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Technological Revolution, Evolution and New Dependencies: what's new about ICT4D?

DOROTHEA KLEINE & TIM UNWIN

ABSTRACT *This paper provides an overview of recent developments in the use of information and communication technologies for development, and argues that, while they do indeed offer new potential for resolving some of the classic dilemmas of development policy and practice, insufficient attention has yet been paid to the lessons that can be learnt from previous information and communication initiatives.*

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At the end of the 1990s and in the early 2000s there was widespread euphoria about the potential of information and communication technologies (ICTs) to have a significant impact on development. If the rhetoric was to be believed, the advent of new ICTs, particularly the internet, was about to bring about revolutionary changes in countries' development.

Today, information and communication technology for development (ICT4D) is an emerging and vibrant area of research and practice, but its successes and failures have just as much to do with evolution as they have with revolution. The cycle of invention of technology, hype around its development impacts, communal learning through failed and successful project implementation and, finally, more measured steps to integrating a new technology into development efforts has been gone through before. In this paper we position the 'new' ICT4D field in its historical and spatial context. Historically technological innovation has always played a key role in development, so much so that many early development interventions were called 'technical assistance projects', and some still are. A few innovations, such as solar-powered ovens and wind-up radios, have caught the imagination of development planners, but not since the introduction of the specialised seeds, pesticides and fertilisers of the Green Revolution has a technical innovation been judged to be able to transform whole societies in the way the internet has. However, the diffusion of the new technology has been highly uneven, both spatially and socially, as has been the diffusion of knowledge and comment on its implementation.

In this paper we use ICTs as an umbrella term that includes any communication device or application, encompassing radio, television, mobile

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phones, computers and network hardware and software, and satellite systems, as well as the various services and applications associated with them, such as videoconferencing and distance learning. In the first section of the paper, we explore why it was that new ICTs and the internet, in particular, captured the public, journalistic and expert imaginations so that such an excited rhetoric could emerge. We then adopt an evolutionary perspective and examine two areas of development thinking and work that preceded the current ICT4D debate: the relationship between technology and development, and the use of media in development. Finally, we look forward to the future of the ICT4D field.

Tracing the emergence of ICT4D as a distinct field

In order to understand the initial excitement around ICT4D, it is necessary to acknowledge that, in the past two decades, a set of inventions has profoundly changed the lives of the richer people on the planet.[1] In 1995 26 million people were using the internet[2]—in 2007 it was 1.3 billion.[3] According to the International Telecommunication Union (ITU), 21 out of 100 people on earth are now internet users,[4] but these statistics hide the gross geographical and social unevenness of the diffusion of the technology, which is to some extent related to the geographies of its genesis.

The development of the internet was preceded by a set of crucial previous inventions: the transistor (1947 in Bell Laboratories, New Jersey, USA); the silicon semiconductor, or 'chip' (1954 in Texas Instruments Laboratories, Texas, USA); new, cheaper production methods for semiconductors (1957 by a Texas Instruments engineer and a colleague, of Fairchild Semiconductors of Silicon Valley, USA); and the microprocessor (1971, at Intel Laboratories, Silicon Valley, USA). Computer hardware developed in parallel; from 1971 it became possible to build smaller computers. In 1976 the first 'microcomputer' was built (1976, at Apple Computers, Silicon Valley, USA), finding an IBM rival in the 'personal computer' in 1981, which was subsequently cloned all around the world. A user-friendly interface appeared in the 1984 Apple Macintosh, and Microsoft (founded 1976 in Arizona, moved to Seattle, USA) became dominant in software.[5]

In parallel, during the 1960s, the US Defense Advanced Research Projects Agency (DARPA) developed a network between computers at the University of California at Los Angeles, Stanford, the University of California at Santa Barbara and the University of Utah. Scientists as well as military personnel began using this and it soon supported several different networks. The base network was funded by the National Science Foundation until 1995 and then privatised. From 1992 non-profit bodies co-ordinating the network were set up to assign, among other things, domain names. The early aim for the link-ups was to work more efficiently through remote computing and access to scattered resources, but e-mail communication between network participants became the most popular usage. In 1989 a new way of organising networked computers, the World Wide Web, and a set of a flexible language (HTML) and fixed protocols (HTTP and URL) (at CERN,

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Switzerland), led to the first websites and the development of a free web browser in 1993.

From these beginnings, the internet has now come to be an everyday part of life for millions of users. Within 14 years the number of users rose 50-fold to 1.3 billion people.[6] E-mail remains the most popular application and has revolutionised the way people structure their work and social lives. With the new ease in data transfer and communication, businesses have changed their organisational structures and routines. Some governments try to offer more participatory interaction with citizens, who can now pay taxes and sometimes even vote online. Individuals who have access can look for information, do their shopping, study for a degree, do their banking, date others, plan their holidays, participate in discussion fora, post their photos and videos, swap music, play games, use social networking sites, write a blog or phone their friends online. In the richest countries access via cyber cafés was largely replaced by phone-based line subscriptions and then broadband subscription. Yet, while for example people in the UK spend on average 14 hours per week online,[7] there are still over five billion people world-wide who have never used the internet.

A parallel ICT revolution has taken place with the diffusion of mobile phones. While in 1997 215 million people were cellular subscribers, 10 years later in 2007, the number was 3.3 billion, and estimates in early 2009 suggest that there are now four billion users.[8] While simple pay-as-you go phones are used in places and by people without internet access, richer users can go online via their mobile phones. The role of mobile phones, however, has particularly been seen as offering real benefits for poor people, as, for example, with recent developments in branchless banking in Kenya.

As the technological changes occurred rapidly and profoundly affected economies, societies and individuals' lives, representatives of the international community worried that people in the global South who did not have access to such technology were being left behind. In 1997 the then UN Secretary-General, Kofi Annan, stated that:

> recent developments in the fields of communication and information technology are indeed revolutionary in nature ... In such fields as agriculture, health, education, human resources and environmental management, or transport and business development, the consequences really could be revolutionary. Communication and information technology have enormous potential, especially for developing countries, and in furthering sustainable development.[9]

He made these remarks at the first meeting of the United Nations Working Group on Informatics. Other related working groups sprang up in the late 1990s, such as the Working Group on IT in developing countries set up by the UN Commission on Science and Technology for Development (UNCSTD). An early report in 1998 commissioned by the Working Group and edited by Mansell and Wehn analysed the potential and impacts of ICTs in developing countries.[10] While they found many positive impacts, they also remarked that

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1) many people's lives in the least developed countries had been 'barely touched by ICTs'; 2) some people were negatively affected by their exclusion from the 'global information society'; and 3) some had been negatively affected by the social and economic 'dislocations' related to the technological change.[11] Rupert Brown's comparative study of computer networks in East Africa makes the point that colonial histories influence patterns of uneven development which can be reinforced by the uneven spread of new technologies.[12] Mansell and Wehn's report called for governments to develop national ICT strategies in order to maximise the benefits and minimise the risks of ICT adoption. Several governments set up multi-stakeholder working groups and some developed national ICT strategies which included addressing the regulatory framework for ICTs, public internet access points, ICT skills training and a drive towards e-government.

Companies also sought to integrate new technologies in their internal and external business processes. Some companies, the so-called dot.coms, pioneered new business models based on the internet. A speculative bubble around these new companies, which needed to grow fast to achieve the necessary network effects to generate profit, burst in 2000. However, some of the key companies to survive, such as Amazon, Yahoo and Google, joined incumbents such as IBM, Cisco, Dell, Apple and Microsoft in shaping the future global economy. Hardware and software companies competed for market share in more 'developed' newly industrialising and in less economically developed countries. They were also obvious counterparts in national ICT strategies and multi-stakeholder infrastructure and project partnerships. Using the language of 'digital revolution' and 'information superhighway', marketing professionals and politicians together ensured that the general public was aware of the significance of the crucial role of new ICTs in their societies. Academic debates around the information society[13] merged with development discourses to echo the earlier approach of development as technological modernisation in previous decades.[14]

Some of the techno-optimists[15] even suggested that developing countries in particular could benefit from new ICTs, allowing them to 'leapfrog' earlier stages of development that more economically advanced countries had undergone. For example, the Asian Development Bank suggested that, if poorer countries were to invest in this new basic technology, they could 'leapfrog' directly towards a knowledge-based economy.[16] National governments set up 'ICT-based' strategies focusing on economic development spearheaded by a competitive ICT sector (eg India, Costa Rica and Brazil) and 'ICT-enabled' strategies using ICTs across sectors to increase efficiency overall (eg Chile, South Africa and Malaysia).

There have been four main lines of criticism of the ICT4D agenda. Some, like Souter,[17] have been concerned about using limited development assistance funds to finance ICT4D projects when in some countries food security, clean water and sanitation, and electricity seemed more pressing needs for local people. Others, like Wade, warned that inappropriate technology could lead to new forms of dependency.[18] Neo-Marxists pointed to the dangers of increased social polarisation as a result of the

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socio-technological shift.[19] Many scholars did not go this far but nevertheless expressed concern about the spatially and socially uneven diffusion of ICTs—the so-called digital divide debate.[20] From this last group there sprang a movement to provide free or subsidised public access to poorer people—for example through telecentres.

In 2001 the United Nations ICT Task Force was formed, focused especially on topics such as internet governance, enabling environment, and education. Individual ICT4D projects were set up all over the world, from small grassroots activities to multi-stakeholder partnerships between donor agencies, technology companies, governments and NGOs. A host of project reports was produced that portrayed these largely as success stories, sometimes producing iconic and frequently cited examples. This stood in sharp contrast to some academic observers, who saw many of them as top-down, supply-driven projects with limited or no impact.[21] Often the more bottom-up initiatives started by local NGOs in response to perceived needs or specific struggles for justice, such as websites disseminating suppressed indigenous cultural knowledge, women's networks, consumer-led corporate watch forums, and citizens' journalism websites received much less attention at international summits,[22] but achieved much more practical good on the ground.

In 2003 the first phase of the World Summit on the Information Society (WSIS) was organised by the ITU in Geneva, and brought together 11 000 delegates from governments, donor agencies, companies and civil society from 175 countries. The second phase of WSIS took place in Tunis in 2005, with 19 401 participants. When the mandate of the UN ICT Task Force ended, outgoing secretary general Kofi Annan initiated a new group, the Global Alliance for ICT and Development (GAID), to continue the work. As a multi-stakeholder and cross-sectoral forum, the GAID brings together representatives from government, business, development co-operation, international bodies, regulatory agencies, industry organisations and unions, producers of ICT, NGOs, media, foundations, academics, and individual practitioners, but has not yet had a significant specific impact on policy or practice.

The invention and diffusion of new ICTs has had a profound impact on the lives of the more economically advantaged people, and on some poorer people world-wide. There are economic interests, political prestige, international structures and ongoing techno-optimistic discourses in place to buttress the mainstream ICT4D field within development work. However, it needs to be recognised that technology and ideology are closely intertwined,[23] and that much of the high-profile ICT4D rhetoric has championed initiatives that view development in ways that are in line with the understanding of key international donors, governments and technology companies. Typically these perspectives focus on economic growth or, by extension, on achieving the Millennium Development Goals by promoting economic growth and thereby seeking to reduce poverty.

Many different terms have come to be used to describe the interface between the use of new ICTs and development, including ICTD (information and communication technology and development), K4D (knowledge

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for development), KM4D (knowledge management for development) and ICT4D. Each of these is subtly different, reflecting the varying intellectual, economic, political, ideological and social interests of their advocates.[24] By 2005 the term 'knowledge management' had become much more widely used for 'development' purposes, pioneered in particular by the important work done by organisations such as Bellanet[25] in its support for km4dev.[26]

Our preferred terminology is ICT4D, in part because it is the most widespread term, but also especially because it places explicit attention on the '4', or what kind of development is being addressed. Rather than the 'and' of ICTD, the 'for' of ICT4D forces users of the term to confront the moral and political agendas associated with 'development'. By focusing on the '4' we are forced to make explicit what we mean by 'development'. The interplay between 'information', 'communication' and 'technologies' for 'development' is one that offers considerable intellectual and practical challenges, and it is these that this paper seeks to explore.

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Technology and development

The term Information Revolution harks back to the Industrial Revolution, a period in which a rapid pace of technological innovation preceded, with some time-lag, the lengthening of life expectancy and increase in per capita consumption.[27] The Industrial Revolution was a period of unprecedented and fast technological change,[28] where key macro-inventions spawned thousands of micro-inventions.[29] Castells argues that, among factors such as the education system, the institutionalisation of property rights, and innovative milieux, innovation took place at the fastest rate where producers and users of innovation were located close together and thus feedback loops were short. Throughout the Industrial Revolution geographies of innovation and technology diffusion were uneven, path-dependent and often intertwined with imperialist ambition. Key innovations of the Industrial Revolution, such as electricity, the internal combustion engine, the telegraph and early telephones, spread very unevenly across continents, countries and into rural areas. Key centres of innovation were Britain, Germany and the USA, with the British and other colonial powers relying particularly strongly on communication technology in building and managing spatially expansive empires.[30] The telegraph, used experimentally in 1790, depended on reliable electricity that only became widespread from 1870 onwards. Headrick argues that with this technology, as with other key innovations, the colonial rulers dissociated the geographic transfer of the technology from its 'cultural diffusion' by training only Europeans in its construction and use, and discouraged entrepreneurialism in non-Europeans.[31] As the Industrial Revolution took place, superior technological capabilities of different countries co-determined the power relations between the 'civilised' and the 'backward', the centres and the periphery, the colonisers and the colonised. Because of path dependency, those who 'came late' often stayed 'behind' while trying to 'catch up'. In the colonial era technological supremacy underpinned military, political and economic power.

In 1949 US president Harry S Truman gave his inaugural address, which is seen by many as the starting point of the modern development project. As has been argued previously in *Third World Quarterly*,[32] it becomes clear how closely intertwined notions of development were with the concept of technological progress:

> The United States is pre-eminent among nations in the development of industrial and scientific techniques. The material resources which we can afford to use for assistance of other peoples are limited. But our imponderable resources in technical knowledge are constantly growing and are inexhaustible. I believe that we should make available to peace-loving peoples the benefits of our store of technical knowledge in order to help them realize their aspirations for a better life. And, in cooperation with other nations, we should foster capital investment in areas needing development … Our aim should be to help the free peoples of the world, through their own efforts, to produce more food, more clothing, more materials for housing, and more mechanical power to lighten their burdens … We invite other countries to pool their technological resources in this undertaking. Their contributions will be warmly welcomed. This should be a cooperative enterprise in which all nations work together through the United Nations and its specialized agencies whenever practicable. It must be a worldwide effort for the achievement of peace, plenty, and freedom … With the cooperation of business, private capital, agriculture, and labor in this country, this program can greatly increase the industrial activity in other nations and can raise substantially their standards of living.[33]

Six important issues can be noted in this speech.

1. The scientific and thus technological pre-eminence of the USA coupled with a will to spread this knowledge, since technical knowledge as a resource is 'constantly growing and inexhaustible'. The express wish to share technical knowledge stands in contrast to the typical colonial powers' instinct to keep technological know-how under the control of the coloniser.
2. The emphasis on a technical fix to help improve poor people's lives without the necessity of redistribution or of US (or other Western) citizens changing their lifestyles (as material resources are 'limited').
3. The idea of leveraging technology to allow people, through self-help, to 'realize their aspirations for a better life'.
4. A self-confidence that the USA would lead the joint multilateral efforts to foster capital investment.
5. An understanding that such an effort would be co-ordinated by UN agencies.
6. A view that the effort would require multiple partners, including business (including US business) and private capital.

This was an understanding of development as technological modernisation, which was either based on a naïve belief in the positive power of technology or, in a more cynical reading, a doctrine that resulted in capital goods from

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'Western' countries finding markets overseas. These could be exchanged for primary materials from developing countries at worsening terms of trade. Development-as-modernisation was an approach that taught that technological innovation and upgrading, connected with cultural change, would help modernise economies and societies. Such societies would prosper as a result of increased growth and productivity. Later variations of the discourse would emphasise import substitution, export-led growth or, in the context of neoliberal globalisation, the need for national economies to compete in the global market. Indeed, one of the classic proponents of modernisation theory, Rostow, argued that countries had to undergo five stages to achieve economic prosperity. His second, third and fourth stage are based on increasingly sophisticated technology being developed and used.[34]

In the logic of modernisation theory, much of development assistance was technical assistance. In the case of the German development agency, for example, one form of technical assistance took the form of teaching young apprentices in carpentry or industrial automation on machinery made by German manufacturers. Sometimes the machinery was donated by the company, but it can well be asked whether this was a welcome donation of some of the most high-quality equipment available world-wide, or a calculated move to train up generations of skilled employees using German machines and thus ensuring market share for German manufacturers in a given developing country. It may well have been both. Either way, it did create, with more specialised equipment, a form of technological lock-in.

Another field, communication and information infrastructure, has long since been an area of multi-stakeholder partnerships between donor agencies, the private sector and governments. In a recent example in Afghanistan, under the auspices of the German development agency GTZ, the head of Siemens Afghanistan's Information and Communication Networks trained employees at the Ministry of Telecommunications in the use of modern IT systems. Siemens had been providing computers to the Afghan interior ministry, clinical equipment to the police academy and parts for an energy distribution plant. They hoped to win the procurement order for the provision of the television and radio infrastructure in Afghanistan. Siemens' CEO, Heinrich von Pierer, explained their motivations in an interview with the GTZ publication, *Akzente,* in 2001:

> The borderline between the state and the private sector in the division of responsibilities for socio-economic development is becoming more and more blurred. Not only are foreign companies supplying capital, but they are also providing countries with know-how, which means that they have assumed an important role in training and further education for the local population. They are creating jobs and transferring new technologies, including those for management, and are thus contributing to more affluence. So the tasks of government and private industry are complementary and inter-linked ... Siemens generally regards itself as a natural partner of the developing countries, whom we offer our co-operation in establishing the urgently required infrastructure ... Investments in infrastructure bolster the international

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> competitiveness of an industrial location and create the conditions for growth and affluence ... Privatisation is progressing hand in hand with the much-welcomed deregulation of the economy in several countries. The state is withdrawing from the infrastructure sectors. Recently, we have started to provide projects and their subsequent operation in addition to planning, delivery and construction ... We have entered several Public Private Partnerships with GTZ, including those in Indonesia [where GTZ and Siemens co-operate in training apprentices, university professors and vocational trainers in mechatronics] and Vietnam. We welcome this co-operation for several reasons. Trainees are familiarised with our technologies and can pass their know-how on to their students. Local technicians prepare themselves to handle modern processing technologies when they work for local industrial companies.[35]

Public–private or multi-stakeholder partnerships might be creating win-win situations for large technology companies and developing country governments. They also fit a technocentric view of development and a neoliberal agenda of privatisation, deregulation and roll-back of the state in the name of greater international competitiveness.

Knowledge, media and development: the roles of information and communication in development practice

There are extensive literatures on the roles of information and communication in development practice.[36] This section of the paper argues that much of this literature has not sufficiently been incorporated into discourses on ICT4D, largely because the latter have tended to be dominated by the focus on 'technologies' addressed in the previous section. Those working in the field of ICT4D, for example, have much to learn from pioneering work done on the use of film and theatre in development over the past half century. Nevertheless, new ICTs do indeed have the potential to transform media interactions, and to enable new kinds of development practice to take shape. In particular, traditional top-down models of information flows in development can be subverted by the anarchic potential offered by the internet and mobile telephony. For example, activists are using advertising clips of multinational companies for homemade parody clips on Youtube and citizen journalists are texting their reports on human rights abuses to independent news sites such as indymedia.

At its simplest information is often defined as raw 'facts' or 'data', and can be differentiated from 'knowledge', which is information that has been incorporated into human understanding and action.[37] However, in much of the ICT4D literature, the concept of 'information' is insufficiently problematised.[38] It tends to be seen as something that simply exists, with insufficient attention being paid to the interests behind its production, storage, propagation and consumption.[39] Although there is considerable overlap in the usages of the terms 'information' and 'knowledge',[40] the latter is generally seen as referring to contextualised information. Knowledge involves social interaction and the sharing of ideas. Thus those focusing on knowledge management agendas have tended to emphasise the importance of

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'knowledge' as a global common good to be widely shared, in contrast to 'information', which is a commodity to be bought and sold, often for individual profit. However, even these distinctions are less rigid than is often assumed. The increasing use of the terms 'knowledge economy' and 'knowledge society'[41] to replace Castells' notion of an Information Age[42] has further complicated matters.[43] It is not only information that has become commodified, but also 'knowledge' itself.[44] All too frequently there is a conflation between positive and normative arguments relating to these distinctions between information and knowledge. While the authors of a recent UNESCO volume make claims about what ideal knowledge societies should be like, the reality is very different. Britz *et al* thus comment that 'Africa still has a long way to go to become a true knowledge society',[45] a statement which combines hyperbolic language with generalisations across an entire continent. While we might wish that knowledge is indeed a global common good, the reality is that it too has become commodified, something to be bought and sold in the market place, in the interests of particular social, economic and political agendas.[46]

The concept of 'communication' is likewise much more complex than is often alluded to in the ICT4D literature.[47] Melkote and Steeves thus identify four distinct approaches to the social-scientific foundations of communications in the context of 'development', each with its own distinctive geography and history: the Communication Effects Approach; the Mass Media and Modernization Approach; the Diffusion of Innovations Approach; and the Social Marketing Approach.[48] Broadly speaking, much traditional communication in development practice has been concerned with conveying particular information from a knowledgeable elite, often based in the world's richer countries, to a less-well informed group of people within poorer countries, in the expectation that such information will have positive 'development' impacts.[49] All too often these top-down, externally imposed practices have failed to deliver their intended consequences. Melkote and Steves, among others, have therefore advocated a much more participatory approach to communication in development practice, involving networking grassroots approaches that can help to empower poor people.[50]

Many traditional approaches in media theory have built on these arguments to distinguish between the content (be it information or knowledge) and the carrier (the means through which the content is transmitted). However, while such a separation between content and carrier may have been appropriate in the past, the emergence of new miniaturised digital technologies means that today they are inseparably connected.[51] It is nevertheless still helpful to consider the ways in which different types of authoring, content, mode of delivery and technology interact. Traditionally much 'development'-oriented media focused on the creation by knowledgeable experts of content that was designed to be 'broadcast', initially through text, but then by radio and TV to people whose lives could be improved through the acquisition of such knowledge. Such a model was closely linked to the influential top-down models of innovation diffusion advocated in the 1970s and 1980s by Rogers and his followers.[52] However, new technologies,

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particularly the use of mobile telephony and the internet, have the potential to transform these models, enabling much greater use of individually generated content and sharing on a peer-to-peer basis. As yet, this potential has not been fully grasped, and much use of ICT has still concentrated on the production and dissemination of expert knowledge, rather than on the communal sharing of ideas in communities of practice.[53]

Much can be learnt of relevance to contemporary ICT4D practice from the work of those involved in the use of theatre, dance and the cinema in development over the past half century. Throughout the first half of the 20th century colonial regimes across the world were actively using various types of media in reinforcing their control and encouraging the adoption of new practices.[54] Much subsequent use of theatre and dance in development has continued to concentrate mainly on the dissemination of messages chosen by those in power to encourage people to change their behaviour patterns.[55] However, building in part on the work of Freire and Boal, such practices have increasingly been criticised, with new practices emerging to replace the former transmission-of-ideas model with an approach that uses input from local communities to help develop local solutions.[56] Exciting initiatives that have emerged from these new approaches include the innovative use of theatre to contribute to the resolution of social issues surrounding HIV/AIDS in Africa,[57] and responses to environmental 'disasters', as in Taiwan.[58] Ahmed has captured the inherent complexity and contradictions involved in implementing theatre for development practices in his study of the use of theatre to address critical social issues in Bangladesh.[59] Critics point out that much of the funding for such initiatives comes from international donor organisations, and such activities therefore tend to serve the interests of 'globalisation in the name of poverty reduction': 'the NGOs are caught in the contradiction of either empire building for self-sustenance or serving as pseudo-mercenaries for survival. Through subtle manipulation, the interests of multi-national capital determine the donor's agendas, which in turn determine the issues taken up by the NGOs in their plays—all in the name of the people.'[60]

Despite such warnings, the majority of ICT4D initiatives funded by donors and governments are still bent on propagating top-down messages, mainly via radio and television, that are deemed to be appropriate by international development agencies, national governments, global corporations and those in other positions of power.[61] Moreover, many successful and valuable TV and radio programmes, such as the highly effective multi-media health promotion and social change project 'Soul City' in South Africa,[62] or the award winning *Makutano Junction* television drama series in Kenya produced by the Mediae Trust,[63] remain primarily concerned with broadcasting the messages deemed to be valuable by those who fund and produce them, rather than necessarily about the main needs and interests of the people for whom they are intended. In these two examples, the popularity of the programmes does suggest that they are indeed providing valuable content, but in many other instances there is little evidence to support such an assertion. The plethora of development focused websites, CDs and videos that remain rarely visited or used is testimony to the many inappropriate,

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albeit well-intentioned, ICT4D initiatives that continue to be initiated. At the same time, short activist videos on YouTube, like the 'Stop the clash of civilizations' clip promoting peace in the Middle East, produced by the online activist group Avaaz, which reached 2.4 million viewers in 2009, can develop impressive momentum.

This raises one further issue that it is important to discuss, namely whether people do indeed have rights to information/knowledge, and if so what the implications are for the debate over whether information and knowledge are global common goods or commodities. Over the past two decades there has increasingly been a shift from approaches to development based on 'needs' to ones based on 'rights'. As Cornwall and Nyamu-Musembi suggest, most of those organisations advocating such a position 'see a rights-based or human rights approach as a catalyst that can transform the practice of development from a focus on identifying and meeting needs to enabling people to recognise and exercise rights'.[64] However, as they go on to point out, delivering such approaches in practice is extremely difficult, given the current structure of international development assistance.

Within the field of ICT4D there has been almost unanimous acceptance of the principle that people have a right to knowledge and information. The first paragraph of the Declaration of Principles emanating from the World Summit on the Information Society in Geneva in 2003 thus asserted that the assembled representatives of the peoples of the world:

> declare our common desire and commitment to build a people-centred, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting their sustainable development and improving their quality of life, premised on the purposes and principles of the Charter of the United Nations and respecting fully and upholding the Universal Declaration of Human Rights.[65]

Although these principles did not explicitly state that information and communication are basic human rights, they came close to it in asserting that:

> Communication is a fundamental social process, a basic human need and the foundation of all social organization. It is central to the Information Society. Everyone, everywhere should have the opportunity to participate and no one should be excluded from the benefits the Information Society offers.[66]

Despite such fine words, little progress has actually been made in enabling the poorest people and most marginalised communities to gain such access. To be sure, as the section above on technologies has emphasised, some progress has indeed been made in improving infrastructures, notably mobile telephony networks, to enable people to communicate and access information more effectively, but there remain very significant disparities in the cost of access to information in different parts of the world.

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While internet access is indeed growing in Africa, it remains prohibitively expensive for all but a few users. Moreover, increasing competition between those countries seeking to benefit from the 'knowledge economy' is leading to an ever greater premium being placed on the value of knowledge, be it the cost of education or access to innovative ideas. To this end we need much more research on identifying exactly what the information and communication needs of the poor actually are, and how they can best be met.[67] The ensuing section examines some of the ways in which these issues may be resolved.

ICT4D—steps forward

This section builds on the comments above concerning technology, knowledge and media, and explores three themes that offer positive and practical ways in which poor people may be able to use ICTs to transform their lives: crafting collaborative partnerships, moving beyond the economic agenda, and developing appropriate business models.

Crafting collaborative partnerships

Much has been written about the value of partnerships in delivering 'development' initiatives, particularly within the field of ICT4D.[68] Indeed, the complexity of such initiatives, requiring high levels of technical expertise, understanding of development agendas, and an ability to deliver programmes on the ground that will indeed benefit poor people and countries, is one of the main reasons why multi-stakeholder partnerships between governments, the private sector, donors and civil society organisations have often been advocated in this field. There nevertheless remain strident critics of such programmes, both on theoretical and practical grounds. Martens, for example, has argued eloquently about the dangers of the private sector becoming ever more closely involved in global decision making, particularly within the UN system, and he cautions about the implications of unelected people, driven largely by the profit motive, having an increasing voice in such arenas.[69] As an alternative to large for-profit companies, representatives of the free and open-source software (FOSS) movement have sometimes played a role as partners in ICT4D projects. Their involvement reaches from fully free and non-commercial solutions developed by volunteers in project networks to models in which the software is freely available without licence fees but service and maintenance are charged for by the small businesses who develop it to mixed solutions which combine a FOSS software with hardware provided at low cost by large technology companies, such as in the case of the One Laptop Per Child (OLPC) Initiative.

On practical grounds it is striking how few partnerships with the private sector have actually delivered effective and sustainable benefits for the neediest of the world's peoples. Until recently one of the main difficulties in judging the success of such ICT4D initiatives was a dearth of effective instruments for their monitoring and evaluation,[70] but recent reports have

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highlighted the fact that, despite their rhetoric of success, many such partnership initiatives have failed to deliver any real 'development' outcomes. An important, if preliminary, review of the New Partnership for Africa's Development (NEPAD) e-Schools project being implemented in six schools in each of 16 African countries by private sector partners, led by AMD, Cisco, HP, Microsoft and Oracle, has thus been highly critical.[71] Perhaps most damning of all were the criticisms that these initiatives failed sufficiently to draw on previous experiences in the field, and did not place sufficient attention on crafting effective multi-stakeholder partnerships. These criticisms apply equally to many other recent ICT4D initiatives.

Despite such problems, it remains critically important to engage all relevant stakeholders in the delivery of effective ICT4D programmes for four main reasons: the complexity of implementing appropriate and effective solutions requires a diversity of expertise from different partners; given the novelty of such solutions, it is important that people are sufficiently trained to ensure their delivery, and collaboration between partners is an effective way of implementing such capacity development; many such initiatives are costly to implement, and the diversification of funding available through partnerships can help to secure this; and there are significant synergies, particularly in the context of achieving shared understandings, from which all partners can benefit.

Such partnerships nevertheless need to learn the lessons of past failures to help ensure future success.[72] Seven interconnected principles are particularly important in guaranteeing such success: they should be based upon clearly identified and relevant development *needs* of specific user groups; they require *charismatic leaders and champions* who are able to bring together the many different stakeholders involved; they require the establishment of *trust* between the different stakeholders; they need to focus from the start on the *sustainability* of the initiative beyond any initial input of resources; they should be founded on a *transparent ethical framework* that openly acknowledges the contributions and expectations of the various partners involved; significant effort should be put into *sustaining the partnership* and its constituent networks; and they should have mechanisms in place whereby the *needs* of users can effectively be matched by the *contributions* that the different partners can offer.

Beyond economic growth

As discussed earlier in this paper, the role of ICTs in development practice has often focused primarily on their role in helping to promote the economic growth agenda enshrined in efforts to deliver the MDGs[73] by eliminating poverty through economic growth.[74] A recent UNCTAD report on *The New Paradigm of ICT* has thus concluded that 'It is now well established that technological progress and innovation are the long-term drivers of economic growth. In the context of a global knowledge economy fuelled by the fast pace of technological innovation, it is important for developing countries to lay good foundations for building their capacity to acquire and create

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knowledge and technology, in order to take advantage of the opportunities offered by globalization and, at the same time, to address emerging global challenges.'[75] But, as Best and Kenny suggest, 'This is not, however, to suggest that ICTs are a silver bullet to solve the problems of underdevelopment'.[76] For those who see 'development' as being concerned as much with empowerment as with growth, and as much about social and political agendas as about economic ones, much more work remains to be done in garnering the potential of ICTs to transform the lives of poor people and marginalised communities, including people with disabilities.[77]

ICTs are already being used, and subverted, in line with a variety of purposes. Many governments are thus now using sophisticated ICTs to gain unprecedented amounts of information about their populations, as the example of the controversial introduction of biometric data in digital identity cards illustrates. Nevertheless, while new ICTs are thus clearly being used by those in power to enhance their control, they do also have the potential to challenge the abuses of such power. The use of mobile phones to monitor election practices in Nigeria in 2007,[78] their use by Barack Obama in the 2008 US presidential election,[79] and their use for casting ballots in the South Korean presidential nominations by the United New Democratic Party in 2007 all indicate new ways in which technology can be harnessed in the interests of democracy. Large retailers like Walmart are likewise using Radio Frequency Identification (RFID) tags to monitor products along their value chains.[80] Once RFID tags are included in every product wrapping, companies will be able to use the data to monitor individual buying habits and build consumer profiles with greater ease. The same tagging technology could be used by consumers to monitor companies' business practices along those value chains. So far, civil society initiatives like Buy-it-like-you-mean-it (http://www.bilumi.org) and academic projects such as the Fair Tracing Project (http://www.fairtracing.org) have successfully subverted barcode technology to provide consumers and producers with more information about a product and the company behind it.[81] More radically, as argued in the concluding sections below, the use of blogs and social networking forums on the internet has indeed enabled bottom-up, participatory and to a degree anarchic communities to form and mobilise in their efforts to subvert the ICT-enabled systems of control that are increasingly being imposed by those in power.

Scaling up, sustainability and effective business models

Many ICT4D initiatives, especially in Africa, have been designed as pilot projects to test out a concept, with the intention of it then being rolled out at scale. This was, for example, the original intention of the NEPAD e-Schools project, and it has also been at the heart of other private-sector led initiatives such as the World Economic Forum's Global Education Initiative's activities in Jordan, Egypt and Rajasthan.[82] The plea that is heard all too often from private sector partners once an ICT4D concept has been 'proven' to be successful at a small scale is then 'How can we make this go to scale?' or

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'How can we make it sustainable?'. Invariably the private sector hopes that governments or donors will cover the costs of such a rollout, without sufficiently realising the inherent contradictions involved therein. It is relatively easy to deliver pilot projects, especially when they are high-profile and have the support of senior figures in the private sector and government. Such projects cannot be seen to fail, and additional resources are frequently pumped into ensuring their success. However, implementing computer-mediated learning in a few schools is a fundamentally different task from rolling out such technology to every school in a country. The much-vaunted OLPC[83] programme, for example, is rolling out 5000 computers (valued at around US$940 000[84]) in four schools in Ethiopia. It is estimated that there are some nine million out-of-school children in Ethiopia: just to furnish each of them with one of these laptops would therefore cost US$1692 million, let alone counting for the costs of providing training or support, or indeed of giving them to every child who is actually in school. Regardless of the potential value of such an educational resource,[85] the sheer costs and scale of the roll-out seem completely impracticable.

In contrast, there are increasing numbers of initiatives now focusing on delivering services to relatively poor people who can afford to pay only small amounts for the benefit thereof. Typical of these is the LifeLines India initiative developed by OneWorld Asia in partnership with British Telecom and Cisco.[86] Here farmers pay a small fee of only five rupees (US$0.12) to access information about agriculture and animal husbandry issues by telephone. In late 2008 the service was apparently being used by some 100 000 farmers from 2066 villages across India.[87] Likewise, in Africa, where mobile phone sales have increased dramatically, there is considerable potential to use mobile networks to provide services, such as mobile banking,[88] for relatively poor users. In this context, innovative initiatives such as kiwanja's FrontlineSMS, which provides SMS-based communication for grassroots NGOs, turning a laptop and mobile phones into a two-way messaging hub, offer very real opportunities.[89]

Three lessons from these comparisons seem to be particularly pertinent. First, sustainability issues must be built into any ICT4D initiative from the very beginning. Second, if activities are to be developed from which poor people are intended to derive benefit, it is crucial that they are implemented at costs that these people can afford. At present it seems likely that the most cost-effective and widespread mechanisms for so doing will revolve around mobile telephony.[90] Third, new and innovative business models need to be developed to deliver services to the very large numbers of people who can afford little, rather than the few who can afford much.

Conclusions: what's new about ICT4D

Among the interconnected areas where the hype of ICT4D seems to have changed little, are the ways in which development is defined, a failure to learn from previous initiatives, and the tendency for development practice to be top-down and supply led. As the above sections have highlighted, ICTs can be

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used to reinforce the position of those in power, be they individuals, companies or countries, but they can also be used to subvert that power. Technologies have often been used to fit the ruling paradigm, so it is not surprising that, under a dominant neoliberal paradigm, the internet as a global network has been used towards creating a global, deregulated, ultra-competitive marketplace. If poverty is really to be addressed, there needs to be a profound shift away from the current focus on private-sector led economic growth; instead focus should be on initiatives that explicitly address the needs and choices of the poor. Likewise the lessons of past development initiatives must be learnt, be they the long history of media engagement in development or the more recent emphasis on partnerships. Just because computers and mobile phones are new, there is no reason to ignore the strong corpus of evidence indicating that externally imposed, top-down and supply-led programmes usually fail to bring significant and lasting benefits for the world's poor.

This is a David against Goliath struggle. Despite some garage-to-riches stories enabled by the potential for exponential growth of customers in a global network, in this more mature period of internet development, size still matters in the new economy. Larger companies' market share, marketing budget and economies of scale present a challenge to smaller competitors, while governments' power to negotiate deals with ICT companies heavily depends on the size of the domestic market they control. The IT industry itself is geographically highly uneven. The places where innovation takes place, where the industry is regulated, where it is written about (this includes the ICT4D discourse), and where strategic decision making is happening are distinct from the places where hardware components are produced and assembled, call centres operated, more generic coding takes place and products packaged, and again distinct from all the places ICT and ICT-related products and services are sold. While some middle-income countries such as South Korea, Singapore, Brazil and South Africa have been able to position themselves favourably in this global division of labour, the countries where the world's poorest people live (except for India and China), remain mainly receivers, not co-producers of the new technologies.

There are, however, at least four areas where new ICTs may indeed be able to move beyond the constraints of past development theory and practice. First, the speed and power of new digital technologies provide an opportunity for activities to be undertaken at scales not previously envisaged. While such attributes of the internet have previously been used, for example, to support the rapid circulation of capital around the world's financial markets, thereby enhancing global capitalism, they can instead also be used to serve the interests of the poor. The research now being undertaken on the 'Base-of-the-Pyramid' approach to poverty alleviation offers considerable potential, since new ICTs have the ability to reach very large numbers of people at relatively low cost, provided that the infrastructure and access can be made available.[91] This requires governments of poor countries and donors alike to concentrate special effort on delivering reliable electricity and digital connectivity across the globe. Until this happens, people who are geographically or socially marginalised will continue to be further

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disadvantaged by ICT4D. If energy and connectivity can indeed be made available, new ICTs can enable business models based on very low profit margins per unit transaction, but very high volumes. These poor-friendly business models could be at least as successful as those more usual models that have sought to maximise profits per individual transaction.

Second, the networked and decentralised nature of the internet has given rise to new thinking about co-operative and collaborative models of creating software and content which can create more democratic forms of interaction and knowledge production. The most surprising thing about open-source software is not that it has not gained more market share against dominant proprietary models, but that it has survived and is continuing as an alternative for users. The digitalisation of content makes it easy to duplicate and disseminate, and the loss of control of commercial intellectual property rights greatly worries many publishers of music, film and indeed academic books and journals. Yet it has given rise to new forms of content designation as part of a 'creative commons' that has allowed less established singers, song-writers, film-makers, journalists, academics and artists to compete on a different, and potentially more level, playing field. Quality assurance concerns aside, this has democratised the creation of knowledge, and created the potential for a different kind of geography of knowledge creation. The content produced on the Spanish version of Wikipedia or Youtube originates from geographically and socially different locations from those of the content of the Encyclopaedia Britannica and CNN.

Third, advances in mobile telephony offer enormous potential for the democratisation of digital technologies. The very rapid adoption of mobile phones across Africa in recent years is testimony to the way in which people across the continent express a demand for them, and are willing to pay for the services. Recent research among university students in Iringa, Tanzania, for example, indicated that many of them were paying as much as five times the amount that they were spending on food on their mobile phone connection charges. Being able to call their friends and family, often in very distant parts of the country, is thus of very great value to them, and reflects the considerable social importance of new ICTs. Likewise in Bangladesh the success of the Grameen phone programme, which enables women in villages to earn an income from providing phone services to their neighbours, is indicative of the innovative solutions that have been created to enable people to communicate effectively and at relatively low cost.[92]

The importance and potential of mobile phones, especially for simple SMS messaging, is reflected in the Frontline SMS website, which asserts that 'Patients now receive SMS reminders to take their medicine, saving time and money travelling to local clinics. Farmers receive details of market prices and demand for their products before heading off to market. National parks communicate details of dangerous animals, providing an early warning system to mitigate human/wildlife conflict. Young people living in the slums of Nairobi receive texts alerting them to job opportunities in the city.'[93] Moving on from mobile phones to mobile devices more generally, in the future, as miniaturisation and increase in processing power continue, it seems likely that people will switch

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from computers and laptops to using powerful, small, multifunctional devices for their information and communication needs.

A fourth area where ICT4D does indeed offer something entirely new is through the rapid expansion of citizens' journalism, social networking and blogging environments that enable people to communicate and make information available across the world more or less instantaneously. The new technologies permit quick and cheap forms of self-expression in text, photos and video, and thus enable those online to hear and express diverse voices. The full potential of these new technologies for development purposes has yet to be developed fully. Indeed, just because people have information does not mean that they can leverage it successfully. Political newslists, such as avaaz.org with its 3.3 million members, have been highly successful at raising hundreds of thousands of signatures on global e-petitions. Whether they can truly have an impact on G8 negotiations on climate change, influence Chinese government policy on Tibet or affect the Israel–Palestine conflict, however, remains to be seen. Nevertheless, the internet has provided a completely new media environment where traditional centralised broadcasting must now compete, at least in theory, with the propagation of information by anyone with access to digital connectivity. The decentralised nature of the internet makes it harder to police content on it. Authoritarian governments rely on their agreements with private sector software companies and service providers who are keen to enter new markets and collaborate with governments to deny citizens access to parts of the internet. At the same time activists are constantly challenging state and private sector control of the internet, and the free and public online spaces have been particularly valuable in sharing information about abuses of political power, and in protest movements across the world. This includes dedicated NGO websites such as the webpages of Amnesty International, political blogs and citizens' journalism sites such as indymedia.org, as well as activist or subversive uses of mainstream sites such as Facebook, Second Life and Youtube.

Some of the most exciting new roles for ICTs are as much in the political, social and personal realms as they are in the economic. It is indeed the multipurpose nature of ICTs such as the internet and mobile phones that make them enablers not just of the business plans of large companies and power fantasies of governments, but of the hopes and choices of grassroots NGOs, micro-entrepreneurs and individuals who use the technologies in their own ways.

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