

Research to Support the Planning Work of the ICT Working Group of the City of Cape Town (CoCT) and the Cape Higher Education Consortium (CHEC)

By Oswald Jumira

oswaldjumira@gmail.com

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Abstract

The City of Cape Town (CoCT) and Cape Higher Education Consortium (CHEC) are striving to work together in Information Communication Technologies (ICT) collaborative research and projects aimed at increasing ICT access and awareness, e-skills and improving on service delivery through use of ICTs. There is need to build integrated and sustainable partnerships which are destined to consolidate the City of Cape Town's status as the 'Rising Urban Star'. This report examines a number of ICT collaborative research case studies, an analysis of ICT research centres, Information Communication Technologies for Development (ICT4D) case studies and includes consultations with ICT researchers to help identify a framework of best practices for successful collaborative projects. Within this report there is also information regarding previous and current ICT projects and researches between CHEC members and CoCT. We also managed to identify potential ICT collaborative research areas and the required capacity to help carry through the projects for the City of Cape Town.

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Background

On the 23 of November 2007 the City of Cape Town (CoCT) and the Cape Higher Education Consortium (CHEC representing Cape Peninsula University of Technology, University of Cape Town, University of the Western Cape and Stellenbosch University) resolved to establish a sustainable and non exclusive partnership. A Collaboration Protocol, which was signed between the CoCT and CHEC in October 2008, commits the two parties to work towards “achieving growth and development related to social, economic and environmental goals within the City’s area of jurisdiction, and to realizing the full potential of the City”. In terms of this Protocol, Information Communications Technology (ICT) has been identified as a key area for collaboration and was established as one of the Working Groups, which would:

- promote access to and awareness of ICT;
- support ICT skills development;
- enhance municipal service delivery through the use of ICT; and
- support for a dynamic ICT sector in the CoCT.

The Working Group through a researcher has set out to identify local and international best practices (through, amongst others, a literature survey) of collaboration in the area of ICTs between higher education and city/regional authorities. They have also requested the researcher to undertake discussions with academics from CHEC member institutions, officials of the CoCT and other relevant experts/stakeholders including business, to identify potential project areas and modalities. From the investigation recommendations are to be made to the Working Group on areas of potential collaboration, with an indication of the mode of interaction and required capacity for implementation in the universities and CoCT.

1. Introduction

South Africa is a lower middle-income developing country which, at the moment, finds itself at the intersection of many forces of change. At the local level, entrenching democracy, growing the economy and eradicating poverty are some of South Africa's highest priorities. On a global level, South Africa is one of many countries seeking to optimise participation in global markets and successfully integrate new and emerging technologies into society. Cape Town being one of the major cities in South Africa shares the country's vision and is spearheading a lot of initiatives focusing on developing the city and leading the city into the digital age. The CoCT is developing ICTs within its communities destined at improving ICT awareness, skills development and service delivery.

Information Communication Technology (ICT) is an umbrella term that covers all advanced technologies in collection, storage and dissemination of information. ICTs are one of several major, new technologies present in our social, economic and political systems. ICTs have a continuing and dynamic presence in our society, impacting on the present and the future. While it may be "... easy to dismiss the future development of ICTs as simply a process of 'roll-out', or the diffusion of already established technologies, "taking such a perspective would be a grave error. There is much to be won, and lost, in the next few years in terms of the development of information communication technologies." (UK Department of Trade and Industry: (2002) a scenario for success in 2005: Information and Communications Technology in the UK).

The CoCT and CHEC have directed their attention to ICTs and the current and future impacts it has on Cape Town and South African society. Although research on the impact of ICTs is relevant in many of the researches currently being done or previously done there is need to focus on integrating effectively new and emerging ICTs within the communities. That emphasis is premised on the assumption that Cape Town needs to unlock the relationship between knowledge, technology, and the uniquely Cape Town social and economic development realities that the city faces. Much of Cape Town's diversity and uniqueness provides opportunities for exciting research on local technologies, especially in the area of ICT. In that way, these ICT collaborative research initiatives seek to attract researchers from scientific, engineering and technological disciplines from different institutions in the quest to support the design, development and application of new technologies in innovative ways to close the gap in the digital divide, service delivery, skills development and ICT awareness.

A lot of research on a number of case studies has been conducted on ICT4D projects to identify best practices and lessons learned. The information is readily disseminated in order to support the success of future projects and constantly raise the bar in development efficacy. This research undertook to study specific projects within ICT Centres, at CHEC member universities and other academic institutions, and case studies within the ICT sector in developing and developed

countries. The research findings are based on case study analysis and consultations with relevant researchers in the ICT academic and industrial field who have worked on individual and collaborative ICT projects over the years. Their successes, challenges and failures created a foundation for a concrete definition of practical collaborative best practices for accomplishing ICT projects. From the consultations and the analysis of the main aims of the research we managed to come up with potential ICT research collaborative areas between CHEC and CoCT within the Cape Town community and also looked at the available capacity that will lead to success of the projects.

The report is structured as follows, Chapter 2 gives an account of ICT collaborative research projects through presentation of case studies and research centres within most of the CHEC member universities and other universities in and outside South Africa. We also have in this Chapter, examples of success stories of Innovation Centres and Technopaks that have been driven by ICTs in developed countries. Chapter 3 gives a summary of the previous and current collaborative ICT projects and research between the CHEC member universities and CoCT. In this section we also look briefly at the ICT projects the CoCT has been working on over the years. Chapter 4 details the best practices for collaborative ICT research taking into account frameworks for ICT4D projects which are mainly for less developed or developing countries which share a lot of similarities and scenarios with ICT projects in low income communities in Cape Town. The potential collaborative areas within the ICT sector for the Cape Town community are discussed in Chapter 5. Chapter 6 looks at the capacity that the CoCT and CHEC members possess in order to take up some of the potential projects or research areas. Chapter 7 concludes the presentation of the research findings and a bibliography follows thereafter.

2. ICT Case Study's and Research Centres

A brief account of ICT research centres, ICT collaborative researches and ICT4D case studies is presented below:

ICT4D Centre

In response to a growing need within industry and academia, in 2008, The University of Cape Town established a research centre to investigate the use of ICTs in a developing world context. The goals of the centre are to provide academic leadership and shape this field so that it best serves those peoples and regions yet to fully engage with digital technology. The centre currently produces MSc and PHD students in the field of are in the process of developing taught courses so that others can gain the necessary skills to work in ICT4D.

The centre takes a multi-disciplinary, human-centred approach to the creation of technology. The solutions created are based on ethnographic studies of needs within the target community or are built at the request of NGOs who have a deep understanding of the communities they work with. Their technology deployments within a community usually follow an Action Research approach, in that they work with the community to create and evaluate the systems they deploy. However, all their work is conducted according to international best practice as witnessed by their numerous publications in prestigious academic conferences and journals.

The centre boasts of staff with excellent track record in capacity building and research in the field of experimental Computer Science – the kind of Computer Science that builds real systems and then critically evaluates their effectiveness. The centre has students from South Africa and other African countries who have been involved in ICT4D for some time. The centre is run by A/Prof Gary Marsden who was awarded in 2007 the ACM ‘Social Impact Award’ in San Jose, California for his work on ICT4D. In 2008 the centre managed to successfully bring the first ACM DIS conference to South Africa with a special focus on ICT4D. Most of the staff is drawn from the UCT computer Science department who include Prof Nic Bidwell, Dr. Marion Walton and Prof Edwin Blake.

Their research projects include:

- Mobile location aware data capture and presentation using converged mobile phones/Personal Digital Assistants
- Mobile and wireless rural communication in tele-health in the Eastern Cape region
- Mobile deaf communication for a Deaf-to-Deaf remote communication System
- Mobile multimedia capture and presentation through exchange of multimedia content

- Mobile Finance looking at cheap, safe and effective ways of making financial transactions for poor communities

ICT4D centre carries out their work in collaboration with the following organizations:

- NGOs: they work extensively with organisations that have access and projects in the community, Institute of Democracy South Africa and township based groups
- University of Western Cape: in areas of network infrastructure and its use in development projects
- Hasso Plattner Institute Research School: Provides bursaries for PHD students in the centre,
- Meraka/CSIR: Currently the centre is in negotiations with the South African national centre in ICT research, Meraka Institute, to see how the institutions can work together to create national ICT expertise
- Industrial Partners: Nokia Research funding a research on use of digital stories in knowledge preservation, Nokia-Siemens Networks funding work on handset interfaces to help users manage cost for fixed-mobile convergence in cellular networks, Microsoft Research (Cambridge) research working on comparison of ICTs in India and Africa and Apple Computers (Education) funding research in use of cellular handsets as a platform for learning in tertiary institutions in developing world

Centre for Information Technology and Development in Africa (CITANDA)

CITANDA is a research unit housed within the Department of Information Systems at the University of Cape Town. It is the vehicle through which research in the department is branded and a conduit for drawing together research emanating from staff members. CITANDA aims to bring together researchers, projects, funders, and programmes focused on the use of ICT in the service of national development. They are striving to become the leading centre of development and research activity for this important effort in Africa.

To achieve this goal, CITANDA actively seeks partners for research and development studies that complement their existing educational and research programs. The centre is interested in (but not limited to) research and international development studies in the following areas: The Impact of ICTs on Economic Development; Information Systems and Practices in Development Contexts; ICT for Development Projects and Evaluation of such Projects; ICT for Development Field Studies in Southern Africa; e-/m- Commerce for Development Studies and Evaluation.

CITANDA also provides consulting assistance in areas directly related to its research and teaching activities: postgraduate and graduate multidisciplinary education in ICT and National Development, ICT Policy Development, and ICT for Educational Programme Development.

There has been collaboration between Mr. Kosheek Sewchurran from CITANDA and Dr. Dick Ng'ambi from the Centre for Education Technology (CET) at UCT in the investigation of both the teaching and learning of IS, and the use of education technology as an aid to teaching and learning. A/Prof Irwin Brown collaborates with UWC in areas of ICT innovation and the use of ICTs in innovation. Dr Wallace Chagona who researches in IS in developing countries and disadvantaged communities in rural and urban areas collaborate with researchers from UWC and CPUT. During its brief period of active existence, CITANDA undertook a number of successful projects, funded from a variety of sources.

Some of these projects, driven by the founder of CITANDA, Professor Paul Licker were:

- nGOFORIT: This project, funded by UCT, established an ongoing panel of NGO informants on issues involving IT and NGO activities;
- Extending the Benefits of e-Commerce: Funded by a grant from the Canadian NGO, the International Development Research Council (IDRC), the project looked at how e-Commerce could be construed as a means of improving business in Africa as well as models for development of effective use of e-Commerce specifically for Africa;
- Transcultural Technology: Funded by the NRF, the study evaluated the contribution of cultural values to use and perception of electronic meeting systems by participants.
- Several projects run by CITANDA for the IDRC in South Africa.
- INDEHELA to be described below

Informatics Development for Health in Africa (INDEHELA)

The initiative started as research partnership between the University of Kuopio, Finland, and the Obafemi Awolowo University, Nigeria, in 1989. A doctoral student from the University of Kuopio in Finland stayed as a visiting research at the Obafemi Awolowo University in Nigeria. A very rudimentary hospital information system, running on a stand-alone PC, was then jointly developed. This gave rise to regular research collaboration between the two universities. The group was then authorized to organize the first Health Informatics in Africa (HELINA) conference in 1993. Several participants felt that ICT could be used much wider to facilitate

healthcare in Africa, if there were appropriate software applications purposely developed for that end.

In the following three years, a group of activists from Finland and Norway in Europe and Nigeria, South Africa, Ghana, Senegal and Zimbabwe in Africa tried to raise European Union funding for a large research and development initiative under the name Informatics Development for Health in Africa (INDEHELA). When this turned out to be too difficult, the Norwegian and South African partners embarked on a bilateral project on district-level information management while the Finnish and Nigerian partners continued on the bilateral development of the hospital information system.

The partners in INDEHELA are now Nigeria (Obafemi Awolowo University), Mozambique (Eduardo Mondlane University), South Africa (University of Cape Town including a network of researchers from CPUT, UWC, UP, MRC-SA), and Finland (University of Kuopio). Also the co-operation between INDEHELA and Oslo University HISP- programme has widened their range; together they cover as well the software and technical side, as the theoretical research.

First phase of the programme was INDEHELA Methods (1998-2001) and the second phase was INDEHELA-Context (2004-2007). The INDEHELA Programme is funded by Academy of Finland.

INDEHELA-Methods (1998-2001 Finland, Nigeria), Methods for Informatics Development for Health in Africa. The objectives of this programme were:

- Create understanding of the practice and problems of software industry in Nigeria.
- Create systems development methods adjusted to Nigerian requirements and constraints.
- Produce an information system for Nigerian hospitals and health centres in a "host project".
- Strengthen the Nigerian partner as the most important Health Informatics Research & Development centre in Sub-Saharan Africa excluding South Africa.
- Establish Information Technology in Developing Countries as a discipline in Finland.

The project was based on the ten-year research collaboration in Health Informatics by the Finnish and Nigerian sites. It produced empirical research information about software industry and systems development practice which was not available from Africa before.

INDEHELA-context (2004-2007 Finland, Mozambique, Nigeria, South Africa)

INDEHELA-context is a follow-on to the INDEHELA –methods. The objectives of this phase are:

- Chart the major contextual factors, in the IS functioning or development
- Create framework mapping social, technical and economical factors, the framework will be a complement to the results of the previous INDEHELA-phase

INDEHELA-results were useful for software professionals in Africa, software education in Africa and prospective international software consultants in Finland.

During 2004 and 2005 a number of individual and collaborative research projects were conducted to contribute towards the objective of the INDEHELA Programme. Details about these projects and results were reported in a number of publications in local and international conferences. The main conferences were the CIRN (Community Informatics Research Network) 2005 in Cape Town, South Africa; IFIP WG 9.4 (International Federation for Information Processing) 2005 in Abuja, Nigeria; ISCAR (International Society for Culture and Activity Research) 2005 in Seville, Spain; and WWW Applications 2005 in Cape Town, South Africa. Several masters' students, a large number of B. Tech projects, and the research work of colleagues at the different institutions are contributing to the South Africa's input to the INDEHELA project.

E-learning Development and Support Unit (EDSU)

The Free Software Innovation Unit (FSIU) at the University of the Western Cape (UWC) has developed and implemented an Open Source home-grown e-Learning system, KEWL. This system has been developed in collaboration with the African Virtual Open Initiatives and Resources (AVOIR) consortium which builds capacity in software engineering in Africa. KEWL3.0 is built within the Chisimba framework and hosts the e-Teaching site which includes a range of advanced communication; content creation and assessment tools.

An integrated eLearning support team, headed by Juliet Stoltenkamp, supports academic and non-academic staff; and students at UWC. The purpose of the e--Learning Division is to define e-Learning's position on education within UWC and how it will support and develop teaching-and-learning activities. The implementation of e-Learning firstly relates to the formal education processes of the institution and involves collaboration with faculties; and other partnerships. The e-Learning Development and Support Team (EDSU) has a responsibility toward building the capacity of the lecturers and students to equip them with skills and e-Pedagogy techniques which enable them to enhance traditional teaching-and-learning practices.

The e-Learning team regularly blogs, providing e-Teaching-and-Learning techniques, linked to actual best practices of lecturers and students at UWC. In order to view these eTeaching tips,

visit eLearning blogs at <http://tinyurl.com/n62on6>. The unit engages in collaborative research with the Centre for Education Technology at UCT.

The implementation role of the eLearning unit is rooted in the integrated planning, support and development of the components of EDSU. It is envisaged that such an integrated implementation approach can help position UWC for other new markets it wishes to infiltrate. The following teams encourage cooperation among stakeholders and provide an opportunity to review the current provision of support and development for educational technologies to ensure total alignment:

- Instructional Designers - are an integral component of the e-Learning Division at the University of the Western Cape (UWC) involved in design of the system.
- e-Learning Student Support- is responsible for training students on how to navigate and manage their content and assessment tasks on the eLearning system.
- ICT staff training – responsible for providing ICT skills training to the entire UWC Staff Community.
- Digital Media Team - is responsible for enhancing communication in teaching-and-learning, research, and business activities of the University of the Western Cape through the effective use of digital media technologies.
- Materials Development Team - the team produces material that supports face-to-face training and just-in-time learning for the use of software applications and the Learning Management System.
- EDSU Research Team - the team has set as its vision to be a leader in the advancement of the EDSU's vision through the provision of high quality research output that will enhance innovative and effective applications of pedagogical approaches leading to the successful implementation and adoption of eLearning at UWC.
- Digital Academic Literacy - is responsible for delivering ICT skills to novice students

Africa Virtual Open Initiatives and Resources (AVOIR)

The African Virtual Open Initiatives and Resources (AVOIR) builds capacity in software engineering in Africa using Free Software (Open Source) as the vehicle. A partnership of 16 African Universities in an alliance that includes partners in North America, Europe, and Kabul, Afghanistan. AVOIR is a network with a node in each member institution. Each node participates in the development, deployment and support of software, seeks business and

partnership opportunities that lead to sustainability, implements software in support of their institutional requirements, participates actively in communication and collaboration activities, and helps to market the network, and its products and services.

AVOIR has created the Chisimba framework and applications based on it, and will be offering a Masters in Free and Open Source Software starting in 2009. Chisimba is a product of collaboration between the following partner institutions: Catholic University of Mozambique, Jomo Kenyatta University of Agriculture and Technology, Makerere University, National University of Rwanda, University of De res Salaam, University of Eduardo Mondlane, University of Ghana, University of Ghana Avoir Nod, University of Jos, University of Namibia, University of Western Cape. Chisimba's home base is in the Free Software Innovation Unit at UWC.

Students' Health and Welfare Centres Organisation (SHAWCO)

SHAWCO is a dynamic, innovative and passionate student-run NGO based at UCT, constantly striving to improve the quality of life for individuals in developing communities within the Cape Metropolitan area. SHAWCO was founded in 1943 by Andrew Kinnear, a medical student who was moved to action by the need which he saw in the impoverished communities of Cape Town. What started off as a one-man initiative quickly grew into one of the country's largest student volunteer organisations, now boasting over 1200 volunteers running over 15 health and education projects in 5 SHAWCO centres as well as other locations around the Cape Metropolitan area.

SHAWCO is divided into 2 main sectors: Education and Health . A third "staff sector" coordinates the SHAWCO community centres, transport, resource development, administrative oversight and project support. They work together with fellow student based outreach programs for examples Maties Outreach from SUN. They also work with community based organization and the local government. Some of the projects being run by SHAWCO include:

Mafundisane

Masifundisane provides environmental awareness and education amongst grade 11 and 12 learners of Khayelitsha. Their focus is on urban geography, environmental (biology) education and support in map work and practical skills for learners doing Geography. They run two lessons a week, hours of both lesson based activities as well as practical ones.

Masizikhulise

Running in both Nyanga and Khayelitsha, Masizikhulise aims to develop the skills of its participants and empower them to become more economically, motivated and active members of society, which they accomplish by starting their own businesses, getting meaningful jobs, honing and applying their IT skills, as well as being socially responsible and active members of their communities. Masizikhulise is divided into four sub-projects, each with its own focus. In Entrepreneurship, participants develop their business skills and are guided towards producing their own business plans. Employment Search Skills focuses on how to go about developing one's skills and guides participants through the difficult task of professionally applying for a job. All participants are required to learn valuable computer skills during IT. All curricula have been developed with the relevant departments of UCT and with the Graduate School of Business.

KenStep

KenSTEP is an academic project that provides tutoring services to the children of the Kensington Community. The project recruits children from grades 3 to 7, from the surrounding Kensington schools, providing them with English, Maths, and Life Orientation tutoring sessions. The Project has a historical relationship with the Kensington community and many mature residents associate with the reputation of the project. KenSTEP acts as a feeder project for the senior academic SHAWCO projects, SO Live and Learn and KenSMART.

IT

The SHAWCO IT project was established in 2002 with a larger expansion in 2004 as the computer centre was built. Through the help of 50 volunteers, the IT Project passes on computer skills to 90 grade 8 – 10 learners in Khayelitsha. IT project aims at developing essential computer literacy skills and an interest in further education by promoting culture of learning while having fun. In doing so then plan a consistent and solid program which will be university applicable amongst a variety of different avenues. The IT project teaches participants to use Microsoft Word, Power Point, Excel, Outlook and the internet for a variety of tasks.

Athlone Living Labs (ALL)

The Athlone Living Lab is a project spearheaded by the Marlon Parker and other researchers from CPUT together with stakeholders in the Bridgetown, Athlone community striving to reconstruct Communities in Tension. A Living Lab is a user-centric research methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real life contexts. It is a human-centric Research and Development approach to ICT solutions and innovations. ALL is a reconstruction interaction space for collaborative design, creation,

dissemination and application of knowledge for empowerment, upliftment and development of people and communities in or headed for tension through the use of innovative ICT solutions.

The ALL project focuses on innovative ICT solutions to facilitate for the:

- care of citizens
- dissemination of information, e.g., to inform citizens about the problems, their consequences and preventative mechanisms;
- education of citizens, e.g., training citizens specific skills etc.
- Enterprise Development of communities

They believe that the universities can offer a bridge to facilitate for ICT based community projects. There are a lot of projects running at ALL which include debt counseling sessions using Mxit, ICT training of former gangsters and drug addicts, social awareness programs and Drug Advice Support Technology solutions. The structure of a living lab concept is described in the diagram below:

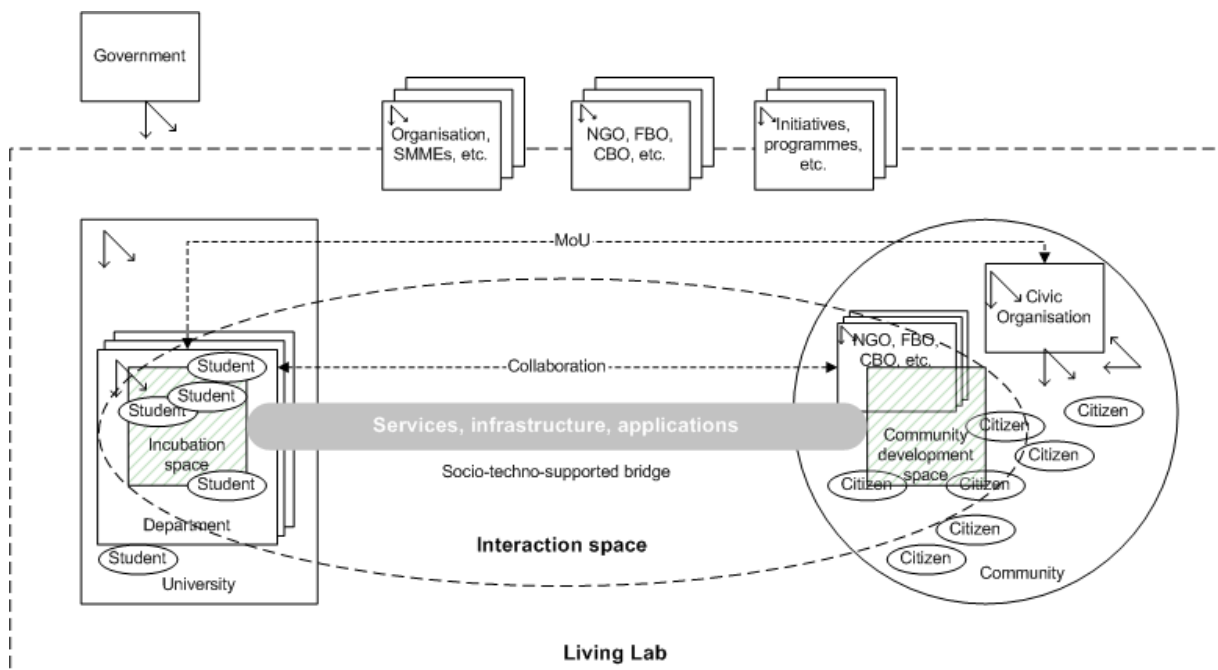


Figure 3.1: Structure of the living Labs concepts

ALL academic stakeholders include: CPUT, UWC – FSIU, UCT, Stellenbosch University, University of Southampton (UK), Malmö University (Sweden), University of Pretoria, NMMU.

Community Stakeholders include: Impact Direct, Bridgetown Civic, Athlone Youth and Family Centre, Athlone SAPS, Athlone Schools Network, Department of Social Development.

Industry partners include: LLiSA, MXit Lifestyle, NetSquared, COFISA, PodCART, Cell-Life, Afrivate, Tabeisa, JJeRR, NETucation, CCSLA, DELL SA-DF.

Digital Doorway Project, eThekweni Municipal Area

Rural areas surrounding Durban in kwaZulu-Natal, South Africa are characterized by fragmented municipal service delivery. Communities living there typically suffer from high levels of poverty and low levels of economic opportunities. This project presented a way of harnessing innovative ICT in order to enable these communities to become part of the global information society. It outlines the proactive role of public libraries in collaborative initiatives in developing digital competencies and providing online information.

Self-contained robust multi-terminal computer units are deployed at central points in rural areas with free unlimited access to all members of the community. Content on the aptly named Digital Doorway kiosks includes the OpenOffice suite, educational games and programs and a snapshot of the Wikipedia. Health and education curriculum material are updated through a satellite receiver. Small community libraries housed in refurbished shipping containers complement the Digital Doorway units. Together the digital library and the container library provide compact one-stop information shops to remote rural communities.

The Digital Doorway project is a joint national initiative between the national Department of Science and Technology (DST) and the Meraka Institute, managed by the Council for Scientific and Industrial Research (CSIR). The Institute supports regional initiatives under the New Partnership for Africa's Development (NEPAD), collaborating with ICT organisations through cooperative programmes in a quest to introduce computer literacy and the associated skills into the ambit and experience of all South Africans (Meraka Institute, 2005). Originally modelled on the Hole-in-the-Wall project developed by Professor Sugata Mitra of the National Institute for Information Technology (NIIT) in India, the Digital Doorway underwrites the concept of Minimally Invasive Education (MIE) as a form of education (Mitra, 1999). This principle of people's inherent cognitive ability to teach themselves computer skills with minimal external intervention forms the basis of the Digital Doorway.

Short term outcomes of this integrated project focused on digital skills development and access to local and global information for poor, isolated communities and managed to achieve this. In the longer term enhanced media literacy will contribute to participation in the knowledge economy, active citizenship and the socioeconomic transformation of societies. Online access to information will steer rural communities to global understanding and nurture the development of democracy (Elizabeth Greyling, Ronel Smith, 2008).

Knowledge Management in Electronic Delivery of Municipal Services, Mangaung Local Municipality

Mangaung Local Municipality (MLM) entered into a strategic partnership with global and local technology leaders, which is centred on a second economy Business Process Outsourcing and Off-shoring (BPO&O) hub in Bloemfontein.

In the early part of this decade, South Africa's Department of Trade and Industry (DTI) embarked on a Business Process Outsourcing initiative aimed primarily at attracting off-shored call centre business to South Africa. As a result the large metropolitan centres were able to attract numerous large offshore call centres to South Africa. In recent years, recognizing that the BPO initiative needed to be broadened to ensure a greater spread of services and economic benefit across the country, the DTI launched its "second Economy BPO&O" initiative, which incentivises BPO&O activity in less traditional locations.

Second economy BPO, as distinct from first generation BPO, is dependent on tapping into offshore and local business process outsourcing services and includes an emphasis on leveraging the use of ICT as an enabler to achieve local economic development through effective service delivery. A key element of second generation BPO concentrates on ensuring long term sustainability for these services.

Fujitsu Services, UniNet Communications, Cisco and Microsoft are service partners that are investing in the MLM BPO&O Hub to deliver the "Re Hodisa Moruo Project". Whilst focusing on the development of sustainable BPO&O business, the project will facilitate economic development through the enhanced delivery of municipal services and greater co-operation between the community and the Municipality.

The project will be delivered through the innovative use of technologies that will utilize the strengths of the "Re Hodisa Moruo" partners. Fujitsu Services is a leading European IT services company specializing in BPO&O and Call Centres. UniNet9 is a South African telecommunications company that is a recognized leader in delivering broadband managed services using its locally developed converged services platform. The Department of Trade and Industry has recognised the project as an approved strategic initiative. The BPO initiative, ICT services and skills development components of the "Re Hodisa Moruo Project" will help to deliver the national Accelerated Shared Growth Initiative of South Africa (ASGI-SA) objectives in collaboration with the private sector.

The challenge for MLM is how to harness the use of ICT technologies as an enabler to improve the lives of the citizens, provide better services at a lower cost and make the City a more attractive place to live and work in, as in the vision of our Integrated Development Plan (IDP) as described by Thabo Manyoni, City Manager, Mangaung Local Municipality.

The project will deploy a unique delivery model that leverages the experience of private sector partners to provide innovative solutions that will initially focus on improved efficiency of basic service delivery, stimulating local economic development, accelerated readiness for the World Cup 2010, and improved communication with the community. This will be made possible largely through the optimization and expansion of existing municipal infrastructure and services, thereby empowering the municipality to provide the next level of delivery. The expansion and optimization, for example, of the Municipal Fibre Network and the deployment of a broadband network that will serve the BPO and Call Centre initiative of the Project, will also improve communications between the Municipality and the community.

The general vision from one of the sponsors, Fujitsu, is that a central service centre will be established in Mangaung that will contribute to job creation by skilling existing Municipal employees, and training new personnel. This will allow co-ordination of service delivery between MLM and the public. The hub also has the potential to offer shared services for the region's other municipalities and the Free State provincial government departments. Ward councillors seek to ensure improved service delivery to fulfil their mandate to their constituencies. The Ward Councillor Empowerment Scheme (WCES) component of the project will empower councillors to monitor the performance of the Municipality and ensure equitable service delivery in their wards as echoed by Papi Molotsane, Executive Chairman / CEO, UniNet.

Local economic development and job creation will be enhanced through employment at the Call Centre/BPO Hub, Mangaung based training and skills development, and the establishment of local offices for Fujitsu and UniNet. The initial investment into Mangaung by the "Re Hodisa Moruo" partners will be in excess of R50 Million rand, and it is anticipated that this will be significantly augmented during the course of the project.

The Mangaung EDP project stems out as the first project of its kind in South Africa and allows the public and private sectors to fuse their initiatives and come together in a model that is aimed squarely at achieving Government's mandate of local economic development through improved service delivery for all its citizens (Fugitsu 2009).

Cofisa Project (Initiative)

The Cooperation Framework on Innovation Systems between Finland and South Africa (COFISA) programme is facilitating the development of regional systems of innovation in South Africa to promote economic development. The ICT sector has been identified as a promising key growth sector in the Western Cape. This potential growth can only be realized if an effective provincial system of innovation exists to support such growth. The effectiveness of the national

and provincial systems determines whether the ICT industry will contribute meaningfully toward the overall goals of economic growth and poverty elimination. To contribute towards this goal the COFISA programme sought to contribute to the enhancement of the effectiveness of the ICT sector in the Western Cape through training on, and use of Foresighting and other future planning techniques in the ICT sector of the Province (Melina Ng, David Lefutso, Thembinkosi Semwayo, 2009).

Joburg Centre for Software Engineering, Johannesburg

WITS University and the City of Johannesburg in May 2005 launched the Joburg Centre for Software Engineering (JCSE), aimed at developing the growth of the local information, communications and technology (ICT) sector. The Centre is based at Wits University School of Electrical and Information Engineering and headed by Prof. Barry Dwolatzky. The centre's vision is to become the nucleus for software development in South Africa and on the continent. JCSE is striving to find ways of supporting growth and strength of ICT skills, which is part of the City's 2030 strategy.

Together with the City of Joburg, industry, local and national government, IT users and academia, the JCSE is promoting best practice in software development by blending international best practice, tools and methodologies with real world professional experience and growing South Africa's capacity to deliver world-class software through research and training initiatives to strengthen the local software development industry. The centre offers high-level public lectures, master classes, continuing professional development courses and technology incubation to develop the ICT leadership for South Africa. It offers consulting and software certification and accreditation services and carries out applied research in collaboration with companies and organisations, aimed at finding solutions to software-related business problems.

The centre boasts of facilities, including world-class infrastructure, specialised computer laboratories, a software engineering library and lecture and meeting rooms. The City sees the centre as one of its flagship projects, leading to Johannesburg being a hub for Africa's ICT sector. It creates greater opportunities for all operators in software engineering, but specifically for black economic empowerment and small medium and micro enterprises (SMMEs). JCSE is also leveraging the development of better affordable software for individuals, enterprise and the government to increase international competitiveness.

The strength of the JCSE lies in its partnerships with business, in the form of gold and silver sponsors. Gold sponsors involved in the project include IBM, Microsoft, First National Bank, Unisys and the Meraka Institute. Barone Budge and Dominick, Oracle, Arivia.com, New Dawn Technology, Tat Consulting Services and BMI-Technology are among the silver sponsors.

SATELLIFE PDA Project, Uganda

The goal of the SATELLIFE PDA Project was to demonstrate the viability of handheld computers - also called Personal Digital Assistants or PDAs – for addressing the digital divide among health professionals working in Africa. This project was inspired and led by SATELLIFE, a non-profit 501(c) (3) organization based in Massachusetts, USA. SATELLIFE promotes the use of appropriate, affordable technologies to link health professionals in developing countries to each other and to reliable sources of information, including by using geostationary satellites, modem-to-modem telephone links, and the Internet. SATELLIFE worked on this project with a number of ground level partners, including the American Red Cross; Makerere University Medical School in Kampala, Uganda; HealthNet Uganda; Moi University Faculty of Health Sciences in Eldoret, Kenya; and the Indiana University Kenya Program (Bridges.org, 2009a).

E-Governance for African Municipalities, Lusaka City Council Zambia

In order to promote efficiency and transparent governance in the African public service, UNESCO and the Danish International Development Agency (DANIDA) conceived a three-year pilot project on “E-governance for African Municipalities,” which began in 2001 and involved selected municipalities from five African countries: Mali, Mozambique, Niger, Tanzania, and Zambia. Lusaka, Zambia’s capital was the country’s representative in this project.

According to Lusaka City Council IT Manager Judy Beene, also the LCC project supervisor, the project’s objective was to promote free flow of information and thus to open dialogue among municipalities and the local communities they serve. In addition, the project strived to improve access to information required for decision making, to communicate effectively with citizens and to establish a municipal information system using ICTs. The e-governance project has transformed the LCC into a knowledge hub and could be used as a tool for service delivery and revenue generation, as well as a teaching and learning centre for e-commerce.

As the local government has a profound impact on the lives of citizens, the governance processes and structures that accompany it must be – and are becoming - participatory, transparent, and accountable. These objectives are becoming a reality in Lusaka City Council through the newly built website, which opened dialogue between the Council and the community it serves. The LCC can now use ICTs as a means of improving responsiveness and reliability in its services. For instance, internet connectivity boosted the Council’s operations by improving communication among the workers, about 50% of whom are now using ICTs. The local network has also streamlined the operations of the Rates Department, as they are able to update their records on a regular basis. In the past, citizens had to walk to the LCC headquarters to access information; today the project has opened municipal services to the city’s population. The minutes for the full council meetings will be posted online, enabling members of the public to

know what transpires in these meetings. Through the website people can come to know their councillors in the wards, to learn of development projects and to explore the Council's delivery of services.

Unfortunately, the LCC project suffered a setback when the funders did not release the last parcel of funding for training council workers in e- governance. According to Beene, there has been little feedback from UNESCO and DANIDA, the project's initiators. The shortage of funds has also stalled the creation of the Public Information Centre, and further budget constraints, owing in part to escalating prices of equipment, have meant that staff was not properly trained for network administration and web design maintenance. The project had to be ended because there has been no feedback from the funders and the Council has taken up the duty of paying the Internet bills. Although e-governance has opened a window on new opportunities for the LCC, its workers need training sessions both to improve their basic computer and ICT skills and to help educate the public on how to use ICT to interact with the LCC effectively.

The project has achieved significant results as the Council can now communicate with other countries through the Internet. Acting Director for the Engineering Department acknowledged that internet access has improved his work as he is able to conduct extensive professional research and to download relevant materials. In addition, he notes that the Engineering Department can use its site to provide updates of activities, such as posting maps showing which roads are closed for maintenance and where new road construction is taking place. According to LCC Senior Software Developer Johns Kafwilo, the project has improved the operation of the Council as most of the communication is done through the Internet where technical consultations can be done. (Kabukabu Mambwe, 2005)

Municipal Services through ICTs (Rural-urban partnership programs), Nepal

The Local Self-Governance Act – 1999 (LSGA) consolidated different acts related to the Local Bodies (LBs) and provided a platform for decentralized governance in Nepal. The LSGA reflects the political will of Nepalese Legislature and Government of Nepal (GON) for the commitment to decentralized governance and it is well reflected in the Poverty Reduction Strategy Plan (PRSP). Decentralization is considered a cross cutting issue having positive implications on Poverty Reduction. To translate the spirit of LSGA into action, the GON has taken several messages to devolve different service related sectors from the line agencies to the LBs, especially to the municipalities in the urban part. As per the LSGA, the municipalities, as a municipal government of Nepal, are providing municipal services to their citizens.

Most of the municipalities are depending upon the traditional systems and are basically focused on the physical infrastructure development. Still, the planning is carried out with the top down

approach in many cases without people's active and meaningful participation. With the emergence of Rural Urban Partnership Programme (RUPP), the concept of urban development has taken a new dimension, for example, social mobilization, people's participation, enterprise development activities for livelihood options, rural urban linkages for balance development, ICTs, and some affirmative action to disadvantaged groups (DAG). Out of 58 municipalities, RUPP is implemented in 35 Municipalities and 49 Rural Market Centres (RMCs) in phase wise manner including 15 municipalities that have been replicated RUPP by the Ministry of Local Development (MLD). RUPP's objective is based on the targets of MDG. The Programme directly contributes on goal 1, Eradicate extreme poverty and hunger, goal 3, Promote gender equality and empower women, goal 6, Combat HIV/AIDS and goal 8, Develop a global partnership for development. Similarly, the programme, through its social mobilization process also supports goal 2, Achieve universal primary education, goal 4, Reduce child mortality, and goal 5, Improve maternal health.

With the support of RUPP, partnering municipalities started bottom up approach planning through social mobilization and Participatory Municipal Development Planning (PMDP) process. Municipalities covered up to 100 % households through social mobilization process forming 5,527 Tole Lane Organizations (in Nepali Tole Bikash Sanstha) – community based organization as a grass root institution to support municipalities in overall development. With RUPP support, the Municipalities established and operationalised Urban Information Centre (UIC) as a municipal Data Bank and Human Resource Development Centres (HRDC) as a Human Resource Incubation Centre providing easy access to the community. Municipalities, with the objective of poverty reduction, established Municipal Partnership Development Fund (MPDF) to provide easy access of credit to the poor and needy community people.

To strengthen and expand the enterprises, municipalities started disseminating daily agricultural price information and supported in establishing Market Linkages through the National B2B e-Commerce Services named "*Nepali e-Haat Bazaar*". Municipalities initiated Public Private Partnership. In addition to this, the municipalities have also shown their commitment to participatory planning and transparency by introducing the municipal e-Governance system that include vital registration, online publication of financial records, citizen charter, discussion forums, comments and suggestions for planning and decision making processes, etc. For easy access of these services, the municipalities established community run telecentres in municipal as well as in the rural areas of the RUPP working municipalities and rural market centres. The Programme has promoted the ICTs as a major tool for strengthening good governance and poverty reduction activities.

Through different means of ICTs, the Programme is also contributing in awareness generating activities, empowerment of women and disadvantaged groups, delivery of basic services and promotion of market linkages for better livelihood options. Till today, UICs have been established in 25 municipalities and MPDFs in 35 municipalities amounting to Nepalese Rs. 136

million that created more than 30,000 entrepreneurs having 53% female entrepreneurs, generated more than Nepalese Rs. 179 million from internal savings with 89 % investment among the community members and constructed 1930 community level infrastructure projects with 78 % resources mobilized from other agencies. The HRDC successfully organized trainings on Social Mobilization, Leadership, Gender, Saving & Credit Mobilization, Enterprise Management, Skill Training, Technology Transfer, PMDP, Local Governance, HIV/AIDS, Computer, B2B e-Commerce, Info Mobilization, Telecentres Operation and Management. to more than 69,000 participants including community members and municipal/VDC staffs. Apart from this, the Agricultural Market Information System and National B2B e-Commerce Services were established in partnership with Agro Enterprise Centre/Federation of Nepalese Chambers of Commerce & Industry in close coordination with High Level Commission for Information Technology. Similarly, telecentres and Cyber Cafes were established with the support of UN Habitat and the World Bank supported TSRP executed by the Nepal Telecom Authority, which is playing a key role in digital divide without any discrimination between the rich and poor. (Ramesh Adhikani, Suresh D. Shrestha, 2007)

E-Learning Programs, Philippians

E-learning applications were the second-most popular development application for ICTs in the Philippians. The primary educational application has been for: distance learning, ICT skills development, networking knowledge institutions and providing access and exposure to the technologies.

Distance learning is delivered through various technologies. For instance, Fr. Francis Lucas (1999) has documented a radio broadcasting model for teaching rural women and household in Quezon about farming technologies. On the other hand, the National Broadcasting Network and the National Institute for Science and Math Education use the television in its Continuing Science Education for Teachers via Television (CONSTEL) project. It made use of the latest broadcast satellite technology combined with well researched and carefully produced tele-lessons. This could then be used to train elementary and secondary school teachers in teaching English, Science and Mathematics. Last, the United Nations Development Programme has the Text2Teach program that has been piloted in 40 elementary public schools in poorer areas in the Philippines. It enables schools to order science videos from electronic libraries using SMS technology. Among courses and topics delivered on a distance learning mode are courses on journalism (Konrad Adenauer Centre for Journalism), on social health insurance (IPHM).

Distance learning is also being practiced by the University of Philipians-College of Public Health and Makati Med (Domingo, 2004). Children and Youth Foundation of the Philippines and the Centre for Industrial Technology and Enterprise run the e-Skills Learning Project. The e-skills is

an innovative approach in training students in trade and livelihood skills. The goal of the project is to improve the quality, delivery system, and widen the reach of skills and technical training and education. Selected courses demanded by the market and successfully run by training institutions are converted into web-based formats and interactive modules. A portal hosts the developed curricula, which are accessible through the Internet. Compact discs (CDs) are made available to those with no Internet connections. Interested training institutions and organizations link with CYFP to access the developed modules. They can be used to run new training programs/courses, as replacements to current programs or as supplements to existing ones. The project provides web-based educational content, online testing, instructor training and technical support. A similar program called the *Ed-venture project* provides computers, internet connectivity, training and after training support for public high schools.

ICTs are also being used to enhance teaching skills and techniques. For instance, the Diliman Interactive Learning Centre provides technical support and facilities for faculty members to develop digital instructional resources. De La Salle University, on the other hand, uses the Virtual Classroom which was licensed by the National University of Singapore to use its online learning system, called: Integrated Virtual Learning Environment (IVLE). Through the IVLE, teachers are able to enhance or complement their teaching by making courses available in cyberspace.

Another e-learning application is the linking together of various research and educational institutions, through a common infrastructure. For instance, the Philippine Research, Education & Government Information Network (PREGINET) involved the establishment of a nationwide broadband network for research and education institutions involved in the development and demonstration of new technologies, services and applications with connectivity to international research and education networks. The E-library project, on the other hand will integrate the current libraries and information sources into a single network system, with focus on Philippine materials to serve a wide range of clients.

Other materials & links such as online library database systems will be made available and accessible only through subscription. The Department of Transportation and Communications (DOTC) in partnership with Science Education Institute and Intel Philippines, on the other hand, provides Mobile Information Technology Classrooms (MITCs) that use an air-conditioned 32-seat bus equipped with 17 laptops, television sets, 2 VHS players, 2 LCD projectors, 2 projector screens, public address system, printer and generator set. They are equipped with the latest in education technology facilities, computers & audio-visuals and instructional materials in science and technology. They provide science and mathematics coursewares in CD and VHS formats. There are similar projects in Bulacan province and by DOST. (Noriel Tiglao Erwin A. Alampay, 2005)

SARI Project, Indian

The SARI project has been a collaborative venture of several organizations: the Indian Institute of Technology, Madras; Berkman Centre for Internet and Society, Harvard University; Georgia Institute of Technology; I-Gyan Foundation; and n-Logue Communications Pvt. Ltd. Initially, researchers at the Massachusetts Institute of Technology were also partners.

In the project, Internet and computer services were offered to members of the village community at kiosks run as a self-sustained business with fees levied for various services. These kiosks were managed by two sets of operators: in some, a private entrepreneur was in charge, while in others an NGO, called Dhan Foundation, ran the kiosk. Dhan aimed specifically at reaching the most socially and economically disadvantaged communities in rural areas with their kiosks, and oversaw 42 facilities. The other 36 kiosks were owned by self-employed rural entrepreneurs. In a majority of the kiosks, the owner operated the kiosk directly. In several cases, however, the owners employed a separately trained and paid operator to manage the kiosks. There were 15 locations where the owner and the operator were different persons. All of the kiosks received Internet connectivity from n-Logue Communications Pvt. Ltd., a rural Internet start-up that was incubated through the SARI project and spun out of the Indian Institute of Technology, Madras. Network connectivity was provided via a wireless in local loop (WLL) technology, called corDECT, also developed at IIT Madras.

Ostensibly, the SARI project was composed of a “board” based at the four principal initiating institutions (Harvard, MIT, IIT Madras, and McKinsey) as well as a project management staff based at IIT Madras in Chennai. Initial support for the SARI program came from the Mumbai-based commercial bank, ICICI, as well as a gift from the CEO of Analog Devices, Ray Stata.

This SARI team worked with n-Logue Communications as the local implementing partner with n-Logue assuming most of the day-to-day project and network management tasks. The Dhan Foundation was selected by the SARI board to serve as the local NGO partner. Additionally, the SARI project had developed partnerships with different agencies—both public and private—to provide various services to community members. These included tie-ups with the Tamil Nadu Agricultural and Veterinary University for providing remote agricultural and veterinary services, and with a private eye hospital, Arvind, for providing telemedicine eye check-ups. The state government supported the project from the beginning with official orders providing for bureaucratic assistance and regular contact with the program.

In addition, the State government, at times, offered e-government services through the kiosks for the issuance of birth and death certificates, income certification, copies of land and cultivation records, complaints regarding civic services, and general petitions on other issues. The scope of the partnership with the local government was limited to two aspects: first, it allowed the kiosks to send applications electronically to the Melur Taluk office (the sub-district government seat)

for various e-government services, and, second, it established a coordinating mechanism for monitoring the processing of such applications.

Failure of these partnerships to sustain themselves over a long term period was one of the major reasons for the closure of the kiosks (Michael L Best, 2008).

CEMINA: Strengthening Women's Leadership in Community Development through Radio Internet in Brazil

Founded in 1988, CEMINA is a Brazilian non-governmental organisation (NGO) that uses radio broadcasting to promote communication and information on gender issues, currently broadcasting to over 400 women's radio programmes. The information and communication technology (ICT) community radio project, Network Cyberella, was based upon the idea that ICT could be used to facilitate the exchange of audio material and thus improve radio content quality and increase Brazil's community radio capacity.

The Cyberella project integrates local radio stations Brazil-wide into a network that shares content by downloading it using broadband internet and then transmitting programmes via the internet and radio. By pairing a familiar technology (radio) with a newer technology (the internet), CEMINA hopes to overcome resistance to new communication technology, particularly among women.

The first 13 stations for the project were selected through a public contest entered by 30 radio stations; these stations participated in the pilot project. Three of these stations were located in communities with no internet connectivity, deliberately selected in consideration of the future installation of Radio-Internet-Telecentres in communities lacking connectivity. According to this case study, this initiative will later be expanded to include Brazil's economically poorest municipalities.

Through this project, CEMINA aims to improve low income women's access to education on gender through community radio, and to facilitate women's integration of new communication technologies. The following were the primary objectives of this project:

- Creation of a radio website profiling Women Radio Network (WRN) stations;
- Provision of hardware and training to 10 WRN stations with the good connectivity essential to the exchange of audio material on the internet;
- Provision of hardware, training, and access to 3 WRN stations with no internet connectivity (they depend upon satellite connections).

Partners: InfoDev, CEMINA, Kellogg Foundation, UNESCO, Local government

Outcomes Impact Results

A radio website has been developed, to which community radio stations can contribute content and download audio files for local broadcast. Two telecentres have been set up, one of which provides ICT training to local youth in response to prevalent child labour in the area.

Outcomes Partnerships

CEMINA was able to partner with organisations that could contribute content to the website, while CEMINA supported them in digital radio dissemination and worked with them to create future network sustainability.

Outcomes Capacity Building

The 13 participating radio stations were provided with a computer, necessary software for sound editing, connectivity costs, and staff training.

Lessons Learned

The following challenges were experienced during the project:

- Shorter programme segments instead of one 60-minute programme allow local radio stations to use segments in different time slots;
- The lack of broadband connectivity in many areas necessitates the use of very expensive satellite connectivity;
- Provision of technical support for partners is very challenging - local assistance partnerships are key to overcoming this obstacle;
- Withdrawal of government support for ICT may cause a funding problem in future.

The following key factors have led to poverty reduction outcomes:

- Significant crossover between radio stations leads to sharing of such resources as content and presenters;
- Two project partners have set up telecentres where the community can access internet services;
- The policy environment has enabled CEMINA to determine their own working practice; Brazilian culture accepts and encourages community radio.

Future Directions

CEMINA and Radio Viva Favela continue to exchange technical expertise and experiences to improve the technology platforms and provide better coverage. Additional funding from the Kellogg Foundation and UNESCO has allowed the project to expand and incorporate sixteen new community radio stations. (Gamos Limited, 2004)

Latvia University of Agriculture (LLU) and Jelgava City Municipality in a Knowledge-based Society, Latvia

LLU offer 34 bachelor level, 21 master level and 13 PhD level study programs. Jelgava is a city in Latvia and is a railway centre and an important market for grain and timber. LLU and Jelgava City Council have collaborations in knowledge-based economic activities: Education, Research and Innovation. LLU and Jelgava city cooperation in education development includes: ICT human resource development, providing modern ICT knowledge and skill acquirement and education system development according market requirements. There have been collaborative projects between LLU and Jelgava City which include:

- PHARE 2003 project, “*ICT knowledge standardization in Zemgale region*”, 2005.-2006.g. Project activities included self-government and educational establishment’s employees knowledge ICT level determination and ECDL certification realized by LLU Faculty of Information Technologies ECDL centre. 122 received ECDL certificates.
- EU European Social Fond activity project “*Professional education availability improvement for the invalids in the Zemgale region*” 2005.-2007. Project activities included education availabilities for the persons with disability improvement in the Zemgale region and face-to-face lectures in Business Support and Adult Education Centre (BSAEC) in collaboration with experts from LLU Faculty of Information Technologies.
- EU European Social Fond activity project “*Continuing education possibilities extension for Zemgale secondary school teachers*”, 2007. Project activities included study materials development “ICT possibilities used in teaching process” for subjects in nature science and humanities and continuing education courses for teachers from Zemgale region realized by LLU Faculty of Information Technologies experts.
- EU European Social Fond project “*Information Technologies study programs modernization in the Latvia University of Agriculture*” 2005.-2008. (VPD1/ESF/PIAA/04/APK/3.2.3.2/0004/0067). The project goals were to create the

preconditions for the part time study program development using e-learning system possibilities and to develop master theses research part in self-government organization.

- PHARE 2000 ESC project “*Building of human resource development and infrastructure backbone for information technology services in Jelgava city*”, 2002 – 2003. Project activities included initiation of ICT literate human resource development that complies with labour market demands, improvement of municipality administrative capacity and communication with business and people and attraction of investors to potential ICT-related clusters in perspective economic territories of Jelgava;
- PHARE 2000 ESC project, “*Establishment of Zemgale region business support and adult education centre*”, 2002 – 2003. Project activities included establishment of Business Support and Adult Education Centre (BSAEC), development of strategic and action plans for the long-term development of the centre to play a central role in human resource, entrepreneurships, and cluster development in the region and establishment of the e-learning system.

These collaboration projects between LLU and Jelgava city led to the creation and development of the Zemgale Technological Park in 2007 (Arnis Mugurevics, Juris Skujans, Irina Arhipova, 2007).

Municipality of Yalova, Turkey

With half the population of Yalova Province living in the city of the same name, the municipality has drawn up an ambitious e-transformation roadmap for increased use of Information and Communications Technology and broadband rollout, with an e-governance model to accelerate economic progress and improve citizen services.

Business Challenges

After preliminary steps toward an e-government, Mayor Barbaros Binicioglu decided that Yalova’s future depended on more substantial ICT investments. City funds, however, were limited and, at first, there were doubts about how realistic it was to propose ambitious schemes such as Yalova’s “ICT Valley”, which was conceived as a smaller version of California’s Silicon Valley, creating a centre of innovation by drawing in leading ICT companies from Turkey and abroad.

What the city needed was a roadmap to support the mayor’s championship of ICT as the engine of social and economic transformation in 21st-century Yalova. The roadmap would be used to attract further investments beneficial to the city’s growth. Key concerns included a campaign to

become an e-government pilot city; attracting investment capital to enhance healthcare and education services, while also encouraging the construction of new schools, a university, and a new hospital; and citizen services combined with strong cost controls to conserve scarce resources.

Solutions

Yalova began designing an e-governance system in December 2005, at the same time the city engaged with Cisco® Internet Business Solutions Group (IBSG). The e-governance system was based on three principles:

- Transparency—making municipal matters such as income and expenditure, municipal tenders, and property portfolios available on the Internet, while monitoring service demand and delivery through a call centre
- Productivity—allowing the municipality to monitor performance among its 700 employees and make improvements based on ICT
- Participation—using funds from a United Nations Agenda 21 program to set up special councils for neighborhoods, women, pensioners, and young people; the councils in turn would provide research data for targeted services

Yalova also had the benefit of well-established relationships with major international organizations and agencies—including the European Union (EU), the United Nations Development Program, and the World Health Organization—through which it had raised money for health and social projects. The city was then able to hire a team of four dedicated community researchers from universities. Such projects also helped position the city strategically within the larger context of Turkish national development, which depends in part on raising the country's digital profile toward European norms.

A brainstorming weekends with IBSG began the process of identifying the range of ICT projects required to support the mayor's vision. After further workshops to define project portfolios, 20 possibilities were drawn up and placed into three categories: Municipal Employee Productivity, Citizen and Business Services, and Economic Development, all supported by a wireless broadband infrastructure.

Projects selected for Municipal Employee Productivity were mobile working for municipal employees, a mayor information system providing feedback on city services, and performance management tools to enhance efficiency. In addition to the productivity gains expected to accrue from mobility, by integrating Short Message Service (SMS) with messaging the mayor's information system, municipal officers could receive automatic alerts and respond to priority cases quickly.

Results from a Community District project survey generated ideas for health and education services, tailored to local needs. One project integrates the municipal portal for all of Yalova's services. A second project allows citizens who use the Yalova Citizen Loyalty card, which currently offers card holders discounts and tickets, to use their card numbers to log on to a citizen portal. The city decided that installing a customer relationship management (CRM) system would help Yalova manage its relationships with customers, including capturing, storing, and analyzing user information to serve the public better.

Business Results

Yalova was the first Turkish city to join the Eurocities Network² as an associate member and, in March 2006, hosted the first European Union Knowledge Society Telecities IT Forum held on Turkish soil, with Cisco as a key sponsor. The meeting marked another step in Yalova's journey toward becoming a European Union Knowledge Society Centre of Excellence. IBSG supports the municipality in its lobbying activities, including contacts with the Turkish State Planning Organization, which controls a US\$2.5 billion national ICT budget and operates under the direction of the Prime Minister's Office. This effort should help Yalova achieve the desired status of a national pilot city for e-government services.

The mayor's backing of ICT has taken on a high profile, owing to his enthusiastic use of technology to contact individual citizens. Through SMS integration, Binicioglu can use mobile e-mail or voice to respond directly on his smart phone in priority cases. His support of a municipal mayor information and performance management system has quickened adoption among municipal employees, with a workflow solution and an integrated performance dashboard in place to monitor service delivery times and employee productivity. Public interest has increased due to the mayor's involvement in workshops to define the project portfolio, and by news of the e transformation program relayed to citizens through Internet kiosks. Citizens can also read newspapers, access e-mails, consult an electronic city guide, and go to the city's Website to learn more about developments. In this way, Yalova's people feel they have some ownership in the program.

In August 2007, Yalova launched a connected community centre pilot, with a manager and 15 PCs that can be used by the public for up to an hour, free of charge. While Internet usage is relatively high in the city, there are disadvantaged sections of the community without Web access, and the aim is to introduce these people to municipal services in health, education, and employment. By providing Citizen Loyalty Card holders with logon access to the citizen portal, the municipality will gain visibility into usage and service demand. The city will be able to follow how frequently people use the portal, which subjects they are most interested in, and how they use it. They will be able to enrich and develop the portal in accordance with usage, and so increase utilization.

Next Steps

While positive results from Yalova's e-transformation efforts are becoming more visible, the possibilities for continued success are great. The city's potential as a leader within Turkey, where it hopes to establish a national knowledge-sharing network based on an international Eurocities model, is further recognized by other mid-sized Turkish cities that attended the Yalova Telecities forum in March. This positioning in turn is likely to bolster Yalova's campaign to be chosen by the government as a pilot city for e-government, offering vital lessons to up to 50 other Turkish cities, lessons and a replicable model to up to 50 other Turkish cities (Cisco 2007).

Joint Municipality Venture to Create a New e-Service Platform, Sweden

This is an effective and structured Collaboration Working Environment (CWE) endeavour within the municipal sector in Sweden established in 2004; 'Association of Municipalities for Joint Development of e-services' (Sambruk). To date the association comprises 80 municipalities. The main objective is to strengthen municipalities in the e-service area, through joint specification and procurement of e-services applications. Actively assisted by a research team from Linköping University, a large number of local municipalities collaborate in requirements analysis processes, to establish 'best practice' solutions.

The purpose is not only to create a new contact channel (e-services), but to improve internal and external efficiency. The specification document 'Open Technical Platform (OTP)' defines a modularized architecture, with open interfaces for structured and standardised data exchange between different software applications. The OTP specification will dramatically reduce the market barriers for new suppliers of software solutions, which will foster innovation and competition and provide municipalities with better opportunities to find cost effective software solutions to enhance the service offerings towards its customers.

The methodology used included collaboration in the Business Process Analysis phase. For the first time in the history of Swedish public services, knowledge and experiences from a large number of municipalities are combined and fused into a joint requirements specification, using a structured approach, based on collaboration between municipality representatives, in conjunction with an active participation of researchers from Linköping University. After the requirements specification is finished and agreed upon, a procurement process is started, where different software suppliers can provide tenders. Following evaluation and negotiations, one or several supplier(s) are selected for delivery of a software solution to the different municipalities in the procurement consortium.

There are many obstacles for such a joint specification and procurement process. The research approach taken is usually some kind of action research. In action research there are combined

objectives, i.e. to actively contribute to a local practice studied and to develop scientific knowledge. In the Sambruk projects these goals have been taken one step further. The scientific results are claimed to contribute not only to a restricted scientific body of knowledge, but also to practitioners (outside the local practice) as a “general practice contribution”. This approach has been labelled practical inquiry (Claes-Olof Olsson, Göran Goldkuhl, 2008). The principles of practical inquiry are depicted in figure 2.

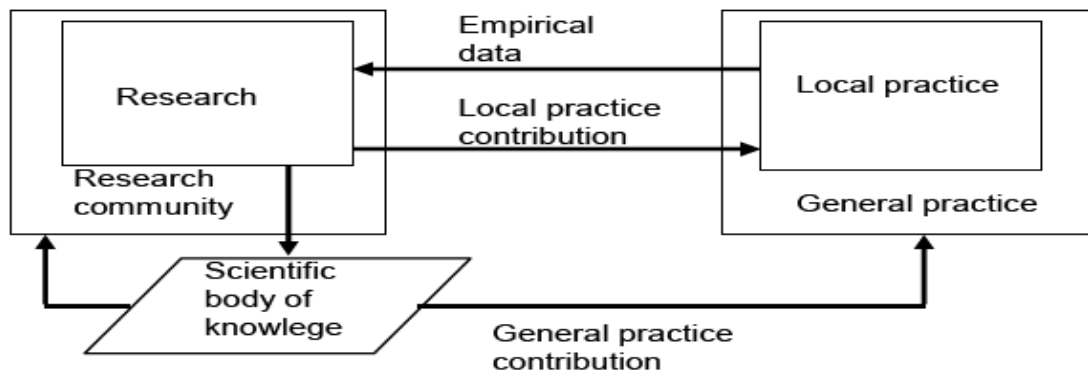


Figure 2 Practical inquiry: A research approach aiming at knowledge as a local and general practice contributions (Claes-Olof Olsson, Göran Goldkuhl, 2008).

The second methodology involves defining a new IT Infrastructure Architecture for greater flexibility. Over the years, as IS/IT applications were more extensively introduced in public services, municipalities did not historically put very much “thought” to the issue of systems architecture. Systems design was left to the suppliers, who rarely looked outside their own respective portfolio of applications for the public sectors. The result is a closed, monolithic environment, with separate, vertical “silos” of applications, not being able to efficiently exchange data between them, nor being able to interface to other suppliers’ systems in the “vertical” sense (e.g. between front-end e-services modules and back-office administrative information systems).

This situation created a lock-in between a specific supplier and its customer (municipality). In order to address this situation and create a road map for a future IT Architecture, Sambruk embarked on a joint project to define an Open Technical Platform - the OTP specification. This included technical specifications of the desired application architecture, comprising well defined principles of information exchange between front-end (e-Services modules to be utilised by citizens) applications and back office systems. The objective of this project is to convince suppliers of back-office legacy systems of the necessity to “open” their systems to data exchange of standard messages, according to the specifications and the OTP principles. This was made possible through the assistance of researchers from Linköping University.

Results

- Collaboration and research support, enhancing Business Process Analysis

The participation of several municipalities in such requirements analysis processes facilitates the search for ‘best practice’ solutions. The joint requirements analysis is a driving force towards harmonisation of diverse working practices. It will also contribute to finding solutions with better coverage, in comparison to what one single municipality would accomplish, carrying out the requirements analysis by itself. While the initial specifications regarded the citizen mainly as an information provider to the municipality officers, the revised design focused on the citizen as a *customer*, to be served by efficient e-services tools providing sufficient information to enable a quality decision as well as an efficient data entry service.

This collaborative working process, involving several municipalities, moves the initiative for standard software package development from the suppliers to the customers (i.e. the municipalities). The functionality of standard e-services applications are specified by the customers in detail. When several municipality officers collaborate in the specification of the desired functionality, the result is a true customer-driven innovation process. This way of collaboration also opens up possibilities for choosing open source software solutions, which may give the municipalities even better functionality in new e-services applications as well as control of future changes and enhancements.

- Utilising the OTP specification

The use of the OTP specification, in combination with carrying out a joint procurement project comprising 20 municipalities, have now resulted in a paradigm shift, whereas the two dominant Swedish suppliers of e-services applications (previously only offered as extensions to their own basic software package for the internal administration) finally agreed to open up the interfaces for information exchange between the front-end e-services application and the back-office software. The new open architecture will now enable the municipalities to select the best e-services solution, independently of existing back-office software.

The process of “convincing” the major suppliers have been excruciatingly slow, almost two years, as the software vendors are extremely reluctant to surrender their existing business models, wherein long term customer relationships was based more on the earlier described closed software architecture, rather than providing excellence in services and applications. With the collective force of a large number of municipalities and some pressure from media, at least one of the major suppliers have now announced the redesign of their software architecture in accordance to Sambruk’s OTP specification. The long term result (within a two/three year period) with a widely accepted OTP specification, will be a huge reduction of earlier market barriers for new suppliers of software solutions, which will foster innovation and competition,

thus providing the procurement side with better opportunities to find cost effective software solutions to enhance the service offerings towards its customer.

The important lessons learnt from the CWE of Sambruk so far;

- implementing e-services as a simple “bolt-on” to existing systems and processes will not create sufficient benefits, neither for the citizens, nor the municipality’s staff, without the active quest for analysing and restructuring existing business processes within the municipalities administration
- the collaborative working principles are somewhat cumbersome to manage as well as more time consuming than working in solitude (i.e. as a single municipality), but the benefits, in terms of enhanced quality in revamping internal business processes and being part of a greater buying force towards the suppliers, have outweighed these issues
- introducing new specifications for the infrastructure and software architecture implies the need for changing the vendors business models and this is indeed a difficult and time consuming task
- the methodology of collaboration through all phases of business process analysis, benchmarking with peers and re-evaluation by external university researchers has proven very satisfactory in creating substantial enhancements in the new e-services introduced, as well as a better working environment for the municipality officers related to the services
- Sambruk has also demonstrated that it is feasible to move the market of software solutions suppliers toward an open, service oriented software architecture.

The end result of this is an optimal ICT platform for future efficient development of existing and new ICT solutions supporting all levels of a municipality’s business operations, thereby enhancing e-Government services to all stakeholders (Claes-Olof Olsson, Göran Goldkuhl, 2008).

eTrikala: A digital City, Greece

Most municipalities in Greece adopted a small number of information systems assigning their development to informatics firms that support them only for a small period of time. They do not follow a particular information strategy, and as a result they adopt different small systems that differ from municipality to municipality and are not interoperable. As an exception, Municipality of Trikala has an innovative spirit towards ICTs solutions. The Municipality aims at supporting

social needs in daily transactions acclimatize the local community to the notion of information society and to collect official and unofficial information from the local community in order to support sustainable growth of small societies.

Municipality of Trikala is a peripheral city in the north of Greece and the capital of the prefecture of Trikala. Its population is over 70,000 and it covers approximately half of the prefectures population. It has been defined as the first Greek digital city, e-Trikala, as it has started since 2003 within the Program of Information Society to orient towards digital solutions to improve its citizens quality of life. Trikala is considerably technologically more mature and extrovert than the other Greek municipalities. It offers a range of services, from health and care to transportation services, and it participates to Digital Communities. It is a member of the International Network of E-Communities which is a global network utilizing digital technology that has as an objective the free access of the citizens in digital networks.

Communities and has taken the initiative to inform other Greek municipalities regarding digital technologies so as to found a Greek Network of Cities. This case describes the e-Trikala project that offers a number of e-services to the city's citizens providing free internet access, health and social care, and e-administration and democracy services. More specifically, this case provides insight in the nature of electronic services a small city provides and in the management of the project. Trikala initiated e-Trikala in 2003 within the program of Information Society and it has developed in a small time period the following services: as free wireless internet, tele-health services, the complaint service Dimosthenis, e-Dialogos, intelligent transportation, and the provision of certificates. The success of the project was also attributed to the involvement of trainees from Universities who were part of the team developing the systems. Sustainability can be achieved by improving the existing services and adding new ones according to the citizens needs and by keeping on the networking with other municipalities (Petros Kavassalis, 2003)

EUREA project: Collaboration between LERU universities in terms of higher education and teaching through ICT, Italy

The different countries of Europe have to set a common objective of increasing the attractiveness and efficiency of their higher education and research systems, by structuring them around a quest for excellence, improving their quality and raising their international profile by multiplying the number of collaborations and partnerships between European universities. The Bologna Process, that started in 1999 and aims to establish a European Higher Education Area by 2010, led a growing awareness in large parts of the political and academic world and in public opinion of the need to establish a more complete and far-reaching Europe, in particular building upon and strengthening its intellectual, cultural, social and scientific and technological dimensions. So, one of the most important aim for the university system is to build a European higher education area.

The aim of this project is to present the challenge that the European projects EUREA (European metadata base of E-Academic resources) will give rise to Academic world in Europe. With these EUREA and e-LERU projects, respectively nine and seven universities all members of the LERU network (the League of European Research Universities) aim to raise the international profile of their educational programmes by pooling their academic digital resources (in particular their courses). The success of the projects depends on the mutual knowledge of the partners in terms of higher education (teaching practices, range of training programmes offered, quality insurance such as evaluation) and on exchanges and discussions to detect common synergies in terms of developing a higher education system supported by a quest for excellence. This project focuses on some key issues that partners have detected during these first months of collaboration, in particular the protection of intellectual property as well as the economical sustainability, topical issues that we can find in the recent report on Digital Content in the Internet Age published by an Interministerial Committee of our Italian government.

To reach this aim they have to harmonise European higher education systems while preserving their specificities, to encourage the students' mobility in Europe and inciting the European universities to collaborate: this process is not so obvious because European Universities are used on how to collaborate in research but they are not used to collaborate in teaching activities. In this framework the LERUs (League of European Research Universities) role becomes crucial and a better knowledge among the Universities involved is the starting point to build a European higher education system which can be really competitive and attractive.

New information and communication technologies have a very important role in this project: since the Internet has been created, Universities have always been major actors in the R&D as well as encouraging the use of ICT (Information and Communication Technologies). European universities were, and still are, strongly encouraged by their governments and by the European Commission to develop e-learning skills and to encourage their academic communities to make intensive use of ICT. In these universities, the result is an exponentially-growing volume of digital resources: not only lectures and pedagogical e-resources, but also audiovisual documents to promote scientific and technological culture, event-based documents on meetings, results of scientific research (articles and reports), as well as conferences and scientific and technological debates. The use of these digital resources remains almost solely confined to the universities which produce them.

Some challenges which are being addressed include the technical architecture of the metadata base which has to be defined. Partners must agree on common standards, formats and API, working on defining the most appropriate technical architecture considering their various specificities and needs. So, an important part of the EUREA feasibility project lies in the elaboration of a business plan, a search for public funds, a market analysis, and a search for private partners: in fact, if to set up this metadata base public fund could be enough, in a second time, the cost of maintenance and promotion of such a system will be high and will have to be

supported by business activities. The need to exchange and reuse learning materials are increasing. The EUREA meta database will sustain this development. EUREA should create a unique position in the market by offering high quality. Another key point of this project is the management of IPR (Intellectual Property Rights) issues: converting the teaching activities into online education or putting research papers or other material on the Internet requires to get proper authorisation from the copyright owners of the elements included in those material.

Ultimately, EUREA is intended to promote the construction of transnational European training programmes and act as a catalyst to the emergence and adoption of attractive innovative teaching practices (Paolo Ceravolo, Antonella Cosetti, Ernesto Damiani, Cristiano Fugazza, and Manuela Milani, 2005)

Innovations Hubs, Barcelona Spain

Barcelona city boasts of a number of research and innovation centres. These centres have been attributed to the development of the city. Policy of the city includes increased:

- intervention at regional level in support of innovation
- re-engagement with science policy and contestation of national policy
- international collaboration growing - alliances with other regions globally
- Mode 2 science orientation
- importance of regional operational scope and demands for intra-mural science
- complementarities between regional and local government objectives and university

Below are some of the projects and centres that are run by the city and national government in Barcelona:

- ICREA project- Attracting returning/new researchers to the city
- CIDEM - Industrial policy measures geared at innovation
- University Investment Plan worth 402 million Euros
- 478 consolidated research groups (DURSI grants)
- Associació Catalana d'Entitats de Recerca (ACER, Catalan Research Entities Association)

- 15 CSIC centres
- 96 other research centres linked to universities and non-profit bodies
- Xarxa d'Innovació Tecnològica (Xarxa IT Technology Innovation Network) – focused on innovation support
- R&D reference centres

22@Barcelona space for innovation

Radical transformation of the Poblenou neighbourhood, a 200-hectare area in the city centre, to convert it into attractive spaces for advanced services, new-generation activities of either a predominantly technological nature or intensively knowledge-based: research and teaching, design, publishing, culture, multimedia or biomedicine. The Plan also allows for the construction of housing, businesses, offices, hotels and public facilities and the legalisation of existing dwellings. In summary, the industrial district of Poblenou will be converted into a technology and innovation district with a full range of services for living and working.

Characteristics

- Compatible uses: industrial, offices, dwellings, commercial, residential, public facilities.
- “@ activities” (emerging activities related to ICTs or highly knowledge-based).
- Identification of a new type of 7@ equipment.
- Increase in development potential, to foster implementation of “@ activities”.
- Morphological flexibility of the transformation.
- Six publicly-funded Plans (Eix Llacuna or “Llacuna Hub”, Campus Audiovisual or “Audiovisual Campus”, Central Park, Pujades-Llull (Llevant), Pujades-Llull (Ponent), Pere IV-Perú) and privately-funded plans.
- Provision of infrastructures related to the Special Infrastructures Plan (PEI or Pla Especial d’Infrastructures). Structured around five major urban systems: mobility and public transport, energy, telecommunications, water cycling, waste management.

The 7 driving forces behind 22@:

1. 22@media: The Campus Audiovisual (Audiovisual Campus) will have 60,000 square metres of roof space. UPF will set up the Ca l’Arañó building for use as the Campus de la Comunicació (Communication Campus) headquarters. The Mediapro Group and the

municipal organisation 22@bcn will build an audiovisual production centre with sets and offices.

2. 22@ict: Efforts to attract companies from the information and communications technologies sector (Indra, Auna, TSystems) will be aided by projects including a building designed for SMEs working in the areas of software and telecommunications, which will have specially dedicated spaces.
3. 22@biocorporation: This program is designed to attract companies that have survived the incubation phase in settings such as the Biomedical Research Park (PRBB). Dedicated spaces will be created specifically for these companies.
4. 22@campus: The Campus Tecnològic i Empresarial (Technology and Business Campus), located in the vicinity of the Forum space, will be the physical headquarters of the new Escola Industrial (Industrial School). Conceptually planned as the key element for the training and research aspect of 22@.
5. 22@entrepreneurs: Features the construction of the Edifici Emprenedors (Entrepreneurs Building), which will be complemented by fixtures that the municipal organisation Barcelona Activa already has in District 22@.
6. 22@technology: Project geared toward attracting some of the technology centres to be developed by the Government of Catalonia in the coming years, as well as those planned with private funding.
7. 22@Poblenou: Aims to reconnect all of the elements that make up the new Poblenou. The program will fundamentally generate awareness regarding the 22@ project and promote the use of ICTs at schools, institutes and by neighbours in general with a view to combating the so-called “digital gap” (22@ Barcelona City Project, 2005).

OSKE Gateway to Finish Experience, Finland

This is an example of a Triple Helix Project whose idea is based on creation of Centres of Expertise to utilise top level knowledge and expertise as a resource for business operations, job creation and regional development. One of the facilitation drivers in Finland and key stakeholders and roles are modelled in the Figure 3 below.

Sector Policies for creation and surviving of COE should be complementary and they include regional, industrial, education, innovation, employment policies. Previously the a university used to collaborate with a specific company but currently a group of universities are teaming up to

collaborate with a group of companies leading to creation of centres of expertise. There are a lot of start-up companies coming out of the CoE models in Finland.

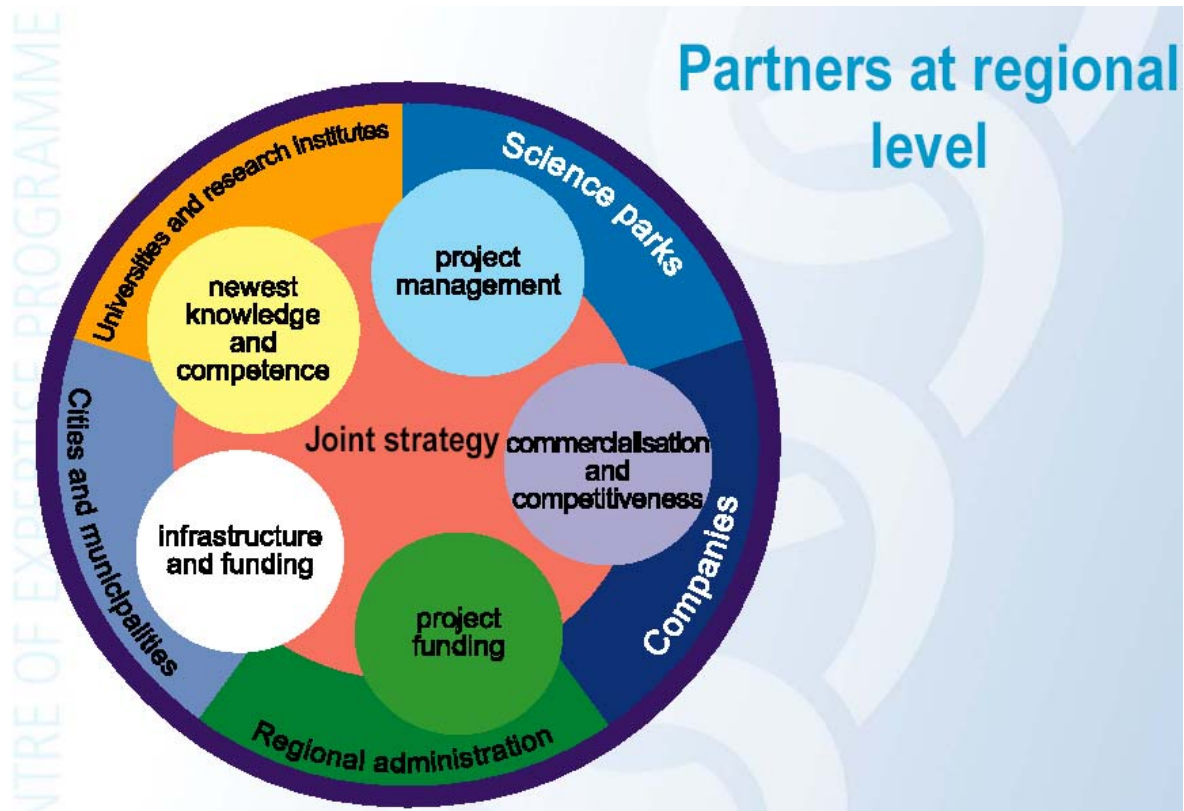


Figure 3: Platforms for “Centres of Expertise” Programme [Neville, 2009]

Science Centre, Philadelphia, USA

Greater Philadelphia was at an economic crossroads and at risk of losing our status as a top tier city. Many plans were been created and they did not need another plan, rather they needed an umbrella strategy that acts as a multiplier to leverage disparate and often competing economic activities into a comprehensive Regional effort. The effort will be to develop a comprehensive understanding of Regional opportunities as well as an understanding of scenarios in which they can realistically leverage critical ‘ingredients’ for the Regional innovation ‘recipe’. It would also challenge the perception that the Region merely used to be a centre of innovation, intellect, commerce, and culture. They observed that there was a unique convergence of circumstances and timing that created a window of economic opportunity for the entire Region. If they did not act then they would miss the window of opportunity – potentially forever.

The centre's concept was based on the idea that Economic Development is like a three-legged stool where each leg is represented by: Attraction, Retention and Growing Your Own (Innovation Philadelphia's focus).

Technology Based Economic Development (TBED) requires patience and persistence, continuity and consistency. Working with early-stage companies takes time. There was need to create a new TBED paradigm characterised by:

- Willingness to deviate from traditional and parochial perspectives
- Encourage public investment and risk taking
- Developing trust through collaboration
- Ensuring the paradigm is responsive to partners' missions
- Building consensus of all constituents through education, participation, and positive outcomes
- Move from technology-based economic development to **Innovation-Based Economic Development**

They decided to concentrate on five prime target areas which included: transforming biomedical research, chemical industry, the creative economy, nanotechnology and business process technology and software. They projected the following outcomes from these target areas:

- Increased connectivity accelerating churn and wealth creation
- Increased employment and "Brain Gain"
- More spinout from industry and universities
- New global partnerships and Global Innovation Image
- Increased private and public foreign investments
- Product and market expansion
- New vendor supplier networks

Partnerships were set up between 32 institutions which include Haverford College, The American College, Drexel University, University of Delaware and Temple University. The centre was initially set up in 1963 and was a non-profit organization. The centre boasts of state-of-the-art incubation facilities since 2008, office facilities, lab equipment and access to academic

collaborations. This centre has seen the birth of more than 400 companies, employing more than 29000 people with annual revenues of over US\$9 billion (Neville Comins, 2009).

3. ICT Projects within CoCT and CHEC Members

Before exploring the best practices framework and high-level project phases for ICT collaborative projects, this chapter gives a picture of the previous and current collaborations and combined researchers that have been taking place between CHEC member universities and the CoCT.

Previous and Current ICT Collaborations within CHEC Member Universities

(a) Curriculum evaluation (SUN and UWC)

Prof. Brink van der Merwe from the Computer Science department at SUN has been working with the department of Information Systems at UWC over the last few years in areas of curriculum evaluation. He has been giving effective analysis and advice to the department on the courses that they offer in order to keep them competitive and in line with industrial needs.

(b) E-Learning, e-Commerce, E-Business and Health Informatics (UCT and CPUT)

Through INDEHELA there have been collaborations between UWC, UCT and CPUT in Health Informatics. INDEHELA partnership as described in the case study section has produced a lot of publications and managed to host a conference in Cape Town on ICTs. There has also been collaborative research in areas of e-Business, e-Commerce and e-Learning between CPUT and UCT. The researchers who have been heavily involved in these collaborations include: Dr. Wallace Chagona (UCT), Marlon Parker (CPUT), Dr. Raymond Kekwaletswe (UCT) and Prof Retha de la Harpe (CPUT).

(c) SAP modules Training (UCT and UWC)

Prof. Irwin Brown from IS Department UCT runs a SAP modules training course at UCT. This course has attracted students from UWC who have managed to get exposure to SAP modules. These highly successful training has been running for a few years and has cemented the relationship between the IS departments at UCT and UWC.

(d) Athlone Living labs (UCT, UWC, SUN, CPUT)

The Athlone Living Lab spearheaded by CPUT researcher Marlon Parker has attracted a lot of interest from stakeholders from the other three universities in Cape Town. Currently there is a Masters student from UCT Media Studies department doing some research projects at the centre. A Masters student from SUN who is studying Psychology is also participating in research focusing on the Athlone Living Lab. UWC students in Social Work and some who belong to the Free Software Innovation Unit are also heavily involved in creation of mobile and computer applications that being used at the centre. These relationships are mainly driven by independent

interest and willingness to give back to the community. Researchers who have been heavily involved in these collaborations included: Paul Scott and Zoran Mitrovic (UWC)

(e) ICT4D (UWC and UCT)

The ICT4D centre at UCT works in collaboration with the UWC IS department and the Free Software Innovation Unit. They have been involved in creation of computer and mobile applications together with the FSIU which are being used in the communities. Paul Scott (UWC) and Prof. Gary Marsden (UCT) are the main researchers involved in these projects.

(f) E-learning CET and EDSU (UCT and UWC)

Juliet Stoltenkamp who heads the E-learning Development and Support Unit at UWC works with the Centre for Education Technologies at UCT in research focused at education and e-learning systems. They host online seminars together in order to share ideas between the two centres and the outside world. They also participate in conferences jointly.

(g) Policy making and implementation for developmental community informatics (UWC and CPUT)

Prof Shaun Pathers and Dr. Zoran Mitrovic have been working on policy making and implementation for developmental informatics over the years. Their relationship commenced when Dr Mitrovic was studying at CPUT. They both worked on the Stuisbaai project and have worked on evaluation of ICT projects on e-Governance.

Current e-Governance ICT Projects being undertaken by the CoCT

(a) Smart Cape Access Project

This project provides free internet access through public libraries in the Cape Town communities. Smart Cape has a total of 170000 registered internet users who are monitored on a daily basis. They collect statistics of the data accessed by the users and use the information for decision making and analysis. This project is wholly funded by the CoCT. Smart Cape has been running for more than seven years and is one of the best examples of community internet access in for ICT projects in Africa.

(b) Smart Truck Mobile Access

This project provides mobile internet access in those areas where there are no libraries. There are vehicles which house computers and are connect to the internet which can be used from within the vehicles.

(c) Digital Business Centres

These centres facilitate business services for SMME's within the low income communities of Cape Town. The business centres offer business advice and training for entrepreneurs. They facilitate for access to business information through presentations, workshops and training offered by financial institutions. These centres are managed by the CoCT e-Governance Department and one of the team leaders is Lynette Maneveld.

(d) Ubusha local web content program which provides local content through Smart Cape Website.

(e) Open Source Competency Centre

The centre promotes and develops the internal open source software competence in the city. They have worked on a number of OSS projects for the city over the last seven years. The Smart Cape Access systems are supported by OSS so this centre is responsible for maintenance of the system. Nathan Nomsen has been in the department since its inception and currently leading the team.

(f) Smart Clinics project,

Manages the OSS online healthcare management system which is currently being used in the clinics and hospitals of Cape Town. All clinics are connected with ADSL lines and operate on a VPN network. The project came up with the single patient numbering system which is has been major success. There is better management of patient records.

(g) Network academy which is a joint venture with CPUT and CISCO for training of network engineers.

Projects between CoCT and a specific CHEC member

(a) Website Project (CPUT)

Prof. Melius Weideman from CPUT has been involved in website usability, website strategy model, website evaluations, and logic flow. He successfully led the way in the redesign of the City's website. He has been involved in consultancy work for the CoCT for a period of two year in website management, planning and content generation. Melius' relationship with the City is a demand based. He also trained CoCT employees on website management and analysis of user statistics.

(b) Smart City Analysis (UCT)

Dr. Wallace Chagona from UCT worked extensively on the analysis of the Smart Cape Access projects. He was analysing the community libraries where the Smart Cape Access computers were being housed. Wallace has written publications looking at the success and challenges of the Smart Cape Access project with much focus on the Delft and Grassy Park libraries.

(c) Training of CoCT employees (CPUT)

Prof Shaun Pathers has been involved in training of CoCT employees 45 on intranet use. He also does consultancy work for the CoCT. Shaun has also worked on the evaluations of the Smart Cape Access projects.

(d) Internship program (UWC)

Since 2004 the CoCT has offered a successful internship program for graduates interested in pursuing a career in ERP-System implementation and support. This internship was born out of an agreement between the City and the UWC-IS department in terms of the students applying for a 1 year internship within the City's SAP Accredited Competence Centre. There have been a number of students who have benefited from this internship program.

4. Best Practices for collaborations in ICTs

The scenarios in some communities in Cape Town are very similar to those of less developed countries and would benefit from the ICT4D case study projects and best practice frameworks that have been presented in literature. For ICT collaborative initiatives to work they have to follow particular best practice frameworks and learn from previous experiences. Since the target areas for ICT development within Cape Town are the low income communities we will refer to some of the ICT projects as ICT4D initiatives or projects. Bridges.org has produced The 7 Habits of Highly Effective ICT-Enabled Development Initiatives (bridges.org, 2002c) through effective study of ICT projects which are quoted extensively in this report. The best practice frameworks for collaboration are to be presented in three stages of ICT project implementation namely Pre-project, Project and Post-project best practices.

Pre-project Best Practices

Before ICT collaborative projects are actually rolled-out, a number of key steps must be taken to put the projects on a solid footing for implementation and continued operation.

Conduct a Needs Assessment

Conducting a needs assessment lays the foundation for project success. It enables the definition of the exact development problem to be addressed, provides scope for setting project goals and ensures that the solution is delivered in an appropriate way to the beneficiaries as eluded in the consultations with Prof. Shaun Pathers and Kobus Elhers. For example, KenStep project, run by SHAWCO in Kensington suburb of Cape Town, only offers face-to-face tutoring of student in Maths, English and Life Orientation amongst the Grade 2 to 7 because "the target audience is not yet advanced enough to be self-motivated" to take online courses and there is no infrastructure for that. CEMINA which aimed to improve low income women's access to education on gender issues through community radio, and to facilitate women's integration of new communication technologies instead of using other modern forms of technology, they decide to use radio communications because it is easier to establish and accessible to a large number of women.

The following are examples of conducting needs assessments:

- Joint Municipality Venture to Create a New e-Service Platform in Sweden made assessments of the previous specifications and procurement procedures for e-service applications by the municipalities before embarking on defining a new procedure.
- The City of Yalova in Turkey set up a Community District project survey which generated ideas for health and education services, tailored to local needs.

- The SARI project in India held numerous discussions with project stakeholders before and during the project phase to understand the community needs, project implementation and progress of the project.
- The Athlone Living Lab in Athlone, Cape Town engages extensively with the community so as to assess the needs of the community and work on projects aligned to the community needs.
- The eTriKala project had input from the community through the use of free internet facilities with links to the City's service delivery portal.

Sometimes a formal assessment is not necessary and a project is based on clear needs, e.g. the need for improved healthcare in Uganda through the STATELIFE project drove the American Red Cross, Makerere University Medical School in Kampala, HealthNet Uganda, Moi University Faculty of Health Sciences in Eldoret, Kenya and the Indiana University Kenya Program to promote use of affordable technologies to link health professionals to each other and to reliable sources of information.

Plan Thoroughly

Planning ensures that an ICT4D project has a clear vision and direction, defined roles and responsibilities for all stakeholders, adequate funding and sufficient technical and administrative means (Accenture, Markle Foundation, United Nations Development Programme, 2001). This stands out to be a relevant point in terms of planning for any ICT collaborative project.

Often in the development sector planning begins with an application for funding in response to a Request for Proposal from a grant-making body e.g. National Research Fund (NRF). A funding application – similar to a project initiation document – succinctly presents a project to a funder and shows that sufficient preparation has been undertaken to suggest that the proposed solution is the best way to meet a specific need. Writing an application according to the format of a reputable funder, e.g. InfoDev of the World Bank, is a good way to think through all the main issues involved in an ICT collaborative project.

When planning for sustainability it is good to answer a number of questions such as: Will this project be able to fund itself in the future? Will the results of the project continue when the project ends? Can this project be applied in other areas or on a bigger scale? In order to be sustainable ICT collaborative projects should ideally be planned and managed using a business model. Omitting components such as a cost recovery system and a marketing strategy has been the downfall of certain Digital Villages in South Africa (Accenture, Markle Foundation, United Nations Development Programme, 2001). The solutions should be built to last and include "mechanisms for growth and replication into their operating models from the outset". While a project that engenders dependency on its funders should be avoided if possible, not all initiatives

are financially sustainable in themselves. A project that requires constant funding, such as SHAWCO projects, is still very successful because of accountability to its sponsors and volunteers

According to Prof Louis Fourie, there is need to create what he terms as “Communities of Practice (CoP)” within the collaborative ICT Working Group between CHEC and CoCT. These CoP’s will be setup to address specific field within the ICT research and project areas which may include e-Learning or e-Commerce or e-Skills. Researchers with interest and prior experience in the specific areas will work together in projects or research. This he believes will promote effective transfer of knowledge and encourage interest since these are specific research areas.

For a collaborative ICT project to deliver positive results there is need for a well-defined structure of operation and management. There are many ideas that were floated during consultations which included setting up a top to bottom hierarchical structure. This structure includes a project leader who works together with subordinates who have specific tasks and responsibilities within the project. Feedback is required on regular intervals to monitor the project. Many researchers interviewed believe from their experience such a setup delivers more positive results. The other idea involves creating a network of researchers with shared input which does not have a hierarchical structure (no researcher superior than the other). This helps because no member of the group has more influence over the others. These structures need to be well defined and agreed upon before any project is taken up to avoid conflicts in running the project.

Set Concrete Goals

ICT4D projects that "clearly identify development goals ... are more likely to develop effective operating models and deliver tangible results" (Accenture, Markle Foundation, United Nations Development Programme, 2001). Setting concrete goals helps to keep a ICT project's stakeholders focused and provides a means for measuring its success. The success of CEMINA project was mainly due to the fact that they clearly spelt out their goals from initiation stage which included promoting use of ICTs through radio communication to increase awareness for gender issues. The Science Centre in Philadelphia set out to move from Technology based Economic Development to Innovation Based Economic Development which saw the creation of over 400 companies. These goals and anticipated outputs must be stated before the project commences so as to help in creation of a structure of operations.

Ensure Ownership, Get Local Buy-in and Find a Champion

On the ground initiatives must allow for direct participation and ownership by the beneficiaries (Accenture, Markle Foundation, United Nations Development Programme, 2001). For example, when using ICTs to disseminate information it is widely recognised that local content is

favourable. For sustainability of ICT projects there is need for strong community participation in the projects where the community takes up project ownership, operation and management. Athlone Living Labs projects are streamlined to offer products that the community needs and there is strong community participation where some community members are taking up the task of running some of the programs e.g. drug counselling programs. Management buy-in, or finding a local champion, is key to project success. The Indev team's greatest challenge isn't teaching NGOs how to build a website but rather convincing their managers of the importance of putting development information online. The City of Yalova projects succeeded because they were spearheaded by a very enthusiastic and ICT knowledgeable leader, Mayor Barbaros Binicioglu. E-learning Development and Support Unit at UWC benefited from the leadership of Juliet Stoltenkamp who has been in the teaching and e-learning sector for a long time and is one of the founding members and is still managing the Unit.

Examples of garnering local support include:

- ICT4D Centre at UCT which works on projects together with NGOs and the community to help demonstrate shared goals of their projects.
- Digital Doorway Project in eThekweni where there was participation by the local communities in creating content.
- SARI project in India where community members invested in the Telecentres and worked together with local and government authorities, business and academic institutions
- The SATELLIFE project partnering with the Makerere University Faculty of Medicine in Uganda and appointing the Dean of the faculty as the local champion.

Identify Key External Challenges

Identifying the key challenges to a project means that contingency plans can be made to mitigate the risks. In the developing world external challenges range from time, resources, unreliable Internet access and power supplies to bureaucratic red tape and lack of ICT awareness, as experienced by the Municipal Services through ICT's programs in Nepal. The SARI projects which details failures of telecentres identifies a lot of problems with the partnerships and management of projects as the reasons for the failures. Creating a framework for ICT project management is paramount to the success and has to be set up before the project commences.

Project Rollout Best Practices

Avoid Duplication of Efforts

Implementing best practice in ICT collaborative projects means doing thorough research first so that work is not duplicated: Smart Cape and Cape Gateway projects setup ICT centres in Gugulethu which were located less than two kilometres apart and these centres were involved in similar initiatives, most researchers interviewed shared the same sentiments within universities where there are research groups or centres working on similar or complementary projects but they do not even know one another or there is no collaboration, the Digital Doorway Project in eThekweni is originally modelled on the Hole-in-the-Wall project developed by Professor Sugata Mitra of the National Institute for Information Technology (NIIT) in India. By studying the efforts and lessons of similar initiatives projects, teams can avoid reinventing the wheel. To ensure that this happens, proposals to the InfoDev Grant are required to clearly demonstrate how previous experience in the sector will be leveraged for a project. This sentiment should be adopted by more grant-making bodies.

Take Small Achievable Steps

As part of the “E-governance for African Municipalities”, to meet the goals, the pilot project emphasized two major components: developing a multimedia training package for municipal personnel; and developing pilot applications in the selected municipalities. The equipment and training necessary to achieve these goals also formed a critical element of the project. For the Lusaka City Council they managed to reap some positive results from the first phase of the project. Taking small achievable steps is the best way to keep a project team motivated and to sustain buy-in from locals or sponsors. The sooner that a beneficiary can see tangible results, the better. Latvia University of Agriculture and Jelgava City Municipality collaboration in ICTs initiatives were executed in different phases and projects which lead to the creation of Zemgale Innovation Centre.

Pilot First

The pilot, or prototype, first approach is summed up well in a report on ICT4D projects in Malaysia: "people will not take up ICT applications unless the potential of those applications can be demonstrated to them. The prototype application should be relatively small, focused, quickly realised, and easily replicated." (Kemp, Mathison, Prasetyo, 2002). The United Nations Development Programme has the Text2Teach program that has been piloted in 40 elementary public schools in poorer areas in the Philippines for e-Learning projects. Dr. Bagula, from UCT, worked on a project to Design Wireless Sensors for Water Quality Monitoring in Malawi. They managed to produce a prototype device that has been used in Malawi and Pakistan and can be used for the Cape Town projects.

Critically Evaluate Efforts and Adapt as Needed

Given that ICT4D projects are mostly rolled-out in developing countries or low income suburbs and often as pilot projects, it is inevitable that changes and unforeseen outcomes occur. Perhaps new external challenges are discovered or initial assumptions are proved wrong. For a project to continually be evaluated there must be a culture of feedback from within the project team and from the beneficiaries. Some projects sponsors commission consultants to formally evaluate initiatives during their rollout. This can be costly but is an effective way to get an objective critique of a project's success and risks. The formative evaluations are used to improve the project during the course of its implementation. This is echoed by Lynette Maneveld (CoCT) and Dr Zoran Mitrovic (UWC) from their experiences in ICT projects.

Of course, feedback and identification of new challenges demand a response. Being able to adapt a project while it is running is one of the differentiating attributes of successful ICT4D project teams. For example, City of Yalova integrated the Short Message Service (SMS) system used to exchange messages with the mayor's information system and municipal officers could receive automatic alerts and respond to priority cases quickly and the system also lead to changes in how the future ICT projects were handled from community feedbacks, SATELLIFE learned a number of key lessons through internal evaluations, an independent evaluation and introduced a number of appropriate changes during the project to overcome the identified challenges.

External challenges in developing countries and low income communities often require inventive solutions. Learning how others have dealt with similar problems is a good way to quickly move beyond project obstacles.

Report Back to Clients and Supporters

Worth-E states that if "those who are giving do not know whether their investment in humanity is actually achieving its goals, the givers are left just as poor as those whom the intended investment has sidestepped" (The Shuttleworth Foundation, 2003). Many ICT projects and centres have been funded or are funded by external stakeholders who need regular detailed updates of project assessments and capital expenses. CEMINA project coordinators have to report on a yearly basis to the partner organizations which are responsible for funding the radio communication initiatives for example Kellogg Foundation. Independent evaluations, internal project reports, surveys and questionnaires produce the material for feedback to clients and supporters.

Post-project Best Practices

Actual implementation is not the end of a project; there are a number of important activities that must be carried out to successfully close a project.

Final Project Evaluation

Once a project has been implemented a final evaluation needs to be conducted. The evaluation, which should result in a report, can be done by the project team or by an independent third party. All stakeholders of the project as well as beneficiaries should feed information into the evaluation. The evaluation assesses the outcomes of the project and measures its effectiveness in reaching the desired goals. Questions that should be considered include: How can the project offering be improved? What barriers were experienced that could have been anticipated? Do those barriers still exist? Is more funding required to remove them or steer the project in a more focused direction?

A good question is also: What new opportunities did the project present? The SATELLIFE project, which set out to pilot the effectiveness of PDAs among medical practitioners in Africa, received excellent feedback from participants for different uses of the PDAs. The project also identified a whole new potential market for commercial firms to tap into.

Follow-up on Projects

All projects should be monitored even once the project teams have effectively extricated themselves from the community or area of the implementation. eTrikala project set up a communication portal to keep receiving information of new ideas to improve on service delivery from the communities and the city has managed to get positive feedback from the community. Determining how beneficiaries cope once a project team is no longer with them is vital information. Lessons can be learned on how to alleviate the stress of them "flying solo".

Disseminate Information

The final project evaluation provides the input for dissemination of the lessons learned. It is absolutely vital that all ICT collaborative project teams contribute their experiences into the growing body of knowledge, both locally and internationally. The ICT4D sector is built on case studies – good and bad cases - and the dissemination of the information. An InfoDev research report (Daly, 2001) gives the following ways to disseminate information:

- participating in Internet fora, e.g. Listservs (interactive mailing lists), chat rooms, blogs and bulletin boards;
- posting materials onto the Web;
- contributing to formal publications such as these, books and journals;
- submitting reports to funding agencies;
- giving classes in a college or university;
- on-site demonstrations to visitors;
- presenting papers in conferences, meetings, seminars, etc.

The report found that out of a number of grantees questioned about disseminating project information the two most common methods were posting information onto the Internet and presenting papers at meetings. ICT4D portals and knowledge bases such as The Development Gateway (<http://www.developmentgateway.org>) and The Digital Dividend Project Clearing House (<http://www.digitaldividend.org>) are examples of where information should be posted.

It is important to note that while lessons can be learned at any time during a project, it is sometimes necessary to wait for a period after a project has been completed before conducting formal evaluations and disseminating that information.

Lessons Learned

Case studies, research centres, consultations and ICT4D stories included general lessons learned on the projects. This chapter highlights some of the important lessons for ICT4D projects in developing countries and poor communities. The lessons learned include:

Build Effective Partnerships

The report *Digital Dividend or Digital Divide?* (Kemp, Mathison, Prasetyo, 2002) highlights that ICT4D projects need a broad range of skills including project management, community development, software development, Web design, IT training and sector expertise. Through building effective partnerships, the successful INDEHELA project case studies described in the report were able to complement their project teams with the necessary skills and produced a number of joint publications. The CHEC and CoCT collaboration initiative is one great step towards greater collaboration in ICT initiatives between a municipality authority and universities. For the Joint Municipality Venture to Create a New e-Service Platform in Sweden, the methodology of collaboration through all phases of business process analysis, benchmarking with peers and re-evaluation by external university researchers has proven very satisfactory in creating substantial enhancements in the new e-services introduced, as well as a better working environment for the municipality officers related to the services.

Design for ICT Infrastructure Realities

It is important to provide solutions that are appropriate to the ICT infrastructure realities of the beneficiaries. For example, if a low income community is being served that has an erratic phone connection to a distant telecomm centre, providing information on a CD-ROM is preferable to building a Website for them (Kemp, Mathison, Prasetyo, 2002). Lack of telecommunications infrastructure, support and reliable telecommunication service lead to the failure of a number of telecentres in the SARI project in India. The CoCT has deployed massive broadband infrastructure within the City and CHEC members and the community can benefit from this. Some universities for example UWC and SUN have initiatives of providing wireless broadband access to communities surrounding their universities. There is more that can be done through

utilisation of such infrastructure through coming up with ICT initiatives that serve the needs of such communities.

Facilitate the Participation of Specific Communities

An ICT collaborative project which is aimed at a specific community must engage with that community in order to be successful. In the Athlone Living Labs, a number of projects facilitate for the participation of community members through awareness-raising initiatives, forming steering committees that included community representatives, and training programmes led by community members. This kind of engagement mitigates the danger that projects for multi-community audiences develop applications which are not appropriate to any community (Kemp, Mathison, Prasetyo, 2002).

Prepare for Diversity

The geographic, economic, and political diversity of the communities means that its people and organisations have a wide range of IT experience and also varied expectations of IT-related projects. This diversity is found in all developing or low income communities and ICT4D projects that aim to cater to a broad audience, like eTrikala project, offer a range of services and products. The target audience can then customise their own experience of the project.

Think Beyond the Project

The INDEHELA initiative started as research partnership between the University of Kuopio, Finland, and the Obafemi Awolowo University, Nigeria, in 1989 in which they were running a rudimentary hospital information system, on a stand-alone PC but in three years the project had more than eight partners and lead to extensive research in Health Informatics. Thus a project can begin with a specific focus is flexible enough to explore new opportunities that have been identified. Often ICT projects bring very skilled professionals to remote places and all opportunities that allow them to transfer knowledge should be exploited.

Stay Focused

While it is important to think beyond a project it is equally important to not try to be "everything to everybody". The success of SHAWCO is believed to be because of their sole focus on Education and Health within the poor communities. It is vital that a focussed vision, which is achievable and relevant, is initially set and maintained throughout an ICT project.

Provide Sufficient Training

The success of almost all ICT4D projects is determined by effective end-user training. But by providing training the users were imparted skills that allowed them to effectively and efficiently use the system. Their apparent hunger for knowledge and resultant new skills helped to lift the motivation levels of all involved in the project. It is important to remember, though, that the method of teaching and content of the training modules must be appropriate to the audience.

Incentivise Involvement

There is need to provide incentives for participants of the projects within the communities and stakeholders. This encourages involvement and interest e.g. the SARI project set up telecentres for participants in the community and they were part of the research and also stakeholders (business) might benefit from employing people who have been trained from the ICT training centres in the low income communities.

Involve All Stakeholders and Manage Their Perceptions

The Joint Municipal Venture to Create a New e-Service Platform project the team learned the value of consulting with other municipalities and researchers from universities prior creating new specifications and procurement procedures of e-service applications. Apart from securing a level of buy-in from the municipalities, the consultations provided an opportunity for them to verbalise their perceptions about the project. Most stakeholders were enthusiastic and eager to change the old system of specifications and procurement of e-service applications and make use of the new specifications and procedures but some were not willing to take up the new changes. The fears, while unfounded, had to be addressed. There is need for all CHEC and CoCT representatives involved in a project to actively participate and be able to accommodate each other's perceptions and views.

Be Sensitive to Local Conditions and Limitations

The Digital Opportunity Initiative (DOI), a public private partnership, aims to identify the roles that ICT can play in fostering sustainable economic development and enhancing social equity. Based on lessons learned from a number of projects it recommends that "technology employed should be affordable, physically accessible, easy to use and maintain, and flexible enough to accommodate user demands for new services" (Accenture, Markle Foundation, United Nations Development Programme, 2001).

Summary

There have been many failures and successes in the ICT sector. Over time a body of knowledge and culture of information dissemination has developed, enabling those in the sector to improve the likelihood of project success by avoiding the mistakes, and building on the pioneering work, of others gone before. This chapter has introduced some of the essential best practices that could prove valuable for CoCT and CHEC ICT collaborative projects. As new projects are implemented there will be new lessons learned and the body of knowledge will grow.

A key tenet of successful ICT projects is thorough planning. A well planned project has a solid foundation from which it can rollout. By examining the work of other similar projects in a particular field or location, the planning process can steer through potential pitfalls and ensure that all foreseeable challenges are identified and addressed.

Sustainability is essential. Successful projects do not simply use this popular buzzword to attract funding, but take the necessary actions to ensure that when a project ends the beneficiaries are not left dependent and, ultimately, powerless. Sustainability is about more than just the continued financing of an operation, it should also result in the empowerment and enablement of the project beneficiaries.

Projects must be constantly evaluated – internally or externally – to ensure that they are successfully meeting the intended need. At the end of a project, the team must take stock and hold a number of debriefing sessions to vocalise the barriers experienced as well as lessons learned. All information is valuable, success stories as well as failures. What is of importance are the reasons for the project outcome.

Once the final evaluation report has been compiled, it must be disseminated as widely as possible. The Web is the obvious place for distribution on a macro-level, while person-to-person communication is very effective on a smaller scale. Members of project teams should be available for presentations at local universities or meetings. CHEC and CoCT ICT collaborative initiatives will benefit from these project best practices under a well agreed governance structure and well defined projects

5. Potential collaboration areas in ICTs

The research through literature review, detailed study of ICT research and projects taking place within the CHEC partners, needs analysis of the communities and the CoCT and consultations with relevant stakeholders has identified areas of potential collaborations between the two parties. These areas include the following:

(a) Continued Learning Programmes

These continued programmes are destined at building a pool of skills within the CHEC members, community of Cape Town and CoCT through a number of initiatives which include:

- Collective curriculum alignment to business, city and community needs, through sharing of information, knowledge and competencies among the CHEC partners
- Enhance Continued Professional Development opportunities to assist the city to develop and retain professional staff members through specialised lectures, training programs, seminars, workshops presented by selected experts in particular fields from CHEC partners
- Expansion of graduate internship opportunities in areas of scarce skills at the CoCT for different durations for the students for CHEC partners e.g. one year SAP-ERP Internship program currently running between the CoCT and UWC-IS department. Internships can be extended to some Units or Centres that are at different CHEC partner universities.
- ICT skills development within the under privileged communities in specific areas e.g. Universities creating tailor made courses for individuals without prior strong academic background aligned to specific jobs within the CoCT or business
- Setting up mentorship programs for university students and CoCT professionals to help increase interest in the understanding of operations and activities within the City

(b) Community Based Development (Community Informatics) using ICTs

The potential collaboration areas in community informatics spearheaded by CHEC partners and CoCT that can help in closing the gap in the digital divide include:

- Extending the concept of Living Labs in under privileged communities to enhance human capacity and empowerment e.g. taking an example of the Athlone Living Lab, Maties Outreach Centre in Kayamandi and SHAWCO computer centres in the Mannenberg and Khayelitsha areas.

- Development of an effective ICT for Development curriculum for the Living Labs or ICT Centres in the townships spearheaded by the CHEC partners to help in educating individuals who can be linked to job opportunities.
- Providing equitable universal broadband access within the Cape Town communities especially schools, business centres and training centres in all communities to strengthen communication for development
- Promoting the use of Open Source Software and other vendor software applications within the communities to help in terms of service delivery, bridging the digital divide and awareness. This can also be a platform for promoting local content and knowledge generation.
- Crime Information Management in the communities. There are isolated examples of community initiatives that set out to address the problems of crime through improved information dissemination and sharing e.g. <http://www.eblockwatch.co.za> is one interesting example where the interests of visitors to South Africa as well as residents are paramount in sharing information about crime, and what to do in case of incidents of different kinds
- Technology to Empower citizens in Communities in Tension (CiT). These projects aim to provide a technology and mobile platform offering counselling, advice, frequently asked questions for people impact by these social ills. The main objective is to meet youth on a level that they are comfortable with as a first point of contact where they can express themselves, receive counselling or advice on the issues of drugs and substance abuse. An example is the Athlone Living Labs where former gangsters and drug addicts are receiving training on how to use computers and offering counselling.

(c) Health Informatics using ICTs

There is need for collaboration in areas of Health which remains a paramount problem within all communities in Cape Town. CHEC members and the CoCT must promote the use of ICTs to increase information flow between the relevant stakeholders to identify their information and ICT needs to support the care of maternal and chronic disease patients (AIDS/HIV, Diabetes, TB, and Cancer) and provide information on awareness and prevention of diseases. Some project areas that collaborations can be targeted at included:

- Patient Health Record design guidelines to support effective maternal and chronic disease healthcare
- Short and in-service information systems courses for healthcare workers in maternal and chronic disease healthcare. This will assist in the use of technology to effectively manage

health care e.g. TB Treatment Compliance Service run by Dr. David Green, a medical practitioner and consultant in Cape Town, where he uses SMS technology to alert TB patients to take medicines and reminders for appointments (Bridges.org, 2006g)

- Health Information and ICT needs analysis: guidelines for data capturing, utilization and ensuring its quality in the healthcare field
- Extending telemedicine initiatives to effectively service the whole community

(d) Development of SMMEs through effective use of ICTs

ICTs can be used to promote entrepreneurship and innovation within the Cape Town community and CHEC partners and the CoCT can play a pivotal role in making this possible. Potential collaboration areas included:

- Development of a SMME portal for the CoCT. This portal, based on an adequate electronic small business servicing will allow current and potential entrepreneurs to spend more time developing their business instead of running around to learn about resources available on the internet – as experience of other cities throughout the world suggests. CHEC partner institution can offer services to SMMEs on best business practices and frameworks using such a platform and the CoCT can keep an inventory of the SMMEs within the city. E.g. the Barcelona innovation centres
- A Self-Help Framework to Empower SMMEs using Appropriate ICTs. These projects propose to create a practical self-help framework to help SMMEs (and, possibly) NGOs choose and implement a customized, relevant, appropriate and effective ICT infrastructure within the City. CHEC partners can be seen spearheading designing of such frameworks and take up a participatory role in implementation with the help of the CoCT.
- Connecting the local SMMEs to the international community using ICTs. This can help accelerate the development of SMMEs in Cape Town through information, technology and training exchange and make them more competitive both in local and international markets. Local SMMEs can market their products to the international market and also source raw materials. CHEC partners can assist in establishing platforms to help SMMEs establish websites for marketing purposes.
- Tapping into the Tourism industry for opportunities within Cape Town and the Western Cape Province. A lot of tourism based SMMEs have been set up in the prime tourist areas in the province which included Hermunus, Strand, Stellenbosch, Kysna, George and Mossel Bay. These business included curios, hotels, guest houses, game park tours, transport services, wine tours and holiday booking centres which are marketed

internationally using the internet. These places have attracted a lot of tourists over the years. CHEC partners and the CoCT can assist in e-business initiatives.

(e) ICT Research and Development to support service delivery

CHEC partners and the CoCT can collectively work on high level ground breaking research projects targeted at development and service delivery using ICTs. The CoCT can throw out a series of challenge grounds to universities in well defined areas through call for research proposals, competitions or city projects. CHEC member universities may also set up Honours, Masters and PHD research topics that are aligned to improved development and service delivery within the City. These proposals may be forwarded to the City for funding or collaborations to help improve service delivery for the City's and bring about novel programmes within the city e.g. setting up a Service Delivery Interactive Portal accessible through the internet on mobile devices and desktop computers.

These research projects can be in the areas of e-local governance, education, health, service delivery initiative, e-skills, broadband access, smart city initiatives, mobile applications, entrepreneurship, social cohesion and any other areas. These research projects should clearly demonstrate collaboration and participation within the CHEC partners, schools, business, NGOs, local government, government and the community. These researches should be disseminated via joint publications, conferences, seminars, workshops and via the electronic and print media. There is need for the creation of CoCT ICT Forum to incorporate all stakeholders in working and researching in ICTs and other fields linked to ICTs.

Below is a list of some specific potential project:

- Setting up an ICT Forum in Cape Town (workshop, seminar)
- Directory of Expertise (CHEC)
- Extending Living Labs concepts for SHAWCO, Maties, ALL
- Extending the Internship Program
- Tailor made ICT training within existing centres
- Promoting Open Source Software
- Call for research proposals, competitions on projects by institutions
- Crime Management Information System

- Facilitating for broadband access
- Effective use of MXit for service delivery

6. Capacity for collaborations in ICTs

For collaboration between CHEC and CoCT to prosper there is need to look at the capacity that the stakeholders possess. This is very vital to understand before a project can be taken up. The main areas of ICT project required capacity included:

(a) Infrastructure within the community

For the success of any ICT project there is need for communication infrastructure. The CoCT has managed to lay fibre cable and setup radio networks in most of the residential and commercial areas of Cape Town. This is very encouraging because it will be easy to provide communication links to run specific projects within the communities. UWC is also establishing a wireless network in areas around the university which can also be used by external stakeholders in the communities. SUN has been striving to set up a WIMAX network within the Stellenbosch area so that all communities can tap into the network but unfortunately ICASSA has not yet approved the licence. There is also need for front end devices like computers, printers, fax machines, electronic boards, scanners and photocopying machines that need to be used by the ICT centres in the communities. External stakeholders can be invited to offer donations or funding towards this. Computers are old can be donated to the community centres to assist in ICT project implementation.

(b) Infrastructure within the universities

For universities to run some ICT research they require equipment for designing prototype systems and run tests. The ICT4D centre and FSIU boasts of state of the art equipment that has been sourced through industrial partners, the university and donations. These platforms assist then in designing and testing applications that can be deployed to communities to promote ICT use. FSIU has a open source platform that can be used to design, host and implement web based applications for external users to promote ICT use.

(c) Human resources

For all these ideas and projects to work there is need for “Drivers or Champions” who spearhead the projects. There is need to find someone who is qualified, enthusiastic and understands how to work with people of different backgrounds. Most of these universities have the most sought after candidates in ICT sectors so they can provide the much needed human resources. There is also need to identify highly experienced researchers within specific ICT fields who will be interested in working on ICT projects within the CoCT. There is need to incentivise involvement to the researchers through funding models and novel projects.

(d) Time

Time is a very scarce commodity for a lot of people involved in a number of research projects. There is need to included specific time frames for projects so that participants prepare for the involvement. Many researchers are mostly absent from some meetings or conferences due to other pressing commitments. From consultations with researchers in the CHEC partner universities there are individuals who are interested in giving a lot of time for such initiatives.

(e) Funding

Most projects have failed due to lack of funding or failure to utilise funds accordingly. There is need for specific funding models that clearly spelt out the accepted expenditures. This prevents cases of misappropriation of funds. Many researchers are also interested in projects that have attractive funding. There is need to setup attractive funding that lures that best researchers and leads to high quality research output. There is great need for the involvement of a third partner which could be industry to fund such initiatives. The CoCT can help source funding through it partnerships with industry.

(f) Access to Information

Most projects fail because there is limited access to information regarding how best such projects can be carried out and previous experiences of fellow researchers. Within this collaboration there is extensive information that can be sourced from publications, these and project reports from CHEC members and CoCT. There is also access to libraries, online digital libraries, forums, blogs, workshops, seminars and conferences where information can be sourced. Most of the researchers have their networks of research colleagues who can be also utilised. The CoCT also has fellow partners in industry and the community who can complement information transfer.

(g) Access to target areas

Some of the areas within the communities have limited access due to social and political tensions that exist. There is need to utilise researchers or community based stakeholders to assist with this problem. This is very possible since there are a number of programs run by universities and the CoCT which help in providing access in some of these areas. Universities possess a great advantage because they have students coming from these specific areas who can assist in breaking the barriers of access.

7. Conclusions

There have been many failures and successes in the ICT4D sector over the years. A body of knowledge and culture of information dissemination has developed, enabling those in the sector to improve the likelihood of project success by avoiding the mistakes, and building on the pioneering work, of others gone before. This research has introduced some of the essential best practices for ICT4D that can also be used for ICT collaborative research projects targeted at bridging the digital divide within Cape Town community. As new projects are implemented there will be new lessons learned and the body of knowledge will grow.

A key tenet of successful ICT collaborative projects is thorough planning. A well planned project has a solid foundation from which it can rollout. By examining the work of other similar projects in a particular field or location, the planning process can steer through potential pitfalls and ensure that all foreseeable challenges are identified and addressed.

Successful projects do not simply use this popular buzzword, “sustainability”, to attract funding, but take the necessary actions to ensure that when a project ends the beneficiaries are not left dependent and, ultimately, powerless. Sustainability is about more than just the continued financing of an operation, it should also result in the empowerment and enablement of the project beneficiaries. "Initiatives demonstrating a capacity to embrace adaptive and flexible solutions are more likely to be sustainable" (Accenture, Markle Foundation, United Nations Development Programme, 2001). Successful ICT4D projects are flexible enough to address new risks that are introduced during the rollout of a project, and similarly exploit newly presented opportunities.

Projects must be constantly evaluated – internally or externally – to ensure that they are successfully meeting the intended need. At the end of a project, the team must take stock and hold a number of debriefing sessions to vocalise the barriers experienced as well as lessons learned. All information is valuable, success stories as well as failures. What is of importance are the reasons for the project outcome. Once the final evaluation report has been compiled, it must be disseminated as widely as possible. The Web is the obvious place for distribution on a macro-level, while person-to-person communication is very effective on a smaller scale. Members of project teams should be available for presentations at local universities or meetings.

"Initiatives with the most impact have approached development problems in a holistic and coordinated way, not only through the provision of ICT" (Accenture, Markle Foundation, United Nations Development Programme, 2001). "ICT in development has the most impact when you mix it into the local cultural, political and social context in ways that are relevant to people's daily lives" (Bridges.org, 2009b). Projects that understand this and take time to appreciate the context of their beneficiaries and the broader goals that need to be achieved are generally more flexible, targeted and successful.

From the research findings we discovered that there has been a lot of collaborative ICT research between CHEC member institutions and the CoCT over the years. There is strong conviction

that these relationships need to be strengthened, systematically broadened and formalised through new potential collaboration areas in ICT research identified by the researcher. Through understanding the best practices for ICT collaborative research and ICT4D projects the initiatives of CoCT and CHEC members will manifest into a lot of ICT projects that will help uplift the low income communities of Cape Town and hopefully improve on service delivery.

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