ICT4D: towards a working process

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Introduction

ICT4Dev takes place in a context, international development assistance, which is significantly different from most other contexts of in which ICT are designed[1]. This poses challenges to the effective design, application and use of ICT to aid processes of social and economic development. It also offers opportunities for learning, for new insights and experiences which might not be available in more conventional ICT design processes. The purpose of this article is to explore the context of intersection of ICT and development. We believe such exploration will produce understandings of this intersection which will have important implications for the practice of ICT4Dev and for ICT4Dev research.

The paper will start by considering some of the characteristics of both the ICT and development sectors and then identify some issues which commonly arise in the introduction or transfer of new technologies, with examples drawn both from ICT4D and from other experiments in technical innovation. It will discuss what can or should be inferred by the soubriquet 'for development' and offer, based on the above, an interpretation of the nature of ICT4D, as distinct from a more general introduction of ICT in developing countries. It will conclude with some reflection on the processes through which ICT4D can be effectively delivered and on the implications of these processes for how such work is planned, managed, funded and evaluated.

Context

It would be a mistake to over-simplify the ICT sector. It offers many different concepts and practices delivering a huge range of often competing technologies and products via a variety of business models. It would probably be fair, however, to say that the sector as a whole, and the industry in particular, prides itself in the rapid creation and deployment of new products and that these products are, in the main, conceived as 'solutions' to problems or challenges experienced by the end users or the organisations that employ them. Much of creation of ICT is driven by very strong commercial considerations as vendors target large, often very profitable markets against strong competition. Although there are examples of successful business models serving the 'long tails', particularly when it comes to mobile telephony, many ICT companies have large organisations – governments and 'blue chip' corporations – in their sights. Consequently there is often a bias towards the creation of products targeted at the needs of these large users in the creation

[1] The authors are aware that the word 'development' is commonly used in the context of creation of new ICT and associated software. Its use in this article, which will discuss extensively the meaning of the word 'development' in a different context would, in their view, invite confusion. So instead they use the word 'design' to refer to processes of creating ICT systems. They do so for the sake of convenience rather than of any wish to argue that 'design' and 'development' are or should be exactly the same thing in the context of ICT.

of new ICT and such products then become the 'expertise' which is most readily available for transfer to other sectors.

'Development' is also driven by a recognised need for change but that is more or less where any consensus ends. The nature of the change, how it takes place and under whose leadership are all open to debate. What 'development' is seen to consist of varies widely according to the location and status of the beholder, their national, cultural or disciplinary background, their gender and, often, their politics. Yes development, and especially official development assistance, is often seen as a technical process requiring many types of formal expertise. However, it also involves the investment of external resources in a given society in order to enable that society to achieve development goals. Where that investment goes, who will benefit from it and, just as importantly who will not benefit, and what changes in that society it is intended to produce are all profoundly political questions.

'Development' in the sense described here and, it will be argued, also in the context of ICT4D is a deliberate intervention intended to produce 'beneficial' change, however defined. It does not refer to changes that would take place anyway as a result of normal social or market dynamics. As suggested above, the actual definition of 'development' is contested, and the nature of that contest also changes over time. Generally however, the notion of development equating simply to modernisation - where a certain country 'catches up' with some idealised state of affairs which exists elsewhere in the world – is discredited. Most actors would also see development as concerning more than simple economic goals. The nearest there is to a consensus on 'development', the United Nation's Millennium Development Goals cover a targeted attack on poverty with other aims relating to women's rights and environmental sustainability as well as various health issues. There is also the key question of agency. Is 'development' a set of large top-down initiatives which change the economic or social landscape or should it be rather – or at least as well – based on the active engagement of the populations in identifying and implementing the changes in their lives that they want to see? There are both ethical and political reasons for letting people chart their own destiny but also very strong practical ones. Time and time again large, technically driven aid programmes conceived without understanding the priorities of local populations and without their local knowledge have simply not worked. Amartya Sen goes further and sees the creation of the capacity to act as defining development itself 'Development consists of the removal of the various types of unfreedoms that leave people with little choice and little opportunity of exercising their reasoned agency' (Sen, 1999, p xii).

Another important feature of the development sector is that it is an environment of great epistemic diversity (Molenaar) or multiple knowledges (Powell, IKM Emergent). It is a sector which draws heavily on technical expertise from many disciplines, which do not always combine smoothly in practice. Just as importantly, it is a sector which tries to work across barriers of social status, gender and culture. Thus both in the technical arena and in that of communication with stakeholders, there is no basis for assuming a common understanding of either the problems faced or their solutions. Such understandings have to be worked on and built through dialogue. As Anacletti illustrates, in a gentle telling of some misunderstandings of his experience, donor agencies and African villagers can have widely different notions of what is going on and why.

Finally, most theories of 'development' do not advocate or foresee a process of enriching the poor by means of impoverishing the rich. Most see widespread economic growth for all as a helpful condition for the alleviation of extreme poverty.

However, most also conceive of this process as a narrowing of the gap between the rich and poor, an issue to which we will return later.

Beyond the overall complexities and uncertainties about development, there are features relating to the attempted introduction of technologies which need to be born in mind. These features are common in all change processes and there are many examples of them in the general ICT management literature, but they perhaps appear even more strongly in the process of introducing a technology developed in one society into another.

The simplest, which perhaps needs no further explanation here, is that what works well in one setting – be it a country or an organisation – does not always work in another. Each location for the use of technology will have its own particular needs and priorities which will be worked towards within an organisational or social culture possibly specific to that place. McCarthy et al. (1997), for example, offer a case study illustrating the incompatibilities of ambulance control procedures between the UK and the Republic of Ireland. If it is understood how hard it can be to translate such a well defined and functional process between two such similar cultures, the scale of the challenges for transfer between completely different societies become obvious.

Introducing changes to an existing system often has unanticipated effects. There are some stunning examples in both historical and development literature of negative effects. For example, some argue that a focus on and evidence of growing agricultural exports from Ireland in the 1840s was one of the factors that led to the fatal slowness of the British colonial administrators to recognise and respond to the scale of a famine, caused by the failure of subsistence crops. Similarly, the success of the green revolution, the growth of high input more technically advanced agriculture across much of the world in the 1940s and 1950s, in raising food production masked an increase in landlessness, poverty and malnutrition amongst poorer families which could not afford the higher costs of the new systems.

More positive, although equally unpredictable, are the emergent factors which arise as people adapt new ideas or technologies to their own realities. Within the ICT sector, we have seen the World Wide Web emerge as one of the main uses of the personal computer and SMS as a major application of mobile telephony without either having been foreseen as such by the leading hardware or software vendors of the time. Within a development context, the creative uses of new technologies can also surprise and educate, opening up possibilities of potential new directions. Tal's early study of mobile telephony in Senegalese villages for example shows their use in enabling new economic transactions, such as remittances being converted to arrive in the form of specific second hand car parts. The habit of leaving the valuable phone in the care of reliable women family members was also seen as affecting the position of women within the village information environments (Tal).

ICT4D

How then, bearing in mind the differing nature of the two sectors and the issues which repeatedly present in processes of technology transfer should we understand ICT4D?

We need to recognise that, however it is defined or understood, development is widely regarded as a public good. Doing something 'for development' implies a deliberate attempt to have a beneficial effect; a moral as well as a practical purpose

above and beyond the activity itself. Just as important, doing something for 'development', for that public good, gives access to the very substantial funds made available by multilateral and government donors and by charitable foundations. Access to such funds does or should carry certain obligations.

'ICT for development' is or should not be the same as the natural market dynamics through which ICT goods and services are acquired by developing countries. All countries, and the businesses and organisations and organisations within them, acquire technologies to try and meet their needs. Global economic statistics show a general tendency for countries of broadly similar economic situations to have similar patterns of investment in a range of modern technologies, be they power infrastructure, aviation, mechanised agriculture or ICT. Such investment contributes (or so it is intended) to the overall productive effort of the country but it does not give it any specific or relative advantage. An early study of internet usage in medium and large industrial enterprises in Senegal found very few computers connected beyond local area networks because of the high risk of acquiring and the high costs of fixing viruses and other problems (Barry and Diop, 2002). The specific problems reported may no longer apply but the issue remains and would be familiar, in earlier decades, to experts promoting mechanised agriculture and finding themselves with ranks of broken down tractors. Generally speaking, it is easier, quicker and cheaper to acquire and to fix advanced technologies in developed countries than in underdeveloped ones. This is not an argument against the technologies, simply a warning that they do not in themselves offer an economic advantage relative to their use in other economies; they do not by themselves constitute development.

We need to see what is it about a particular use of ICT which identifies it as being specifically helpful to development. It would, we suppose, be possible to argue that any ICT expenditure in the development sector should count as ICT4D. Thus if a group of aid organisations working together on some large health project decided that it would be efficient to use personal computers to keep and exchange their management information records, they might think of charging the health expenditure part of the project to a health development budget and the computers and software to an ICT4D budget. We would suggest this is a lazy use of the term ICT4D. It should be recognised that for many purposes in virtually all parts of the world, some use of ICT is now an integral part of any office based work. If that work is worth doing in its own right, then it should be paid for out of the budget which relates to the output of that work and the ICT required to deliver it should be seen simply as part and parcel of the costs of so doing.

If the point that ICT4D is and should be distinct from other channels of ICT use is accepted, then there is a need to be clear about what it might be and what it should involve.

If ICT4D is to successfully focus on development, it is not sufficient to make simple assumptions about the beneficial nature of a particular intervention. ICT is joining a field of social and professional interaction which has been struggling, by no means always successfully, with the issues it confronts for sixty years. ICT practitioners wanting to work in this field have an obligation to learn about it, however critically. At the same time there are many working in the development sector appear to have a limited if not prejudiced understanding of ICT or of its more innovative working methods and who need to have open minds to the contributions ICT could make to their efforts. Mutual ignorance is not a basis for productive effort in either sphere (Thompson, Gurumurthy & Singh).

Beyond the overcoming of ignorance, there is a need to recognise and learn to benefit from what are often very different philosophies, working cultures and approaches. ICT are historically linked to engineering, a science which requires a good understanding of a problem and very accurate calculations of the solution. The fast moving and solutions oriented thinking of the ICT sector was remarked upon above. The opening editorial of the journal 'Information Technologies and International Development' gives some recognition to a different world of work in recognising '*that development conditions differ from one country to the next and always impose real constraints on the speedy roll-out of new applications*' but this hardly challenges the underlying assumptions of speed, linear dissemination pushed from an external point and centralised decisions about the value of functionality. This approach does not sit easily or automatically with a view of development as offering people choices and opportunities to exercise their own reasoned agency.

Conceptually, ICT4D needs to move away from its focus on technology and locate itself within the wider field of studying and participating in informational developments. As Hamelink says '*All agree that information is being handled and, at least sometimes, used in new ways. If we accept this, and label such new ways of handling and using information (which clearly include its communication, reception, response, adaptation and re-use) "informational developments" we have a core phenomenon, the nature and impact of which may be studied and discussed.. Informational developments are clearly taking place. They are shaped by and in turn shape socio-political, economic, cultural and technological processes'*. In any particular setting, there will be potentially positive informational processes which are not taking place but which, if they were, could add an additional dimension to development. The challenge for communities, ICT4D researchers and practitioners is to identify those processes and work out how to enable them.

In this context, and bearing in mind the argument made above about the bias in commercial ICT toward the provision of products for large organisation, it is depressing to note the top down nature of much large scale ICT4D. Mozambique and Rwanda, for example should be credited as being amongst the first countries in Africa to develop national ICT strategies. Such a pity then, that they start with the functional needs of their ministries and of the offices of the ministries based in the capital cities. By the time they gradually roll out to the provinces and districts, the character of the information environment is inevitably dominated by the needs and perceptions of these bureaucracies. Opportunities to build new forms of citizen engagement, new links between producers and the ministries and researchers hired to support them, to overcome the rural urban divides which are so central to the alienation between the governing elites and the mass of the population in so many African countries have been lost. It is not even clear if, between the immediate needs of the commissioning ministries, the donors with their own approaches to ICT based on the reduced transaction costs of e-government over any notion of e-governance, and suppliers geared to providing big 'solutions' for big clients, any thought was given to other traditions of development communications or to either national or international experience with community informatics. Other countries or their donors, make similar mistakes with their HIV information strategies, wiring themselves to global talking shops whilst failing to invest in the bottom up information systems that could actually provide them with the data on local behaviour, attitudes and issues which they need to devise effective local responses to the pandemic.

In practical terms, ICT4D researchers, practitioners and those that support them need to grasp the fact that, in order to succeed, ICT4D needs to be based on an interactive process with those who will use the technology and those it will affect. In this it is not unique in the ICT field. Many practitioners may remember the ICT text

books which, in some cases up until the late 1990s, preached that an organisation's information needs were static and that therefore organisational information systems could be built in a long linear progression which covered every design need. Such thinking took no account of the degree of change in organisations and their environment and was soon, except where government purchasing departments were the client, swept away by modular, object oriented systems with much greater flexibility and lower costs of changes. Other approaches based on user-led design, soft systems analysis and human computer interaction further explored the extent to which ICT could be responsive tools for humans rather than rigid systems.

A similar process would be beneficial in terms of ICT4D but there is one significant difference. Most first world ICT design is funded by clients using their own resources for their own purposes. Most ICT4D is funded by international donors, or by technology companies with their own interests to promote. The 'user' is often in a relatively powerless position, despite the rhetoric of the process being based on the potential to 'empower' disadvantaged communities. The question of power relationships is therefore crucial to effective ICT4D in a way which is fundamentally different than the willing seller/ willing buyer of normal ICT market dynamics. It is in this context that the oft cited desirability of 'win-win' situations needs to be looked at extremely critically. It is quite legitimate for a mobile phone company to conduct market research in emerging markets. However if the result is that the company has a new world beating design and a few poor communities have some free trial phones, it is hardly 'win-win' and, as the relative wealth between the parties has widened not narrowed, it is certainly not development. Even more apparently benign interventions need to be examined. For example one project, which one of the authors heard praised at an Internet Society meeting focussed on development, involved West African farmers being able to access advice on-line from an agricultural research institute based in Europe. It sounded good until one questioned the quality of advice sent from distance without detailed knowledge of local conditions. One could also wonder whether the economic and intellectual benefits to the institute in gaining access to regular flows of local data might outweigh the benefits to local farmers of the advice they received in return.

The fundamental point, however, is that good quality interaction with stakeholders is a precondition of the successful introduction of ICT into a development environment. It is essential because no technology becomes a working technology in such a setting until it has been understood, tested, often adapted and sometimes subverted by the end user group. Some funders of ICT4D research, of the authors' acquaintance seeks to use UK developed norms to place a line between the process of the creation of 'technology' and that of its application. We would argue that in the context of ICT4D no such line exists and its invention, for the convenience of a distant bureaucracy betrays a profound lack of awareness of the scientific process which is allegedly being supported. An equally important consideration is the involvement of users, and of local sources of intellectual and commercial support, in a process which gives them a voice and increases their capacity to intervene in the development processes which are shaping their future. This is where the 'for development' ethics kick in. However, as noted above, this relates not simply to notions of democratic governance of the process but also to practical considerations of how well any intervention is likely to work unless there is a feeling of ownership of the process at community level, or at least no sentiment of unwanted external imposition.

A few authors have recently drawn attention to the need to adapt design methods when working in different cultural contexts (Winscheirs, 2006; Medhi, 2007; Dearden & Rizvi, 2008). At a recent workshop in Cambridge, participants in four ICT4D

projects funded by the British Engineering and Physical Sciences Research Council, nearly all of whom came from a technology rather than a development background, reported back on the difficulties and constraints they had faced. Most of these would fall into one or other of the features of such work briefly described above. The meeting ended with a keynote speech by Garry Marsden, professor of Computer Science at the University of Cape Town, who has been involved in ICT4D projects in Southern Africa for many years. He reported that after many years of trying, his unit had stopped working with end users in poor communities because '*we are so bad at it'* and '*we always get it wrong*'. Listening carefully, it was clear that what was being reported was nothing to do with him or his colleagues making individual mistakes but that they had previously used an entirely inappropriate methodology, one that had been designed for ICT design in radically different environments. They now work through intermediaries with knowledge of the community and of its information environment who identify potential needs and are able to translate these into terms that a computer science unit can work with. It is not argued here, or as we understand it by Professor Marsden himself, that this should be considered 'best practice'. What is suggested is that by a hard and critical look at past practice, by taking steps to improve the quality of a relationship and of communication with the end user community and by sharing control of the process, Professor Marsden has demonstrated three necessary ingredients of good practice.

We are left with two very basic conclusions from this discussion of ICT4D. First, that if it is to succeed in terms of technology design and in terms of development, it has to be based on a high quality, interactive relationship with potential users, which will need to include some detailed understanding of their lives, their information environments, existing informational developments and the range of choices they face. Such relationships are not optional extras but are fundamental to both the scientific and development processes. This does not, however, make them easy. Issues of equity, culture and approach need to be carefully negotiated.

Second, the implications of the need for and outcomes of such relationships are that an ICT4D process cannot be based on the local execution of an externally conceived and designed idea. The idea itself, let alone the physical artefact through which it is ultimately realised, will change during the process of its discussion and realisation. . So if, as evidence suggests, ICT4D has to be experimental and interactive in order to discover its potential, what does this mean for how such work is conceived, planned, managed and evaluated? What does it mean for how it is funded?

Practice

Given the repeatedly reported need to be able to really engage with people on the ground for effective understanding of the need for and use of technological/scientific innovation, can emergence and innovation be compatible with linear, risk-averse planning models that demand definition of outputs in advance? The answer is no. Planning models which require the prior identification and the definition of roles for all participants in a process or the definition of outputs in advance are not compatible with the scientific method required for technological innovation or with effective and ethical approaches to international development. Of course at the moment, this is primarily a problem for development practitioners or for researchers who want to work in what they see as the necessary way. In the longer term however, as the evidence for the arguments behind this paper grows, the problem will rest with the donors and policy makers. Why, except for their own bureaucratic convenience, are they investing public money in processes which are highly unlikely to achieve their intended results?

In truth it is in both parties' interests to explore ways of enabling improved research and improved development practice. A starting point might be to rephrase the question above as 'can emergence and innovation be compatible with formal requirements for accountability, transparency and value for money? ' This is a question which, if we are to take it seriously, still requires a lot of thought but it does not contain any actual contradiction. Nor does it imply any hierarchy of right or wrong. The same person who might argue vehemently against the constraints of linearity has no inherent reason to argue against the principles of accountability and transparency in the use of public or charitable funds.

The authors do not claim to have a satisfactory answer to the question as now posed. Indeed they, with other colleagues, have a plan of work over the next few months which intends to see the question debated in various fora by development practitioners, policymakers and donors as well as by researchers. However, they would suggest that any answer will need to incorporate understandings of the following

Clear ethics relating to

- How to recognise and mitigate the risks to vulnerable groups in engaging with these projects and the demands the project place on their time and energy?
- How to conceptualise and agree the long term ownership and benefits of any interaction? This should cover immediate issues such as what approach should apply to sharing rewards that may arise by exploiting ideas developed in such projects. It should also seek to understand the potential for benefits which have different meaning and value for the different stakeholders and the possibility that such benefits may occur over different time spans.
- How are short term intense interventions (typical of ICT design) be balanced with long term support structures (required to ensure sustainability of new technologies)?
- What happens if in the progress of the project it becomes clear that the group should be prioritising something other than the ICT research?
- How should external agents behave if they become uncomfortable about ethical practices within the groups they are working with?

Building joint approaches to issues such as the identities of researcher/ technician and 'beneficiary'

- Development and use of fora through which demand for new informational developments can be expressed and communities, as well as researchers, can initiate research/development processes
- Participatory action research models identifying all parties as co-researchers,
- Equipping 'beneficiaries' with research / technical skills of their own
- Involvement of and creation of opportunities for local researchers and businesses – capacity building as a feature of development
- Understanding that the technical alone can never be development and that a mixture of methods and approaches may be required. For example 'solutions' that are highly innovative at a technical level, may be more difficult to sustain because the ecosystem of support probably does not exist for that 'solution'.

Bricolage may be more appropriate in a development environment, but its contribution as a methodology in ICT research may not be recognised.

New practices for reporting on & disseminating research

- Who is this knowledge for, who are the best assessors of the knowledge, and what standards should be used to judge the quality of the knowledge?
- How are things published and made available to different subsections of the community (international researchers, local researchers, development practitioners, local activists, local etc.)? In particular is the western model of academics publishing papers to establish their name (their university brand), and then charging for teaching that knowledge to new generations of students compatible with the development ecology? If not, what can be done to incentivise and confer value on other kinds of output?
- How are disciplinary boundaries dealt with – given that much of the most useful research will be interdisciplinary?
- How are opportunities/incentives structured to encourage academics in developing regions to focus on the problems in their home countries? South Africa is an interesting model here because government has sought explicitly to direct research in this direction.
- How are people given the right to reply / discuss claims made by academics?

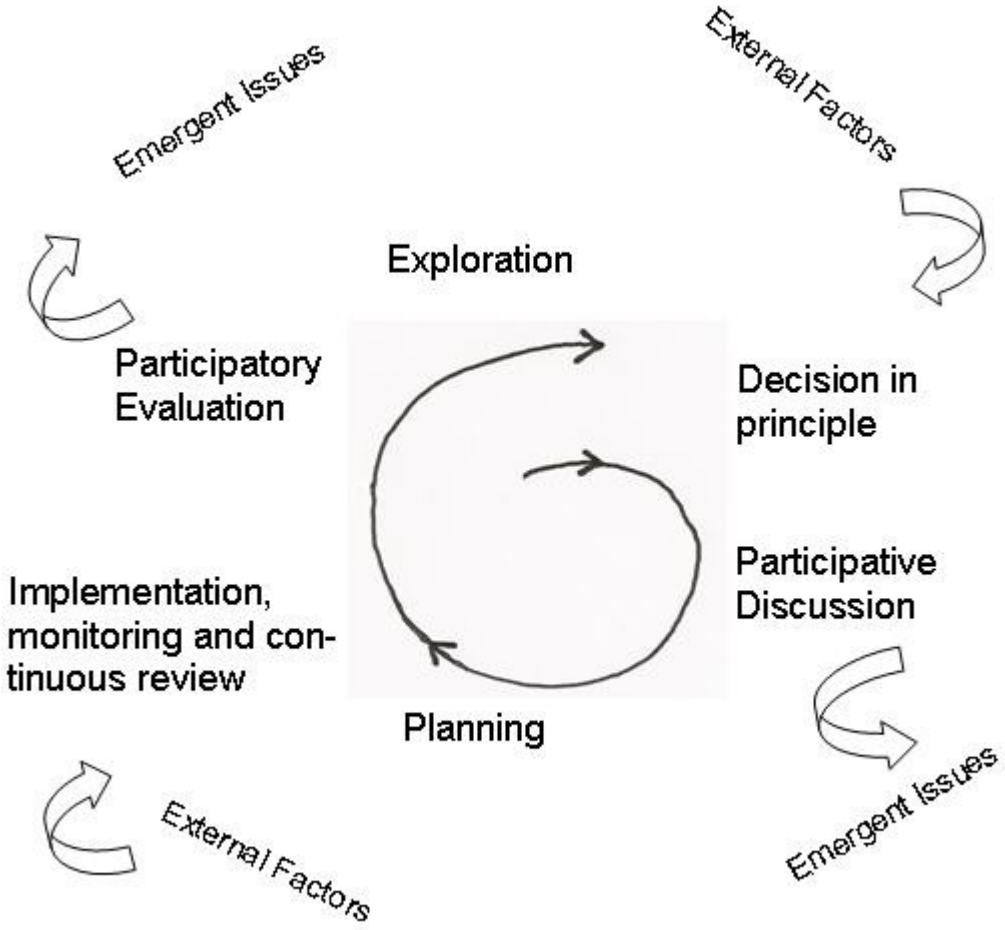

Figure 1 – Revised Project Cycle

Finally, there is an absolute need to understand and support new and more dynamic processes of interaction. We have to move away from the concept of a project as a neat series of events – planning, implementation, monitoring, evaluation - detached from everything else that is going on around it. Projects will and should inevitably engage with what is going on around them, with new factors, with unanticipated events. Equally important, the notion of a participatory process as being a methodology that one party, the one which makes the plan and gets the funding, can then deliver through subsequent interaction with a 'local partner' needs to be thoroughly debunked. The result, we suggest, will need to be a new understanding of a project cycle, one possible version of which is represented in figure 1 above, not as a discrete set of events but as an intervention in an existing process of historical and continuing change. There should be purpose and expectation but also openness to emergence and to new external factors. Evaluation and learning has to be conducted against the realities of the lived experience rather than the details of the original plan. Finally partnership and participation has to be negotiated from the beginning and may need more multi-faceted and less hierarchical funding and reporting arrangements in order to embed the autonomy and freedom of the various stakeholders. These complexities and uncertainties may lead to new demands from the donor. There may, for example, be a need to fund separate phases of exploration, intervention, sustainability & post-intervention impact analysis – to be conducted after the main project has finished and perhaps left the field.

Concluding Remarks

In this paper, we have sought to identify and reflect on a number of issues and constraints which, as we argue, have prevented many ICT4D and ICT4D projects realising the potential which the expertise and resources they attracted might have led one to expect. We recognise that this could be seen as a criticism of the whole notion of ICT4D. This, despite considerable reservations about the term ICT4D itself and the pre-eminence it confers on the technologies, is not our aim. We see enormous developmental potential in using ICT to support the many and various informational developments which are taking place in different societies across the world. We do however argue that this cannot be achieved on the simplistic basis of 'technology transfer' from one place where it 'works' to somewhere else where it might work. Instead, we think ICT4D has to be based at least on substantial adaptation and often on new invention if it is to achieve newly defined purposes in new settings. Such processes, as has happened with much ICT growth in the 'developed' world, have to involve detailed knowledge of and interaction with the societies in which it will be used.

We think our argument is based on the evidence of the issues relating to technology transfer and innovation in development in both ICT and other technical fields. However, we also think that by suggesting a process of interaction and mutual learning we are situating ICT4D in a far more exciting and rewarding context for its practitioners, than the one implied by the imparting of received wisdom from one place to another. Similarly, in challenging policy makers and funders to enable effective development methodologies rather than inhibit them, we offer them the potential to argue that their work needs to be based on detailed knowledge of and engagement with the work they fund. The notion that increasing waste and reduced innovation rather than imagined efficiency gains are the result of them becoming de-

skilled box-tickers is one that they might find helpful in internal debates on re-organisation within the structures in which they work.

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