

The two phases of the World Summit on the Information Society[1] provide an excellent opportunity to *integrate* sustainable development principles and practices into the institutions and policy frameworks that are shaping the information society. Similar to earlier United Nations' summit processes, the WSIS has sparked wide-ranging multi-stakeholder dialogues at the regional, national and sectoral levels. In some instances, these civil society groups are introducing national WSIS delegations to the policy development processes and priorities that have resulted from the WSSD and the MDG negotiations. While this may help to ensure that the WSIS Declaration and Action Plan address previously negotiated development priorities, the national level policy outcomes may, in the long run, be even more profound. Environment and social development organizations that have become active in the WSIS process are increasingly demanding involvement in the crafting of national e-strategies and information and communication technology (ICT) policies and insisting that these reflect sustainable development goals. While December 2003 marks the end of the first phase of international information society policy development, it is merely the beginning of a truly multi-stakeholder national information society policy process in many countries. Such a process requires an extensive cadre of applied policy analysts at the national level who are familiar with the language and methodologies of both sustainable development and the information society.

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[1] Phase 1 of the WSIS concludes in December 2003 with a global leaders' summit in Geneva, Switzerland. Phase 2 of the WSIS will conclude in December 2005 with a second summit in Tunis, Tunisia.

We must find ways to address the policy development challenge outlined by David Rejeski in 2002:

> *The problem, in terms of sustainable development policy, is that the system we have been exploring will be built long before any extensive dialogue occurs about its larger social purpose and embedded values. By the time questions about environmental impact and social equity are asked, many of these technologies, and the social institutions that support them, will be effectively locked in. In a high clock speed world, technological change will almost always outpace policy innovation and social dialogue.[2]*

From January to July 2003, an International Development Research Centre (IDRC)-funded scoping study[3] assessed the potential for engaging young researchers from academia and civil society to undertake policy research and analysis on harnessing the information society to achieve national sustainable development priorities. As part of the scoping study, this working paper has been created to provide both an introduction to the analytical frameworks available for their research as well as to explore the types of policy processes that could benefit from greater coherence in thinking between the information society and sustainable development.

2.0   Analytical Frameworks as Research Priorities

Only a small amount of literature has attempted to discuss the information society and sustainable development together. Both Felleman (1997) and Pamlin's (2002) works are good examples, with each offering important and interesting insights into information policy and tools and their role in environmental sustainability. However, more often than not, discourse on these two policy fields has a tendency to provide a very narrow cross-section of issues and perspectives. Thus, the purpose of this section is to outline the frameworks that have been developed and that can be used for application and testing in a variety of national contexts. The preliminary literature review identified six analytical frameworks within which to work. These frameworks are: environmental information systems; eco-efficiency and innovation; negative environmental aspects of the information society; modifying consumer demand and values; access to information and public participation; and poverty reduction. An in-depth discussion of each framework follows.

2.1   Environmental information systems

Much of the early research on linkages between sustainable development and the information society focused on the potential for information systems to assist decision-makers to monitor and evaluate the state of the environment. Environmental information system (EIS) programs seek "to increase the quality, efficiency and accountability of decision-making processes through applications that systematically use environmental information. In this regard EIS development seeks to enhance the use of harmonized environmental data sets through improving data availability; facilitating access to data; ensuring that data is internally consistent; and ensuring that different data sets match each other."[4] When the aspect of decision support dominates, some authors speak of Environmental Decision Support Systems[5] or even Sustainable Development Decision Support Systems.[6]

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[2] Fine, Charles. Clockspeed: Winning Industry Control in the Age of Temporary Advantage. Perseus Books, 1998. http://www.clockspeed.com/ Cited in Rejeski, David. "Anticipations." p. 24. In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light*. Solna, Sweden: WWF Sweden, 2002. http://www.panda.org/downloads/general/ict_sustainability.pdf.

[3] The *Next Generation Policy Directions: Scoping Study on National Information Society and Sustainable Development Capacity Building*, drafted by Ms. Terri Willard, was released in July 2003.

[4] Environment Information Systems in Sub-Saharan Africa. "About EIS." http://www.grida.no/eis-ssa/about/eis.htm.

[5] Hilty, Lorenz and Thomas F. Ruddy. *The Information Society and Sustainable Development*. Northwestern Switzerland: Solothurn University of Applied Sciences, 2000. p. 3.

The process of generating and utilizing environmental information in decision-making is complex. Environmental information policy includes the elements of information generation, dissemination and stewardship.[7] Generation covers issues such as legitimization, sources of data, classification schemes, mapping, quality and format. Dissemination determines the degree to which information is shared actively or passively among stakeholders, as well as additional issues such as privacy, confidentiality, secrecy and information pricing. Information stewardship policies regulate the ownership, sharing, currency and archiving of environmental information. While many policies only govern publicly generated data, some countries are also beginning to establish policies regarding corporate information that is increasingly required under environmental reporting regulations.

In 1992, global policy-makers recognized the importance of information to decision-making in Chapter 40 of Agenda 21.[8] The chapter recognizes that, "[i]n sustainable development, everyone is a user and provider of information considered in the broad sense. That includes data, information, appropriately packaged experience and knowledge. The need for information arises at all levels, from that of senior decision-makers at the national and international levels to the grass-roots and individual levels." Recommended activities included bridging the data gap and improving the availability of information for decision-making.

Building upon experiences in Europe and North America, EIS policies, programs and technologies have since been introduced around the world.[9] Geographic Information Systems (GIS) applications (see Box 1 below) are one example of an EIS technology being transferred for adoption in other parts of the world. The United Nations Environment Programme (UNEP) has played a key role in this process, particularly in the fields of geo-spatial data modelling and the creation of environmental meta-data standards.[10] Within the past few years, however, UNEP has turned its attention to developing capacity at the national level to create environmental information policies and their corresponding institutions. This development has occurred since UNEP began to recognize that "global data aggregations have proven to be inadequate in highlighting priority areas for subsequent management action. It is clear that the authority of global assessments is severely dependent on the ability to include higher resolution, national and sub-national data and aggregate upwards, rather than to depend on making assumptions about the national and regional significance of findings based on global data. To ensure more accurate global assessments therefore, it is necessary to ensure that national and sub-national data sets are available and accessible for international assessments."[11]

As environmental information systems have advanced, some have evolved to approximate sustainable development information systems including environmental, social and economic data for holistic decision-making. One such system is the Dashboard of Sustainability, an innovative online measurement tool, that uses the metaphor of a vehicle's instrument panel to display country-specific assessments of economic, environmental, social and institutional performance towards (or away

[6] Kersten, Gregory E., Zbigniew Mikolajuk, Anthony Gar-On Yeh (eds.). *Decision Support Systems for Sustainable Development: A Resource Book of Methods and Applications.* Boston: Kluwer Academic Publishers, 1999.

[7] Felleman, John. *Deep Information: The Role of Information Policy in Environmental Sustainability.* Greenwich, CT: Ablex Publishing Corporation, 1997. pp. 78-93.

[8] United Nations. "Chapter 40: Information for Decision-making." *Agenda 21.* 1992. http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter40.htm.

[9] Of particular note are the regional EIS capacity-building and harmonization programs in Africa (http://www.grida.no/eis-ssa/) and Central and Eastern Europe (http://www.grida.no/enrin/).

[10] United Nations Environment Programme (UNEP). DEWA~Europe/GRID-Geneva. http://www.grid.unep.ch/.

[11] Capacity-building in Environmental Information Management. "About the Programme." http://www.grida.no/enrin/about.cfm.

from) sustainability.[12] However, it is still in its infancy and will require considerable effort before becoming a user-friendly management tool for national level policy-makers. In the meantime, significant sustainability gains may be made at the national level by linking environmental information systems with legacy systems on cadastral (land ownership) records, regulatory affairs and scientific knowledge.[13]

It is interesting to note that the topic of EIS has not been raised within the context of the World Summit on the Information Society. Despite its clear importance to sustainable development at the national level, as an area of ongoing policy development and implementation, UNEP and other key global players have set it aside as a focal issue in information society debates.

Box 1. EIS in FOCUS: GIS as an environmental planning and management tool

Geographic Information Systems (GIS) have advanced into an increasingly important information tool, especially in the areas of environmental planning and management. By definition, GIS is a particular system of computer software and hardware capable of manipulating, analyzing and presenting spatial information. With this technology, skilled GIS technicians can map, query and analyze large quantities of data held together in a single database. As a result, GIS is used in many countries for a variety of purposes including: environmental resource analysis; land-use planning; locational analysis; tax appraisal; utility and infrastructure planning; demographic analysis; and habitat studies.

Over the past 10 years, attention and resources have focused on spreading this technology into the countries of the South. Given the considerable number of projects undertaken, studies are now investigating the ways in which policy-makers can use GIS to inform them.

Sponsored and overseen by the International Working Group for Africa, a joint activity of the U.S. Agency for International Development (USAID) and the World Resources Institute (WRI), one study[14] sought to report the findings on the assessments it made of three West African countries at the macro-level (a review of GIS activities at the country level) and micro-levels (a review of four specific projects with a GIS component). Investigators looked at the impact of GIS on the decision-making process as well as on the quality of the decisions being made. The authors were quick to point out that the use of GIS is still in its early stages and that policy-makers in Africa are, for the most part, relatively unaware of its benefits. Slowly but surely, however, technical capacity is being transferred and small achievements are being made.

Although most of the featured examples above demonstrate the ways in which the tools of the information society can advance environmental goals, it is also possible for GIS applications to be used in other broad sectoral areas such as health care as was shown with the health care centre example in Cote d'Ivoire. EIS tools also show promise in effectively informing policy-makers with hard, factual data and, in the process, potentially removing the seeds of doubt, complacency and misinformation. EIS tools can certainly have an impact. With this in mind, it is more crucial than

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[12] International Institute for Sustainable Development. "Dashboard of Sustainability." http://www.iisd.org/cgsdi/intro_dashboard.htm.
[13] Examples of the impact of these types of information systems integration can be found in Felleman (1997). pp. 95-172.
[14] Basoole, Andre, Jake Brunner and Dan Turnstall. "GIS: Supporting Environmental Planning and Managament in West Africa." 2001. http://pdf.wri.org/gis_africa.pdf. For further findings and insights of the country cases presented, please refer to the study.

ever for research efforts to shed light on how the uses of EIS tools can help towards achieving sustainable development.

2.2   Eco-efficiency and innovation

The highest-profile interventions in the WSIS process regarding sustainable development have been made by a coalition of the Global e-Sustainability Initiative (GeSI), United Nations University, World Wide Fund for Nature (WWF) and The Club of Rome. Due to the group's multi-stakeholder nature (UN, private sector, NGO and think tank) and the reputations of each of its individual members, their perspectives on sustainable development were given more serious consideration following their emergence following PrepCom1. Moved by a noticeable absence of meaningful discourse about the environmental aspects of the information society, this coalition felt compelled to present a proposal that called for the environmental aspects to be included in discussions about the information society and sustainable development. In their proposal, the coalition outlined four themes: Sustainability Implications of the Knowledge Society; International Cooperation; Opening the Gates and Overcoming the Digital Divide; and Services and Applications.[15]

One of the foundation documents for this coalition has been the WWF publication *Sustainability at the Speed of Light*, launched prior to the WSSD in 2002, which states, "It is in the context of the state of emergency constituted by the ecological catastrophe threatening our planet that we should approach Information and Communication Technology (ICT)." [16] This powerful group of organizations emphasizes that "The WSIS must ensure that the final summit outputs and recommendations are supportive of sustainable development and build on the work carried out during the World Summit on Sustainable Development held in 2002 and other relevant international agreements. The environmental dimension must be given sufficient weight."[17] Based primarily upon the experiences of countries in Europe and North America, researchers have focused on how information technology is changing global patterns of production and consumption and the environmental consequences of these changes.[18]

Many of the researchers in this group have their intellectual roots in a significant body of research with and for the private sector regarding eco-efficiency, a term the World Business Council for Sustainable Development (WBCSD) invented in 1991. The WBCSD defines *eco-efficiency* as being achieved by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout its life cycle, to a level at least in line with the Earth's estimated carrying capacity.[19] The

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[15] Their collective contribution to the WSIS Declaration and Action Plan can be found at http://www.gesi.org/events/docs/wsisprepcom2.doc. Key to the influence of this group was the workshop presented on 25 February 2003 at PrepCom2. For details of the agenda and participants, please visit http://www.itu.int/wsis/docs/pc2/inf/environment/gesi.pdf . Slides of the presentation are available at http://www.gesi.org/events/docs/WSIS%20prepcom-2%20030225.pdf

[16] "Foreword." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light.* Solna, Sweden: WWF Sweden, 2002. http://www.panda.org/downloads/general/ict_sustainability.pdf.

[17] "Comments on the draft Declaration and Action Plan WSIS/PCIP/DT/1-E & 2-E" http://www.gesi.org/docs/WSIS%20GeSI-WWF%20comments%20030414.pdf

[18] Cross-links between the coalition members sites highlight the influence of additional work in this field undertaken by Information Society Forum (particularly their third report published in 2000, http://www.poptel.org.uk/nuj/mike/isf/ew.html), Digital Europe (http://www.digital-eu.org/), SustainIT (http://www.sustainit.org/), the UNU's IT and Environment Initiative (http://www.it-environment.org/), and the Network for Energy, Environment, Efficiency, and the Information Economy (http://n4e.lbl.gov/).

[19] World Business Council for Sustainable Development. "Cross-cutting Themes: Eco-efficiency." http://www.wbcsd.ch/templates/TemplateWBCSD4/layout.asp?type=p&MenuId=NzA&doOpen=1&ClickMenu=LeftMenu.

Council has identified that eco-efficiency has become an indispensable business strategy in that it allows companies to do more with less. Businesses are achieving eco-efficiency gains through:

- **Optimized processes** – By focusing on approaches that prevent pollution in the first place as opposed to end-of-pipe solutions, which can increase production costs.
- **Waste recycling** – By utilizing the waste by-products of one industry as fuel to power another.
- **Eco-innovation** – By manufacturing old products through cleaner, innovative production methods.
- **New services** – By leasing products instead of selling them and thereby creating a shift among manufacturers towards product durability and recycling.
- **Networks and virtual organizations** – By sharing resources that increase the effective use of resources

The Council is already noting the efforts of businesses from around the world that are moving in the direction of achieving eco-efficiency.[20] Through the application of ICTs within a framework of eco-efficiency, industries and societies strive to meet the challenges of Factor Four and Factor Ten, placing special emphasis on the domains of energy, material usage and transport productivity.[21]

In the broad area of technology and society that eco-efficiency encompasses, researchers claim that enormous order-of-magnitude improvements are already being achieved in the performance of materials and services. This wave of innovation and accomplishment is still in its early stages. Beyond these, adherents suggest that there is a largely unrealized potential for bringing together and "cascading" these new technologies in new synergistic ways that will permit productivity improvements in many sectors (see Box 2 below) on a scale and at a speed never possible in the past.[22]

This concept of cascading potential was reinforced by *Sustainability at the Speed of Light*, which emphasized that "Trying to understand ICT's relationship to sustainable development… requires an analysis of ICT on two different levels: that of isolated equipment, that processes information and/or is involved in communication, gaining new capacity; and that of the integrated network system as a whole. It is important to understand that the network system changes as each new element is connected, and each new connection enhances the whole, with the total sum being greater than the sum of the parts."[23] To adequately understand the potential for ICTs to enable the achievement of more sustainable development, we must look beyond the direct impacts of the tools themselves to indirect impacts of the broader information society that they enable.

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[20] World Business Council for Sustainable Development. "Eco-efficiency – Overview." http://www.wbcsd.org/templates/TemplateWBCSD1/layout.asp?type=p&MenuId=Mz14&doOpen=1&ClickMenu=Left.

[21] Ernst von Weizsaecker et al. *Factor Four. Doubling Wealth, Halving Resource Use.* Earthscan, 1997. Cited in Weiler, Raoul. The Landing Place for Industry. In Simmons, Stephen (ed.), *The SASKIA Landing Place.* http://mango2.vtt.fi:84/tte/projects/saskia/docs/SASKIA_Landing_Place_Doc.pdf.

[22] Britton, Eric. "The Information Society and the Sustainability Challenge." In Britton, Eric (Ed.) *The Journal of World Transport Policy and Practice. Special Edition: Information Society and Sustainable Development.* Vol. 2, No. 1, 1996. http://www.ecoplan.org/library/wt2-1-2.pdf.

[23] Pamlin, Dennis (Ed.). "Introduction: A Report about ICT and Sustainability." *Sustainability at the Speed of Light.* Solna, Sweden: WWF Sweden, 2002. p. 7. http://www.panda.org/downloads/general/ict_sustainability.pdf

This focus on long-term systemic changes is similar to that which is emerging from other research on the connections between innovation and sustainable development.[24] Many of these innovation-oriented approaches recognize that "[t]he path to a prosperous, sustainable and equitable society is long, winding, and difficult, but a start can now be made with a knowledge-based and human-centred strategy."[25] Careful attention is placed on the ability of institutional cultures and relationships, enabled by ICTs and fostered by national legislation, to transform socio-economic patterns.

While these researchers recognize the significant obstacles to the emergence of a supportive institutional infrastructure, their conclusions are generally optimistic. Potential environmental benefits of the information society highlighted by coalition members and related institutes include:

- Dematerialization – Opportunities to transform a physical product into a service play a significant part in the prospects for long-term sustainability.[26] With the advent of reliable Internet-based distribution systems, there is some hope for a reduction in the production and consumption of other physical media storage formats. Reductions in print publications (e.g.,books, magazines and forms), videocassettes, music CDs, photographic prints, and software production and distribution may be possible, with commensurate reductions in material usage. The paper industry, alone, is cited to be a vast consumer of both energy and resources. Thus, with the rise of better reading electronic devices, it is expected that the environmental savings (in terms of emissions reductions) will be great. One estimate suggests that some 3.3 metric tonnes of carbon dioxide (CO_2) would be reduced by not printing newspapers, while as much as 3.8 metric tonnes of CO_2 would not be released into the atmosphere by not having to manufacture office paper.[27] On a larger scale, portions of the facilities for service-industries might be dematerialized as well. For example, the banking industry is being transformed in many countries through the introduction of online banking as part of general cost savings.

- Transportation substitution and transport efficiency – As broadband communications become more accessible, there is evidence that telework and Internet-delivery of media products may enable the transportation of digital information to substitute for the transportation of people and goods.[28] For instance, working electronically using a home computer can reduce commuting time, especially during rush hour, and stem the demand for office space. Global business travel fears in the wake of terrorist activities and the spread of SARS have proven that much former travel may be less necessary today due to improved lower-cost technologies for video and audio-conferencing. Lessons may be shared and many meetings conducted at an acceptable level of efficacy.[29] In addition, advances in telematics are improving the efficiency of transportation through improved logistical coordination and industry cooperation.[30] Experiences in Central and

[24] Examples of organizations exploring the linkages between innovation and sustainable development are diverse, including government agencies (e.g., Industry Canada), academia (e.g., Copernicus Institute for Sustainable Development and Innovation), private sector (e.g., World Business Council for Sustainable Development), and multi-stakeholder networks (e.g., Entovation).

[25] Malone, Tom. Comments on Global Learn Day. Cited in Amidon, Debra M. *The Innovation Superhighway.* Boston: Butterworth Heinemann, 2003. pp. 14-15.

[26] Forseback, Lennart. *Case Studies of the Information Society and Sustainable Development.* Brussels, Belgium: Information Society Directorate General of the European Commission, 2000. p.7.

[27] Cohen, Nevin. "E-commerce and the Environment." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light.* Solna, Sweden: WWF Sweden, 2002. p. 64.

[28] STELLA Focus Group 2 on ICT, Innovation and the Transport System http://www.stellaproject.org/FocusGroup2/FG2.htm.

[29] Arnfalk, Peter. "Can Virtual Meetings Replace Business Travel?" In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light.* Solna, Sweden: WWF Sweden, 2002. pp. 76-95.

[30] Britton, Eric (Ed.) *The Journal of World Transport Policy and Practice. Special Edition: Information Society and Sustainable Development.* Vol. 2, No. 1, 1996. http://www.ecoplan.org/library/wt2-1-2.pdf and Romm, Joseph.

Eastern Europe point to the need for an enabling legislative framework when implementing transportation telematics programs, however.[31]

- Increased efficiency in industry and buildings – The Internet holds the potential to increase efficiency in a variety of buildings, including retail, warehouse and storage, and office buildings.[32] A 1999 OECD study estimates that e-commerce and business-to-business transactions would mean energy cost savings of $4 to $5 billion, most of which would be in the commercial buildings sector and industrial sector (i.e., construction). A 12.5 per cent decline in the use of retail buildings alone represents about 1.5 billion square feet of commercial building space no longer needed.

- Increased efficiency in production and planning – As traditional manufacturing and commercial companies put their supply chain on the Internet, and reduce inventories, overproduction, unnecessary capital purchases, paper transactions, mistaken orders and the like, they achieve greater output with less energy consumption.[33] Firms can use the Internet to forecast demand more accurately, thereby reducing inventory and product waste, as well as the energy and materials required to warehouse and transport products. Using Web-based programs, firms can find out exactly what product a consumer wants before it is produced, and thanks to more efficient communication via e-mail, how it is working and what modification or maintenance is needed after it is purchased.[34]

While some might assume that these issues are predominantly the concern of OECD countries, Asian corporations and governments are increasingly becoming engaged with these issues. May 2002 proved to be a bell-weather month with two international conferences addressing these issues: the Asia-Pacific Regional Conference on Environmental Issues in Telecommunications (Hong Kong) [35] and the ICTEAP Regional Workshop for Asia-Pacific Region (New Delhi).[36] These meetings have led to the development of a growing community of practice in the Asian region on ICTs, sustainable production and innovation.

This section on eco-efficiency and innovation has, thus far, presented the promising aspects of ICTs in achieving sustainable development, but there remain unanswered questions that raise doubt. Given the rapid development of technologies, it is not possible to predict the long-term environmental impacts of these technologies including the effects of product design, packaging, energy, transportation and land use. For instance, while e-commerce shows potential in improving the efficiency at the individual level of the firm, it is feared that its ability to facilitate global production in dispersed locations may have environmental consequences, especially if shifting production processes overseas increases the volume of transport. Concern is also expressed over the lowering of prices of goods as a result of efficiency gains. The fear here is that lower prices can potentially increase the

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"The Internet and the New Energy Economy." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light*. Solna, Sweden: WWF Sweden, 2002. p. 42. http://www.panda.org/downloads/general/ict_sustainability.pdf.
[31] CAPE Project. http://www.rec.org/REC/Programs/Telematics/CAPE/CAPE.html.
[32] Romm, Joseph. p 36.
[33] Ibid. pp. 37-40.
[34] Cohen, Nevin. "E-commerce and the Environment." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light*. Solna, Sweden: WWF Sweden, 2002. p. 64.
[35] More information is available at http://www.gesi.org/events/aprceit.htm.
[36] More information is available at http://www.icteap.org/. Note that the scope of the ICTEAP initiative extends beyond sustainable production to embrace public rights of access to information, environmental information systems and poverty alleviation. As such, it demonstrates one of the most robust programs exploring the linkages between the information society and sustainable development.

demand for a product, and as a result, cancelling out any environmental gains. This is often referred to as the "rebound" effect.[37]

Box 2. Eco-efficiency in FOCUS: TeliaSonera in Finland
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TeliaSonera is a major telecommunications company operating in the Nordic and Baltic regions of Europe.[38] As a telecommunications company offering Internet, telephone and other telecommunication services, TeliaSonera has capitalized on the promise of its technologies in improving eco-efficiency in various economic sectors/areas. The company provides examples, which are highlighted below:

❑ **Health Care**
According to TeliaSonera, telemedicine can deliver health services more efficiently as well as in an environmentally-friendly manner. For instance, teleradiology allows for the digital transmission of x-rays, thereby eliminating the need to use chemical-intensive procedures to develop the film. Further, there is no need to travel to a specialist for x-raying as pictures can now be transmitted from one location to another. Doctors could also use video-conferencing for diagnostics, doctor-to-doctor consultations among others.[39]

❑ **Commerce**
On its Web site, TeliaSonera quotes a study that indicated that paying bills in the traditional manner consumes up to seven times more energy than paying them through the Internet. Therefore, by using Internet invoicing, paper consumption and a bank's physical space requirements are reduced.[40]

❑ **Employment Practices**
Most traditional office meetings can now occur without the physical presence of all staff in one location. This can be done through telephone or video-conferencing or by using different online meeting programs. According to TeliaSonera, this translates into a viable cost-saving venture for businesses/organizations in the sense that travel costs to the meeting site would not have to be borne by staff or the organization. Needless to say, this is also efficient as staff in remote locations can partake in real time.[41]

❑ **Transportation**
The use of telecommunications technology will reduce the need to travel and thereby reduce the amount of emissions released into the atmosphere. For instance, TeliaSonera suggests that the use of satellite navigation and different mobile services can help to improve the logistics and reduce driving for kilometres. In the area of retail, it is estimated that having groceries delivered can replace as many as 12 separate shopping trips to a grocery store.[42]

The discussion and featured examples above demonstrate the ways in which the tools of the information society such as the Internet can facilitate eco-efficiency gains, thereby furthering

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[37] Cohen, Nevin. "E-commerce and the Environment." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light.* Solna, Sweden: WWF Sweden, 2002. pp. 71-72.
[38] TeliaSonera Finland Oyj. "Sonera – About Sonera."
http://www.sonera.com/CDA.COM.FrontPageFrame/0,1396,hierarchyId=618,00.html.
[39] TeliaSonera Finland Oyj. "Sonera."
http://www.sonera.com/CDA.COM.ArticleFrame/0,1395,hierarchyId%3D1135,00.html.
[40] Ibid.
[41] Ibid.
[42] Ibid.

environmental goals. At the same time, however, there remain questions that raise doubts about achieving eco-efficiencies. With such uncertainty and knowledge gaps, it becomes incumbent upon willing researchers to devote their time and energy into this endeavour with the hope of advancing eco-efficiency and innovation discourse.

2.3   Negative environmental aspects of the information society

Not all environmental impacts of the information society are likely to be benign, however. For purposes of this paper, environmental impacts are defined as the substantial or potentially substantial changes occurring in any part of the physical environment, as a result of environmental interventions. These interventions take the form of: emissions released into the air, the disposal of solid or liquid waste, noise pollution and radiation, among others. These interventions can impact the climate system, groundwater supplies, plants, soils and wildlife.[43] The members of the WSIS Environment and IT Working Group,[44] comprised primarily of Swiss researchers, is one group raising concerns about the negative environmental consequences of the information society. This Working Group, building its positions and interventions based upon the work of the UNEP coalition as well as from the literature arising from the SASKIA (Strategic Action for a Sustainable Knowledge and Information Age) project[45] of the European Commission IST program and the Global Society Dialogue,[46] has suggested that the rebound effects of the information society may undercut many of the gains realized through eco-efficiency and innovation.

Thomas Schauer, of the Global Society Dialogue, provides the most comprehensive listing of potentially negative environmental consequences of the information society. [47]

Primary effects include the cradle-to-grave impacts of the computer and telecommunications industries. This includes the negative impacts of the mining of precious metals for components, chemical usage and disposal during the manufacturing process, energy consumption by computers, and the disposal of electronic waste[48] (see Box 3 below). Within the international literature, the issue of electronic waste has received particularly strong attention. The growth of waste electrical and electronic equipment is about three times higher than the growth in average municipal waste.[49] Videos and publications on the community-level environmental impacts of international trade in electronic waste in countries such as China, have led to calls for a ban on such trade. The most active campaigners in this field have been the Silicon Valley Toxics Coalition[50] and the Basel Action Network (BAN)[51]. At WSIS PrepCom2, members of the Environment and IT Working Group provided free continuous showings of the BAN film documentary "Exporting Harm"[52] near the free computer stations for several days in an attempt to raise the profile of the electronic waste issue.

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[43] Langrock, Thomas, Hermann E. Ott, Thomas Dworak. "Environmentally Friendly ICT-Products." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light*. Solna, Sweden: WWF Sweden, 2002. p. 98. http://www.panda.org/downloads/general/ict_sustainability.pdf.

[44] Environment and ICT Working Group. http://www.wsis.ethz.ch/.

[45] SASKIA Project. http://mango2.vtt.fi:84/tte/projects/saskia/.

[46] Global Society Dialogue. http://www.global-society-dialogue.org/.

[47] Schauer, Thomas. *The Sustainable Information Society: Visions and Risks*. Universitätsverlag Ulm GmbH, 2003. http://www.global-society-dialogue.org/saskia.pdf.

[48] Langrock, Thomas, Hermann E. Ott, Thomas Dworak. "Environmentally Friendly ICT-Products." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light*. Solna, Sweden: WWF Sweden, 2002. p. 42. http://www.panda.org/downloads/general/ict_sustainability.pdf.

[49] "Proposal for a directive of the European Parliament and of the Council on waste electrical and electronic equipment", 2000/0158 (COD). Cited in Schauer, Thomas. p. 11.

[50] Silicon Valley Toxics Coalition. http://www.svtc.org/.

[51] Basel Action Network. http://www.ban.org/.

[52] More information on the film is available online at http://www.ban.org/exportingharm_film.htm.

Potentially more serious than the primary negative effects of increased ICT usage are the secondary "rebound" effects of eco-efficiencies achieved by industry. According to Stephen Simmons, "In the context of Sustainable Development, the term "rebound" seems, at first glance, clear and unambiguous. Some action is taken which produces a reduction in the material content and/or energy use of some items of production; as a result of the improved eco-efficiency the price of the product is reduced; as a result of the price reduction, the product becomes more attractive in its market and more are sold. The outcome, the "rebound effect," is that there is an increase in the global total of material and/or energy used resulting from the increased sales that wholly or partially negates the eco-efficiency gain."[53] In other words, "A particular technology may enable a particular good or service to be produced with the consumption of fewer material resources; but if it stimulates demand, including demand for other technologies, it may increase total resource use."[54]

It is feared that while ICTs may reduce some travel and dematerialize some products, their net effect under existing policy regimes and consumer values will be to increase overall transportation demand and consumerism as part of the globalization process. Rather than substituting virtual consumption and transportation for real world, people appear to be adding them together. Data from the 1990s indicates that within the European Union, there was no decoupling of economic growth and mobility even though international telephone traffic grew at an unprecedented rate of more than 10 per cent annually.[55] In addition, the growth of freight transport has been larger than the growth of GDP in the region. This pattern seems to be an extension of a century-long trend of trade growth exceeding production growth.[56]

Meeting rapidly growing consumer demand from Southern countries while reducing the per capita global ecological footprint from 2.3 hectares to 1.9 hectares per person[57] will require using ICTs for more than achieving eco-efficiency. While such consumption growth is necessary to address poverty and unsustainably low consumption in many communities (see section 2.1.6), it is not likely to be achieved on a sustainable basis without a reassessment of consumer values amongst the middle and upper classes.

The debate surrounding the environmental impacts of the information society is certainly interesting and important to take into consideration. This framework clearly recognizes that ICTs are certainly not without their faults with respect to their environmental impacts on climate, land, water, wildlife and human health. By recognizing this fact, the research efforts will need to probe further into the environmental consequences of ICTs as well as pointing to measures that stakeholders can take to mitigate such harmful effects, if possible.

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[53] Simmons, Stephen. "Technological Innovation and Rebound." pp. 46-52. In Simmons, Stephen (ed.), *The SASKIA Landing Place*. http://mango2.vtt.fi:84/tte/projects/saskia/docs/SASKIA_Landing_Place_Doc.pdf February 2003.

[54] Holderness, Mike (ed.) "Living in peace with the environment: The environmental dimension of sustainability." Third Report of the Information Society Forum, 2000. http://www.poptel.org.uk/nuj/mike/isf/EW-ch3.html.

[55] Schauer, Thomas. p 16.

[56] Ibid. pp. 37-38.

[57] These figures reflect the calculations of Redefining Progress regarding biologically productive space available per person, using 1999 population data. More details are available at http://www.rprogress.org/programs/sustainability/ef/.

Box 3. Negative environmental aspects of IS in FOCUS: Interventions and impacts[58]

When toxins, associated with the manufacture of component parts of ICT products, are released into the environment their effect on animals, plants and humans are dependent on various factors. These factors include: toxicity, the environmental persistence of the toxin, the concentration and its capability to interact with other substances in the environment and whether these toxins can bio-accumulate in the storage tissues of plants and animals. The following table attempts to list the most important environmental interventions and their respective environmental impacts that result through the various life phases of ICT products.

Phase in life cycle	Selected environmental intervention resulting during the phase	Resulting environmental impacts
Material acquisition: • Raw material extraction (oil, copper, mercury, silicon etc.)	• Intervention in landscape and soil • Mine tailings become waste	- Destruction of ecosystems - Impact on groundwater - Loss of fertile land - Possible eco-toxic effects
Manufacturing and use: • Production of electronic devices (e.g., semiconductors, capacitors, printed circuit board, liquid crystal displays) • Assembly of ICT products	• Air emissions (fugitive emissions, e.g, HCFCs, hydrogen, silane) • Effluents containing: acids, alkalis, metals, organic solvents • Leakage from landfilling of solid wastes (e.g., scrap components, sludge containing heavy metals)	- Depletion of stratospheric ozone - Eco-toxic effects of flora, fauna and humanity - Toxic effects of lead and other heavy metals
Use phase: • Usage of equipment • Production of material Inputs required for ICT equipment (paper, toners, batteries)	• Emissions of ground level ozone • Radiation from cathode ray tubes • Effluents (from paper industry) and air emissions, waste generation	- Impact on human health - Toxic and potentially toxic effects
End of life management: • Waste treatment (landfills, incineration) • Improper waste treatment (waste export, illegal dumping)	• Air emissions, especially from incineration (dioxins and furans) • Leakage out of landfills (lead, radioactive substances, asbestos, chromium, etc.)	- Potentially highly toxic effects
Throughout entire life cycle: • Energy production • Transport	• Air emissions resulting from energy consumption and transport (NO_X, SO_X)	- Climate change - Acidification

Adapted from: Langrock, Thomas, Hermann E. Ott, Thomas Dworak. "Environmentally Friendly ICT-Products." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light.* Solna, Sweden: WWF Sweden, 2002. p. 100.

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[58] Langrock, Thomas, Hermann E. Ott, Thomas Dworak. "Environmentally Friendly ICT-Products." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light.* Solna, Sweden: WWF Sweden, 2002. p. 99.

2.4   Modifying consumer demand and values

Increasingly, sustainable development practitioners are calling for information society policies to address the demand side of consumerism, the establishment of collective values, and the accountability of decision-makers for the long-term and indirect impacts of their decisions. To be most effective, two complementary policy approaches will likely be necessary:[59]

1. The *consciousness strategy* – emphasizing measures that increase the environmental consciousness of the population; and
2. The *frameworks strategy* – promoting new laws and taxes that reward environmentally friendly behaviour.

As Schauer details, "the two components would not only have effects for specifically achieving sustainable development, each component would also decrease the influence of obstacles which the other component faces. Frameworks would decrease eco-schizophrenia as in the case of changing the rules of the prisoners' dilemma, and measures of the consciousness approach would help to decrease the 'democratic brake' which is the obstacle for the frameworks approach."[60] Examining each of these strategies in greater detail provides some insight into the types of policies and programs that are necessary.

The consciousness strategy is closely related to public education policies and programs. As a means of implementation for Agenda 21, international policy-makers outlined a general program of action regarding education, raising public awareness and training for sustainable development. The indicative budget suggested that approximately US$15.2 billion per year would be required to achieve internationally agreed upon goals.[61] References are made within each section to the need to address how emerging ICTs and information systems could be used to enhance these activity areas. For example:

- There is a need to strengthen, within five years, information exchange by enhancing technologies and capacities necessary to promote environment and development education and public awareness (36.5.h);
- Countries and the United Nations system should promote a cooperative relationship with the media, popular theatre groups, and entertainment and advertising industries by initiating discussions to mobilize their experience in shaping public behaviour and consumption patterns and making wide use of their methods….UNICEF should make child-oriented material available to media as an educational tool, ensuring close cooperation between the out-of-school public information sector and the school curriculum, for the primary level. UNESCO, UNEP and universities should enrich pre-service curricula for journalists on environment and development topics (36.10.e);
- Countries, in cooperation with the scientific community, should establish ways of employing modern communication technologies for effective public outreach. National and local educational authorities and relevant United Nations agencies should expand, as appropriate, the use of audio-visual methods, especially in rural areas in mobile units, by producing television and radio programs for developing countries, involving local participation,

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[59] Schauer, Thomas. pp. 64-74.

[60] Ibid. p. 73.

[61] United Nations. "Chapter 36: Promoting education, public awareness and training." Agenda 21. (1992) http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter36.htm.

employing interactive multimedia methods and integrating advanced methods with folk media (36.10.f);

- Countries and the United Nations system should increase their interaction with and include, as appropriate, indigenous people in the management, planning and development of their local environment, and should promote dissemination of traditional and socially learned knowledge through means based on local customs, especially in rural areas, integrating these efforts with the electronic media, whenever appropriate (36.10.i); and

- Countries should enhance the ability to gain access to, analyze and effectively use information and knowledge available on environment and development…. National and regional environmental labour-market information systems should be developed that would supply, on a continuing basis, data on environmental job and training opportunities. Environment and development training resource-guides should be prepared and updated, with information on training programs, curricula, methodologies and evaluation results at the local, national, regional and international levels (36.22).

Beyond these basic approaches, many civil society organizations are advocating a more aggressive public education approach along the lines of either immaterialization or demarketing.

Immaterialization, including the sub-class of ICT-led immaterialization, is characterized by a "switch" in consumption behaviour from more material to less material (see Box 4 below). It is a culturally informed choice to change at least some aspect of a lifestyle. The important distinction between immaterialization and dematerialization is that the former involves more than simply making consumer goods more efficient, but rather replacing them with completely new forms of goods inherently more sustainable because they involve very little material use.[62] As a value-led behaviour change, it is greatly influenced by the lifestyle experienced in early, formative, years (particularly the teenage years).[63] Given the increasing influence of ICTs in the teenage years, researchers such as Stephen Simmons, seem to indicate that young people will be at the forefront of ICT-led immaterialization. An ASSIST research study identified a threefold contribution of ICTs to lifestyle change favouring sustainability. First, the background condition for change is aspiration for quality of life enhancement; then there must be an inherent "ICT-pull," enhanced by the marketing of ICTs designed specifically for specific lifestyles; and finally there has to be a time lapse appropriate to generational succession, allowing those who have experienced ICT-pervasive lifestyles in their formative years to come to maturity.[64]

Demarketing is one of the most recent trends that emerged from the field of social marketing. It seeks to discourage consumers, or specific sub-sets of consumers, from purchasing and using a product or service. Demarketing has traditionally been used by governments to reduce consumption of goods with negative social and economic consequences (e.g., tobacco) or by corporations to reduce consumption of scarce goods. However, in its latest incarnation, demarketing is increasingly the objective of some civil society groups engaged in culture jamming.[65] Culture jamming is "a combination of information warfare, terror-art, and guerrilla semiotics, directed against the information society in which we live—an ever more intrusive, instrumental technoculture whose

[62] Immaterialisation.org. "About immaterialzation." http://www.immaterialisation.org.

[63] Simmons, Stephen. " Immaterialisation: The new reality." http://www.terra-2000.org/Documents/Prague/Papers/Immaterialisation-the%20new%20reality.pdf.

[64] Simmons, Stephen. "Lifestyle, ISTs and Society" pg. 93-96 in In Simmons, Stephen (ed.), *The SASKIA Landing Place.* http://mango2.vtt.fi:84/tte/projects/saskia/docs/SASKIA_Landing_Place_Doc.pdf.

[65] Lasn, Kalle. Citizens or Egoistic Cyber-Consumers – The Cultural Role of the Internet." In Pamlin, Dennis (Ed.). *Sustainability at the Speed of Light.* Solna, Sweden: WWF Sweden, 2002. p. 153. http://www.panda.org/downloads/general/ict_sustainability.pdf.

operant mode is the manufacture of consent through the manipulation of symbols." [66] Culture jamming techniques include: sniping and subvertising, media hoaxing, audio agitprop and billboard banditry. The collective impact of culture jamming is to increase public awareness of how our consumer values are shaped and to challenge us to redefine quality of life in less material terms. As such, it can be seen as a type of general demarketing campaign against the majority of goods and services that are mass-produced and mass-consumed. In general, however, culture jamming challenges intellectual property rights and tempts corporate lawsuits in ways that earlier social marketing approaches did not. Spoofs and libel suits often go hand-in-hand.

Switching from the consciousness strategy to the frameworks strategy, we must recognize that governments can only reward environmentally friendly behaviour if there are well-established information systems regarding pricing and the environmental impacts of products and services, as well as information systems supporting tax administration and the administration of special programs. Market-based systems are founded upon the assumption of perfect information. While we may not achieve that lofty requirement, effective information systems are a pre-requisite to the effective implementation of environmental tax and rebate programs. For example, in the United States, several states offer tax credits for certain approved solar or wind energy systems.[67] However, individuals and corporations are unlikely to apply for these programs unless there exists a) easy access to information regarding the price of comparative energy sources in the short- and long-term; b) publicly accessible information about the tax credit program; c) simple application forms and procedures to apply for the credit; and d) confidence that the tax authorities will remit the credit to them (or their financial institution) in a timely and accurate manner.

While some e-government initiatives with tax administration authorities are beginning to emerge in developing country contexts,[68] it is more common to find that staff in tax administration offices continually struggle with massive paper files to perform audits and collections; gather information to compile and transmit monthly reports; and perform all core functions of tax administration.[69] In such situations, it is difficult to envision that tax administrations could effectively collect and utilize the data necessary for a successful tax credit system to promote sustainable development activities. Furthermore, the effectiveness of tax credit programs may be severely limited in countries in which the cost of tax evasion is less than the cost of applying for legal tax credits. Until tax authorities have sufficient information and resources to enforce tax collection, framework strategies may have limited effectiveness.

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[66] Dery, Mark. "Culture Jamming: Hacking, Slashing and Sniping in the Empire of Signs." Open Magazine Pamphlet Series, 1993. http://www.levity.com/markdery/culturjam.html.

[67] The states of California (http://www.consumerenergycenter.org/renewable/tax_credit.html) and Texas (http://www.seco.cpa.state.tx.us/re_incentives.htm) provide a good deal of information online about such tax credit or rebate programs.

[68] World Bank Group. "Tax Administration." E*government. http://www1.worldbank.org/publicsector/egov/taxadmin.htm.

[69] Jacobs, Arturo A. *Users' Standards for Integrated Tax Information Systems in Tax Administration of Developing Countries.* Pheonix, AZ: The M Group Inc. http://www.mgroupglobal.com/images/ITS%20Jacobs.pdf.

Box 4. Consumer demand and values in FOCUS: Household Consumption in OECD countries

In July 2002, the Organization for Economic Cooperation and Development (OECD) released a policy brief documenting household consumption patterns of citizens of its member states. Entitled *Towards Sustainable Household Consumption? Trends and Policies in OECD Countries*, the policy brief includes a comprehensive analysis of consumption patterns in five key areas: food, tourism-related travel, energy, water and waste generation. The publication also includes a trends analysis as well as a discussion on the driving forces behind decisions to consume. Questions with respect to the role of government in promoting sustainable consumption are also explored.[70]

Consumption is defined as more than simply purchasing a product or service on the market; it involves selection as well as the actual use, maintenance, repair and disposal of the product or service. The practice of consumption has appeared to intensify over the past two decades keeping in line with the growth of the Gross Domestic Product (GDP) and is expected to grow to 2020, according to the OECD. This forecast is clearly alarming, making the challenge to foster sustainable consumption patterns even more daunting, especially when we consider the prospects of industrializing economies aspiring to consume in much the same way as the developed world.[71]

Consumption affects the environment through simple day-to-day decisions made by individuals. This ranges from what goods and services individuals wish to buy to where they want to live and work to where they want to go on vacation. Although minimal, the combined consumption patterns of each individual household have an immeasurable impact on the environment including air and water pollution, wildlife habitat deterioration and climate change. Despite the efficiency gains made in terms of energy use and waste generation, the sheer volume of goods and services consumed outweighs these gains, according to the OECD.[72]

Environmental pressures will particularly intensify from consumption in the following areas:

- ***Transport*** – The current total number of vehicles in OECD countries (totaling some 550 million) is projected to increase by 32 per cent by 2020, while the distance traveled by these vehicles are expected to increase by 40 per cent. Meanwhile, global air travel will triple in the same period.
- ***Food*** – Households impact the environment through their eating habits and/or choice of diet, especially if the foods require large amounts of energy to be consumed to be cooked and waste to be generated (through packaging).
- ***Energy*** – Energy used in OECD nations grew by 36 per cent between 1973 and 1998 and is expected to grow by a further 35 per cent until 2020, despite the efficiency gains.
- ***Water*** – Population growth and the accompanying expanded water use has reportedly outweighed the effect of water saving technology and behaviour.

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[70] Organization for Economic Development and Cooperation. "Towards Sustainable Household Consumption? Trends and Policies in OECD Countries." 2002. http://www.oecd.org/dataoecd/28/49/1938984.pdf. p. 2.

[71] Ibid. 2-3.

[72] Ibid. p. 3.

Box 4. Consumer demand and values in FOCUS: Household Consumption in OECD countries (continued)

- ***Waste*** – The waste generated by cities is forecast to grow by 43 per cent between 1995 and 2020 to reach approximately 700 million tonnes per year in OECD countries overall. Recycling waste has slowed down the rate of growth in waste generation, but, again, the total volume of waste produced has dampened these gains.[73]

Key to understanding this troubling phenomenon is consumer behaviour. In other words, what drives such unsustainable consumption patterns? Can anything be done about it? The manner in which a consumer arrives at a decision to purchase is complex. According to the OECD, individuals can be motivated by both selfish (lifestyle, individual taste) as well as social (culture, social context and concern) reasons. There are other factors as well that influence consumption patterns including: a rising per capita income, demographics (more working women, more single-person households) and the corresponding changes in lifestyle have all led to an increase in individualized buying patterns, a shift towards to more processed and packaged products, higher levels of appliance ownership among others. Technology, institutions, infrastructure and low-priced and mass-produced goods are also cited as contributing towards high consumption patterns.[74] Given these motivational factors behind consumption, is sustainable consumption even possible? What can governments do to help?

Sustainable consumption is defined, according to the Norwegian Ministry of the Environment, as the use of goods and services that respond to basic needs and a better quality of life without overtaxing natural resources or over-relying upon toxic materials and emissions in their production or use. To help countries achieve the aspired goal of sustainable consumption, the OECD has been actively working in this area since 1994. The organization recommends that governments use a variety of policy instruments to foster a sustainable consumption society. For instance, governments should require that prices of goods internalize the true cost of producing consumer goods and services. In the area of policy coordination, governments should actively and adequately coordinate policies across economic sectors. More importantly, however, in terms of informing citizens, governments must disseminate information on topics such as water and energy conservation; introduce eco-labelling laws; schedule open forums and discussions, among other actions. Clearly, the OECD recognizes that "information can be a powerful tool for promoting more sustainable household consumption patterns."[75] The question then becomes is the information society up to the challenge?

Modifying consumer demand and values, whether through immaterialization or demarketing, will be a challenge to overcome. With recent trends and data indicating very little progress in stemming inconspicuous consumption habits, national governments of all states will have to utilize all possible avenues to achieve a truly sustainable society. How the information society can help with this endeavour remains to be researched and seriously discussed.

2.5 Access to information and public participation

Some of the most important policy advances linking the information society and sustainable development have occurred in the areas of access to information and participation since 1992. In Principle 10 of the Rio Declaration, the governments of the world affirmed that the public's right of

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[73] Ibid. pp. 3-5.
[74] Ibid. pp. 5-6.
[75] Ibid. p. 8.

access to information, participation and justice in decision-making is instrumental in protecting the environment and in integrating environmental values into development choices.[76] These norms of equitable and environmentally sound decision-making are, to a large degree, fundamental pre-requisites for the operation of a sustainable information society. Within the realm of policy discussions regarding the information society, we may, however, focus primarily on the first two access principles: information and public participation. These processes reflect the two sides of a healthy ongoing dialogue between national governments and their citizens—ensuring flows of information from government to citizen and from citizen to government.

Worldwide demand for access to information has grown in recent years, driven by at least three interrelated forces: the urgency and scope of environmental problems, the increasingly active character of civil society and the revolution in information technology.[77] The importance of the issue has been recognized for decades though. According to Elena Petkova et al. in *Closing the Gap*:

> *The importance of developing and sharing environmental information through scientific exchange, educational programs and the media, has been recognized at the international level since at least the UN Conference on the Human Environment in 1972. In the decades since, advocates for right to know legislation have argued that the right to know is a critical tool in fighting corruption and waste…. Worldwide, 44 countries had passed access to information legislation as of 2000.*[78]

Right to know legislation is based upon the logic that better information enables decision-makers to make better decisions; broad access to information promotes better decisions by mobilizing demand for sustainable solutions to problems; and access to information empowers citizens to take a more active role in providing improved environmental performance independently of the state.[79]

This logic introduces the second element of the access principles: the right to participate in decision-making. This element reflects the importance of ensuring that all relevant issues—ranging from defining the scope of a problem to developing solutions for it—are addressed.[80] The role of public participation has shifted over time to include keeping governments accountable for their actions, identifying and understanding the public interest, and developing the substance of policy.[81]

The strongest international agreement regarding these issues has been the United Nations Economic Commission for Europe's (UNECE) *Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters* (Aarhus Convention) adopted in June 1998 at the Fourth Ministerial Conference in the "Environment for Europe" process.[82] The Convention is not only an environmental agreement; it is also a Convention about government accountability, transparency and responsiveness. It grants the public rights and imposes on Parties and public authorities obligations regarding access to information and public participation and access to justice. Box 5, below, takes a closer look at Estonia, one of the Parties to the Aarhus Convention, and its attempts to make progress in this area.

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[76] Lash, Jonathon. "Foreword." In Petkova, Elena, Crescencia Maurer, Norbert Henninger, and Frances Irwin (eds.) *Closing the Gap: Information, Participation, and Justice in Decision-making for the Environment.* Washington, DC: World Resources Institute, 2002.

[77] Petkova, Elena et al. p. 35.

[78] Ibid. p. 34.

[79] Ibid. p. 35.

[80] Ibid. p. 66.

[81] Berle, Thomas C. and Jerry Cayford. Democracy in Practice: Public Participation in Environmental Decisions. Washington, DC: Resources for the Future, 2002. Cited in Petkova, Elena et al. p.66.

[82] United Nations Economic Commission for Europe. Environment and Human Settlements Division. "Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters." http://www.unece.org/env/pp/welcome.html.

At the international level, The Access Initiative (TAI), a coalition of civil society groups collaborating to promote implementation of commitments to access to information, participation, and justice in decision-making undertook pilot assessments of the progress made by national governments in implementing these principles.[83] The initiative led to the development of a preliminary standardized diagnostic tool to assist civil society in auditing the existence and implementation of national legislation on access to information and rights to public participation.[84] In addition, their pilot assessment identified patterns of challenges facing countries and led to the creation of the Partnership for Principle 10 (PP10)[85] as a Type II outcome of the World Summit on Sustainable Development.

With the adoption by the UNEP governing council in February 2003 of decision 22/17, part II B on enhancing the application of principle 10 of the Rio Declaration on Environment and Development, new resources are now being committed to addressing the implementation gap at the national level.[86]

Box 5. Access to information and public participation in FOCUS: Implementing Aarhus in Estonia

Among other things, the Aarhus Convention obliges its 25 signatories to make matters concerning the environment available for public consumption through a variety of mediums including information in electronic form. One of the 25 European countries belonging to the Convention is Estonia, a seemingly enthusiastic promoter of the use of information and communications technologies in environmental decision-making.

One of the much-acclaimed electronic tools developed by Estonia is the Tana Otsustan Mina (TOM, or Today I Make Decisions in English) Web site. This site serves as a portal for the general public to comment on draft pieces of government legislation that have been posted by all government ministries. Once on the site, citizens may directly comment on the proposals or may suggest their own ideas during this first creation phase of all regulations. The ideas having the greatest support from the public are then submitted to the relevant ministry by a prime minister's resolution. However, this is not the end of public involvement. Instead, the public has continuous access and is able to track the progress of the idea(s) they supported.[87]

Since its launch two years ago, TOM has reportedly seen more than 430 ideas directly from citizens. More promising is the fact that some of these ideas have actually been integrated into legislation put forth by several government agencies. In fact, about 10 acts based on electronically submitted ideas are about to be enshrined into law and more than ten are under further elaboration in the ministries. For these achievements, TOM was recognized with a European Commission Award at a November 2001 e-government conference held in Brussels, Belgium.[88]

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[83] The Access Initiative. http://www.accessinitiative.org/.
[84] The Access Initiative. *Assessing Access to Information, Participation, and Justice for the Environment: A Guide (version 1.0)*. http://www.accessinitiative.org/how_to_guide.html.
[85] Partnership for Principle 10. http://www.pp10.org/.
[86] United Nations Environment Programme. "UNEP Information Note: African Experts Workshop on Rio Principle 10 – Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters" http://www.unece.org/env/pp/documents/principle.10.africa.doc.
[87] Tingas, Kaidi. "The public plugs in." *The Bulletin*. Vol. 12, No. 3. Autumn 2003. p. 15.
[88] Ibid. p. 15.

Box 5. Access to information and public participation in FOCUS: Implementing Aarhus in Estonia (continued)

Another initiative coming out of Estonia is the non-governmental, Estonian Law Centre's work on Internet law drafting. Its Third Sector Internet Forum on Law Drafting cooperates with ministries to present draft laws together with explanatory notes and lists of especially acute problems on the Internet. Among the other duties of this Forum is to alert third-sector associations whom the draft concerns and invites them to comment on the draft laws.[89]

Like with all government-sponsored legislation, there is a time limit for the legislative process. At the end of the process, the forum closes further discussion and conclusions are then drawn based on submitted comments. These conclusions are then presented to the government ministry it affects in order to give them an opportunity to respond. Should a ministry refuse to present a draft law to the forum before it goes out to other ministries for concordance, the forum then submits its proposals and comments directly to the Estonian parliament. Given the rather short time limit for concordance, the forum aims to gain access as early as possible to draft laws in order to ensure proper consideration of civil society's concerns.[90]

Obviously, there is still important work to be done in the area of access to information and the public's right to participate in decision-making processes. The barriers such as the lack of communications infrastructure, illiteracy, lack of training and access among others continue to hinder the progress of attaining well-informed societies that hold their governments accountable. The challenge for the IS and SD spheres, therefore, is twofold: to overcome these primary barriers followed by fostering the meaningful use of ICTs in environmental decision-making.

2.6   Poverty reduction

Poverty reduction constitutes the final, and perhaps the most pressing, linkage between the information society and sustainable development. Historically, practitioners from both communities have had to grapple with accusations that the have evolved primarily to respond to concerns of the industrialized North. As these communities have broadened into the global arena, they have recognized that they must directly address the issue of poverty in order to have relevance to the majority of the world's population. The wide variety of literature linking poverty, sustainable development and ICTs reflects the broad array of analytical approaches within each field. These approaches can be loosely grouped into three categories, those focusing on: economic development, the Millennium Development Goals, and rights and capabilities approaches.

Economic-focused analyses of the poverty nexus between the information society and sustainable development tend to highlight the issues of achieving economic efficiencies and improving employment prospects. If one assumes that developing countries have pervasive market imperfections and high transaction costs, it is possible that ICTs may have a greater efficiency—enhancing potential there than in developed countries.[91] However, the net impact on the poor appears ambiguous, depending on whether they are predominantly employed within the productive sectors or the distribution sectors. Should they be employed primarily in the distribution sector and

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[89] Ibid.
[90] Ibid.
[91] Bussolo, Maurizio and David O'Connor. "Technology and Poverty: Mapping the Connections." In
Technology and Poverty Reduction in Asia and the Pacific. ADB/OECD, 2002. p. 27.

transaction costs were cut, there is a strong likelihood that their livelihoods would be jeopardized. Nevertheless, should transaction costs more heavily affect commodity prices strongly demanded by the poor, a reduction in their price should benefit them[92] (assuming that alternate employment in another sector may be found).

Other economic analyses examine the impacts of pro-poor growth and livelihood strategies.[93] Beyond the ICT sector (an important growth industry in its own right), these technologies have pushed the boundaries of markets so that they have become less local and have contributed to the more efficient integration of global and local supply chains.[94] In this manner, they have untrapped human resources, allowing them to participate in markets and activities beyond the constraints of their locations. With an appropriate institutional and social infrastructure, even poor people may benefit from ICTs ability to cause people's skills to jump in potential asset values.[95] This is particularly true if programs are consciously developed to use ICTs to instigate and support livelihood development. One of the largest focuses on the ground has been in working in agriculture and local community development. These programs have often been associated with the creation of multipurpose community telecentres in poor areas to support micro or family enterprise as well as networks providing agricultural market, pricing and input cost information.[96]

Finally, some traditional economic analyses have begun to incorporate issues of equity to the extent that information asymmetries impact on market behaviour. With the awarding of the 2001 Nobel Prize in Economics to George Akerlof, Michael Spence and Joseph Stiglitz,[97] the research community formally recognized the need for public institutions to correct for asymmetries and the threat of misinformation in markets. This issue takes on added importance for the poor, who may be less able to capture information, resulting in being on the losing end of any transactions undertaken with asymmetries present.

Analyses focused on the use of information and communication technologies to achieve the Millennium Development Goals (MDGs) tend to reflect a broader understanding of poverty, which includes social and environmental conditions in addition to economic opportunities. However, the connection between the two is ultimately more practical than theoretical. As noted by Adama Samassékou, President of the WSIS Preparatory Committee, "Quite simply, without the widespread and innovative use of ICTs, the Millennium Development Goals may prove impossible to attain."[98] Recognizing the need for broad based innovation using ICTs, the UN ICT taskforce has established a "Committee on the use of ICT for the achievement of the MDGs." This Committee serves as part of Task Force 10 (Science, Technology, and Innovation) of the Millennium Project.[99] One innovative use of ICTs to achieve the MDGs is discussed in Box 6 below. In addition to addressing the

[92] Ibid. p. 33.

[93] Gerster, Richard and Sonja Zimmermann. *Information and Comunication Technologies (ICTs) for Poverty Reduction? Discussion Paper.* Berne, Switzerland: Swiss Agency for Development and Cooperation, 2003. pp. 15-16.

[94] Spence, R. *ICTs, the Internet, Development and Poverty Reduction. Background Paper: Discussion, Research, Collaboration.* Draft. Ottawa, Canada: IDRC, April 2003. p. 11.

[95] Ibid. p. 13.

[96] Ibid. p. 15.

[97] Nobel e-Museum. "The 2001 Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel – Information for the Public." http://www.nobel.se/economics/laureates/2001/public.html

[98] Samassékou, Adama. "Towards the WSIS and Renewed Roles for the Private Sector & Information Society in Brazil and the World." Speech at the UN ICT Task Force Regional Meeting for LA&C. 12 June 2003. http://capitalsocinfo.socinfo.org.br/doc/seminario/discursoadama.pdf.

[99] United Nations Information and Communication Technologies Task Force. "United Nations Millennium Project." http://www.unicttaskforce.org/mdg/project.asp.

achievement of Target 18,[100] it is anticipated that this committee will provide advice on how to achieve goals and targets for combating poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women.

In February 2003, the United Nations Development Programme (UNDP) presented a draft working paper to Task Force 10 on the role of ICTs in enhancing the achievement of MDGs.[101] The paper emphasizes that the role of ICTs extends beyond increasing the cost effectiveness, impact and reach of actions to improve health, education and related MDG focus areas. ICTs can also strengthen the creation of enabling conditions such as transparency and accountability, as well as facilitate information sharing and knowledge creation for each of the MDGs. In terms of implementation, the paper notes that:

> *the development impact and results achieved from ICT as an enabler are found to vary with: (i) the role assigned to ICT in development (ICT as an enabler vs. ICT sector); (ii) the reflection of MDG priorities in policy and implementation of e-strategies; (iii) the degree of "holisticism" or consideration of cross-sectoral elements and linkages with implications for capacity to implement, sustainability, and cost effectiveness; (iv) the extent of inclusion in formulation and implementation as well as responsiveness to needs; and (v) cost and ease of replicability of ICT tools and technologies.*

While the MDG-focused analyses are broader than traditional economic assessments of poverty, researchers drawing upon the freedoms-functionings-capabilities poverty reduction framework of Amartya Sen provide the most expansive linkages between the information society and sustainable development. According to Sen's framework, freedom is both (1) the primary objective, and (2) the principal means of development. Poverty is seen as the deprivation of basic capabilities—the substantive freedoms he or she enjoys to lead the kind of life he or she has reason to value.[102] This approach concentrates on deprivations, which are intrinsically important, and appreciates that there are other influences on real capability deprivation than income, and that the impact of incomes on capabilities is contingent and conditional. Sen makes a number of important distinctions in clarifying the nature of positive freedom. He distinguishes between its constitutive and its instrumental role in "development" (which is the goal of public policy especially in the face of poverty, famine, etc.). To say that freedom is constitutive of development is to say that the use of freedom is part of what well-being is. Sen has in mind chiefly rights to active political participation, at the local and higher levels, in determining the shape of one's social and economic environment. However, there are also important freedoms that have an instrumental role in making positive freedom possible. These instrumental freedoms include: political freedoms, economic facilities, social opportunities, transparency guarantees and protective security.

In general, Sen's work supports the importance of using ICTs to improve educational opportunities for the poor as a mechanism for improving their capabilities.[103] One of the more interesting implications of Sen's research is regarding the degree to which the information society may expand our ability to participate in community decision-making. Sen's theories imply that participation may be a constitutive element of personal well-being, while the actual ability to influence a particular

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[100] MDG Target 18 states, "In co-operation with the private sector, make available the benefits of new technologies, especially information and communications." Indicators for this target are "Telephone lines and cellular subscribers per 100 population" and "Personal computers in use per 100 population and Internet users per 100 population." Source: United Nations Millennium Project. http://www.unmillenniumproject.org/html/dev_goals.shtm.

[101] United Nations Development Programme (UNDP). "The Role of ICT in Enhancing the Achievement of Millennium Development Goals." Draft document. Unpublished. February 21, 2003.

[102] Sen, Amartya. *Development as Freedom.* New York City: Anchor Books, 1999. p 87.

[103] Sen, Amartya. "Why Human Security? Text of presentation at the "International Symposium on Human Security" in Tokyo, 28 July, 2000. p. 4.

decision is merely of secondary instrumental value. Seen in this light, the value of rights to participation explored in section 2.5 take on additional importance in overcoming poverty.

Box 6. Poverty Reduction in FOCUS: Poverty Mapping

The Millennium Development Goals were agreed to at a special summit of the United Nations in 2000. These goals are indeed ambitious, but not impossible for the world to fulfill as it attempts to grapple with reducing the incidence of poverty in the South. To achieve the eight goals, the United Nations Development Programme (UNDP) understands and acknowledges that every possible tool, including those offered from the ICT sector, must be harnessed.[104] Poverty mapping or the spatial representation and analysis of indicators of human well-being and poverty,[105] is proving to be one ICT tool that can be used in this fight against poverty.

The World Resources Institute (WRI) in collaboration with the United Nations Environment Programme's Global Resources Information Database conducted a study to examine the uses and impacts of poverty mapping. The principal investigators were drawn to this particular area of inquiry due to their extensive experience in mapping biophysical indicators and their potential in informing and influencing the decisions of policy-makers. Therefore, given the need for accurate and timely information by policy-makers, poverty maps are proving to be a useful tool in identifying areas where the standards of living are the lowest and where necessary investments should be directed. In conducting this research, the researchers used a country case study approach with the following findings:

- In Nicaragua, poverty maps are being used in both national and international efforts in implementing poverty reduction strategies. For instance, the country is relying heavily on poverty maps to distribute some US$1.1 billion in capital spending over five years.
- Similarly, in Guatemala poverty maps are being used to allocate hundreds of millions of dollars in the poorest parts of the country to restructure the National Public Investment System.
- Emergency response and food aid programs are also beginning to make use of poverty maps when allocating much needed relief supplies to the victims of natural disasters. For instance, in Cambodia poverty maps are being used to distribute US$50 million in World Food Program aid to the poorest segments of the population.
- High-resolution poverty maps are contributing to state- and local-level decision-making in places such as Minas Gerais state in Brazil. Here, in an effort to redistribute state tax revenues equaling some US$1 billion annually, the state of Minas Gerais is utilizing poverty maps to identify financially disadvantaged municipalities making efforts to improve their respective health, education and sanitation infrastructures as well as investments in environmental conservation.
- The investigators also reported on the "increased transparency of public decision-making" that occurred as a result of the poverty maps. This increased transparency not only raised the issue of poverty, but also created opportunities for debating and discussing the issue at the local and national levels. There was also a noticeable increase

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[104] United Nations Development Programme. "Information and Communications Tools for Development." http://sdnhq.undp.org/it4dev/.
[105] Henninger and Snel. "Where are the poor? Experiences with the development and use of poverty maps." Executive Summary. http://population.wri.org/pubs_content_print.cfm?ContentID=1611.

Box 6. Poverty Reduction in FOCUS: Poverty Mapping (continued)

in civil society participation. This was particularly the case in Panama where officials from that nation's Social Investment Fund (SIF) cited that the use of poverty maps
actually helped them "resist pressure from politicians to alter funding allocations once they had been made" (Henninger and Snel 2002) by the SIF.[106]

The above case studies appear to indicate that poverty mapping may be a relatively easy task to accomplish. This might not be the case. As several map producers have found out, accessing the statistical data in order to create the maps remains a challenge. Undoubtedly, accessing up-to-date population distribution statistics is essential for the creation of high-resolution maps as these are more accurate and reliable. However, some of the map producers were able to overcome this challenge of accessing recent population data by effectively collaborating with national statistical departments and other relevant agencies. The use of high-resolution maps, as the authors of this study indicate, tends to generate high interest, which, in turn, can increase the impact of these maps.[107]

On the subject of impacts, one of the areas in which the poverty maps have had a noticeable impact is in the area of institutional strengthening in developing countries. Not only were the technical skills of participating researchers enhanced, but so was the reputation of the institutions in policy-making circles for no longer did politicians influence their reports and data.[108]

To ensure that poverty mapping is a sustainable endeavour, the researchers have made at least seven recommendations in this study including:

1. In plans to assist their financially disadvantaged citizens, every country should attempt to map their distribution so that resources can be targeted to those specific areas.
2. National governments, in close collaboration with other institutional stakeholders, should survey the need for poverty maps carefully outlining its purpose, methodology, agencies to be involved, technical supports required among others.
3. Governments must nurture and facilitate the necessary long-term political support to sustain poverty mapping initiatives in their states. This must also include the necessary moral, financial and technical supports.
4. The need to craft national legislation to make available all poverty information to all those who seek it, including the poor themselves.
5. Poverty mapping should be used as broadly as possible, therefore innovative applications such as the opportunity to integrate poverty mapping into natural resource management and pollution control should be encouraged.
6. There is a need to devote resources to fund research efforts on new methods in poverty mapping.
7. Developing a strategy to make poverty mapping a reality in all countries. Those countries that are already successful in creating poverty maps should make attempts to enable the less developed countries by providing the technical and financial supports.[109]

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[106] Henninger and Snel. "Where are the poor? Experiences with the development and use of poverty maps." Executive Summary. http://population.wri.org/pubs_content_print.cfm?ContentID=1611.
[107] Ibid.
[108] Ibid.
[109] Ibid.

Reducing the incidence of poverty has taken on an increased sense of urgency with the declaration of the MDGs. Most of the goals aim for 2015 as a target date to halve absolute poverty. Of course, reaching these goals will depend on not only political will, but also the ability to effectively use all possible avenues including information technology as demonstrated by the poverty mapping case above. It is not a question of the availability of tools to fight poverty, but a question of sensible application of those tools. Determining such sensible applications must be an area to focus on in research undertakings.

3.0   National Information Society and Sustainable Development Policies

Increasingly, a number of countries are developing national information society and sustainable development policies with at least cursory references to the other policy area. For example, in 2000, Edvîns Karnîtis, Advisor to the Prime Minister of the Republic of Latvia, forecasted, "that Latvia's sustainable development may well be based on the basic principles of development in the Information Society of Europe—freedom, equality, fraternity, unity and sustainability."[110] However, it is still more common for these policies to be developed in isolation from each other.

What follows, then, is a more clear articulation of the policy arenas that can and need to be influenced to achieve the much discussed policy coherence. There will also be a discussion on national development plans and national positions in international policy dialogue and how IS and SD realities have to be grounded in these in order to garner the needed attention and resources to make policy coherence possible.

3.1   National policy arenas

The widespread tendency to divide issues into separate policy silos has been long practiced by governments everywhere. Many state administrations continue to be organized into distinct ministries covering the areas of: industry, telecommunications, health, education and environment,among others. This ministerial breakdown of national issues into separate units serves a practical purpose, but this practicality often overlooks the interdependency and potential linkages of policy areas. For instance, problems affecting the environment are cross-sectoral and, as a result, require the coordinated responses stretching beyond that provided by an environmental ministry. It should come as no surprise, then, that such administrative fragmentary approach to governing not only create jurisdictional conflict among ministries, but also allows for well-financed interest groups to effectively lobby on behalf of their own self-interest.[111]

Within each policy arena, there is more than likely a policy network. Simply put, a *policy network* is a cluster of public and private actors connected to each other by way of resource dependencies, information, expertise, money and legitimacy. Depending on the type existing in a country, policy networks can either be open or closed. A closed policy network is referred to as a *policy community* and can usually be comprised of government ministries and producer interests affected by the decisions of that government ministry, as a result, leaving little room for other interests to effectively lobby for change. On the other hand, *issue networks* are open comprising of competing interest groups with their own demands.[112]

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[110] Karnîtis, Edvîns. "The Information Society: Several Scenarios for Latvia's Sustainable Development." *Baltic IT Review 2 '2000* http://www.dtmedia.lv/raksti/EN/BIT/200007/00071110.stm.

[111] Carter, Neil. "The environment as a policy problem." The Politics of the Environment. Cambridge, Cambridge University Press, 2001. pp. 168, 174.

[112] Ibid. p. 175.

Regardless of the types of policy network, there is still the need to influence policy arenas to achieve policy coherence. But to do this requires an understanding of national sectoral policies on (but not limited to): health, education, natural resources, economic development, transportation, industry, social and community services. By being aware of these policies can steps then be taken to find the appropriate spaces where policy coherence is possible? For instance, in the national health care sector, are there opportunities to utilize technologies such as teleradiology? In the national education sector, what are the possibilities for using the Internet as a research tool? In the national transportation sector, how realistic is it to expect GIS tools to locate a major railway line through a rural area? More importantly, will the sectoral policies allow for these changes or are they too rigid? What about cultural and religious objections/reservations to introducing these technologies? These are but some points to take into consideration when looking for IS and SD policy coherence.

3.2   National development plans

Most nations of the South contain what is known as national development plans. These plans serve as a roadmap for countries as they resolve to attain economic growth with the ultimate goal of raising the standard of living for their citizens. Usually set for every five years or so, the plans usually feature social and economic goals to be achieved for the short-term in a variety of sectors. Some plans, such as the national plan for Brunei,[113] contain cursory references to the environment and the importance of not overexploiting natural resources for the sake of economic growth.

Countries, such as China, are explicit (albeit quite brief) in their mention of a strategy for sustainable development and achieving technological progress. But, much like the manner in which state administrations are organized, these outlooks are mentioned separately in two different sections of the development plan. For instance, in its sustainable development strategy piece of the development plan, China recognizes the urgency of the of protecting the natural forests of the upper reaches of the Yangtze River and the Yellow River,[114] but perhaps does not recognize, or at least does not mention, the potential of ICTs (e.g., GIS applications) to assist with addressing deforestation in these regions. In the same manner, in its science and education strategy of the development plan, officials recognize that China must "strive to make fresh progress in the important fields of…information technology…"[115] Again, the failure to make the link is seen again as to how advances in IT can help further sustainable development goals. This lack of acknowledgement with respect to the ties between the two policy areas, if mentioned at all, may be somewhat distressing for a variety of reasons.

The failure to mention anything with respect to sustainable development may be that the country in question simply does not recognize SD as important in its long-term strategy. Although this might not be the case any longer as countries are increasingly recognizing, at least on paper, the need to adopt growth strategies that are sustainable in nature. Another reason for concern is that the absence of clear and explicit language around IS and SD linkages might translate into insufficient resources being transferred into these policy areas resulting in a missed opportunity for such countries. Therefore, it is essential that linkages be demonstrated and presented to national governments so as to encourage their needed attention and integration in a variety of policy sectors.

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[113] See Brunei Ministry of Development—Environment Unit website for more details. "Brunei Darussalam Environmental Policies." http://www.brunet.bn/gov/modev/environment/512.html.

[114] Government of the People's Republic of China. *Report on the Outline of the tenth Five Year Plan for National Economic and Social Development*. http://english.peopledaily.com.cn/features/lianghui/zhu9.html

[115] Ibid. http://english.peopledaily.com.cn/features/lianghui/zhu5.html.

3.3   National positions in international policy dialogues

As discussed above, national policy positions are often crafted in isolation. And because they are crafted in relative isolation, they tend to be narrow and rigid in character making the task of changing them, to better reflect modern realities, somewhat daunting. However, one way rigid national policy positions can become disrupted is by what happens internationally. With the rise of the information revolution and globalization, the belief systems of policy elites are being challenged by international agreements and discussions. The many environmental treaties such as the ban on chlorofluorocarbons, for instance, served to disrupt the resistance of powerful producer interests at the national level.[116]

Most issues go through an attention cycle, whereby an issue is the topic of global concern and then eventually disappearing from the global radar screen. It is instances such as these that offer a window of opportunity for policy dialogue and perhaps even policy change. However brief, many have argued that such occasions should not be discounted as groundbreaking moments to advocate for structural changes. Depending on the strength of the issue, it may sometimes be possible to challenge dominant policy paradigms and replace it with new perspectives, institutions and policies.[117] The World Summit on the Information Society appears to offer an excellent opportunity for propelling the issues of IS and SD to the forefront.

National positions on a host of international issues are diverse in form ranging from a clear and articulate stance on one end to an unclear or absent position on the other end. Needless to say, this can be a challenge for attempts at bridging the divide between IS and SD. The national position of Kenya, as they relate to WSIS.

The Millennium Development Goals (MDGs),[118] agreed to by world leaders at the Millennium Summit held at the United Nations in New York in September 2000, is another case of national positions on international policies. Fulfillment of the Goals is largely contingent on the national prioritization of the goals. Many nations have made the MDGs a focus of their mid- to long-term national development strategies for coming years. The influence of the MDGs on international policy positions appears to be closely linked to coordination of national ministries of foreign affairs. Canada and the Philippines aligned their WSSD priorities closely to those outlined by the MDGs. In the cases of Malaysia and Kenya, while the MDGs have not been explicitly mentioned in their WSSD or preliminary WSIS positions, their performance on the goals does coincide with the identification of priorities. For example, the Kenyan WSSD position strongly emphasizes poverty reduction and women's health, two areas in which they are lagging in MDG performance. In the next phase of research, MDG performance can be used as an indicator of the need for improvements on national IS and SD policy development and implementation.

Achieving the MDGs will indeed be the focus of many countries in the South. As the target date approaches, each country will seek ways to further the life circumstances of their citizens and the use of ICTs may just help in this cause. In fact, the UNDP recognizes ICTs as "an increasingly powerful

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[116] Carter, Neil. "Greening government." *The Politics of the Environment*. Cambridge, Cambridge University Press, 2001. p. 185.

[117] Ibid. 179-180.

[118] The Millennium Development Goals present clear global targets for combating poverty, disease, hunger, environmental degradation, and discrimination against women. Summarizing the agreements made at UN-organized world conferences of the past decade, the goals are widely accepted as measurements for global development progress. For most goals, the year 2015 is the accepted target date for MDG achievement, with the year 1990 used as a benchmark.

tool for… improving the delivery of basic services; and enhancing local development opportunities."[119] Further, the UNDP fears that "without innovative ICT policies, many people in developing countries—especially the poor—will be left behind."[120] The UNDP is clear in its commitment to expand ICT access to achieve a higher but sustainable standard of living for the world's poorest people. These global commitments will, undoubtedly, influence IS and SD policies for achieving gains in one area cannot be done without gains in the other.

Undoubtedly, national policy development is becoming increasingly linked to international experiences and exposure. With the increase in international seminars, conferences, and training courses on the information society and sustainable development—as well as the growth of regional policy consultants, policy-influencers have gone global. The more directions a decision-maker hears an idea from, the greater the perceived legitimacy it is likely to have. This suggests that in addition to cultivating contacts directly within relevant government ministries, it is essential to cultivate relationships with academics, civil society representatives, private sector associations, and agencies at the national, regional, and international level in order to influence national policy development.

4.0   Conclusion

As we move from the age of industrialization into the age of information, it would seem appropriate for us to consider the implications of IS in SD and vice-versa. The research undertakings looking at precisely this intersection promise to offer an exciting and unique opportunity to study potential policy linkages between these often disparate policy fields. The lenses through which researchers will seek out the spaces for policy coherence have been described above. The environmental information systems show potential with its tools to survey and assess landscapes with much greater resolution. E-commerce applications show promise in cutting back on material usage, especially paper and paper products. The Internet is proving to serve as a valuable information tool for the public who appear to be increasingly concerned with government legislation and decisions. These tools are also offering them a voice in the decision-making process. Technologies such as poverty mapping are proving to be a useful application in distributing resources to areas in desperate need. However, as was discussed, there is a downside to the tools of the information society as it relates to sustainable development.

As with most technologies, the information society has negative consequences on the environment, which was considered in this background paper and which will be considered in the research project. These include the release of toxins into the air and water over the life span of ICT products from their material acquisition phase to their disposal phase. Furthermore, as such technologies grow in popularity; there is the added concern of over consuming these products. Such over consuming means more materials will have to be extracted and manufactured and perhaps increasing overall energy use. Closely tied with this idea is the so-called "rebound effect," whereby achieving eco-efficiencies and innovation can actually promote the consumption of products because of their cheaper costs. Given these environmental effects, does this mean that all attempts to study the impacts of the information society and sustainable development be abandoned?

If anything, this paper clearly demonstrates the potential and need to harness the positive aspects of the information society and use it for sustainable development purposes, where possible. There are many areas in which the two policy fields can complement each other as was demonstrated in some of the case studies above. Needless to say, these areas of coherence need to be carefully demonstrated and evaluated before recommendations are put forth for adoption at the national level.

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[119] United Nations Development Programme. "Information and Communications Technology for Development." http://sdnhq.undp.org/it4dev.
[120] Ibid.

Advancing such policy recommendations at the national level will not be an easy task to accomplish. Garnering the attention of policy-makers will require credibility, trust and access through carefully nurtured networks comprised of government scientists, bureaucrats, academics and key civil society organizations. By influencing policy dialogues and change, the researchers who engage in such endeavours will not only be known to be at the forefront of the information revolution, but also at the forefront of a truly sustainable future.

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