ICT4D 2.0: The Next Phase of Applying ICT for International Development

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Use of information and communication technologies for international development is moving to its next phase. This will require new technologies, new approaches to innovation, new intellectual integration, and, above all, a new view of the world's poor.

The phase change from *information and communication technologies for international development* (ICT4D) 1.0 to ICT4D 2.0 presents opportunities for informatics professionals and offers new markets for ICT vendors. It also brings new challenges to our established methods of working and emphasizes the need for new expertise and new worldviews. Harnessing digital technologies in the service of some of our world's most severe problems requires understanding these changes. Before proceeding, though, we must ask why we should give priority to ICT application for the poor in developing countries.

First, there is a moral argument. Most informatics professionals spend their lives serving the needs of the world's wealthier corporations and individuals because, to borrow bank robber Willie Sutton's phrase, "that's where the money is." Yet seeking to squeeze a few extra ounces of productivity from firms that already perform relatively well, or save a few minutes in the life of a busy citizen, pales in ethical importance when compared to the potential benefits of applying new technology to our planet's megaproblems.

The world's poor live on the frontline of these problems. From climate change to conflict and terror, from disease to resource depletion, the poor in developing countries suffer most. They also suffer from that other blot on the global conscience, poverty, with nearly half the global population living on less than US$2 per day.

Second, there is enlightened self-interest. In a globalized world, the problems of the poor today can, tomorrow—through migration, terrorism, and disease epidemics—become the problems of those at the pyramid's top. Conversely, as the poor get richer, they buy more of the goods and services that industrialized countries produce, ensuring a benefit to all from poverty reduction.

Third and finally, there is personal self-interest. Compare designing a system for an African or Asian community to doing the same for a company in the global North. The former is quite simply more interesting—a richer, more satisfying, more colorful experience.

This explains the 4D element, but what of the ICT half? The standard response on investing in digital technologies rather than, say, a tubewell is that we need to invest in both because development requires water *and* information.

A more assertive response might give a macro-level answer: Economic, social, and political life in the 21st century will be increasingly digital, and those without ICTs will be increasingly excluded. We might also give a micro-level answer: Ask poor communities or look at how they spend what little money they have; not always, but sometimes, they prioritize the ICT option.

FROM ICT4D 0.0 TO 1.0

The first digital computer put to use in a developing country was installed in Kolkata in 1956 at the Indian Institute of Statistics for scientific calculation work. From that early start until the 1990s, computing for development focused on two application emphases. Initially, government was the key actor, and developers applied IT (ICT's precursor) mainly to internal administrative functions of the public sector in developing countries. During the 1980s, multinationals and other firms came to the fore and viewed IT as a tool for delivering economic growth in the private sector.

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Two things happened in the 1990s that gave birth to what might recognizably be called ICT4D 1.0: the Internet and the Millennium Development Goals (MDGs).

The Internet sparked a generalized upsurge of interest in ICTs, including a reinvigorated interest in how ICT might be applied in developing countries. At the same time, international development began to move back up the political agenda. This move received impetus from the search for concrete targets, emerging first as the International Development Goals in 1996, then formalized as the MDGs by the September 2000 Millennium Declaration, which sought particularly to reduce poverty while improving health and education and fostering gender equality.

The digital technologies of the 1990s, then, supplied a new tool in search of a purpose; development goals were new targets in search of a delivery mechanism. These two domains intersected and gave rise to ICT4D in a flurry of publications, bodies, events, programs, and project funding.

The 1998 World Development Report from the World Bank highlighted the role of information, knowledge, and ICT in development; the creation by the G8 countries of the Digital Opportunities Task Force in 2000 set an agenda for action on ICT4D; and the World Summits on the Information Society held in Geneva in 2003 and Tunis in 2005 acted as key learning and policy-formation points along the ICT4D path.

The key actors became international development organizations and nongovernmental organizations (NGOs) that prioritized the application of ICT to the MDGs. Centrally, the MDGs worked to improve the lives of what Prahalad called the "bottom of the pyramid": the three billion people who live on less than US$2 per day.

ICT4D 1.0

With timescales short and pressure to show tangible delivery, the development actors involved with ICT4D did what everyone does in such circumstances: They sought a quick, off-the-shelf solution that could be replicated in developing countries' poor communities.

Given that poverty concentrates in rural areas, the model that fell into everyone's lap was the rural telecottage or telecenter that had been rolled out in the European and North American periphery during the 1980s and early 1990s. Understood to mean a room or building with one or more Internet-connected PCs, this model could be installed fairly quickly; provide tangible evidence of achievement; deliver information, communication, and services to poor communities; and provide sales for the ICT companies that were partners in most ICT4D forums. Thus, a host of colorfully named projects began rolling out, from InforCauca in Colombia to CLICs in Mali to Gyandoot in India.

> **Pushing forward the Internet-connected PC will require hardware innovations in several areas.**

ICT4D 1.0 was not solely restricted to telecenter projects. But the telecenter provided the archetype for this period, which stretched from the mid-1990s forward a full decade. Sadly, these efforts often resulted in failure, restriction, and anecdote. Each of those outcomes led to specific lessons and new watchwords:

- *Sustainability.* The failure of many ICT4D projects to deliver and survive prompted a new emphasis on ensuring the longevity of such projects.
- *Scalability.* The limited reach of individual telecenter projects motivated a new search for scalable ICT4D solutions.
- *Evaluation.* ICT4D 1.0 was often held aloft by hype and uncorroborated stories, which fostered a new interest in objective impact evaluation.

More generally, these outcomes led to a rolling reappraisal of priorities, processes, and purposes. There is no sharp divide to mark the first phase of ICT4D from the second—the latter began as the first lessons were being learned back in the 20th century. Nor is there a consensus on what ICT4D 2.0 looks like—that discussion is ongoing. Nonetheless, we can sketch some of its component parts.

ICT4D 2.0

As we stand on the threshold of ICT4D 2.0, we confront the key technical question of how to deliver the Internet to the remaining five billion people who lack such access.

Back in the 1990s, the initial model serving the global North consisted of a PC connected via landline. But attempted rollouts faced major hurdles as the South's poor proved far harder to reach. The model was too costly to be sustainable or scalable. Likewise, the necessary power and telecommunications foundations were often absent. Pushing forward the Internet-connected PC will therefore require hardware innovations in several areas:

- *Terminals.* Ongoing efforts have focused on developing the type of low-spec, low-cost, robust terminal device that could work in large numbers of poor communities. The most high-profile of these is the One Laptop per Child (OLPC) project's XO and, not coincidentally, a slew of relatively similar devices is spewing forth. Despite 20 years of overpromising and underdelivering—from the "People's PC" to the Simputer—it seems low-cost terminals will be a central part of ICT4D 2.0.
- *Telecommunications.* Wireless has become the delivery mode of choice to provide connectivity to poor communities in the global South. Interest in satellite-based forms such as VSAT during

the 1980s and 1990s has given way to a focus on land-based transmission systems. In the same way, attention is turning from Wi-Fi-based systems and innovation to WiMax.

- *Power.* With only 15 percent of rural households in sub-Saharan Africa having access to electricity,[1] three areas of innovation continue to be required that take us through the power cycle—new, low-cost devices for local electricity generation; better ways to store, carry, and transmit electricity; and lower power consumption by ICT devices.

We stand at a fork in the Internet access road. We can keep pushing down the PC-based route when less than 0.5 percent of African villages so far have a link this way. Or we can jump ship to a technology that has already reached many poor communities. Mobile telephony, for example, already reaches out to more than half the African population (www.id21.org/insights/insights69/insights69.pdf).

Here the requirement for hardware innovations appears relatively limited. At least, we can say that to date the mobile phone offerings from multinational firms appear to be diffusing fairly readily. Half the world's population—stretching well down into the bottom of the pyramid—are mobile phone users, and growth rates currently are fastest in the poorest regions.

Current growth rates will likely carry usage to more than 90 percent of the world's population, leaving the key questions of how to reach the last half-billion, and of how to diffuse Internet-enabled phones, given that most phones in poor communities are currently calls-and-SMS-only. For both these questions, the need for hardware innovation might reemerge. Innovations will also occur as bottom-up developments on mobiles converge with top-down attempts to produce lower-cost PC-like terminal devices, ending with something like a BlackBerry-for-development.

Finally, some have asked if the Internet should be the focus or if developers should look at where the poor have already "voted with their wallets" and see whether the simpler, cheaper technologies already in use can deliver sufficient ICT functionality to make a difference. Rather than wait for handset and bandwidth upgrades to allow mobile Internet access, we must determine what can be achieved for development through calls and SMS and, possibly, older technologies. Access figures are hard to come by, but we can estimate that something like 80 percent of the population in developing countries has access to a radio, 50 percent to a television.[2,3]

Early in ICT4D's history, these statistics prompted the swift reinterpretation of ICT to incorporate radio and television, and foreshadowed the role convergence would play in ICT4D 2.0. Looking at the technologies that already penetrate—mobiles, radios, televisions—developers must now seek ways to add computing and Internet functionality.

NEW APPLICATIONS

Equating the poor in developing countries with illiteracy is a common mistake. Adult literacy, even in the world's poorest countries, is still greater than 50 percent, and two-thirds of 15- to 24-year-olds are literate.[4] Effectively, every community will have at least some literate members who can act as infomediaries, thus massively multiplying the accessibility of written materials, online or otherwise. Nonetheless, we require interface innovation to drive access to ICT-based information, services, and jobs in the fields of audiovisual interfaces and to create interfaces for all local languages.

Even if past and future innovations can provide access to ICT for most of the world, the hardware-plus-interface combination remains an empty husk. When filled with applications software, that husk can play four main development roles: data content handler, interactive communicator, service deliverer, and productive tool. These roles form a sort of chronology that ICT4D has moved slowly toward, closing the gap between supply and demand.

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Content

During ICT4D 1.0's debut, developers rapidly recognized that plugging a peasant farmer or slum-dweller into Google offered limited value. Much of the information they required would not emerge because it was not in digital format. A series of projects, such as Open Knowledge Network, sought to create relevant local data content focused on livelihood-appropriate issues such as health, education, agriculture, and rights.

Once media technologies like radio and television were incorporated into ICT4D, developers recognized that its noninteractive and broad-scale nature presented a lack of specific data relevance. For these technologies, the phase change to ICT4D 2.0 has been associated with *community radio*—very localized broadcasting that allows community input. *Community television* is not yet a realistic prospect, but its equivalent, *participatory video*, provides for the creation of video content by the local community, presented at individual screenings for community groups.

Interaction

Quite a fuss was made in this domain about dealing with "ICT not IT," technology "now with added C." Despite this, using technology for communication—at least, for interactive communication—has been a late arrival. This might be because, faced with the telecenter model, interaction meant e-mail, and the poor had

no one to message. Their social networks were seen as small, local, and informal.

As takeup of mobile phones proved, these networks have been extended by rural-to-urban and international migration. New technology might extend them further, thus adding to the social capital of the marginalized majority. How to do this and how best to exploit the interactive communications capabilities of digital media remains a growing task for ICT4D 2.0.

Services

Just as Web models move from informational to interactional to transactional stages, so ICT4D recently moved to look at service delivery for the poor. To date, this has targeted e-government: enabling bill payments via telecenters or helping order important certificates. The limited reach of the telecenter model constrains the impact of such innovations, and ICT4D 2.0 seems more likely to take forward *m-development*: finding ways to hang relevant services onto the growing mobile base.

Currently, this means exploiting existing functionality such as use of SMS for tasks ranging from reminding people with AIDS to take their antiretrovirals to monitoring elections. In the future, it means adding further functionality, such as banking the unbanked: using mobiles to deliver financial and banking services to those currently excluded from the mainstream.

Production

ICT seems well understood as a tool for delivering information and services to the world's poor. Where it has so far been little understood is as a tool the poor can use to create new incomes and jobs. This new productive view is partly encompassed when the poor act as authors of data content, as seen in community radio and participatory video projects. As well as delivering relevant content, these projects also empower those involved to take control of these means of production for the 21st century. This trend could now spread further to encompass all of Web 2.0—drawing bloggers, mashers, and wiki-writers from the ranks of the world's most disadvantaged, and also possibly requiring the creation of new applications.

The sense of empowering inclusion that comes from content creation is valuable. But the first priority for the poor is typically employment, which opens many possibilities. Mobiles are widespread. To date, the poor have created incomes both *around* the technology—such as selling accessories and prepay cards—and *via* the technology—by selling or taking calls.

Other, novel ICT-enabled microenterprises could be developed as well, as some telecenters have already discovered with social outsourcing: the outsourcing of IT services to social enterprises based in poor communities

(www.gk3onlineinteractions.net/en/node/79). So a priority for ICT4D 2.0 will be conceiving new applications and new business models that can use the growing ICT base—of mobiles, telecenters, and so forth—to create employment.

NEW INNOVATION MODELS

Moving forward, there are two extremes along the continuum of different approaches to technology and development. At one end is the *passive diffusion* view. Taking the lead from mobile telephony's rapid spread, this approach holds that if ICT does have a developmental value for the poor, a combination of private firms' search for profit plus the poor's search for value will make it happen. Any attempt to intervene from outside is foolish and wasteful: a force feeding of the inappropriate that will only lead to messy regurgitation. Conversely, the *active innovation* perspective feels the market will not deliver—or will deliver

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too slowly—to the poor. Hence, intervention is required in the form of innovations that will better help to meet development goals.

Given that some element of active innovation will likely remain in the ICT4D field, two key questions arise.

First, we must decide what to innovate. As the OLPC experience demonstrates, large-scale hardware and operating system innovations specifically targeted at the bottom-of-the pyramid are risky ventures, reserved only for the brave or foolish. In a moderated way, this even applies to the large private-sector players. Instead, most ICT4D 2.0 innovation is likely to occur on a smaller scale, either in adapting or applying existing technologies.

Second, we must decide how to innovate. In terms of innovation, we can identify three different modes: pro-poor, para-poor, and per-poor.

Pro-poor efforts

Pro-poor innovation occurs outside poor communities, but on their behalf. Telecenters began as pro-poor efforts and the OLPC was largely designed this way. This can be an effective approach for engaging resources from the global North in developing-country problems. However, it runs into the danger of design versus reality gaps: a mismatch between the assumptions and requirements built into the design and the on-the-ground realities of poor communities.

Various low-cost terminal devices might fall into this gap trap. Initial telecenter models did. And when there's a large design versus reality gap, the outcome is almost certain failure.[5] Hence, the widespread lack of success and sustainability reported for telecenter projects.

Nonetheless, there will still be a space for pro-poor innovation in ICT4D 2.0. For example, innovative pro-poor pricing models have worked. Prepaid plans for

mobiles have been an essential part of their uptake in the developing world, and no doubt Microsoft's US$2 Student Innovation Suite software package for developing countries will also prove popular.

Para-poor efforts

Para-poor innovation is done working alongside poor communities. Its use has grown during ICT4D 1.0 and will be central to ICT4D 2.0. The need for participative, user-engaged design processes was a key learning point of the first phase. It's a lesson the informatics discipline generally learned several decades ago, but there is always a need to reinvent such wheels when new application areas arise, filled as they are by a gold rush of new actors.

Community participation in project design is fraught with pitfalls. Who participates matters—this is often a very small, vocal, elite minority. How they participate matters—individual and group processes produce different results. Why they participate matters as well—participants often give the answers they think designers want to hear. ICT4D participation is complicated because it creates multiple divides between designers and users that must be bridged: techie versus nontechie; rich versus poor; and often a Western versus non-Western mind-set. For certain projects, the divides between urban versus rural and men versus women must also be addressed.

Per-poor efforts

Per-poor innovation occurs within and by poor communities. It was hardly a possibility in the 1990s, thanks to insufficient contact between poor users and the new technologies. This has changed in the past few years. As first mobiles, then PCs, and now the Web started to reach the poor, they have themselves become innovators, although not in the traditional laboratory/R&D sense. Rather, they are adapting and applying the technology in new ways. By and large, we have only anecdotes to date, such as these:

- *New processes*. Beeping (or flashing) communicates a message without completing the call. Street vendors use this method to receive free "I want to buy now" messages from known customers.
- *New business models*. Use of air time as currency has let mobile phones metamorphose into mobile wallets. Those who own phones in poor communities have thus been able to use them for payments or for receipt of remittances from distant relatives.
- *New products*. Backstreet rechipping of phones has been facilitated by emerging informal sector enterprises that strip and resell circuitry from high-end phones, replacing it with basic calls-and-SMS-only functionality. They then sell the resulting high-end-body-with-low-end organs as a unique hybrid for

those who want the latest look but lack the budget to match.

As the weight of such anecdotes grows, there will be pressure within ICT4D 2.0 for more systematic means to harvest per-poor innovations. This is well-practiced within the appropriate technology movement, which has already made the transition from pro- to para- to per-poor innovation, and has evolved methods for capturing and scaling new ideas from poor communities. Arguably, such methods might be enhanced during ICT4D 2.0 by adding features from open source and Web 2.0 innovation models.

NEW WORLDVIEWS

The key actors in the ICT4D field are drawn from particular disciplinary worldviews. Many of those active in the field draw from a computer science background, some from the "harder" end dealing with hardware and firmware, yet others from the "softer" ground of human-computer interaction. Such expertise is essential if ICT4D 2.0 is to deliver new technological and application priorities. It will also be an essential part of pro- and para-poor innovation.

Technocentricity

Where computer science stands alone, however, problems arise. Developers have identified the root of several ICT4D failures as stemming from their technocentric approach, dominated by an informatics view of the world. Such projects are frequently analogous with the old medical joke, "The operation was a success but unfortunately the patient died." They deliver a system that works technically but that fails to make a developmental contribution.

To move away from the failures of ICT4D 1.0, then, we must have new, broader worldviews guiding ICT4D 2.0 projects. These broader worldviews will likely come from two main disciplinary candidates: information systems (IS) and development studies.

Examining IS

During the 1980s and early 1990s, IS provided ICT4D's intellectual home. This bond has strengthened with the creation of IS discipline journals dealing solely with ICT4D; with new editorial board members on key IS journals being appointed with a specific developing country remit; and, most recently, with the Association for Information Systems' creation of a special interest group on IS in developing countries.

An IS perspective offers the means to understand many of the problems that beset ICT4D projects. Most notably, it offers models for understanding the human, political, and contextual reasons why so many ICT4D projects fail.

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It also offers approaches for addressing those factors during project design and implementation. At its widest setting, IS even permits us to step back and answer questions about the political economy of ICT4D: whose interests it promotes and what its opportunity costs are.

But the IS perspective fails in two ways. At least in part, it has lost track of the artifact, becoming so much of a social science and so concerned with context that it fails to engage with the technology.[6] It has also made few connections with the context, stakeholders, and process of development. IS tends neither to understand, nor to use the ideas of, development studies.

Examining development studies

Thus, we must turn to development studies. This discipline has so far failed to adequately conceive or support ICT4D. In part, this has happened because it turned away from technology generally in the 1980s—a counter-reaction to the "big science" and "technology transfer" ideas that characterized the by-then-discredited paradigms that had dominated development in earlier decades.

As a result, ICT4D 1.0 grew as a bubble, driven by actors external to the development field, such as IT vendors, and by a few believers within that field. But it stayed isolated from mainstream development, which remained skeptical about technology, especially new technology.

As the 21st century progresses, though, development studies is changing. Science and technology are climbing the development agenda, driven by human development champions such as Jeffrey Sachs who see technology as central to achieving the MDGs; by the central importance given to science and technology in the newly industrialized countries (NICs) like Korea and Taiwan; by Brazil, Russia, India, and China (BRIC), emerging economic powers and new aid donors; and by new perspectives on innovation that show how it can be effective in addressing the poor's problems.[7]

There are thus growing opportunities within ICT4D 2.0 for engagement with development studies. This engagement will help us understand where digital technologies fit into development paradigms, processes, and structures. Not only can this guide *posthoc* activities like ICT4D impact assessment, it can also guide *prehoc* activities that seek to understand ICT4D priorities, project design, and the implementation of good practices. A development-studies perspective thus provides guidance at both a macro and micro level, all ultimately increasing the likely contribution of ICT to development.

Integrating perspectives

We can conclude, then, that each one of these three intellectual domains—computer science, IS, and development studies—offers something to the ICT4D field. Conceptually, this means we need spaces that bring these three domains together. This has yet to be achieved and remains the key intellectual challenge during ICT4D 2.0.
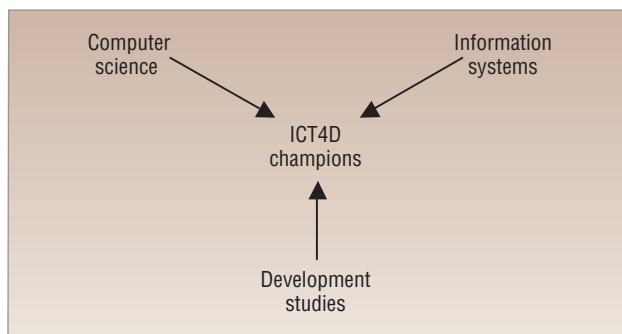

Figure 1. Creating ICT4D 2.0 champions. These tribrids must understand enough about the three domains of computer science, IS, and development studies to draw key lessons and interact with and manage domain professionals.

But some promising possibilities can be found in groupings such as the ICTD conferences, where informatics professionals address development issues, and the proposed new IFIP grouping on computing-design-for-development. Both groupings focus those at the computer-science/IS boundary on the particular needs and practices of system design in a development context. They draw on the broader burgeoning fields of design-for-development in the academic sphere and design-for-emerging-markets in the commercial sphere.

Practically, this means that ICT4D 2.0 projects need a combination of the three expertise areas if they are to succeed. That could be interpreted as meaning multidisciplinary teams. But just as important will be the issue of leadership. Here, we can extend the general finding that successful IT projects are led by hybrids that span the technical and organizational.[8]

As Figure 1 shows, we need to develop or find ICT4D champions who are *tribrids*: They must understand enough about the three domains of computer science, IS, and development studies to draw key lessons and interact with and manage domain professionals. How to create these ICT4D champions remains a challenge. Vocational training will no doubt help, as those who create master's programs in ICT4D are keenly aware. Tribrids also tend to self-create during ICT4D projects as leaders from any individual domain rapidly find themselves facing problems that only insights from other domains can solve.

Strategically, we also need to develop tribrids in ICT4D policy- and program-making. We can chart this requirement by tracing a chronology of views about ICT and development, as Figure 2 shows.

We can use this data to reinterpret our earlier chronology of technology and development. Until the 1990s—what we labeled ICT4D 0.0—most development policy- and program-makers tended to either ignore IT completely or to isolate it from the mainstream of development into separate policies and ministries. These key actors relegated IT to a marginal role, or even viewed it negatively as, for example, in the "Jobs not Computers"
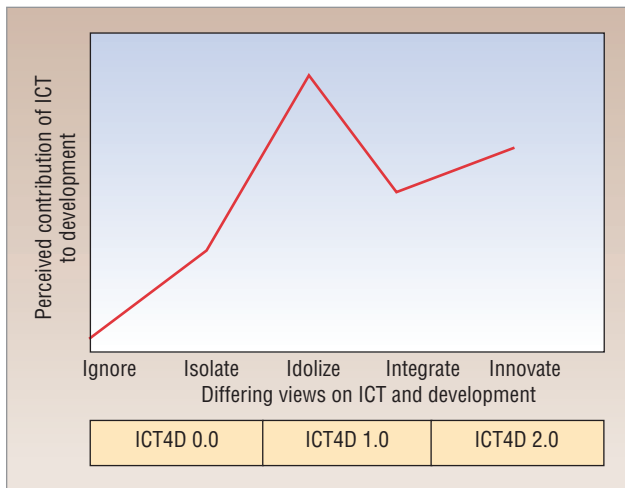
Figure 2. Changing views on ICT and development. Tracing this chronology of views about ICT and development can provide data for reinterpreting earlier chronologies.

graffiti appearing in India during the 1980s.

This view persisted among at least some development officials during the 1990s as part of a more general sidelining of science and technology. At the same time, and driven from a technical and computer-science-based paradigm that initially touched little on development studies, the ICT4D movement arose, idolizing digital technologies and placing them center stage in the development process.

ICT4D 1.0 failed to live up to its potential, spawning a reassertion of the supremacy of development studies, which drew also from IS's views on what they saw as overly narrow conceptions of computer science. ICT thus came to be *mainstreamed* within development, becoming subservient to the achievement of development goals and integrated into a long list of other tools and techniques that might prove useful. A typical formulation would start with a development goal, seek to understand the role of information and communication in achieving that goal, then ask which new technologies—if any—could help deliver that role.

In many ways, this integrated approach looks sensible. It represents where we start with ICT4D 2.0 and lies behind mantras such as "a means not an end" or "a tool not a goal" when quoted in relation to ICT4D.

But the integrated approach is problematic for several reasons. By trapping ICT as a tool serving individual development goal silos, it misses out on ICT's role as a crosscutting, linking technology. This reduces the chance of diffusing learning about ICT, increasing the danger of reinventing wheels. ICT can also now fall out of development programs because they have no overarching champions. As many gender activists will tell you, when an issue becomes "mainstreamed" into development policy, it can become synonymous for "forgotten."

Putting the ICT artifact front and center in development is highly problematic, but it also achieves things lost when ICT become subsumed through integration: a sense of excitement, motivation, and hope about development. The ability to tap into additional development funding sources, such as those of IT sector philanthropists, can also be lost.

An integrated approach typically means an information-centric one to ICT, which conceive them as tools for handling the information and communication that development requires. As a result, it seems harder to recognize and develop ICT's productive role as the potential basis for thousands of new ICT microenterprises.

Finally, the transformative potential of ICT disappears in an integrated approach. There is no question of seeing how ICT could "move the development goalposts" or "think outside the MDG box." For an example, we need look no further than the current state of mobiles in development. There are no crosscutting initiatives to learn about this new mass technology—which is only adventitiously being incorporated into development projects—or to identify its transformative possibilities. Where is the necessary MOTForce—a Mobile Opportunities Task Force to match the earlier DOTForce—without which mobiles' contribution to development will be left to the market, to chance, or just plain left behind?

Rectifying this during ICT4D 2.0 demands not just project-level tribrids, but policy- and program-level ones. These can provide a more balanced approach to ICT4D strategy, an innovative approach that pulls its plan of action from an amalgam of the key questions each domain can answer:

- From computer science: What is possible with digital technology?
- From IS: What is feasible with digital technology?
- From development studies: What is desirable with digital technology?

EVOLVING ICT4D 2.0

There is no sharp dividing line that lets us say, "ICT4D 1.0 stopped here; ICT4D 2.0 began here." On the ground, there is a sense of evolution, not discontinuity. And yet … something messy, fuzzy but new, is emerging. It makes sense to see what happens if we give this a label.

When determining the key differences between ICT4D 1.0 and 2.0, we could draw on several parallels with the concept of Web 2.0. For example, ICT4D 2.0 is about the world's "long tail"—using digital technologies to draw on the capacities of the 80 percent who hold only 20 percent of the world's resources. Or, using Eric Schmidt's "don't fight the Internet" characterization (http://radar.oreilly.com/archives/2006/07/levels-of-the-game-the-hierarc.html), we can see ICT4D 2.0's slogan as "don't fight the poor." Where 1.0 imposed preexisting designs and expected the poor to adapt to them, 2.0 designs around the poor's specific resources, capacities, and demands. Or, we can transform "the network is the platform" to

argue that while ICT4D 1.0 saw ICTs as a tool for development, the second phase sees ICTs as the platform for that development.

Alternatively, we could break things down into a chronology of ICT4D issues, as represented in Figure 3:

- *Readiness*: Having the policies and infrastructure to make ICT availability possible.
- *Availability*: Rolling out ICTs to the poor to help them become users.
- *Uptake*: Implementing and applying ICT to make it useful.
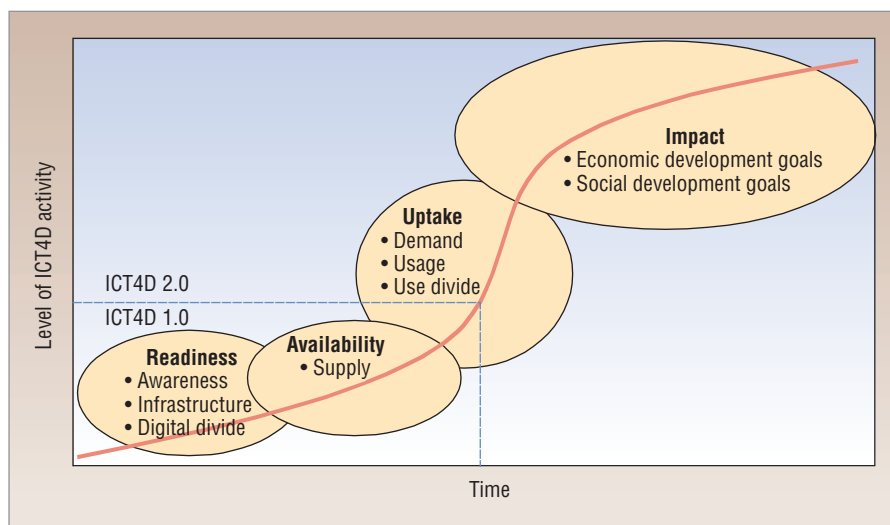- *Impact*: Using ICTs to make the greatest developmental impact.

Figure 3. Changing ICT4D issues over time. Readiness, availability, and uptake issues will remain relevant for at least a generation, but they will fade alongside greater interest in impact.

Readiness, availability, and uptake issues will remain relevant for at least a generation—probably forever as new waves of technology emerge. They present ongoing needs for innovation in infrastructure, hardware, and software. But mobiles are already a reality and Internet-connected PCs a growing possibility, particularly for the urban and peri-urban poor. So, where ICT4D 1.0 was about getting the foundations in place and establishing proofs of concept such as piloting largely supply-based uptake, ICT4D 2.0's developers can turn part of their attention elsewhere and, instead of thinking solely about pilots, can instead think more about sustainability, scalability, and impact.

They can stop thinking from a monodisciplinary perspective and instead think more from a tridisciplinary perspective that combines computer science, IS, and development studies. Finally, they can stop thinking solely about needs—often defined from outside poor communities in rather paternalistic terms. Instead, they can also think about wants—what the poor themselves actually demand and how their communities would use digital technologies if left to their own devices.

We have seen that ICT4D 2.0 focuses on reframing the poor. Where ICT4D 1.0 marginalized them, allowing a supply-driven focus, ICT4D 2.0 centralizes them, creating a demand-driven focus. Where ICT4D 1.0—fortified by the "bottom of the pyramid" concept—characterized the poor largely as passive consumers, ICT4D 2.0 sees them as active producers and innovators.

Three overarching challenges thus frame this next development phase: giving the poor the tools to produce digital content and services, offering them incentives that create new incomes and jobs through ICT, and convincing established interests to recognize the scale and value of the ICT-based innovations the poor produce. ◼

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