iisd International Institute for Sustainable Development

Institut international du développement durable

IISD REPORT

ICTs, the Internet and Sustainability: Where Next?

David Souter
Don MacLean

October 2012

International Institute for Sustainable Development

The International Institute for Sustainable Development (IISD) contributes to sustainable development by advancing policy recommendations on international trade and investment, economic policy, climate change and energy, and management of natural and social capital, as well as the enabling role of communication technologies in these areas. We report on international negotiations and disseminate knowledge gained through collaborative projects, resulting in more rigorous research, capacity building in developing countries, better networks spanning the North and the South, and better global connections among researchers, practitioners, citizens and policy-makers.

IISD's vision is better living for all—sustainably; its mission is to champion innovation, enabling societies to live sustainably. IISD is registered as a charitable organization in Canada and has 501(c)(3) status in the United States. IISD receives core operating support from the Government of Canada, provided through the Canadian International Development Agency (CIDA), the International Development Research Centre (IDRC), and from the Province of Manitoba. The Institute receives project funding from numerous governments inside and outside Canada, United Nations agencies, foundations and the private sector.

Head Office

161 Portage Avenue East, 6th Floor, Winnipeg, Manitoba, Canada R3B 0Y4

Tel: +1 (204) 958-7700 | Fax: +1 (204) 958-7710 | Website: www.iisd.org

ICTs, the Internet and Sustainability: Where Next?

October 2012

Written by David Souter and Don MacLean

Acknowledgement

The International Institute for Sustainable Development (IISD) project summarized and reviewed in this report has explored the relationship between information and communication technologies (ICTs), the Internet and sustainability. Written and published around the time of the second Earth Summit, Rio+20, in 2012, the project asked one central question:

- How far and in what ways do we need to change our understanding of sustainability in the light of the information and communication revolution?

The project has included:

- An introductory discussion paper by David Souter exploring the ways in which ICTs and sustainability have interacted since the Brundtland Commission in 1987 and the first Earth Summit in 1992.
- Two keynote interviews with influential thinkers on ICTs and on sustainability, Vint Cerf and Jim MacNeill, who have played leading roles in those fields throughout the past 25 years.
- Three commentaries on ICTs and sustainability at the Rio+20 Summit: one (by Don MacLean, David Souter and Heather Creech) raising issues that should be considered in anticipation of the meeting, one (by Shawna Finnegan and Lisa Cyr) describing what actually happened at the event, and an overall assessment of the scope and outcomes of the summit by IISD's European Representative, Mark Halle.
- Three short papers on critical themes by leading experts in different aspects of the relationship between ICTs and sustainability—Robin Mansell, Bill St. Arnaud and Graham Vickery.
- Seven further interviews with prominent experts in different areas of ICTs and sustainability—Angela Cropper, Anriette Esterhuysen and Alan Finlay from the Association for Progressive Communications, Caroline Figueres, Ashok Khosla, Jay Naidoo, Luis Neves of the Global e-Sustainability Initiative, and Nii Quaynor.

This concluding report is divided into three sections.

The first section summarizes the responses to the project's core question, set out at the opening of this report, which have emerged from the contributions listed above.

The second section looks at the Rio+20 Summit and its outcome document, *The Future We Want*, noting and seeking to explain the very limited extent to which the summit recognized the impact and implications of ICTs and the Internet on sustainability.

The third section asks what needs to be done now to address the themes explored in the project, and concludes with suggestions to governments, businesses and other stakeholders in both ICT and sustainability communities. These suggestions are concerned with ways to address four challenges that are central to the interaction between ICTs and sustainability:

- Mitigation of the environmental impact of ICTs
- Maximization of their potential contribution to environmental adaptation, sustainable economic growth and social equity
- Understanding of the long-term changes that are inherent in an evolving Information Society
- The need for more productive international discourse around ICTs, the Internet and sustainability than that which currently takes place

Section 1—Where Are We Today?

The introductory paper for this project asked one central question: "How far and in what ways do we need to change our understanding of sustainability in the light of the information and communication revolution?" This question, it suggested, could be divided into three subsidiary questions, which provide a framework for this section of the report:

- What impacts are new media and the Internet having on achievability of the core elements of sustainability—economic prosperity and social equity, environmental protection, cultural diversity and governance—and on the balances among these elements?

- To what extent do these impacts and implications of ICTs and the Internet enhance sustainability or, to the contrary, raise new sustainability challenges?

- Do these economic, social, political and cultural impacts and implications require us to revise, rethink or readjust our understanding of what sustainability means from the ways in which it was defined in 1987 and in 1992, before today's ICTs became available?

There are, of course, different ways of defining sustainability. Our starting point in this project has been the ways in which it was defined in the 1987 report of the Brundtland Commission. These might be summarized as ensuring:

- Intergenerational equity—"development that meets the needs of the present without compromising the ability of future generations to meet their own needs,"

- ...that development does "not endanger the natural systems that support life on Earth: the atmosphere, the waters, the soils and the living beings," and

- "...consumption standards that are within the bounds of the ecological possible and to which all can reasonably aspire."

Collectively these require an integrated or holistic approach with three pillars of equal significance: economic prosperity, social equity and environmental protection.

This understanding of sustainable development was broadly endorsed by the 1992 Earth Summit and has provided a basis for subsequent work by sustainability specialists and reviews by the international community. It has not, however, as Jim MacNeill and other contributors make clear, prevailed politically. For most governments and many other stakeholders, economic objectives (poverty reduction, enhanced prosperity) have been granted primacy over environmental goals whenever they've been deemed to be in conflict. Whatever the impact of this on economic prosperity, the environmental and ecological consequences have been negative. We have, it seems, now crossed four of the acknowledged "planetary boundaries," including loss of diversity, resource depletion and significant impacts from climate change as a result of greenhouse gas emissions. Where prosperity has grown—in industrial countries until the recent downturn, in the BRICs and many other "emerging market" and developing countries throughout the period, in some less developed countries much less or not at all—it has not necessarily been equitable, and growth may not be sustainable over the longer term if industrial country markets fail to recover and negative environmental impacts accumulate. Several contributors to this project—including Anriette Esterhuysen, Ashok Khosla and Jay Naidoo—explicitly or implicitly questioned established development growth models, emphasizing the importance of social justice, equity and access to resources rather than financial measures of prosperity. Although use of the term

IISD REPORT OCTOBER 2012
ICTs, the Internet and Sustainability: Where Next?

2

"sustainable development" has become established, almost required, terminology in international agreements, it has often been included as a token. Sustainability specialists are at least as likely to be pessimistic today as optimistic about the future.

ICTs and the Internet have been more economically dynamic and enabled wider social change than any other economic sector in the period since the Brundtland Report and the first Earth Summit. In that period, telecommunications have been liberalized in almost all jurisdictions, and technologically transformed. Mobile has displaced fixed telephony as the principal means of interpersonal communications, offering relatively cheap access in almost all locations. There are now more mobile phone subscriptions than people on the planet. Computers, like mobile phones once rarities, are now commonplace in most countries and extensively used in government and business, even in low-income developing countries. The Internet has emerged, becoming first the principal source of information access and exchange worldwide and, more recently, a dynamic new means of social networking. Even traditional ICTs, like broadcast radio and television, have become much more diverse in technology and content, reaching deeper into societies around the world. Communities and individuals for whom ICTs would have been luxuries 25 years ago are now dependent on them.

These dynamic changes are often described as an information revolution or the emergence of an Information Society, a development potentially comparable in importance to that of settled agriculture in the distant past or industrialization two or three hundred years ago. As indicated in the introductory paper for this project, the Information Society is variously seen as an observable phenomenon—something that is currently occurring—and/or as an aspirational vision—a transformation of society toward which, advocates believe, governments, businesses and other stakeholders should set their course. It may—and, for many, should—develop further into what might be described as a Knowledge Society or Network Society.

Whatever view one takes of the extent to which digital networks are displacing or should displace other social structures, it is undeniable that the changes that have taken place in access to and use of information and communications technologies and services over the past 25 years have significantly affected personal and social behaviours, economic production and transactions, and relationships between citizens and their states. As Vint Cerf points out in his interview, governments and economies have now become so dependent on ICTs and the Internet that they would find it difficult to maintain services or continue transactions if these were suddenly to fail; the ways in which they now do things, in other words, are not sustainable without these new technologies. An Information Society, as generally understood, would/ will involve even more profound re-ordering of the ways in which we do the things we do, and consequent dependence on ICTs. The emergence of settled agriculture and industrialisation had as profound implications for sustainability, in their own time and for future generations, as any developments in mankind's history. If the "information revolution" is genuinely analogous to these, its implications will be as profound. While the jury is still out on that big question, we can't afford to ignore what this might mean for sustainability today, especially when sustainability is under such pressure from the ongoing effects of industrialization.

The introductory paper for this project identified some of the more specific ways in which changes in ICTs and the development of the Internet have been affecting society, economy, politics and culture during the period since the Brundtland Report. Communications, it argued, are central to human interaction, whether within the family, in economic exchange or in the power structures that surround them, including the relationships between governments and citizens. Information is critical to the development of knowledge, the quality of decision making, empowerment and the

rights, responsibilities and opportunities of individuals and communities. Substantial changes in the mechanisms and dynamics of communication and information are therefore likely to have profound implications for the ways in which people interact, economies develop, societies and cultures evolve, and people relate to governments. Three factors have been especially important in the development of new media and the Internet since the Brundtland Commission reported 25 years ago:

- New ICTs are acknowledged to be general-purpose technologies, changes in which are not contained within a single sector but enable and often require change in most other economic sectors and areas of public policy, from the production and distribution of goods and services to the delivery of health and education.

- The pace at which new ICTs have developed has been exceptionally rapid, more so than any other sector in our history. In particular, telecommunication has become close to universal within a generation, giving the vast majority of people the ability to exchange information and views instantly and affordably without proximity.

- The Internet has drastically altered access to information, making far more information available and making access to that information more equitable. This has altered and continues to alter decision-making capabilities, including more inclusive participation in governance. It also alters relationships between governments and citizens, making easier both protest and surveillance.

One, widely recognized, way of analyzing the implications of these changes on sustainability has been to separate the effects of ICTs, or technological innovations in general, into different "orders." This approach, which was developed for the ICT environment by the Forum for the Future, is described briefly in the introductory paper and more fully in Graham Vickery's contribution to the project. In summary, it distinguishes between:

- First order (or direct) effects that result from the physical existence of ICTs and the processes involved in making them

- Second order (or indirect) effects that result from the ways in which ICTs are used, in particular those that result from applications and access to content

- Rebound effects that result from behavioural changes caused by the interaction of first and second order effects and that may mitigate or exaggerate those impacts

- Third order (or societal) effects that are the aggregated outcomes of large numbers of people using ICTs over the medium- to longer-term

It is widely believed that the first order effects of ICT manufacture and use are proving strongly positive in terms of economic prosperity (through job creation, improved efficiency in manufacturing and trade, etc.) and social equity (empowering people by giving them greater access to information and more opportunities to coordinate activities). Equally, however, first order effects are widely acknowledged to be strongly negative for the environment, because of the large amounts of waste generated by the sector, the short life cycle of ICT devices, and the rapidly growing greenhouse gas emissions that result from equipment manufacturing, network operations, data centres and the use of an ever-growing range of terminal devices by an ever-growing consumer base.

Second order impacts, being indirect, are less certain. ICTs provide individuals, businesses and governments with the opportunity to do other things that are not part of the ICT environment differently from how they did them before, responding to opportunities to make efficiency gains, reduce staffing levels, add consumer value, increase profit

margins and meet other corporate objectives. Resulting impacts on economic prosperity and social equity will vary according to the objectives being pursued and the ways in which they are impacted by technology. Net or summative economic and social outcomes are therefore hard to predict. Net environmental impacts are also unclear. As the Global e-Sustainability Initiative (GeSI) has demonstrated, ICTs offer the potential to enable large-scale reductions in carbon emissions through what are called "smart systems," particularly in energy production and distribution, manufacturing, transport, construction and building management. Decisions about these, however, are made outside the ICT sector and are dependent on the cost-effectiveness of required investments for those other sectors. As the chair of GeSI, Luis Neves, admits in his interview, it has been harder to persuade managers in those sectors to adopt smart systems than GeSI had expected.

Assessments of these impacts are also complicated by the uncertainties surrounding rebound effects. Energy efficiency does not necessarily lead householders to use less energy and so save money: the financial savings due to energy efficiency may lead them to use more energy for the same financial outlay. Working at home does not necessarily lead to decreased use of motor vehicles: it may displace commuting on public transport with leisure travel by car. Assessing net outcomes requires sophisticated modelling and retains high levels of uncertainty.

It is clear, and should be recognized here, that the impact of ICTs and new media has sometimes been exaggerated or overemphasized. Some advocates of an Information Society or of ICT4D (ICT for development) have seen ICTs and new media as catalysts of transformation, able to overcome the challenges that defeated post-war and post-colonial governments and development agencies and to usher in a new age of prosperity, empowerment and, indeed, sustainability. Exaggerated claims for the transformative potential of ICTs in the run-up to and during the World Summit on the Information Society (2003 and 2005), which often detached them from the underlying human and other resource constraints facing developing countries, led to considerable disillusion within development agencies toward the end of the last decade, which has only recently been replaced by more enthusiasm for more realistic exploitation of ICTs' potential. While there is now better understanding in the development community that the Information Society is a human development rather than a technological development issue—a point made by several contributors to this project—this is not always replicated in the ICT community. A new wave of optimistic rhetoric from the Broadband Commission for Digital Development is again urging the transformative power of technology on the United Nations and the development community. This needs tempering by context. IISD believes that, if technology and innovation are to have a major impact on development and sustainability, that impact must be rooted in the societies and economies concerned. Successful public policy must be located in a thorough understanding of the real world with which it is concerned—the development challenges facing people in their daily lives; the capabilities and assets they have available; limited institutional capacities and financial resources; the constraints posed by their environments—rather than in technological aspiration—a point to which we will return.

It is at least possible in broad terms to quantify and predict the first and second order effects described above with some degree of confidence. This is not the case with societal, third order effects, about which we have much less lasting evidence and which are inherently more unpredictable. They concern the ways in which society and economy, politics and culture are structured. It is changes in these underlying structures of human experience that are likely to have the most unsettling implications for sustainability, challenging assumptions about human behaviour and prospects for social and economic change that were reasonably held when the Brundtland Report was written and the first Earth Summit held, but which no longer stand. These long-term implications for society are described in Section 6 of the introductory paper and need not be repeated here in detail. Most contributors to the project saw them as

positive in most respects, though some—including Jim MacNeill—were concerned about what they saw as negative implications for social coherence and the quality of decision making. A list of examples of the implications for societies and economies described in the introductory paper is useful, and cannot be short. They include:

- The globalization of industrial production and business management (including outsourcing), shifting from local and national to global labour markets

- The transition from managed to automated financial markets, elevating risk and giving greater economic power to finance traders at the expense of economic planners in government and managers of businesses in goods and other services

- The implications of these developments on economic relations between the global North and South, West and East

- Changes in relationships between employers and employees, including the delayering of management and the individualization of employment (home-working, freelancing, micro-entrepreneurship, etc.)

- The virtualization of some goods and services, particularly cultural goods

- Changes in consumption patterns, in particular, purchase of goods and services online rather than in markets, shops and malls, with consequential impacts on the viability of urban centres

- Changes in patterns of social interaction—within families, friendship groups, diasporas, social, political and business associations—as a result of the universal availability of immediate interactive communications at a distance and of Internet applications enabling different forms of social networking

- New patterns of human settlement that may emerge from these developments in economic production and consumption and in human interaction

- Changes in the ways in which information and knowledge are acquired and used as a result of the much wider availability of far more information

- Shifts in the balance of rights and responsibilities of governments, businesses and citizens as it becomes easier to exercise expression and to associate in diverse physical and virtual communities but more difficult to maintain privacy

- Changes resulting from the ability of individuals to use ICTs, and especially the Internet, to bypass legal constraints and social norms

- Changing relationships between the citizen and the state, as behavioural records are automated, surveillance opportunities increased, and databases linked

- Changes in the ways that people understand their own communities and remodel their identities within the nation–state and according to their other preferences

- New interactions between cultural traditions, as ICTs both spread global brands and enable smaller social and cultural groups to intensify their interactions and maintain/establish their own traditions

- The development of multistakeholder models of governance alongside more conventional national and multilateral forms

In her contribution to this project, Robin Mansell criticizes the widespread perception of ICTs and other technological innovations as exogenous—as external shocks to societies and economies rather than as developments within them. This focus on the effects or impacts of ICTs on societies, in her view, ignores the recursive character of innovation, the ways in which innovation and society continually affect one another iteratively over time. Societies and ICTs, she emphasizes, interact in complex, systemic and unpredictable ways. Sustainable development approaches to ICTs and the Internet need to build on this endogenous perspective rather than exogenous impacts, to remember that change proceeds from within a system rather than being delivered from without.

The societal concerns described above are related to this insight. These long-term, unpredictable challenges to sustainability result from the interaction between information technologies and the societies and economies in which they are increasingly available and increasingly diverse. It is important for those concerned with sustainability to concern themselves with first and second order effects, with mitigating the environmental harms that result from rapid growth in the availability and use of ICTs, and with maximizing the environmentally beneficial gains that they have the potential to deliver.

The crucial message of this project, however, is that understanding of the relationship between ICTs, the Internet and sustainability must concern itself with the long-term structural changes that evolve as a result of iterative and recursive interactions between those technologies, societies, economies, power structures and cultural identities. Contributors who discussed the core question for this project in their interviews generally felt that the defining principles of sustainability remained broadly unchanged by events since 1987/1992, but that it was right to reassess how those defining principles could and should apply to circumstances that, in many ways, now differ from those at the time of Brundtland. ICTs and the Internet are among significant changes that have taken place within that time. Whether they are seen as primarily exogenous or endogenous, they are enabling or facilitating change in the nature of societies and economies whose sustainability is today in question, and therefore also enabling or facilitating changes, including opportunities, in how sustainability can be achieved. That is why, in our view, ICTs and the Internet do require us to rethink the meaning of sustainability in ways that the sustainable development community has so far not addressed. The next section of this report looks at how unaddressed they were at the recent Rio Summit.

Section 2—What Happened in Rio?

The second Earth Summit, held in Rio de Janeiro in June 2012, has been widely considered disappointing. As Mark Halle points out in his commentary, insufficient progress toward agreement had been made before the event took place, while the outcome document that was finally agreed, *The Future We Want*, was both under-discussed and superficial. Of the two main themes that had been advertised for the event long in advance, one (the green economy) proved too controversial for many governments and barely made it into the outcome document, while only limited progress was made on the other (improvements in the institutional framework for sustainable development). Where new initiatives did emerge from Rio—the development of a 10-year framework for consumption and production, the introduction of Sustainable Development Goals—they were only partially developed and are dependent on future negotiations at the United Nations General Assembly, where political priorities will carry even greater weight. All in all, few people regard the summit as having added much to thinking about sustainability, or indeed as rehabilitating a summit process that is increasingly seen as failing to deliver productive outcomes. Those involved in sustainable development need to think seriously about how to reinvigorate multilateral and multisectoral debate if they want to see it lead to changes in policy and practice that are commensurate with the challenges we face.

Our principal concern here, however, is with the extent to which the Rio Summit recognized the impact and implications of ICTs and the information revolution for sustainability—the issues discussed in Section 1 above. The answer to that question, as Shawna Finnegan and Lisa Cyr make clear in summarizing their Rio experience, is that attention was neither systemic nor substantial.

In Section 1, we argued that changes in information and communications since 1987/1992 have had profound implications for the ways in which society and economy, politics and culture have developed and are developing. In doing so, as we have made clear, we do not argue that ICTs offer solutions in themselves to the environmental crisis or to the development challenges facing humanity. On the contrary, we believe that, if solutions can be found, they will lie in human development experience, which may (and should) use technology as instruments to deliver change. What primarily concerns us is that international discourse on sustainability should pay attention to its changing context. The challenges and opportunities of sustainability today have evolved from those at the time of the first Earth Summit, most obviously as a result of failures to secure sustainability objectives since 1992—greenhouse gas emissions have continued to grow in volume; we have crossed a number of planetary boundaries—but also because of other developments, including those concerned with information and communications that we have described. Indeed, we have argued that those changes concerning information and communications are particularly important because they are so fast and unpredictable, and—because ICTs are general-purpose technologies—these changes have implications for most, if not all, other economic sectors and areas of public policy. If we ignore them, we will be addressing challenges and opportunities as they used to be, not as they have become. This is not sustainable.

Yet no consideration of this is apparent in the Rio outcome document. It is almost as if these changes had not happened or could be considered insignificant from a sustainability perspective. There is no systematic assessment of the developing Information Society in *The Future We Want* or of its impact, nor is one proposed in its recommendations for the future. So far as Rio+20 was concerned, the sector might as well have been in stasis—surprisingly so given that, as Jim MacNeill makes clear in his interview, the Brundtland Commission did anticipate the potential of ICT developments and expected them to make a significant contribution to sustainability.

Rather than considering the relationship between ICTs and sustainability as a "thematic" area, *The Future We Want* makes only occasional references to the relationship between ICTs and aspects of sustainability. Sections of text address other infrastructures and economic sectors, including energy, water and sanitation, agriculture, transport, mining, even tourism, but there is no separate section addressing the communications sector or ICTs—either exploring the impact that they have on sustainability or their potential to contribute to it. The only other major issue in sustainability to receive such nugatory treatment is population growth.

Here is the sum total of what the outcome document has to say about ICTs and/or the Internet:

- Paragraph 44, which is mainly about civil society engagement, includes the following. "We recognize that information and communication technology (ICT) is facilitating the flow of information between governments and the public. In this regard, it is essential to work toward improved access to ICT, especially broad-band network [sic] and services, and bridge the digital divide, recognizing the contribution of international cooperation in this regard."

- Paragraph 65 begins as follows. "We recognize the power of communication technologies, including connection technologies and innovative applications to promote knowledge exchange, technical cooperation and capacity building for sustainable development."

- Paragraph 114 resolves "to improve access to information, technical knowledge, and know-how, including through new information and communication technologies that empower farmers, fishers, and foresters to choose among diverse methods of achieving sustainable agricultural production."

- Paragraph 230, which is about education in general, and sustainable development education in particular, mentions "more effective use of information and communication technologies to enhance learning outcomes."

- Paragraph 274 recognizes "the importance of space-technology–based data, in situ monitoring, and reliable geospatial information for sustainable development policy-making, programming and project operations." (These are all ICT applications.)

In addition, paragraph 128—which recognizes that improving energy efficiency, increasing the share of renewable energy, and cleaner, more energy-efficient technologies are important for sustainable development—could be considered as implicitly recognizing the role of ICTs in increased energy efficiency, although no explicit reference is made to them.

ICTs, in short, are seen in the Rio outcome document as incidental tools that might help in a few areas of sustainable development activity. They are not seen as playing as significant a role in the state of sustainability today or in the potential for achieving sustainability tomorrow as other infrastructure and economic sectors. They are most certainly not seen as having altered the underlying structures of social and economic development that sustainability needs to address.

It is instructive to contrast this with the outcome documents from another UN summit, the 2003/2005 World Summit on the Information Society (WSIS). This summit, not surprisingly, saw the Information Society as the future, claiming "that the ICT revolution can have a tremendous positive impact as an instrument of sustainable development"[1] and that it would have a pervasive impact on almost every aspect of human life. A commitment to sustainable development was reiterated three times in the first three paragraphs of WSIS's *Declaration of Principles*.[2] It called on international

---

[1] *Tunis Commitment*, para. 13, http://www.itu.int/wsis/docs2/tunis/off/7.html
[2] Geneva *Declaration of Principles*, http://www.itu.int/wsis/docs/geneva/official/dop.html

development agencies to "develop their own strategies for the use of ICTs for sustainable development, including sustainable production and consumption patterns"[3] and listed fields of activity in which ICT applications could facilitate sustainable development.

There is, of course, nothing surprising in governments, gathered together in a summit to discuss the Information Society, regarding it as of primary importance to global development, nor in the same governments gathered together to discuss sustainable development treating that as having primacy. It should, however, be surprising—and concerning—that there are so few links between the two. A theme considered so significant to global development by the international community that it merited two global summits in 2003 and 2005 cannot sensibly be so comprehensively ignored by a subsequent summit concerned with the sustainability of development itself, particularly when WSIS's expectations of the growth in the adoption and impact of ICTs have been exceeded in the intervening years.

It is particularly striking that *The Future We Want* entirely missed the relationship between ICTs, the Internet and the two themes that were chosen by the international community for Rio+20: the green economy and reform of the institutional framework for sustainable development. The Rio+20 discussion guide published as part of this project outlined the questions arising here as follows:

- What role can ICTs play in relation to the main topics to be discussed under the green economy theme—jobs, energy, cities, food, water, oceans, disasters? What policies and practices are needed to enable these? What are the respective roles and responsibilities of ICT policy-makers, the ICT sector, sustainable development policy-makers, green economy sectors, and other stakeholders?

- What role can ICTs play in strengthening the institutional framework for sustainable development at the global, national and regional levels—including its economic, social and environmental pillars—through improved access to and sharing of information, new forms of stakeholder engagement, improved analysis of policy options and evaluation of policy outcomes? What policies and practices are needed to enable these improvements? What are the roles and responsibilities of different actors and stakeholders?

It was not just the formal summit and its formal outcomes that ignored the impact and implications of information and communications technology. Much the same could be said about the side events that were organized in Rio by business and other organizations in the margins of the formal summit, and about the alternative People's Summit, which was populated largely by civil society. Although there were a few ICT-related discussions in both of these, almost none of them—as Shawna Finnegan and Lisa Cyr report—addressed the Information Society in any systematic way. Business sessions were preoccupied with presentations of ways in which individual companies are developing ICT applications that can be used to support the monitoring of environmental impacts or adaptations to improve efficiency in other industries. The International Telecommunication Union's (ITU) main half-day event in Rio provided ICT companies with an opportunity to show how they are "greening" their activities and to discuss future plans for green technology, but without an opportunity for broader multistakeholder discussion. ICTs were largely absent from discussions at the People's Summit, beyond a few contributions from specific NGOs.

Yet ironically, as Shawna Finnegan and Lisa Cyr also report, in another sense ICTs were everywhere in Rio. Everyone was using laptops and wireless devices to write and monitor contributions, keep up with email, gather information from the Internet and one another, share photos, plan what to do next within the summit and where to have dinner in the

---

[3] Geneva *Plan of Action*, para. 8, http://www.itu.int/wsis/docs/geneva/official/poa.html

evening. While the impact of ICTs on society was largely ignored in formal and informal discussions, it was pervasive in how the delegates themselves behaved. Perception of the importance of ICTs and the Internet seems to have been lost somewhere between the personal and the political.

Two questions arise in light of this analysis of Rio outcomes:

- Why did Rio+20 fail to recognize the relationship between ICTs, the Internet and sustainability as an important issue for sustainable development policy?
- What can be done about this?

The final paragraphs in this section address the former of these questions; Section 3 of this report is concerned with the latter.

The idea that there is a paradigm gap between the ICT sector and other sectors with which it interacts is quite familiar. Even where ICTs have been used for governmental purposes, understanding between ICT professionals and those concerned with administration or service delivery has often been weak, leading to poor performance and unsustainable investments. A number of contributors to this project have emphasized that ICTs, indeed technologies in general, do not provide solutions, but tools that can be used to enable improvements to be achieved—citing in support the failure of technology-led development initiatives like "One Laptop per Child" to deliver what they promised. In her contribution, Robin Mansell argues that inadequate policy responses follow from analyses that treat ICTs and other innovations as exogenous influences that impact on established social and economic structures, rather than understanding the relationship between them and the social, human, power and other structures with which they interact.

One explanation for Rio+20's failure to address the implications of the Information Society can be found in this kind of paradigm gap. Sustainable development professionals have generally failed to adapt their notions of sustainability to accommodate changes in underlying characteristics of society, including those described in the introductory paper and in Section 1 above.

Indeed, development professionals more generally have often missed these underlying changes. This is partly because they are preoccupied with their own priorities: the crises within their own mandates, from climate change to food security, which leave them little time to investigate new intersecting influences. Partly, too, it is due to bad experience. The grand claims made for ICTs and the Internet by some advocates of ICT4D—for example, in delivering the Millennium Development Goals—have looked and proved unrealistic from development professionals' points of view. Bed nets are obviously more effective at preventing malaria than ICT devices, and it is hard to see how ICTs can be the lead technology in improving sanitation. Lessons concerning the limitations of ICTs have been learned, sometimes through bitter experience, within the ICT4D community, particularly among those with direct experience of delivering projects on the ground. The importance of understanding that ICT4D initiatives depend on human capacity and enabling institutional and developmental contexts is emphasized by Caroline Figueres and Ashok Khosla in their contributions to this project.

But development interventions are not the only ways in which ICTs and the Internet are influential. The adoption of ICTs and the Internet by individuals and organizations for their own purposes has, in practice, mattered far more and been far more influential on social and economic development than interventions by governments and other agencies that seek to use them for developmental purposes. Development and sustainable development policy-makers and

practitioners should pay more attention to the changes in society that are associated with adoption of innovations like mobile telephony and the Internet by general populations, including their target beneficiaries—changes that are often not valued as "developmental" but that represent important developments in society, economy and culture. As Angela Cropper noted in her interview for this project, the disconnection between environmental, development and ICT sector professionals and their thinking is as significant amongst multilateral agencies and within the UN system as it is elsewhere.

The most prominent submissions advocating ICTs within the context of Rio+20 were those of the ITU and its associated Broadband Commission for Digital Development. These argued that ICTs could have dramatic impacts on both conventional and sustainable development outcomes. The Broadband Commission, for example, urged the summit to adopt "broadband for all" as a Sustainable Development Goal, one that it claimed would help (for reasons that were not detailed) to achieve a low-carbon future.[4] The ITU's Secretary-General argued that "[i]nformation and communication technologies should be at the top of any outcome adopted by the Rio+20 conference" because "ICTs have a catalytic impact on all three pillars of sustainable development—economic growth, social inclusion and environmental sustainability," while "broadband connectivity in particular facilitates transformative change in … sectors from power [to] transportation, buildings, education, health and agriculture with the potential to achieve our Sustainable Development Goals."[5] These contributions both lie at the "transformative" end of perceptions of the impact that ICTs can have, well removed from the perception held by most participants. GeSI's more nuanced balancing of positive and negative outcomes, summarized in the project's interview with Luis Neves and discussed above, was less evident in Rio. In practice, as indicated by the extracts from *The Future We Want* quoted above, none of these interventions was considered during negotiations and none had any impact on the final outcome document. The ITU's claim, summarized in the headline of a press release issued at the end of the summit, that "Rio+20 recognizes essential role of ICT and broadband networks as catalyst for sustainable development" is, unfortunately, disingenuous. Rio did not say anything significant about ICTs and sustainability, and the word "broadband" appears only once in its report (as "broad-band"; see above). Far from being won, the challenge of integrating ICTs and the Internet into perceptions of sustainability within the United Nations and the sustainability community has barely begun. The question for the final section of this report is: How might this integration challenge be progressed?

---

[4] Broadband Commission for Digital Development, *Leveraging Broadband for Sustainable Development*, http://www.broadbandcommission.org/Documents/BBCom-Rio+20-v15.pdf
[5] International Telecommunication Union, "ITO at *Rio+20* promotes ICTs as key to the 'Future We Want,'" http://www.itu.int/net/pressoffice/press_releases/2012/CM03.aspx

Section 3: Where Do We Go from Here?

Two starting points for answering this question emerge from the discussion in Sections 1 and 2:

- Firstly, it is clear from the analysis in Section 1 and from contributions to this project that there is a significant relationship between changing information and communications and sustainability, and that our approach to sustainable development could be significantly improved if more attention were paid to this.

- Secondly, it is clear that insufficient attention is being paid in practice, particularly by the sustainable development community—that there is a paradigm gap between policy-makers and businesses in the ICT sector and those which are primarily concerned with sustainability. This is demonstrated by the weakness, in this respect and others, of the Rio+20 outcome document and the limited discussion of ICTs, the Internet and sustainability throughout the Rio fora.

Paradigm gaps don't disappear if they're ignored. This project is concerned to point toward ways in which this one can be tackled. The final section of this report looks, in turn, at four areas of activity that need to be addressed:

a. Mitigation of the environmental impact of ICTs

b. Maximization of their potential contribution to environmental adaptation, sustainable economic growth and social equity

c. Understanding of the long-term changes that are inherent in an evolving Information Society

d. International discourse around ICTs, the Internet and sustainability

The first three of these four areas correspond quite closely with the Forum for the Future's taxonomy of impacts of ICTs on the environment. The first is concerned primarily with mitigating direct or first order effects; the second with exploiting the potential of indirect, second order effects; the third with the long-term societal implications with which this project has been most concerned.

It is a moot question whether first and second order effects can or should be juxtaposed or traded off against one another. In his interview for this project, Luis Neves argued that they can. This is because, in his view, the ICT sector is unique, as its own environmental impacts (e.g., greenhouse gas emissions) enable reductions in the impacts of other sectors.

While this case can certainly be made, it relies on including very different applications and issues when describing "information and communication technologies" and the sustainability challenges to which they relate. In practice, the causes of these direct and indirect impacts, and the contexts for dealing with them, are very different.

Negative direct impacts result from two principal sources—reliance on carbon-based energy sources to power the manufacture and use of ICTs; and the consumption of material resources, some of which are highly toxic—throughout ICT product life cycles. The growth in these impacts results from the expansion of networks and from the adoption and usage intensity of ICTs by all within society—individuals, organizations and businesses—across the world. This growth increasingly emanates from developing countries. Given that demand for ICT products and services will continue to increase, dealing with these direct negative impacts requires increased energy and material efficiency, reduced waste and toxicity, and a shift toward green energy sources—decisions that depend principally on ICT businesses, policy-makers and regulators.

Most of the potentially positive indirect impacts that have been identified, on the other hand, depend on decisions taken by power utilities, government service delivery departments, manufacturers and construction businesses in sectors that use, rather than make, ICTs. The most significant of these are based in Europe, North America and parts of Asia. For these indirect effects to have significant impact, these businesses and public agencies not only need to improve the energy and material efficiency of their existing operations, but also to adapt their business models and their relationships with suppliers and consumers—for example, by giving end users tools to monitor and control their energy consumption and feed distributed energy sources into smart grids—even, as Bill St. Arnaud suggests in his contribution to this project, by creating energy Internets through the convergence of electricity and transportation infrastructures.

The causes and principal interventions in these two cases are distinct. The sustainability challenge of mitigating negative direct effects of ICTs is only incidentally linked to potential positive indirect effects. For this reason, we believe it is better to regard the mitigation of direct impacts of ICTs and the fostering of more environmentally sustainable indirect impacts as separate challenges. The following paragraphs suggest ways of taking forward each of these.

Mitigation

The environmental damage caused by the ICT sector does not attract the same level of antagonism drawn, for example, by the aviation sector, although its impact on greenhouse gases is roughly comparable and its impact, on both greenhouse gases and waste, is growing significantly faster. Given the rate of growth in ICT networks and usage, and the challenges involved in shifting them from carbon-based to green energy sources, it is not realistic to expect their greenhouse gas and waste impacts to fall in the foreseeable future. GeSI has projected, for example, a 6 per cent compound annual growth each year in greenhouse gas emissions from the sector, up to 2020 (with likely continued growth thereafter). Sustainability, it seems, will have to live with growing negative impacts on greenhouse gases, waste and some scarce resources from the ICT industry. This increases the need for reductions in other sectors in order to achieve the overall reductions in emissions required for sustainability.

It should also increase the pressure on ICT businesses to mitigate their own impacts. Some ICT businesses already see this as a significant challenge in terms of corporate social responsibility and reputational risk, if not yet in terms of profits. Customers want the latest devices and the latest services, leading to rapid rates of churn (short device life cycles) and high levels of use (including power requirements). Sustainability and environmental considerations are not yet influencing customer choice significantly where ICT devices are concerned, not even in the limited way that they have begun to influence markets for motor vehicles and food in some industrial countries. As with carbon-based fuels such as petrol/gasoline, price is likely to be the most effective driver for more sustainable customer preferences, but there are no indications yet that price is beginning to play that role where ICTs are concerned. Indeed, technological improvements are driving prices down at the same time as they increase devices' capabilities.

If the consumer market is unlikely to shift to more sustainable choices in the near future, the question moves further up the supply chain toward the business models and practices of network operators and manufacturers. There is likely to be some economic pressure on manufacturers to reduce dependence on scarce resources such as coltan (required for capacitors in devices such as mobile phones) as these become more scarce. Reduced energy use (and therefore cost) in production processes and network management also carries bottom-line attractions for profit-oriented businesses. However, adjustments in business practice, network management or device design responding to these kind of price

incentives are not likely, as things stand to counteract the profit gains to manufacturers of users frequently replacing terminal devices or to network and service operators of maximizing the amount of time that consumers spend using their facilities and applications.

Luis Neves suggested in his interview that mitigation of the negative environmental impacts of ICTs would require both business and government involvement. This can be most readily achieved by standards agencies and/or regulation. The ITU and, to a lesser extent, GeSI and the Organisation for Economic Co-operation and Development (OECD) have paid attention to the former, but relatively little attention has been given to the latter. As discussed later in this section, a number of meetings organized by the ITU will shortly be considering standardization issues related to environmental impact, including the World Telecommunication Standardization Assembly (WTSA) in November 2012.

It would be beneficial if the ITU, GeSI and other industry organizations could work more closely with sustainability specialists, including those from civil society, to consider ways in which governments, businesses and consumers could share responsibility for mitigating negative impacts of networks and devices. Four issues in particular are suggested here for that consideration.

- Standards applying across the ICT industry to the design and deployment of network equipment, network architecture, the design and use of devices, and the ways in which applications using networks and devices are configured. The existing work of the ITU's Standardization Sector (ITU-T) and GeSI in this area should be acknowledged here. ITU-T brings together governments and major businesses, as well as other multilateral/public–private standards bodies and less formal coalitions of businesses active in different parts of the sector. Those processes can pay more or less attention to environmental outcomes. At the very least, where a choice needs to be made between alternatives, it would be better for the industry to select that which is less environmentally harmful or more environmentally sustainable. ITU-T Study Group 5 has supported this, for example, by developing energy efficiency metrics for telecommunications equipment. Specific initiatives could be taken to develop standards that reduce environmental impact, for example in extending battery life, improving charging technology and reducing the incentive for users to keep equipment running in standby mode. Standardization bodies could pay more attention to developing principles and standards for low-carbon networks and devices.

  A similar culture to incorporate environmental impacts would be welcome in Internet standard-setting processes. At present, standards developed through the Internet Engineering Task Force (IETF) and the World Wide Web Consortium (W3C) prioritize value to the Internet itself. There has been some reluctance in the Internet community to consider impacts in other public policy areas as relevant to protocols and standards. As Vint Cerf commented, however, in his interview for this project, "it would certainly be … helpful to remind engineers that sustainability is an important part of design, given that we now realize that our present practices may not be sustainable."

- The biggest mitigation challenge may well be that concerned with churn and the short life cycle of ICT devices. Metcalfe's and Moore's Laws—that the value of a telecommunications network is proportional to the square of the number of connected users, that the capacity of ICT devices doubles approximately every two years— explain why users like to increase the number of devices and services they use and to replace these regularly with the latest versions. The dynamic nature of ICT technology and markets also encourages businesses to compete through the features rather than the efficiency of their devices. At present, the average life cycle of

mobile phones, computers and many peripherals is around two to three years. This has major implications in terms of waste, including toxic waste, and for embedded carbon (the energy use required in the production of devices). In his interview for this project, Luis Neves acknowledged the importance of this issue and that the ICT sector has no idea at present how to get to grips with it. It needs to do so urgently, bringing together for this purpose network, service and content providers to consider ways of delivering what consumers want, with lower churn. One possibility may lie in the development of multipurpose or converged devices, which is already underway. The mobile phone has morphed for many users into a multipurpose digital device—one instrument delivering many different applications from telephony to broadcast radio, camera to debit card. Other devices including laptop and tablet computers are also used for multiple purposes, and this may at least reduce the demand for numbers of devices. We need to know more about the impact now and in the future of these trends, particularly their impacts on the life cycle of devices.

- The development of cloud computing, shifting data and application software from individual hard drives to data centres managed by global communications businesses, is likely to have a significant influence on environmental impacts. Data centres are notoriously dependent on air conditioning to lower the temperatures generated by their equipment and ensure that it maintains optimal performance. The ITU-T's Study Group 5, IISD and equipment manufacturers have all promoted research that explores ways of reducing the power requirements of data centres—by reducing heat generation, improving the tolerance of equipment, storing energy, relocating to cooler site locations, relying on renewable energy sources, or exploiting heat generated for other, environmentally sustainable, purposes. These are important research areas as requirements for data centres will grow rapidly over the next decade.

  The net impact of movement toward cloud computing, including consumers as well as data centres, is unclear. While data centres have more environmental impact, devices that rely on cloud computing will require less energy, and some reduction in churn may result from reduced demand for computing power within devices. Assessments of cloud computing's sustainability also need to take into account economic and security aspects of such large volumes of data being held by a small number of global operators. More research and foresight analysis is also needed in these areas.

- A fourth area of possible intervention is regulation. Communications sector regulation is largely undertaken at national level, although what are effectively regulatory decisions are also taken at global level—by the ITU's Radiocommunication Sector (which manages the radio-frequency spectrum and satellite orbits), through its International Telecommunication Regulations (which are to be reviewed this year, see below), through the World Trade Organization's agreements on telecommunications services, and by regional institutions such as the European Commission. Since the 1980s, communications regulation has been principally concerned with the establishment and maintenance of competitive markets as the primary means of achieving consumer welfare, although some regulators also address standardization issues (type approval of terminal devices) and public policy objectives (most notably, promoting universal access/service). Different regulatory strategies— for example, concerning the structure of competitive markets, interconnection arrangements and pricing strategies—will have different outcomes in terms of network configuration and usage levels, just as will the different business models implemented by communications operators. These, in turn, will have different environmental impacts.

Communications regulators have not generally had, within their mandates, powers to orient market development toward environmentally less harmful outcomes. Nor, with the exception of the Basel Convention, which covers e-waste at an international level, have environmental regulators paid significant attention to the ICT sector. However, it would be possible for regulators to address these issues, not just where network deployment is concerned but also (through type approval) with respect to consumers' terminal devices. Regulators and businesses could explore whether there are ways of using regulatory frameworks to encourage more sustainable device choice by consumers and network configuration by operators, without distorting markets in ways that would otherwise be detrimental to consumer welfare.

Adaptation and Enhancing Sustainable Outcomes

Many sustainability challenges require both mitigation—the reduction of harm—and adaptation to the impact of the harm that has already occurred and that will continue to occur, at least until mitigation is effective. This is particularly true in areas such as climate change. In his contribution to this project, Bill St. Arnaud emphasizes the need to recognize that, however successful future mitigation efforts concerning climate change may be, significant change is already inevitable and it is therefore crucial for societies to adapt to this, a task in which ICTs can play an important role.

As noted above, some commentators have sought to juxtapose the negative direct impacts of ICTs with positive indirect impacts expected to arise, in particular, from the adoption of smart systems in power generation and distribution, transport management, manufacturing and construction. Smart systems exploit the capacity of ICTs to manage production and distribution processes in ways that increase their energy efficiency, thereby saving both costs and carbon. They can be considered relevant to both mitigation and adaptation, depending on one's viewpoint: climate change specialists are likely to think them mitigation, while from the perspective of those within utilities and ICT-using businesses their value will lie principally in adaptation to new economic and environmental circumstances.

ICT businesses and policy-makers have encouraged the adoption of smart systems through policy initiatives (such as GeSI's *SMART 2020* publication) and research collaborations. Significant initiatives include the following:

- GeSI has sponsored modelling studies of the impact of ICT use in the energy, transport, manufacturing and building management sectors. It has developed a methodology for evaluating the carbon-reducing impacts of ICTs for use by companies and customers (notably business customers). It has also published assessments of carbon savings that might be achieved through dematerialization and the adoption of broadband applications within households.

- ITU-T has organized a series of seminars in different world regions to explore the relationship between ICTs and industry. As well as measures concerned with direct impacts (above), its Study Group 5 has developed methodologies for assessing the impact of ICTs on energy consumption. The ITU's Development Sector has provided policy guidance to developing countries on the application and use of ICTs to combat climate change and address other environmental issues.

- The Information, Computer and Communications Policy Committee of the OECD has done significant work on the role of smart systems within green growth strategies, smart grids for power generation, the value of sensor networks, the effectiveness of environmental awareness initiatives such as eco-labelling, and related issues. At a ministerial level, OECD has issued declarations on green growth and the Internet economy and a Recommendation on ICTs and the Environment that sets out 10 principles as a general framework, from enhancing the contribution of ICTs to improving environmental performance. This is one of the few documents of its kind that addresses first, second and third order effects holistically.

The potential carbon-saving impact of smart systems, GeSI estimates, comfortably outweighs the growing carbon-burning direct impacts that it identifies. The problem, as Luis Neves acknowledges in his interview, is that decisions to implement smart systems are not made by the ICT sector and it has proved difficult for GeSI to get across to utilities and manufacturers, construction and transport businesses, that smart systems would be beneficial both environmentally and to their bottom lines.

GeSI's excellent analytical work in this area needs to be accompanied by much stronger dialogue between the ICT sector and those other businesses and by more government support for investment in smart systems. More analysis needs to be undertaken of the cost and cost-effectiveness to utilities and other businesses of introducing smart systems in place of the less technically efficient systems that are currently deployed, and into ways of cutting costs of implementation that would allow them a quicker rate of return on investment. Given the public interest in positive environmental outcomes, it would be useful to engage regulators, particularly in the utility and transport sectors, in discussions about how to incentivize the adoption of smart systems. As well as looking at potential savings from smart systems, it is also crucial for government, business and regulators to consider the incidence and likelihood of rebound effects, in particular the possibility that savings through energy efficiency will lead to consumers raising energy consumption. It is essential that this is factored into any policy approaches or new business models.

Adaptation does not stop at smart systems, however. IISD recently completed a study for the African Development Bank, exploring ways in which ICTs are being used to support adaptation to climate change. Relevant uses of technology range from sensor systems, through data analysis and information-sharing networks of professionals, to early warning systems and monitoring of climate change outcomes by local communities. Although quite a wide range of applications could be identified, there were also large gaps in implementation—both geographic and thematic—while coordination and experience sharing were poor. These areas of adaptation also require attention from governments and development agencies.

Societal Impacts

It is the uncertainty surrounding societal or third order effects that makes them much more challenging, from a policy perspective, than first and second order effects, and potentially of much greater impact on our understanding of sustainability. Changes in production and consumption patterns, employment and leisure profiles, social interaction and human settlements, norms and values, and the rights and responsibilities of governments and citizens: these concern the fundamentals of society and economy, politics and culture. It is much harder to see what will happen as a result of changes in these underlying characteristics of society than it is to predict the outcomes of device adoption or the deployment of smart systems. Societal impacts such as these also take place over long periods of time. They are recursive, changing shape and character as they evolve. And they will be affected by ongoing changes over time in the nature of ICTs themselves, as technology and markets develop in ways that are, at present, highly unpredictable. (The rapid growth of social networking on the Internet, which was poorly anticipated by the industry, illustrates the challenge of anticipating rapid change in communications markets.) The uncertainty and unpredictability arising here in many ways resemble the uncertainty and unpredictability of the consequences of climate change, and policy responses will need to be as adaptive as those required in that domain.

A first step—in the context of this report and, particularly, of the complacency around these impacts evident in the Rio outcome document—is simply to raise awareness of policy-makers that significant underlying changes are happening in their societies, which are being influenced by the information revolution. That in itself would be of value.

What would be much more valuable, however, would be for policy-makers to gain a more sophisticated grasp of the ways in which the Information Society is developing and in which ICT technology and markets are influencing the direction of large-scale characteristics of societies, such as patterns of production and consumption, employment and human settlement. This deeper awareness and understanding could be linked, as Jim MacNeill, Ashok Khosla and other contributors to the project have indicated, to reconceptualizations of development, development models, and social and economic outcomes that are consistent with environmental/ecological sustainability. Contributors such as Anriette Esterhuysen and Jay Naidoo also emphasized the relationship between ICTs and issues of social justice, participation, empowerment and governance.

This is partly a research agenda—we need empirical evidence of what is happening now—but it is also fruitful ground for foresight analysis: looking forward, for example through scenarios, at how societies may develop and at the implications of the directions they may take for government, businesses and citizens alike. The forthcoming development of a framework for sustainable production and consumption, agreed in Rio and to be discussed further by the UN General Assembly, offers one opportunity in which the societal impact of ICTs might be explored. IISD would welcome the opportunity to work with other organizations concerned with ICTs and sustainability to develop a research and foresight agenda around this and other societal themes.

International Discourse

In his contribution published as part of this project, Mark Halle argues, in effect, that the time for grand summits such as that in Rio has now passed. These, he feels, can no longer deliver big picture outcomes, forcing heads of state and government to sign up to agreements on intractable problems, in the way that, arguably, they once did. In practice, it might be said, big summits have become inherently conservative—their outcome documents built around lowest common denominators of agreement; the governments that take part in them unable to agree, let alone to implement, far-reaching change. His frustration with Rio+20 was echoed by a number of other contributors, notably Jai Naidoo, who observed the same delegates and delegations taking part in repeated summits, with very little participation by those most affected by the problems concerned (particularly those most marginalized), more likely (in his view) to backtrack on previous commitments than to take steps that are critically necessary to avert coming catastrophe.

If not summits, though, then what? The following paragraphs look, firstly, at how forthcoming planned fora—multilateral or multistakeholder—might be used to push forward new agendas, and secondly, at whether alternative new fora might give more substance to discussion of ICTs, the Internet and sustainable development.

A number of important ICT sector and sustainability fora will be held during the remainder of 2012 and in early 2013. Some of these are relevant to discussions around ICTs and sustainability, while others address the overall framework for future development of the sector and progress toward what can be regarded as an Information Society. They include the following:

- ITU-T held a "Green Standards Week" in Paris in September 2012, in conjunction with other intergovernmental organizations, standards bodies and private companies. A series of discussions took place around ICT standards and methodologies for greener cities, smart grids, the ICT supply chain, e-waste, the green economy, environmental monitoring and disaster communications.

- The ITU's World Telecommunication Standardization Assembly (WTSA) will follow in Dubai in November 2012. This will adopt a four-year program for developing standards on ICTs, building (among other areas) on the work of ITU Study Group 5 (SG5), which has considered ICTs, the environment and climate change over the past four years. As well as furthering work on energy efficiency, environmental impact assessment, impact reduction (including e-waste) and adaptation to the effects of climate change, SG5 has proposed that work should begin on "leveraging and enhancing ICT environmental sustainability." Proposals in this context include development of a global database standardizing information about environmental impacts of ICT products and services, development of an eco-rating program to provide information on ICT impacts to governments, businesses and users, and recommendations concerning ICT procurement policies that would support environmental sustainability.

- The global Internet community will hold its seventh annual Internet Governance Forum (IGF) in Azerbaijan, also in November 2012, with the overall theme of "Internet governance for sustainable human, economic and social development." As is often the case, it is hard to say whether the inclusion of sustainability in a titular theme will lead to substantive discussion about sustainability itself. Much of the Forum will be preoccupied with regular IGF topics such as critical Internet resources, IPv6, access and content issues, as well as with "enhanced cooperation" between governments and other stakeholders on issues of Internet public policy. Few of the workshops that have been proposed for it explicitly address sustainable development as this would be understood by the sustainable development community. However, many of the subjects that will be discussed do relate indirectly to sustainability, while the sustainability of the Internet's current modalities—in both technology and governance—represents another underlying theme.

- Discussions about the future of the Internet amongst ITU members (member–states and [private] sector members) will continue at the World Telecommunication/ICT Policy Forum, which will be held in Geneva in May 2013 with the theme of "International Internet-related public policy matters," alongside the 2013 meeting of the WSIS Forum.

- Immediately following WTSA, in December 2012, the ITU will hold the World Conference on International Telecommunication (WCIT-12), also in Dubai, with the aim of revising and updating the International Telecommunication Regulations (ITRs), the treaty between ITU member–states that regulates international telecommunications infrastructure and services (which, among other things, underlie the Internet). There has been controversy about the scope of this conference, with some in the Internet community fearful that it will lead to greater ITU control or oversight of Internet governance. It will certainly address some of the security-related threats to the sustainability of the Internet that were identified by Vint Cerf in his interview for this project. In addition, there is a proposal to add energy efficiency and reductions in e-waste to the treaty as a basic principle of international telecommunication regulation.

- In the last quarter of 2012, the UN General Assembly will discuss and develop recommendations from the Rio+20 Summit, including the issues to be covered by proposed Sustainable Development Goals and the development of a framework for sustainable production and consumption. The General Assembly will also agree arrangements for the 10-year review of outcomes from WSIS (see below) and for the 2015 review of the Millennium Development Goals, which, in turn, will lead to a new UN Development Agenda.

- The 10-year review process for WSIS will begin in February 2013 with a conference entitled "Towards Knowledge Societies for Peace and Sustainable Development," to be hosted in Paris by UNESCO. Subsequently, an action plan proposed by the UN Group on the Information Society has proposed that, rather than a 10-year review summit along the lines of Rio+20, there should be a smaller high-level review meeting dovetailed with the ITU's quadrennial World Telecommunication Development Conference—the conference that establishes the program for its Development Sector, which is due to be held in 2014. Some governments and some other stakeholders would prefer a full-scale UN summit along the lines of Rio+20, and a decision on this will be made by the UN General Assembly at the end of 2012.

These events all provide opportunities for governments, businesses and other stakeholders to explore aspects of the relationship between ICTs and sustainability, particularly first and second order effects. It would be helpful if those with relevant expertise—including GeSI, the OECD and IISD—could work more closely together to identify ways of increasing awareness of the issues discussed in this project and of instigating more thorough investigation and sharing of ideas and experience, including research and foresight analysis. The role of the private sector is especially important here. None of these international fora, however, provide the same degree of opportunity to address societal impacts as the Rio+20 Summit might have done. For that, new ways of addressing international policy-makers and business decision-makers will be required.

Experience at the second Earth Summit—and at the Copenhagen climate change summit in 2009—has lowered expectations among environmental specialists about the effectiveness of UN summits in dealing with the kind of challenges they face. While the United Nations has bravely asserted that Rio+20 moved agendas forward, most participants regarded it as "disappointing" or worse. Where global summits did, at one time, offer opportunities for breakthrough in deadlocked negotiations on intractable issues, they no longer seem to be doing so. Repeat summits, held one or two decades after an earlier event, seem to be particularly unproductive. As Jay Naidoo puts it in his interview, they see the same people negotiating again and again on the same issues, reinterpreting and sometimes backtracking on previous commitments. Perhaps partly because it was such a repeat summit, responding to the outcomes of its predecessors, Rio+20 also proved unable to accommodate new issues, such as the information revolution, in the framework that had been established in those earlier events. Additionally, as Mark Halle notes in his contribution, summit processes have high opportunity costs: they not only take a lot of money, they also divert the attention of sustainability professionals in government, business and civil society for lengthy periods of time. This can only be justified if they are likely to produce significant results, rather than stasis and disillusion. We should, he argues, drop the summitry and concentrate on the implementation gap.

The challenge to the international community, therefore, is to find an alternative that offers a more realistic prospect of achieving gains—a challenge that is far from trivial. The universality of UN summits and other UN processes—the essence of multilateralism—is rightly valued by developing countries. There are, however, three clearly identifiable problems with summits at present, each of which inhibits real progress from being achieved:

- The first is the overwhelming significance attached within summits' formal structures to their outcome documents. In many ways, summit processes are extended negotiations around a text that culminate with the signing ceremony that is formally designated as "the summit." Instead of seeking to learn from one another, delegations—often in practice led by diplomats rather than subject specialists such as experts on sustainability—focus on developing a text that can be presented as global agreement or consensus. Not surprisingly, this text often comprises lowest common denominator consensus, deliberate ambiguity and prevarication, deferring real decisions to a later forum where they may or may not prove less contentious. As time goes by, in spite of these unpropitious origins, the outcome text becomes the starting point for future negotiations, where it is treated (and argued over) as if holy writ. The problem here is that achieving universal agreement on *something*, no matter how unconvincing, has come to be seen as more important than achieving progress that is meaningful (and that need not be universal).

- The second problem is that summits and other UN processes have too little space for expertise that comes from outside government. The case for multistakeholder engagement is not—or is not only—that it is more equitable, as many in civil society would argue. Nor is it—nor should it be—a challenge to the sovereignty and authority of governments, certainly not to those that are elected by and accountable to their people. The central case for multistakeholder engagement is that it draws essential expertise into the process of developing relevant policies, gives that expertise due weight, allows more informed discussion, and facilitates agreement on measures that are much more likely to achieve results than agreements by non-experts pursuing political or diplomatic goals. At present, almost every global summit sees angry exchanges about the extent to which multistakeholder participation should be allowed, with non-governments camped outside the main event in a disconnected and discontented forum of their own. The private sector is often largely absent from something it considers will have little value for it, other than perhaps in marketing. The challenge here is to find ways of engaging private sector and other non-governmental expertise that governments accept as positive rather than threatening. This problem, also, is not trivial.

- The third problem is the insistence, within the UN system, that every summit must be pronounced successful, even when everyone knows that it was not. At the start of the Rio+20 Summit, the UN Secretary-General said that progress on sustainable development had been too slow since 1992 and that, in Rio this time round, "words must translate into action."[6] After the event, he said: "Let me be clear. Rio+20 was a success. In Rio, we saw the further evolution of an undeniable global movement for change."[7] Not many people who took part think that the summit turned "words into action," however, or that the evolution in global movement for change was anything near fast enough. The problem here is that pretending failure is success, or very limited success is real progress, saves face not planets. It isn't credible, and it isn't sufficient to meet the needs for which the summit had been organized.

---

[6] BBC News Science & Environment, "Rio+20: Progress on Earth issues 'too slow' – UN chief," http://www.bbc.co.uk/news/science-environment-18527141
[7] United Nations Conference on Sustainable Development, "UN senior officials highlight Rio+20 achievements," http://www.uncsd2012.org/index.php?page=view&nr=1308&type=230&menu=38

The current model of international discourse on sustainability, in short, is not sustainable. What is needed instead, or at least alongside it, are other and less formal processes that inject new dynamism into international dialogue, that have the potential for moving dialogue forward rather than encouraging it to rest on its laurels. This is particularly important in the two areas covered by this report—in sustainable development, because the world is heading rapidly toward a crisis of unsustainability; in the Information Society, because the ICT sector is moving so fast that summits cannot respond quickly enough to its dynamic growth.

This report is not the place to explore in detail the kind of processes that are required here, though a number of aspects of what might work better are implicit in the comments made above. A revitalized dialogue on sustainable development needs to engage all stakeholders, not merely governments, because governments alone cannot bring sustainability about. The engagement of the private sector is particularly crucial. It needs to question assumptions and to learn how changing times and circumstances—including the crossing of planetary boundaries and including the advent of an Information Society—have changed the context and meaning of sustainability and the ways in which achieving it must be addressed. Policy approaches need to be adaptive to the changing world. International discourse needs to value the exploration of ideas and options rather than seeking to lock debate and innovation within parameters that are acceptable to all. Substantive dialogue needs to address big issues like population growth and GMOs rather than parking them because they are too controversial. It needs to recognise that failure to agree on something is not the same as failure, and that agreement on something not worth saying is not success.

There are a number of ways that could be suggested for improving dialogue along these lines. The commission model of the 1970s and 1980s—including the Brandt Commission on international development issues and the Palme Commission on international security issues, as well as the Brundtland Commission—is one model that has worked previously. Bringing together a small and representative group of global opinion leaders, with an expert secretariat, to explore a specific theme and make recommendations of global relevance, is one way of trying to break the logjam inhibiting discourse in international summits.

Such a commission needs, however, to include diverse experience and opinion: it must be more than a coalition of the like-minded. The present Broadband Commission is quite widely felt to fail this test because it is seen as an advocacy body for a particular view of the relationship between ICTs and development, making the case for broadband rather than that for development. Other commission processes in the past are felt to have been disappointing or unsuccessful in their outcomes; they can be highly dependent on the personalities involved and the resources available to enable insightful research and analysis.

A better model in recent experience would be the Working Group on Internet Governance, which was held between the two phases of WSIS, whose members (at least in theory) participated as individuals rather than as representatives of governments or businesses and that sought to achieve multistakeholder consensus around a definition of Internet governance and possible ways forward on contentious issues. A series of even more informal meetings, drawing together experts for discussions that are off-the-record or held under Chatham House rules, could also help to invigorate debate that reaches well beyond the meetings' own participants. Informal gatherings of experts along these lines can end with summary reports whose insights can be highly influential.

Another option might be a more informal international gathering, such as the multistakeholder IGF that emerged from WSIS. This has no decision-making powers and produces no outcome documents along the lines of those that emerge from summits. Some participants find this frustrating, others liberating. As a forum, it has certainly helped to build trust across multilateral and multistakeholder boundaries, where previously this was absent, and to foster more creative discussion around difficult issues, not just in the IGF itself but in other Internet fora. It has showed that international fora can be organized without large bureaucracies in charge. While it has its critics, they are less vehement than those of Rio+20. The IGF has also spawned national and regional meetings that explore its issues at a less-than-global level.

Why is this particularly important for this project, which is concerned with the relationship between ICTs and sustainability? Three reasons indicate why it would be particularly valuable to instigate new forms of discussion around this theme, as a contribution to discussion about sustainable development in general.

The first is the pace of change. As many of the contributors to this project have indicated, and as the UN Secretary-General acknowledged, the last 20 years have seen many sustainability indicators moving in a negative direction, particularly where climate change and other planetary boundaries are concerned. The pace of change is fast and the time available before impacts become irreversible is short. The pace of change in information technology has also been exceptionally fast, and it has had substantial impacts on society, economy, politics and culture—impacts barely noticed in the formal dialogue in Rio or in *The Future We Want*. With change so rapid, it is urgent that serious understanding of it is injected into the sustainability debate.

The second is that the present paradigm gap between the ICT and sustainable development communities is contributing to unsustainability. As in other public policy domains, understanding of sustainable development in much of the ICT community is weak and shallow. Understanding of ICTs and their impacts and implications in the sustainable development community, as Rio+20 demonstrated, is equally poor. Sustainable development is not possible if it ignores major dimensions of sustainability.

It is crucial, at the same time, that the complexity of the relationship between ICTs and sustainability is understood and dialogue about it fully nuanced. As we have argued earlier, technocentric strategies and programs will not deliver sustainability. Sustainable development must be encompassed within the planet's natural constraints—must be "within the bounds of the ecological possible," in the words of the Brundtland Commission—and will always be dependent on human agency—the choices made by governments, businesses and individuals, the limits imposed by human capacity, etc.—rather than determined by what is technically feasible.

The third reason is that ICTs offer new ways in which debate can be invigorated. Smaller and less formal meetings are not the only way in which dialogue can move on from big, more formal meetings. Even where formal meetings with restricted participation are required, for example in the UN system, it is possible to use ICTs to draw in expertise from the private sector and civil society, refreshing debate, ensuring that it is informed by insights from those who, in practice, are affected by it and, in many cases, will be responsible for implementation. Spaces for debate, open and closed, can be made available online. Standards and policy documents alike can be discussed and developed online over a period of time, as is the case with standards developed by the Internet Engineering Task Force and the World Wide Web Consortium or policies developed by the Regional Internet Registries. Even international treaty documents can be opened up to wider scrutiny and input from outside the negotiating process, as the ITU has recently done with the International Telecommunication Regulations to be reviewed at WCIT-12.

IISD's Global Connectivity program has explored the relationship between ICTs, the Internet and sustainability for the past decade. Its work has revealed a number of barriers that stand in the way of mutual awareness and understanding, better communication and more effective collaboration on issues of common interest to the ICT and sustainable development communities. As indicated, these include differences in world views and guiding principles; professional, institutional and ideological rigidities; the lack of an overarching paradigm concerning the interaction between communications and sustainability; and the absence of fora in which members of the two communities can meet, explore relationships and synergies between their fields of work, and identify opportunities for joint research and joint development of ideas. All of these factors, as confirmed by many of the people interviewed in this project, contributed to Rio+20's failure adequately to address the relationship between ICTs and sustainability.

This brings us to one last proposal. In his interview for this project, Jim MacNeill suggested that "it would be very useful if … experts from the ICT community … got round a table with a number of leaders from sustainable development non-governmental organizations or institutes," in order to discuss the relationship between ICTs and sustainable development. A group of that kind—more focused in its subject, smaller and less high-level in its membership than the Brundtland Commission—would be one way to build on the insights in this project, increase understanding across the paradigm gap that has been identified between ICT and sustainability professionals, and inject this crucial new dimension into discourse on sustainable development. IISD would welcome the opportunity to work with other organizations to bring about that forum and use it to inspire wider and better dialogue about the relationship between sustainability and the Information Society.

www.iisd.org