IDRC | CRDI

Information and Networks

Program overview 2011–2016

Science and Innovation
Program Area

Canada

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Note: This is a shortened version of the Information and Networks prospectus approved by the IDRC Board of Governors in June 2011.

List of Acronyms

BOP   Bottom of the Pyramid

DFAIT   Foreign Affairs and International Trade Canada

DFID   Department for International Development UK

ICT   Information and Communication Technologies

ICT4D   Information and Communication Technologies for Development

I&N   Information and Networks

IDL   IDRC Digital Library

IPR   Intellectual Property Rights

LAC   Latin America and the Caribbean

MENA   Middle East and North Africa

NGOs   Nongovernmental Organizations

OA   Open Access

OBM   Open Business Models

OER   Open Educational Resources

OGD   Open Government Data

OS   Open Science

UNESCO   United Nations Educational, Scientific and Cultural Organization

Executive Summary

The accelerating advance of networked technologies, such as mobile phones and the Internet is transforming developing country societies. As of 2010, an estimated 5 billion people worldwide use mobile phones, including those at the bottom of the pyramid. Within 5 years, Internet penetration could reach similar levels, mainly by means of mobile Internet access. These diffusion rates are thrusting developing countries to become increasingly more networked societies where one's life is organized through information networks, with impacts across all socio-economic strata. For example, the presence of these technologies is lowering the transaction costs for communication as well as propelling new ways for people to share organize, collaborate, and even produce information and digital resources. As a result, new open platforms of development, such as open education, open government, open business models and open science could potentially improve learning, enable better governance, enhance livelihoods, and improve scientific collaboration.

Yet, at the same time, the growing prevalence of networked technologies can also facilitate the curtailment of individual rights to freedom of expression, privacy, access to knowledge, and collective action in the developing world. Moreover, concern has been expressed about the extent to which marginalized groups, such as women, are able to productively take part in emerging networked societies. This potential exclusion limits both the benefits marginalized groups can reap from networked societies as well as the roles they can play in shaping the future of these emerging societies. Legal and economic choices that are now being made will have critical implications for both shaping the nature of and determining who will benefit from a global networked society.

IDRC's ability to make a difference in these issues lies in its ability to develop a program that builds a critical southern perspective to catalyze positive and inclusive benefits from information networks, as well as dampen their negative tendencies. Therefore, the "Information and Networks" (I&N) program will support interdisciplinary and systemic research that seeks to facilitate positive digital transformations, particularly in the thematic areas of creative industries, governance, learning, and science, as information networks are radically changing practices in these four areas. I&N will attempt to achieve four interconnected outcomes related to these abovementioned themes: (i) improve the quality of openness that networked technologies enable; (ii) protect the rights of citizens and consumers; (iii) catalyze the inclusion of marginalized communities in emerging networked societies; and (iv) deepen and broaden the field of information networks and development.
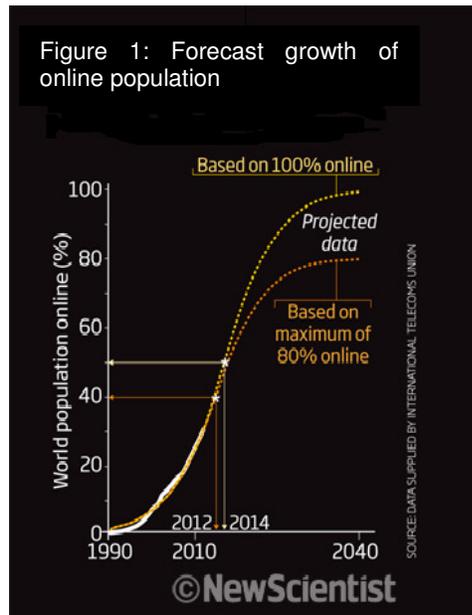
I&N will achieve its outcomes on the basis of complementary strategies: encouraging innovation, generating knowledge, influencing policy, and building research capacities. Key modalities to implement these strategies will include creating a set of thematic research networks, developing a series of competitions to seed innovations, and supporting a set of research capacity building activities for grantees, which will include young researcher mentorships, interdisciplinary theory and methods building and evaluation, and communications support.

1. Context and Background

a. Development Challenge and Situational Analysis

Networked technologies[1], which include the Internet and mobile telephones, are transforming developing countries by increasing people's access to services as well as stimulating economic growth. For example, mobile phones have greatly expanded individuals', living at the Bottom of the Pyramid (BOP), access to a wide range of services in developing countries (Spence & Smith, 2010). In addition, increased mobile penetration has shown to positively increase economic growth in low income countries (Waverman, et al., 2005; Kathuria, et al., 2009). Networked technologies' positive social impacts seem particularly strong in poverty-stricken contexts (Donner, 2008).[2]

Furthermore, there is increased interest in the ways networked technologies could lead to positive development outcomes. This interest stems from various developments, such as the accelerating pace of technological change, which greatly expands the potential for these technologies to have social, political, and economic impacts over the next 5 to 10 years. Societies in the developing world are harnessing the accelerating speed of technology diffusion. As of 2010, almost 5 billion people use mobile phones. This amount comprises many of the world's poorest, including nearly 90% of the most impoverished populations of Brazil, India, China, and South Africa. An estimated 2 billion people access the Internet, with 60% of them living in developing or emerging economies (ITU, 2010). It is predicted that the majority of people in the developing world will have access to the Internet within the next decade, particularly as accessing the Internet through mobiles becomes more prevalent. In China alone, the number of mobile Internet users is expected to reach 600 million by 2012 (China Economic Review, 2011).

Figure 1: Forecast growth of online population

Therefore, as more and more people in the developing world become "networked" they benefit from the positive externalities (or "network effects") that flow from being a part of the larger network. As the landline telephone only became useful once a critical mass of people were connected, the same logic applies with mobiles and the Internet. Figure 1 illustrates that the critical mass needed for the Internet to have a durable impact on developing societies will be achieved by 2012-2014. As Clay Shirky, a prominent writer and scholar on the effects of new technologies, explains, "Communications tools don't get socially interesting until they get technologically boring... It's when a technology becomes normal, then ubiquitous, and finally so pervasive as to be invisible, that the really profound changes happen" (Shirky, 2008). All of these developments then demonstrate an opportunity to amplify the potential benefits and

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[1] For the purposes of the prospectus, the terms "networked technologies" and "information networks" will be used interchangeably although both refer to mobile phones and the Internet.
[2] It is for these reasons that Sachs (2008) stated that mobile phones and wireless Internet will "prove to be the most transformative technology of economic development of our time".

mitigate the risks of networked activities in certain domains. Amongst the most crucial and relevant themes are those of creative industries, governance, learning, and science, particularly because information networks are having an increasingly transformational role in these areas as well as raise new and important questions about these themes. The following section will discuss the ways in which the Internet and mobiles could, and are, making a big difference within these four themes.

Creative Industries: Knowledge and creativity are drivers of economic growth in networked societies. Despite the world economic crisis, world exports of creative goods and services continued to grow, reaching $592 billion in 2008 — more than double their 2002 level, indicating an annual growth rate of 14 per cent (UNCTAD, 2010). This growth confirms that creative industries, which include the music, film, gaming, publishing, software, and broadcasting industries, hold great economic potential for developing countries. Digital technologies are, however, causing significant changes to occur within these industries' organizational principles (Castells, 2009). For example, the negligible costs of digital media reproduction – combined with rampant piracy – are fundamentally changing business models in this area. Active consumers (also known as "prosumers"[3]) in the developing world increasingly contribute to global online platforms, creating new pools of locally-relevant knowledge and delivering a wide range of services, including culture, education, and entertainment (Anderson, 2009; Chesbrough, et al., 2006). Also, digital transformations are driving a range of free and open business models in these industries that are reaching a large number of low-income customers and suppliers more quickly and less expensively than traditional vertically integrated models. The expanding reach of these new business models offer unprecedented potential to connect isolated communities and entrepreneurs, a connection that can play a significant role in speeding up the South's structural socio-economic transformation. Yet, this process also brings about many new challenges and while there are many success stories[4], there is limited understanding of the socio-economic implications of these new business models. Therefore, there is a strong need to investigate how the poor are benefiting from these models within creative industries as well as the ways in which they might be harmed by them. In addition, there is a need to examine whether these new models result in new forms of economic exclusion and informality. It is also fundamental to understand how to balance the global and national governance of creators, distributors, and consumers' intellectual property rights so that new forms of online income generation can be enabled in emerging networked societies.

Governance: Some governments in the developing world are seeking to meet their citizens' rising expectations of improving both the legitimacy and effectiveness of governance in their countries (Norris, 2011) by instituting "open government" initiatives, such as making government data available through the Web or attempting to create more participatory democratic processes through harnessing the power of social media. Some scholars see these changes as ways to widen the public sphere, promote a pluralism of

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[3] "Prosumers" refers to a combination of producers and consumers.
[4] Artists in the developing world are becoming increasingly popular among fans using the Internet and digital media to disseminate their work. A well-known example is "tecnobrega" in North Brazil, where artists forego traditional copyright and willingly share their creations with informal street vendors to market and distribute their music. Significant revenues are, however, realized through paid events, such as highly popular dance parties that bring in millions of dollars (Anderson, 2009)

ideas, and enable greater collective action to influence government (Benkler, 2006). Citizens are also engaging in novel forms of collaborative action, such as the use of mobiles and the Internet to monitor the government and expose abuses. For example, Ugandawatch 2011 is an application that allowed citizens to monitor voter intimidation through citizen-reporting of incidences through mobile text messages. Yet, despite these changes, the democratic impacts of these technologies are still unclear (Faris & Etling, 2008; Aday, et al., 2010).

Although some experts perceive technology as a liberating force, others point to the fact that authoritarian states are exploiting the benefits of technology to consolidate their positions of power. Their growing sophistication in surveillance and censorship has chilling effects on citizens' political participation (Rohozinski, 2010). Censorship is rampant in cyberspace and extends far beyond "the great firewall of China." An example of governments' increasing surveillance is their ability to easily track mobile phone users' locations through the use of global positioning system technology. In addition, surveillance issues also emerge from the spread of personal information stored by government or the private sector. Without proper personal data protection, this collection and storage of information could put people at risk to a wide range of potential abuses, including invasions of privacy, identity theft, and ethnic or gender profiling[5]. Technology is therefore fundamentally transforming the relationship between the citizen, the corporation, and the state; yet, very little is known as to whether this transformation is empowering or disempowering for consumers and citizens.

Learning: Increasing demand for post-secondary education and increasing costs to provide educational services are forcing developing countries to find financially affordable and pedagogically acceptable solutions to address these challenges (UNESCO, 2009). A foremost concern is to maintain the quality of teachers and the content and instruction they deliver. It is possible to address educational quality and reach by increasing the availability and use of open educational resources (OER) and associated open source software. As well, technologies, such as mobile devices, the social web, and gaming are creating opportunities to manage learning and learning effectiveness. Better quality learning materials, learning environments, and learning results are potential outcomes in using these new media for education. However, while

Monthly Visits to MIT OpenCourseWare since 10/2003

these technologies are growing on the supply side, little is known of the 'benefits' (such as

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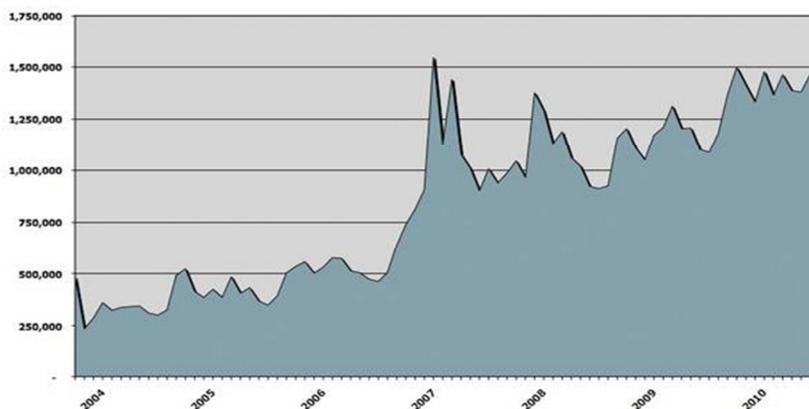
[5] A recent study exploring how advertisers target Facebook members found that the social network site may be inadvertently revealing its users' sexual orientation. Research found that different ads were targeted to gay users, even though dating preferences were supposedly hidden.(Guha, et al., 2010)

improvements in educational outcomes) of using these media. While the creation of OER with the freedoms to repurpose, remix, and redistribute is increasing, there is little evidence of significance in reusing or reengineering existing OER content. Those who stand to gain the most from OER reuse in the developing world face considerable barriers, stemming from a general lack of knowledge about the concept of OER and a paucity of technological infrastructure and institutional policies. Not much is known about who, in emerging economies, are using OER, how, where and under what circumstances, how beneficial, at what costs, as well as the legal and policy requirements for institutionalizing an OER culture in higher education. As well, almost no analysis exists on whether there is a nexus between learning performance and the use and reuse of OER. Therefore, these issues represent a critical knowledge gap for innovating educational policy and program formulation to improve the learning culture in the developing world.

Science*:* Scientific collaboration, an enabler of scientific production, is still very much dominated by the developed world. Developing countries researchers frequently reiterate the challenges they face in conducting research, collecting data, accessing information, and collaborating with their counter parts from the global research community. Recent studies highlight the general lack of awareness of research produced in the developing world as a result of poor research management and indexation of outputs (SARUA, 2008). Open and Internet-enabled collaborative science has been touted as a possible solution to these problems. The principal characteristics of open science are transparency in experimental methodology, observation, and collection of data; the public availability and reusability of scientific data; the public accessibility and transparency of scientific communication; and the use of web-based tools to facilitate scientific collaboration (Nielsen, 2008). Other suggestions to address these challenges include rethinking the value of development oriented research outputs that have been dismissively referred to as "grey literature". This issue is perhaps relevant in a context where developing countries' governments are rethinking the role they should play in supporting science and research and in encouraging universities' community engagement to ensure science addresses development challenges and concerns.

Yet, despite the potential positives of open science, it is also fraught with challenges, namely those related to reputation, resources, time, and ethics - all challenges that make researchers wary of adopting open science. This wariness stems from critics questioning the rigour and quality of open access journals as mainstream thinking assumes that "scientific productivity is measured by the number of papers in traditional journals with high impact factors, and the importance of a scientist's work is measured by citation count. Both of these measures help determine funding and promotions at most institutions, and doing open science is either neutral or damaging by these measures" (Gezelter, 2009). However, some recent studies suggest that open access journals are beginning to be more heavily cited than closed journals, a change that may respond to critiques of open journals' rigour and quality (Harnard, 2009). Nevertheless, little data is available to illustrate the ways that open science models may enhance the quality, reach, and uptake of research, particularly by and for the South.

As the above discussion has illustrated, an increasingly networked world is drastically transforming societies and having a significant impact on developing countries; yet, there is less clarity about whether these changes will be more or less inclusive in terms of their potential benefits in the developing world. Here lies some of the most salient debates within

the field. Carolina Rossini, a Brazilian law professor based at Harvard, stresses the importance of understanding "how the Internet changes the capacity of knowledge production, distribution, and access and how this affects access to knowledge, education, scientific innovation, and development," particularly from the perspective of developing countries. Rossini takes her position based on the pioneering work of Manuel Castells, who observes that "technological capacity, technological infrastructure, access to knowledge, and highly skilled human resources become critical sources of competitiveness in the new international division of labour" (Rossini, 2010). However, others, such as Kentaro Toyama, are more sceptical and view new technologies as initially generating optimism and exuberance that is eventually replaced by a disappointing reality (Toyama, 2010). Some go further and warn that the surge in social media and mobile use are leading developing societies to fall prey to corporate interests, eroding the public sphere and reinforcing existing power asymmetries (Gurumurthy, 2009).

New arguments and questions are, therefore, being raised around the role that information networks play in societies in the South and how they might impact issues of poverty, empowerment, and citizen rights. These questions seem much more pressing when one takes into account the point raised by some of the leading computer scientists in the world - "Bits (digital technologies) are still a new phenomenon – a new natural resource whose regulatory structures and corporate ownership are still up for grabs. The legal and economic decisions being made today will determine how our descendants will lead their lives. The way the bits illuminate or distort the world will shape the future of humanity" (Abelson, et al., 2008). Therefore, one of the key goals for this program will be to explore the ways in which an increasingly networked society enables or inhibits actions to address development goals in the global South.

   b. About the Program

The issues described above are not new to IDRC. Starting in the 1980s, with the Information Sciences division, IDRC demonstrated that information technology can play a positive role in development. Much of this work successfully stimulated digital inclusion of the poor and marginalized communities in the developing world. For example, external reviews of ICT4D validated that research on the BOP's mobile and Internet usage, expenditures, and earnings contributed to the reform of telecommunications and fiscal policies that favoured the poor. E-health projects also established that mobiles were useful and cost-effective tools to collect health data. Research has also shown that mobile price information systems could reduce transaction costs for farmers by approximately 11%.

In addition to these important outcomes, IDRC's research, supplemented by external evaluators' views, also identified a number of trends that were deemed important for the future role of ICTs in development. One of the most notable is the explosive growth of mobiles, which continues to make digital access less challenging and, as a result, allows new open models of collaboration and access to information to flourish. Phenomena, such as free access to research results, educational or government resources, or online crowd-sourcing, such as Ushahidi, have, in a few years, gone from being largely irrelevant to potentially having an impact on development. Nevertheless, although research has demonstrated the empowering potential of ICTs, other IDRC supported projects, such as the Open Net Initiative research, suggest that the growing prevalence of ICTs is facilitating the curtailment of individual rights to freedom of expression, privacy, and collective action in

the developing world. The Gender Research for African Community Empowerment (GRACE) network expressed concern about the extent to which marginalized groups, such as women, are able to productively take part in emerging networked societies. The most recent external evaluations of the ICT4D programs also suggested that because of the increasing importance of networked technologies in all facets of society, it will be essential to take an integrated interdisciplinary approach to study the increasing role of information networks in development.

IDRC will continue to play a critical role in contributing to the field of ICTs through mainstreamed ICT research in health, agriculture, State accountability and legitimacy, climate change, and economics; however, the recent external evaluations also indicated that important emerging networked society policy issues, such as digital openness, privacy, censorship, and intellectual property rights, have increasingly significant implications across programming areas and merit a consolidated research approach. Therefore, in order to respond to the evaluations' recommendation, IDRC proposes to develop a networked society program - "Information and Networks" (I&N) - which will support critical Southern perspectives to better understand and catalyze inclusive and beneficial uses of open and networked platforms enabled by the Internet and mobiles. Although a growing number of government, foundation, private sector, and NGO actors are funding or implementing activities in digital inclusion and empowerment, few are using a critical interdisciplinary and systemic approach to explore these issues and fewer still are supporting research on the developing world by developing country researchers. Thus, by assuming this approach to programming, IDRC will have a strong comparative advantage.

2. Approach to Programming

a. Program Goal

I&N's goal will be to **enable greater understanding of how information networks positively and negatively affect developing countries' citizens, especially citizens belonging to marginalized communities.** The program will catalyze positive digital transformations, *particularly in the thematic areas of creative industries, governance, learning, and science*.

b. Program Outcomes
The program has four interconnected outcome areas: (i) the enhanced quality of **openness** that networked technologies enable; (ii) the protection of citizens', consumers', and prosumers' **rights**; (iii) the **inclusion** of marginalized communities in the benefits of information networks; and (iv) the deepening and broadening of the **field** of information networks and development. The latter outcome integrates and builds on the first three outcome areas.

Openness: Enhanced Quality of Openness
The emergence of the networked society is particularly powerful because it has played a role in reducing the transaction costs of knowledge creation, communication, and distribution. Knowledge, a key input to human development processes, has traditionally been a high cost product, particularly for the majority of those in the developing world (Benkler, 2006). However, digital information can now, at little cost, be accessed, produced, used, reused, and shared around the world. In addition, new ways of organizing and producing are emerging (Benkler, 2006; Shirky, 2008). For instance, "Commons-based" production methods, describe collaborative efforts, such as free and open source software and Wikipedia, which are based on the sharing of information. These collaborative processes have spread significantly in the realms of the creative economy, science, government, and learning (Lemos & Mizukami, 2010). Finally, the increased ability to communicate also enables new forms of collective action towards a common goal. For example, Ushahidi is a system that allows people to act as data collectors by sending text messages with their mobile phones which is then mapped online[6]. An Ushahidi implementation in Mexico, *Cuidamos el Voto*, enabled citizens to report incidences of fraud in the electoral process that resulted in 335 official investigations (MobileActive, 2009). Also social media, like Facebook and Twitter, may make it easier to act collectively and affect social change, as the recent events in the Middle East appear to indicate.

> **Box 1: Enhancing quality online learning**
> The "Openness and Quality in Asian Distance Education" network seeks to benchmark good practices and ensure quality in distance education delivery. It establishes a set of quality assurance standards and performance indicators for distance education in various settings (formal, informal, life-long); assesses the impact and viability of open educational resources (OERs); and investigates ways to increase access to adult education services responding to rural livelihood and health needs in poorly-resourced rural, remote or marginalized communities.

Openness refers to two things. Firstly, it is the content available on information networks. And, secondly, it is the means people use to connect, share, organize, and produce on information networks. Although, as we have discussed above, the quantity of openness has increased over the past few decades, this program's goal will be to enhance the *quality* of openness and how information's quality can be enhanced to ensure it achieves its development outcomes.

More specifically, the "openness" outcome area will focus on developing:
- A greater understanding of the context, dimensions, variations, implications, and quality of digital openness, particularly in the thematic areas of creative industries, learning, governance, and science;
- Informed and influenced policies to enhance the quality of openness in the four themes.

Examples of potential research questions for this outcome area could include: What are effective mechanisms for the collaborative production of open educational resources in the South? How are creative entrepreneurs in developing regions making use of open business

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[6] We can say this is "Crowdsourcing," a process of enlisting "a crowd of humans to help solve a problem" (Doan, et al., 2011, p. 87)

models to create vibrant, dynamic, and knowledge-intensive services and industries? How can open access to research findings and data enhance the production, uptake, and quality of research outputs? What types of ICT-enabled models could best support innovative ways of collecting data and what are the effects on research quality, ethics, and impact?

Rights: Protecting the Rights of Citizens, Consumers, and Prosumers
A number of human rights have been identified to be closely linked to the Internet. These rights include the freedom of expression, the right to information, data protection, and privacy, and the freedom of association. Although the expansion of networked societies can help promote citizens', consumers', and prosumers' rights, as well as expand their capabilities and freedoms, these same technologies can also be used to curtail them. For example, the potential of networked technologies to support the freedom of expression and association is debatable (Deibert, 2011). The recent events in Egypt and Tunisia speak to the potential of networked technologies to facilitate collective action to bring about social change (Shirky, 2011). Yet, others question the role social media has in stimulating effective collective action (Morozov, 2011). For the latter, the expansion of networked societies can also restrict these rights, in particular through the chilling effects of ubiquitous surveillance. For example, authoritarian states can exploit the benefits of technology to consolidate their positions of power. Following the 2009 protests in Iran, the government was able to capture data from mobiles and social media to crack down on protesters. By intercepting data from Facebook, they sent threatening messages to Iranians living abroad, text-messaged nationals to stay home and avoid the protests, and pushed "patriotic" Iranians to fight back online.

> **Box 2: IPRs and Piracy**
> The project "Toward Détente in Media Piracy" seeks to research the nature and extent of media piracy in India, South Africa, and Brazil to inform intellectual property policy making. The project contributes a socio-economic development voice to ongoing piracy debates, such as the understanding that increasingly punitive enforcement regimes and education programs in developing countries often do little to reduce piracy as they fail to address the underlying cause - a lack of access to affordable creative resources.

In addition to these issues, an expanding networked society also highlights the need to have an appropriate intellectual property rights (IPRs) regime. Copyrights and patents are generally considered important policy tools to boost access to information, creativity, and innovation. However, the expansion of strong IPRs in the developing world, which has emerged in response to rampant piracy, potentially threatens entrepreneurial innovation and the ability to access knowledge for learning and creativity (Karaganis, 2011; Kenny, 2011).

More specifically the "Rights" outcome area will focus on developing:
- A deeper understanding of the extent to which citizens', prosumers', and consumers' rights, particularly their rights to information, privacy, freedom of expression, and access to knowledge are, or are not, being protected in the digital sphere;
- Informed policies to protect aforementioned rights in networked societies;
- Increased uptake of new research methodologies and methods to assess the extent of curtailment of previously mentioned rights and help protect them.

Examples of potential research questions for this outcome area could include: What is the right balance between the intellectual property rights of creators, distributors, and consumers in networked societies? Which data protection regulations help or hinder the

protection of privacy? How are digital technologies being used in developing countries to expand pluralism and freedom?

Inclusion: Catalyzing Inclusion in the Benefits of Information Networks
Although there are many benefits emerging from the expansion of information networks, these benefits are not equitably distributed, particularly in the developing world. For instance, marginalized communities and groups are often excluded from these benefits based on a variety of factors, including their socio-economic position, gender, and education. A study in Bangalore illustrates this point as the government's digitization of land records led to a land capture by rich and empowered Indians, which enabled India's elites to take advantage of this open data instead of the members of the poor and disempowered groups for which the opening of the data had been intended (Benjamin, et al., 2007). This example demonstrates that networked societies might actually exacerbate exclusion and reinforce existing power asymmetries as opposed to eradicating them as the initial purveyors of these applications often assume (Gurumurthy, 2009).

> **Box 3: Inclusive Networked Societies**
> Research networks in Asia, LAC and Africa are investigating demand for various economic and social services among the bottom of the pyramid (BOP). The studies have proved useful in making governments understand the significance of networked technologies, especially mobiles. Their findings have contributed to debates on universal service policies, taxation and on the registration of phones for security purposes. The results have also been used by industry to better understand, and design products and services for the BOP.

In order to determine ways of addressing this issue, I&N will seek to improve the possibilities of marginalized communities' economic and social participation by investigating issues of socio-economic integration, creativity, and entrepreneurship and their relationship to emerging networked societies. Currently, the vast majority of new connections to mobiles and the Internet occur amongst the urban poor, a trend that is only projected to continue. Therefore, the frontier of socio-economic exclusion and inclusion in emerging networked societies is in urban spaces (Qui, 2009). In Rio, Beijing, Delhi, and Cairo, many disadvantaged groups move from exclusion to inclusion or vulnerability to resilience and digital technologies, particularly mobiles, are playing an increasing role in those movements. Studying the phenomenon of moving from unconnected to connected in urban spaces may be the best way to catalyze inclusive networked societies. As the poor and marginalised in various urban settings develop innovative ways to access and use technologies, they can be documented and replicated elsewhere. For example, prepaid mobile phone subscriptions were essentially an innovation developed to meet the needs of poorer consumers that did not have regular monthly incomes and, yet, this innovation is one of the main reasons mobiles are now ubiquitous.

More specifically the "Inclusion" outcome area will focus on catalysing:
- An increased understanding of the mechanisms that reinforce inclusion or exclusion of the urban poor, with a particular focus on women and youth, in information networks and their developmental benefits;
- Policies that are informed and influenced by evidence to increase and enhance the economic and social participation of these marginalized groups;
- Improved innovations that enable marginalized people to benefit from information networks.

Examples of potential research questions for this outcome area could include: How are the urban poor using information networks to improve their situation? In what contexts are the urban poor benefitting or not from information networks? What policies or regulations would be most apt to facilitate the urban poor's sharing in the benefits of information networks in learning, entrepreneurial activities, and civic empowerment?

Field-Building: Deepening the Field of Information Networks and Development
Field-building, which seeks to build new areas of knowledge through constructing novel interdisciplinary concepts and methods, building research capacity, and investigating more systemic approaches to development problems, is essential to realize policy and practice changes (Bernholz & Wang, 2010).

Research in the domain of information networks and development clearly benefits from an interdisciplinary approach (Kolko, Unwin & Zinnbauer, 2010). Traditionally, the field has suffered from operating in disciplinary silos, such as economics, which has focused on the relationship between technology and economic growth or productivity; computer science, which has investigated the adoption or usefulness of a particular technology or law focussing on the legal dimensions of digital copyright. These single discipline approaches have resulted in minimal systemic thinking and cross-discipline learning. However, the transformational potential of the emerging networked society, particularly within a development perspective, is often systemic and structural and therefore requires an interdisciplinary focus to understand the interactions, feedback loops, and evolution of the systems. For instance, by taking an interdisciplinary approach to examine ways of promoting the production and dissemination of scientific outputs in the developing world, one learns that this activity can be constrained by a complex system, such as structures and values surrounding the dissemination of publications in universities; the (dis)incentives to collaborate and share research; digital infrastructure; incentives related to existing metrics for publication and quality of research; and legal contexts. Using an interdisciplinary approach illuminates the complex system that can impact how and why researchers publish, an illumination that is difficult to identify when a single research approach perspective, such as the promotion of open access journals is taken as its narrow entry point makes it difficult to uncover all of the challenges a researcher can experience in conducting as well as publishing their research.

> **Box 4: Strengthening research on information networks and development**
> A field building program funded by IDRC seeks to identify future research leaders and facilitate their development through support for theoretically-based and methodologically rigorous research. Applicants benefit from concerted capacity building exercises including a mentorship arrangement. In particular, the program promotes broad-based high-quality multidisciplinary research at the intersection of information networks and development.

More specifically, the "Field-building" outcome area will focus on:
- Establishing integrative and interdisciplinary research that cuts across issues of openness, rights, and inclusion, as a way to conduct research in this field;
- Developing new interdisciplinary research concepts, questions, methodologies, and outputs that enhance our understanding of information networks and development;
- Supporting a set of research capacity building activities for grantees that will include young researcher mentorships, inter-disciplinary theory and method building, and evaluation and communications support.

Table 1 below provides a summary of this program's key expected outcomes.

	Baseline	Minimum Expected	Medium	High
Openness	Growing prevalence of Open development processes, such as Open Government Data (OGD) initiatives, Open Educational Resources (OER), Open Science initiatives (OS), and Open Business Models (OBM) in the South; however, their quality and impacts on development are poorly understood	*Network building and innovation* Networks are built on OGD, OER, OS, and OBM that produce new applications and evidence about their impact in developing countries	*Research recognition* Evidence on good practices and impact of open development processes are cited, used, and recognized by a global community of peers, the media, and policy-makers	*Affecting open policies and practices* Policy-makers and practitioners involved in OGD, OER, OS, and OBM use project results to inform their funding and implementation
Rights	Digital transformations challenge traditional Intellectual Property Rights (IPR) regimes, leading to a disjuncture between the rights of creators, distributors, and consumers. Expansion of networked societies in the South brings increasing threats to privacy and freedom of expression.	*Knowledge generation* A body of research that examines the relationship between IPR and emerging practices in networked societies Networks built that produce policy research on digital privacy, censorship, and role of media in collective action	*Contribution to literature* Evidence from supported research is recognized and cited by peers, policy-makers, and the media Evidence is created that is used and cited on the importance and impact of personal data protection issues and digital censorship	*Affecting laws related to rights* Evidence and networks inform legal and policy reforms at the global and national levels enabling balanced IPRs in developing countries Networks support changes in legislation and business practices related to personal data protection
Inclusion	Information networks increasingly play a role in lives of youth, women, and urban poor. Lack of evidence on how these groups are affected by, enabled in, and excluded from information networks and consequences for development.	*Capacity building* Research done and capacities built to enable the examination of the participation of the urban poor, women, and youth in emerging networked societies	*Research recognition* Evidence on the ways the marginalized are affected by, enabled in, and excluded from information networks is used and cited by policy-makers, the media, and peers	*Inclusive policies* Fiscal, communications, and technological policies and practices are informed by this evidence and ensure that excluded groups share the benefits of information networks
Field Building	Research capacity is uneven and methodologically weak, with limited engagement with systemic and interdisciplinary approaches to assess the influence of information networks on development outcomes.	*Interdisciplinary knowledge generation* Body of interdisciplinary and systemic knowledge (including new methods) generated about the relationship between openness, rights, and inclusion in networked societies	*Interdisciplinary capacities* Research validated by peers for its analytical value. Networks with capacity to develop and apply research methodologies, communicate for influence, and critically evaluate contributions to the field	*Information networks research field* IDRC and grantees are recognized for contributing to the evolution of the field of information networks and development, through advancing the perspective of systems-thinking and interdisciplinarity

3. Program Strategy

I&N will achieve its outcomes on the basis of four complementary strategies: stimulating innovation, generating knowledge, influencing policy, and building research capacities.

- Stimulating innovation: Catalyze innovations and demonstrate their value, social impact, sustainability, and potential scaling-up over different thematic areas.
- Generating knowledge: Investigate the ways in which information networks are leading to social change in developing countries. Explore the potential to replicate models and then create standards that could contribute to field-building.
- Influencing policy: Inform and influence policy debates on conditions and environments conducive to creating and sustaining a progressive networked society.
- Building integrated research capacity: Support systemic and interdisciplinary thinking and research for an integrated and interconnected domain to be defined as "research on inclusive networked society"

Strategic tensions
The following section outlines key tensions that emerge from development research in this field and the strategic approaches that have been chosen to balance these tensions and maximize the intended program outcomes.

Research Quality and Capacity Building: There is often a trade off in either focusing primarily on research quality led by top researchers or on building the capacity of less experienced or emerging researchers in a field. I&N will use its four programming strategies to counter this tension and attempt to achieve both objectives. Innovation will focus on capacity building while knowledge generation will balance capacity building and high quality research through research networks. Policy influence will concentrate on high quality policy research and employ targeted capacity building in the area of research to policy. Lastly, for the capacity building strategy, an interdisciplinary and systemic approach will be adopted in order to foster new skills, insights, and methodologies into a higher quality research domain.

Intervention and Observational Research: Intervention or action research, which is commonly used to understand and encourage innovation, can directly benefit and demonstrate valuable lessons for development; however, it can also be limited to a restricted sample, fail in its implementation, or even lead to unintended negative consequences. In contrast, *observational, policy or descriptive research* sets out to build knowledge and impact policy and practice, but through a much less direct route. I&N will assess each project to ensure the best methodological approach is taken to achieve the project's intended research goal. For example, research areas at an experimental stage, such as open government data, will employ an intervention (action) approach, whereas less experimental research, such as digital activism or government censorship topics, will use a more observational approach.

Directive and Responsive: Successful research programs for development need to be built on well identified development issues and needs; yet, at the same time, they need to respond to new opportunities and potential inter-project synergies. In order to address this potential tension, I&N will use three programming modalities:

- Networks: This will be I&N's principal programming modality. Policy influence networks, research networks, and capacity building networks are three structures that emphasize different comparative advantages. Each has its own benefits, requirements, and financial/administration costs for IDRC and the recipients. The program will likely create a network on each theme and use the most appropriate type of network structure to achieve the greatest outcomes or research results.
- Open calls/competitive grants: A call for proposals may have objectives specific to the programming themes but allows for flexibility in terms of research focus and methodology. They have also proved useful in identifying new partners. Open calls will be used more within the "innovation" and knowledge generation strategies.
- Unsolicited proposals: Proposals allow for responsiveness around emergent issues and research topics that fall outside of those identified in the prospectus but must relate to the core ideas of I&N.

In addition, as the programming context may change over the course of five years, I&N will build flexibility into its strategy. Approximately 80% of funding will be dedicated to projects that fall under the prospectus' themes, while the remaining 20% will be allocated to projects that cover new themes, contributing to emergent issues and field-building.

Methodologies
The nature of research on networked societies is at a crossroads of diverse disciplines across technology and the social sciences; therefore, I&N will support research that is interdisciplinary and uses multiple methods. The following section outlines the types of methods that the different I&N supported programs will employ.

- Innovation supported-research will tend to employ an intervention methodology (action research) that extracts general replicable principles that can be applied to scale up innovations.
- Knowledge generation will employ national, regional, and cross-regional comparative case studies as well as experimental and quasi-experimental designs.
- Research for policy influence will be carried out by descriptive studies of which the results will be shared through evidence-based advocacy.
- Field building activities will focus on theory-building, testing new inter-disciplinary research methodologies, and extracting models and principles to define the field.

Capacity Development
To ensure recipients dealing with technological innovation in the context of social change can assess their progress and adapt to their rapidly changing context, I&N will initiate specific skill-building and mentoring activities around evaluation. I&N will also develop toolsets to facilitate interdisciplinary practices and foster social science research skills, including gender research, particularly for engineers and applied scientists working in development.

Communication for Influence
I&N will support the development of tools and skills for effective communication of research, particularly through the use of social media, networking sites, and data visualization, among others. This approach will be adopted by recipients as well as the I&N

team in its own communication practices. Each team member will also publish at least one article or chapter per year that brings to light findings across I&N projects.

IDRC cross-cutting themes (gender and global governance)
- The centrality of inclusion as an I&N outcome dictates that the program is aware of the nature of gender inclusion and exclusion that could be generated by I&N projects. I&N will also put a gender monitoring tool into place that will allow the program to gauge the extent to which gender is integrated into the research it supports.
- I&N will interact with issues of global governance in two principal ways. First, it will seek to ensure the grantees it supports in the areas of intellectual property rights engage with the global governing bodies in that area (e.g., World Intellectual Property Organization, World Trade Organization, etc.). Second, the program will support its projects to actively participate in global Internet governance bodies such as the yearly Internet Governance Forum and the third World Summit on the Information Society in 2015. The latter is a major event in this field.
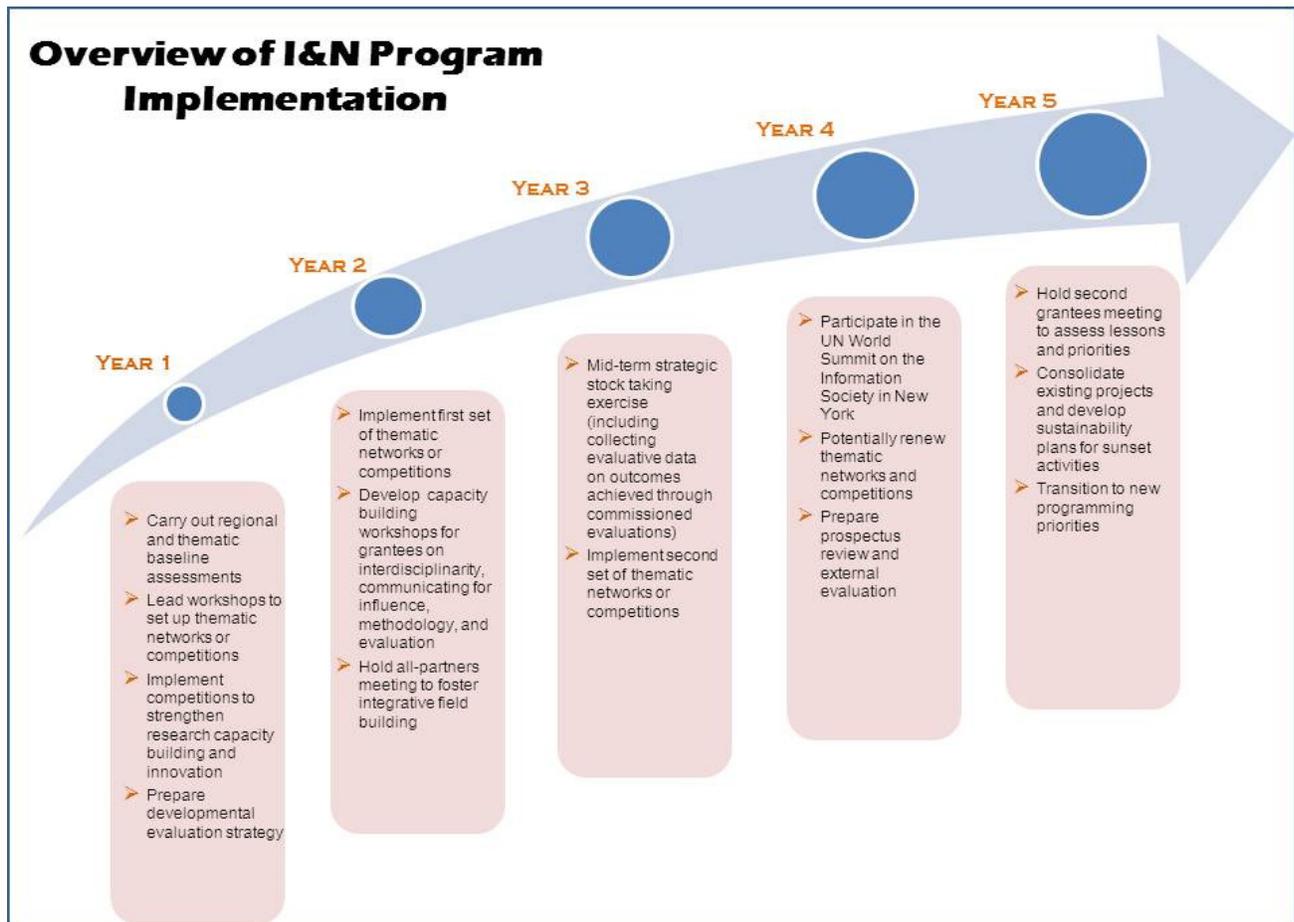
4. Regional Priorities and Themes

As previously described, the thematic areas of creative industries, governance, learning, and science will be key entry points to seek outcomes around openness, rights, inclusion, and field-building within emerging networked societies in the South. The program will address regional priorities based on an analysis of the different countries and regions' diverse political, social, cultural, and economic characteristics. This analysis will take advantage of the IDRC experience in programming inside these different contexts, while, at the same time, respond to new challenges and opportunities.

In Asia, persistent inequalities remain in terms of sex ratios, gender gaps in earnings, economic autonomy, and employment segregation. For example, women are overrepresented in the most casual and low-earning segments of the informal economy. In addition, disparities with regard to opportunities are also related to urban and industrial biases in national and regional development. Governments and civil society groups are learning that by calibrating technologies to specific development needs, and taking into account factors of usability and affordability, relatively inexpensive technologies applied in appropriate settings can have high economic and social returns. The mobile phone, for example, is becoming the tool governments use to communicate with the public to create citizen-centric smart governments that allow for greater transparency while safeguarding consumer/citizen rights. At the same time, Asia is also home to long-standing authoritarian regimes (e.g., China, North Korea, and Burma) where State innovations in the area of digital surveillance pose threats to human rights activists. As a result, it appears that a specific regional interrogation of these innovations will be necessary.

In Latin America and the Caribbean (LAC), there has been recent improvement in key development indicators, such as years of formal education, access to information technology, and overall economic growth. However, there has been little change in the structural conditions that make LAC the most unequal region in the world. For example, more than 20% of young people in Latin America do not study or work. Young people who are employed face unstable and informal job conditions because of their lack of training and work experience (ILO, 2010). Even in the formal sector, in 2007, less than 15% of the workforce had a tertiary education. Therefore, a large part of the population still remains largely vulnerable to social risks and trapped in a poverty cycle that is linked to the lack of skills and absence of economic opportunities. While a few countries have improved their participation in scientific outputs, most researchers in the region lack the resources to actively participate in the activities related to global knowledge production. Also, the region is still characterized by young democracies, and although a few countries such as Chile, Brazil, and Colombia have made substantial progress in using technology to increase the efficiency of the State, their capacities to respond to their citizens' demands remain limited. Given that Brazil is the world leader in the area of developing a new form of networked society based on open models, there is an increased demand to explore novel models of organization in education, business, science, and governance that respond to this region's development challenges.

The Middle East and North African (MENA) region is characterized by high levels of direct engagement by the state in the productive sectors, increasing demographic growth, high levels of youth unemployment, and low rates of women's participation in the labour force. The region's digital infrastructure has significantly improved, as mobile and Internet

affordability has increased access in urban and peri-urban areas. This successful deployment of ICTs may have contributed to citizens' mobilization during the recent Arab spring. As a result, there is growing interest in the role of social media in national debates, citizens' mobilization, and reducing corruption. Moreover, there is continued interest in the ability of information networks to foster employment, improve educational outcomes, ameliorate collaboration of Arab societies in scientific collaboration, and promote gender empowerment.

In Sub-Saharan Africa, in addition to governance and social service delivery reforms, youth unemployment remains a major challenge. Promoting and developing youth's skills to ensure they can actively participate in emerging networked societies will be an important issue to tackle. As connectivity concerns increasingly become part of the past, Africa will need to rethink its policies and support scholars, universities, and small and micro enterprises in ways that enable them to shape networked societies toward the region's social and economic goals. The exponential growth in mobile markets has happened in tandem to this context (Waverman, 2007). Despite its socio-economic challenges, the region is experiencing dynamic innovations, such as mobile money transfers (M-Pesa) or crowd sourced crisis information sent via mobile (Ushahidi). Therefore, research should explore the best mechanisms to harness Africans' innovation potentials in mobile applications and networking tools to support learning, livelihood improvement, and civic empowerment.

5.   Concluding Comments

As highlighted in the introduction to this prospectus, the current day legal and economic decisions being made about emerging networked societies will have profound ramifications on the lives of future generations (Abelson, et al., 2008). Therefore, using an integrated approach to programming, I&N can empirically inform these legal and economic decisions by supporting research focused on achieving outcomes that could catalyze positive benefits from emerging networked societies. First, the proliferation of mobiles, PCs, and the Internet is creating an opportunity to produce and tap into a vast wealth of digital information for the purposes of learning, improving governance, enhancing livelihoods, and producing scientific knowledge. As such, it will be particularly important to learn how we can move from the trend of an increasing quantity of data to an enhanced quality of openly available information that serves development needs. Second, digital technologies are enhancing as well as potentially curtailing citizen, creator, and consumer capabilities and freedoms in the global South. In this regard, it will be particularly important to influence the policies and regulations that are needed to protect these individuals' rights to privacy, freedom of expression, and access to information. Third, information networks do not equally benefit all social groups. Reliance on technological processes, such as digitally delivering government information can reinforce exclusion, particularly for women, the poor, and youth. As such, it will be vital to develop digital policies and practices that ensure technological processes are as inclusive as possible for members of all social groups. By assuming this approach to programming, IDRC will have a strong comparative advantage because although a growing number of government, private sector, and NGO actors are funding or implementing activities on these issues of digital inclusion and empowerment, few are using a critical interdisciplinary and systemic approach to explore them and fewer still are promoting research on the developing world by developing country researchers.

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