Reflections From and On The Forum

ICT, Development, and Poverty Reduction:
Five Emerging Stories

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In September 2003, IDRC organized *A Dialogue on ICTs and Poverty: The Harvard Forum.* Six years later, much has changed. Trends highlighted at the Harvard Forum and elsewhere have progressed, and many have accelerated. Communication and the networking enabled by information and communication technologies (ICTs) are proving to be economically, socially, and politically transformative. Their central roles as enablers of openness and innovation are striking. The spread and appropriation of ICTs have been a key dimension of globalization, pushing societies to build communications systems and manage them well, and to develop infrastructure and the capacity to use it. ICT regulation and policies have improved in many countries, often in response to good research and advocacy.

The most striking change, however, has been explosive growth in mobile phone access and use in all regions, with private—and in some cases, nonprofit—operations supplying access to people at the "bottom of the pyramid" (BoP) by way of very low-margin, high-volume business models.[1] In both poor and wealthy countries and populations, mobile phone use has enabled and facilitated the expansion of markets, social business, and public services. An entire range of economic services has emerged that are enabled by mobile phones: banking and financial transactions, marketing and distribution, employment services, personal services, and public services. Beyond economic impacts, improvements are being made in other freedoms or dimensions of well-being: personal security, political participation and accountability, peace, dignity, and opportunity.[2]

One should not forget the negative aspects and possibilities of communications-based transformations, such as mobile phones being used to fan violence, cyber crime, and terrorism, and the vulnerability that can then be created by a disruption of communication. In addition, both nationally and internationally, control of communications is often contested, and the openness of the network remains a constant battle. Concerns are being raised about reversals in competition, access, and costs, as well as about political and vested interests reasserting control over the "golden egg."

And yet, affordable mobile Internet—smart phones and data

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services—exists today in wealthier societies. It could become nearly universal in the next generation. Compared to six years ago, there is *much* more of a development and research knowledge base, both in terms of conceptual thinking about the transformative impacts of widespread communications, and regarding empirical knowledge about ICT demand, use, costs, benefits, and impacts.

Drawing from a wide range of recent literature, we identify five main stories that come together at many points in the literature:[3] universal access, economic and social services, openness, human development, and innovation.

It is worth underlining that this article is mostly about mobile phone access and use, as this is the dominant story of the last decade for people in the bottom or base of the pyramid. This is not to deny the importance of broadband, Internet connection, or computers and devices with computing power much greater than that of mobiles. Initiatives in telecenter development and "one laptop per child," for example, are important in bringing more complex services to poor people, and have had mixed success and reviews. Unlike mobile phone penetration, these technologies have been driven more by public and nongovernmental organizations than by market supply and demand. What is clear is the importance of increasing mobile phone access and mobile-based services prior to the proliferation of broadband in the BoP, no matter which forms that eventually takes.

Connectivity and Universal Access

The first story is the dramatic global increase in ICT connectivity and use, with usage nearing universal in some developing, as well as many advanced, countries. Usage is lowest in Africa, on average, but the growth rate is highest on that continent. The poorest of the poor are still unconnected, but *quite* income-poor people spend surprisingly large fractions of disposable income on mobile phone use, including calls, messages, and other innovative techniques to communicate cheaply or for free (e.g., beeping and "missed call" messages). Research shows that poor people, like others, highly value communication for social, economic, and other benefits. Both need and effective demand exist.

Increasingly, so does supply, through low-priced business and nonprofit activity, as does public support in terms of basic infrastructure, policy and regulation, universal access schemes, and investment in the full range of public and social e-services.

So, this is a story of demand on one side, and on the other, the combination of technology and all the processes (market, public, nonprofit, political, etc.) that produce affordable supply. Connectivity is the basis on which all the potential benefits (and costs) of ICTs rest. And while major increases have taken place with mobile phones, there is still a long way to go in many countries and very poor populations—and even longer to reach global universal broadband connectivity.

Services and Beneficial Access

The second of the five related stories is that of economic and social services enabled or facilitated by connectivity, services that were referred to above: financial, business and distribution, employment, personal advancements, and public services. Well-known examples prevalent in the BOP and other populations include:

- Finance—m-banking, remittance transfer, micro finance, and insurance

- Distribution—primary producers connecting directly with markets, reduced distribution margins, and buyer oligopoly

- Employment and income—drivers and casual workers getting jobs by phone and improving their own efficiency

- Personal advancement—managing security, childcare, and home services

- Public services—telehealth, distance education, and many other e-government services

These are some examples of the new banking and financial services:

- Mobile banking started in the Philippines in the first years of this decade. For the two providers, startup investment was estimated at US$5–10 million. One processed US$123 million of transactions per month in 2006, and the other processed US$257,000 per day, as

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3. To see the literature covered, please refer to Spence and Smith (2009).

well as an additional US$28.3 million for the year in remittances (Mendes et al., 2007).

- In Kenya, Safaricom has a now larger system, with some 7 million users (*Economist,* 2009). The system in South Africa is smaller, but it is growing. In Sri Lanka, "Mobile ATM" began by using mobiles to confirm cash requests by users, who then got cash from a travelling agent; post offices later came in as cash providers.

- About 90% of the world's population doesn't use banks, and a large and growing percentage of the nonbanking population uses mobiles; the potential mobile SMS banking business appears both massive and, like connectivity, probably low margin and high volume in nature.

- Global foreign remittances now amount to approximately $400 billion, with another estimated $200 billion going unreported; SMS-based transfer systems, inexpensive and convenient, are gaining ground quickly. Potential savings on within-country transfers are even more massive.

- Phones (SIM cards) are becoming all-purpose financial transaction devices, and there is no obvious limit to related transactions: Micro-finance, micro insurance, and nonfinancial e-services are just some of these highly expandable fields.

The potential transformative implications of these innovations for poorer populations are striking, as are the business and economic opportunities in developing countries.

Openness and Open Access

The third story is one that started before open source software and "access to knowledge" became memes and micro movements unto themselves; it is the story of the larger movement that pushes for openness in all layers of society: social, economic, legal, and technological (infrastructure, software/logic, content). In some areas and countries, openness is on the rise through activities such as open source software, open government, open educational resources, open standards, and open access to journals, books, and media. Such applications of open source and open access thinking are numerous, and they are expanding in both the so-called

"developed" and "developing" contexts. Both ideology and ICTs have been major drivers in all these developments, making it possible to communicate, organize, produce, and consume more widely and collaboratively, and making "closedness" increasingly more difficult to sustain (Smith & Elder, 2010; Heeks, 2010).

There are important caveats and concerns with respect to these openness trends and their power to impact positively on human, economic, social, and political development. In some countries, they are advancing more slowly, and in terms of intellectual property protection, progress is highly contested—and too often regressive—in both developed and developing countries. Power and politics drive policy, and heavy current global economic, environmental, and security concerns often counter openness trends. Power interests also shape the contours of the newly evolving social relationships at local levels in ways that can harness the benefits for the powerful, not the poor. Ongoing research is needed to advance the positives and counter the negatives of openness trends in general, and especially in different BoP populations.

Human Development and Capable Access

The fourth story is one of human development and an increase of attention to individual, external, and group capabilities and freedoms, regarding these as highest-level development objectives. Inspired by Sen's capability approach, this movement advances combinations of economic development, social justice, and social choice—the last being of particular importance for public goods, where markets do not function adequately, or in some cases, do not function at all.

Arrow's "impossibility theorem" (formally the "General Possibility Theorem") is a result of a breathtaking elegance of power, which showed that even some very mild conditions of reasonableness could not be simultaneously satisfied by any social choice procedure, within a very wide family . . .

Addressing these problems fits well into a general program of strengthening social choice theory (and "nonobituarial" welfare economics). In general, informational broadening, in one form or another, is an effective way of overcoming social choice pessimism and of avoiding impossibilities,

and it leads directly to constructive approaches with viability and reach. (Sen, 1998)

Agency is central to the capability approach, as are opportunity and equity. Well-being is measured in more spheres (political, social, cultural, ethical) and more dimensions than just the economic ones, including education, health, security, dignity, and empowerment. Processes of building capabilities and freedoms, as well as making social choices, are critical and easily reversed through conflict, disaster, pandemic, mismanagement, and worse.

Informed public discourse is central in both Sen's writing and the capability approach, an essential ingredient taking many forms in the complex and typically difficult processes of social resolution and choice. Connections between *informed public discourse* and *(open) communications* are not hard to trace. ICTs and communications, especially at the bottom of the pyramid, intersect with capabilities and human development in other basic ways, too: Several propositions are advanced in the literature and in researchers' experiences, presenting our community with some initial evidence, but needing further exploration, both conceptually and empirically.

- Communication enabled by ICTs, notably mobiles, is instrumental in building capabilities and enhancing freedoms. The evidence for economic capabilities is substantial, as noted above. The evidence for political, social, cultural, and ethical freedoms is also significant, available in the form of a large volume of cases and anecdotes.

- Collective consumption is so extensive in communication enabled by ICT services that this communication can be considered a public good that, much like education, provides a fundamental base for expansion of capabilities and freedoms.[4]

- While this indicates a case for public investment in (BOP) access, the best approaches remain elusive: Universal service mechanisms, telecenters, laptops for all children, and other

connectivity-aimed mechanisms haven't worked at all widely yet. Lowering taxes on "budget" mobile providers and services has, however, gained support as an option.

Innovation

The fifth story is one of innovation, increasingly regarded as fundamental to development. Science and technology policy literature and, more recently, innovation systems thinking have long regarded ICT as a platform technology in a country's innovation system, similar to the conceived roles of biotechnology and (emerging) nanotechnology. ICTs, among other things, are the carriers of technological knowledge and the links that connect the essential elements of a national innovation system:

> the national *institutions,* their incentive structures and their competencies, that determine the rate and direction of technological learning (or the volume and composition of change generating activities) in a country.[5]

Lately, considerable attention has focused on innovation in and for the BoP. Innovation comes from all parts of the "system," and, here again, ICTs play critical roles as catalysts and knowledge providers, as well as platforms for and propagators of innovations. Mobile phones, for example, have enabled a range of economic and social innovations among poor populations (see also Zuckerman's contribution in this volume for an interesting, related commentary).

In this context, it is useful to distinguish different aspects of innovation in terms of *who* is innovating. For example, Heeks' (2008) categories of "for the poor," "with the poor," and "by the poor" innovation help clarify that innovation emerges through combinations of different actors. The proliferation of mobiles was accomplished through innovative (prepaid) pricing schemes by telecoms businesses (for the poor), through service providers (banking) innovating with the relatively "flexible" mobile technology (with the poor), and through poor subscribers creating innovative and unanticipated forms of use and benefit (by the poor).

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4. Networks become more valuable as they grow; the value to individual subscribers grows as their family members, neighbors, bankers, service providers, disaster warning systems, etc. are also connected. These positive collective benefits in usage are one of the main factors defining public goods and resulting in private sector under-investment.
5. Patel, P. & Pavitt, K. (1994), The Nature and Economic Importance of National Innovation Systems, STI Review, No. 14, OECD, Paris. See also OECD, National Innovation Systems, Paris 1997: www.adiat.org/documento/33.pdf

Further Interconnections

While these five narratives—connectivity, services, openness, human development, and innovation—may be different in many ways, they certainly overlap conceptually and in practice.

Openness and human development appear to be strongly connected.

- Open access raises the level of resources available to individuals and groups, which can increase their capabilities. Open content, for example, both in terms of open intellectual property and collaborative production, drastically increases the amount of information available for productive use.

- Open access also underpins new means of interaction, participation, and collaboration. Web 2.0 technologies are well known as a social collaborative platform, but simpler technologies like SMS also allow for group organization and mobilization in the BoP.

- Increased capabilities occur if individuals or groups have the internal capacity (education, health, political freedoms, etc.) to be able to use new technology resources (e.g., Warshauer, 2003). At the same time, clearly these very capacities are also enhanced by ICT usage.

- If capabilities consist of internal capacities that interact with the constraining and enabling resources, as well as with factors that the external structures (social institutions, demographic forces, culture, etc.) bestow on individuals, open access may be seen as one enabling factor in the external environment.

Human development and innovation perspectives come together in many ways:

- Both appear in many open access activities, and both are beginning to appear in the ICT policy and regulatory research work aimed at universal access. Surveys of mobile phone use at the BoP, for example, suggest that ICT-enabled communications build human capabilities and freedoms while providing economic services, as well as personal/family/social interaction and community relationships (Spence & Smith, 2009, ch. 3). For many of the poor, too, isolation is changing quickly into connectedness.

- A new strand of innovation systems research and action addresses the design of technologies for human development—cognizant that new technologies usually expand some capabilities while contracting others—and focuses on technology innovation by and for people at the BoP (ibid., ch. 5). ICT access and usage is one particular focus of this work, and it is a recurring enabler in other strands of innovation.

- Mohammad Yunus (2008) predicts that "The future of poverty, as I see it, will be decided by the technological devices and services that are designed a priori for poor people."

In applied and conceptual senses, it should not be surprising that connectivity, services, openness, human development, and innovation—or *universal, beneficial, open, capable, and innovative access* perspectives and approaches—would have a lot in common. In many ways, they may represent a range of reinforcing factors. Connectivity enables openness, which enables a greater range of capabilities, which, in turn, enables more openness and innovation. Patterns of interaction are certainly more complex than this, but there is some strength to the idea that an increase in any one enhances possibilities for some or all of the others.

Priorities for Policy, Action, and Research

1. **Telecom and ICT policy/regulation research and advocacy work,** which has been very active and effective since the beginning of the millennium, needs to continue. Crucial to all ICT-supported developments and movements is progress toward low-cost and universal access. Universal/affordable broadband access—much of it mobile—appears possible for the coming generation, but achieving it will need concerted policy, as well as new technology and business model development. ICT policy and regulation are still poor in too many countries. Further, regulation needs to keep up with rapidly changing technologies, and increasingly, to mesh with regulation in other sectors—most notably financial services—a challenge that has only begun to be addressed in most developing countries. For example, the expansion of and competi-

tion in low-cost SMS-based financial and other services poised to take off globally are priorities being held back by vested interests in too many countries.

2. **Research on mobile and ICT usage, particularly at the bottom of the pyramid,** will continue to be very valuable for informing policy, market, and social business development. Some of this research could usefully focus on ways ICTs may strengthen a range of capabilities in individual, local, and broader development contexts. Public, private, and nongovernment ICT-related investments could become larger and more efficient as a result.

3. **Open access and open source thinking and activity with an increased focus on the BoP** could be intensified usefully. What are the specific types of information whose availability would be most valuable to different BoP groups, and what models of collaborative production can enhance the most-needed services—e.g., health, education, and security?

4. **The acceptance of agency** (beyond just participation) in development initiatives becoming more general could be useful, suggesting more knowledge and networking around truly participatory service and benefit delivery models that work. While there is a substantial knowledge base here, it could be made clearer with respect to investments that are more and less transformational in terms of capabilities, and by consequence, more likely to be sustainable.

5. **Focusing innovation thinking on capabilities** looks like a valuable pursuit. Helping design both product and social technologies from the point of view of (poor) users and their capability enhancement—and agency—is challenging. Different designs can affect some capabilities positively and others negatively. Working with people in the BoP to optimize their ICT-related technologies and innovation is a promising area of research.

6. **Risk mitigation:** Ways in which ICT systems have been impacted by global financial crises and economic recessions need thought, as do ways in which ICT systems are changing with, and contributing to, renewed but altered processes of growth and development. ICT monitoring systems are beginning to show what the recent global failures have done to levels of poverty. Ongoing remedial action at all levels should not overlook communications needs and related beneficial opportunities. Nowhere is this clearer than in the need for quick action on disaster early warning and management mechanisms, for both natural disasters and pandemics. Ways in which ICTs can strengthen social safety nets, and both national and international risk mitigation capacities more broadly, merit particular attention in research, policy, and investment.

7. Finally, **global warming and carbon emissions** are problems urgently needing action. There are many areas where ICTs are particularly important in global mitigation and adaptation, including alternative energy management and energy conservation through ICT-based control systems, carbon emission measurement, monitoring and markets, and the roles of ICTs in *informed public discourse* on global warming and its solutions. ∎

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