

# The Digital Doorways Project (DRAFT, July 2009)

Social-Technical Innovation for High-Needs Communities

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**Abstract**—Adopting a socio-political viewpoint, the paper discusses the South African Digital Doorways (DD) project and its potential adaptation with Indigenous communities in Australia. The DD, designed for remote high needs communities, is a South African kiosk computer and approach to informal learning. The DD project is described in terms of concepts drawn from Community and Development Informatics, including the significance of consultation and collaboration to ensure effective design, adoption and use in tribal and indigenous communities. A brief comparison with the One Laptop Per Child project is also made. Based upon the conceptual framework described, consultations for project development with the DD staff are described. The early form of a proposal for extending the project in the East Kimberleys region of Australia through a pilot is also outlined.

*Keywords*-Digital Doorways kiosk; social-technical design; community informatics; development informatics; indigenous ICT.

## INTRODUCTION

The purpose of the paper is not technical. Instead, the paper adopts a socio-political viewpoint which argues that Indigenous and tribal cultures must be accounted for in social-technical interventions (Giddens 1984; Lamb and Kling 2003). The article focuses on practical challenges for the Digital Doorway (DD) Initiative in South Africa, and the potential adaptation of the project in Australia with the Wunan Foundation in the remote East Kimberley region of Western Australia.

The DD Initiative was initiated by the Meraka Institute of the South African Department of Science and Technology and the Council for Scientific and Industrial Research (CSIR) as part of the government of the country's strategic mandate for ICT development, articulated by then President Mbeki in 2002. Mbeki specifically referred to "technological literacy [being] key to the country's future in an increasingly globalised world", and he called for local solutions to solve digital divide issue, with the intent also to lead Africa on the issue (cited (Gush, Cambridge et al. 2004)).

The author has been working with Meraka early 2008 to clarify its conceptual framework and contextualize its activity in traditionally-oriented African environments. Of particular interest has been the development of activity beyond the original school-based educational aims of the project (Gush 2008).

Should funding become available, project development and evaluation studies will undertaken with Meraka in order to assess the wider impacts of the DD project and how the project can be developed in the future.

## **The Digital Divide**

The Digital Divide between those who have access to skills, knowledge and technological infrastructure and those who do not is one of greatest challenges to the uptake of Information and Communication Technologies (ICTs). While mostly applied to the situation in developing countries, it is equally relevant to the situation of Indigenous communities in Australia or Aboriginal Communities in Canada (Loader, Keeble et al. 2004; Steyn 2007).

But bridging the divide is not just an issue of hardware and software. As known from the widely used work of Rogers, will only be adopted if they are perceived as relevant and beneficial and having value in such a way that they are adopted, despite any inconvenience they may cause (Rogers 2003). This experience is known from encounters with ICTs in developing countries (Heeks 2002) and other studies which speak of the need for “soft technology” and “soft infrastructure” to support people’s interactions with ICTs (Simpson 2004).

The problem of adoption is even more complex when working with tribal and Indigenous communities and not just people in poverty. A major reason for the difficulty is the significance of effective consultation that meets community norms and expectations (often involved with traditional forms of decision-making) to overcome historically-based experiences of domination and oppression. Without effective consultation and community acceptance, all sorts of projects and interventions founder and ICT projects are no exception to this experience (Stoecker 2005). This significant inter-cultural issue represents a great challenge to assumptions about linear project implementation, because working with tribal and Indigenous communities takes forbearance, patience flexibility, time, and especially humility. But because public ICT policy for needy communities is often driven by political imperatives that can be risk adverse and time-driven, finding a solution that bridges community, and other funding and political interests, is a huge challenge.

## **The South African context**

The population of South Africa was at least 48 million in 2001, with a considerable African refugee population. At least 45-50% of the population are considered to be living in real poverty At least 7.5 million adults are illiterate. According to the UN Human Development Index, which looks at factors such as life expectancy, income, and school enrollment, all the lowest-ranking countries are African and about 14.5% of South Africa’s population lives on less than \$2 per day. Thus privately owned ICTs beyond the widely-used mobile phone are not a proposition (United Nations Development Program 2008). The poorest households are typically those headed by black women in rural areas. It also has a very large young population There are approximately 30,000 schools in the country, perhaps only 20% having more than one computer (Gush, Cambridge et al. 2004).

## **The Digital Doorway as a response**

In response to the challenge of developing a public internet device for use by many people in environments where things like access to electricity is critical, the Meraka Institute has developed robust single or multi-user Digital Doorway terminals to provide both cached and direct internet experiences in public locations to underserved, poor populations, particularly in rural areas of the country. There are now over 150 installations throughout the country. (Gush 2004; Gush, Cambridge et al. 2004; Gush 2008).

A strong influence on development of the project has been the Hole in the Wall project in India with its public, wall-mounted screens and terminals. It demonstrated learning outcomes through non-invasive informal learning, in which non-supervised use, spurred on by national curiosity leads to skills acquisition. The evidence from India is in fact that children quickly learned basic computer skills (Gush, Cambridge et al. 2004; Mitra, Dangwal et al. 2005) Thus, informal education for school-age children outside of the classroom setting has been the first target of the DD project, with the consequent desire to develop an Africanized technology using Open Source products. While the focus has been upon the production of interfaces in English, materials in South Africa's other official languages can be installed. The standard Open Office suite, cached Wikipedia, and multimedia tools are installed for children to explore.

## The Digital Doorway Unit

As one of many initiatives at Meraka involving communities and technology (for example, other areas include community wireless, accessibility, and e-health, as well as high-performance computing), the core Digital Doorway terminal is a robust digital kiosk with 4 screens, and keyboards with touch-pads, built to withstand the rigors of the African climate, enthusiastic use, as well as physical or technical vandalism. It can be securely bolted to the ground or floor (Gush 2008).

DDs can be Bluetooth-enabled (kids love being able to access photos or music for their phones). Kiosk terminals are connected to a server with Xubuntu, have connected video cameras, concealed speakers and uninterruptible power supplies (important in Africa). Units can be configured for offline cached accesses or direct internet access via broadband (wireless, cable) or satellite.

Further versions are being developed, including the lighter and portable "BEE" in conjunction with UNICEF, targeted at emergency environments (The Communication Initiative Network 2008). In addition, a visually-appealing and ventilated portable classroom or public space has been developed that can be transported by truck and easily erected. The space can securely house 3 DDs, and solar power and a satellite dish installed on the roof. Otherwise, DDs can be installed in places like a public library, under the porch of a school yard, or in local shop (it is best that DDs not be rained upon). DDs are technically reliable.



### Figure 1: Registering a personal account on a DD.

The empirical data available to Meraka about the outcomes of the DD installations are of a mixed nature, in part due to the lack of longitudinal, ethnographic and interpretive studies. However, several observations have been made concerning usage patterns thus far:

- It is believed that from log data files and actual observation, that there is increased awareness and use of computers by school-age users.
- However, use is dominated by males between 10-24 years of age, and despite the rural nature of most sites, the preferred language is English.
- Rather than personal user accounts, the standard open suite is used for access (Gush 2008).
- There is evidence that the DD improves learning (Cronjé and Burger 2006) though there is a need for controlled longitudinal studies of school-age children.

Other observations about the project include the need for improved work with sites that do have technical difficulties, and the importance of community champions to encourage uptake, use, and content development when the DD is not “sold” in the community. As suggested by Gush, “unsuccessful sites may require technical or social intervention, or even relocation” (Gush 2008).

### Comparison to the One Laptop Per Child (XO) Project

The One Laptop Per Child (XO) is designed as a cheap, small, individualized learning computer for children using a Linux-based operating system. The project has had major philanthropic and corporate backers, including Nicholas Negroponte, and over a million have been distributed to developing countries. As well, there is a program for distribution to Indigenous schools in northern Australia. [See <http://www.laptop.org> for more information]



Figure 2: After-school fun with the DD in the library. The satellite is on the roof.

Because XOs can be wireless networked, there is potential, for example, to network them into a DD hub as robust connecting point. The development of the XO as a “green computer” is also a significant breakthrough, as is the way in which its proponents have highlighted the importance of digital literacy in developing countries.

However, it now appears, despite the significant funding, publicity and political support attached to the XO, questions are being asked about its effectiveness and vigorous practitioner debates do not abate on websites such as <http://www.olpcnews.com>. While some of the hostility can be explained as ideological opposition to American “celebrity philanthropy”, resistance to “spin”, or technical back-biting, there are also more serious critiques. The authors of a recent study of the XO conclude that technical innovation that is divorced from local needs, engagement, and acceptance is bound to have implementation problems (Kraemer, Dedrick et al. 2009). This is a criticism that also needs to be taken into account with the DD project. There are other practical reasons why the XO may not be ideal for wider distribution than schools: its keyboard is too small for adult hands, unlike the DD, nor is it intended to be a robust mass device for multiple users like the DD.

These problems are a confirmation of the evidence concerning the fundamental importance of “soft technology” and “soft infrastructure” no matter how wonderful a piece of equipment appears to be to its designers and enthusiasts. Working on the ground for system design is critical.

## **The Situatedness of Technology: A developmental perspective**

Suchman’s studies are well known for arguing that the “situatedness” of technology is critical to effective design and use (Suchman 1987; Suchman 1999), but this principle has not been well-articulated with respect to communal situations such as those found in tribal collectivities. Indigenous culture has been too often regarded as primitive, easily acquired, and secondary to the expert knowledge (including technical knowledge) held by the Western-trained researcher or practitioner. As a consequence, the history of action and research (even of the most well-intentioned sort) with Indigenous communities has all too frequently been bound up with the effects of colonization, unequal benefits of research, and deterministic cultural, political, and economic agendas in favour of the researcher, rather than the “researched” (Bishop 2005). The same comment is relevant to socio-technical research, however well-intentioned, where the concept of the “individual” and “community” has lacked sociological depth and subsequent nuanced application in design and application (1995; Lamb and Kling 2003).

The most difficult challenge in all of this is to work with communities to find socio-technical solutions to the proposition that Indigenous peoples are not merely stakeholders in their heritage or development, but that they “own that heritage and that the right to fully control and if and how research is undertaken on that heritage” (Niven and Russell 2005).

Gurstein, who is widely cited in *Community Informatics*, recently suggested that *Community Informatics* involves “... a commitment to universality of technology-enabled opportunity including to the disadvantaged; a recognition that the “lived physical community” is at the very center of individual and family well-being – economic, political, and cultural; a belief that this can be enhanced through the judicious use of ICT; a sophisticated user-focused understanding of Information Technology; and applied social leadership, entrepreneurship and creativity” (Gurstein 2008: 12).

That is, Community Informatics is a type of social-technology theorization and practice that promotes social change and human development in conjunction with technology. Community Informatics is thus a specific form of research and implementation at a micro-level of society, directed at local communities and even smaller collectivities in them (community organisations, families, informal groups, village micro-enterprises). Its theories and practice are based on fields as diverse as information systems, management systems, library sciences, program evaluation, and community development, and these bring a particular nuance to working with communities on the ground, whether in western or developing countries (Heeks 2002; Stillman and Linger 2009).

Additionally, within the field of Development Informatics, there is an approach that is critical of the appropriate use of Western ICTs and systems which benefit no-one but elites and in fact, only serve to highlight the potential for well-intentioned projects to serve to disempower local interests (Avgerou and Walsham 2000; Zheng and Heeks 2008) and reinforce relations of dependence on external players. This is a viewpoint that has emerged from dependency theory which has developed in a variety of different (and debated theoretical forms) as described by Sonntag, (2001). Consequently, socio-technology interventions should empower and provide dignity to those in need (Avgerou and Walsham 2000; Zheng and Heeks 2008). At their worst, interventions psychologically disempower, a point well known from the writings of Franz Fanon on colonization in Africa (Fanon 1967; Gibson 1987). Equally, the question of empowerment is the major theme of the November 2009 Prato Community Informatics Conference (<http://www.ccnr.net/prato2009>).

## **Clarifying the Theory behind the DD**

A review of the principles of community informatics and program evaluation techniques was conducted by the author in conjunction with Meraka and Monash South Africa staff on two occasions in 2008 (Stillman 2008). Principles behind community-based research and community development were also discussed, as a way of providing concepts and a vocabulary to describe and map different community and stakeholder interests (Rothman 1972; Stoecker 2005). A workshop to outline the focus of particular DD variations for different community needs was also held in April 2009.

Through this intensive process, Meraka and some Monash South Africa academic staff have gained knowledge and a common language about working with communities. Additionally, new and important ideas were generated. For example, in the first workshop series, the metaphor of an “ideal type” was introduced, drawing upon Max Weber’s foundational work in sociology (Weber, Shils et al. 1949: 90). The principle of the ideal type was used to develop an ideal representation of the DD ideal for modeling and discussion. This struck a strong chord with people, and one of the participants came up with a statement which still carries some weight because it encapsulates much of what is intended about the DD: “Digital Doorways being built by each community and maintained by the community, that are sustainable and contributing to the development of that community”. This statement brought to the fore the insight that the Digital Doorway device was something more than a device, but social-technical change agent.

The result has been a much higher degree of awareness by the DD staff concerning issues about working with communities, and how to analyze the social factors that account for successful and non-successful adoption in apparently similar communities.

The more recent set of workshops in April 2009 reflected upon the DD as a *group or social* (rather than *individual*) technology that can serve different purposes. Some of the key factors that were articulated included:

- Emphasis on group rather than individual use (as opposed to commercial devices which focus on the individual user). Individual use continues to be possible.
- The goal of the support infrastructure is aimed at bottom-up adoption and innovation rather than off the shelf commercial technology which stops at the consumer, or depends on a further commercial relationship. Thus, it is a “sponsored” *Social Computer* for multiple users, rather than a self-funded or corporate Personal Computer.
- The DD is an “embedded social technology” in deliberately designed or intended circumstances concerning social, economic, educational, and community development.
- The DD may in fact be a first stepping stone for many people into more portable and personalized/configurable technologies.
- The DD is a place and platform for peer-assisted learning/informal learning
- The DD is a communication hub for uploading and downloading information.
- The DD is designed for circumstances where technical support is limited and a strong, robust device is needed that can be easily supported locally or remotely.
- Group social interaction by a group is critical for informal learning as distinct from the more individualized approach that underlies OLPC.
- The DD is meant to be a technical platform and environment for social-technical research.

The critical future challenge will be applying such insights to future implementation and then, to research outcomes in South Africa, as well as potentially, in Australia.

## **The Digital Doorway for Australia**

### **The Indigenous Demographic context**

Despite Australia ranking high on the UN HDI overall, the condition of the approximately 450,000 Australians (2.3% of the population), who identify as Indigenous is more akin to third-world conditions. Indigenous Australians overall, die early (males 59.4 years, female 64.8 years, are far poorer, and are far less healthy than other Australians. They are also more likely to live outside of cities, with significant populations in remote areas living in poverty and dependent on welfare support. Only 55% of the over 15 population were in employment, including community employment programs. (Human Rights and Equal Opportunity Commission 2008: Appendix 2) and the history of white-black relations is one of trauma, and continuing, controversial intervention (National Inquiry into the Separation of Aboriginal and Torres Strait Islander Children from Their Families (Australia), Wilson et al. 1997; Macintyre and Clark 2004).

In Australia, the potential for ICTs in remote communities to support change in communities has been recognized (Human Rights and Equal Opportunity Commission 2008: 98), but an issue has been the problem of ethical community engagement, content and backend support. (Daly 2005; Daly 2007; Dyson, Grant et al. 2007; Hughes and Dallwitz 2007; Nakata, Anderson et al. 2007). One prominent Australian Indigenous leader characterized the problem as follows:

*“From the perspective of working to remove disadvantage, it is social justice what faces you in the morning. It is awakening in a house with adequate water supply, cooking facilities and sanitation. It is the ability to nourish your*

*children and send them to school where their education not only equips them for employment but reinforces their knowledge and understanding of their cultural inheritance. It is the prospect of genuine employment and good health: a life of choices and opportunity, free from discrimination” (Dodson 1993).*

The importance of effective collaboration and consultation cannot be underemphasized for work with Australian Indigenous communities who persistently complain of the lack of consultation and programs which treat them as objects, rather than people with a contribution to make.

## **Current Proposals**

As already observed, Indigenous Australian educators, researchers and others have identified access to the internet as an important tool for cultural development, education, and business development, and the Human Rights Commission has itself identified proper high-speed internet as important to remote communities for educational purposes. Indigenous access to broadband is at least half that of the rest of the population with rapidly decreasing access due to remoteness and socio-economic status (Human Rights and Equal Opportunity Commission 2008). Given the huge cost of the provision of face-to-face services in remote parts of Australia for a very small population (as in Canada), cost savings through robust technology are also important because monies could be put into other supports such as schools.

The leadership of the Wunan Foundation which serves the East Kimberley region of Western Australia (<http://www.wunan.org.au>), has expressed a strong interest in partnering with Monash in an initiative that would bring DD technology to its region, as a pilot of Australia. In addition, there is the potential for knowledge and skills exchange with communities in South Africa. The Founding Chair of the Foundation, Ian Trust, accompanied the author of this paper to South Africa in April, and he argues for a philosophy of self-help and independent development (National Interest Program 2008).

Plans with Wunan are in a preliminary stage, and of course may change, depending on funding outcomes, but they are indicative of how a social-technical project that takes collaboration and consultation and community engagement seriously can work with an Indigenous community.

Of particular interest is the fact that Wunan has a distinct community development philosophy, around developing partnerships for training young people, keeping in the community, and developing particularly independence from the welfare system through meaningful work. This has led to the following suggestions.

First, there is the idea for local manufacture and maintenance of DDs for an Indigenous Network if arrangements could be developed with Meraka. Second, Wunan, either alone or with other partners, could become the hub for a number of different indigenously-owned, controlled, and sustained industries, including content development for different products in different Indigenous languages, the manufacture, installation and physical upkeep of DD units, and the administration of the network nationally. Third, in remote locations, local people could be trained as hub “operators”, and bush nurses and others trained to work with remote equipment that links back to medical or other services.

Additionally, a number of academics at Monash are interested in the use of the DDs for telehealth and health education, remote education or remote business (e.g. tourism and sales of art) with all the

advantages that live connectivity including videoconferencing can provide. The partnership would represent investment by Monash University in Indigenous social justice. The partnership is also important because it will permit the development of insights into non-traditional areas of Information Systems research as suggested by Orlikowski, a leading researcher and theorist. She called for research into “the meanings and emotional attachments that users develop for the technologies they use”. Such activity, given the importance of community identity, history, memory, and ownership of information and heritage by traditional and Indigenous communities, is an opportunity for both original research and activity that supports social justice(Orlikowski 2000: 423).

## Conclusions

Ultimately, to adapt what has been suggested by the Aspen Institute in its overview of the necessity of open and multi-disciplinary comprehensive studies of community change (Kubisch 1997), the “recipes, ideas and techniques” discussed here can create a culture of “systemic connection”. Such connection is necessary for a socio-technology such as the Digital Doorway which is intended as a non-commercial community, rather than individual device.

The understandings between developers, researchers and particularly, traditional communities can be deepened and strengthened through a clear understanding of the different rationales for the development and implementation of such an initiative. However, such new connections and recipes are not intuitive or easy to acquire, but need to be consciously “worked at” as “systems of accumulated expertise” because of their differences with more conventional socio-technical activity (Giddens 1992: 2ff). This remains the ongoing challenge to working with Indigenous and traditional communities and of course, the communities themselves should be supported to develop their own expertise (as children or adults) to influence the development of products and systems by technical experts.

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