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## **Do Information and Communication Technologies (ICTs) Contribute to Development?**

Richard Heeks

### **Introduction**

Every year, developing and transitional economies spend in excess of US\$800bn on information and communication technologies (Heeks 2009a). Even Africa, the world's poorest continent was likely to spend over US\$60bn in 2010 (WITSA 2008): the equivalent of around US\$60 per head. Such per capita figures are easily superseded: those outside the richest quartile who own mobile phones in Africa spend 11-27 percent of monthly income on them (Gillwald & Stork 2008). For example, in rural Tanzania, average spend is US\$22 per month; some 20% of total income and such that around half report "they sometimes substitute important needs (e.g. education, buying food, and clothes) for mobile phone ownership/usage" (Mpogole et al 2008:7).

Much of this expenditure will find its way from developing to developed countries; the latter being home to most of the world's ICT multinationals. Conversely, ICT-related development and investment funds flow from North to South. The World Bank Group invests around US\$800m per year in specific loans and guarantees on ICTs and development, and US\$1-1.5bn per year on projects with significant ICT components (World Bank 2009a). Private sector investment in Africa on mobile telephony alone runs at about US\$10bn per year (Heeks 2009a).

From the individual through the organisation to the nation and beyond, then, huge sums of money are being spent on ICTs. But what is the contribution of all this expenditure to development?

That can be answered in certain terms fairly easily, if we see infrastructural development as a fundamental part of broader development, and ICT as a fundamental part of infrastructure. In 1998, one of every 100 inhabitants in a developing country was an Internet user (ITU 2010). By 2008, that figure was nearer to a sixth of the population – 15 per 100 – with a 21 percent annual growth rate. The rise for mobile phones has been even greater: the number of subscriptions was equivalent to 2 percent of the developing world's population in 1998 (ibid). Ten years later in 2008, that figure had risen to 55 percent, with a 26 percent annual growth rate.

Estimates suggest that actual ownership of mobiles might be around three-quarters of the subscription rates (due to lapsed and multiple subscriptions), but that actual usage might in turn be twice that figure (due to shared usage of mobiles) (Heeks 2009b). These estimates suggest usage rates of mobiles in excess of 80 percent of the

population of developing countries; a figure supported by field data from the lowest-income group in a sample of Asian countries suggesting 95 percent of adults had made at least one phone call in the previous three months (de Silva et al 2008).

So the development contribution of ICT investment in terms of technological infrastructure, diffusion and even usage has been dramatic. There are of course enormous inequalities that remain. Access inequalities of location, age, gender, education and – often underpinning all four others – income; have not gone away. The kids growing up as "digital natives" in suburban Bangalore are far removed from their counterparts in the "bit-less deserts" of remote rural Africa. Yet even these blanks on the map are fast being coloured in: it is estimated that, by 2013, over 90% of Africa's population will be covered by the mobile network (Denton 2008).

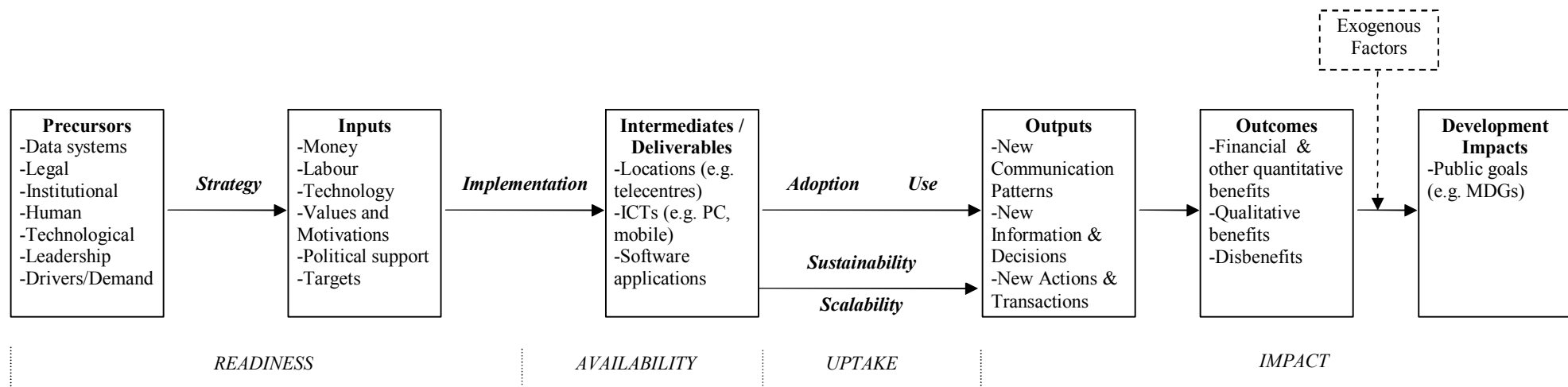
### **Beyond Infrastructure: The ICT4D Value Chain**

Digital technologies have therefore spread very rapidly into developing countries, leading to a situation that looks very different from just one decade ago. It seems reasonable to paint an overall picture in which the Internet is increasingly widespread in developing countries; and mobile phones are close to ubiquitous.

But infrastructure and access are only the starting point in understanding ICTs' contribution to development; they are inputs whereas our real attention should be focused on outputs.

To make the connection between the two, an obvious device would be a value chain, such as the one shown in Figure 1 (Heeks & Molla 2009). This builds on a standard input—process—output model to create a sequence of linked ICT4D resources and processes. It can be divided into four domains:

- **Readiness:** the systemic prerequisites for any ICT4D initiative; both the foundational precursors that we might conceptualise mainly at the national level such as ICT infrastructure, skills and policy; and the more specific inputs (both "hard" and "soft") that feed into any individual initiative.
- **Availability:** implementation of an ICT4D initiative turns the inputs into a set of tangible ICT deliverables; typical among which might be a telecentre (with publicly-accessible Internet-connected PCs) or mobile phones.
- **Uptake:** the processes by which access to the technology is turned into actual usage; also noting that key concerns around this process and its ability to contribute to development have related to the sustainability of this use over time, and – for various innovations that are prototyped – the potential or actuality of scaling-up (Walsham & Sahay 2006).
- **Impact:** which can be divided into three sub-elements:
  - *Outputs:* the micro-level behavioural changes associated with technology use.
  - *Outcomes:* the wider costs and benefits associated with ICT.
  - *Development Impacts:* the contribution of the ICT to broader development goals.



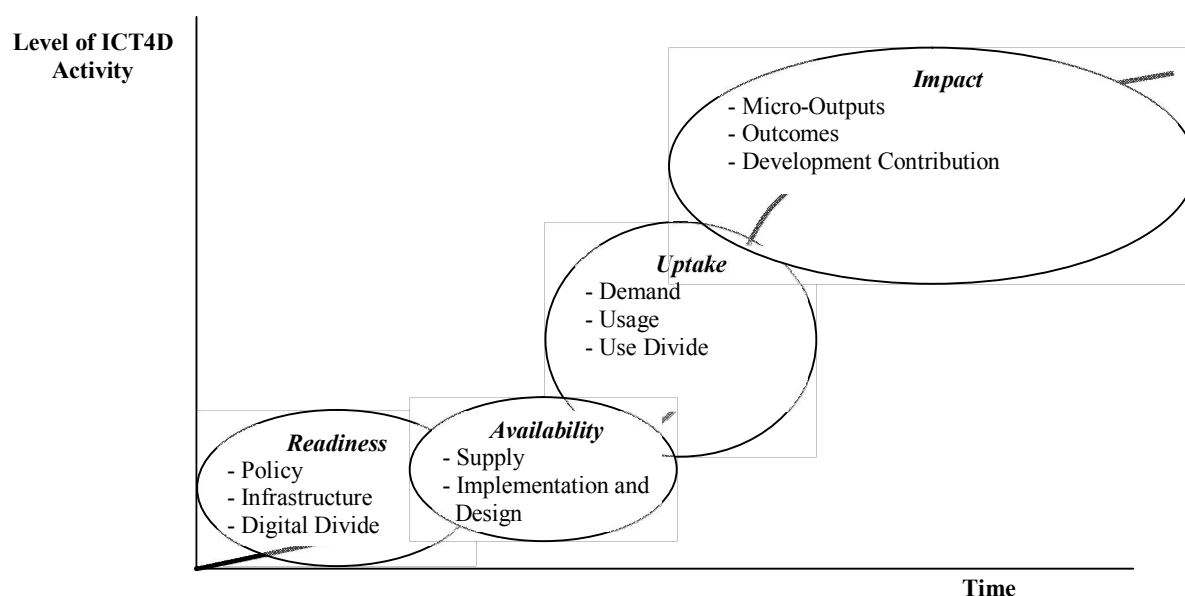
**Figure 1: The ICT4D Value Chain**

Interest in these domains among the ICT-for-development community has changed over time. One way to trace this is through four staging posts:

- The Digital Opportunity Taskforce (DOTForce) arose from the 2000 G8 summit in Okinawa. In 2001, it produced its "Digital Opportunities for All" report which encompassed four focal areas (DOTForce 2001). Three – readiness, connectivity and human capacity – were related only to the Readiness domain; and one – participation in e-networks – looked mainly at Readiness and Availability issues.
- In 2003, the first World Summit on the Information Society was held in Geneva. Its main report was, tellingly, entitled "Building the Information Society" (WSIS 2003) and not surprisingly the main focus was on building ICT connection and access; again looking mostly at the Readiness and Availability domains.
- The second World Summit on the Information Society was held in Tunis in 2005. Unlike its predecessor, its agenda did start to talk about impact (WSIS 2005). It still had a strong focus on precursors like financing and governance, but it included additional discussion about the actual application of ICTs, thus starting to encompass the Uptake and Impact domains.
- The largest subsequent meeting was the GK3 event in Kuala Lumpur at the end of 2007. It was shaped by twelve main sub-themes (Gerster & Weigel 2007). Analysing these shows a fairly even spread across the four domains, though with Impact by now the largest single focus, followed by Availability.

There has been no subsequent comparable single event in the area drawing together thousands of participants; rather, a growing number of smaller events drawing several hundreds. However, a useful bellwether is the Information and Communications for Development Report produced by the World Bank. In its 2009 edition, the ratio of mentions of "readiness" to "impact" was 1:35 (World Bank 2009b).

Such evidence is best seen as straws in the wind rather than definitive, but it does suggest a similar pattern to that seen in other areas of ICT application (Heeks & Molla 2009), and summarised in Figure 2.



**Figure 2: Changing Focus of ICT4D Priorities Over Time**

Whatever the exact shape of the graph, it reflects the relative lack of attention that has been paid to ICTs' contribution to development until quite recently. This has led to numerous calls for more such attention to be paid (e.g. McNamara 2003, Kenny 2006, Souter 2007). The relative lack, but recent emergence, of work on this topic is the main impetus for this special Policy Arena.

### **Assessing ICTs' Contribution to Development**

The objective rationale for impact assessment of ICT-for-development investments is the same as one might find for any investment (Heeks & Molla 2009). It will be some combination of: a) retrospective achievement – post-hoc assessment of what has been achieved from investments to date; b) prospective priorities – pre-hoc assessment of future development project investments; c) accountability – enabling agencies to be held to account for their ICT4D spending.

The particular rationale for ICT4D specifically to be evaluated derives in part from the large and growing levels of investment noted above. But it also has a more political and subjective impetus: the history of ICT4D (see box 1) which has cast a long shadow, and the felt need for those within the "ICT4D community" to prove the value of their work to the "development mainstream"<sup>1</sup>.

#### **Box 1. A Short History of ICT4D**

Information and communication technology has experienced a particular diffusion cycle within development; a cycle that can be characterised as heavy over-promising followed by noticeable under-delivery. This is characteristic of the early course of each development "silver bullet" that emerges every few years (Healey 2002, Waage 2010). But ICT has perhaps been an especially marked case, launched via a series of reports and events that were strong on promise and hype; reeking of "technology boosterism and cyber utopianism" and seen as the tool of Northern private sector firms seeking new markets for their goods (Pieterse 2009, see also Wade 2002).

This was then followed in quite rapid and relatively well-publicised succession by reports of little-used or abandoned ICT projects; and by overall analyses that something like one-third of such projects were total failures, something like half were partial failures, and only a small minority succeeded (Heeks 2002). Such rates of failure are not unusual for any type of change initiative; especially those based on new technologies. And they arose in part because the main ICT4D model – the rural telecentre – was one drawn from the global North which incorporated design assumptions and requirements that significantly mismatched local realities in the average developing country village (ibid.)

Whatever the reason, political damage was done by the large, readily-observed and relatively-brief gap between hype and reality. Donors began moving away from ICT; for example with the UK's Department for International Development closing its

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<sup>1</sup> Talking privately with senior ICT4D figures in development agencies, one finds their main concern is that the case for ICT in development has yet to be made to their colleagues, and needs to be made.

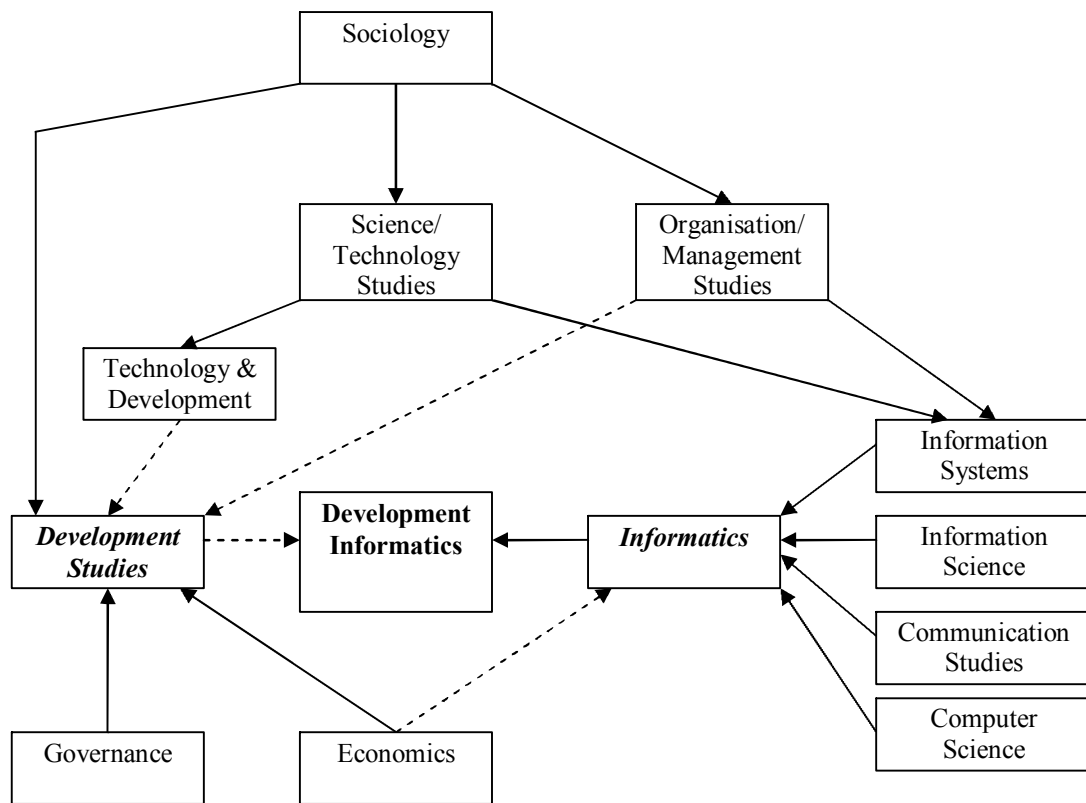
Information and Communication for Development group, and its ICT4D research programme in 2006.

On the ground, developing country governments have continued to expand their ICT policies, ICT agencies, and ICT investments (Duncan-Howell & Lee 2008, infoDev 2008). As already noted, the diffusion of ICTs into developing countries, and individual spending have also grown rapidly. But, within some parts of the development community, and having received the "mark of Cain", ICTs have struggled to regain an appreciation of their value.

While the underlying objective need for impact assessment of ICT4D therefore rose during the 2000s, its implementation was hampered by various factors already discussed: the focus of many involved – as summarised in Figure 2 – on readiness, availability and uptake rather than impact; the relative recency of investments; relatively high project failure rates; and changing donor priorities.

Of course, material was still being produced on ICTs' contribution to development but, where it was done, ICT4D impact assessment often lacked rigour: being descriptive rather than analytical; and often lacking clarity around, or lacking a sound foundation of, research methods (Garrido 2004, Heeks 2007). These shortcomings, in turn, often derived from the lack of a conceptual framework with which to structure the data gathering and analysis. Hence, in development work generally, the call for more theory-driven approaches to assessment of impact (e.g. DFID 2009).

Conceptual frameworks that would provide the necessary structure can be found from a variety of disciplines. Figure 3 (adapted from Heeks 2006) is incomplete – there are other disciplines and sub-disciplines that could be added. However, it does provide an approximate map of some of the disciplinary foundations of the core sub-discipline of "development informatics", which studies the relation between ICTs and socio-economic development.



**Figure 3: Disciplinary Foundations for Development Informatics Research**

Historically, the strongest conceptual foundation for development informatics has been the information systems discipline, deriving from the foundational work undertaken via the International Federation for Information Processing's Working Group 9.4 on "Social Implications of Computers in Developing Countries" (e.g. Bhatnagar & Bjorn-Andersen 1990, Bhatnagar & Odedra 1992, Odedra-Straub 1996, Roche & Blaine 1996, Avgerou & Walsham 2000). However, this work has focused largely on understanding issues of technology innovation, transfer and implementation. In part, this reflects the timing of the work – stretching, as it does, from the 1980s – vis-à-vis the Figure 2 curve. But it also reflects disciplinary norms and issues. Where "impact" has been covered, it mainly looks at new information systems processes within organisations – the "outputs" of the ICT4D value chain – rather than pushing out to look at the development impact of new technology. Summing up more than twenty years of work on information systems and developing countries, Avgerou (2008) identifies key themes as investigation of information systems failure (including issues of scale and sustainability), and the development of global outsourcing. Where work has looked at the strategic role of ICTs, it has done so more around issues of design and diffusion rather than developmental impact. Papers in this area's most recent conference in 2009 – "Assessing the Contribution of ICT to Development Goals" (Byrne et al 2009) – cover many interesting topics but ICTs' contribution to development is, ironically given the conference title, barely mentioned.

Many of the conceptual frameworks applied by information systems researchers are drawn from outside the discipline. Examples popular among those working on developing countries – reflecting more general use across the IS discipline – are actor-network theory, new institutionalism, and structuration (Avgerou 2008). None of these has, per se, very much to say about socio-economic development.

The same borrowing is present in most disciplines (as is the consequent "are we a discipline?" self-questioning e.g. Coles & El-Bushra 2002, Squires 2002) but there are also internally-developed frameworks that can be used. If we turn to organisation/management studies, for example, we can find a set of work that has taken the enterprise as the unit of analysis, and sought to understand the contribution of ICT to development through its impact on micro-, small- and medium-sized enterprises. A variety of business-management frameworks have been used to do this, looking at enterprise relations or enterprise variables (Heeks & Molla 2009). For example, Esselaar et al (2007) find that ICT usage is linked to higher labour productivity and higher sales turnover in African SMEs.

One of the main proponents of the use of enterprise models to understand the development impact of ICTs is Jonathan Donner (e.g. Donner 2004, Donner 2007). In this Policy Arena, Donner and co-author Marcela Escobari make use of conceptual framework that is very well-known in organisation/management studies – the value chain model developed by Michael Porter – in order to structure their investigation of ICTs' contribution to development.

Mobiles contribute little to the internal value chain of these enterprises: not unexpected given those enterprises are generally very small. Instead, Donner & Escobari identify a series of qualitative benefits relating to interactions with customers and suppliers that help improve the coordination and quality of those interactions, and build trust. ICTs are mainly used to improve the quality and increase the depth of existing trading relations, but there are signs that they can also build and/or help maintain new commercial contacts. Financially, then, mobile phones are delivering clear benefits to small and micro-entrepreneurs: increasing financial stability by reducing price variations over time and building a more diverse, geographically-wider set of customers; saving money by removing the need for journeys and, in some cases, clearly delivering higher profits.

Donner & Escobari find fewer signs yet that mobile phones can have a more transformational effect. They find few signs that market structures are being altered: if anything the power of middlemen has been enhanced. And they find few signs that mobiles are responsible for creating new livelihoods. Hence, they conclude, that in "value systems where mobile telephony is introduced, there is currently more evidence suggesting changes *in degree* (more information, more customers) than for changes *in structure* (new channels, new businesses)".

However, they note the continuing paucity of the research base, and the issue of working in an area of fast-moving change. As such any conclusions may be time-contingent. Commerce intermediaries have been strengthened largely because they have had early access to ICTs that other players could not access. The rapid diffusion of ICTs, though, means this is an advantage that is rapidly being eroded and we should anticipate increasing examples of the type of ICT-enabled "disintermediation"



that has been seen in some value chains in the global North. The creation of new livelihoods through ICTs may show few signs at present because hardly anyone seems to have taken a systematic look at this issue. We currently have only some very rough and ready extrapolations suggesting – for example – that mobile telephony has created more than 700,000 jobs in Pakistan and more than 3,000,000 jobs in Africa, of which perhaps around 70 percent are jobs such as phone call resellers and airtime retailers of the type found in poor communities (PTA 2007, GSMA 2008).

We also still know little about other mobile-related issues:

- The mobility these ICTs enable: as Donner & Escobari note, many studies find mobile phones in developing countries provide the first telecommunications link for most users. Hence, and unlike in the global North, mobile telephony is a substitute rather than supplement to fixed-line telephony. But mobile phones are not a like-for-like substitution. They are – obviously! – mobile, but we know little yet about the implications of that mobility beyond the fact that increasing numbers of DC users are taking advantage of it.
- The other functionality of mobiles: mobile phones also differ from fixed-line through various other functionalities – text messaging, data processing and storage in various formats (including audio and video), digital photography/video, and higher level services such as m-payment and m-banking. Donner & Escobari find little research has yet been done to understand the enterprise or other economic impacts of these functionalities.
- The digital provide: the development informatics field saw a lot of writing in the 1990s and early 2000s on the digital divide. In Figure 2 terms, this was a readiness, availability and uptake issue which reflected the concern that those without access to ICTs would fall behind those who were benefiting from using the new technologies. As ICTs have spread into poor communities, a few shards of evidence of the mirror image have emerged; a "digital provide" that sees those who do not own and those who cannot access ICTs also benefiting. Jensen's (2007) study, cited by Donner & Escobari, points to this. It reports that fishermen in Kerala who owned mobile phones found their profits to increase by an average of about US\$4.5 per day, sufficient to justify phone ownership in cost-benefit terms. But fishermen *without* phones also saw their profits rise – by an average US\$2 per day – as a result of the general improvements in market efficiency which phones introduced. The revenue gains by all fishermen arose because they wasted less (i.e. sold more) of the fish they caught. But the actual price per kg for fish decreased due to the increase in supply arising from less waste. This delivered a second digital provide benefit: fish consumers now paid less than previously thanks to mobile-induced efficiency gains. But evidence on the digital provide – particularly from research like this which is well-conceptualised and rigorously-conducted – is, as yet, very rare.

Like the value chain, ideas from organisation/management studies applied to development informatics often come from business schools. They have, expectedly, been used particularly to address work that views development through an economic development lens. However, this is not always the case, as the Policy Arena paper by Farida Khan and Rehana Ghadially demonstrates. Their central interest is the impact of ICTs on the sense of empowerment felt by young Muslim men and women in Mumbai. For the purposes of field study, they draw their conceptualisation of empowerment from the management literature. However, the origins for their interest

in empowerment come from development studies: the gender and development literature specifically, although one can readily see other roots such as the human development paradigm generally, and the various types of capital which form the assets pentagon in the livelihoods framework.

Researchers and practitioners must take care they do not read the trend line indicated in Figure 2 as the basis for ignoring issues earlier on that line as time passes by. Khan & Ghadially's work is a reminder of this. Mumbai is second only to Bangalore as a centre for ICT sector activity in India; a country perhaps more than any other in the global South that is associated with digital technologies. Yet even in this supposed high-tech citadel, the trench lines of the digital divide are still clearly visible: they found women were far more likely to be non-users and low users of ICTs outside their college time; men were far more likely to report high usage.

For those who were able to gain some additional access to ICTs, there is a continuing gender difference but one which might be rather unexpected. Women report greater levels of empowerment as a result of ICT training than men. Naturally, this might relate partly to lower starting points, or to expectations that might not be realised. But the result holds across psychological, social, education, and economic indicators. It suggests, once the digital divide has been crossed, that ICTs do have a potential to reduce inequalities; that the idea of technology-enabled "catch-up" is not entirely fanciful.

Although there is other research that touches on the impact of ICTs on empowerment (e.g. Corbett & Keller 2004, and Kleine's paper in this Policy Arena), including work taking a gender perspective (e.g. Buré 2006, Macueve et al 2009), Khan & Ghadially's work appears relatively rare in using a psychological conceptualisation. This is a little surprising given the relatively broad interest in well-being and development (e.g. Gough & McGregor 2007) which has drawn from ideas in psychology. But perhaps this is understandable because the psychological foundations of wellbeing must sit alongside derivations from development studies.

Turning, then, to development studies as a disciplinary basis for work assessing the contribution of ICTs, the suggestion of Figure 3 is that this discipline has so far made relatively little contribution to development informatics. In some ways this is predictable given so few of those working in this sub-field are based in development studies departments (for example, of 211 authors presenting papers at the two largest development informatics conferences in 2009 – ICTD2009 and the 10<sup>th</sup> IFIP WG9.4 conference – just one author was based in such a department; the remainder were drawn largely from informatics departments, with a small number from management and business schools, and a handful (six) from geography, politics, sociology and international relations departments).

This is clearly problematic for a number of reasons. An impoverished understanding of development will be utilised. Indeed, one can surely argue that discussion of ICTs' contribution to development in the absence of development studies' ideas to define and understand development may make little sense. In turn, this may mean poor guidance for technical project designers on how to relate ICTs to development, reinforcing the tendency to techno-centrism seen in ICT4D projects (Schech 2002). At least, it will be much harder to connect to development studies researchers, and

development policy-makers and practitioners without the conceptual tools and language of development studies to hand.

Recognition of the fragile thread between development studies and development informatics has led to calls in recent years for a stronger connection (e.g. Madon 2006). This is slowly starting to be seen, with a few works particularly conceptualising development around the livelihoods and capabilities approaches (e.g. Duncombe 2006, Gigler 2008). Dorothea Kleine's contribution to this Policy Arena is therefore especially welcome since it assesses the impact of ICTs from a development studies base.

She roots her work in Sen's capability approach though also drawing on the livelihoods framework and development-oriented ideas on empowerment. Indeed, even more than Khan & Ghadially, she identifies empowerment – understood as the choices that an individual is able to make – as central to this human development-oriented notion of what development is. Staying true to the individualisation inherent within this view of development, Kleine instantiates her "Choice Framework" by looking at the impact of ICT on the life of a single female micro-entrepreneur, living in rural Chile.

Her findings at once illustrate some of the strengths and weaknesses of capabilities ideas. To many understandings of development, the selected instance of what ICTs have offered this woman might be seen as trivial: the ability to "visit" online a German city in which she once had a pen friend. But to the woman herself, that ICTs now offered her such a choice was of significant value in her life.

As Kleine recognises, one of the tensions in applying a Sen-inspired framework is its interpreted requirement for each individual to provide their own definition of what development means; demanding a highly time-consuming participative process that is at odds with many agencies' LogFrame-inspired perspective that seeks collective and measurable indicators. Negotiating this tension is one of the current tasks in development studies more broadly (e.g. Ibrahim 2006) as well as in development informatics specifically.

## **Summary and Conclusions**

The diffusion of information and communication technologies into low-income countries and communities has been recent and rapid. As a result, a critical mass of evidence about ICTs' contribution to development is only now starting to emerge. More such evidence is needed; especially evidence that is well-conceptualised and rigorously-researched.

The papers in this Policy Arena and other good-quality research allow us to see that – whatever our particular understanding of development – ICTs are making a contribution. We have moved beyond the situation which held a few years ago where publications were, when scratched beneath the surface, talking mainly about potential. And we are moving beyond the situation of talking mainly about contribution in terms of the upstream parts of the ICT4D value chain: infrastructure, accessibility and use. Now one can talk about the actuality of "downstream" development impact:

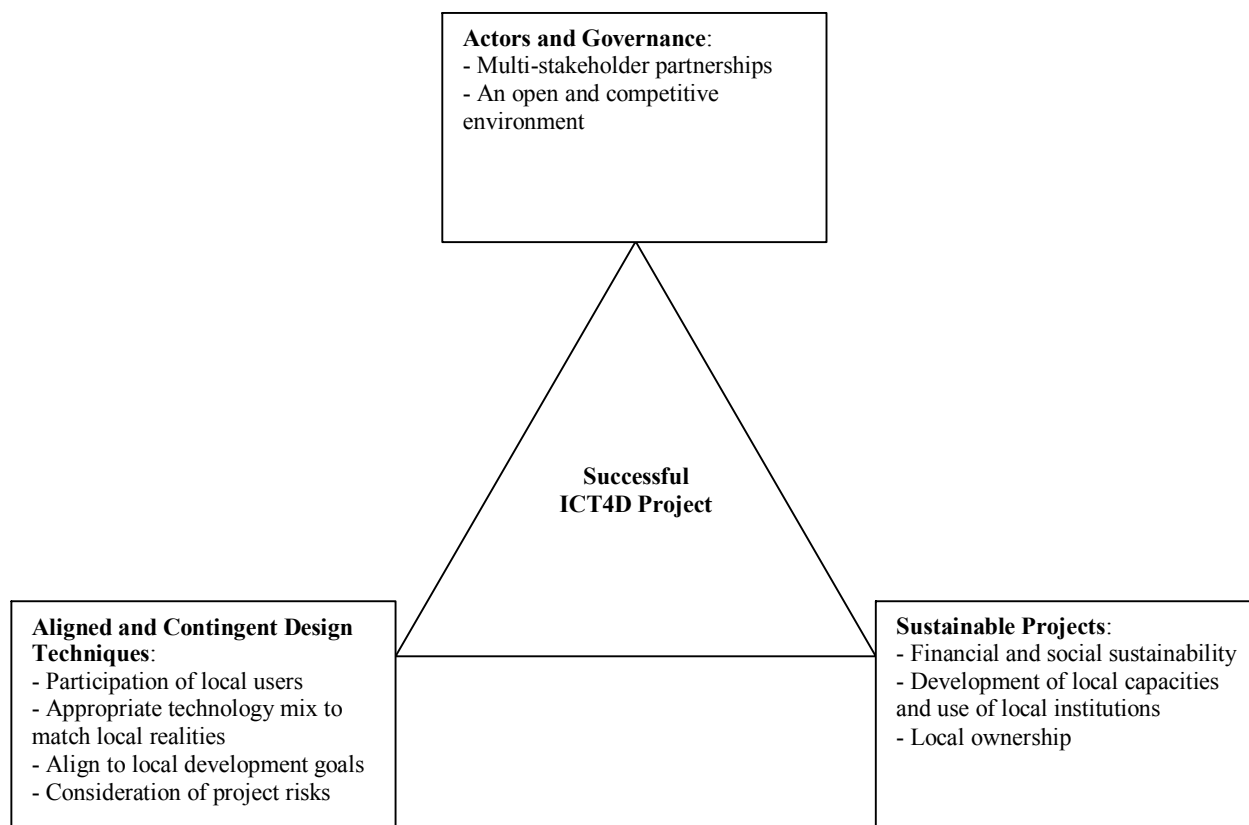
- Development as economic growth: from Donner & Escobari and others (e.g. Abraham 2007, Levy et al 2010), we see that ICTs are both saving money and making money for those from low-income communities. Credible cost-benefit analyses are disappointingly scarce but do suggest a positive return on investment can be achieved at both individual (Jensen 2007) and community (Kumar 2004) levels.
- Development as sustainable livelihood: the SL framework is not explicitly used by any of the Policy Arena papers, but Khan & Ghadially's research supports what others have found (e.g. Molla & al-Jaghoub 2007, Heeks & Arun forthcoming); showing that ICTs enable the development of additional livelihood assets, the enactment of new livelihood strategies and therefore produce improved livelihood outcomes.
- Development as freedom: Kleine shows in detail how one valued choice for one individual was enabled through ICTs, illustrating a more general finding (e.g. Kivunike et al 2009, Olatokun 2009) that ICTs are increasing both capabilities and realised functionings in developing countries.

That is the good news. The bad news is that such development contributions are not always seen. ICTs in low-income countries and communities may represent an excess of cost over economic benefit (Mpogole et al 2008), they may not sustain (Avgerou 2008), and they may fail to enhance capabilities (Zheng & Walsham 2008). While research on impact has been relatively limited, as noted above, work on implementation issues has been less so. A firm base of good practice guidance exists, distilled from general development lessons but also from the specific differences identified between those ICT initiatives which do, and which do not, make a development contribution.

That good practice guidance is summarised by Heeks & Molla (2009), and shown in Figure 4. As indicated, ICT4D project managers are guided to attend to three main issues:

- Design: ensuring that designs are sufficiently aligned to local realities.
  - Governance: drawing on the strengths of multiple actors.
  - Sustainability: ensuring this from an economic and socio-political perspective.
- Underlying all these is the need for a process that involves "the local" at all stages.

**Figure 4: Good Practice for ICT4D 2.0 Implementation**



These elements of good practice have not, though, been the focus of this editorial nor this Policy Arena. Instead, the main practical call – and notwithstanding the contribution of the papers included here – is still for more theory-based evidence about ICTs' impact on development; especially for more evidence founded in theories that have currency within development studies. Though it may take more knowledge and effort to collect, such evidence is likely to be more systematic and rigorously-collected, and more relevant to, and credible with, its user audience.

This call targets academic researchers but also development professionals. Not merely those working on individual development projects but also development policy-makers. At the level of national policy, for example, too little is understood either through macro-level research or the aggregation of micro-level research about the actual contribution that ICTs are making as a result of current investments (Juma & Yee-Cheong 2005, Guislain et al 2006).

Of course calls for more impact assessment as an input to both policy design and policy evaluation are perennial but we can move forward a little.

First, by recognising that the technical issues of ICT4D impact assessment such as the need for a conceptual foundation, sit alongside human issues. These include identifying the motivation for both doing impact assessment and making use of the results, and the relations between assessors and policy makers (Crewe & Young 2002,

Carden 2005). One suggested way forward is to co-opt policy-makers (or at least members of their team) as co-researchers who will themselves be part of the group investigating ICTs' contribution, and thus take a dual role as both creators and users of impact evidence (Tuplin 2003, Barnard et al 2007).

Second, to see that the rapidity of both technical change and technology diffusion mean one cannot simply extrapolate the situation today from the findings of yesteryear. There is a constant need for new impact assessment because ICTs' contribution to development is ever-changing; impact assessment that is able to ask broad and sweeping questions. This is most noticeable on standing back to recognise that, in development terms, two types of ICT application can be distinguished: progressive and transformational (Avgerou 2009). Progressive applications are those which could deliver substantial impacts – e.g. the creation of new income or new capabilities through ICT – but which do not change the underlying mechanisms and structures of development. Transformational applications make a more fundamental change. They may introduce an entirely new business model. They may alter the existing balance of power.

The evidence reported in this Policy Arena points to a progressive contribution to development. That is not to denigrate that contribution, but to recognise that it does not fulfil the promise of ICT that it would be a disruptive technology; that it might "change the rules of the game" and deliver "Development 2.0". Whether ICTs can, ultimately, have a more transformational contribution remains an open question. There are signs of this – direct development models that deliver resources from global North to global South without intervention of traditional intermediaries; networked development models that rely on the "crowdsourcing" or "crowdvoicing" of individuals; and grassroots development models that arise quasi-organically from within poor communities (Heeks forthcoming).

But the only way to identify such transformation will be through continuous evaluation that tracks ICTs' ever-changing contribution to development.

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