- PDF
- Send to a friend

Open ICT ecosystems transforming the developing world

Essay by Matthew Smith and Laurent Elder, September 18, 2009 in response to A Dialogue on ICTs, Human Development, Growth, and Poverty Reduction

This paper is forthcoming in the Journal of Information Technology and International Development.

In the years following 2008, developing countries as a whole may invest as much as US$100 billion annually in information infrastructure (Khalil & Kenny, 2008). In addition, the rapid expansion of mobile phones even in the poorer regions of the world, [1] [2] and the emergence of the 'social' (i.e., participatory and collaborative) web [3] are rapidly reshaping not only the way people access and share information, but how they relate, collaborate, and organize (Benkler, 2006; Shirky, 2008). These new technologies, most notably information and communication technologies (ICTs), offer new and transformative applications and services, means to communicate and produce content, and decentralized innovation models (Heeks, 2008). In this context of expanding ICT networks and applications, Khalil and Kenny (2008) appropriately ask: How can we catalyze the impact of ICTs on development?

The hypothesis of this paper is that open social arrangements, enabled by ICTs, can help catalyze the development impacts of ICTs. In other words, *open ICT ecosystems provide the space for the amplification and transformation of social activities that can be powerful drivers of development.* Note that an ICT ecosystem [4] is understood to be more than just a technological system; rather it is a social system within which ICTs are embedded. [5]

Defining 'open'

'Open' and 'openness' are not novel concepts in relation to human activities. Democracy and participation represent an opening up of decision-making processes to more people. Transparency and accountability represent an opening up of organizations, people, and processes to scrutiny and feedback loops. Recently, more and more activities are emerging with the word open appended to an existing term, such as open government, open access, open education, open source, open hardware, open cities [6] , and even open money. [7] As each of these activities contains similar but differing meanings of 'open', it is essential to be clear about our own definition. For the purposes of this paper, an open social arrangement consists of social relationships that favour:

*a) universal over restricted **access**;*
*b) universal over restricted **participation** in informal and formal groups/institutions;*
*c) **collaborative** over centralized production.*

Note that openness is not one end of a binary dichotomy (closed and open), rather openness is a range, from less to more open [8] (see Table 1 below for examples of openness activities). Importantly, the degree of openness in this range is a function of a variety of determinants. For example, the level of openness of particular content is generally a function of ownership, raising issues and arguments around intellectual property rights, the commons and public goods. However, property regimes are but one (important) component that determines the overall degree of openness.

Open ICT ecosystems and development

ICTs enable social change through their core mechanisms of information storage, processing and communication. Given the central role of information and communication in the coordination of social activities, it is not surprising that successive rounds of ICTs have played a role in transforming social life, from paper, to the printing press, to the telegraph and so on (Kallinikos, 2001). Each successive round of new ICTs brings new possibilities to improve or transform human activities and relationships. The openness hypothesis proposed in this paper is predicated on the emergence and diffusion of a new round of ICTs – mostly mobiles and the social web. When these new technologies constitute part of an open "ICT ecosystem" they provide a space for new social activities that bring benefits such as efficiency, innovation, and growth. [9]

Consider the increased access and connectedness that the ubiquity of mobiles brings and the novel social activities and outcomes for which they provided the opportunity. In 2001, Manila residents, angered by a perceived injustice, organized a protest using SMS that lead to the fall of the Estrada presidency in four days (Castells, Fernandez-Ardèvol, Qiu, & Sey, 2007, p. 187). M-PESA, a mobile based banking system in Kenya, provides branchless banking services to Kenyans who otherwise had no access to such services (Morawezynsik & Miscione, 2008). Governments now expand services to hard to reach citizens through mobiles (m-government) (Song & Cornford, 2006). Mobiles also allow previously disconnected farmers and fishermen to access market information in real time, increasing market efficiencies and reducing resource waste (Abraham, 2007; Veeraraghavan, Yasodhar, & Toyama, 2009). It is no surprise that mobile phone access has been linked to increased national GDP (Waverman, Meschi, & Fuss, 2005).

Likewise, consider the participatory and collaborative potential of broadband Internet with collaborative software and a legal environment that allows for the sharing of content and knowledge. For example, open source software presents potential benefits to developing country institutions such as governments and universities (Sahraoui, 2009). Although results have been mixed (van Reijswoud & de Jager, 2008), countries such as Brazil [10] have begun to mandate that the public sector use non-proprietary, open source software. In South Africa, a consortium of 18 local and international organizations has created freely accessible educational resources and course design guidance for teachers in Sub-Saharan Africa. [11] In Egypt, Facebook enabled political organizing that has been comparatively difficult to clamp down upon. [12] Models are emerging for 'apomediation' in health care: a networked, collaborative filtering process providing an alternative to a trusted health specialist intermediary between patients and useful health care information (Eysenbach, 2008). One can only imagine the possibilities as we move more towards convergence of these technologies (mobiles and social platforms).

The power of opening up ICT ecosystems comes also from the virtuous cycle that it can put in motion. As sharing and collaboration are established as norms, the benefits of sharing increase. The increased prevalence of open content keeps the price of competing content low, and collaborative models are emerging that allow for filtering and rating of content to ensure quality in the midst of potential data-overload. The establishment of standards opens up a new range of possible cross-platform activities that encourages others to accept those standards. The success of open models breeds their application to more and distinct activities. For example, businesses are discovering mechanisms allowing them to benefit from opening up proprietary information. Saif et al. (2009) have even applied the paradigm to improve Internet access by allowing users to 'share' downloaded content over peer-to-peer dialup connections. Openness breads more openness.

Indeed, openness appears to be a game changing force. Consider how Craig's List, an extremely simple web-site for classifieds ads, is undermining a traditional revenue stream of newspaper companies. [13] Or, take the recent success of the new media component of Barack Obama's presidential campaign which applied the principles of transparency, authenticity, and

participation with powerful mobilization and motivation affects. After the Massachusetts Institute of Technology (MIT) opened up their courses through Open Course Ware (OCW), it became much more difficult for competing universities such as Stanford to charge for their software. Consequently, many universities have followed suit (Smith, 2009). This opening up of content has also impacted on otherwise closed regimes. China, for example, has vacillated back and forth between the benefits of allowing access to MIT's OCW, and the potentially subversive content matter.

A story is emerging that connects open ICT ecosystems to human development, although we are just beginning to explore the possibilities. More open ICT ecosystems can massively increase the diffusion of content and the possibility for people to make sense of the information in their particular contexts. Low cost devices, open content models, and communication tools such as P2P sharing, open up both the information and communication channels that make universal access to information a less idealistic and more realistic goal. If knowledge is a driver of development (Benkler, 2006, chapter 9; Mansell & Wehn, 1998), more democratic access to information is one component of more equitable development. Furthermore, massive access and sharing makes possible the reaping of the positive externalities from each new person accessing these public goods (Stiglitz, 1999).

These open spaces also help unlock the creativity and energy for locally driven innovation. In particular, Heeks (2008) argues that per-poor innovations (by the poor and for the poor) are increasingly possible now, as they combine the flexibility of open (software/hardware) platforms and access to information with local contextual expertise. The innovative uses of mobiles to keep costs affordable for the poor such as 'beeping' and 'missed calls' (Castells, Fernandez-Ardevol, Qiu, & Sey, 2007; Donner, 2008) and use of multiple Sim cards [14] are the first sign of these new possibilities.

Of course, the flip side of the equation must be recognized: open ICT ecosystems also allow for the amplification and emergence of new socially detrimental activities. Messages of hate and intolerance and the spread of misinformation can be amplified. Possibilities and the sophistication of online crime such as fraud, piracy, and child pornography grow as systems connect and more information flows over these networks. State surveillance is expanding, often faster than the legal regimes to keep it in check, in both democratic western autocratic countries. Personal privacy is threatened as the ability to cross-reference data collected as public and private activities are increasingly mediated by connected networks. Of course, the use of new technologies for both positive and negative ends is not a novel concept, and as these examples illustrate, ICTs applied in an open context are not exempt. Indeed, crucial to any policy and practice considerations is the necessity to negotiate appropriate level of openness that balances the societal benefits with the costs. [15]

Openness at a crossroads?

Benkler (2006), Lessig (2006) and Shirky (2008) have clearly stated that the policy choices we make now, especially in the realms of technological infrastructure and intellectual property, will have enormous implications on the future of society. For example, the current design of the Internet, which has enabled innovation on such a large scale, is the result of a fortuitous convergence of historical events, inventions, policy choices, cultural attitudes, and personal ingenuity; it could have easily been otherwise (Castells, 2001). The Internet is a network with intelligence located at the end-user computers and a 'neutral' middle that treats all information flowing over the network equally providing an amazingly flexible platform for end users to innovate (Lessig, 2001). Policy and practice choices that reinforce or challenge the smart terminal and neutral middle design, such as Digital Rights Management (DRM) technologies, have important implications for the resultant flexibility and innovation possibilities provided by the system. Similarly, IP laws established now in relation to free trade agreements between developed and developing countries that do not take into consideration these dynamics may

ultimately limit the availability of important resources (such as educational content) to low-income countries. Already there is evidence emerging that this is occurring. [16] The takeaway point is this: a more sophisticated theoretical and empirical understanding of the societal benefits and detriments of more open systems are needed in order to inform current models of practice and policy that will profoundly shape the openness of our ICT ecosystem in the future.

Research implications

The argument presented in this paper suggests a research focus on a unit of analysis that works at a level above specific ICTD applications: *the new social activities and enabled by different configurations of ICT ecosystems their connections with particular social outcomes*. This will be an increasing range of new forms ICT-enabled social practices such as massive participation, collaborative production of content, collaborative innovation, collective information validation, new “open” organizational models, and standards and knowledge transfer, to name a few. These examples are modules of social practices that can be applied to solve similar problems across different development domains. For example, models of co-creation of services might be applicable with small variations in the health, education, and government services. Variations of open source collaboration techniques are applicable for generation of software, educational content, and solve problems that are traditionally difficult for relatively small teams (Shirkey, 2008).

Research is also needed on the specific dynamics of these new forms of ICT-mediated sharing, cooperation, participation and collaboration. How do you establish standards to facilitate sharing amongst groups? What are the different organizational structures that are appropriate for the desired outcomes in different domains and contexts? What are the sets of individual or group barriers to engaging, what are the incentives? What are the different cultural influences on the formation and use of these open spaces?

Finally, research needs to identify and understand the policy factors and emergent issues that shape the possibilities for and nature of future social innovations, for example, the very real tensions between increased access, surveillance, and privacy. Spam, fraud, hacking, and other cyber crime threaten the unfettered use of open arrangements and need to be effectively countered. Balance must be negotiated between creating the incentives for the continued development of technological infrastructure and ensuring that all segments of society have access to the technology. National and International IP laws must balance the need for providing innovation incentives, allowing the flexibility for new models of sharing, and not stifling creativity.

Final word

Today’s policy and technological interventions, whether they be in the form of copyright and patent laws, technological design (DRM for example) or even the roll out of mobile phones, will have profound repercussions on the extent to which communities in the developing world benefit from greater access to technology. Our assumption, as discussed, is that building openness into polices and technologies will result in greater opportunities for developing countries to transform into equitable and sustainable knowledge societies. However, that assumption needs to be tested. We certainly hope our organization and others can play a role in testing the hypothesis and therefore build the evidence base to help feed the debate on the value of “openness”.

Citations

[1] There is an estimated global penetration level of 61% for mobile phone subscriptions. http://www.itu.int/newsroom/press_releases/2008/29.html.
[2] Keremane and Kenny (2007) estimate that the mobile footprint covers as much as 77% of

the world's population.
[3] Often called “Web 2.0”.
[4] “An ICT eco¬system encompasses the policies, strategies, processes, information, technologies, applications and stakeholders that together make up a technology environment for a country, government or an enterprise.” from Roadmap for Open ICT Ecosystems, 2005, Berkman Center for Internet & Society at Harvard Law School. http://cyber.law.harvard.edu/epolicy/home.
[5] This is also understood in some literature as a “socio-technical” system.
[6] See: http://www.creativeclass.com/creative_class/2009/06/01/creating-the-open...
[7] See: http://openmoney.info/techne/index.html
[8] Shirky (2008) describes a similar range of activities as: sharing, cooperation, collaboration, collectivism.
[9] See Roadmap for Open ICT Ecosystems, 2005, Berkman Center for Internet & Society at Harvard Law School. http://cyber.law.harvard.edu/epolicy/home.
[10] http://onthecommons.org/content.php?id=543
[11] http://www.tessafrica.net/
[12] Wolman, D. (2008) The Facebook Revolution, Wired Magazine, November.
[13] See, for example : http://nymag.com/nymetro/news/media/internet/15500/
[14] http://lirneasia.net/projects/2008-2010/bop-teleuse-3/
[15] The definition of benefits and costs are often normative and yet many of the issues related to technology and openness are actually putting into question traditional norms. For example, “piracy”, which could be considered a “cost” of an open architecture by the owners of products and content, may be seen as a legitimate way to share knowledge, for which there would be broader societal benefits.
[16] See: http://tinyurl.com/ACA2K-IDRC

References

Abraham, R. (2007). Mobile phones and economic development: evidence from the fishing industry in India. Information Technologies and International Development, 4(1), 5-17.

Benkler, Y. (2006). The wealth of networks: how social production transforms markets and freedom. New Haven: Yale University Press.

Bollier, D. (2007). The rise of collective intelligence: decentralized co-creation of value as a new paradigm of commerce and culture. Washington, D.C.: The Aspen Institute.

Castells, M. (2001). The internet galaxy: Oxford University Press.

Castells, M., Fernandez-Ardevol, M., Qiu, J. L., & Sey, A. (2007). Mobile communication and society: a global perspective. Cambridge, Mass.: The MIT Press.

Donner, J. (2008). Research approaches to mobile use in the developing world: A review of the literature. The Information Society, 24(3), 140-159.

Eysenbach, G. (2008). Medicine 2.0: social networking, collaboration, participation, apomediation, and openness. Journal of Medical Internet Research, 10(3).

Heeks, R. (2008). ICT4D 2.0: the next phase of applying ICT for international development. Computer, 41(6), 26-33.
Kallinikos, J. (2001). The age of flexibility: managing organizations and technology. Lund: Academia Adacta AB.

Khalil, M., & Kenny, C. (2008). The next decade of ICT development: access, applications, and the forces of convergence. Information Technologies and International Development, 4(3), 1-6.

Lessig, L. (2001). The future of ideas: the fate of the commons in a connected world. New York: Penguin Books.

Lessig, L. (2006). Free culture: the nature and future of creativity. New York: Pengun Books.

Mansell, R., & Wehn, U. (Eds.). (1998). Knowledge societies: information technology for sustainable development: Oxford University Press.

Morawezynsik, O., & Miscione, G. (2008). Examining trust in mobile banking transactions: the case of M-PESA in Kenya. In C. Avgerou, M. L. Smith & P. v. d. Besselaar (Eds.), Social Dimensions of Information and Communication Technology Policy (pp. 287-298). Boston: Springer.

Patra, R., Pal, J., & Nedevschi, S. (2009, April 17-19). ICTD state of the union: where we have reached and where are we headed. Paper presented at the 3rd International Conference on Information and Communication Technologies for Development, Doha, Qatar.

Sahraoui, S. M. (2009, April 17-19). ICT governance in higher education: case study of the rise and fall of open source in a gulf university. Paper presented at the 3rd International Conference of Information and Communication Technologies for Development, Doha, Qatar.

Saif, U., Chudhary, A. L., Butt, S., Butt, N. F., & Murtaza, G. (2009). A peer-to-peer Internet for the developing world. Information Technologies and International Development, 5(1), 31-47.

Shirky, C. (2008). Here comes everybody: the power of organizing without organizations. New York: Penguin Press.
Smith, M. S. (2009). Opening Education, Science, 323(89), 89-93.

Song, G., & Cornford, T. (2006, October 12-13). Mobile government: towards a service paradigm. Paper presented at the 2nd International Conference on E-government, University of Pittsburgh.

Stiglitz, J. (1999). Knowledge as a global public good. In I. Kaul, I. Grunberg & M. A. Stern (Eds.), Global public goods: international cooperation in the 21st century (pp. 308-325). Oxford: Oxford University Press.

van Reijswoud, V., & de Jager, A. (2008). Free and Open Source Software for Development. Monza, Italy: Polimetrica.

Veeraraghavan, R., Yasodhar, N., & Toyama, K. (2009). Warana unwired: replacing PCs with mobile phones in a rural sugarcane cooperative. Information Technologies and International Development, 5(1), 81-95.

Waverman, L., Meschi, M., & Fuss, M. (2005). The impact of telecoms on economic growth in developing countries, Africa: the impact of mobile phones (pp. 1-21). Moving the debate forward: The Vodafone policy paper series #3.

All Access Essays

Diversity and Global Inclusion

- Understanding our Knowledge Gaps: Or, Do we have an ICT4D field? And do we want one?
  by Michael Best

- Open ICT ecosystems transforming the developing world
  by Matthew Smith and Laurent Elder

- ICT Diffusion: Have we really made any progress?
  by Sabri Saidam

Open Access

- The Need for a "Knowledge Web" for Scholarship
  by Carolina Rossini

- Opening Access in a Networked Science
  by Melanie Dulong de Rosnay

- A Take on Peter Suber's "The Opening of Science and Scholarship"
  by Jean-Claude Guedon

Open Infrastructure

- Metaphors We Regulate By
  by Rikke Frank Jørgensen

- FORWARD WITH FIBER: An Infrastructure Investment Plan for the New Administration
  by Doc Searls

View all thematic areas »

Source URL: http://publius.cc/open_ict_ecosystems_transforming_developing_world/091809#comment-0