

## **An analysis of the factors affecting the sustainability of ICT4D initiatives**

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### **Abstract**

The sustainability of ICT for Development (ICT4D) initiatives remains an enduring concern, and projects typically have a high rate of failure. ICT4D is in flux and the trends are analysed to show how sustainability issues have changed from requirements for external support via governments or funding agencies to self-sufficiency (mainly) based on economic viability. Sustainability is typically defined in terms of financial, social, institutional, technological, and environmental aspects. The major factors influencing the sustainability of ICT4D projects in poor rural areas are summarised via a systems analysis. The questions posed by this analysis may be partially addressed by strategies based upon the concept of human scale development. Two ICT4D initiatives that are concerned with enterprise development are used to illustrate the practical realisation of aspects of such a strategy.

**Key words: ICT4D, sustainability, human scale development, development through enterprise**

### **Introduction**

Information and Communication Technology (ICT) has been promoted as being able to increase the efficiency and effectiveness of work. There are also signs that the pervasive use of ICTs are globally leading to the transformation of some societies to a new kind of society: the information or knowledge society (Unwin, 2009, p. 19). As ICTs become more pervasive, it seems logical that it should be used to influence development strategies. Statements have been made that ICTs can be used in so-called "leapfrogging" strategies of development, where intermediate stages of industrialisation are skipped in order to reach the

information society (Davison et al., 2000, in Kleine, 2009). In spite of increasing criticism of such “leapfrogging” strategies, a multitude of ICT for Development (ICT4D) initiatives has been launched concurrent with the growth in prominence of ICT4D on worldwide policy agendas during the late 1990s (Leye, 2009). However, many of these initiatives have failed, and the sustainability of ICT4D initiatives is an (unresolved?) problem with few success stories (Heeks, 2002, 2008, Toyama, 2010).

In reaction to this, many different approaches to ICT4D have developed, each with its own set of sustainability challenges. In this paper the focus is on the fundamentals underlying these sustainability challenges, such as the need to consider the many dimensions of sustainability. For example, Ali and Bailur (2007) have identified five main aspects of sustainability in the ICT4D literature: financial, social, institutional, technological, and environmental. Another fundamental is the need to deal with the various systems (each with a variety of role players) in which ICT4D initiatives are embedded.

Many ICT4D initiatives target communities of the poorest of the poor and hence take place in a local community context of minimal resources. This poses a challenge to all development strategies. Multiple-level systems perspectives are required when evaluating and improving the sustainability of development strategies and development initiatives at the project and enterprise level. A narrow focus on the project itself does not suffice to surface the reasons for failure, or to identify the route towards sustainability. The reasons for failure lie inside the scope of the project, within the community itself, and outside the community in the larger socio-economic system which includes the economy. A systems approach with respect to the analysis of the sustainability (or lack thereof) of development initiatives seems to be required.

This paper reviews the shift in focus from the individual ICT4D project to systemic issues by covering trends in ICT4D and discussing the learning regarding sustainability in ICT4D. After a systems analysis of sustainability issues, human scale development is put forward as a possible strategy for dealing with these issues. Two examples of ICT4D initiatives are analysed to illustrate how aspects of human scale development strategies have been implemented. Finally, the potential for future research is outlined.

## **Trends in ICT4D**

Heeks (2008) has described the evolution of ICT4D in three phases: ICT4D 0.0, 1.0 and 2.0. In the first phase, until about 1990, computers were used in government administration and by multinationals to foster economic growth. From the mid-1990s onwards, ICT4D 1.0 started as development actors such as the World Bank called for the adoption of ICTs as a tool for development – a call which was in response to the growth of the Internet and the adoption of the Millennium Development Goals (MDGs). Due to the need for a rapid response to the plight of poor, rural communities, a popular choice was the deployment of telecentres to deliver information, communication and various services. The many failures that occurred in telecentre initiatives led to new “watchwords”, namely sustainability, scalability and evaluation (p. 27).

In reaction to these failures, many new approaches to ICT4D have been propagated. Heeks (2008, p. 33) refers to ICT4D 2.0 as the next phase in using ICTs to achieve development aims, and states that it differs from ICT4D 1.0 in viewing ICTs not just as a tool for development, a means to an end, but as “the platform for that development”. ICT4D has transformative potential, and the focus is on the use of ICT as a productive tool. Heeks (2010, p. 22) has also referred to this as a new approach to development, “Development 2.0” that contains “new IT-enabled models that can transform the processes and structures of development.” New ICTs can be moulded by people themselves to fit their objectives and can be used to produce digital content and services to create income (Heeks, 2008). There is a move from a passive diffusion view of technology and development (the market will deliver) to an active innovation view where intervention is required via innovations in order to achieve development goals (Heeks, 2008). These innovations can be created in different ways: pro-poor (for the poor), para-poor (working with the poor) and per-poor (innovation by the poor in their communities). The new ICTs, which include social technologies and ubiquitous mobile communications, enable per-poor innovation that empowers people.

Spence and Smith (2010) have identified five main stories in their review of the literature of ICT, development and poverty reduction, namely: universal access, economic and social services, openness, human development, and innovation.

Another influence on trends in ICT4D is an ongoing discussion on the philosophy of ICT4D which has also spawned different approaches to ICT4D.

Tim Unwin (2009, p. 360) remarks: "How we define ICT4D depends entirely on the development perspective that we adopt". Unwin (2009, p. 1) distinguishes between development perspectives that focus on economic growth and those that focus on participation and empowerment (i.e. more on human development), and proposes that "ICTs can have a key role to play in delivering both of these contrasting views of development". Based on an analysis of ICT4D initiatives, Unwin (2009, p. 371) develops two broad classifications: market-led ICT4D with an emphasis on economic growth, and socially-led ICT4D that focuses on equality of access. These are recognised to be extreme positions, with most ICT4D initiatives fitting in between these positions.

Chigona et al. (2009, p.3) sub-divide human development approaches and refer to "technocentric" and "sociocentric" approaches. Technocentric approaches aim to provide ICT and access to it. Such approaches are mostly top down, expect development to happen if access to technology is provided, and in practice disregard the actual needs of people. Sociocentric approaches put people and their developmental needs first and foremost and is an example of human scale development. They coin the phrase "socio-techno divide" to refer to the difference between these approaches (ibid, p. 3).

Leye (2009, p. 30) adopts a similar position and states that "the bulk of the ICT4D discourse does not question the assumption that ICTs necessarily stimulate economic growth and combat poverty", and critiques the assumption of ICT4D advocates that "technologies are autonomous forces or independent variables causing change in every domain of human life".

Mansell (2011) analysed key ICT4D discourses among major development agencies and found that an “exogenous” model for development prevails. Exogenous refers to an external cause, i.e. using ICT as an intervention from the outside to fill knowledge and technology gaps in a developing country. These models are frequently accompanied by a “Western-centric and universalist model of economic growth and development” with typically a neoliberal emphasis on market-led development (Mansell, 2011, p. 2). In contrast, “endogenous” refers to internal causes, i.e. “practice-based approaches” that work with local communities to define ICT intervention strategies (p. 4). This corresponds to Heeks’ per-poor innovation model. These approaches include interpretivist socio-technical perspectives and acknowledge multiple knowledges and multiple models for development. Endogenous models have been dominated by exogenous models in ICT policy discourses due to the influence of neoliberal policy which emphasises market-led development where the interests of sellers of technology and content often prevail (Mansell, 2011). It is encouraging that Mansell did find some evidence of the endogenous model (for example in UNESCO reports), but disappointingly, Mansell (2011, p. 11) concludes that “the interpenetration of the exogenous and endogenous models has not resulted in a consistent distancing of the latter from the former in a way that encourages departures from advocacy of investment in technology as a solution”.

These various worldviews and philosophies provide a framework for understanding the different departure points of the diagnoses of sustainability issues in ICT4D.

### **Learning regarding sustainability in ICT4D**

The project and development practice level is discussed first, followed by a discussion on principles and models of development and ICT4D.

Heeks (2002) attributed the high rates of failure of information systems (IS) projects in developing countries to a design-actuality gap where there is a mismatch between the desired systems state of the IS designers and the local actuality of the users.

According to Heeks (2010, p. 635) “a firm base of good practice guidance exists” that has been derived from lessons learnt in development, as well as from an analysis of the differences between the contributions to development of ICT initiatives. The good practice guidance to ICT4D project managers is summarised as three issues (Heeks and Molla, 2009, as cited in Heeks, 2010, p. 635):

- 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.

Here sustainability is seen as wider than purely economic sustainability. Toyama (2009) notes that the primary emphasis in ICT4D has been on the long-term financial viability of projects and that Pralahad, in his influential book “The Fortune at the Bottom of the Pyramid” has argued that true financial sustainability requires a for-profit model.

It is of course a question whether people do actually learn from each other's mistakes or good practices. Kleine and Unwin (2009, p. 1060) find that in the ICT4D field there is “a failure to learn from previous initiatives, and the tendency for development practice is to be top-down and supply led”.

Pade-Khene, Mallinson and Sewry (2011, p. 189) categorised rural ICT sustainability into social and cultural, institutional, economic, political and technological sustainability and identified 19 Critical Success Factors (CSFs) associated with these categories “that need to be incorporated in the rural ICT project process”. It is of course difficult for any project to comply with all of these CSFs, and it would hence be useful to prioritise these factors. Pade-Khene et al. (p.191) do call for a holistic view of a project in the “greater community context”, rather than a narrowly technological focus, and identify the key issues as “economic (production, management, and use of resources in the rural community, etc.), technological (choice in technology), and rural society (social, cultural, and political) issues”.

Tim Unwin (2009) summarises ICT4D practitioner insights into eight interrelated principles for ICT4D success: a focus on needs, designing appropriate technology solutions, sustainability, vision and commitment, infrastructure, effective partnerships, monitoring and evaluation and addressing issues of accessibility. Unwin (p. 365) states that sustainability is primarily a problem with “externally situated ICT4D programmes, and in part reflect a desire by those who create them to guarantee their continued success after the initial period of investment is over”. His opinion is that too little attention is paid on how initiatives can become self-supporting, and recommends that all ICT4D programmes that are introduced by external players have a framework for ensuring “continued viability beyond the initial period of funding” in order to not saddle the beneficiaries with the burden (ibid). This needs to include total-cost-of-implementation models. Unwin does put forward a fairly simple recipe for the underlying basis of sustainability: if people’s needs are met in an appropriate, cost-effective way, then the ICT4D initiative will be sustainable! As an example Unwin mentions the rapid adoption of mobile phones in Africa. It should be noted that this recipe does assume that people make judicious choices regarding their spending, which might not always be true. Toyama (2011a) mentions Kathleen Diga’s research which has shown that some households in Uganda assign a higher priority to mobile phone talk time over other needs such as nutrition and clean water.

Considering the developmental policy level, Unwin (2009, p. 361) spells out the issues associated with the view of development as economic growth and the use of ICTs to serve this goal: inequalities will often be increased by introducing new ICTs, and in the process the opportunity is missed to use ICTs to change the lives of marginalised people.

Kentaro Toyama (2011a), who has done ICT4D research in India, has found an array of reasons for the failure of ICT4D in his survey of literature. These include failures to: design context-appropriate technology, partner with local organizations, adhere to socio-cultural norms, account for poor infrastructure, build relationships with local governments, invite the participation of the community, provide services that meet local needs, think through a viable financial model, provide incentives for all stakeholders. Toyama (p. 75) makes the point that “poorly designed technology or technology by itself, rarely has impact”, and that other things are needed. Toyama points out that critics of ‘technology is the answer’ approaches, have developed frameworks to analyse ICT4D interventions, each of which list the different categories of things that can go wrong (e.g. Heeks, 2002, 2010).

Toyama (2010) holds that a narrow focus on the long list of reasons why ICT4D initiatives fail, does not necessarily provide insight in the “deeper reasons” for failure, and suggests that technology-related reasons are not one of them. Technology is “only a magnifier of human intent and capacity” and cannot substitute for lack thereof such as negative intent (e.g. corruption) or minimal capacity (e.g. lack of education). He argues that success therefore depends on a “foundation of competent, well-intentioned people” (ibid).

In a more recent publication Toyama (2011a, p. 75) spells out in more detail an “amplifier theory of ICT”. The crux is that ICTs multiplies human intent and institutional capacity and does not add to it. The consequences of this theory are important: “(1) technology cannot substitute for missing institutional capacity and human intent; (2) technology tends to amplify existing inequalities; (3) technology projects in global development are most successful when they amplify already successful development efforts or positively inclined intent, rather than seek to fix, provide, or substitute for broken or missing institutional elements” (p. 75). This puts the human dimension of ICT4D in the foreground and clarifies the dependence of the impact of technology on positive or negative human intent. It emphasises the importance of inequalities and the need to address the power relationships which perpetuate those inequalities.

The mechanisms of technology amplification actually worsen inequalities. Toyama identifies three mechanisms, namely: differential access (if you have more money you can buy better access), differential capacity (a better education leads to a better ability to use technology) and differential motivation (many poor people suffer from low self-efficacy, and hence have little motivation to improve their lives). This makes improving education vitally important and points to the importance of the multitude of social factors which influence self-efficacy.

Toyama (2011a, p. 77) notes that the challenge faced by ICT4D is that in poor communities, though the human potential is present, “well-intentioned capability” is actually scarce. He finds a “pessimistic irony for ICT4D” since “exactly in those contexts where human and institutional forces are stuck in the status quo or working against development, technology will not produce positive change” (p. 77).

Unwin (2009, p. 361) also acknowledges the role of human intent: “no amount of new technology is necessarily going to improve government unless there is already a desire within government for change”.

In summary, the role of technology is limited in sustainable ICT4D interventions, the human dimension is paramount. In each of these overviews of sustainability issues, the focus is wider than the individual project and includes the greater context within which the project is conceptualised and executed, and within which it ultimately has to become sustainable. Sustainability is the outcome of a mixture of endogenous and exogenous factors. When project sustainability is being considered the unit of analysis is always greater than the project itself and the actual scope and extent of the system that is relevant to sustainability needs to be analysed.

### **A simple systems analysis of sustainability issues**

As discussed in the ICT4D Trends section, Unwin (2009) develops two broad classifications of ICT4D that is useful to orient the discussion on sustainability. There are market-led ICT4D and socially-led ICT4D and most ICT4D initiatives fit somewhere between these two ends of a spectrum of interventions. The sustainability issues are different. Market forces dominate on the one end, as opposed to the direct interventions by civil society, government, funding agencies, and corporate social investment which dominate socially-led ICT4D. Unwin points out that the long term sustainability of socially-led initiatives is often based on a planned or unplanned transition from donor or state funding to acquiring private-sector support by promising routes to increased profitability. A pathway to sustainability is required that is dependent on many actors in the wider system. A case in point is USAID funding for telecentre establishment in Sri Lanka that is tied to co-investment by the local private sector (Hosman, 2011). To Unwin (2009, p. 374) the bottom-line remains: “such initiatives are not sustainable in the long term, unless people can see real benefits from them for which they

are willing to pay” and, as previously mentioned, this depends on meeting people’s needs in an appropriate, cost-effective way.

Of course, the majority of socially-led initiatives will never be sustainable without ongoing support from government or donors, a case in point being education and achieving the pervasive use of ICT in education. These are initiatives that build human capacity and institutional capacity, which, as Toyama has argued, are vital as a base for technology amplification or indeed for any developmental efforts.

On the market-led side of the spectrum, Unwin (2009, p. 370) outlines the typical roles of government in development: create the environment in which the private sector can function freely while trying to ensure that “the potential benefits are spread as widely as possible, through the use of regulatory mechanisms, tax-based incentives, and subsidies targeted to the poorest users.”

Given this overall picture, what are the prospects of sustainable ICT4D or indeed any developmental interventions in a poor rural community with limited resources, situated in a developing country where governments often do not have the resources or the intent or the capacity to deliver basic services? Toyama (2011a), as mentioned previously, paints a bleak scenario where “well-intentioned capability” is scarce in such communities and where the introduction of technology will not lead to positive change.

A possible answer is bootstrapping the human capacity in this community, this local system. As soon as there is some human capacity that can be amplified by technology, and if there is positive intent, a virtuous spiral of change can be initiated. This process starts with a focus on individuals. There are many entrepreneurial ICT4D initiatives that start with this point, the growth of entrepreneurs, which address building human capacity and developing positive, entrepreneurially driven intent. The institutional capacity in the local community needs to be built as well in order to be able to engage with the bigger institutions that can deliver resources into this system. The contention is that the local system has too little resources to ever be fully self-sustainable. Most systems are in fact not self-sustainable, but require external inputs, as evidenced by the massive global trade. This leads to the argument that

the local system needs to build its capacity to exchange value with other systems, i.e. by using ICTs in production mode to develop products that can be exported, and by developing a track record of effective use of funding that attracts a continuous stream of external funders. There are many roles required in this context, and one of them has been put forward time after time: the champion role. Toyama (2011a, p. 79) is justifiably critical of the track record of telecentres as for-profit microenterprises and reports that the few who do well are mostly run by “devoted non-profit organizations that expend considerable effort and resources or by talented, dynamic entrepreneurs who manage multiple income-generating activities”. In fact, the single best predictor for success is the presence of a local, capable and motivated champion that invests time and effort to keep a telecentre going (ibid.). This champion role is very demanding and it too requires support, in many cases from sources external to the local system.

The champion or visionary leader role is required at many levels. Unwin (2009, p.366) includes vision and commitment as one of the eight ICT4D principles and “visionary champions” are required to drive initiatives at all scales.

The development of such champions takes time and there are many possible ways to go about this. The typical ICT4D project does not get funded for a long enough period to invest enough time and effort to grow and nurture champions. This means that alternative sources of funding and expertise is mostly required to sustain the “incubation” and ongoing support of these champions.

The argument for links to external systems does not exclude the need for the local system to be as self-sufficient as possible. As Unwin (2009) contends, sustainability is dependent on people being willing to pay if their needs are met in an appropriate and cost effective manner. Supply needs to meet the particular requirements of the local demand. Service offerings need to be tailored to the local consumer’s ability to pay, an example being pre-paid air time (or talk time) which is sold in small amounts. But this is not the only or a sufficient basis for sustainability, a portfolio of developmental and ICT4D interventions are required, the sustainability of which depends mainly on role players in other, bigger systems.

The question becomes how do these role players at various levels become involved in the development of a particular local community? How do we link local human capacity development such as the growth of a local champion to the institutional capacity development and the development of linkages for value exchange across a range of systems?

A possible answer lies in the idea of human scale development, which has been mentioned briefly in the section on trends in ICT4D.

### **Human scale development as a strategy**

The concept of human scale development, as developed by Max-Neef and collaborators, has influenced ICT4D thinking. It is based on the satisfaction of human needs, growth in self-reliance, and balanced interdependence of, amongst other aspects, people and nature (Chigona, Pollock, Roode, 2009). Self-reliance, ideally to be achieved at all levels, is understood “in terms of a horizontal interdependence and, in no way, as an isolationist tendency on the part of nations, regions, local communities or cultures” (Max-Neef et al. cited in Chigona et al., 2009, p. 4). In addition, these relationships of self-reliance are postulated to have “greater synergic and multiplying effects when they flow from the bottom upwards”, with local self-reliance therefore influencing regional self-reliance, which grows national self-reliance (Chigona et al., 2009, p. 5).

The concept of human scale development was used by Roode (2002) to formulate a definition of sustainable development:

Sustainable development is achieved through self-reliant human scale development which flows from the individual level to the local, regional and national levels, and which is horizontally interdependent and vertically complementary.

Chigona et al. (2009) have used the human scale development based definition of sustainable development to analyse an individual ICT4D project (a telecentre project), and the “socio-techno divide” concept to study South African government speeches related to ICT and development. In this process they have outlined a strategy for sustainable development that has great potential for systemic analysis of ICT4D initiatives. In accordance with their sustainable development definition, this strategy starts with activities at the local level and works towards the achievement of complimentary activities at the higher levels. To contribute to sustainable development and to achieve sustainability, a single ICT4D initiative should build a “stable network of aligned interests of all the community stakeholders”, and in keeping with the horizontal interdependence of self-reliance, grow an additional network between communities “through aligning their different interests by accepting their mutual interdependence” (ibid, p. 5). The flow of self-reliance from the bottom upwards, the vertical complementarity - as mentioned in the definition, require the development of additional networks of support, which are also developed via alignment of interests between the different “vertical” levels (local, regional, national). The key issue is the alignment of the local, community level interest in (presumably) socio-centric development with that of the higher levels.

The analysis of the South African government's speeches revealed a techno-centric interest in “investment in ICT, providing access to ICT and providing Internet-based government services” (ibid., p. 17), and thus misalignment of interests is demonstrated, and a socio-techno divide exists. In order to influence this non-alignment of interests to achieve vertical complementarity, the “translation of the interests of the various key actors” (ibid., p. 17) is advocated. True to human scale development concepts, this process has to start with the individual at local level, so that people can participate actively. In addition, the understanding of the interests of other levels should be greater among key actors at local level, and the process of translation of interests to achieve alignment should be driven from the bottom up, hopefully resulting in the building of networks across all levels. The end result would be the bridging of all sorts of divides, including the so-called digital divide (inequalities in access to computers and the Internet (Unwin , 2009)).

This approach seems highly promising while at the same time highly theoretical or impractical. However, there are ongoing development initiatives that show aspects of this

approach in action. These deal mainly with enterprise development and are discussed in the next section.

### **Human scale development in action**

The Infopreneur and Macha Works initiatives will be discussed briefly as examples of development initiatives with a clear human development focus.

#### Infopreneurs

The Infopreneur initiative follows a “development through enterprise” strategy that delivers a whole range of services to rural communities via an ICT-enabled distribution channel that is established via the creation of a comprehensive and sustainable community of Infopreneurs® (Van Rensburg, Veldsman & Jenkins, 2008a, Van Rensburg, Veldsman & Lähde, 2008b, Van Rensburg, Cronje, Du Buisson, 2010).

The focus of this initiative is to develop a crucial missing link in the overall system. The network of Infopreneurs® is designed to “address both the service gap (between local level government and under-serviced communities) and the trade gap (between so-called 2nd economy, emerging enterprises and formal, 1st economy enterprises” (van Rensburg et al. 2008b). Infopreneurs® are community based, ICT-enabled micro service enterprises that deliver services such as creating local video material (e.g. videos at weddings) and creating and maintaining an electronic business directory and catalogue of local business (that can be used in local economic development planning of local governmental authorities) (van Rensburg et al. 2008b). A key aspect is the adoption of a franchise model as part of the overall goal of providing a comprehensive support system that is sustainable. Young

community members are set up in their own community Infopreneurs<sup>®</sup> service businesses following a MicroFranchise approach (Magleby, 2005) to provide direct support. This support is delivered via Master Infopreneurs<sup>®</sup> that function as area franchise holders (Van Rensburg et al. 2008a). The Master Infopreneurs<sup>®</sup> are guided and enabled to be social entrepreneurs (Martin and Osberg 2007) by the support context (Franchisor) or so-called "back-office" that not only supports the IT system but also does strategic marketing, establishes service level agreements with national commercial and government entities and provides financial assistance and training (Van Rensburg 2008b).

The individual Infopreneur<sup>®</sup>, in line with human scale development principles, presents the human face of development that community members can talk to. The direct support provided by Master Infopreneurs<sup>®</sup> enables the local champion (Infopreneur<sup>®</sup>) to be sustainable. The alignment of interests in a network is vital to the sustainability of this model and van Rensburg et al. (2010) state that:

Experience to date has taught us that the Ubuntu principle ('I am because of others') affects the core of the systemic sustainability of the Infopreneur network in the African context. The value of the whole network has proven to be far greater than the sum of its individual parts.

The initiative therefore represents an example of the strategy suggested by Chigona et al. (2009). It builds a network that can drive the alignment of interests of key actors in the system via the translation of interests from the bottom up (the Infopreneur) to the Master Infopreneurs<sup>™</sup> which functions at a regional level, to the "back office" that engages at national level.

In the ongoing evolution to improve the sustainability of this model, the importance of ongoing behavioural changes in communities via Infopreneurs<sup>®</sup> as embedded change agents, has grown (Van Rensburg et al., 2010). These change agents support the creation and export of products such as information and knowledge-based 'assets' (ibid), thus, as outlined in the systems model, building capacity to exchange value with other systems.

## Macha Works

Macha Works is based in rural Zambia and has developed a unique approach to rural development that contains a significant ICT4D element (Van Stam & van Oortmerssen, 2010, Macha Works, 2011). Their approach is designed to deal with two fundamental inhibitors to structural rural development (Macha Works, 2011):

- “The community lacks the capacity to attract and retain talented people, because they are reluctant to establish themselves permanently within the community.
- High distribution and transaction costs present significant barriers to economic activity and the ability of government, businesses and local organisations to reduce the significant gap in service provision.”

Building and retaining human capacity is key. A holistic approach is advocated because:

efforts to implement stand-alone interventions in single areas such as healthcare or education have proved unsustainable because of high distribution costs. Different gaps in service delivery are linked and deficiencies in one area can have an impact on others. For example, losing a talented and innovative head teacher at a school not only reduces the quality of education but also makes it harder to retain health professionals or entrepreneurs in the community because they see less opportunity for their children.

(Macha Works, 2011)

Macha Works has found that people stay because of personal development opportunities for themselves and their family via a learning environment in the work place and good education for their children. The Macha Works approach therefore has these fundamental components: Internet connectivity, local heroes (developing local talent) and community initiated solutions.

Of these the key building block is the building of the capacity of talented people within the community (the local heroes) and retaining them via the strategy outlined above. The role of the Internet connectivity is to create the learning environment and enable linkages between local heroes and external people. A Wireless Local Area Network (WLAN) with 90 wireless routers also lowers the cost of reaching the community (Van Stam & van Oortmerssen, 2010). The Macha philosophy is that “the only people that can develop Africa are people from Africa itself” and hence they need to “decide what is needed and implement solutions that work within the context of their own community” (Macha Works, 2011). This is a striking example of an endogenous development approach. Toyama (2011b) has written a blog post in which he reflects on how Macha Works actually works, based on a conversation with GertJan van Stam, the initiator of Macha Works. Toyama’s opinion is that a key aspect is van Stam’s facilitation and mentorship role to assist the local community in achieving their own aspirations and that without this “underlying intent and capacity on the part of both van Stam and the community” the impact of technology would be very little.

In practice the Macha Works model has two phases:

- a slow phase: observe, seek to understand and wait, develop relationships with the right people to find out where to go and what to do; and
- a rapid phase: a quick implementation that provides new energy and confidence.

The slow phase allows the whole system of stakeholders, government and individuals to gain understanding and build relationships. This is a strategy to achieve the alignment of interests suggested by Chigona et al. (2009). The slow phase also turns the normal model of first deciding what to do and then deciding who should do it, on its head. The focus is first on the who, the assumption is that the right person (local hero) will emerge at the right time to take responsibility. The flow of self-reliance is indeed from the bottom upwards as suggested in the human scale development model.

## **Concluding remarks**

In order to increase the sustainability of ICT4D interventions the focus has shifted away from the technology aspects to the human aspects. The role of technology has become clearer as being “only a magnifier of human intent and capacity” (Toyama, 2010). This follows trends in development funding to move away from exogenous to endogenous models of development with the development of local human and institutional capacity as the foundation. The strategy of human scale development holds promise and developmental interventions have demonstrated various ways in which this strategy can be implemented. We are dealing with human capacity development, which is a slow process and requires ongoing long term mentoring and support. This does not fit well with the typical three year funding horizons of funding agencies or research funding. This means that ICT4D initiatives cannot go it alone. Toyama (2011a, p. 81) recommends that “technology projects should seek to amplify the impact of existing institutions that are already contributing successfully to development goals”. The Infopreneur and Macha Works initiatives provide examples of the slow process of building such institutions where none exist.

Plans for future research include refining the systems analysis based on the insights developed by other human centered development theorists and practitioners, for example Kleine’s work in operationalising Amartya Sen’s capability approach (Kleine, 2010) and the work of Urquhart, Liyanage & Kah ( 2008) using social capital and knowledge management theories.

## References

Ali, M., & Bailur, S. (2007). *The challenge of “sustainability in ICT4D – Is bricolage the answer?* Paper presented at the 9th International Conference on Social Implications of Computers in Developing Countries, São Paulo, Brazil, 28-30 May 2007. Retrieved from <http://www.ifipwg94.org.br/fullpapers/R0010-2.pdf>

Chigona, W., Pollock, M, & Roode, J. D. (2009). South Africa’s Socio-Techno divide: a critical discourse analysis of government speeches. *South African Computer Journal*, 44, December 2009, 3-20.

Heeks, R. (2002). Information Systems and developing countries: Failure, success, and local improvisations. *The Information Society*, 18, 101-112.

Heeks, R. (2008, June). ICT4D 2.0: The next phase of applying ICT for international development. *Computer*, 41(6), 26-33.

Heeks, R. (2010) Do Information and Communication Technologies (ICTs) contribute to development? *Journal of International Development*, 22, 625–640.

Hosman, L. (2011). Making the transition from pilot to scale: examining sustainability and scalability issues in a public–private telecenter partnership in Sri Lanka, *Information Technology for Development*, 17(3), 232-248.

Kleine, D., (2009). The ideology behind the technology – Chilean microentrepreneurs and public ICT policies. *Geoforum*, 40, 171–183.

Kleine, D., & Unwin, T. (2009). Technological revolution, evolution and new dependencies: What's new about ict4d? *Third World Quarterly*, 30(5), 1045–1067.

Kleine, D., (2010). ICT4 what?—Using the choice framework to operationalise the capability approach to development. *Journal of International Development*, 22, 674–692.

Leye, V. (2009). Information and communication technologies for development: A critical perspective. *Global Governance*, 15, 29-35.

Macha Works (2011). *Theory of change Macha Works*. Retrieved from <http://www.machaworks.org/en/what-does-macha-works-do.html>

Magleby, K. (2005). "MicroFranchises as a solution to global poverty", December 2005. Retrieved from <http://www.microfranchises.org/file.php?id=35>.

Mansell, R. (2011). Power and interests in information and communication technologies and development: exogenous and endogenous discourses in contention. *Journal of International Development*. (In Press) Retrieved from <http://eprints.lse.ac.uk/32152/>

Martin, R. & Osberg, S. (2007). "Social Entrepreneurship: The Case of Definition." *Stanford Social Innovation Review*, Spring 2007.

Pade-Khene, C., Mallinson, B. & Sewry (2011). Sustainable rural ICT project management practice for developing countries: investigating the Dwesa and RUMEP projects, *Information Technology for Development*, 17(3), 187-212.

Roode, J. D. (2002).. *A Framework for Achieving Sustainable Development through ICT Interventions*. Paper presented at the 2nd Social Study of IT workshop (SSIT): ICT and globalization, London School of Economics, 22-23 April 2002, London. Retrieved from [http://is2.lse.ac.uk/events/ssit2/roode\\_files/frame.htm](http://is2.lse.ac.uk/events/ssit2/roode_files/frame.htm)

Spence, R. & Smith, M. L. (2010). ICT, Development, and Poverty Reduction: Five emerging stories. *Information Technologies & International Development*, 6(Special Edition), 11–17.

Toyama, K. (2009). *ICT4D Research and Potential Sustainability*. Paper presented at the Workshop on Human-Centered Computing in International Development, April 4–5, 2009, at CHI 2009, Boston, Massachusetts, USA.

Toyama, K. (2010). Can Technology End Poverty? *Boston Review*, Nov/Dec 2010.

Retrieved from <http://www.bostonreview.net/BR35.6/toyama.php>

Toyama, K. (2011a). *Technology as amplifier in international development*. Paper presented at the iConference 2011, February 8-11, 2011, Seattle, WA, US.

Toyama, K. (2011b). *Why Macha Works Works*. Retrieved from <http://ict4djester.org/blog/?m=201102&paged=2>

Unwin, T. (ed.) (2009). *ICT4D, Information and Communication Technology for Development*. Cambridge, UK: Cambridge University Press.

Urquhart, C, Liyanage, S., & Kah, M. MO. ( 2008). ICTs and poverty reduction: a social capital and knowledge perspective. *Journal of Information Technology*, 23, 203–213. doi:10.1057/palgrave.jit.2000121

Van Rensburg, J., Veldsman, A., & Jenkins, M. (2008a). From Technologists to Social Enterprise Developers: Our Journey as ‘ICT for development’ practitioners in

Southern Africa". *Information Technology for Development*, 14(1), 76-89.

Van Rensburg, J. F. J., Veldsman, A., & Lähde, K.(2008b). *Social Entrepreneurship: A foundation for 'creative capitalism' in rural African communities*. Paper presented at Science real and relevant: 2nd CSIR Biennial Conference, CSIR International Convention Centre Pretoria, 17&18 November 2008, pp 9. Retrieved from <http://hdl.handle.net/10204/2544>

Van Rensburg, J., Cronje, B., & Du Buisson, U. (2010). *Infopreneurs® in service of rural enterprise and economic development: Addressing the critical challenges of scalability and sustainability in support of service extension in developing (rural) economies*. Paper presented at the CSIR 3rd Bi-annual Conference 2010, Science Real and Relevant, CSIR International Convention Center, Pretoria, South Africa, pp 13. Retrieved from <http://hdl.handle.net/10204/4242>.

Van Stam, G. & van Oortmerssen, G. (2010). *Macha Works!* Paper presented at WebSci10: Extending the Frontiers of Society On-Line, April 26-27th, 2010, Raleigh, NC: US. Retrieved from [http://journal.webscience.org/339/2/websci10\\_submission\\_25.pdf](http://journal.webscience.org/339/2/websci10_submission_25.pdf)