

ICT for Society through Society: Application of code-sprints as entrepreneurial enabler

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Abstract

Information and Communications Technology for Development (ICT4D) is faced with the challenge of creating sustainable and innovative success stories which speak to the creation of an inclusive digital society. Initial attempts at ICT4D had limited success. "ICT for Society through Society" implies an approach through which digital inclusion is driven from within a society with the potential to contribute to ICT4D efforts. In this paper, it is argued that code-sprints, when enriched with life skill elements, utilising tertiary education students from development communities as participants, have the potential to create innovative solutions for that community. In short, complying with the ICT for Society through Society mantra.

1. General introduction

The importance of Information and Communications Technology (ICT) in addressing the global development challenge has been well documented. The World Summit on Information Society (WSIS) states in its Declaration of Principles: "*We, the representatives of the peoples of the world, declare our common desire and commitment to build a people-centred, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting their sustainable development and improving their quality of life...*" (WSIS-ITU, 2003).

Furthermore, the recognition of ICT as an important development driver has also been established. The Organisation for Economic Co-operation and Development (OECD) states in its Technology Outlook: "*Information technology (IT) and broadband are major drivers of research, innovation, economic growth and social change.*" (OECD, 2008).

Nationally, the importance of ICT for development has also been recognised. South Africa's National ICT R&D and Innovation Strategy states: "*Effective uptake and utilisation of ICT have a demonstrated impact on economic progress and there are clear indications of ICT's positive impact on development. Such uptake requires investment in R&D, innovation and human capital development to create the requisite absorptive capacity in the economy.*" (Department of Science and Technology, 2007).

Of equal importance is acknowledging the growing national ICT skills shortage. *IT Web* recently wrote the following: "*SA's shortage of skills in ICT could cost the country dearly in productivity and additional expenses...*" (Mawson, 2010).

Aggregating the above, it is clear that ICT is a key element in development initiatives. Through ICT and broadband interventions, the quality of life in communities can be improved. However, South Africa faces a growing shortage in ICT skills, which is hampering development efforts.

A number of high level interventions have been implemented to address the ICT skills challenge. They include:

- The Meraka Institute (African Advanced Institute for Information and Communications Technology) and the Meraka eSkills Institute.
- SAITS Implementation Initiatives with the Department of Trade and Industry.
- Presidential International Advisory Committee on Information Society and Development (PIAC on ISAD).
- E-skills agenda of the PIAC (Presidential International Advisory Committee).
- Department of Labour initiatives.
- SETA initiatives.
- Skills Development Strategy for South Africa.
- JIPSA (Joint Initiative on Priority Skills Acquisition).

The Meraka Institute, with a mandate of improving ICT Readiness (infrastructure and access), enhancing ICT Capability (skills) and enabling ICT Use (intensity) in order to allow for ICT Impact (outcomes) is actively addressing the ICT skills gap. The Meraka Institute drives several initiatives aimed at enhancing national ICT Capability, such as bursar programmes, Masters and PhD studentships, as well as post-doctoral employment opportunities. The Meraka Institute also hosts several initiatives aimed at improving ICT Readiness. such as the Digital Doorway (DD, 2010) and Wireless Africa (Mesh 2010). The Meraka Institute's National Accessibility Project (NAP, 2010) is a powerful example of enabling ICT Use to create an environment for ICT impact.

Recently, another program in the form of the SAFIPA-MERAKA code-sprint program was added to the Meraka Institute's ICT Capability portfolio (Coetzee and Seetharam, 2009). A code-sprint is a mechanism where a small team is constituted to “aggressively” contribute to a software project with well-defined components for a focussed, short timeframe under the guidance of a senior and experienced technical leader familiar with the project (or technology) being enriched. Through the code-sprint, technical skills are transferred to the team members, in addition to enhancements being applied to the software project (Wikipedia, 2010. Hackathon (Wikipedia). Available at: <http://en.wikipedia.org/wiki/Hackathon>; Wikipedia, 2010. Information and Communications Technologies for Development (Wikipedia). Available at: http://en.wikipedia.org/wiki/Information_and_communication_technologies_for_development).

Code-sprints, also known as “hackathons” have been used with great success in the open-source community (the success of these events is substantiated by the large number of sprints and hackathons over quite a number of years). Two examples are Plone Sprints and OpenBSD Hackathons (Plone, 2010; OpenBSD, 2010). A Plone Sprint is regarded as a focused development session to build a particular subsystem, while also establishing leadership in the community. OpenBSD on the other hand views a hackathon as an event where pure development takes place, where attendance is by invitation only and which is not seen as a training event.

Combining the learning obtained from NAP as well as the SAFIPA-MERAKA code-sprints program, a possibility for development is identified. NAP, an initiative to enhance inclusion and empower persons with disabilities, has shown that initiatives need to come from within the community to succeed. A popular slogan in this domain is “**nothing about us, without us**”. In addition, the code-sprints program has shown that software projects aimed at the development space can be enriched while participants are improving their ICT skills (Afrimesh, 2009).

Through the above, a potential approach for development can be crafted: “**ICT for Society through Society**”. This slogan suggests that development efforts have a better chance to succeed if those efforts are driven from within the community. It also implies an inherent community ownership of development efforts.

This paper investigates the feasibility of the “ICT for Society through Society” paradigm at the hand of the SAFIPA-MERAKA code-sprints program, an analysis of the Information and Communications Technology for Development (ICT4D) evolution and through the identification of value-add elements to the code-sprints program.

Section 3 positions code-sprints as a viable addition to already existing efforts addressing the national skills gap. Section 3 analyses trends in ICT4D, while Section 5 investigates possible elements that can add value to the code-sprint program participants. The conclusion is presented in Section 6.

2 Code-sprints and the South African skills gap

ICT training and education have received wide-spread attention, as its importance is widely recognised. However, the success and applicability of ICT training, education and skills transfer have been questioned. A recent survey (Accenture, 2008) has found that seven out of ten companies have a perception that sufficient skills are not provided through the formal Tertiary Education Institutes (TEI) programmes. This is not necessarily an indication of poor TEI education, but rather a misalignment of the type of ICT skills required for specific market segments. This also applies to the type of skills required to empower an ICT developer creating societal solutions aimed at achieving ICT Impact.

Code-sprints is a mechanism where a team develops or contributes to an open-source project under the guidance of a skilled technical leader in a dynamic and energetic team-orientated environment (Wikipedia, 2010. Sprint (software development) (Wikipedia). Available at: [http://en.wikipedia.org/wiki/Sprint_\(software_development\)](http://en.wikipedia.org/wiki/Sprint_(software_development))). The skills transferred and internalized, in conjunction with exposure to a vast number of open-source technologies and software development communities, empower these participants.

The Meraka Institute has successfully completed Year One of its annual SAFIPA – Meraka Code-sprints program as funded through the South Africa – Finland knowledge partnership on ICT (SAFIPA) (SAFIPA, 2010). Results from Year One reflected the success of the program (Coetzee *et al.*, 2010), indicating that appropriate skills and knowledge have been transferred. Elements that have impacted negatively on Year One of the code-sprints (e.g. not all code-sprinters started on the same day) have been identified and will be addressed in the execution of Year Two of the program.

Code-sprints can become an important addition to the South African arsenal aimed at addressing the skills gap. However, it remains an open question whether the current incarnation of code-sprints will be sufficient to create impact in a developing context. Through the analysis of ICT4D (presented in the following section), a potential approach is identified which can allow for the creation of impact through community innovation.

3 Information and Communications Technologies (ICT) for development

According to Heeks (2008), ICT4D has existed since the early 1950s. Heeks divides ICT4D into three phases: ICT4D 0.0, ICT4D 1.0 and ICT4D 2.0. ICT4D 0.0 was mainly focused on establishing internal government functions in developing countries.

During the 1990s, the Internet combined with the Millennium Development Goals (UNDP, 2010), created renewed interest in how ICT can be applied to the benefit of a developing community. Heeks refers to this phase as ICT4D 1.0. A key defining element of ICT4D 1.0 was often the utilisation of a quick, developed world solution which could easily be replicated in a developing world. This typically took the form of telecenters. Heeks points out that these efforts often resulted in failure, mostly because no thought was given to elements such as sustainability, scalability and evaluation.

ICT4D 2.0, based on Heeks' analysis, among other elements, investigates mechanisms to deliver the Internet to those communities who lack access. Areas of interest in ICT4D 2.0 include efforts to create low-cost terminals (e.g. the One Laptop Per Child project's XO, as well as many different mobile devices), wireless connectivity, as well as mechanisms to utilise power consumption, power generation and storage.

Through an analysis of the descriptions of ICT4D the following three graphical representations of ICT4D's phases can be created. Figure 1 presents ICT4D 0.0. It should be noted from Figure 1 that the ICT solution for development was created outside of the specific community it was aimed at empowering. No feedback from the community was possible to the creators of the solution, resulting in solutions which in general were not suited to solve the needs of that community.

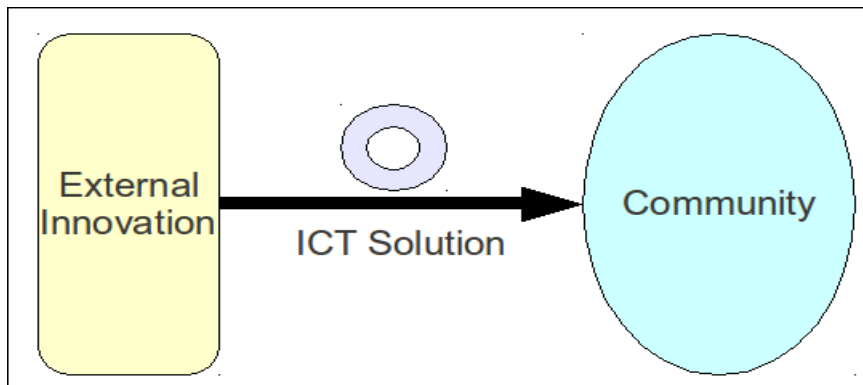


Figure 1: ICT4D 0.0.

Figure 2 illustrates a graphical representation of ICT4D 1.0. An important improvement from Phase 0.0 to Phase 1.0 is the addition of feedback from the community which influences a solution better suited to the community. The application of a Living Labs methodology has received wide-spread attention recently and does provide for solutions which are co-created with the community. An important aspect to take note of is the fact that the solution is still created externally to the target community (Herselman *et al.*, 2010).

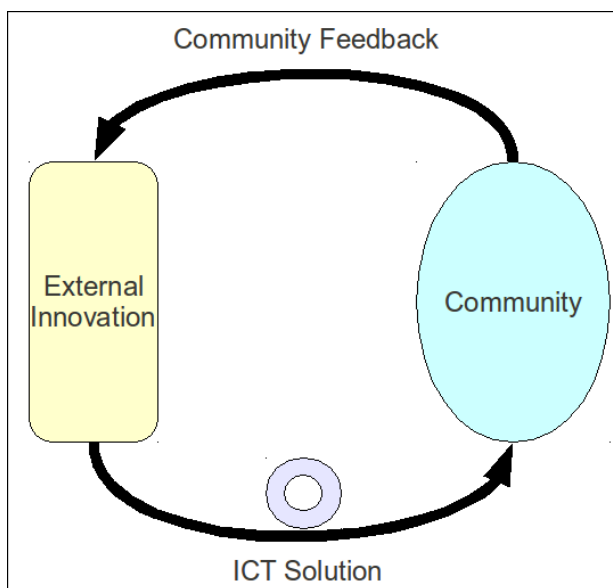


Figure 2: ICT4D 1.0

With the continuous evolution of ICT4D, a new phase is currently coming to the fore. ICT4D 2.0 has as core building block the element of the community being the active innovators and producers of ICT solutions (see Figure 3). This is fundamentally different from previous phases. In ICT4D 2.0, the solutions are aimed at what the community “wants” in contrast to what somebody else thinks the community “needs”.

ICT4D 2.0 motivates for community members to be the instigators and owners of ICT solutions. The depth and complexity of these solutions obviously depend on the community member's technical prowess. This serves as motivation for creating technical skills training opportunities for community members. The challenges facing such an endeavour are well-known and in most cases will not be achieved.

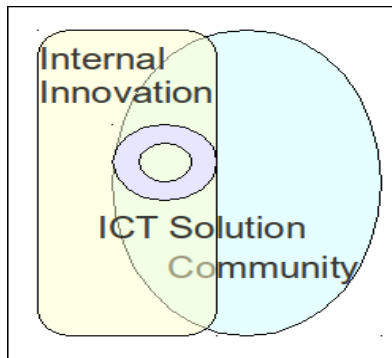


Figure 3: ICT4D 2.0.

However, more young community members are attending tertiary education institutions (TEI) in South Africa. This group can become the ideal drivers of ICT4D 2.0, if they are armed with appropriate skills.

As described in Section 3 code-sprints are an effective tool for transferring technical skills. However, the current incarnation of code-sprints is not aimed at creating a “holistic” participant. Viewing Figure 3, it becomes clear that participants in ICT4D 2.0 initiatives need additional skills.

4 Code-sprints as entrepreneurial enabler in a developing context

Through the experiences obtained and learning extracted from Year One of the SAFIPA-MERAKA code-sprints program (Coetzee *et al.*, 2010), it is clear that code-sprints can enhance the technical skills of participants. However, taking the requirements of ICT4D 2.0 (as described and illustrated in Figure 3) into account, it is obvious that technical skills by itself will not empower a member of that community attending a TEI to participate in the ICT4D 2.0 revolution. The section below describes potential elements that can be added to the code-sprint program for participants to obtain skills beyond technical proficiency.

Entrepreneurial business incubation programmes provide valuable insight into skills that can potentially empower code-sprint participants. SoftStart's coaching model aims to expose ICT entrepreneurs to experienced business professionals (Koorbanally, 2005). The coaching programme distinguishes between “functional” and “technical” expertise. Functional expertise refers to the transfer or general knowledge about legal, finance, human resources, marketing, operations and information technology areas, while technical expertise refers to knowledge about specific subject areas.

The CoachLab™ (The Innovation Hub, 2010) aims to fast-track the development of ICT post-graduates by preparing them to enter the high technology industry as knowledge workers through their participation in specific industry projects. These industry projects are driven by the CoachLab™'s industry partners which include EPI-USE, Cisco Systems, Vodacom, Standard Bank and Talentek.

Internationally, organizations such as “The Partnership for 21st Century Skills” (P21, 2010) and the “Key Skills Student Website” (Quality Improvement Agency, 2010) suggest elements leading to personal development and mastery as key enabling factors. The Partnership for 21st Century Skills provide tools and resources enhancing critical thinking and problem solving, communication, collaboration, creativity and innovation skills. The Key Skills Student Website advocates the improvement in skills pertaining to communication, application of number, information and communication technology, working with others, own learning and performance as well as problem solving.

Contextualizing the above with regards to the code-sprint program, three life skills related themes are identified which can enrich the code-sprint program, namely: Open-source, Operational Development and Personal Development. The recommended elements covered in each theme can include:

- Open-source – the code-sprint program is built on the concept of open-source software. As such, the program participants would benefit by understanding the various open source licenses and the applicable business models.
- Operational development – it is envisaged that the code-sprint participant will create innovative solutions for his/her community. This requires operational knowledge such as how to register a company, knowledge regarding tax (e.g. VAT, PAYE and income), invoicing, contracts and lawyers, as well as employment agreements.
- Personal development – the participant will need good personal mastery to be a successful entrepreneur. Key skills required include knowledge of mechanisms that allow goal setting and career planning, problem solving, critical thinking, analysis, collaboration and networking, as well as how to improve their own learning and performance.

The above-mentioned themes can be included in the code-sprint program in the form of additional sessions provided by guest speakers and tutors.

Figure 4 presents a graphical view of the potential sweet spot which can lead to ICT4D 2.0 entrepreneurial activities when the various dimensions addressed in this paper are combined in an individual. The participants know and understand the demands, needs and wants of their environment (community knowledge) and when armed with the appropriate ICT skills (technical skills), combined with sufficient personal mastery (life skills), they are well equipped to create innovative solutions from within the community. In essence, complying with the stated ICT for Society through Society mantra.

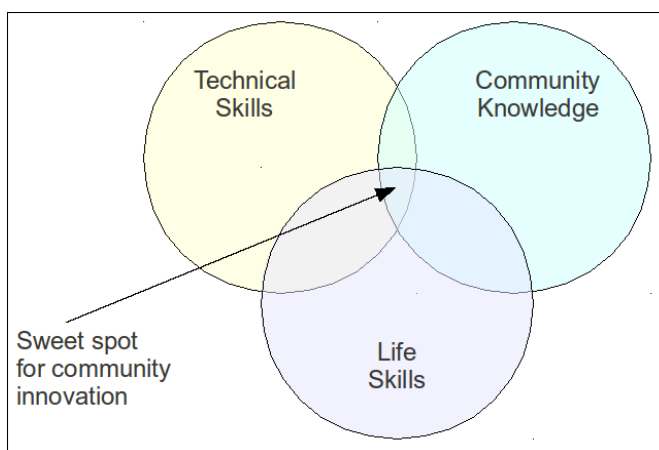


Figure 4: Optimal community innovation.

ICT4D 2.0 is an evolving concept, with a focus on the community as producers and innovators, as opposed to being ICT consumers only (Wikipedia, 2010c). It is argued above that combining life skills with technical skills among members from a specific developing community can create an opportunity for ICT4D 2.0-related innovation. It should be noted that the themes addressed as part of the life skills dimension are complex in their own right and most likely will not be covered in sufficient depth in the code-sprints program to empower the participant to achieve personal mastery. However, it is envisaged that exposing the code-sprint participants to other dimensions will plant the seed, leading the individual down the road to becoming a holistic entrepreneur.

Cognisance should be taken of an initiative known as “Infopreneurs” (Van Rensburg *et al.*, 2008). Infopreneurs describes a methodology for community-driven entrepreneurial activities. The enriched code-sprint program, in association with the Infopreneur methodology, can become a very powerful system-based methodology.

5 Conclusion

In this paper, the author sketched the ICT challenge facing a developing South Africa. One mechanism, the SAFIPA-MERAKA code-sprint program, has shown potential as an additional vehicle with which to address the South African skills gap. The author then introduced Information and Communications Technology for Development (ICT4D) and highlighted the various recognised phases (0.0, 1.0 and 2.0). ICT4D 0.0 and 1.0 have met with limited success. It is believed that ICT4D 2.0 has the potential to enhance digital inclusion and allow for initiatives with impact in a specific developing community.

An important aspect of ICT4D 2.0 is that of the developing community being the active producers and innovators of ICT solutions. Through an analysis of various national incubators and their associated coaching programs, as well as international programmes, applicable life skills associated elements are extracted and positioned to become part of the SAFIPA-MERAKA code-sprint program. The author argues that combining technical skills and life skills with a community linkage can potentially empower an individual from that community to become an active innovator and producer. Thus, in essence, establishing the validity of ICT for Society through Society.

The SAFIPA-MERAKA code-sprint program has positioned itself to test the validity of expanding through the addition of softer, life skills sessions for code-sprint participants from previously disadvantaged universities. The argument presented in this article, that digital inclusion of a society can be better achieved by people from that society will be tested, with results extracted and published.

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