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# **Pan-Asia ICT R&D Grants Programme**

## **Review and Analysis**

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Asia-Pacific Development Information Programme,  
UNDP Regional Centre in Bangkok,  
Bangkok 10200, Thailand

**Prepared by**

Michael Dougherty<sup>1</sup>  
Bangkok, 10140 Thailand

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# **Pan-Asia ICT R&D Grants Programme Analysis**

## **About this review**

This review is an analysis of 56 projects funded by the Programme between 2002-2005. In preparing this review, a wide range of source materials was consulted. This includes internal reports and external publications produced by UNDP-APDIP, AMIC, APNIC and IDRC. The project reviews drew on the grant recipients' original project proposals, interim and final technical reports, as well as on a number of research papers they have produced. In addition, to solicit current insights into the projects, an email questionnaire was sent out to all grant recipients. The responses from recipients were followed up with additional queries, either to clarify information or further explore aspects of the project as was considered useful. Through a number of meetings and dialogue via email, the review also drew upon UNDP-APDIP and AMIC's direct, personal experience with projects.

To provide an overview, and easy access to this review, the projects have been broken down and presented in categories of type. Within each category we have ordered them by their start date, and numbered them sequentially. Out of the total of 56 projects, 30 projects received a more substantial review of outcomes and impacts. This is based on those projects that had submitted either an interim and/or a final technical report at the time of writing. The content of the reviews are primarily a consolidation of information from these reports combined with the responses from the email questionnaire. The goal of this review is to provide an overview of the Programme from 2002-2005 in a consistent and accessible form, through a consolidation of a wide variety of available project information. In addition, this review seeks to tease out the general trends within the array of projects funded since 2002 and draw conclusions on some of the common factors affecting project success, common challenges that projects faced, and the scope for lasting impact and scaling up.

## **About the Pan-Asia ICT R&D Grants Programme for Asia-Pacific**

The Pan-Asia ICT R&D Grants Programme for Asia-Pacific has the objective of building institutional research capacity on Information Communication Technologies (ICTs) in the developing countries of the Asia-Pacific region. The programme is directed at encouraging original and innovative ICT solutions to development problems. The Programme is overseen by a Committee established by the United Nations Development Programme's Asia-Pacific Development Information Programme (UNDP-APDIP), the Asian Media Information and Communication Centre (AMIC), the Asia Pacific Network Information Centre (APNIC), and the

International Development Research Centre (IDRC) of Canada. Grants for suitable research and development projects are awarded to Asia-Pacific based organizations on a competitive basis.

The scope of the projects funded by the Programme include: research and development into innovative ICT applications, with a clear focus on practical and replicable approaches and techniques; research on Internet infrastructure design, performance, management policy and related topics; research with clear learning outcomes and social impacts from specific ICT policies and interventions and applications; research on policy matters affecting Internet networking, especially linked to areas such as culture, environment, gender equity, health, social equity, sustainable community development, technology diffusion/transfer, and benefits to rural areas; development of practical solutions based on the application of proven and readily available Internet technologies with minimum basic research, technology-related issues such as broadband connectivity, “last mile” innovation, mobile and wireless technologies for the developing world, and increasing the capacity or efficiency of existing network infrastructures.

### **Programme funding and project structure**

The Programme awards two levels of grants: grants up to a maximum of US\$9,000 for a project period not exceeding 12 months, and grants up to a maximum of US\$30,000 for a project period not exceeding 24 months. The ICT R&D Grants Programme Committee meets twice a year to review proposals and award grants. During project implementation, specific monitoring and evaluation processes are used. These include regular project progress reports, internal formative evaluation reports, and administrative and financial status reports. From time to time, the Programme also conducts evaluations, reviews, reports and field visits to individual projects.

### **Copyright and dissemination**

The results of the awarded projects are transparent and made available publicly on the Programme and partner websites and by other means, as appropriate. Project results, including papers, research data and findings, resources, techniques, and tools are openly available and distributed in the interest of sharing research results and research experiences widely. Recipients under the ICT R&D Grants Programme agree to free dissemination of their project research results. Copyright for project results resides with the research team and the Programme, as well as other funding agencies in the case of co-financed projects.

## **About the projects**

### **Geographic scope of the projects**



Between 2002-2005, the Programme funded 64 projects, of which eight were closed for a variety of reasons. Of the remaining 56 projects, five are specifically regional in nature while the others were located or managed in 14 countries in the Asia Pacific region namely, Bhutan, China, India, Indonesia, Malaysia, Mongolia, Nepal, Pakistan, Philippines, Republic of Nauru, Solomon Islands, Sri Lanka, Thailand and Vietnam. Figure 1 provides a geographic breakdown of the 56 projects included in this review.

Figure 1 - Number of projects by country

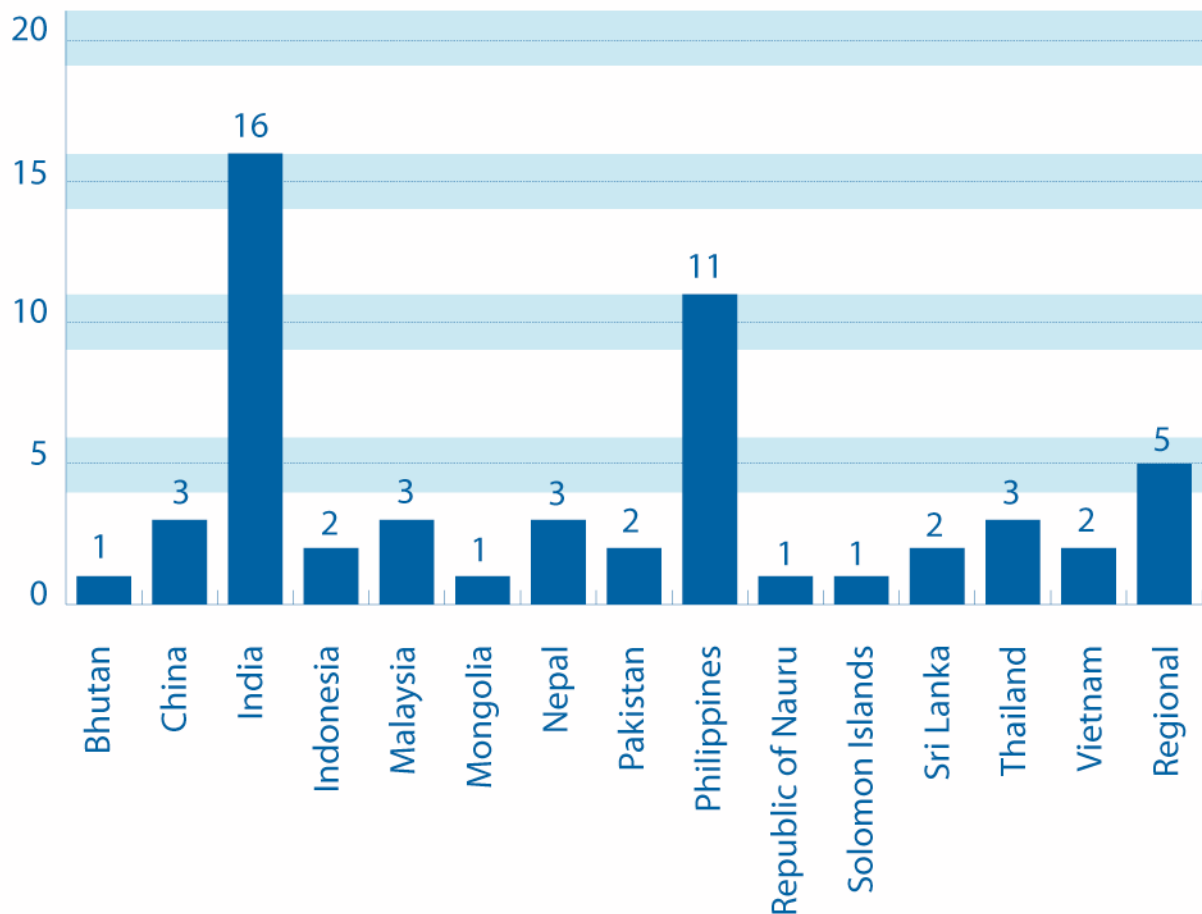


FIG. 1 NUMBER OF PROJECTS BY COUNTRY

The projects have a wide range of geographic scope. Some are local level pilot projects such as the *M-DOK: Mobile Telehealth and Information Resource System for Community Health Workers* (no. 54) project, which is undertaking its research in a rural community in Lanao del Norte in the Philippines. Others are national in scale, such as the *Nepal Internet Exchange* (no. 29) project, which has helped establish a national consortium of Internet Service providers (ISPs) to facilitate the exchange of local Internet traffic throughout the country. Others, while locally based, have a truly global potential for the application of their work. In this category, the *Nafees Nastalique*:

*Character-Based Nastalique Font for Urdu* (no.26) project facilitates Urdu publishing through electronic media and benefits approximately 60 million Urdu readers across the world.

Five projects included in this review were specifically regional or trans-boundary in scope. These include *The Open Source Software Localization Toolkit* (no. 30), which, although based in Cambodia, has seen regional and even global application of its localization work. The project *Towards a Regional Geographic Information Infrastructure (RGII) in the Hindu Kush-Himalayan (HKH) Region* (no.41) combines Geographic Information System (GIS) technology in the Hindu-Kush Himalayan region, including the countries of Bangladesh, Bhutan, and Nepal. Also, included in this group is the *Open Source GIS/Mapping Solution for the Indian Tsunami Information Resource Center* (no. 35), which is designed to serve South India as well as other Southeast Asian tsunami-affected areas. The *Shahmukhi to Gurmukhi Transliteration Solution for Networking* (no. 39) is also trans-boundary in nature as its Punjabi Language Transliteration Tool facilitates electronic and written communication between people living in East (Indian) and West (Pakistani) Punjab, as well as Punjabi's living around the world. Finally, the *Effects of ICTs on Media Transformation, Education and Training in Vietnam, Laos and Cambodia* (no. 24) project researches how ICTs are currently integrated into the media industry in these three countries.

It should be noted that almost all of the projects have wide regional and global potential for further application, either through up-scaling or through dissemination and replication. This is explored further below.

### **Scope of projects by type**

There are three main areas that all of the ICT R&D projects address. All of the projects contribute in some way to bridging of the “digital divide”, whether through policy research, developing infrastructure and applications, or capacity building and training. All projects use information communication technology either as a central focus of their research work or in service of broader development goals. Finally, all projects include a component of supporting community, organizational or national development, or social change initiatives.

It is within this broader programmatic scope that we seek to provide further delineation of the project types. These are outlined in Figure 2, It should be noted that almost all of the projects cross several different categories, and in addition, each of the categories include a fairly diverse range of projects. To provide a deeper understanding of each category, they are treated in detail below, with several exemplary projects.

**Figure 2 - Projects categorized by types**

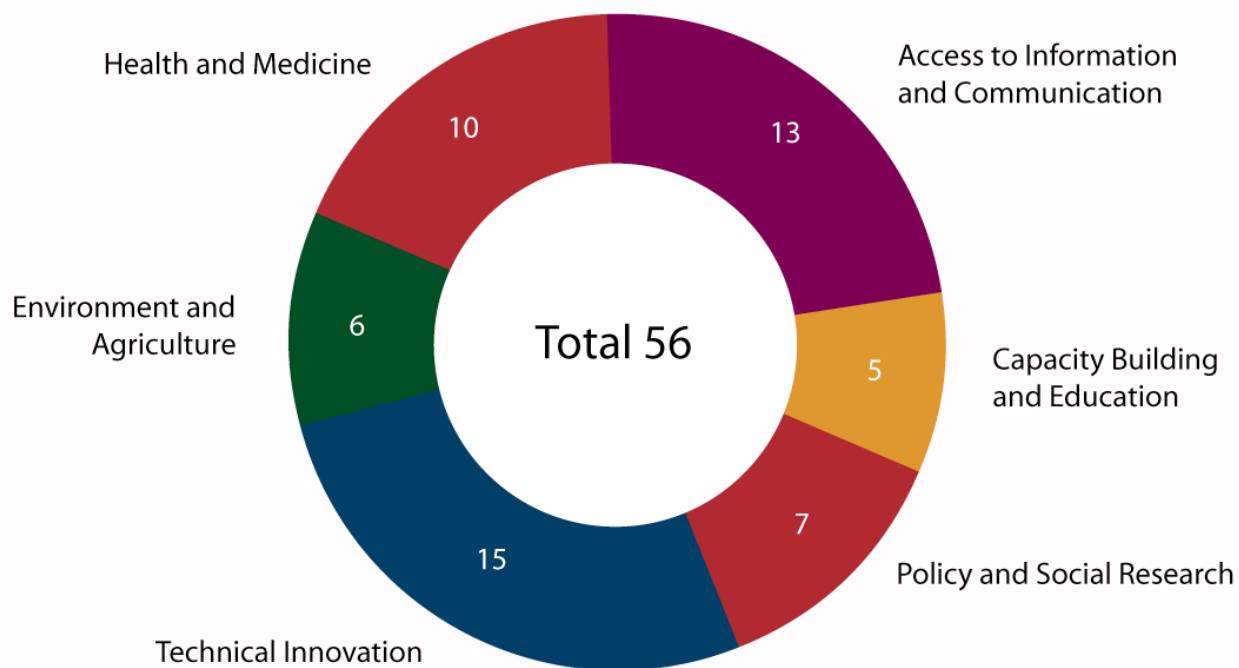


FIG. 2 PROJECTS CATEGORIZED BY TYPES

### **Access to Information and Communication**

Included in this category are the projects that have a primary objective of increasing access to information and ICTs. Invariably, there is a strong social dimension to these projects. They often deal with “last mile” initiatives, increasing access and capacity building at a local level, and addressing issues such as culture, gender equity, social equity, sustainable community development, and benefits to rural areas. An example of project types in this area is the *Low-Cost IT Centre for the Philippines* (no. 3), which studies the impact and replication of an existing IT Centre, and created a guide for setting up additional low-cost IT centres.

### **Capacity Building and Education**

This category includes projects that focus on capacity building for local communities on the use of ICTs, as well as those projects that employ ICTs to increase the capacity of educational institutions and other alternative learning fora. In this area are projects such as *The Distance Learning Application of the Solomon Islands People First Network (PFnet)* (no.14), which pilots a distance learning facility in one of Solomon Islands' rural community high schools.

### **Policy and Social Research**

In this category are projects with a more traditional focus on research and analysis of outcomes and social impacts from specific ICT policies, interventions and applications. In this area are research projects such as *Diffusion of Information and Communication Technologies in India:*

*Labour Market Implications for Developing Countries* (no. 20), which explores the trade-offs between improving productivity by deploying ICTs and generating employment in developing countries.

### **Technical Innovation**

This category represents those projects that have a central focus on technical innovation or deal with the construction of digital systems or strategies that increase the capacity or efficiency of existing network infrastructures. Many projects in this category build on existing technology or applications and expand their functionality to serve development needs. For example, the *ICTs Assisted Learning Tool for Deaf in Pakistan* (no. 27) project developed custom software and training modules distributed through the web and compact disks to provide a new, flexible medium for hearing-impaired people to communicate in Urdu sign language.

### **Environment and Agriculture**

In this category are projects that specifically address the design of solutions to meet the complex demands of environmental management such as Geographic Information System (GIS) or agriculture services such as crop forecasting, disease management and marketing. Projects in this category are those such as the *Development of a Forest Fire Forecasting System for Western Ghats* (no. 43), in Kerala State, India, which use web-based GIS and Remote Sensing.

### **Health and Medicine**

Included in this category are projects that use ICTs to address health issues. Projects range from those designing platforms for information management and exchange to those that are field-testing applications, technologies and strategies that deliver health-related services to those who are currently not receiving them. In this area are projects such as the *Development of ICT-based Telemedicine System for Primary Community Health Care in Indonesia* (no. 47), which developed PC-based medical stations and conducted field-testing in a number of locations. Another example is the *Generic Engine for Modules in PrimaCare* (no. 56), which is developing open-source medical software modules to improve the quality of Primary Health Care through better patient, clinical, information and statistical data management in Malaysia.

## **Project Impacts and Lessons Learned**

### **Overview of projects impacts**

One of the key factors in determining the success of projects lies in the articulation of the link between the development goals and the appropriateness of the technological solution. The Programme supports a range of project types, from those that are primarily focussed on

addressing development issues that employ ICT as a component, to those that are focussed on creating ICT solutions for development issues. In all cases, however, it should be acknowledged that, within the context of the Programme, ICTs are not seen as an end in themselves, but rather as tools to be used in the service of larger development initiatives.

When reviewing the various projects it is important to remember that as a research and development programme, there is a degree of uncertainty at the outset of every project as to whether a project will be successful or not. It is, in fact, overcoming this uncertainty – or discovering the answer to the research question – that lies at the heart of any research and development programme. The following section explores some of the key common challenges projects faced and also some of the common factors that can be seen to have influenced the success of projects. This leads to a further discussion of the strategies and opportunities projects have employed for increasing long term project impact, scaling up and sustainability.

### **Common challenges**

While projects have faced many discreet challenges that are particular to the context within which they have undertaken their project work, the following challenges have been observed as common across all project reviewed.

#### *Selection of entry points for interventions*

The issue of selecting the entry point for an ICT intervention can have wide ranging implications for the type of project work that is required. In some cases for example, when working with beneficiaries who may have low levels of education and literacy and/or no experience with computers or other technology, a greater degree of energy will be spent on building capacity, than actually mobilizing the technological solution proposed. In other cases the technological infrastructure may be so basic as to seriously limit the potential of an intervention. Often such cases represent the social realities that form an essential barrier to bridging the digital divide. Among the more successful projects that have worked in such restricted environments are those that plan appropriate strategies to overcome these issues. An example of this is the *ICT-Enabled Women's Social Net* (no. 6), project, which sought to establish an ICT service centre for women. This project undertook its work in remote rural communities in Marathwada, India, that are typified by extremely limited infrastructure, low levels of education and a population that is more focused on daily survival than exploring new opportunities for employment or self realization. While this project continues, it is exemplary of the kinds of challenges a project can face depending on its location, beneficiary group and technical intervention.

#### *Partnerships and management*

Several projects noted problems with partnering organizations, which hampered the progress of their project. This may take the form of working with a private, for-profit technical partner that will obviously have different motivations than a not-for-profit development partner. An example of a project that experienced difficulties in this area is the *ICT Assisted Economic Empowerment - Integrated Tools Development* (no. 4) project in Malaysia, which had problems with its IT partner, including technical problems that delayed the technical handover, and unforeseen high maintenance costs that had obvious implications for the project's sustainability. In such cases, a well-defined Memorandum of Understanding (MoU) and scope of work have been recommended to avoid any problems as the project proceeds. An alternative suggestion has been to seek technical partnerships with like-minded institutions such as government agencies or educational institutions. In addition, there have been some cases where the receipt of funding from foreign donors is restricted by government regulations. In such cases the late release of funds to the project team seriously hampered the project work. While some of these events cannot be planned for, and project teams will often have to think on their feet, solid upfront research into what resources a project requires is critical to its success.

#### *The unforeseen event*

Several project works were hampered by unforeseen events, which were beyond the control of the project team. This could be anything as simple as the issue of dust interfering with computer functions or the theft of project equipment. The project, *Leveraging ICTs Through Weekly Market Centres for Tribal Communities* (no. 1), India faced many such difficulties in carrying out its work, from computers being used in very harsh conditions, unreliable Internet access, insufficient electrical supply, and so on. Although the project had planned for these events and ultimately was able to overcome them, it required great perseverance and ingenuity on the part of the project team to carry it out. There have also been other more serious problems such as cases of a national emergency. For example, when the Severe Acute Respiratory Syndrome (SARS) virus hit China, the project team of the *ICT for Agriculture and Rural Development* (no. 42), was severely hampered in their movement, resulting in a severe blow to the completion of their project work. In the face of such unforeseen events, the ability of the project team to respond appropriately, even redefining its objectives if necessary, and regaining project momentum is the key to overcoming such challenges.

#### *Planning for success*

A number of projects that were successful in completing their research objectives found that without further and often quite robust efforts regarding dissemination of research results, their project would not have the maximum impact possible. In many cases, the grantees did not feel that outreach and marketing aspects of the project fell within the scope of their work and, indeed, in some cases the original project team may not be best suited for this work as it falls beyond their

expertise. Initially, this was the case in the *Nafees Nastalique: Character-Based Nastalique Font for Urdu* (no. 26) project mentioned earlier. The project team noted in its final technical report, that “...the font has been made, but still many people do not know how to use it.” Although not envisioned for this project, the team recognized the need for a significant outreach programme to train end-users across the country in order for the project to have its full impact. Although this project has gone on to have wide ranging applications of its work since that time, it is an important point to keep in mind when planning a project.

### **Common success factors**

As with the common challenges, there are a number of factors that have been observed as common to the more successful projects.

#### *Participatory processes*

Projects that embraced a participatory process on some scale had a marked increase in their probability for success. Projects have introduced participatory processes into their research work on a variety of levels and scales, from those that consult beneficiaries through such methods as questionnaires, focus groups and qualitative interviews, to those where beneficiaries are in direct control in decision-making and other strategic processes. In this light it can be observed that some projects use participatory methodologies as a means to an end, such as to receive feedback on the appropriateness of an intervention, to those that focus on enabling participation as an end in itself. An excellent example of this is the *Community Health Information Tracking System (CHITS)* (no. 48) project in the Philippines. The researchers in this project noted that developing a community-based health information system is a challenging task. However, by paying close attention to health center events and culture and by employing purposeful immersion in the end-user's way of life, the researchers were able to gain immense insight into their needs and requirements, and then apply these insights into software code, a process they call evolutionary software development. The researchers were originally leaning towards a technology-centric implementation of an information system. With deeper analysis and understanding of the needs and requirements of end users, the researchers were able to put technology in its place to serve the genuine needs of community health workers. Whatever the degree of participation that has been embraced by each project, the cross-learning between the project teams and beneficiaries benefits the research outcomes in two essential ways: first, by helping to refine the appropriateness of the solution within the context that the projects outcomes are realized; and, second, by increasing level of ownership and equity of beneficiaries in the project. These two factors, more than any other, increase the chances for projects to continue to evolve and grow beyond the proposed research phase.

#### *Adaptive research*

Another factor that can be seen as a common success factor of applied research projects is the degree of responsiveness the project has to the research environment, and their ability to adapt and change along the way based on their experience and research findings. In this category are projects that embrace at least to some extent an action research methodology, involving the following four steps: initiation of an intervention or action; observation of results; reflection; and a refinement of the research question, strategy or intervention. This is a cyclical process that can be repeated over and over throughout the life of the project.

Perhaps the best example of this kind of project is the *Open Source Software Localization Toolkit* (no. 30). Originally the project sought to simply develop a localization toolkit, comprised of a manual and a Compact Disc (CD) that would reduce the necessary research, work and expertise that a country or group would require to undertake a localization project. However, as the project proceeded, it found that the software documentation it was to draw upon was very limited and of poor quality. Therefore, the project had to complete a great deal of work it had not anticipated, including highly detailed research into open source software design and in some cases resolving technical problems as required. In addition it came to be seen that the project would have much more profound impact if it could link the toolkit (through documentation) to other major open source projects, such as OpenOffice. This has led the project to become a player in the world of open source, helping produce documentation that has value not only for the project itself, but also beyond it, as part of other localization projects.

Clearly the longer term, two-year projects have more scope to benefit from such a responsive methodology. However, in short-term projects, such a strategy - even if used on a more basic level - can greatly enhance the quality of findings to the research question. Interestingly, it has not been observed that projects that use such an adaptive process experience deep shifts in the principle project goals, more often the shifts can be observed in the specific outputs that are considered appropriate, or changes in strategies to meet those goals.

#### *Common organizational models and patterns*

There are several organizational models and patterns that can also have a positive affect of the success of projects. The strongest models can be found among those projects that have either a specific collaborative agreement, or at least inherent synergies with other organizations such as government offices, development organizations or educational institutions. In particular, if the project is in some way building on the work of its partners, either by filling a gap or by extending a particular programme or application, results can be dramatically enhanced. This is most likely due to the fact that the need has already been clearly established, and the project has momentum of its own at the outset; thus, the project team is not faced with starting at the most basic levels of partnership building, involving reaching common understandings, defining roles and



responsibilities and so forth. In addition, because such institutional partners also tend to have their own sources of funding, there is a greater likelihood that the research results will have long term impacts. Many projects use this model. Just one example of such collaborative projects is the project: *Building a Philippine IPv6 Research Network* (no. 28). This project combined the knowledge resources of the Advanced Science and Technology Institute (ASTI), which initiated IPv6 research in the Philippines with infrastructure provided by the Philippine Research Education and Government Information Network (PREGINET), to build internal capability and a knowledge base.

The second kind of project model that has been successful is that which furthers an existing institutional initiative within the implementing organization itself. This might involve scaling up an existing service, exploring a new application within an existing framework, or expanding a particular area of expertise within the organization. The strength of this model has been observed in two ways. First, larger organizations that bring more substantial institutional stability, human resources, knowledge and experience and perhaps independent funding sources, bring obvious strengths to projects. An example of such a project is the project: *Towards a Regional Geographic Information Infrastructure (RGII) in the Hindu Kush-Himalayan (HKH) Region* (no. 41), which builds on and further advances the work of the implementing organization, the International Centre for Integrated Mountain Development (ICIMOD) and its networks of partners. However, it should also be noted that some smaller projects have succeeded without the benefits of these substantive resources. Many of these smaller organizations have overcome profound challenges and succeeded in the realization of their goals because the project is seen as essential to the achievement of greater community or institutional aspirations. In both of the cases above, the specific project is often a piece of either a larger or longer term development initiative, and thus it can be argued that the similarity between these two types of organizational structures and the common success factor, is the degree of long term commitment they bring to the project.

### **Lasting impact, continuity and sustainability**

Turning from the above analysis to address the question of projects lasting impact, continuity and sustainability, there are two preliminary outcomes a project must achieve to move on.<sup>1</sup> The first relates to project success. On a most basic level this means that the project work established itself as useful to its beneficiaries. It also indicates that the projects have overcome one or more challenges such as those outlined above. Specifically, the entry point and technological solution are appropriate for its intervention, it has been able to manage itself and partnerships effectively, it has overcome any challenges posed by unforeseen events and finally it has been able to plan for

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<sup>1</sup> This section also draws from and expands on the report: *ICTs for Governance and Poverty Alleviation: Scaling up the Successes - A Study of ICT Projects in India*

its own success and establish the next steps the project needs to take to reach its maximum impact. Whether or not it has integrated participatory processes, an adaptive research strategy or one of the organizational models outlined above, is important but less critical. The main point is that the projects value and appropriateness has been clearly established and any uncertainty in the above areas has been addressed.

At this point, financial sustainability is the next issue that projects will face in efforts to continue their work beyond the grant period - be that simple continuation and development of the project work itself or scaling up to reach wider audiences. ICT R&D Grants Programme projects have addressed this issue in several ways. First, as mentioned above, a number of projects were conceived of as a component of a larger institutional effort. In some of these cases, the institution can sustain the project after the more intensive initial period of establishing capacity or infrastructure as was the case with ICIMODs *Regional Geographic Information Infrastructure in the Hindu Kush-Himalayan Region* (no. 41) project. Second, several projects have specifically focused on financial sustainability as a key outcome of their research work. That is, if their research is successful, the project will be financially viable, thus allowing the project to proceed directly to scaling up. A good example of this kind of project is the current project: *Impact of Remote Telemedicine in Improving Rural Health, India* (no. 52). This project is field-testing a low cost medical kit that works in conjunction with a rural kiosk to transmit data to a doctor in a town. The project expects to study the impact of this product in the selected villages over a 24-month period and if successful, will be expanded throughout Internet kiosk operator n-Logues' network. The third way financial sustainability has been addressed is in those projects that have used their research work period to either build alliances and connections with other complementary organizations and or have gone on to seek further funding from other donor organizations.

Assuming a project has established its intervention as successful and that it has provided for ongoing financial sustainability, there are four ways that projects have been observed to continue on and scale up to achieve lasting impact. The simplest way is through a multiplication of the project model. This would involve an expansion of the project work over a larger geographic area, or serving a larger beneficiary group. An example of this kind of project is the Beijing-based project: *Developing a New Resource Sharing System and a New Tool to Use Electronic Materials in Multi-Media Format Based on Grid Technology* (no. 33). This project has great potential to achieve scaling through introduction of its system throughout the Chinese Universities and educational institutions. The second way that scaling has been observed is through intensification of the project within the network infrastructure that has been created, serving the same or similar beneficiary groups with the delivery of additional services and/or applications. The *Remote Telemedicine* (no. 52) project by nLogue mentioned above is a good example of introducing new services through existing networks. This strategy can be continually expanded to include a wide

variety of services such as e-governance, crop forecasting, marketing initiatives and so on. The third way a project can scale up is through an evolution of the project work, that is that the results of the project work itself lead to a new line of inquiry or exploration that emerged from the intervention itself, or was made evident by the project work. In such cases scaling up may be observed through the project taking on a new direction. In the projects we reviewed, the best example of this type of scaling is represented by the *Open Source Software Localization Toolkit* (no. 30), which continues to grow and evolve with the open source movement at large.

The final way that scaling has been observed is less direct, but never the less can have dramatic impact on both initial target beneficiaries and extend to larger local and regional communities. This model of scaling can be seen in the ripple effects created by a project intervention. That is, once a community of users has been exposed to the value that a new technology can offer them, and has overcome any barriers to its use, such as physical access, language and skills, they will tend to take the initiative themselves to further build on their own capacities to find new and innovative uses and applications of the ICT medium. At this point, the users have established the value of the medium and adapted it for their own uses, which implies a kind of personal ownership or equity stake in the medium. It can be observed that every project in the Programme, regardless of its degree of success or scalability has contributed to this kind of ripple effect. On the most macro level, it is this effect that will continue to contribute to the creation of new communities of users and, in turn, creators of information and knowledge that will further shape and evolve the use and application of the ICT medium.

## **Conclusion**

In the following pages is a compilation of 56 projects funded by the Pan-Asia ICT R&D Grants Programme between 2002-2005. It is hoped that this review will be useful for existing projects to better understand how their work fits into the overarching scope of the programme and related efforts in the Asia Pacific region, while also providing new projects, potential projects and other interested parties, both within and beyond the scope of the Programme, to benefit from this vast body of working knowledge, practical experience, research and insight. Further, it is the hope that with this tool, new contacts will be made, new collaborations initiated and new solutions discovered.

## **Pan-Asia ICT R&D Grant Programme: Project Review**

### **Access to Information and Communication**

## **1. Leveraging ICTs Through Weekly Market Centres for Tribal Communities, India**

### **Keywords**

technology development and management, community process networking, employment generation, governance, India

### **Geographic coverage**

India

### **Objectives**

The objective of this project is to promote the use of ICTs among selected tribal communities in central India.

### **Description**

The project was implemented in a remote, rural tribal area of Central India, where about 70% of the population is below the poverty line. The project leverages access by basing itself in a weekly village market, which is regularly visited by the population of about 68 villages. The project offers email, Internet and computers for local people to access information in the areas of government information, health, prices, employment, marketing and availability agri-forest produce, agriculture diseases, trading information, and sending/receiving messages. The project intends to extend these services and help identify new areas in which Internet and ICTs can help the poor villagers in tribal and rural areas.

### **Target beneficiaries**

The beneficiaries of the project include the rural village and tribal population, particularly those depending on agriculture and wage labour, and women.

### **Outputs**

- Test how and where the Internet can be brought to remote communities;
- Assess whether weekly markets can provide the leverage for “door-step” availability of the Internet;
- Address infrastructure problems such as electricity, technology support, and phone lines, while using Internet technology;
- Identify complimentary technologies that can be used to increase the projects effectiveness,
- Understand how the government responds to the use of the technology; and

- Assess the social and economic impact of the use of the Internet in a tribal community and understand the social and psychological factors that influence use or non-use.

### **Outcomes and impact**

In its efforts to test its method for bringing ICTs to remote communities, Satpura Integrated Rural Development Institution (SIRDI) established a Multi Facility Centre at the weekly market place, Sawalmendha. The market is visited by thousands of people from the surrounding 68 villages every week for purchasing their essentials and other routine work. By establishing the information centre with multiple facilities, the SIRDI ICT project was able to fulfill many of the information needs of the villagers. It also set up nodes at Taluka Town, Bhainsdehi and the District Town of Betul, and established a communication network between villagers and the staff at Sawalmendha.

The project addressed both technical and social considerations in the project area. From a technical point of view, the main issues were to test how ICTs can be made to work in remote areas where there is no access to phone lines, the power supply is non-existent, technical support is missing, and the road network is poor. The project also sought to identify complementary technologies such as public address systems to increase the access to information. This project was successful in bringing ICT to remote communities. Computers and other instruments were tested in harsh conditions and did not break down throughout the project period. Because telephone lines were unreliable, Internet access was very difficult to achieve and it took several months to get the connection activated. In addition, the power supply, not only in Sawalmendha but in the whole State of Madhya Pradesh, was poor. The availability of electricity was between 4-8 hours per day, which was not sufficient to charge the batteries of the Uninterrupted Power Supply (UPS) and Inverters. Hence Generator backup planned in the project was useful.

From a social perspective, the project sought to test whether weekly markets can provide a "door-step" for access to ICTs, to assess the impact of use of ICTs on tribal communities and understand the social and psychological factors that influence use or non-use of ICTs. The project also sought to understand how the Government would respond to community use of this technology. The project noted that because of the lack of awareness about ICTs on the part of people in the project's geographic region, the community could not really benefit on a large scale during a short period. The project also noted that the literacy rate and awareness of ICTs in the project region was almost negligible, though it was found that the literate people were keener to use the facilities. It was also noted that response from the villages regarding the generation of requests for help was much healthier in those villages where SIRDI had already been working and had social workers based. During the later stages of the project the local youth started taking interest in the activities of the centre and in learning Internet technology skills. The percentage of requests for help submitted by women remained consistent throughout the project period at about 35 percent

The project carried out various activities like an Agricultural Camp for farmers, Quiz Competition for students, Eye Camp for visually impaired people, and the production of CDs with documents and provision of forms for various government schemes. It also offered services such as photocopy, scanning, printing and lamination, and providing students' school results via Internet at a low cost. A unique aspect of the project was its development of a network of "Saathins" (meaning companions) who became leaders of the information initiative. The project selected two Saathins from villages in the project area and gave them a two day training at the Sawalmendha ICT Centre. In total, 108 Saathins from about 60 project villages were trained to work as catalysts. The project also formed a federation of Saathins, using the money collected through photocopy and lamination charges and through charging for the students' results on the Internet. This money was deposited in a separate bank account for Saathins, and was used for the economic sustainability of the project.

A remote place like Sawalmendha, which could not have otherwise had access to ICTs, now has an ICT facility and network of users. It was one of the objectives of the project that it should become economically viable over a period of time and should be run by the women who were trained under the project. The initial period of one year was quite difficult, considering the technical obstacles, low literacy rate, and lack of awareness about ICTs in the project region. However, now that steps for revenue generation have been taken, the project team sees many economic opportunities for sustaining this project. To add to this, SIRD's own Self Help Groups began incorporating ICTs with the aim of helping women become entrepreneurs, boosting their confidence, and changing their overall perception towards life while also providing a sustainable platform for further ICT development.

### **Project Duration**

Start Date: June 2002

End Date: June 2003

Total Duration 12 months

### **Contact Information**

Upma Diwan, Project Manager and Ajay Kumar, Chief Technical Advisor

Satpura Integrated Rural Development Institution (SIRD)

V & P.O Bhiram Karanja, Taluka Chandur Bazar

Distt Amrawati, (Maharashtra) 444809, INDIA

Telephone: 9172-272 5236/ 25420

Fax: 9172-232 1231

Email: [sirdi@vsnl.net](mailto:sirdi@vsnl.net)

**Website**

<http://www.sirdi.org>



## **2. Wireless Internet Post Office, India**

### **Keywords**

digital divide, rural access, solar-power, wireless communication, economic development, livelihoods, India

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to couple advances in consumer electronics, with an entrepreneurial model to foster the deployment of text-based digital communication.

### **Description**

This project addressed infrastructure and technology related connectivity problems associated with the digital divide by coupling advances in consumer electronics with an entrepreneurial model in a Wireless Internet Post Office (WIPO). The WIPO is capable of delivering text-based messaging services to remote villages through a network of solar-powered wireless repeater stations. The systems cost and complexity are minimized by using off-the-shelf commodity components and by operating in the international license-free band, combined with directional antennas to provide inexpensive long-range wireless networking. Users synchronise a low-cost Personal Digital Assistant (PDA) at wireless repeater stations, much like dropping off and picking up mail at a post office.

### **Target beneficiaries**

This research project aimed to design a complete communication system from the Internet gateway to the end user. Ultimately it is the end users who are served by the WIPO, including villagers who want to contact relatives in distant locations, farmers who want information on prices, access to markets, and advice on disease and pest control, small businesses who want to access distant markets, educators who want teaching materials, and medical and aid workers who require information in their respective fields. The WIPO also benefits people involved in the wireless network, for each component can have an economic model for income to encourage deployment and propagation. The WIPO creates an entrepreneurial opportunity for PDA owners to become micro-businesses, providing services, including scribing, data collection, crop pricing, and referrals, and matching buyers with sellers.

## **Outputs**

The specific deliverables of the project were specification documents and test results that resolve the system component design issues posed in the project methodology. The project also created a web site to disseminate information on how to build and deploy a WIPO system. The web site is maintained to survive the project, and keep information and results publicly available, while serving as a focal point for discussion and providing links to similar work, supporting material, and follow-up activities.

## **Outcomes and impact**

Complete design of a Wireless Internet Post Office system was completed and a working concept demonstrator of WIPO has been set up at the Indian Institute of technology (IIT) Delhi campus. The setup comprises of three relay nodes spread over the IIT campus communicating over 802.11b network using long-range antennas. Three parabolic and three Yagi Antennae have been used in the current setup. The system has been used to validate the design and also to carry out some performance tests.

The major research problem faced in the application was how to design a network, which uses low cost commodity hardware components, is resilient to node failures due to likely power failures in the application environment, is easy to deploy and configure, uses public domain software modules, and does not rely on any specific equipment model or manufacturers. Most of these problems were addressed and the validated system has been tested. The technical design for the project consists of the following four design components: the Internet gateway station; wireless network architecture, design and selection of the wireless communication protocols to be used; and design of application modules for handheld devices, the Internet gateway station and wireless relay stations.

The project website (see <http://genie.iitd.ernet.in/wipo/>) has been updated to include the final integrated designs, current setup and the results obtained. A complete software package, including the installer script, of the system is also available from the website. A simulation using the Network Simulator 1 has also been completed. The results obtained from the simulation are also available from the project webpage.

Initially, the project team faced some issues in the implementation of the project; however, during the course of the project they were resolved. Some of the problems were due to interference, to communication over multiple links originating from the same node, and in sourcing the necessary antenna and cabling.

The project team solved the multitude of technical and system design issues inherent in a Wireless Internet Post Office, and provided digital access to the widest possible population at the lowest usage and capital cost. Since wireless networking eliminates the painful process of laying cables to connect villages, the design provides a viable and effective means of bridging the digital divide and bringing low-cost communication to the most needy.

The project team believes that the technology developed as a part of this project can form a basis for business solutions for remote areas, which can be offered as services to the people in rural areas at very low cost. The team from this project is now equipped to provide technical support to an implementation agency interested in deploying a commercial network in a remote area.

**Duration**

Start Date: May 2003

End Date: April 2004

Total Duration 12 months

**Contact information**

Prof. Huzur Saran

Indian Institute of Technology (IIT)

Department of Computer Science and Engineering

Delhi Hauz Khas, New Delhi, 110016 India

Telephone: 91-011-26596009

Fax: 91-011-26581060

Email: [saran@cse.iitd.ernet.in](mailto:saran@cse.iitd.ernet.in)

**Website**

<http://genie.iitd.ernet.in/wipo/>

### **3. Low-Cost IT Centre for the Philippines**

#### **Keywords**

e-learning, IT training, employment generation, networking, social services, Philippines.

#### **Geographic coverage**

Philippines

#### **Objectives**

The objectives of this project are to help bring low-cost IT training and services to communities throughout the Philippines.

#### **Description**

In the Philippines, many IT centres offering computer literacy courses and other services are emerging in urban areas. However, these are often unaffordable for poor Filipinos, and inaccessible for rural Filipinos. In 2001, the Technical Education and Skills Development Authority (TESDA) Lingayen approached Engineers Without Borders (EWB) to seek support in setting up a low cost IT centre that would offer affordable IT training to local residents. The centre was completed in August 2002 and is offering affordable computer training. This project follows on the success of that initiative, by studying its impact, replicating it in three additional locations and finally by creating a guide to setting up low-cost IT centres in the Philippines.

#### **Target beneficiaries**

The three IT centres can provide computer IT training for approximately 1500 people over three years, who benefit from increased employability as well as enjoy secondary benefits that will likely arise as poorer members of society understand how they can use ICTs to accomplish their own development objectives. The research findings and training components also benefit TESDA, EWB, the province of Sarangani and other partners, thus enabling the project to progress to phase three and to ensure low cost access to IT training for thousands of poor Filipinos.

#### **Outputs**

- Three new IT centres in serving the rural poor Sarangani Province, Mindanao;
- New programming for the Lingayen and Sarangani Province IT centres, based on a research paper evaluating the IT training centre and training methodology implemented in Lingayen in 2002;

- A research paper evaluating the impact of increased availability of low-cost IT training on members of a local community, particularly those less well off and marginalized in society;
- A guide to setting up a low-cost IT centre and guide for running low-cost training programs;
- A Policy paper on the role of western NGOs in facilitating the setting up of low cost IT centres and training programs;
- The set of training programs in English for basic computer literacy;
- A series of technical appendixes on computer/LAN set-up; and
- A plan for phase III of the Scala project to help less well off Filipinos gain access to technology that can help them improve their lives.

### **Outcomes and impact**

While this project completed on time some of its specific outputs were not fully achieved, particularly those of a more technical nature. This was due to an evolution of the research based on the finding of studies on the Lingayen ICT centre during phase one. Initially the project established three principles to be followed to ensure positive development outcomes, sustainability, and replication. These three principles are: low initial cost borne by the centre, so the centre is not forced to charge large fees to recoup the capital investment; innovative programming that offers targeted services that benefit the poor and offer services based on a pay-what-you-can principle; and finally, that local skills must be built to maintain and repair the ICT centre after the implementing organisation has departed.

Following the analysis of the Lingayen centre after one year of operation, the project defined three additional principles to research, which were found to greatly improve its model. These are: monitoring to allow efficient follow-up and ensures the stability of the centres; impact assessment to help target the programming approach for each trainee's circumstance, while following the development outcomes of the ICT centres; and lastly, a holistic programming approach that specifically addresses the social and employment needs of target beneficiaries furthers the projects impact. The project therefore shifted its focus slightly to develop the tools, training programmes and structures to embrace these new principles.

Based on this the project went on to develop a recipe that incorporated both the needs of the underprivileged Filipinos and the socio-economic reality of the semi-urban communities in the Philippines. The new model definition and research findings were then applied to the development and successful implementation in four ICT centres. Overall, the most significant research finding is the new definition of this model. Based on the experience of the four ICT centres, the project created a scalable, low-cost, appropriate, and sustainable ICT resource centre solution. With changes to the model and programming, the ICT centres from the first two phases of this project - 45 computers in all – offer training to the 'out-of-school' youth and persons with disabilities with a

combined objective of over 500 beneficiaries. The project accomplished this for less than \$35,000, which is a very low-cost model, especially given that the first two phases were the pilot phases of the project.

Based on the investment of time, effort, and funding the project was considered to be successful in improving the model for the development of ICT resource centres and integrated ICT training for the Philippines. Further, this innovative work has been recognised by the prestigious Global Knowledge Partnership (GKP) Youth Award 2003, which aims to reward and bring international recognition to the outstanding work of young people who have used ICT for the promotion of development around the world.

### **Duration**

Start Date: May 2003

End Date: November 2003

Total Duration 6 months

### **Contact Information**

Nabeel Al-Kady

Engineers Without Borders

5650 Yonge St. Suite 207, Toronto M2M 4G3 Ontario Canada

Telephone: 1-514-816 8463

Fax: 1-514-816 8463

Email: [nabeela@ewb.ca](mailto:nabeela@ewb.ca); [parker@ewb.ca](mailto:parker@ewb.ca)

### **Website**

<http://www.ewb.ca>

## **4. ICT Assisted Economic Empowerment - Integrated Tools Development**

### **Keywords**

women, outsourcing, home office, poverty reduction, economic empowerment, e-marketing, integrated platform, Malaysia.

### **Geographic coverage**

Malaysia

### **Objectives**

The objectives of this project are to assist disadvantaged women who are confined to their homes due to disabilities and other circumstances.

### **Description**

This project is targeted at disadvantaged women who, due to disabilities and other circumstances, are confined to their homes and as a result are economically and emotionally constrained. The project explores the possibility of developing an integrated system of ICT tools, such as computer, Internet, telephone, SMS, facsimile and similar modes to free the women from the confines of their homes. Through utilization of tools already available to them, or supplied through this project, the women can provide products and services to the external market.

### **Target beneficiaries**

The beneficiaries of this project are 50 women who were short-listed from a core group of 200 women participants.

### **Outputs**

A series of outcomes were envisaged at different levels. First, the project planned to explore the feasibility, adaptability and effectiveness of using a combination of ICT tools as opposed to over-dependence on one mode such as the Internet. Second, a core group of economically empowered women was to be formed as role models for others in similar circumstances. Finally, the project sought to expose the Malaysian corporate sector to the use of decentralized skills and talents.

### **Outcomes and impacts**

This project focused its efforts between development of technical solutions and building the capacity of women to offer marketable skills. It did run into several difficulties, in particular it noted

some serious problems related to its IT partner. Due to financial constraints, the project selected the partner based on the lowest price quoted, not the best in technology. This led to technical problems, which delayed the technical handover to six months after the project period was over. The project also mentioned that the application delivered has quite a high maintenance cost, which has obvious implications for the projects sustainability. Reflecting on this, eHomemakers concluded that working with a commercial entity was problematic and that a better partner would have been a university or a non-profit research institution, although none was available at the project design period.

Despite this the project set-up an English language marketing web site (<http://www.justmarketing.info>). The project also developed a Distributed Work Management Application (DWMA) using mobile telephones. The necessary server hardware, interconnectivity cables and mobile handsets were purchased for the purpose of the DWMA application. System integration between the mobile handset and the server was conducted and basic SMS sending and receiving functions were tested to support a large number of recipients. Business logic functions are still pending and will commence once the server OS and applications have been migrated to the production server.

The DWMA system uses Malay language and a numeric code system for replies. It is also designed to cater to multiple products and services, requires minimal typing and includes a distress system for unexpected incidents. Using its beta DWMA system, the project developed and conducted two training sessions on its use, one in Ipoh and one in Klang Valley. The project reported that the system was positively received and is confident it is applicable to the women's needs.

Importantly, the project mentions that technology is a tool only, and without efforts in marketing, product improvement and other non-ICT related capacity development training, the technology usage will not be maximised. Particularly if there is no direct benefit to the women they will eventually lose interest in using the application. To address this, the project made considerable efforts to hold meetings and conduct a variety of focus groups with women. It also held a series of training sessions on basket weaving and translation skills.

Through this project, poor urban women are now linked through an ICT platform to group market their products, thus earning income for the household and reducing reliance on charity aid. The larger project envisions that this ICT platform will eventually allow women to participate in eHomemakers' gender governance framework where women own and manage the information network for themselves and by themselves.



**Duration**

Start Date: May 2004

End Date: April 2005

Total Duration 12 months

**Contact Information**

Chong Sheau Ching

eHomemakers / Mother for Mothers

179 Jalan Datuk Sulaiman 4, Taman Tun Dr Ismail,

60000 Kuala Lumpur, Malaysia

Telephone/Fax: 603-77273959

Email: [scchong@ehomemakers.net](mailto:scchong@ehomemakers.net)

**Website**

<http://www.justmarketing.info>

<http://www.ehomemakers.net>

## 5. Robust Networks for Rural Areas in India

### Keywords

network development, information management, wireless technology, computer kiosk, agriculture, information kiosk network, low bandwidth applications, India.

### Geographic coverage

India

### Objectives

The objectives of this project are to disseminate information to users in a resource-constrained environment.

### Description

This project addresses the dissemination of information to users in resource constrained environments typical of rural areas in the developing world. The quality of service over these networks is often difficult to maintain due to power outages, equipment failure, low bandwidth and unreliable network connections. This project aims to develop solutions using wireless technologies, multi-lingual databases and interfaces, meaning based searches, interfaces for the illiterate, caching, transcoding and customizing Internet content. Solutions will be deployed in rural parts of Maharashtra and published for the benefit of other organizations and ICT interventions.

### Target beneficiaries

The beneficiaries of this project include 26 computer kiosks being operated by rural entrepreneurs and their users in and around Pabal; a reliable internet connection is provided to Vigyan Ashram, a rural vocational education NGO; local youth benefit through experience in surveying and deploying internet-kiosk based services; and other ICT interventions that face problems of low bandwidth and unreliable network connections can learn from the published work.

### Outputs

- Report on field study of Pabal's network;
- Operational long distance WiFi link between Rajgurunagar and Pabal.
- Localized website for market price information;
- Content pages of the villages in the Pabal region;
- Multilingual Question and Answer engine; and
- A report on kiosk services before and after deployment.

## Outcomes and impacts

At the time of writing, this project is still active. However, many of its main objectives have been achieved and some key observations have been made relating to challenges and obstacles in ICT deployment in rural areas. The project assesses an existing ICT deployment and studies its weakest links from a technical, service-delivery and business perspective. The findings have helped prioritize the action items for the managers at both n-Logue and Vigyan Ashram, the main partners in the project.

Some of the projects technical and service achievements to date have been the linking of the Pabal and Rajgurunagar projects using an 802.11b wireless link, and the launch of an innovative online question and answer forum called *Almost All Questions Answered (aAQUA)*. Results from the project have been extensively documented and disseminated, with publications presented at leading conferences such as the 12th International Conference on Management of Data (COMAD) in Hyderabad 2005, the 24<sup>th</sup> International Special Interest Group on Management of Data (SIGMOD) in Chicago 2005 and the International Conference on Information and Communication Technologies and Development (ICTD 2006) in Berkeley, as well as in various newspapers and in an agricultural industry survey magazine. Result from the project have also been integrated into a Masters level course offered at IIT Bombay titled "ICT for Socio-Economic Development". The project conducted a training for NGOs in May 2005, and documentary films have been made on the project work. Publications are available at the project website (<http://www.dil.iitb.ac.in>).

Based on observations from the Pabal and Rajgurunagar projects, the project team noted some of the factors affecting the success and failure of ICT deployment in rural areas. Among some key observations are that if kiosk businesses are to be viable in rural areas, they do require data speeds comparable to urban areas. This will allow service operator to offer a wider range of services such as distance education, videoconferencing, access to multimedia and digital libraries, VoIP services and so forth. However the project noted that service providers are not always the best people to develop the kind of online services most relevant to rural communities. It is vital to perform a market survey before starting such a project and then bring in partners such as government institutions, private companies and content providers who will back the content and services. Kiosk operators alone are unable to create these linkages.

The project challenges the notion that urban business models will work in rural areas. While results show that there is a huge demand for urban-like ICT services in rural areas, the challenge for the business is aggregating demand. To be a viable business, the project suggests building wide area networks to connect a larger number of potential users over sparsely populated areas. The project also observed that the security and maintenance of equipment deployed in remote areas must

always be a consideration, that relationships with vendors of all equipment must be closely monitored to ensure that they are adhering to their maintenance contracts, and finally that kiosk operators must be given the necessary statutory powers to offer e-government services.

The study and reports produced by the project will be of significance to rural ICT deployments looking at providing Internet based services. The knowledge and experience gained from the project is being documented and disseminated via the project website and email to network operators who plan to offer data services in rural areas. The results are considered to be particularly useful for agri-extension centres, Government officials in the Ministry of Agriculture and Ministry of Information Technology, NGOs studying the sustainability of online services, and private sector enterprises that desire to understand the business potential of rural ICT services.

The project is compiling best practices in the area of content repositories and e-agri-extension services and has been a catalyst in promoting such services through its online question and answer forum – *Almost All Questions Answered (aAQUA)*. It is also assisting in linking the Pabal and Rajgurunagar projects using an 802.11b wireless link. Finally, as the project sees that large intranets servicing large number of people are more likely to be financially viable, the project is demonstrating how larger intranets can incorporate multiple servers and synchronize with one another to form one consistent database.

This project represents a good model of academia-NGO-private partnership that explores the limitations of Internet technologies in rural areas and seeks to address them through the provision of meaningful services.

### **Project Duration**

Start Date: March 2004

End Date: May 2006

Total Duration 26 months

### **Contact information**

Professor Krithi Ramamritham

Indian Institute of Technology, Bombay

KReSIT, IIT Campus, Powai, Mumbai 400 076 India

Telephone: 91 22 2576 7900 / 01 / 02

Fax: 91 22 2572 0022

Email: [krithi@iitb.ac.in](mailto:krithi@iitb.ac.in)

### **Website**

<http://www.iitb.ac.in>

## 6. ICT-Enabled Women's Social Net

### Keywords

gender equity, community development, household economy, economic productivity, women's empowerment, digital divide, capacity building, India

### Geographic coverage

India

### Objectives

The objectives of this project are to establish an ICT Service Centre that caters exclusively to women.

### Description

This project explored the use of ICTs as an empowerment tool for women in India through the establishment of an ICT Seva Kendra (Service Centre). The Seva Kendra caters exclusively to women, in an effort to encourage participation, build capacity, and support their work towards social transformation. ICT Seva Kendra focused on leveraging ICTs like email, word processing, database management to redress the problems faced by self employed women, self help group members and elected women representatives of local self government bodies. Thus, the centre sought to catalyze and support the building of several issue-, thematic- and regionally-based ICT-enabled women's social networks.

### Target beneficiaries

This project benefits self-employed women, members of Self Help Group's and elected women representatives of local government bodies.

### Outputs:

All the outputs generated by the project were to be disseminated in the form of CDs, print and mainstream media such as radio and television. Outputs include:

- Effective usage of ICTs to advance women's lives through awareness of information about support systems and mechanisms that support them;
- Generation of content and software that respond to the practical and strategic needs of the target constituency;
- Increased economic benefit, sharing of resources and reduced costs;

- Support to demand entitlements, counter mainstream stereotyping, and take action against the neglect of women; and
- Empowerment of women to play an active role in public decision-making and collective action at a regional level to advance their lives.

### **Outcomes and impact**

This project remains technically incomplete. However, while the project failed to meet many of its proposed outcomes, it has also had some important successes and offers some valuable lessons learnt. In addition, it should be noted that the proponents are continuing their work in this area, beyond the scope of the original proposal.

Some of the key challenges the project faced were serious problems with its partner organisation, the Maharashtra Foundation. Its unwillingness to advance funds was the reason the project has remained incomplete. Two lessons the project learnt from this experience were: one, to ensure terms of reference with partner organisations are in place before the proposal submission stage itself and, two, to begin community based work only after committed grant amount is transferred into the project account. The team also notes that in the current context of the Indian government increasing controls on NGOs and tightening rules for accepting foreign donations, they believe there is an urgent need for grant agencies to develop strategies to ensure the support they provide can be accessed by small organisations like Marathmoli.

The project researched data of the villages in Tuljapur Taluka, and selected two remote villages, Savargoan and Kemwadi. The villages were not being served by any other NGOs, had very poor transport services, no opportunities for higher education, and limited options for employment. Sanitation and drainage systems are totally lacking, drinking water supply is not assured and agriculture is mostly rain fed. According to the Anganwadi (Government School) worker, children in both the villages were malnourished. Most of the young girls and women work as farm labour. Many young girls are forced to quit school, regardless of their performance, either to work in the fields or to be married. Women are not involved in community decision-making processes.

The project team spent a great deal of time in the field and gained firsthand experience of the realities of life in rural Marathwada. Based on this experience, they saw the challenge as three-fold. One, to demonstrate the value that ICTs could offer women, and secondly connect this value to the realities they faced in daily life, and last but not least to build their confidence in mastering and using this technology for advancing their lives. The project team held numerous meeting and focus groups. They produced a successful poster-based campaign on the value of ICTs. They helped start a community managed library. They formed committees to investigate the health status and document the nutritional patterns of young girls and women in the village and collected

a daily diary of 35 women that covers their eating patterns, housework schedules, wage labour and time spent on any personal needs, if any. The also worked with self-help groups on such activities as management structure and finance mechanisms. The project used the time away from the field to conceptualise, network, conduct strategic planning exercises, gain expertise and disseminate Marathmoli's perspective through various government and non-government institutions and media.

At the time of this assessment, the project has also achieved: a partnership with the ICT Research & Training Centre, Centre for Development of Advanced Computing (CDAC), Bangalore to customise its Content Management System, ECKO, according to the specifications of Marathmoli's portal prototype; software prototype development (in process) of Women's Security Net; individual writing assignment with the Centre for Communication and Development Studies, Pune, to map the inter-generational evolution of women's resistance to patriarchal processes within the family and community of the Marathwada region (they facilitated a partnership of Action for Agricultural Renewal In Maharashtra (especially Latur Centre) and CDAC, Bangalore), and created an action plan for further activities.

The project team noted that the initiative and confidence of the women erased any despairing notions they had about the harsh conditions women and young girls faced, and their efforts began to mirror the hopes of village women. Although the project suffered from financial problems and instability, it is carrying on its work. Perhaps most importantly, the project represents the small but important steps that need to be taken to realize the vision of empowering women and young girls, especially from marginalised communities.

### **Duration**

Start Date: March 2004

End Date: February 2005

Total Duration 12 months

### **Contact Information**

Swatija Manorama, Program, Manager

Marathmoli, Maharashtra Women's Action Net

601, Wing A, Siddhivinayak Society,

Gurunanak Rd, Bandra w, Bombay 400050

Telephone: 91 22 25324538

Email: [swatija@gmail.com](mailto:swatija@gmail.com), [asmitamj@gmail.com](mailto:asmitamj@gmail.com)



## 7. Unsung Among Us

### Keywords

globalization, cultural currency, cultural equity, content creation, dissemination, India.

### Geographic coverage

India

### Objectives

The objectives of this project are to use ICTs for preserving the cultural heritage of small and marginalized communities.

### Description

The project team conceptualized “Unsung Among Us” with a vision to collect, document, preserve, disseminate and develop indigenous knowledge through the creation of digital film and media. The project was started as part of the People’s Plan Programme in 1997 with the leadership and ownership of Karakulam Grama Panchayath, in Kerala. Incorporated as a dream project of voluntary activists and public functionaries, Unsung Among Us supports local people in their living and self-governance processes. The programme evolved into an organized centre focused on upgrading rural development through Information Communications Technology (ICT) and human resource development through self-help and employment training.

### Target beneficiaries

The direct beneficiaries are the indigenous peoples of Kerala whose culture and knowledge is showcased to the global community through ICT based content creation and distribution. Cultural heritage and indigenous knowledge is a valuable resource for all and thus humanity as a whole benefits from their preservation.

### Outputs

- Multimedia CD ROMs containing audio, video and animation;
- A multimedia website with space for ongoing development of the project; and
- A project report.

### Outcomes and impact

The project goal to identify, familiarize and document those who are living but ‘Unsung Among Us’ was successful. The project team developed a Participatory Model to achieve a better

understanding of indigenous knowledge of Kerala. Through information collection, documentation and dissemination, the team collected content created by all levels of society. The project team then looked for local groups and individuals with adequate interest and selected the unsung based on the possibility of documenting the unsung characters in digital format. The documentation process empowered those involved, built capacity, democratized knowledge and demonstrated local strengths.

To implement this project, the Unsung team recruited an organisation called Adikala as the local associate. With the partnership and participation of Adikala volunteers, the team was able to: initiate preliminary discussion of the project goals and objectives; generate Unsung descriptions; design documentary plots; develop scripts; take still photographs; start filming; manage sound recording; edit the scripts and films; preview the first reels; and project the finished products. For the local adoptions in Parumala, the project team followed the same process. The completed films cover folklore and folk drama, ritualistic art forms, linguistics, music, martial arts, dalit culture, indigenous technology and indigenous medicine.

The project team provided training in cinematography, sound recording and editing. The research team also worked on identifying, sorting, script writing and documenting the proposed characters. At the local level, the team conducted seminars to brainstorm with interested groups, discuss characters and manage group forums. The project team also held a workshop on Development of Script and Literature.

The project team was able to produce: Anti-epidemic awareness creation films, created by an animation diploma faculty; a signature song and film that tells a Karakulam story; a handbook on health, sanitation and environmental management; a book on management development mechanisms; and periodicals on rural employment, women empowerment and public participation. The teams have also implemented pilot films at two places: one at Thiruvananthapuram District and another at Pathanamthitta District.

The Unsung team has established an office facility for the project with an office assistant and a technical assistant at the Information Technology Center (IITC) at Grameena Patana Kendram (GPK). The project team is also ready to install a studio facility at IITC/GPK. For post-production, the project team has employed a group of trained-hands from IITC/GPK. This studio provides technological know-how and quality control to the project. Four members of the team have acquired knowledge related to documentary filmmaking, helping them to generate more creative contributions from the stakeholders in the future.

The project team commends the wholehearted involvement of the Unsung themselves for their tireless contributions to their communities.

**Project Duration**

Start Date: January 2004

End Date: December 2004

Total Duration 11 months

**Contact Information**

Suhruth Kumar

Grammena Patna Kendram

Karakulam Post, Thiruvantapuram,

Kerala 695564 INDIA

Telephone/Fax: 91 471 2371463

Email: [info@iitcgpk.org](mailto:info@iitcgpk.org)

**Website**

<http://www.unsung.info>

<http://www.grameena.org>

## **8. "Bhutan 200" - Lowering the Cost of Local Internet Access**

### **Keywords**

Internet, digital divide, information access, bandwidth, rural remote access, e-government, Bhutan

### **Geographic coverage**

Bhutan

### **Objectives**

The objectives of this project are to research ways of reducing Internet access costs in Bhutan.

### **Description**

In Bhutan, many studies identify the high cost of Internet access, low international bandwidth, and lack of relevant local content as the main barriers to adoption of Internet-based technologies. As a consequence, citizens are missing out on the benefits of the efficient dissemination of information and services that the Internet can provide, and the beneficial 'network effects' of increasing the number of citizens online. The project aims to research alternative technological approaches and propose technical and business solutions that can be deployed by Bhutan's current and future ISPs to increase domestic Internet traffic.

### **Target beneficiaries**

The beneficiaries of the project are the citizens of Bhutan, who can benefit by lower Internet access charges for domestic Internet traffic. Other beneficiaries include ISPs and the local ICT industry that benefit from increased demand for local content and locally hosted applications.

### **Outputs**

The research results are a technical feasibility report that distinguishes between local and international Internet traffic, and a 'how to' business guide for current and future ISPs in Bhutan. These results are relevant to any country in Asia Pacific interested in boosting their own local web-content industry and reducing Internet access prices for citizens to access local content.

### **Duration**

Start Date: January 2005

End Date: October 2005

Total Duration 9 months

**Contact information**

Mr Tenzin Chhoeda,  
Director, Department of Information Technology,  
Ministry of Information and Communications, Royal Government of Bhutan, Post Box: 482,  
Thimphu, Bhutan.

Tel: +975-2-322925

Fax: +975-2-328440

Email: [director@dit.gov.bt](mailto:director@dit.gov.bt)

**Website**

<http://www.dit.gov.bt>

## **9. Community Mesh Network for Mahavilachchiya, Sri Lanka**

### **Keywords**

Wireless Mesh Network, Internet access, digital divide, community development, Sri Lanka

### **Geographic coverage**

Sri Lanka

### **Objectives**

The objectives of this project are to develop a low-cost wireless broadband architecture for providing high-speed Internet access services in Mahavilachchiya.

### **Description**

Internet access is largely perceived as a way to reduce isolation, provide educational and economic opportunities, and ultimately improve the quality of life. Unfortunately, high capital and operating costs have limited access in rural Sri Lanka. An innovative integrated strategy, based on existing technology and rural social structures, could help overcome a variety of barriers and ultimately help get large numbers of villagers on the Internet. This project aims to design and develop a low-cost wireless broadband architecture using Mesh technology. The pilot programme aims to provide high-speed Internet access services in Mahavilachchiya, and intends to identify key success factors for sustainable services.

### **Target beneficiaries**

This project ultimately aims to benefit the entire population of Mahavilachchiya. Special beneficiaries within this large group are the agriculture community, credit societies, employment seekers, wholesale buyers, children, teachers, parents, food processors, importers and village level vegetable collectors.

### **Outputs**

This pilot project aims to create a wireless Mesh Network where villagers have access to information and use this knowledge to stimulate economic growth by creating new products, increasing productivity and promoting new commercial and administrative methods. In addition to economic development, this connectivity can foster social development, cohesion, and inclusion, through its applications in education, health and increased citizen participation in civil society and government.

**Duration**

Start Date: December 2004

End Date: May 2006

Total Duration 18 months

**Contact information**

Manju Haththotuwa, CEO/Managing Director

Information and Communication Technology Agency of Sri Lanka

Email: [manju@icta.lk](mailto:manju@icta.lk)

## **10. Achieving Universal Access: Developing a Philippine Business Model and Government Intervention Strategies for Viable Community Tele-centres in Rural Areas**

### **Keywords**

tele-center, rural economic development, database, Philippines

### **Geographic coverage**

Philippines

### **Objectives**

The objectives of this project are to develop a self-sustaining Philippine tele-centre business model.

### **Description**

Convergence in ICTs allows innovation and new cost-effective means for the achievement of universal access, especially for developing nations. Community tele-centres can provide a platform to synergize development goals and business objectives, provide access to isolated communities, expand marketing and distribution channels, lower transactions cost, and aggregate demand and buying power. This project seeks to develop a viable and self-sustaining Philippine tele-centre business model to increase access to information in marginalized communities while generating income for a sustainable operation. Further, this project aims to identify gaps in the local programs on universal access and to recommend appropriate government interventions to jump start tele-centre development in the Philippines.

### **Target beneficiaries**

The database, policy recommendations, survey and analysis of community needs, identification of the different technologies available and recommendations regarding “last mile” initiatives benefit investors and operators of tele-centres such as the Department of Transportation and Communication, Philippine Postal Corporation, Telecommunications Office, local government units, public telecommunications entities, IT Enterprises, and other private firms; The Commission in Information and Communications Technology; The National Computer Centre; The Advanced Science and Technology Institute of the Department of Science and Technology; The National Telecommunications Commission (NTC); and most importantly, the households of the local communities in the Philippines.



**Outputs**

- Recommendations on government intervention strategies and policies for the creation of an investment climate that is favourable to the establishment and operation of tele-centres in the rural areas;
- A business model for a viable and self-sustaining tele-centre in the rural areas of the Philippines;
- A database of existing tele-centres and other similar efforts for achieving universal access; and
- Presentation of survey results.

**Project Duration**

Start Date: January 2005

End Date: August 2006

Total Duration 20 months

**Contact information**

Mr. Enrico Basilio, Director for Special Projects

Centre for Research and Communication (CRC) Foundation

Unit 1103 Pacific Center Building, San Miguel Avenue,

Ortigas Center, Pasig City, Philippines

Email: [ebasilio@uap.edu.ph](mailto:ebasilio@uap.edu.ph)

**Website**

<http://www.crc.org.ph>

## 11. Piloting Mobile ICT Access Models, Sri Lanka

### Keywords

community access, community radio, multimedia, mobile tele-centre, Sri Lanka

### Geographic coverage

Sri Lanka

### Objectives

The objectives of this project are to explore new models of access to a range of locally relevant content.

### Description

This pilot project provides a framework for extending community radio and multimedia to incorporate a mobile ICT infrastructure that delivers cost effective access to relevant information and knowledge that can help alleviate poverty and isolation to remote communities in the developing world. The Kothmale Community Radio website is proposed to be extended by incorporating a web-based community information, communications and knowledge management system. In order to effectively address poverty, the software tools provide a gateway allowing communities to access knowledge sources and services that are tailored to their own information and communication needs

### Target beneficiaries

The mobile design of the access point provides potential access to the most geographically remote areas of the Kothmale region. Complimentary fixed access points will be developed alongside health and emergency communications networks to improve the lives and livelihoods of all members of the community, including its 17 schools, numerous businesses and other organisations. The results can be used by project partners and Governments and NGOs to better understand the potential of mobile ICT solutions and to explore new models of access to locally relevant content.

### Outputs

- A working model for a mobile multipurpose community tele-centre;
- An interconnected wireless community network;
- An increase in social capital, skills and capacity; and
- A localised information and knowledge sharing portal.

**Duration**

Start Date: October 2005

End Date: December 2006

Total Duration 15 Months

**Contact information**

Sunil Wijesinghe, President

Kothmale Community Radio

Riverside, Mawathura, VIA Gampola, Sri Lanka

Telephone: +94 77 9101 787 (mobile)

+94 81 2350 422 (office)

Email: [info@kothmale.org](mailto:info@kothmale.org)

**Websites**

<http://www.kothmale.org>

<http://www.etuktuk.org>

## **12. Implementation of Wireless Last Mile Telephony Solution for Information Sharing and Disaster Mitigation in the Rural Philippine Setting**

### **Keywords**

wireless technology, disaster management, early warning systems, Philippines

### **Geographic coverage**

Philippines

### **Objectives**

To pilot a wireless connectivity solution for rural communities in the Philippines, with technical and procedural guidelines.

### **Description**

Information and communication have become vital tools for individuals and communities to gather and share information and maximize their potential. However, many rural poor and marginalized sectors of society do not have access to the new opportunities that are being created and are thus constrained in their efforts to lift themselves from poverty and inequality. This project aims to develop a pilot model using wireless technologies as ‘last mile’ solution to enable low cost connectivity to rural communities in the Philippines. Some of the key benefits are higher bandwidth, unconstrained by traditional cable capacities, which allow for services such as broadband Internet access, video-conferencing and, importantly, disaster prevention and mitigation through efficient information distribution to rural communities.

### **Target beneficiaries**

- The investors and operators such as the Department of Transportation and Communication (DOTC), public telecommunications entities (PTEs), Small and Medium IT Enterprises (SMITES) and other private firms;
- The Advanced Science and Technology Institute (ASTI) of the Department of Science and Technology (DOST) can benefit from the identification and recommendation of different technologies available;
- The Commission in Information and Communications Technology (CICT) can benefit from the technical and procedural guidelines formed by the project; and
- Rural communities in identified locations benefit from the inauguration of such facilities and the economical services it provides.

**Outputs**

- Develop technical and procedural guidelines for the establishment of an economically and technically feasible wireless 'last mile' connectivity solution for a rural setting;
- Establishment of pilot wireless connected community;
- Formulation of strategies for the establishment and continued operation of wireless connected communities to be established by government and private sectors; and
- Presentation of the results and recommendations from the pilot test program.

**Duration**

Start Date: January, 2006

End Date: June, 2006

Total Duration 6 months

**Contact information**

Denis F. Villorente, Director

Advanced Science and Technology Institute

ASTI Bldg., UP Technology Park Complex, C. P. Garcia Ave., Diliman,

Quezon City 1101 Philippines

Telephone: +632 426 9766 to 67

Fax: +632 426 9756

Email: [info@asti.dost.gov.ph](mailto:info@asti.dost.gov.ph)

**Website**

<http://www.asti.dost.gov.ph>

### **13. Maximizing the use of Traditional, Digital and Satellite-Based Radio Services to Extend Educational Programming and Other Relevant Audio Content to Students and Community Residents of The Republic of Nauru**

#### **Keywords**

education, distance learning, community radio, governance, Nauru

#### **Geographic coverage**

Republic of Nauru

#### **Objectives**

The objectives of this project are to adapt existing traditional, digital and satellite radio communication resources to serve the educational and development of the students and people of the Republic of Nauru.

#### **Description**

The Republic of Nauru suffers severely from environmental degradation due to now exhausted phosphate mining activities. Poor fiscal management has led to massive unemployment, unreliable energy and environmental infrastructure, lack of food and water, low life expectancy, declining education rates, reliance on foreign aid subsidies and political instability. This project aims to combine existing satellite-communication networks at the University of the South Pacific, a regional leader in distance education, with proven radio technology, so students and the general public can receive educational materials and community development information. A successful radio project could serve as a model for similar projects in other regional countries.

#### **Target beneficiaries**

- Students of the University of the South Pacific based in Nauru;
- The general public residing in Nauru, including primary and secondary school students and teachers; and
- Regional non-governmental organisations by providing a communications outlet for dissemination of information pertaining to community development, health, youth, and micro-enterprise.

#### **Outputs**

- Creation of a broadcast vehicle to deliver academic programs from the University of the South Pacific to students in Nauru (secondary and tertiary) and their teachers (in-service training);
- Creation of a community radio station for Nauru;
- Training of community residents to oversee operation and management of the radio station; and
- Increase the dissemination of community-develop information, particularly in village-based business, health, and environment issues.

**Project Duration**

Start Date:

End Date:

Total (months):

**Contact Information**

Ms Linda Austin, Media Resource Coordinator

Media Centre, Centre for Communication Technologies

The University of the South Pacific,

PO Box 1168 Suva, Fiji Islands

Telephone: (679) 323-2129

Fax: (679) 323-2038

Email: [Austin.L@usp.ac.fj](mailto:Austin.L@usp.ac.fj)

**Website**

[http://www.usp.ac.fj/index/php.media\\_centre/](http://www.usp.ac.fj/index/php.media_centre/)





## **14. A Distance Learning Application of the Solomon Islands People First Network (PFnet)**

### **Keywords**

education, distance learning, community centre, PFnet, Solomon Islands.

### **Geographic coverage**

Solomon Islands

### **Objectives**

The objectives of this project are to pilot a distance learning facility in one of Solomon Islands' rural community high schools.

### **Description**

This project utilized an existing rural Internet connection through the rural-development and peace ICT initiative, The People First network (PFnet), to pilot a distance learning facility in one of Solomon Islands' rural Community High Schools. The project entailed the design and application of a distance-learning programme, especially designed to integrate within the PFnet facilities. It studied the impacts of the email station on the wider community, focusing on particularly vulnerable groups such as women and young people. In doing so, this project provides an example of a PFnet application, as well as invaluable baseline data for the further expansion of PFnet to all rural areas of the country.

### **Target beneficiaries**

Beneficiaries of this project are the remote rural communities that suffer most from deficient transportation and communication networks. The project also enabled professional and commercial linkages, economic activities, civil society participation and coordination, government services, and development projects. Indirectly, PFnet benefits organizations working in rural development, allowing them to improve their operations through better logistics and information exchange, while improving the living conditions of their staff in remote locations.

### **Outputs**

- Distance Learning ICT Centre established in a rural area as a model application for the national PFnet programme;
- USP Distance Learning Programme adapted and optimised for PFnet, including field-tested using an established PFnet community email facility, and establishing that it can be

successfully expanded to other rural areas with the growth of PFnet;

- Increased understanding of the impact of ICTs on rural populations, and outreach to vulnerable groups who are not accessing the services.
- Baseline data for expansion of network;
- Building local capacity of teachers of Sasamunga Community School to learn basic office computing skills, and exposing students of the school to computing as an educational aid, email and Internet; and
- Project monitoring.

### **Project outcomes & impact**

Overall, the research project has been successful. Stakeholders were consulted through focus interviews, evaluations and workshops. Based on their input, the project provided a realistic model of how ICTs can benefit the education sector. The project produced valuable baseline data on the impacts of the distance-learning centre, and the general impact of the email facility on the wider community. These results can be used by education providers, such as the Solomon Islands College of Higher Education and PFnet as well as the University of the South Pacific, to further develop this model and expand distance education at the national level.

The immediate success of the project is illustrated by the fact that all 19 students who directly took part in the three-month training are now confident computer and email users. Of students who responded to questionnaires, 68 percent said they would like to study further. As foreseen, the project also had a number of benefits to the wider community as it provided easy and affordable communication to individuals, local businesses, and organizations. For example, the email station helped improve access to medical services for the people of Sasamunga and nearby communities through enhanced communication links and coordination between the local hospital and other health providers. Local businesses also actively use the email station to contact their suppliers, place orders, check current prices of goods and for basic banking. Finally, it was noted that the centres improved communication between rural people and their relatives and friends within the country and abroad. These results demonstrate what may be the most important outcome of the project, which is that it clearly shows that people in rural areas are ready and capable to successfully adopt these new skills and technologies not only for education, but also to improve themselves and their communities.

The successful completion of the distance learning trials and research findings culminated in a series of summits and workshops between the stakeholders to find ways to improve and maintain such a model for distance learning. These events provided collective and in-depth inputs highly useful for further expansion of the programme. For example, the need was identified for additional research to be carried out, which could provide access to first-hand information to facilitate better

planning and effective implementation of policies aimed at reaching and improving the lives of the rural population. It was also noted that access to funds to meet schools fees by rural dwellers is a common problem in Solomon Islands. While, during the project implementation, student enrolment fees were supported by the national parliament, it was suggested that a broader scholarship scheme be put in place so that interested students from rural areas could continue to study through distance learning programmes. Minor problems were also identified, particularly with the distance learning trials. However, these are considered to be issues that can be easily resolved if a standardised approach was set up with the distance education provider and PFnet. A number of more detailed recommendations for improvements in the programme were made, primarily relating to continued build up of technical capabilities and expanding the range of training areas for users and tutors.

The project promises ongoing positive results for rural communities throughout the Solomon Islands. Based on its findings a national pilot project was designed and submitted for funding with the European Union (EU). This project is now being implemented by RDVA through Pfnet. The results of the research also made it possible for the VSAT system to be set up in a community high school in each of nine provinces of Solomon Islands. The system allows schoolteachers, students and community members to have full Internet access for studies, research and distance learning. Finally, the research findings contributed to the development of a national IT curriculum and the development of e-government in Honiara through the Ministry of Finance.

**Duration**

Start Date: February 2002

End Date: June 2002

Total Duration 5 months

**Contact information**

Alan S. Agassi, Executive Chairman, RDVA

Rural Development Volunteers Association (RDVA)

Department of Provincial Government and Constituency Development

Anthony Saru Building, 5th Floor, P.O.Box G35, Solomon Islands

Telephone: (677) 23288

Fax: (677) 23288

Email: [rdva@pipolfastaem.gov.sb](mailto:rdva@pipolfastaem.gov.sb)

**Website**

<http://www.peoplefirst.net.sb/volunteers>

## **15. IT-mediated Rural Women Education and Dissemination of Health Information - A pilot in Tamil Nadu, India**

### **Keywords**

gender equity, education, health, HIV/AIDS, India.

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to design and evaluate a web-based women education/health information tool targeting rural women in Tamil Nadu, India.

### **Description**

This project addresses the United Nations charter for improving the health and social welfare of women in developing countries through education. The project aims to design, test and implement an information technology-based women education and health information dissemination pilot project. It targets rural women in the Tiruchirapalli District of Tamil Nadu, India. The project uses existing education infrastructure to demonstrate the economic viability and the social benefits of such a program in a developing country with complex social and religious interrelationships. A charitable educational institution, the Seethalakshmi Ramaswamy College for Women (SRCW), Tiruchirapalli, is at the heart of this pilot as a focal point to educate and disseminate information to rural women.

### **Target beneficiaries**

The beneficiaries of this project are rural women of Tamil Nadu, India and ten rural schools, and ten government schools run by the Tiruchirapalli Corporation.

### **Outputs:**

- A research report discussing the social health and education issues facing the target population and alternative scenarios for strategies and solutions;
- A health information web site operating through SRCW disseminating relevant information to participants and the world-at-large;
- A practical training module disseminating information to participants; and
- A network of volunteers and social service organizations to provide ongoing support.

## **Outcomes and impact**

In this project, the focus was on understanding the factors that resulted in the dropout of young females from schools. Further, the project also examined the level of awareness of specific health issues among rural women and to pilot an ICT-based solution that improves dissemination of information.

This project was carried out in three phases. The first phase involved an initial survey in 25 villages and five corporation schools, and assessed the level of the health awareness with special reference to prenatal care, postnatal care and HIV/AIDS and awareness of the importance of school education. Using this information the project developed IT tools for dissemination of this information. The IT tools were tested in the villages and in the schools. In the second phase the IT tools were fine tuned in the light of the feedback during the pilot study of the first phase, and the information was disseminated to women and children of about 25 villages that were backward in health and where the school drop out rate was high. Girls from two different colleges were also sensitized with the help of these tools. The final phase involved the government machinery so that the project can be sustained.

The pilot has been very successful in meeting and surpassing its objectives of raising ICT awareness among young female students and rural women in target areas. Seethalakshmi Ramaswamy College for Women, the partner institution now has a group of approximately 200, trained, first generation girl students who come from a rural background with traditional, village-based parents without a high level of formal education.

Results show a high, intangible return on investment (ROI), which will continue into the future. However, because of the very nature of the problem, it is difficult to quantify the impact it has on various people. The impact can only be qualitatively assessed from the response of the participants. Overall, the project appears to have targeted a population in excess of 50,000 in 39 villages and two suburbs of Trichy town. Field experience clearly shows that the project is having a significant impact on women in these villages raising their awareness. Over 1000 women from 25 villages participated in various stages of the program. It should be noted that the people who attend such programs spread the message through word of mouth and informal channels, thus making the messages spread further.

The project also gave the researchers and students insight into what the real issues are and where ICTs will work and where they will not. The welfare of women is a major socioeconomic problem in India. Poverty, lack of knowledge and resources, social systems, religious beliefs and a variety of socioeconomic and political dimensions impact on women in developing countries and impede their ability to access health information. An important element is the lack of education. While the

solution to this problem is more involved than what a small IT based project (such as this one) can solve, IT tools can play a significant role in distilling worldwide information and disseminating it to rural audience at a reasonable cost.

This research suggests that, in rural communities, a locally focused system is much more useful than a global www system and a combination of IT with motivated individuals is more effective in combating social problems. Such a micro system with local community ownership could be a forerunner to similar ones in other parts of India. Subsequent to this project, the researchers proposed to communicate these findings to State Government authorities/agencies and discuss micro strategies for local implementation. The researchers note that one year was probably too short a time to make a substantial impact.

**Project Duration**

Start Date: July 2003

End Date: July 2004

Total Duration 12 months

**Contact information**

Dr. V. S. Venkatesan

University of Western Australia Graduate School of Management

23 Caporn Street, Nedlands 6009 WA Australia

Telephone: 61-8-9386 8765

Fax: 61-8-9386 8765

Email: [vvenkate@ecel.uwa.edu.au](mailto:vvenkate@ecel.uwa.edu.au)

**Website**

<http://www.gsm.uwa.edu.au>

## **16. Pilot Testing of a Local Government Knowledge Sharing Network in the Philippines**

### **Keywords**

governance, knowledge management, database design, Philippines.

### **Geographic coverage**

Philippines

### **Objectives**

The objectives of this project are to test an ICT-mediated mechanism for knowledge sharing among local government units.

### **Description**

Philippine e-Commerce Law of 2000 had mandated all government agencies to develop e-governance capabilities. Local Government Units (LGUs) have since started a range of data and knowledge bases and websites. In addition, LGU staff is receiving ICT training and learning from one another's efforts. As such, a wealth of technical and practical knowledge has been accumulated in various Philippine government and non-government organizations useful for local development planning and management. This project aims to inventory and classify this knowledge, to test and define best practices, and create systems for sharing and integrating innovative knowledge strategies and practices at the national and local level.

### **Target beneficiaries**

Philippine local government units and national government agencies.

### **Outputs**

- Inventory of existing local governance and development knowledge base;
- Design a classification system and an e-directory of existing expertise;
- Action research and piloting of an e-group among local planning and development officers/coordinators (LPDOs), to define priority knowledge needs and promote a knowledge sharing culture;
- Develop a bottom-up system allowing LPDOs to design and maintain a knowledge base system;
- Develop a top-down 'Help Desk' where experts on various technical areas of local governance and development volunteer their expertise through on-line consultation; and

- Launch LOGOSHARE, including the above components.

## **Outcomes and impact**

At the time of writing, this project has made good progress towards meeting its objectives and outputs. The project aims to pilot-test a mechanism for connecting all LGUs and other institutions holding and/or needing knowledge in local governance and development, into an ICT-enabled network for mutually-beneficial knowledge sharing and technology innovations. It is anchored on the principle that knowledge itself has no value, but each time it is shared and re-used, then value and benefit is created. An ICT-enabled knowledge network that is user-driven, responsive and participatory has the potential to multiply this benefit.

The project is being implemented on a co-management and partnership approach between the Galing Pook Foundation, Philippine Sustainable Development Network (PSDN) and the Center for Conscious Living Foundation (CCLF). Galing Pook Foundation serves as the repository of the best practices in good local governance. Much of the expertise and best practices are drawn from Galing Pook's chest of awarded programs. The PSDN is tasked to undertake all ICT related activities, including the creation of an experts' directory, design and execution of a knowledge web-based database, the development of a portal and help desk, and the corresponding workshops and training that the initial users of the network would need. CCLF provides advisory services to the partner organizations in the areas of knowledge management and organizational learning. A Memorandum of Agreement was used to define a clear program of work and scope of responsibilities by the implementing partners.

As far as project implementation is concerned, 15 LGUs have initially signified their willingness and commitment to enter into partnership on an ICT-enabled knowledge-sharing project. Eleven of these have been consistently active in participating in project activities.

The project performed a participatory LGU needs assessment to determine the information requirements and the capacity of the users. The results of the assessment formed the basis for the preliminary system design. The project also consulted the LGUs to facilitate the process of identifying priority areas of knowledge that would be most helpful to the local planning and development officers.

Two major workshops were held. The first was LOGOSHARE Consultation Workshop held on 8 September 2004, at the National Computer Center, University of the Philippines in Diliman, Quezon City. This workshop organized a core group of users composed of selected LPDOs that would help define the LOGOSHARE ICT Infrastructure contents and protocols. Results from this meeting helped determine the information requirements and define the capacity of users. The



second workshop was the LOGOSHARE Project ICT Training Workshop, held at the National Computer Center of the University of the Philippines in Diliman, Quezon City on 3 - 4 November 2004. Most of the parameters of the LOGOSHARE Project were identified during the two workshops. A followup workshop was held in 28 March 2005 at the National Computer Center to test run the portal and LOGOSHARE website (<http://www.logoshare.ph>)

To accomplish the project objectives, the following components will be undertaken: a pooled knowledgebase of best practices in local governance and local development called *e-Kaban Galing* - "Kaban" means storage chest; an LG e-directory of expertise in local governance and local development; piloting an e-group among LPDOs; setup of a bottom-up portal; design and testing of an LGU Help Desk; and launching of LOGOSHARE.

This project is well on its way to meeting its objectives. The remaining months of the project will be devoted to completing the technical aspects of the project, developing a sustainability plan and strengthening the network. The establishment of the physical infrastructure (website), although an end in itself, should largely be just a means to reach the desired outcome, which is a core group of people able to identify and solve local governance problems and issues aided by a network of practitioners supplying knowledge and know-how.

**Duration**

Start Date: December 2003

End Date: December 2005

Total Duration 24 months

**Contact information**

Pamela Grafilo, Program Officer

Galing Pook Foundation

Room 1604 Jollibee Plaza, Emerald Avenue,

Ortigas Center, Pasig City, 1605 Philippines

Telephone: 063 2 687 1347 to 48

Fax: 063 2 687 7719

Email: [pehm.grafilo@galingpook.org](mailto:pehm.grafilo@galingpook.org)

**Website**

<http://www.galingpook.org>

## **17. ICT-Enabled Life Skill and Sexuality Education for Adolescent Girls**

### **Keywords**

social services, gender equity, adolescent women, life skills, sexuality education, eLearning, India

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to educate and empower adolescent girls in selected cities and villages using computers, digital cameras and the Internet.

### **Description**

In India, there are approximately 10 million pregnant adolescents and adolescent mothers throughout the country at any given time. Unfortunately, education, health and family welfare programs are not adequately addressing the special needs of adolescents. ICTs have great potential to reach these girls and provide sexuality education as well as opportunities to develop skills needed to plan their career and life in general. Today's girls are tomorrow's women, and being young and educated they have great potential to solve women's problems and village issues. This project employs computer, Internet, and digital cameras to educate, organize and empower these girls.

### **Target beneficiaries**

The project beneficiaries are working and school going girls, including Dalit adolescent girls from Othiyur village of Eddaikazhinadu town, Panchayath, Kancheepuram District, and adolescent girls from slums of Thiruvannamiyur.

### **Outputs**

This project explores the usage and impact of ICTs on urban girls in Chennai city and rural girls in a small village. With adolescent girls participation, the project proposed to create profiles of families in village and slum areas for use in education and planning, and develop interactive learning materials. It is also designing an ICT based information creation and dissemination system for use among rural and urban adolescent girls.

### **Outcomes and impact**

The general aim of the project is to provide comprehensive sexuality education and life skills training to adolescent girls in urban and rural areas in Chennai, India – a population that is often not educated in areas that are vital for physical health, psychological and emotional development, and empowerment. At the six-month point, the project reported that the following had been completed: a growing database of family and community profiles, a portion of the sexuality curriculum, data on adolescent girl's proficiency and comfort with computer use, and the formation of girl's club, or "snaehedhi" with a corresponding newsletter and website (<http://www.snehidhi.org>).

The project held focus group meetings with adolescent girls to assess general knowledge and beliefs about sexuality and sexual health, as well as understand the socio-cultural context that contributes to these beliefs. Based on the results of this, the project developed an outline for a 5-module sexuality education curriculum. It includes: Growing up (including puberty), Sex and Sexuality, Sexual Violence, Abuse and Decision Making (including counselling and legal resources), Sexually Transmitted Diseases, and Knowledge Assessment and Feedback.

The results of the focus group also revealed that the project would have to devise culturally sensitive ways of approaching the topic of sexuality education, and general women's health issues, without alienating or distressing the girls in the process, many of whom have never been spoken to about these subjects before. The project therefore takes the approach of gradually educating and building rapport with the girls through training in computer technology skills. In the slums of South Chennai the project aggressively networked and disseminated information about the centre and the computer lessons that they offer, with the result of approximately 100 adolescent girls attending the centre. The project reports the girls have gained confidence in using the computers and have been taught basic computer skills, program applications and using the Internet. After some issues with electricity and phone connections, the project was able to set up a computer in Othiyur village and began computer lessons for the girls in a manner similar to those in our Thiruvannamiyur center.

At the interim point in the project, it surveyed 98 out of 109 girls using the centre with interesting results. Of the respondents, 71% were introduced to computers in the centre and began using them there for the first time. 78% of the girls reported coming to the centre everyday or multiple times a week to use the computers (65% everyday). A very high rate, 98% reported feeling comfortable using the computer at the time of the survey, however, much less - about 31% of the girls - reported an interest in learning about personal health from the computer, with a greater number of girls wanting to learn vocation-related skills, such as typing. The project observed that the girls seemed to understand the importance and identify with learning more tangible skills that can be gained from computer use. Thus the project saw the need to focus on conveying the

potential to learn education materials in upcoming training sessions with girls that come to the centre.

The project is of the view that its main strength lies in its commitment to truly understand the communities it is working with and develop curricula and relationships that will have lasting, sustained effects in these communities. The project anticipates that the next six months would produce more quantifiable “outcomes.” However, they recognize the importance of building trust and confidence at the initiating stage in this type of community-based work.

**Duration**

Start Date: August 2004

End Date: July 2005

Total Duration 12 months

**Contact information**

Ms. K.R. Renuka

Centre for Women's Development and Research

5/359 Annai Indiar Nagar Okkiyampet, Thuraipakkam Chennai - 600096 India

Telephone: 91-44-24482821, 24963621

Email: [cwdrindia@yahoo.com](mailto:cwdrindia@yahoo.com)

**Website**

<http://www.cwdr.org.in>

<http://www.snehidhi.org>

## **18. MISSION: A Secure and Easy-to-Use MIS Framework for SHGs, SHG Federations and other Community-based Financial Institutions, India**

### **Keywords**

self help groups, micro enterprise, employment generation, economic productivity, information management, technology development and management, India

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to develop a management information system (MIS) for managing self-help group operations.

### **Description**

Self Help Groups (SHGs), SHG Federations and other community-based financial institutions have proven to be effective empowering agents for local communities to achieve sustainable livelihoods and rural development. However, the lack of management capacity is one of the main limitations for their continued growth and sustainability. The MISSION project is a secure, extensible and easy-to-use Management Information System (MIS) to help ensure the continued financial performance, sustainability and growth of these institutions. Recognizing that such institutions have infinitely varying requirements, this project develops a modular tool-based framework for MIS systems with components can be used together or separately, serving the needs of small local institutions, all the way to large multi-state networks.

### **Target beneficiaries**

This project benefits thousands of community-based financial institutions around India and the world that currently have difficulty collating, analysing and reporting data collected from the field, as well as the hundreds of thousands of poor clients that these organisations serve. The project aims to give all of these organisations a standard set of tools to carry out tasks and compete more effectively in the formal capital market.

### **Outputs**

The project output is a detailed and comprehensive project report, and topical publications in the research literature for the relevant fields including: a description of the software design so that it can be easily duplicated by other practitioners; detailed descriptions of the testing methodology

and implementation strategy; raw observations from training and testing phases; and detailed analysis and final conclusions about the project results. The project intends to freely distribute detailed hardware designs and software implementations on request.

**Duration**

Start Date: January 2005

End Date: March 2007

Total duration: 24 months

**Contact information**

Vijay Pratap Singh Aditya, CEO

Ekgaon technologies Pvt. Ltd., India

C 2/6, First Floor, Safdurjung Development Area, New Delhi - 110 016 India

Tel: +91 11 41657166, 26534990

Fax: +91 11 41657167

Email: [vijay@ekgaon.com](mailto:vijay@ekgaon.com)

**Website**

<http://ekgaon.com/?q=node/29>



## **19. Evaluating the Impact of Universal Access Models, Strategies and Policies in ICTs on Poor Communities in the Philippines**

### **Keywords**

Universal access, information, digital divide, public policy, private sector strategy, rural and urban development, Philippines.

### **Geographic coverage**

Philippines

### **Objectives**

The objectives of this project are to assess the relevance and the impact of public policy and private strategy on access to ICTs within poor communities.

### **Description**

Access to information through ICTs can make an important contribution to sustaining and developing the lives of the urban and rural poor. While many ICT programmes are shaped by government policies and by private sector strategies, empirical evidence on the nature and effects of such policies and strategies is lacking. This project addresses this problem by exploring the diffusion of ICTs to poor communities in the Philippines. The project assesses the relevance and impact of public policy and private strategy on access to ICTs within poor communities by focusing on the gaps between planned and implemented policies and strategy, and between policy and strategy and the livelihood needs of poor communities.

### **Target beneficiaries**

The beneficiaries of this project are poor communities who are in need of access to information communication technologies, government regulatory officials and policy-makers who are interested in improving universal access to ICTs, corporate strategic planners who are interested in tapping potential markets in marginalized communities, and local government units and community organizations who want to use ICTs in development projects.

### **Outputs**

The project output is a handbook for use by government policy-makers, advisers, and advocacy groups, and for strategic planners in the private sector. The handbook, *Bridging the information divide in the Philippines*, was disseminated to relevant community organisations, including those in the target communities, to assist them with advocacy work, project design and implementation.



## **Outcomes and impact**

This project was successfully completed. A handbook entitled *Bridging the information divide in the Philippines* was produced and disseminated to policy-makers, Non Government Organizations (NGOs) involved in bridging the digital divide, and students in public administration dealing with information and knowledge management.

The primary objective of the research was to understand the impact of universal access policies and strategies to access ICTs as seen from the ground. The research investigated the extent to which people have access to ICTs, the characteristics of people who make use of it, and how and for what ends they are utilized.

Based on household surveys conducted in urban and rural barangays in Puerto Princesa City, the research focused on key demographic traits in the communities and how these influenced their capabilities, functioning and freedom with respect to ICT use. While the areas of the survey were different in terms of modern infrastructure, size, topography, kind of economy, etc., some of the findings that pertain to demographic issues with respect to access, such as income, gender, educational attainment, urban-rural differences, and age were fairly consistent.

The most significant factor identified was educational attainment. People with higher education tend to use and value ICTs more. As far as gender is concerned, findings from the survey reveal that there are no significant differences between males and females in ICT use, with the exception that more women use ICTs such as cellular phones, and email. This was found to be consistent with other studies.

Results also revealed the importance of considering the role of alternative information systems in the communities. Examples of these alternative systems include the use of community radio, church bells, roving teams in emergencies, sending letters through friends, two-way radios, and AM radio (for announcements and messages). The impact of new ICTs, such as cellular phones, was also evident in the resulting glut of landline telephones.

Another revealing finding is the different levels of access (access ladder) and the increasing importance of ICTs for people to either to look for jobs or to study. There was also very low access and knowledge about computers, emailing, and the Internet. What was noteworthy was the significant relationship educational attainment had with the use and perceived need for these kinds of services, especially for work.

Ownership of an ICT tool such as personal computers (PC) does not guarantee that everyone in the household knows how to operate it. However, the ownership of a PC does make a person more likely to learn how to use a computer compared to those who do not have a PC in the house. But, most people surveyed who knew how to use a computer didn't possess a computer of their own. This suggests that a majority of users have access to computers through schools, offices, public Internet cafes or computer rental shops.

Awareness of computer programs and what they can do is crucial before people actually attempt to use them. However, only a slight majority of those who know of email and the Internet actually possess an email account or have tried using the Internet. As mentioned previously, one significant factor in moving from knowledge of an application, like email and the Internet, to actually trying them out is the level of education. Furthermore, of the respondents, who say they have email accounts, a majority (64%) say their account is provided by their office or school and the remainder say they have an Internet-based account (e.g. Yahoo, hotmail). This indicates the important role organizations (e.g. schools, workplaces, community organizations) can play in connecting the digitally excluded.

It is important, therefore, for policy-makers to look into the different ways by which people manage their limitations to access. At the same time, they must consider the implications of how people send and retrieve information on governance and development. In this case, the role of indigenous and alternative models of communication and its integration with more modern ICTs like the Internet and cellular technologies may yet prove useful in preventing information and knowledge-gaps from widening. Likewise, the role of social intermediaries be it through institutions like schools and NGOs, or informally through friends and family, for bridging the information divide also needs to be stressed.

### **Project Duration**

Start Date: March 2002

End Date: July 2003

Total Duration 15 months

### **Contact Information**

Erwin A. Alampay, PhD, Asst. Professor

The National College of Public Administration and Governance

University of the Philippines, Diliman, Quezon City Philippines 1101

Telephone: 63-2-9285411

Fax: 63-2-9283861

Email: [erwin\\_alampay@yahoo.com](mailto:erwin_alampay@yahoo.com)

**Website**

<http://www.upd.edu.ph/~ncpag/>

## **20. Diffusion of Information Communication Technologies in India: Labour Market Implications for Developing Countries**

### **Keywords**

Labour, public policy, productivity, employment, gender, economics, India.

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to examine how different modes of use of ICTs impact labour market outcomes in developing countries.

### **Description**

This project examines how different modes of use of ICTs impact labour markets in developing countries where policy makers have encouraged ICT-based industrialisation to simultaneously generate employment and improve economic productivity. While the emergence of a new ICT industry promises to generate employment, deploying ICTs to automate and rationalize existing industries also threatens to cause job loss and skill redundancies. The findings of this study provide policy makers in developing countries with insights into the trade-offs between improving productivity by deploying ICTs and generating employment.

### **Target beneficiaries**

The results of the study benefit various agents seeking to ensure work and employment standards in developing countries, such as policy makers and labour representatives, and especially those representing women workers. Further, the findings of this research have contributed to the general field of labour economy theory through advancing the understanding of the impacts of ICT diffusion in developing economies.

### **Outputs**

The primary output of the project is an analytical report on labour market impact of ICTs in India and their significance for other developing countries. The report is available on the website of IIIT-B (<http://www.iiitb.ac.in>) for anyone to download for free. A limited number of hard copies are also available for free distribution to those who request them. In addition to the analytical report, the project also generated at least 300 hours of interviews on the effects of ICT-based industrialization.

The interviews are archived and preserved by IIIT-B and made available freely to other researchers.

### **Outcomes and impact**

This project was completed one month over the originally scheduled period of twelve months. The project encountered several difficulties in conducting research work on labour markets in India. The first obstacle was the lack of an official database on labour conditions in the Indian IT and Information Technology Enabled Services ITES sectors. The second more substantial difficulty was that the project found employers were reluctant to allow them to conduct interviews with employees. The project recommends that the state should provide a mandate compelling firms to allow researchers to conduct fieldwork, at least from government-recognised research institutions.

Despite these setbacks the research followed its planned course of development with some minor modifications. The research study began with a detailed review of the literature to locate the issue to be explored in larger theoretical debates on the impact of information communication technologies on labour markets. Subsequent to this exercise, the automobile and ITES sectors in India were selected for the focus of the research study. Secondary data pertaining to these two sectors was collected and used to stress the relevance of the choice and to delineate their key characteristics. The project went on to develop questionnaires and conduct interviews in each industry, modifying its approach due to the access issues mentioned above. Based on the findings of the research, one paper has been published and at the time of this publication another one was in the process of production. In addition, papers based on this study have been presented in two Asia Media Information and Communication Centre AMIC conferences and at three conferences in India.

The study results offer a detailed analysis of how the new organisational shift towards a more global, flexible mode, relies heavily on deployment of advances made in the realm of information communication technologies to co-ordinate decentralised production and distribution. The study focuses particularly on the impact this trend has had on the generation of quality employment, especially for women, and it covers such areas as skill polarisation, de-skilling, disintermediation, gender neutrality, labour market flexibility, and autonomy at work.

The study shows that there is no clear correspondence between diffusion of information communication technologies, and employment generation and quality of work. While ICTs undermine the need for certain kinds of jobs, they also enable the creation of new kinds of jobs. The net effect strongly depends upon the nature of labour market institutions that facilitate labour to move from vanishing jobs to new ones, and also on the health of the overall economy. Importantly, it shows how public policy is critical to ensure positive outcomes.

The study does point to the employment opportunities that ICTs open up for women. But the ability of women to access such employment opportunities depend crucially upon first, access to skills and, second, a strong household-based care economy that allows them to move into high intensity paid employment. In addition, while ICTs may enable more employment opportunities for women, that does not imply improved gender equity, as many jobs remain highly gendered. Another important finding is the fluidity of the gendering process that allows re-gendering, which facilitates men to occupy jobs traditionally seen as 'feminine'.

**Project Duration**

Start Date: April 2002

End Date: May 2003

Total Duration 13 months

**Contact Information**

Dr. M. Vijayabaskar, Assistant Professor

Madras Institute of Development Studies

79, II Main, Gandhinagar, Chennai 600 020, India

Telephone: 0091-44-2441-2589, 1574, 2295, 9771

Fax: 0091-44-24910872

Email: [baskarv@mids.ac.in](mailto:baskarv@mids.ac.in)

**Website**

<http://www.mids.ac.in>

<http://www.iiitb.ac.in>

## 21. Policy for Integration of ICT Initiatives Across Rural Karnataka

### Keywords

eGovernance, information management, policy, rural development, India

### Geographic coverage

India

### Objectives

The objectives of this project are to develop strategies and policy recommendations for integration of ICT interventions in rural Karnataka.

### Description

The Karnataka Government has initiated various e-governance initiatives for enhancing rural development. However, the implementation of these initiatives have not had the expected impact for the rural population due to insufficient inter-departmental co-ordination and lack of integration with private sector organizations working on similar initiatives. This research project develops strategies and policy recommendations for integration of ICT interventions in rural Karnataka, encompassing available infrastructure, applications, information resources and manpower with the aim to accelerate rural development through leveraging ICT interventions.

### Target beneficiaries

Integration of ICTs brings multi-faceted benefits to the rural community of Karnataka, the local government, and corporations.

### Outputs

- An interim research report that analyses preliminary findings of the research; and
- A final report with research findings, policy recommendations and practical implementation methodology for effective integration of ICTs in rural Karnataka.

### Outcomes and impact

At the time of writing no final report has been submitted by this project. At the time the interim report was filed, much of the proposed research on the provider side had been completed and a number of conclusions had been reached. However, the final goals of proposing systems that could provide the rural population of Karnataka with ICT based multi-sector advantages and

initiating private entrepreneurship models that could make the ICT schemes sustainable, has not been reached.

To date the researchers have examined the existing infrastructure, applications, information and manpower resources provided by governmental authorities, non-profit organizations and corporate concerns. They held discussions with each of these stakeholders and others such as private franchisees of specific ICT initiatives. The researchers have yet to map the needs of the villagers and cross-reference these with the services that are being provided. The mapping was intended to draw on surveys conducted in two villages where some ICT initiatives are operational.

The project began by producing a compilation of the various ICT initiatives across the State using resources such as directories on ICT initiatives, newspaper articles, discussions with persons working on rural issues and on ICTs (both in-house and external) and the Internet. Apart from the application providers, the list also included organizations that worked in areas linked to ICT penetration in rural areas, such as providers of power and communication links, research laboratories, hardware manufacturers etc. This list was updated during the course of the project based on discussions with the various stakeholders.

About 36 organizations were short listed, including 14 government departments in such sectors as power distribution and financing, communication (radio, land-line, cellular and mobile technologies and satellite technology), agriculture and agri-produce marketing, public administration, information technology, education, commercial taxes, health and family welfare and silk trading. The short listed organizations also include six companies involved in the manufacture of ICT equipment especially for the rural market (including a research laboratory), four corporate organizations providing ICT services for the rural community, one nationalized bank providing micro-credit services in Karnataka, and eleven NGOs working on rural ICT initiatives.

Based on the survey conducted so far, the preliminary research findings cover a range of ICT initiatives in the sectors of health, education, public administration, produce pricing and marketing. The following conclusions were reached.

Most initiatives are planned with a pilot based approach and in most cases rely on funding and subsidies to make the model a success. Initiatives that have been implemented or expanded by the local government have seen a certain degree of replication but this has been limited and confined to pilot stage only. Individually, none of initiatives studied are economically sustainable through private enterprise on a large scale.



The researchers found no integration within a sector and across sectors. Although service providers indicated they understood the relevance of collaborating with others, concern over the dilution of their distinct mandate has resulted in a lack of action on this front. The potential for collaboration is perhaps also further hampered by the lack of an apex body that is analysing the needs of the community vis-à-vis what is being offered by the service providers, and thus the larger context in which they work has not been presented.

There were two key technical issues that came up in the review. First, nearly every service provider identified the power situation in the State as being a major bottleneck to ICT initiatives. Many of providers have addressed this issue in the pilot projects through power supply equipments such as UPSs (Uninterrupted Power Supply) and Diesel Generator sets, but these were not considered adequate in the long run. Renewable energy devices have also been considered, but the high capital investments made them prohibitive. The second main obstacle is connectivity, which was not very reliable across rural Karnataka. However the project found that efforts were being undertaken to address this problem using a variety of technologies.

Since to date, the project has not completed its assessment of community needs, it is difficult to assess the impact, usage and effectiveness of services being offered to the rural public using information communication technologies.

**Project Duration**

Start Date: December 2003

End Date: July 2004

Total Duration 8 months

**Contact Information**

Dr. Purandar Chakravarty

Centre for Environmental Studies (CES)

The Energy and Resources Institute (TERI)

4th Main, 2nd Cross, Domlur II Stage

Bangalore - 560 071 INDIA

Telephone/Fax: 91-80-5356590-95

Email: [purandar@teri.res.in](mailto:purandar@teri.res.in)

**Website**

<http://www.teriin.org>

## **22. Policy and Measures to Promote ICT Application and Deployment for Business Development in Rural Areas in Vietnam**

### **Keywords**

e-governance, ICT policy, rural economic development, Vietnam

### **Geographic coverage**

Vietnam

### **Objectives**

The objectives of this project are to prepare policy recommendations to increase the use of ICT in rural business.

### **Description**

In Vietnam, the rapid development of ICTs has created both opportunities and challenges for socio-economic development in rural areas, particularly efforts to narrow the gap between different regions, realize gender equality and promote sustainable growth and poverty reduction. This project aims to investigate the policy environment, as well as the problems and difficulties faced by grassroots organizations, businesses, small and medium enterprises (SMEs) and households in rural areas. It focuses on the shift to new modes of economic activity influenced by the application of ICTs. The project aims to produce conclusions and recommendations for policy-making processes, to be used by government authorities and business managers to increase ICT application and development in rural areas.

### **Target beneficiaries**

The project contributes to the formulation process of all strategy, policy and master plans to promote ICT application and development in rural areas of Vietnam. The immediate users of the study are governmental bodies. In turn, Vietnamese companies, local communities, grassroots groups and households in rural areas benefit from the study. In addition, foreign donors, researchers and the general public can use the study for purposes such as funding plans, input for further research, awareness raising campaign or education and training.

### **Outputs**

- Recommendations on policy measures;
- Report on policy environment and identification of situation on ICT application and deployment in rural areas in Vietnam;

- Report on assessment of ICT application and deployment in rural areas in Vietnam, especially for business development;
- Report on experiences from other countries in ICT application and deployment in rural areas; and
- A final project report.

### **Outcomes and impacts**

At the time of writing, this project had not submitted its final report. It has completed a number of its stated objectives and outputs as outlined below. Research activities and findings reported to date include:

The project held an inception workshop on ICTs Application and Development in Vietnam. Among the more than 70 participants in this workshop were the ICT experts, researchers, policy makers, officers from some ministries, government organisations, non-government organisations, ICT software, hardware and service providers, ICT training centres and universities, SMEs, and households from traditional trade villages in the Red River Delta and in Northern Vietnam.

The project has also completed an assessment of the current State Policies and Strategies on ICTs Application and Development in Vietnam. The assessment covered a review of legal documents and a series of interviews with government officials from provinces and ministries on the current situation and future vision for ICT application and development in rural areas.

To derive a series of references and lessons learned from other countries, the project compiled a collection of foreign experiences in ICTs application and development in rural areas that focuses on challenges in ICT development in rural areas, social and economic impacts, common policy frameworks, common strategies and successful initiatives.

Another ongoing activity is the projects' national survey of business enterprises in the rural areas, which is being conducted to assess the role and impact of ICT on their business development, their needs, e-readiness, difficulties, and impact of the policy environment for ICT application development in business.

The research results have contributed to the process of creating a more conducive environment for ICT application and development in Vietnam. Recommendations of the research group have contributed to the process of developing high level policy and strategies on ICT, which have been issued by the central and local governments. "ICT for rural areas and business development" have been highlighted in these documents. Among the most notable of these is the *National Strategy for ICT Development to 2010* and *ICT Orientation to 2020* issued on October 6, 2005, as well as the

*National Master Plan for Tele-communications and Internet Development to 2010* issued on February 7, 2006

Some research results have also been utilized in other research projects such as e-commerce Development in Vietnam, Development of Traditional Villages in Vietnam, Measures to provide Science and Technology Information to Rural and Remote Areas, and Open Source Software for ICT Development. While the final project report has yet to be received, all the reports of each completed work to-date and related documents and materials are available from the project office.

**Duration**

Start Date: August 2004

End Date: December 2005

Total Duration 20 months

**Contact Information**

Mr. Vu Thi Thanh Huong

Expert, Department for Planning and Finance

Ministry of Science and Technology

Address: 39 Tran Hung Dao Street, Hanoi, Vietnam

Tel: 84 4 9438 519

Email: [Vtthuong@most.gov.vn](mailto:Vtthuong@most.gov.vn)

**Website**

<http://www.most.gov.vn>

## **23. Roadmap for Process Re-Engineering for Reaching e-Governance to the Disadvantaged, India**

### **Keywords**

e-governance, information management, public policy, community development, India

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to explore ways of using ICTs for integrated delivery of services to Indian citizens, in particular the disadvantaged groups.

### **Description**

Many State and local level governments in India are in the process of using new ICT opportunities to provide integrated delivery of services to citizens. However, attempts have not delivered on services that require complex organizational processes, such as cross-referencing, discretion, evaluation and judgment. These types of processes are often essential to serve disadvantaged sections of society. This research project aims to study six initiatives in India, and combine its findings with the experience of Centrelink (<http://www.centrelink.gov.au>), a community service department of Government of Australia . The project goal is to develop a roadmap for process re-engineering for integrated service delivery. The outcomes of the research are policy briefs for governments and guidelines setting up front-end agencies for e-governance services.

### **Target beneficiaries**

The direct beneficiaries are the State governments involved in e-governance efforts and administrative reforms in India, while the ultimate beneficiaries are the citizens of India themselves, particularly the disadvantaged.

### **Outputs**

The outcome of the research study will be a document that will serve as a policy brief for the government, and as guidelines for implementing officials and departments, including: detailed documentation of issues and solutions in developing an e-governance front-end agency for Indian governments, and a road map from the present *ad hoc* arrangements to a full-fledged institutionalized agency/department with appropriate outreach components.

**Project Duration**

Start Date: April 2006

End Date: September 2006

Total Duration 6 Months

**Contact Information**

Parminder Jeet Singh

IT for Change

393, 17<sup>th</sup> Main, 4<sup>th</sup> T Block, Jayanagar, Bangalore, India 560011

Telephone: 00 91 80 41461055

Fax: 00 91 80 2665 4134

Email: [Parminder@ITforChange.net](mailto:Parminder@ITforChange.net)

**Website**

<http://www.ITforChange.net>

## **24. Effects of ICTs on media transformation, education and training in Vietnam, Laos and Cambodia**

### **Keywords**

media, journalism, ICTs, access to information, participatory politics, dissemination, Vietnam, Laos and Cambodia

### **Geographic coverage**

Vietnam, Laos and Cambodia

### **Objectives**

The objectives of this project are to survey the extent to which ICTs have been integrated into the media industry.

### **Description**

While the Internet is widely used in Indochina, the systematic integration of ICTs into the news industry is not evident. This limits the industry's accessibility to global information resources, connectivity among journalists, and its contribution to participatory politics through dissemination of public interest news. This project responds to the lack of research on ICTs in Vietnam, Laos and Cambodia media by surveying how ICTs are currently integrated into the industry. It aims to identify the strategic applications of ICTs in expanding reporting of public interest issues in a state-controlled media environment and based on its assessment, produce a range of reports and learning tools to increase integration of ICTs into the local media industry.

### **Target beneficiaries**

The immediate beneficiaries are journalists and media educators in Vietnam, Laos and Cambodia. At the regional level, aid agencies, government organs and "think tanks" focused on the development of ICTs in the region can benefit from the comprehensive analysis and reports, which will identify the problems and opportunities and present strategies for addressing problems and capitalizing on opportunities. At the global level, the academic community and media-research funding organisations can benefit from a better understanding of how ICTs are being applied to journalism in a region that is relatively undocumented.

### **Outputs**

The expected outputs are: an assessment of ICT application needs by journalists in Vietnam, Laos and Cambodia; a profile of the journalists' strengths, limitations and opportunities in ICT

application; an industry report on existing ICT support systems for journalists; a regional training and education model for ICT-assisted journalism; a learning resource manual; and a 30-minute digital video recording of interviews with journalists and government representatives.

**Project Duration**

Start Date: August 2005

End Date: December 2006

Total Duration 16 Months

**Contact Information**

Dr. Dinh Thi Thuy Hang

Institute of Journalism & Communication

Ho Chi Minh National Political Academy

Email: [hdinhi@hotmail](mailto:hdinhi@hotmail)



## **25. Policy, Praxis and the Public Interest: Engendering a Strategic InfoComms Policy Research Programme in the Philippines**

### **Keywords**

governance, ICT policy, participatory research, Philippines

### **Geographic coverage**

Philippines

### **Objectives**

The objectives of this project are to examine critical ICT policy at the local and national levels in the Philippines.

### **Description**

This project aims to support and strengthen the recently set-up Philippine Commission on ICT (CICT), by examining critical ICT policies at both the local and national level. The project aims production of seven research papers on strategic policy areas in the Philippines, and to implement a multi-stakeholder approach in its production and validation. Roundtable discussions and validation workshops will complement the research process and produce outputs that can benefit the national and regional community with sound info-communications policies.

### **Target beneficiaries:**

The direct beneficiaries are the project partner of the proponent, the Philippine Commission on Information & Communications Technology (CICT), to which the outputs of this project will be turned over. Indirect beneficiaries are other policy stakeholders in the Philippines, policy communities in other countries of the Asia Pacific region, and ultimately the people of the Philippines.

### **Outputs**

- The production of research papers in seven areas of information and communication policy that correspond to Philippine national priorities for policy development, including: Internet Governance in the area of the administration of country level Top-Level Domains (ccTLDs); Internet governance and policy implications for emerging technologies its implications for Universal Access programs; The Question of Agency in InfoComms Policy Development: An evaluative history of Philippine ICT governance from an institutional standpoint; Free/Open Source Software (FOSS): Evolving a Policy Framework and Action Plan for the Philippines;

WSIS@PH: An Assessment of Philippine Participation in International Spaces, National Processes; Locating the "Digital Divide" in the Philippines ; and Mainstreaming Gender Issues in ICT Policy Development;

- Conduct roundtable discussions and research validation workshops for each policy research area pinpointed, involving different strategic stakeholders in Philippine information and communications policy development (CICT and attached agencies, academe, key IT associations, NGOs, and other civil society organizations); and
- Print publication of the papers, including relevant outputs of the related roundtable discussions and validation workshops, in monograph form or as a single volume; online and offline (CD) publication of all project outputs.

**Duration**

Start Date: June 2005

End Date: December 2006

Total Duration 18 Months

**Contact information**

Alan G. Alegre, Executive Director

Foundation for Media Alternatives

Unit 1, #32 Esteban Abada St., Loyola Hts., Quezon City 1108, Philippines

Tel: +63 2 435-6684

Fax: +63 2 433-2192

Email: [Info@fma.ph](mailto:Info@fma.ph), [alalegre@fma.ph](mailto:alalegre@fma.ph)

**Website**

<http://www.fma.ph>



## **26. Nafees Nastalique: Character-Based Nastalique Font for Urdu**

### **Keywords**

Urdu, Open Type Fonts, language models, Pakistan.

### **Geographic location**

Pakistan; Global

### **Objectives**

The objectives of this project was to develop a Nastalique font for Urdu.

### **Description**

Urdu is written in Nastalique script, which is cursive and has a complex and context-sensitive structure. Its application for computers and the Internet have been limited by a lack of quantitative detail on its rules and the mathematical inability of traditional fonts such as True Type to model its complexity. Recent advances in font technology such as Open Type Font (OTF) now enable the modeling of complex scripts like Nastalique. This project performed a quantitative analysis of Nastalique rules, and modeled them using OTF. The project results provide the facility for users to disseminate information in Urdu language through electronic media. As OTF is a formal standard, no specialized software is required to read and render this font.

### **Target beneficiaries**

Definition and free disbursement of Nastalique font for Urdu accelerates Urdu publishing through electronic media and benefits the 60 million readers of Urdu across the world. In this group, those who do not understand a second language (e.g. English) are able to publish and access web pages, email, chat, and a variety of other computer applications.

### **Outputs**

The output of this project is a character-based Nastalique font for Urdu. The project also produced research papers quantifying Nastalique rules with significant detail and analyzed methods for modeling and rendering complex fonts.

### **Outcomes and impact**

In its quest to model Nastalique font the project sought to understand the fonts' underlying principles, including calligrapher's intuition. Through a series of lectures on Nastalique, in-depth discussions with calligraphers and analysis of handwritten books, the project matured its perception of Nastalique's inherent architecture and enhanced the knowledge base of this writing

style. At the end of this research, the project succeeded in consolidating Nastalique and producing its logical model as it came to be understood. Major research findings include: capturing context sensitive substitution grammar of Nastalique, formulating its cursive positioning rules, deriving optimized Nuqta (marks on alphabet) placement rules, and implementing kerning rules where necessary.

The above findings documented both the logical and physical model of Nafees Nastalique. Towards the end of its effort, the project faced unexpected limitations in OTF specifications. Within these limitations the project sought the optimal solutions. Finally, it tested existing technology for font development, identified its limitations (with reference to Nastalique font), and indicated areas where enhancements are needed. The project team indicates that the OTF font model is now being extended, allowing greater capacity to realize more complex fonts such as Nastalique. Regardless of this, the project met its objectives and target outputs and the Nafees Nastalique font was released. This font is freely downloadable at <http://www.crulp.org>.

The project team credits the hard work of students at the Center for Research in Urdu Language Processing (CRULP) and the calligraphers who worked with a great deal of understanding and patience with a team of computer scientists. Even though these groups had different backgrounds and professional disciplines, there did not seem to be any significant communication problems between them. This project has built capacity at CRULP to develop fonts and this capacity is now being shared with other organizations.

The results have enabled 60 million Urdu users to potentially develop web pages and publish, as well as easily access content using the Internet. However, the project team feels that the overall impact of the project has yet to be realized. The font has been made, but still many people do not know how to use it. Although not envisioned for this project, the team recognizes the need for a significant outreach program to train the end users across the country for the project to have its full impact.

An additional issue that came up was whether it is in the best interest of the font to be open source as required by the grant. The main issue is that the font can be freely manipulated and if this is done poorly, its aesthetic and functional properties could be degraded, resulting in confusion for the end user. Also, related to this matter are commercialization opportunities of such products. For example, the project was contacted by BBC UK who wanted to purchase rights for the font, so that they can modify it for the BBC Urdu website. The project team recommends that administering agencies should look into advising and guiding their partners in relevant Intellectual Property Rights (IPR) issues, and making the agreement much more detailed in this area.

**Duration**

Start Date: March 2002

End Date: August 2003

Total Duration 18 months

**Contact information**

Dr. Sarmad Hussain,

Senior Research Fellow

National University of Computer and Emerging Sciences

852B Block, Faisal Town, Lahore, Pakistan

Email: [sarmad.hussain@nu.edu.pk](mailto:sarmad.hussain@nu.edu.pk)

**Website**

<http://www.nu.edu.pk>

## 27. ICT-Assisted Learning Tool for the Deaf in Pakistan

### Keywords

Hearing impaired, e-learning, social services, special sector education, instructional design, Urdu, Pakistan

### Geographic coverage

Pakistan

### Objectives

The objective of this project was to research emerging communication technologies for developing Pakistani (Urdu) sign language.

### Description

Modern information communication technologies offer a new flexible medium for hearing impaired people to communicate. This research project focused on practical and replicable learning solutions for the deaf in Pakistan. The solution was modeled using online and compact disk (CD) technologies. The CD is comprised of easy-to-understand lesson plans and assessment tests, graphically illustrated through Pakistani (Urdu) sign language. Selected data sets from the exercises are also made available online through the Internet as a freeware for easy downloads by the hearing-impaired community. The product can be widely adapted across the country with the aim of greater development and integration of the deaf of Pakistan into the society.

### Target beneficiaries

The prime beneficiaries are Pakistani deaf and hearing impaired individuals. Secondary beneficiaries include the academic staff in deaf education institutions and the community-at-large.

### Outputs

The project website (<http://www.special.net.pk>) and CD include the following components:

- A Pakistani (Urdu) Sign Language Compendium/Dictionary of 500 words and signs;
- 50 new environmental terms in signs;
- Font conversion utility; and
- Sign Alphabets, basic Urdu PSL grammar and traffic signs.

### Outcomes and impacts

The visual Pakistan Sign Language (PSL) forms an integral part of communication of Pakistan's hearing-impaired people. PSL presently contains approximately 4000 different gestures with diverse dialects. The project started with the challenging multi-purpose aim of not only coming up with a selected set of usable Pakistani sign language gestures, but also introducing information technology-based education tools for the community. To facilitate uniformity in use and enhance access to PSL for improving literacy of the hearing impaired, ICTs as a communication medium and learning instrument were explored in a formal manner for the first time in Pakistan.

The project's first phase explored and developed the PSL symbol set. A unique aspect of the project was to infuse an awareness of environmental concerns into the hearing-impaired curriculum, through a pioneering effort involving the development and introduction of PSL environmental terms. The project completed a literature review of available PSL resources and documentation detailing the methodology for compiling a representative set of new and existing PSL. These results were the basis for evolving technological education variants under the second phase of work pertaining to modeling of PSL for CD packs and the Web. Urdu alphabets to PSL converter software and PSL font structure were also developed. The last two phases of the project focused on research to evaluate multiple teaching approaches using ICTs and exploring the various options of online and offline instruction techniques for the hearing impaired. Thus, the research resulted in the development of a quality CD-based learning tool for the hearing impaired, which is now being distributed through the Pakistan Association of the Deaf for the benefit of the community-at-large. The contents of the CD in downloadable form are also available on the website (<http://www.special.net.pk>).

The launching of the CD ROM received coverage in the most widely distributed English language publication of Pakistan (see: <http://www.dawn.com/2004/03/08/local10.htm>). However, the project proponents are of the view that it is ultimately the children, teachers and parents of hearing-impaired children who are the main advocates of this new resource.

The project noted several challenges it faced in carrying out its work. In particular, it noted difficulties working within the somewhat fragmented and complex political dynamics of the special education sector. It also noted that the perception of ICTs as a tool of the elite were a hindrance, although with continued integration of computers and ICTs into schools this was seen to be less of a problem in the future. In addition, the project approach, which was to promote the use of ICTs for sustainable development, was something new in Pakistan's special sector. It noted that in Pakistan, special sector work is typically undertaken within a charity framework and the institutions involved are used to this model and act accordingly.



The main challenge lies in the dissemination of the CD to relevant institutions and target beneficiaries. As the project has ended and the team members of the project are working in other organisations, the overall dissemination of the product has suffered after the project's completion. The project recommends that the Pan-Asia ICT R&D Grants Programme should further support dissemination and showcasing of the project work at fora inside and outside of Pakistan.

**Duration**

Start Date: December 2002

End Date: November 2003

Total Duration 12 months

**Contact information**

Sabahat Saeed Khan, Coordinator, Knowledge Management

IUCN Pakistan

1 Bath Island Road, Clifton, Karachi, Pakistan

Telephone: 92-21-5861540

Email: [cro@iucnp.org](mailto:cro@iucnp.org), [sabskhan@gmail.com](mailto:sabskhan@gmail.com)

**Website**

<http://www.iucnp.org>

## **28. Building a Philippine IPv6 Research Network**

### **Keywords**

IPv6, Internet Protocol, IPv6 infrastructure, IPv6 applications, IPv6 transition mechanisms, Philippines

### **Geographic coverage**

Philippines

### **Objectives**

The objectives of this project are to initiate Internet Protocol version 6 (IPv6) usage by the Philippine Research Education and Government Information Network (PREGINET) infrastructure.

### **Description**

While the Philippines has experienced a rapid rate of adoption of the Internet since 1993, it has been slow to adopt IPv6, the new Internet Protocol standard that increases the address size to 128 bits and solves address availability problems. Considering Internet reception in the Philippines, this project recognized the need to start building internal capability and a knowledge base. The Advanced Science and Technology Institute (ASTI) initiated IPv6 research in the Philippines through AI3. This project aimed to initiate IPv6 usage with Philippine Research Education and Government Information Network infrastructure. Using a test bed, the schools involved in the project explored transition mechanisms and pursued in-depth research on the protocol itself. Sustainability of the project is supported by PREGINET.

### **Target beneficiaries**

The intended beneficiaries in this project are the schools that participate in it. This includes the faculty that assists by helping build the test bed, which is an added research component in their laboratories, and the students who work in an actual “research playground” doing hands-on testing and research on IPv6. The project also benefited members the academe, government institutions, and the IT industry that participated in seminars, trainings, and workshops organized by the project to disseminate information and results. Most importantly the Philippine Internet in general benefits through the diffusion of IPv6.

### **Outputs:**

- Papers outlining research findings delivered to at least two conferences or meetings;
- Online documentation of technical details and creation of “How-Tos”; and

- A final research report on the experiences and recommendations on universal access strategies and policies.

### **Outcomes and impact**

The Philippine IPv6 Research Network project was completed successfully in one month over the time originally estimated. The project began with a call for participation and selected three partners based on established criteria, including their technical capability and geographic representation for the three major island clusters in the Philippines. The partners selected were: the Electrical and Electronics Engineering Department of the University of the Philippines (UP-EEE) in Diliman, Quezon City; the Mindanao State University – Iligan Institute of Technology (MSU-IIT) in Iligan City; and Central Visayas Information Sharing Network (CVISNET) in Cebu City.

The IPv6 network developed through this project is now being used as a testbed for the design, development, and testing of IPv6 applications by the participating institutions of the project. It continues to be used by faculty, researchers and students. Some applications developed through this project are now being used, such as the "Dynamic DNS Solution for a Campus Network" project of the students from MSU-IIT, which was among the top 20 Grand Prize Winners of the 2004 Linux Scholars Challenge.

The project team experienced some difficulties during the initial implementation due to a lack of experience with the intricacies of IPv6 among some of the institutions involved. In addition, there were challenges relating to the fact that CVISNET and MSUIIT are remote sites. However, in the end, the project demonstrated that distance is not a hindrance in achieving collaborative research , as demonstrated by the successful partnership with CVISNET and MSU-IIT.

The project has had a wide range of outputs beyond those outlined in the original proposal. It conducted a number of workshops on IPv6 routing, DNS servers, web servers, web proxies, email and IPv6-enabled applications for faculty, students, government staff, and the identified project managers. It also organized an IPv6 Forum on applications, operations, and possible business models that companies can use in adopting IPv6. The project deployed hardware to three project sites, including computers, routers and application servers. This included connecting several non-partner institutions to the test bed. CVISNET, UP, and MSU-IIT, were able to establish IPv6 connectivity to ASTI, and to other international IPv6 networks through ASTI and AI3.

The project created a number of presentations and other materials, including a paper for the IPv6 Promotion Council Retreat entitled "Hurdles and issues in advancing IPv6 deployment in the Philippines" presented in the IPv6 Summer Retreat in Seoul, Korea on Aug. 23, 2003. The project supported two Asia-Pacific College (APC) undergraduate students who developed Macromedia

tutorials. It also presented a technical talk on IPv6 for the partner institutions of PREGINET and gave a presentation on IPv6 to the Philippine Internet Services Organization (PISO). The project leader was able to attend the APAN Conference held in Fukuoka, Japan, 22-24 January 2003 and one project staff of the PREGINET project attended the APRICOT 2003 Conference in Taipei, Taiwan, where the first Asia-Pacific Global IPv6 Summit was conducted.

Finally the project provided research assistance to an undergraduate thesis entitled *Internet Protocol Version 6 (IPv6) Implementation for the AMD Net 186 Demonstration Boar*. It also provided technical support to the first Philippines IPv6 Mailing list for Filipinos. The list is intended to be a venue for exchanging theoretical and practical know-how in the next-generation Internet Protocol in the hope of expanding research and deployment of IP version 6 in the Philippines.

ASTI has become the point of contact for IPv6 in the Philippines. ASTI's collaboration with institutions, particularly with schools and universities, Internet Service Providers (ISPs), telecommunications companies, and other IPv6 stakeholders, has contributed to its aim of deploying IPv6 in the Philippines. The range of seminars, workshops, and reports developed by the project was seen to increase awareness and appreciation of IPv6 within the government and the network engineering community of the Philippines while also contributing to the global IPv6 R&D community and related advocacy efforts. The Advanced Science and Technology Institute continues to conduct research and development in IPv6.

### **Duration**

Start Date: November 2002

End Date: September 2003

Total Duration 10 Months

### **Contact information**

Denis F. Villorente, Director

Advanced Science and Technology Institute (ASTI)

ASTI Building, UP Technology Park, CP. Garcia Ave. UP Diliman

1101 Quezon City, Philippines

Telephone: 63 2 426-9755, 925-8598

Fax: 63 2 426-9756

Email: [denis@asti.dost.gov.ph](mailto:denis@asti.dost.gov.ph)

### **Website**

<http://www.pregi.net/content/section/10/64/>

## **29. Nepal Internet Exchange**

### **Keywords**

ISP, Internet exchange, routing, technology development and management, Nepal.

### **Geographic coverage**

Nepal

### **Objectives**

The objectives of this project are to address the problems associated with local traffic routing within Nepal.

### **Description**

The project addressed problems associated with local traffic routing within Nepal. Many Internet Service Providers (ISPs) in Nepal have their own international gateway. However, because there is no way to separate local from international traffic in most cases local traffic must traverse the global Internet backbone before reaching the ISP in the next block. The formation of a local Internet Exchange is seen to facilitate the exchange of local traffic while reducing the load on global gateways. The research importance of the Nepal Internet Exchange (NpIX) continues to increase as the size of the Internet in Nepal continues to grow. A joint NpIX working group, with participation from all stakeholders did much of the preliminary work and a sustainable operational modality for the NpIX was worked out. An NpIX board was established with representation from all relevant bodies and it oversaw the entire project, including development of appropriate procedures and processes for the establishment and operation of the Internet Exchange (IX).

### **Target beneficiaries**

The project beneficiaries are ISPs and users who benefit through preservation of bandwidth and Internet access. The exchange also provides a "looking glass" facility for researchers to ascertain the size of Internet infrastructure in Nepal.

### **Outputs**

The project documented the procedures and processes required for the establishment and operation of an Internet Exchange, which can be studied by other countries and situations as they consider establishing their respective IXs.

### **Outcomes and impacts**

NpIX has been a successful project and has provided instant benefit for ISPs, Internet users, and Government. This project can be used as a model in other countries and lessons learnt during the project shared with others in establishing their respective Internet Exchange's.

At the time this project was implemented, there were about 15 companies providing commercial Internet services in Kathmandu, some of which also had a presence outside the Kathmandu Valley. Of these, more than half have their own international gateways. In addition, a number of providers had their own international connections through satellite links. As there was no way to separate international traffic and local traffic, all traffic would have to pass through the international gateways before reaching the ISP next door, resulting in extra expenditure, slower Internet access and hindering broadband deployment. Additionally, almost all ISPs in Nepal were using static routing in their respective Internet Protocol (IP) networks. This created constraints in network management and did not provide automatic switchover if the network link went down.

To enable the exchange of local traffic locally between the ISPs, content providers and network operators in Nepal, the Nepal Internet Exchange was established following the London Internet Exchange standards.

Using questionnaires, statistical analysis and interviews, the project team collected data from the ISPs and peering partners and evaluated the significance of the Internet Exchange . The project team also researched Internet usage patterns and data flow directions through data collected at the IX and in co-operation with the ISPs. Research using this data was documented enabling a data exchange facility and growth in data traffic. The aggregated data on the total traffic flowing through the Internet Exchange Points (IXP) was always made available online. At the same time, a detailed analysis based on information provided by the ISPs was published on the Internet every three months.

The project team held training workshops once every three months and provided ISPs with the necessary skills to use the IX. Training was focused on Border Gateway Protocol (BGP) peering technology. All the ISPs were successfully upgraded to dynamic routing with Open Shortest Path First (OSPF) and BGP. The IP networks are now in an ideal condition. The Internet Exchange is stable, and if one of the peers or the IX fails, all the peer traffic is now automatically routed via the Internet gateway of the respective ISPs.

With the introduction of the NpIX, ISPs are now able to separate international traffic and local traffic, and the local Internet Exchange facilitates the exchange of local traffic. This has benefited the ISPs directly through preservation of bandwidth and a ten per cent increase in cost effectiveness. The NpIX project also provides a “looking glass” facility for researchers to ascertain

the size of Internet infrastructure in Nepal. Users also get to enjoy faster and free downloads for local content.

The project has benefited: the local Internet Industry by fostering a close knit technology group who exchange information and know-how on a regular basis; users, because now connections are faster and much more reliable; and the government, because the IX is the platform that hosts the government portal, including the content generated under its e-government programme. The results from NpIX provide a convincing set of economic reasons for policy makers in developing countries for the formation of an Internet Exchange.

The project team achieved their objectives and is actively working for more improvements and expansion of this exchange facility by enrolling more ISPs, Universities, educational institutes and corporate networks. NpIX is conducting continuous research, for as the Internet infrastructure grows such research will continue to help solve IP issues, routing and other problems.

The establishment of an Internet Exchange in any country or region helps foster the growth of the local IT and Internet Industry. However, the project team notes that any Internet Exchange can only be successful with the full cooperation of the ISPs. Educating the ISPs about how to setup the networks is more important than having experts do it for them. In addition, the core team must consist of people who both possess a good understanding of the Internet Routing system and the trust of all the local participants. Based on the findings of the project, the team recommends giving the participants in the Internet Exchange full control over their network routing infrastructure.

### **Duration**

Start Date: January 2003

End Date: October 2003

Total Duration 9 months

### **Contact information**

Rupesh Shrestha

Computer Association of Nepal

235/39 Dhobidhara Marg, Kumari Galli, Kathmandu, Nepal

Tel: (9771) 432700 / 434836

Fax: (9771) 424043

Email: [shrestha@info.com.np](mailto:shrestha@info.com.np)

## 30. Open Source Software Localization Toolkit

### Keywords

open source, localization, language, poverty reduction, Cambodia, Asia-Pacific

### Objectives

The objectives of this project are to reduce the necessary research, work and expertise that a country or group needs to undertake a localization project.

### Geographic coverage

Cambodia, Asia Pacific Region

### Description

This project addresses the problem of localization of software for countries throughout the Asia Pacific region. Several countries in the Asia Pacific region are at this time considering starting localization projects, but lack the human resources required to start these projects without outside expert advice. This project is developing a Toolkit in layman's language to allow Asia Pacific countries to develop localization projects without the need of specialized help. The Toolkit is being developed over a two-year period, with preliminary releases made public during that time.

### Target beneficiaries

The project benefits all countries in the Asia-Pacific region, particularly small countries and national minorities that use their own script but do not have the necessary expertise and knowledge to undertake a localization project.

### Outputs

The development of an Open Source Localization Toolkit, comprised of a Manual and a CD. The Manual consists of a series of "How to" sub-manuals that include everything that a prospective localizer needs to learn: from management issues such as "How to decide what you need and how to write-up a Localization project" to the more technical issues, including installation of translation tools, finding and processing the files that need to be translated and building (physically creating) applications in local language.

### Outcomes and impact

All Open Source Software can be translated and localized (adjusted for local standards and tastes), so that it is possible to create a complete set of free programs in a local language that



meets the needs of end-users. For those countries or regions that do not have any programs in their own language, experience shows that this translation produces an important push in the use of computers, as it greatly reduces the training needs (training can be done in the local language), allows teaching from an earlier age, and permits computerization of Government services in local language(s).

The problem is that the Open Source community is sometimes highly technical and the procedures to be followed to localize text are not well documented. Gathering the necessary information to start a complete localization project, understanding the procedures, evaluating the necessary resources and preparing a plan can sometimes take up to six months of a trained computer scientist. To address this, the project was first conceived as an umbrella project, gathering information about different open source projects, and documenting their localization methods and their integration.

Once the project was started however, initial findings made a change in methodology necessary. These include the following. Either no or little localization information was available for key programs, or they were highly technical, which did not fit well with the spirit of the toolkit. In many cases the tools for easy technology-independent translation of open source software did not exist, or were not defined. Finally, the researches found there was little written on how to develop a localization program. In response to these findings, the project considered that it could best contribute towards its goals by defining the ideal translation system for Free and Open Source Software, and how it would interact with the technological world of Open Source and with the translators, simplifying the process and helping small economies reach their localization goals much faster.

It became clear that coordinated localization projects can be improved if they are done using the same programs and the same format. The South Africa based Translate Toolkit project does this by converting the files that need to be translated into a standard format and convert them back to the application's format once the translation is done. The main problem with the Translate Toolkit was that the documentation was deficient. Thus developing reference documentation of the Translate Toolkit software became the first technical task completed by the project.

As a follow up to this, it was now necessary to link (through documentation) the Translate Toolkit to other major open source projects. The OpenOffice project, which had no translation facility decided to link itself to the Translate Toolkit. The localization documentation developed by the Open Source Localization Toolkit has become the official localization documentation for OpenOffice 2.0, simplifying the localization procedure for this product and linking it to a global localization procedure.

While the Open Source Localization Toolkit is not yet a single unit, dissemination of the different parts that have already been developed is assured by the fact that they have been integrated into the applications and tools that they apply to, and can therefore be used not only as part of the Open Source Localization Toolkit, but also as independent pieces of information. This documentation is already being used by localization projects in Asia (Nepal, Lao).

The two efforts coming up for completion include a detailed manual on how to plan and write a localization project for a given country and language. It covers all aspects of the project, from defining its social goals to understanding the work-load and preparing a plan and a budget. The second effort is a study on the role of localization in the acceptance of open source software by final users. The goal of this study is to determine the best possible strategies for the planning and distribution of localized software, and integrating this in the above document.

**Duration**

Start Date: August 2004

End Date: July 2006

Total Duration 24 months

**Contact information**

Mr. Javier Solá, Coordinator, Khmer Software Initiative (Khmeros)

Open Forum for Cambodia

P.O.Box 177 Phnom Penh Cambodia

Telephone: 855 23 360 345

Email: [coordinator@khmeros.info](mailto:coordinator@khmeros.info)

**Website**

<http://www.forum.org.kh>

## **31. Scientific Journal Publishing in India: Indexing and Online Management**

### **Keywords**

Open access, research capacity, publishing, knowledge management, indexing, India

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to improve the accessibility of scientific literature published in Indian journals by introducing an indexing system.

### **Description**

Access to research and scholarship is one of the critical development issues in overcoming the often-noted "knowledge gap." This project aims to improve the accessibility of scientific literature published in Indian journals by introducing an indexing system with the ability to generate metadata for each article. This collaboration builds on the development of the Public Knowledge Project's (PKP) Open Journals Systems (OJS), which manages and publishes peer-reviewed journals. The proposed system is self-sustaining under the existing infrastructure support for Indian scientific journals and academic publishing. Thus, the project contributes to the research capacities of India as well as other nations in the process of utilizing new technologies to improve their knowledge infrastructure.

### **Target beneficiaries**

This project benefits Indian researchers and journal publishers through improved visibility and impact of their work locally and globally, new opportunities for expanding research contacts, collaborative research, and launching of online journals in topical research areas.

### **Outputs**

- Web accessible indexing and search system for Indian Academy of Sciences IAS journals;
- Web accessible Indexing portal for Open Archives Initiative (OAI) compliant Indian journals;
- Online journal publishing system for Journals of the Indian Institute of Science (JIISC);
- Enhancements to PKP OJS and Harvester systems (software); and
- A national level workshop on open access journal publishing and indexing.

### **Duration**

Start Date: August 2004

End Date: September 2006

Total Duration 24 months

### **Contact Information**

Prof. N.V. Joshi, Chairman,

National Centre for Science Information, Indian Institute of Science,

Bangalore – 560012 India

Tel: (+91-80) 23600271/22932511/22932654/22932655

Fax: (+91-80) 23601426/23600683

Email: [sjpi@ncsi.iisc.ernet.in](mailto:sjpi@ncsi.iisc.ernet.in), [chairman@ncsi.iisc.ernet.in](mailto:chairman@ncsi.iisc.ernet.in)

### **Website**

<http://sjpi.ncsi.iisc.ernet.in>

## **32. Dobhase: English-Nepali Translator**

### **Keywords**

English-Nepali dictionary, web based language translation, digital divide, Nepal

### **Geographic coverage**

Nepal

### **Objectives**

The objectives of this project are to develop a web based engine that can translate general English texts to Nepali.

### **Description**

The number of Internet users in Nepal is growing rapidly but only a small portion of the population can read and understand English, thus limiting access to global Internet content. The project addresses this problem through the development of an English to Nepali Machine Translation (MT) system. The MT project aims to create a web-based engine that can translate general English texts to Nepali on demand. A transfer-based approach is used to develop the main translation engine, with server side scripting and Hyper Text Markup Language HTML used to integrate the engine with a web server.

### **Target beneficiaries**

The project benefits urban and rural Nepali speaking users of the Internet. It also benefits administrative, educational, tourism, and development organizations, and others who require translation of web content, manuals and documents from English to Nepali. Students and faculty benefit from experience in Machine Translation and local language computing. The project also offers references for further research activities in connection with language computing. Finally, the community at large benefits from free online distribution of the software package.

### **Outputs**

- Bilingual English-Nepali Dictionary;
- English morphological analyzer;
- English parser;
- Nepali morphological analyzer;
- Nepali generator;
- Transfer rules;
- Web interface; and

- An integrated machine translation engine.

### **Outcomes and impacts**

While not complete at the time of writing, this project has made important steps towards achieving its final goals. In broad terms the project can be viewed as a two fold process. The first step consists of the analysis, design and implementation of the proposed machine translation system, including development of the system architecture. It also includes an extensive and comparative review of literature on a variety of approaches considered feasible for this particular machine translation system. The study also included detailed linguistic studies relevant to the machine translation problem being addressed. The second step consists of activities geared towards making the complete machine translation system available over the Internet. It requires the design and implementation of presentable user interfaces, choice of appropriate web locations for the system and popularization of the system in the community that can benefit from its use.

The project followed an evolutionary approach to system development. Prototypes and working version(s) were placed online to allow end-users from wide backgrounds to contribute by means of feedback and suggestions on the quality of translation. In addition to this, the project goals, design and implementation issues have been presented to the public frequently through publications and presentations in conferences, seminars and workshops. On the basis of the feedback received from both of these sources, the system has been continually refined and upgraded.

DoBhase as a Machine Translation System uses a transfer based approach, in which it first analyzes the source language and then generates a representation called a parse tree. Transfer rules are then applied to this representation, which helps to generate the syntax of the target language. Finally, morphology generation rules are applied to each terminal (lexical items) of the parse tree. The system has pipeline architecture. Each module has an input, which is the output of another module. Output from the system is guaranteed even if the input English sentence is grammatically incorrect. In the worst cases, the system is able to produce word to word translation.

The *rule based* approach was used because of unavailability of a sufficiently large text corpus in Nepali, which could have made it possible to adopt a more sophisticated method. The system being developed is enough to provide a *gist* translation, however it may require post editing for the quality of translation to be acceptable for publications and formal writings. Looking at other initiatives in Nepal, it is likely that in a couple of year's time there may be a sufficiently large Nepali text corpus, which could be integrated with the current system, thus improving the quality of translated text.

As the system is being hosted online, the system is available to everyone who has access to the Internet. However, the project team notes that the full realization of the project may require advertising the product and training of users, which is beyond the scope of the present initiative. Nevertheless, the Dobhase machine translation project has designed and implemented a "rule based" machine translation system for the first time. The technology developed can be used for future development and enhancements. The project has produced a number of by-products, which enhance the linguistic resources of Nepali language in general, such as the Bilingual dictionary, grammar, rules and so forth.

The project results and outputs have been widely disseminated through referred conferences, journal publications and presentations.

**Duration**

Start Date: January 2005

End Date: June 2006

Total Duration 18 months

**Contact information**

Sanat Kumar Bista, Assistant Professor

Information and Language Processing Research Lab (ILPRL)

Kathmandu University, Dhulikhel, Kavre, NEPAL

P.O Box: 6250, Kathmandu, Nepal

Telephone: ++977-11-661399

Fax: ++977-11-661443

Email: sanat@ku.edu.np

**Website**

<http://nlp.ku.edu.np>

<http://www.ku.edu.np/~dobhase>

### **33. Developing a New Resource Sharing System and a New Tool to Use Electronic Materials in Multi-Media Format Based on Grid Technology, China**

#### **Keywords**

digital libraries, grid technology, multimedia, e-learning, China

#### **Geographic coverage**

China

#### **Objectives**

The objectives of this project are to build multi-media knowledge repositories, using grid technology for universities in China.

#### **Description**

Many universities and schools in China have their own computer servers to store multi-media content to serve as an educational resource. However, the efficiency of the systems has been limited by a lack of integration and inability for users to revise and store materials. This project aims to develop a new system based on grid technology to help institutions build integrated multi-media knowledge repositories that allow teachers and students to publish their works for sharing and modification, and for use in lectures and classes. The outcome of this project can be easily applied to fit a variety of institutional circumstances so that a universal application of the system and tools is possible.

#### **Target beneficiaries**

The project benefits teachers and students at universities and schools that use a computer server with information in various formats. The project also benefits designers of these knowledge repositories. Although at present the network infrastructure in China cannot provide high bandwidth services, the project's scalability ensures that the end users can use the basic services such as searching and browsing the flyweight resources.

#### **Outputs**

- Displaying modules of multi-type media (text, image, audio, video), embedded in a Grid Service Markup Language (GSML) browser;
- Authoring tool for composing multi-type media;



- Standard searching service with functions to provide end users with a unified interface resource information exchange between knowledge repositories;
- Standard indexing service, to distil metadata from resources and then put them into the repositories automatically;
- Standard publishing service for users to publish their work into the repositories; and
- A running sample system based on the resources of Earthview Environmental Education Digital Library.

### **Outcomes and impacts**

At the time of writing, this project is progressing according to schedule. The project team has finished the requirements analysis, system design, and is undergoing system development. The most technically challenging aspects of the project have been the analysis, abstraction and encapsulation for the common requirements of the resource sharing system, and forming the infrastructural framework using grid technology. The project finished the development and testing of several display modules, which can handle popular media formats. Future work remains for system development, sample system deployment, field test, tuning, and assessment. It is anticipated that the project will be successfully completed by the proposed deadline.

The results reported on to-date can be summarized in three parts. First, the project used Grid technology to design and develop the resource sharing system. The Grid technology uses Service Oriented Architecture (SOA) to integrate distributed heterogeneous environments with non-trivial qualities of services, exports interfaces based on open standards, and provides a uniform access-point for end users. The system uses three layers: a lower model layer for dealing with heterogeneous databases, and abstracting the raw relational tables to uniform programmable objects; a control layer that provides basic functionality to the upper layer by handling the lower objects, and a view layer, which is a user interface combining the basic functionality to integrate application logic. The architecture provides both traditional web-style portal and a new powerful, operable user-side client.

Second, in order to describe the basic information of the resources, the author must supply some kinds of metadata information. The most common metadata standards include: Dublin Core Metadata Initiative, Machine-Readable Cataloging Standard, and the Format for Bibliographic Records etc. This system uses Resource Description Framework (RDF) to achieve the interoperability between different standards. The RDF is just like a market where resource providers using different standards can publish and exchange their own metadata.

Third, in the resource sharing system, a resource is a mixture of several formats of media (e.g. text, image, audio, and video). To access these, the project developed a corresponding display

plug-in for the user-side GSML browser. The system supports most popular media formats. There is also an authoring tool in the resource sharing system. Using a visual editor, the GSML composer, authors can drag and drop plug-ins at any place they want, and then modify the event route to obtain synchronization.

Looking ahead, work remains on system development, deployment, site test, tuning, and assessment. The project foresees that once the most challenging aspects of the project development process is completed, the infrastructure framework can then be used to build many kinds of resource sharing systems. Though the project is still underway, many of current Earthview Environment Education Digital Library users, have shown strong interest in the project. In addition, aspects of the project work have been shared with other development teams in the laboratory, who have cited its strengths in organization, interactive facilities, and interface presentation.

### **Project Duration**

Start Date: December 2004

End Date: December 2006

Total Duration 24 months

### **Contact Information**

Dr. Li Hao, Director

Beijing Earthview Environment Education and Research Centre

Heng Xing Da Sha 20 C

Zhong Guan Cun East Road No.89,

Beijing 100080, China

Telephone / Fax: (86-10) 6263 2675

Email: [earthview@263.net.cn](mailto:earthview@263.net.cn)

### **Website**

<http://www.earthview.org>

## 34. Mongolian Text to Speech Conversion Tool

### Keywords

text to speech, visually impaired, Mongolian, Mongolia

### Geographic coverage

Mongolia

### Objectives:

The objectives of this project are to survey the extent to develop Mongolian TTS converter and a simple human computer interface that is suitable for visually impaired people.

### Description

Text To Speech (TTS) conversion tools offer visually impaired people the ability to access and use personal computers and software. Currently there is no TTS software for visually impaired people in Mongolia. Thus, there is a great need to develop a text to speech converter tool with simple human computer interface in local language that meets the needs of visually impaired people and provides a foundation for further development of TTS applications. The project aims to develop Mongolian TTS converter and a simple human computer interface that is suitable for visually impaired people.

### Target beneficiaries

This project benefits visually impaired people, general users of computer systems, students and researchers, Mongolian IT companies, and the general public. The Mongolian text to speech synthesizer will be available online and released under a General Public License (GNU/GPL).

### Outputs

- Mongolian text to speech converter;
- Mongolian character recognition tool;
- Text to speech converter software package for visually impaired people; and
- A user manual in Mongolian.

### Outcomes and impact

The rationale of this project is to assist for the participation of Mongolian visually impaired people by helping them with Mongolian text to speech converter tool. Another benefit is the prevention of eye-sight related problems resulting from eye concentration on computer displays when reading electronic books, publications and other electronic contents. The main objective of this project is to

develop Mongolian TTS converter and a simple human computer interface that is suitable for visually impaired people. The interface for visually impaired people is a sound and mouse click driven and the system reads a loud the file name being inputted to the system for confirmation.

This project initiated research and activities. It was project team's aim to not replicate previous work, but instead to learn from their outputs and proceed. The project team has identified efforts made in research and development of TTS by the MBROLA project (<http://tcts.fpms.ac.be/synthesis/mbrola.html>) and Festvox project (<http://www.festvox.org>). The MBROLA project concentrates on academic research for speech synthesis, particularly on prosody generation, known as one of the biggest challenges taken up by Text-To-Speech synthesizers. Tools available from the Festvox project proved to be difficult to import to Windows OS, although the project was able make use of its findings and documentation.

Developing the text to speech system requires expertise in ICT and research into Mongolian language and related theories. The researchers and project team organized informal and formal meetings with leading linguistic theorists in Mongolia to identify conflicts discuss possible solutions of existing language theories and their practical use in TTS. Mongolian language is a branch of Altaic, which has different phonetics, structure and grammar than western languages. Relative studies were made on existing Mongolian language theories. The grammar theory of Ts. Damdinsuren and others were found to be most suitable for the TTS project. In this theory, words are split into syllables. To process syllables into TTS, research was performed on how to form words and to program correct pronunciation. This involved defining rules for tones, unpronounced syllables and characters, and over 700 frequently used abbreviations. In addition 400 foreign words were identified, and are being recorded for integration into the system.

At the time of writing, most of the necessary linguistic research activities related to the development of Mongolian text to speech converter were completed successfully. The sound and mouse click driven interface part of the Mongolian text to speech converter tool was designed successfully but not tested onsite with visually impaired people as the recordings of the diphones (syllables) was not yet completed. The text to speech converter tool at present can pronounce words with syllables that are recorded and saved in the database. The database is currently being populated.

The following activities have been conducted to promote the activities and results of the project. Consultation meetings were held with linguistic experts from department of Stage speech art of the Mongolian University of Arts and Culture. The research paper was approved for publication in the April, 2006 edition of the bimonthly IT magazine "MyComputer" (<http://www.mycomputer.mn>) and is being considered for publication in the ComputerTimes monthly magazine. The project's website

(<http://www.infocon.mn/tts>) has been developed and is being regularly updated with the results from the Mongolian text to speech converter tool project, its source code and other relevant outputs and information. Plans are also underway to cooperate with OpenMN (<http://www.openmn.org>) and the Mongolian Unix User Group (MUUG) (<http://www.mnbsd.org>) for wider dissemination of project outputs after completion. The project will distribute the text to speech converter package on Compact Disks and through free download from the project website.

**Duration**

Start Date: September 2005

End Date: September 2006

Total Duration 13 Months

**Contact information**

Batpurev Batchuluun

Executive Director

InfoCon Co., Ltd

P.O.Box 24, Ulaanbaatar 210646, Mongolia

Telephone: 976-99091465

Fax: 976-11328469

Email: [batpurev@infocon.mn](mailto:batpurev@infocon.mn), [info@infocon.mn](mailto:info@infocon.mn)

**Website**

<http://www.infocon.mn>

## **35. Open Source GIS/Mapping Solution for the Indian Tsunami Information Resource Center**

### **Keywords**

Tsunami, open source, GIS, mapping, training, India

### **Geographic coverage**

India, Asia Pacific region

### **Objectives**

The objectives of this project are to provide an open source Geographic Information System (GIS) Mapping Solution for the Indian Tsunami Information Resource Centre.

### **Description**

In the aftermath of Southeast Asia tsunami a large and diverse array of organizations worked collectively on relief efforts over a large geographical area. This created a huge demand to coordinate complex activities and locational data. This project aims at adding an Open Source GIS/Mapping solution into the existing Indian Tsunami Information Resource Centre. It will also train organizations on how to collect GIS data, how to enter data into the system, and how to use the system to visualize the data. The Open Source GIS/Mapping solution can be used by any organization to GIS-enable their data.

### **Target beneficiaries**

Non Government Organizations (NGO's) and NPO's who are contributing to the tsunami relief and rehabilitation work in South India, as well as other Southeast Asia tsunami-affected areas. Volunteers, who want to get involved in the tsunami relief and rehabilitation, work in the South and Southeast Asia. Donors and other grant making bodies, who want to financially support the tsunami relief and rehabilitation work that is being undertaken by various parties. The overall beneficiaries of this project are anyone who wants to know which NGOs are working on which projects and in which areas.

### **Outputs**

- An Open Source GIS/Mapping solution integrated into the existing Tsunami Rehabilitation Knowledge Center;
- Interface with the agencies collecting tsunami data, training them how to collect GIS data required by the system, how to enter their data into the system, and how to use the system to visualize the data that has been collected; and

- Release Open Source GIS/Mapping solution as independent software that can be used by any organization to GIS-enable their data, and develop training for software developers to GIS-enable their tools using the system.

**Duration**

Start Date: May 2005

End Date: February 2006

Total Duration 10 Months

**Contact information**

Jason E. Steward

Janastu

Email: [jason@openinformatics.com](mailto:jason@openinformatics.com)

**Website**

<http://www.ground1.org>

## **36. Automatic Synchronization and Distribution of Biological Databases over Low-Bandwidth Networks among Developing Countries**

### **Keywords**

bioinformatics, P2P protocols, network management, digital infrastructure, file sharing, Thailand, Asia Pacific Region

### **Geographic coverage**

Thailand, Asia Pacific Region

### **Objectives**

To research, implement, and test a next generation automatic biological software, courseware, database distribution, and synchronization network based on Peer-to-Peer (P2P) technology for developing countries in the Asia-Pacific region with low-bandwidth Internet links.

### **Description**

Many countries in the Asia-Pacific region are moving into the field of bioinformatics, which involves the collection, organization and analysis of large amounts of biological data through computer networks. However for many, progress is impeded by the computational infrastructure and network bandwidths. This project addresses the problem of low bandwidth and reliability through the introduction of 3<sup>rd</sup> generation P2P protocols, which uses the computing power of the entire network and allows file transfers to continue in the case of a disconnection. P2P thus promises to help facilitate the distribution and synchronization of biological databases across the Asia-Pacific region.

### **Target beneficiaries**

The major beneficiaries are research and educational institutes in developing countries, especially those in the Asia-Pacific region that are just moving into bioinformatics but do not have the necessary large Internet bandwidth available, such as Thailand, India, China, Indonesia, and the Philippines.

### **Outputs:**

- Open-source client software based on 3rd generation P2P technology, for automatic downloading and synchronization of biological software, courseware, and databases, to be made available free-of-charge through the Asia Pacific Bioinformatics Network (APBioNET); and



- Reports on performance and results of the test-bed set up will be published in respected journals and conferences and be made available through the APBioNet website (<http://www.apbionet.org>).

**Duration**

Start Date: January, 2006

End Date: June, 2007

Total Duration 18 Months

**Contact information**

Amornrat Phongdara Director,

Centre for Genomics and Bioinformatics Research,

Faculty of Science Prince of Songkla University, Thailand

Kanchanawanish Rd., Hat-Yai, Songkhla 90112 Thailand

Telephone: 66-74-288384

Fax: 66-74-288384

E-Mail: [pamornra@yahoo.com](mailto:pamornra@yahoo.com)

**Website**

<http://www.apbionet.org>

### **37. Development of a Real-time and Mobile Integrated Water Quality Monitoring System Based on Information Communication Technology: A Study Case in Ha Long Bay**

#### **Keywords**

water management, natural resource management, information management, governance, Vietnam

#### **Geographic coverage**

Vietnam

#### **Objectives**

To develop a real-time integrated water quality monitoring system in Vietnam

#### **Description**

This project addresses the complexity and costs associated with managing Vietnam's abundant coastal and fresh water resources. The project aims to extend the Computerized Water Quality Measurement System developed by the Institute of Chemistry at the Vietnamese Academy of Science and Technology (VAST). The integrated system, which uses a Global Positioning System (GPS) and water quality monitoring will be combined with data acquisition, transmission and web-based information sharing. Data stored in local memory is automatically transmitted to a nearby centre via a radio network. After a preliminary treatment, the information is then transmitted to the main server via Uplink connections and shared in the community, thus providing a real-time integrated water quality monitoring system.

#### **Target beneficiaries**

The model water quality monitoring system can be expanded to different locations benefiting the research, forecasting and decision making of water management personnel, environmentalists and academics. The data can also be displayed visually on public advertisements and television, for purposes of community education on environmental protection.

#### **Outputs**

The project output is a complete system for water quality measurement consisting of:

- Three sets of water quality sensors, electronic devices, data acquisition, data transmission, a server for communication and web-based information sharing and related software;

- Data sets for water quality parameters such as pH, dissolved oxygen (DO), salinity, conductivity, temperature, Oxidation-Reduction Potential (ORP);
- Completion of communication and web-based information sharing system;
- Confirmation of the systems long-term operational performance;
- Reliability of the system's replication for other locations in Viet Nam; and
- A Project report.

### **Project Duration**

Start Date:

End Date:

Total Duration

### **Contact Information**

Le Quoc Hung, Associate Professor,

Head of Lab Computer Application to Chemical Research, Director of Environmental Division

Institute of Chemistry, Vietnamese Academy of Science and Technology (VAST)

18 Hoang Quoc Viet, Cau giay, Ha Noi Vietnam

Telephone: 84-4-8362008

Fax: 84-4-8361283

E-Mail: [hunqlq@ich.vast.ac.vn](mailto:hunqlq@ich.vast.ac.vn)

## **38. IPv6 Tunnel Broker: A Key For Using Next Generation Internet in Developing Countries**

### **Keywords**

Internet protocol, DNS, IPv4, IPv6, network management , Thailand

### **Geographic coverage**

Thailand

### **Objectives**

The objectives of this project are to develop an Internet Protocol version 6 ( IPv6) tunnel broker configuration system allowing IPv4 users to connect to IPv6 networks

### **Description**

IP address shortage is a problem facing all Internet users in developing countries like Thailand. IPv6, with its 128-bit addresses, is expected to alleviate this address shortage. Several mechanisms are available for connecting users to the global IPv6 networks. One popular mechanism is an IPv6-over-IPv4 tunnel where IPv6 packets are encapsulated inside IPv4 packets and are transmitted over IPv4 networks. Many types of tunnel mechanisms exist, but are far too complex for general Internet users. This project aims to develop a semi-automatic IPv6 tunnel configuration system that will connect end users to IPv6 networks in a simple, convenient manner. The proposed IPv6 tunnel broker system will also provide secure authentication process and support a variety of client's platforms.

### **Target beneficiaries:**

This project benefits all Internet users who want to get on the IPv6 network quickly without having to wait for IPv6 service from their ISPs. The proposed IPv6 tunnel broker benefits Internet users both in Thailand and other developing countries whose IPv4 addresses become a rare asset.

### **Outputs**

This project aims to produce a commercial-level prototype of IPv6 tunnel broker system, with hardware and software components and deploy it on the Thailand IPv6 Testbed network. Specific outputs are:

- The hardware component, which consists of a web server that acts as a tunnel broker, IPv6 tunnel servers, and a DNS server;
- The software component, which consists of tunnel broker administrator and database that runs on the web server, and the client software that runs on the end user's computers;

- Two versions of the client software: one for Windows XP platform and one for Linux;
- Deployment of the IPv6 tunnel broker service through the NECTEC IPv6; and
- Testbed website (<http://www.ipv6.nectec.or.th>). Users can download client software and configuration manual from the same website.

**Duration**

Start Date:

End Date:

Total (months):

**Contact information**

Dr. Panita Pongpaibool

National Electronics and Computer Technology Center (NECTEC)

112 Phahol Yothin Rd., Klong Luang, Pathumthani 12120 Thailand

Telephone: +662-564-6900 x2568

Fax: +662-564-6863

Email: [panita@nectec.or.th](mailto:panita@nectec.or.th)

**Website**

<http://www.nectec.or.th>

## 39. Shahmukhi to Gurmukhi Transliteration Solution for Networking

### Keywords

language transliteration software, Shamukhi, Gurmukhi, India, Pakistan

### Geographic location

Punjab, India and Punjab, Pakistan

### Objectives

The objectives of this project are to develop a software package facilitating transliteration from Shahmukhi to Gurmukhi languages and enabling web based networking between East and West Punjab.

### Description

This project is a culmination of ten years of academic research and literacy development in the United Kingdom, Pakistan and India. The aim of the project is to facilitate electronic and written communication between people living in and originating from East (Indian) and West (Pakistani) Punjab, through the development of a Punjabi Language Transliteration Tool. The intellectual background to this work has already been completed via a grant from the European Union, Asia-ITC programme. The Punjabi University at Patiala has also developed a Gurmukhi to Shahmukhi Transliteration software. This project aims to develop the complementary Shamukhi to Gurmukhi processor as well as facilitate use of these technologies on the web, thus enhancing networking between India and Pakistan.

### Target beneficiaries

The target groups are media organisations, literary and literacy promotional organizations, writers and NGOs involved in dissemination activities amongst the urban and rural poor, the virtual Panjabi community, schools and colleges.

### Outputs

- A detailed report outlining logic of using phonic system for the three types of scripts;
- A wordprocessing facility in Shahmukhi using Nask & Nastalique fonts;
- Documentation for usage of Shahmukhi wordprocessing facility;
- Training materials for use of Shahmukhi wordprocessing facility;
- Panjabi Language transliterational Tool;
- Detailed documentation on usage of keyboard mapping;
- Documentation for usage of Transliteration Tool; and

- Training materials for usage of Transliteration.

**Duration**

Start Date:

End Date:

Total Duration

**Contact information**

Dr. Gurpreet Singh Lehal, Director

Advanced Centre for Technical Development of Punjabi Language

Literature & Culture, Punjabi University, Patiala, INDIA

Telephone: 0091-1753046171

Fax: 0091-1753046171

Email: [gslehal@yahoo.com](mailto:gslehal@yahoo.com)

**Website**

<http://www.universitypunjabi.org>

## 40. VClass SIP-based Mobile Classroom

### Keywords

e-learning, mobile classroom, interactive learning, Session Initiation Protocol, Java, Thailand, Asia Pacific Region

### Geographic coverage

Thailand, Asia Pacific Region

### Objectives

The objectives of this project are to develop remote mobile classroom facilities using Session Initiation Protocol (SIP) technology.

### Description

This project addresses problems associated with mobility in e-learning platforms. Mobility allows teachers to design and conduct meaningful interactive courses by reaching students at their Personal Digital Assistant (PDA), home or office PC, laptop, or conventional house phone. The project integrates a SIP with an open source e-learning platform called VClass, to create an easy and effective way to reach students during a class and to extract learning objects from mobile resources. The project aims to produce a mobility enhanced VClass e-learning platform - called a mobile classroom - that provides greater flexibility for student learning environments.

### Target beneficiaries

The primary target beneficiaries of the new functionality offered by the VClass SIP-based Mobile Classroom are the many learning institutions in the Asia Pacific region who use the open source software VClass to power online, web enhanced, and hybrid education programs. In addition, other institutions and non-profit organizations that are interested in e-learning may also benefit.

### Outputs

The project output is a mobility enhanced VClass e-learning platform. The mobile classroom will be available both as a web accessible Java application and for installation on mobile and stationary computing devices. Courseware on cultural studies will be archived and made public to researchers and students.

### Duration

Start Date:



End Date:

Total Duration

**Contact information**

Prof Kanchana Kanchanasut, Director

IntERLab, Asian Institute of Technology

PO Box 4, Klong Luang, Pathumthani 12120 Thailand

Telephone: 66-2 524-5703

Fax: 66-2 524-6618

Email: [Kanchana@ait.ac.th](mailto:Kanchana@ait.ac.th), [kk@cs.ait.ac.th](mailto:kk@cs.ait.ac.th)

**Website**

<http://www.interlab.ait.ac.th>



## **41. Towards a Regional Geographic Information Infrastructure (RGII) in the Hindu Kush-Himalayan (HKH) Region**

### **Keywords**

GIS Mapping, information management, standards, Hindu Kush-Himalayas

### **Geographic coverage**

Bangladesh, Bhutan, Nepal, Hindu Kush-Himalayan region

### **Objectives**

The objectives of this project are to increase the availability and accessibility of relevant geographic data and to enhance the exchange of geographic information within the region.

### **Description**

Decision-making in the Hindu Kush-Himalayan (HKH) region requires a realistic assessment of natural resources and socio-economic conditions through the systematic generation and access of data. Many spatial databases in the region have been developed in isolation from one another and thus information is dispersed, heterogeneous, inaccessible, or not relevant due to their continuity, reliability and nature of parameters. In response to this situation, the project worked with partners from Bangladesh, Bhutan and Nepal and used Internet mapping technology such as ARCIMS (<http://www.esri.com>) and generic database technology such as an Structured Query Language (SQL) server to develop an Internet-based Geographic Information System (GIS) metadata system. The system adheres to international standards for compatibility with other regional/global partners, and offers a regional integrated platform to increase the availability and accessibility of relevant geographic data, and enhances the exchange of geographic information.

### **Target beneficiaries**

The researchers, development projects and agencies working with GIS in the region are the direct beneficiaries of the project. The growing use of GIS technology with easily available spatial databases also facilitates the development of more realistic policy planning and action plans, which ultimately benefit the mountain community at large. With adoption of standardised formats for database queries, information sharing and consistent presentation across multiple participating organizations, who are both major users as well as producers of information and knowledge, the entire GIS community in the region benefits from the system.

### **Outputs**

The major outputs of the project are:

- A customised, Internet-based mapping system for publishing geographic data and information; and
- A metadata system based on international standards for documentation and existing spatial databases, which facilitates search through the Internet and encourages data sharing in the region.

### **Outcomes and impact**

The project activities were carried out to achieve the objectives as planned in the project document. A number of other ongoing activities in ICIMOD also complemented these project activities and helped to achieve the set goals.

In the initial phase of the project, a conceptual framework was developed to share GIS resources and provide GIS services exploiting the full potential of the Internet and GIS technology. The main GIS resources were identified as database and metadata resources, map resources, application resources, and training and educational resources. A concept of the portal system was developed to provide a common platform to access and share information and knowledge about GIS technology and its applications in mountain environments.

A comprehensive underlying structure for the portal was developed based on the ESRI's g.net architecture, which used the latest Internet mapping technology. The portal was designed to be a virtual platform for sharing data and information by the users and providers, offering a new one-stop experience for all geographic data needs in the region. The portal was named the Mountain GIS Portal. The portal provides a number of GIS services and resources that are accessible to the user through the Internet. The user can access the metadata, on-line data, maps, application and training resources. Similarly, the users can also submit their own data, metadata, maps or application case studies. The system administrator manages these materials and posts them as appropriate. In this way, a user can also be a provider of the resources through the portal.

The major software packages used to build the Mountain GIS Portal are ArcGIS, ArcIMS and IIS HTTP Server. XML has been the underlying database for metadata and its administration. The system is tied together through a combination of XSL, ASP, JavaScript programs and various web pages.

Based on the conceptual design, the following systems were developed for the implementation of the portal: the metadata system with spatial search and text search capabilities; online data services to view and query data as well as to create online maps by the users themselves; a map catalogue to serve the published maps on the Internet; a series of websites (<http://www.icimod->

gis.net, <http://www.nepal-gis.net>, <http://www.bhutan-gis.net> and <http://www.bandladesh-gis.net>); and web pages integrating the systems in a common framework. Other features included in the portal are a discussion forum, news and events, and numerous links to GIS resources on the World Wide Web. To further strengthen collaboration and communication, an email based moderated mailing list has also been established.

The implementation of the Mountain GIS Portal has helped in organizing, documenting and disseminating ICIMODs' and its partners' own geographic data and information. With the framework in place, the effort is focused on encouraging more partners to join and publish their metadata and spatial database using the basic system developed. The application has the potential to be extended to other regional and national institutions of the HKH, an important step towards realizing the vision of a Regional Geographic Information Infrastructure. Already, a number of institutions have put their data and information into the portal and it is expected to grow in the coming years. Since data sharing culture is still conservative in the region, ICIMOD has to play a proactive role in convincing more of its partners to actively participate in the framework. However, the project is still active, and has plenty of scope for continued growth both through additional information inputs and by extension to other countries and institutions.

### **Project Duration**

Start Date: March 2002

End Date: April 2004

Total Duration 24 months

### **Contact Information**

Basanta Shrestha, Acting Division Head MENRIS

Mountain Environment and Natural Resources' Information Systems (MENRIS)

International Centre for Integrated Mountain Development (ICIMOD)

GPO Box 3226 Jawalakhel, Kathmandu Nepal

Telephone: 9771-525316/9771-525313

Fax: 9771-524509/9771-536747

Email: [basanta@icimod.org.np](mailto:basanta@icimod.org.np)

### **Website**

<http://www.icimod.org>

## 42. ICT for Agriculture and Rural Development in China

### Keywords

agricultural extension, economic productivity, marketing, governance, China.

### Geographic coverage

China

### Objectives

The objectives of this project are to assist farmers in their marketing activities using ICTs.

### Description

This project proposed to construct a prototype ICT service for agriculture marketing in Qingdao, Shandong Province, China. The core Internet technology, the AgQingdao system, was based on a hierarchical model of four levels including Qingdao-Pingdu-Towns-Villages. In addition to using Internet as the its central component, the project sought to use the county-run television station, call centre, telephones, mobile phones, and village-run broadcast stations to meet farmers needs in an "all-round ICT service". The project proposed a participatory strategy to develop its information services. It planned to mobilize all stakeholders, including government agencies, the private sector, companies, farmers, marketers, technicians and professionals, to contribute money, labour, and knowledge to this project.

### Target beneficiaries

- Municipal Government of Qingdao: the AgQingdao system planned in this project was to become a key component of its e-government facility;
- Farmers: the hierarchical model of four levels, and an "all-round ICT service" were proposed to advise farmers on crop growing and marketing, and business strategies;
- Companies: the e-enterprise system was to introduce modern management ideology and methodology; and
- Marketers: the e-commerce tools provided by this project were to assist them in finding better and more opportunities to sell their goods and services.

### Outputs

The project outputs were to include the AgQingdao system, which was to be a key component of the e-government facility and it was also supposed to function as an e-extension service on agricultural research and technologies, an e-commerce system for marketing of agricultural products, and a call center serving farmers.

## **Outcomes and impact**

This project remains technically incomplete at the time of writing. The project began as planned by defining criteria to select the project area, which included geographic location, sufficient information sources and communication and Internet infrastructure, the willingness of the local farming community to accept the new technology and try different approaches on information transformation, and a local government that encourages and supports the application of information technology for agriculture and farming. Based on these conditions, the project selected Kunshan as the prototype county to implement the project, in replacement of Qingdao or Rizhao as were presented in original plan of the project.

The project began its work with the local government in March of 2003 and had gained the support from the Kunshan Municipal Information Office, Kunshan Agriculture Bureau, Kunshan Science and Technology Bureau, Kunshan National Agriculture Demonstration Park, and Kunshan Direction Development Corporation. In collaboration with these organizations, the implementation methods were defined.

However, at this stage the project encountered a major setback. The Severe Acute Respiratory Syndrome (SARS) epidemic broke out in mid-April 2003 and lasted two months, and it greatly affected progress. The local research team members were stranded in Kunshan National Agriculture Demonstration Park and could not move even within the premises of Kunshan municipality. In Beijing, where the China Agriculture University is located, every person who went in and out of the province had to be quarantined for at least fourteen days. At the end of June, the China Agriculture University called all faculty, staff and students who were assigned outside of Beijing during the spring of 2003, to return to campus for another two weeks of quarantine. Project work was delayed indefinitely, and the loss of time also resulted in a loss of momentum for the project.

By the time the interim technical report was due, the project had completed some work and it appeared to be moving ahead. Some research it reported as having been complete was: research on Kunshan agriculture production; research on the needs for agriculture information and formats; identification of the current local agriculture information structure and its utilization dynamics; meetings with agriculture related government bureaus; research into the current, existing agriculture web sites and exploration of the possibility of consolidation these sites into the project system. The project also coordinated the construction of <http://www.ChinaAg.com> web site with Morning Glory Digital Technology Company (a subsidiary of Kunshan Direction Development Corporation) and assisted Morning Glory on building the TVWeb as an information exchange platform.

At the time of writing, the project had requested a six-month extension to finalise the project.

**Project Duration**

Start Date: March 2003

End Date:

Total Duration 12 months

**Contact Information**

Professor Shen ZuoRui

China Agriculture University

2 Yuanmingyuan Xilu Road, Beijing 100094 China

Telephone: (8610) 6289 3015

Fax: (8610) 6281 7605

Email: [ipmist@cau.edu.cn](mailto:ipmist@cau.edu.cn)



### **43. Development of a Forest Fire Forecasting System for Western Ghats, India using Web-based Geographical Information System and Remote Sensing**

#### **Keywords**

forest fire forecasting, remote sensing, GIS, environmental management, India.

#### **Geographic coverage**

India

#### **Objectives**

The objectives of this project are to develop forest fire forecasting using Geographical Information Systems (GIS) and Remote Sensing to help reduce the degradation and loss of biodiversity in Kerala State, India.

#### **Description**

Western Ghats, a biodiversity hotspot and essential environmental resource for Kerala State, is under severe threat due to the recurrence of forest fires. Between 1991 and 2003, fires destroyed more than 25,000 hectares of forests in Kerala. The project aims to develop an effective method for forest fire forecasting by using GIS and Remote Sensing to make a forest fire hazard index. The early fire forecasting system developed by this project can be used by the Forest Department to manage and conserve the fire prone areas more efficiently. The forecasting and prevention of forest fire also benefits the local communities residing in and around the forest whose livelihood depends entirely on natural resources.

#### **Target beneficiaries**

By using the fire forecasting system, the Forest Department can manage and conserve the fire prone areas more efficiently, benefiting the local communities residing in and around the forest whose livelihood depends on these natural resources, reducing the degradation and loss of biodiversity of the area, and contributing to the wise use of the mountains of Western Ghats, which are essential water catchments for Kerala State.

#### **Outputs**

- Forest Fire Risk Area Map of Southern Western Ghats;
- Forest Fire Forecasting System;
- Project report on forest fire, its causes, consequences and solutions;

Presentation of the Fire Forecasting System on the Centre for Environment and Development web site (<http://www.cedindia.org>) that can be freely used by stakeholders;

- A network of local organizations and people; and
- Skill development of front line staff of the Forest Department and local people.

### **Outcomes and impact**

This project is still in process at the time of this report. However, the project has submitted two interim reports and is well on its way to completing its final results.

From the beginning, the project has adopted a participatory and multi-disciplinary approach. The participatory approach of the project is considered crucial as the cause and effect of forest fires are best known to local stakeholders such as forest department personnel and local people. During the project implementation experts from the following organizations were consulted: Kerala Forests and Wildlife Department; College of Forestry, Kerala Agricultural University, Vellanikkara; Kerala Forest Research Institute, Peechi, Thrissur; Ashoka Trust for Research in Ecology and Environment, Bangalore; Environmental Systems Research Institute, Bangalore; and the Department of Statistics, University College, Thiruvananthapuram.

The project's multi-disciplinary approach has included the use of a variety of research tools and techniques such as Participatory Resource Appraisal (PRA), Remote Sensing data in preparing current vegetation maps, GIS in spatial data analysis; statistical techniques for development of the model, and programming tools like Visual Basic (VB) for developing the automated system.

Primary and secondary data were collected from 10 Protected Areas (PAs) and a forest fire prone area prioritization model has been developed. Vegetation Maps were prepared using remote sensing data through Digital Image Processing (DIP) and further classification by staff during processing. The results were then verified on the ground during the field visits. The other base maps prepared of various thematic layers from Survey of India topographic sheets are drainage, land use, contour, settlements, roads, trek paths etc. These maps have been subject to overlay analysis by assigning ranks and weights to generate fire risk area maps. The different parameters that influence forest fires were identified, and the data in the form of maps (spatial) and tables (non-spatial) have been prepared. The identified parameters have different levels of influence in inducing fires. So ranks (intra parameter) and weights (inter parameter) have been assigned for each parameter (through Knowledge Based Approach and Logistic Regression Approach) and they have been used in the overlay analysis to arrive at the final fire forecasting system.

The output of the project is a web-based model, designed to improve the existing forest fire management system of the region. At present the team has designed the Forest Fire Forecasting

System (SWG Fire Mapper 1.0), which takes into consideration a variety of parameters that effect the initiation and spread of wildfires. The weights and ranks need to be finalised and input into the SWG Fire Mapper 1.0 to get acceptable results for fire prediction maps of the PAs. The website of CED (<http://www.cedindia.org>) is proposed to be the platform for the web-based Fire Prediction System.

The project also plans to hold a series of training, capacity building and awareness programmes. These include Training and Capacity Building programmes for Forest Department Officials and decision makers. The project will also undertake awareness programmes for local communities in selected areas on the causes and spread of forest fires.

Although this project is still underway, it has already developed a model for the prediction of Forest Fires. The approach can be adopted and replicated in other geographical areas with necessary modifications in the ranks and weights, based on the specific characteristics of the local area. The design, construction, deployment, data collection, and data analysis is a pioneering effort and can be taken as a baseline study by other researchers.

#### **Project Duration**

Start Date: August 2004

End Date: August 2006

Total Duration 24 months

#### **Contact information**

Dr. Babu Ambat

Centre for Environment and Development

T.C. 9/2598, Elankom Gardens, Vellayambalam, Trivandrum - 695010, Kerala, India

Telephone/Fax: 91-471-2726793/ 91-471-2726792

Email: [ceddir@vsnl.com](mailto:ceddir@vsnl.com)

#### **Website**

<http://www.cedindia.org>

## **44. Development of an SMS-Based Rice Seed Stock Inventory System for Rice Farmers, Philippines**

### **Keywords**

Seed Net, rice, seed stock, SMS, agricultural extension, Philippines

### **Geographic coverage**

Philippines

### **Objectives**

The objectives of this project are to enable seed growers and seed centres to link together and share a real-time seed stock inventory system.

### **Description**

With less land and exploding population, rice yield increase has to come from the plant itself, using modern technology. The Philippine Rice Research Institute in 1994 created a national seed network called "Seed Net" with 100 seed centres that multiply foundation seeds from local farmers and sell them to commercial seed growers for further multiplication. As the network has been limited by lack of connectivity and real time exchange of information, this project aims to develop an SMS based Rice Seed Stock Inventory System using mobile phones to enable seed growers and seed centres to link together and share information in a real-time seed stock inventory system. The system will have an SMS server to handle incoming data and queries, and a database to process data, directory, and generate reports.

### **Target beneficiaries**

Key beneficiaries are considered to be the 100 accredited Seed Net members, 35,000 seed growers and about 1 million rice farmers nationwide.

### **Outputs**

- Develop a real-time seed stock inventory system;
- Enable farmers to query seed stock through SMS; and
- Link breeding centres, seed net, and commercial seed growers; and spur a seed reservation system.

### **Project Duration**

Start Date: January 2005

End Date: January 2007

Total Duration 24 months

**Contact Information**

Roger F. Barroga, Head, Information and Communications Technology Division,  
Philippine Rice Research Institute (PhilRice)

Email: [roger@philrice.gov.ph](mailto:roger@philrice.gov.ph)

**Website**

<http://portal.openacademy.ph>

## **45. Web-based e-Crop Management, China**

### **Keywords**

crop management, eCrop, agriculture extension, simulation models, Nitrogen optimization, China

### **Geographic coverage**

China

### **Objectives**

The objectives of this project are to use crop simulation model and nitrogen module to optimise crop and vegetables production at field level.

### **Description**

This project aims to develop an "e-farm" system that provides a dynamic web-based crop and vegetable information and simulation services. The system aims to support decision making on agriculture production for farmers and small cooperation agencies in Fuyang, Anji county, Zhejiang Province of China. Crop simulation models on the project web site combine Nitrogen (N) and Water modules, economic analysis and decision-making tools to provide users with methods for optimizing crop and vegetable production.

### **Target beneficiaries**

The e-farm web based application tools developed in this project benefit county e-government facilities, farmers, companies and buyers and sellers of farm products.

### **Outputs**

- The e-crop Management SimuSystem as a key component of the crop management at field level and also partially as e-extension of agricultural science and technologies;
- An e-simulator for vegetable production system;
- Preliminary performance tests of the e-crop management SimuSystem model
- Project report on e-farm and toolkits and its application; and
- Skill development on web-based simulator and data transfer.

### **Project Duration**

Start Date: February 2005

End Date: December 2005

Total Duration 12 months

**Contact Information**

Dr. Jingping Yang

Agro-ecology Institute, Hua-Jia-Chi Campus, Zhejiang University

268 Kai Xuan Rd. Hangzhou, 310029, Zhejiang, P.R. of China

Telephone: 0086-571-86971154, 13067755647

Email: [jpyang@zju.edu.cn](mailto:jpyang@zju.edu.cn)

**Website**

<http://www.cls.zju.edu.cn>

## **46. Crop Disease Forecasting System and Expert Crop-Advisory to Farmers over Information Kiosk Networks in India**

### **Keywords**

agricultural extension, information kiosk, crop-disease forecasting, crop and climate sensors, India

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to disseminate crop advisory and disease forecasting services to farmers in a resource-constrained environment.

### **Description**

aAQUA farmer clubs and Krishi Vigyan Kendra (KVK) Baramati utilize online information kiosks to provide crop advisory and disease forecasting services to farmers. However, the usefulness of the predictions are limited due to the nature of the input parameters, which change from place to place. This project plans to enhance the accuracy of forecasts to farmers by placing more sensors in surrounding regions. The project utilises an existing network of kiosks to send the data and also provides content to a local community radio station, which can benefit a wider number of farmers. The disease forecasting services model can be replicated across the country using the network of KVKs.

### **Target beneficiaries:**

The main beneficiaries are farmers in Pune district and kiosk operators in Pabal and Baramati. Data from the project can also be used to plan the establishment of disease forecasting centres at the government level. KVK experts benefit by learning to use new ICTs for making disease forecasts and others who are implementing Agri-extension services benefit through the published work on the Internet.

### **Outputs**

Documenting a model for expert crop assistance using remote sensors in kiosks.

- Open content on disease forecasts based on aAQUA and historical data, visualization of the data through user-friendly interfaces;
- Training material for kiosk operators; and
- Feedback from experts and farm coordinators.



**Duration**

Start Date: September 2005

End Date: May 2007

Total Duration 20 Months

**Contact information**

Krithi Ramamritham

Indian Institute of Technology Bombay

KReSIT, IIT Bombay, Powai, Mumbai 400 076 India

Telephone: +91 22 2576 7900/ 01/ 02

Fax: + 91 22 2572 0022

Email: [Krithi@cse.iitb.ac.in](mailto:Krithi@cse.iitb.ac.in), [Krithi@it.iitb.ac.in](mailto:Krithi@it.iitb.ac.in)

**Website**

<http://www.dil.iitb.ac.in>



## **47. Development of ICT-based Telemedicine System for Primary Community Health Care in Indonesia**

### **Keywords**

telemedicine, primary healthcare, public health policy, Indonesia

### **Geographic coverage**

Indonesia

### **Objectives**

The objective of this project was to develop Personal Computer-based medical stations and conduct field-testing in at least eight locations.

### **Description**

This project involved the development of a pilot Internet and communication technology-based telemedicine system for primary community health-care in urban and rural areas of Indonesia. The project utilized existing Internet technology to enhance PC-based medical stations and performed field-testing as a key aspect of its work. The pilot telemedicine network consists of six medical stations for community health centres, and a station for each referral hospital, health office, and a test laboratory respectively. The project includes software development, as well as system and network integration. The resulting system can gradually be expanded to cover larger number of stations.

### **Target beneficiaries**

- Users of the Telemedicine for Primary Community Health-care;
- Under-served communities in the rural and urban area, especially mothers and children; and
- All the major players in the delivery of the Primary Community Health-Care in Indonesia such as: health-care providers; primary community health centres (Puskesmas), referral health offices, and referral hospitals.

### **Outputs**

- "White Paper" containing practical recommendations for ICT policy reform regarding social and community usage of the Internet in Indonesia;
- A Generic Internet-based Telemedicine System for Primary Community Health-Care, including software modules for day-to-day primary health-care in Community Health Centres;

- Dissemination activities (seminars, meetings, mailing-lists, websites) to promote the application of the ICT-based telemedicine systems; and
- Use of the system by Community Health Centres, through the Research Group on Biomedical Engineering, Institut Teknologi Bandung (ITB).

### **Outcomes and impact**

The project successfully completed its objectives within the proposed timeframe. In the first few months of implementation, the project faced unforeseen difficulties particularly in convincing the medical personnel and initiating collaboration with various target institutions, namely, the Bandung Health Office, Referral Hospitals, and the 70 existing Community Health Centres in the Bandung area. Although unavoidable delays occurred on certain aspects, the project achieved the targeted objectives and even surpassed them, as the number of Community Health Centres joining the telemedicine system was double the project's target.

The project integrated the fields of community healthcare, ICTs, and biomedical engineering to develop and implement a community healthcare telemedicine system. The system is comprised of a health office, a referral maternity hospital, and a number of selected Community Health Centres in Bandung. Associated telemedicine software modules were developed and were provided free-of-charge by the project. These include: medicine data recording and reporting; patients' data recording and reporting; tele-coordination; community health education; and limited tele-consultation. The project also integrated ICT training for medical personnel on the use of PCs in day-to-day healthcare, efforts to improve the quality of maternal healthcare delivery, and a web-based Community Healthcare Information System that provides public access to a range of healthcare facilities and information.

The project worked in close cooperation and coordination with local government health institutions and personnel, especially the personnel of community health centers (CHC) in Bandung, who are the primary users of the system. More than 70 percent of the medical doctors and administrative staff involved in the project are female. Local health institutions and personnel participated in the project at two key stages. The first stage involved the collection of information, defining of system requirements, and the system design. The second stage involved the dissemination of the design results, in which the systems were implemented into daily healthcare delivery activities at the selected Community Health-Care Centres in the Bandung area.

The project work resulted in a number of key observations and recommendations. Significant improvements were noted in the day-to-day provision of healthcare services at Community Health Centres. The software packages that were particularly useful were the "Medicine Data Recording & Reporting Software Package", and the "Patient Data Recording & Reporting Software Package".

However, the project found that human resource training, in particular familiarisation and socialisation with computer use and tele-medicine in general, required significantly more time than expected. Thus the project has shown the significant role that human resource development plays in the sustainable implementation of ICT-based telemedicine systems. This also implies that the success of tele-medicine and other information system implementation in healthcare settings is dependent on the institution's organisational readiness. Therefore, improvement of organisational readiness (personnel, workflow, policy and environment) should be in line with system development and implementation. At a macro scale the support of government and implementing institutions is vital for the success of programs. Support should not be limited to recommendations, but also include policy change and financial allocations such as budget allocation for healthcare institutions to implement ICT related healthcare solutions.

The project has shown encouraging results of the benefits ICT-based tele-medicine systems can offer to Indonesian Community Health Care. Further support from the Government, related health institutions and other organizations is required to expand and realize the systems full potential.

**Duration**

Start Date: November 2002

End Date: June 2004

Total Duration 20 months

**Contact information**

Prof. Dr. Ir. Soegijardjo Soegijoko

Biomedical Engineering Program,

School of Electrical Engineering & Informatics,

Institut Teknologi Bandung (ITB),

Jalan Ganesha 10, Bandung, 40132, Indonesia

Telephone: 62-22-2534117

Fax: 62-22-2534117

Email: [soegi@ieee.org](mailto:soegi@ieee.org)

**Website**

<http://biomed.ee.itb.ac.id>

## 48. Community Health Information Tracking System (CHITS)

### Keywords

health, injury surveillance, SMS, database modelling, training, Free/open source software, health, web-based primary care, Philippines.

### Geographic coverage

Philippines

### Objectives

The objectives of this project are to improve injury prevention programmes for children by having a good injury registry.

### Description

In this study, open-source tools from the Linux community combined with participatory people-centric strategies are employed to enable implementation of a child injury surveillance system by health workers. The reporting system has three main components: a short messaging system for reporting child injuries, the training of village health workers on injury surveillance, and a web-based graphical presentation system of injury data for decision makers. The project was implemented in an urban poor village as a pilot. SMS was chosen because of its widespread penetration in the Philippines and its wireless capabilities.

### Target beneficiaries

Among the beneficiaries of this project are community health workers in Pasay City, Metro Manila, Philippines. The other beneficiaries are local government officials who receive the health reports generated by the system to be used in community-level and local government level decision-making.

### Outputs

- Rapid prototyping of injury codes, SMS and landline phone submission formats and protocols, community health worker surveillance kits;
- Data modelling of database for the surveillance system;
- Applications development to receive data and generate reports, including bug fixes and enhancements;
- Training including identifying objectives, preparing content, manuals and certificates;
- Pilot testing, training evaluation, exams, certificates; and
- Deployment, including actual submissions of data.

## **Outcomes and impact**

The Community Based Child Injury Surveillance System project's aim was initially to create a data collection system using short messaging service over cellphones. After preliminary investigations, however, the researchers discovered several issues associated with the original strategy such as constraints in economics (cost of sending messages) and existing national and local health policies (only government health centers can submit official health data).

The project responded to these factors by shifting strategies and creating a computer-based information system that served, primarily, the needs of the health center facility and, secondarily, of the national public health system. The project was renamed CHITS (Community Health Information and Tracking System).

By employing a combination of methods, including community immersion, systems analysis, joint rapid application development, onsite technical assistance and grassroots-oriented training, CHITS was piloted in two of thirteen health centers in Pasay City. The pilots had two major components: first, an extensible and customizable software engine for health facilities, and second a training program for health data collectors, such as health center staff and community health workers.

CHITS attracted the attention of the Department of Health and its tuberculosis module has been presented to TB control program managers in the private health sector and is being considered for adoption. There are also plans of citywide implementation of the CHITS in the cities of Pasay and Marikina, two of the most progressive cities in the country that have received local and international citations. Inquiries from three other municipalities have also been made.

The CHITS generic software engine is being used by a blood bank and a national surgical registry. CHITS offers lessons in systems development that address end-user and organizational requirements as well as create value at the level of data collection. It is proof that open source is a viable alternative to software development in health.

The researchers note that developing a community based health information system is a challenging task, closely approximating the level of difficulty found in the development of hospital and clinical information systems. By paying close attention to health center events and culture and by employing purposeful immersion in the end-user's way of life, the researchers were able to gain immense insight into their needs and requirements and apply these insights into software code, a process they call evolutionary software development. The researchers were originally leaning towards a technology-centric implementation of an information system. With deeper analysis and

understanding of the needs and requirements of end users, the researchers were able to put technology in its place to serve the genuine needs of community health workers.

CHITS was selected as a finalist in the 2006 Stockholm Challenge under the health category, to learn more see: <http://event.stockholmchallenge.se/finalists.php>

**Project Duration**

Start Date: January 2004

End Date: December 2004

Total Duration 12 months

**Contact Information**

Herman D. Tolentino/Alvin B. Marcelo, MD, Chief, Medical Informatics Unit

Medical Informatics Unit, UP College of Medicine, University of the Philippines

547 Pedro Gil Street, Ermita, Manila 1000 Philippines

Telephone: 632-522-9231

Fax: 632-522-9231

Email: [alvin.marcelo@miu.ph](mailto:alvin.marcelo@miu.ph)

**Website**

<http://www.chits.info>

<http://www.upm.edu.ph>



## **49. Tele-medicine in Nepal**

### **Keywords**

ehealth, tele-medicine, connectivity, digital imaging, social services, Nepal

### **Geographic coverage**

Nepal

### **Objectives**

Test the potential of telemedicine in the areas of pathology, dermatology and radiology in rural Nepal.

### **Description**

Nepal faces an acute shortage of doctors with a ratio of approximately 6000 to 1. In addition, health workers in rural health care, who serve most of the population, are isolated from specialist support and up to date information. The advent of ICTs has unleashed new opportunities to the delivery of health services. However, without considering local technological and cultural conditions, and the appropriateness of solutions and sustainability, tele-medicine could potentially have a negative impact on the continuity of the system. This pilot project intends to gain experience in this area, emphasizing low cost connectivity techniques, including imaging, and the training of local health care workers who must take the lead in developing and operating tele-medicine projects.

### **Target beneficiaries**

The project benefits under-served communities in the rural and urban areas of Butwal, Jhapa and Bhaktapur and the primary health care project of Bhutanese refugees in Jhapa in Morang District. In addition, health workers benefit at Siddhi Memorial Foundation, Bhaktapur, Siddhartha Children and Women Hospital, Butwal and AMDA-Hospital, Damak.

### **Outputs**

The proposed outputs of this pilot project are to:

- Develop a tele-medicine system based on store and forward principle suitable for Nepal;
- Create a pool of health professionals at HealthNet Nepal who are trained in the use of digital cameras and related equipment suitable for diagnosis and management of cases;
- Plan a possible collaboration with the Ministry of Health to implement the tele-medicine system in remote areas; and

- Use the technology for other organizations in Nepal for diagnosis and management of cases captured through images.

**Duration**

Start Date: August 2004

End Date: August 2006

Total Duration 24 months

**Contact information**

Dr. Mohan Raj Pradhan

HealthNet Nepal

P. B. 2533, Maharajgunj, Kathmandu, Nepal

Telephone/Fax: 977-1-4429722

Email: [mpradhan@healthnet.org.np](mailto:mpradhan@healthnet.org.np)

## **50. Web-based Integrated Dengue Hemorrhagic Fever (DHF) Surveillance System in Indonesia**

### **Keywords**

Dengue Hemorrhagic Fever, e-health, information management, GIS, open source software, Indonesia

### **Geographic coverage**

Indonesia

### **Objectives**

The objectives of this project are to improve the detection and management of dengue hemorrhagic fever cases, and the prevention and control of dengue transmission in the community.

### **Description**

Dengue Hemorrhagic Fever (DHF) is the leading cause of hospitalization and death among children in Indonesia and other endemic areas in the developing world. However, case detection and management, disease surveillance, and community-based control of dengue transmission are often uncoordinated resulting in an inability to prevent and manage DHF outbreaks. This action research project aims to involve the local government, community members, health care and public health personnel in the development of an integrated, web-based geographic information and decision support system. The system is expected to improve the detection and management of DHF cases in the community and become a model of DHF control approach in other endemic areas. It may also be applied for other communicable diseases.

### **Target beneficiaries**

The community who live in urban and suburban areas, where the incidence of DHF is highest, are the direct beneficiaries of the project. The health sector as the leading agent of DHF control in the community can also learn from the project how to plan, advocate, mobilize resources, and implement DHF control based on the evidence suggested by the data.

### **Outputs**

The project aims to integrate DHF surveillance and control activities among health care personnel and public health administrators through a web-based geographic information and decision support system, so that hospitals, community health centers and health offices are able to: monitor the incidence and time-space clustering of DHF cases and fatalities in the community; develop guidelines in the mobilization of resources to minimize DHF morbidity and mortality, especially in

the form of web-based interactive programs; and enhance learning processes in the success and failures of DHF case management and control in the community. The networked surveillance system is a tool to facilitate concerted efforts in the utilization of data that is systematically collected, processed and presented in an electronic virtual map, to inform strategies to control the spread of DHF. The main output of the project is a report on the effectiveness of the web-based DHF surveillance system. The final report will be published on the website, and rewritten to be published in a peer-reviewed journal.

**Duration**

Start Date: January 2005

End Date: September 2006

Total Duration 21 months

**Contact information**

Prof. Dr. Hari Kusnanto

Centre for Health Informatics and Learning,

Department of Public Health, Faculty of Medicine, Gadjah Mada University, Sekip Utara,

Yogyakarta 55281, Indonesia

Gadjah Mada University

Tel: 62-274-549432

Fax: 62-274-549432

Email: [harikusnanto@yahoo.com](mailto:harikusnanto@yahoo.com)

**Website**

<http://map.depkes.go.id>

## **51. Using ICT to build capacities of HIV/AIDS Service Providers in India**

### **Keywords**

Public health, HIV/AIDS, e-health, capacity building, information management, e-training, e-forums, e-library, India

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to develop an Electronic Resource Centre on HIV/AIDS in India including e-training programmes, interactive e-forums and e-support.

### **Description**

India accounts for 60% of the HIV/AIDS epidemic in South Asia, with an estimated 5.1 million people infected in 2004. A nationwide needs assessment survey conducted by SAATHII indicate that while over 1200 agencies are attempting to respond to the crisis, delivering quality services has been impeded by a lack of ICT capacity-building programmes, lack of digital forums for networking, sharing of knowledge and best practices, and inadequate access to relevant electronic resources. In this project SAATHII aims to develop an Electronic Resource Centre on HIV/AIDS in India. The centre aims to address these critical needs through HIV/AIDS e-training programmes, interactive e-forums linked to online databases, technical assistance and e-support tailored to organizations' specific resource needs. The project intends to assess these programmes using both quantitative and qualitative analyses, the results of which will constitute core determinants of an enhanced response to the fight against HIV/AIDS in India.

### **Target beneficiaries**

The project focuses on four categories of stakeholders involved in the fight against HIV/AIDS in India: non-profit HIV/AIDS service-provider organizations in rural and semi-urban areas who have access to the Internet; physicians, counsellors and social workers involved in offering prevention, treatment, care and support services; HIV/AIDS positive people; members of the public seeking up-to-date information on HIV/AIDS related issues ranging from prevention to treatment to policy.

### **Outputs**

An integrated Online Resource Centre for HIV/AIDS in India consisting of:

- Training modules: instructional modules with interactive components delivered via dedicated web pages on the <http://www.saathii.org> website;

- e-forum outputs: available for general use beyond the project period and consolidated into Frequently Asked Questions and Best Practices documents for wider dissemination on the website with 'smart search' functionality;
- Research papers and reports based on analyses of the e-training, e-forum and e-support components, comparisons with the offline training and support programmes, and quantitative and qualitative analyses of the capacity-enhancement obtained by the participants in these programs; and
- A model of capacity building through ICT that can be then tested and adapted to other resource-limited settings.

### **Project Duration**

Start Date: March 2005

End Date: September 2006

Total Duration 18 months

### **Contact information**

Dr.L.Ramakrishnan - Country Director (Programs and Research)

SAATHII (Solidarity and Action Against the HIV Infection in India)

78, Pushpa Nagar Main Road, Nungambakkam, Chennai 600 034 India

Tel: (+91 44) 2817 3948

Mobile: (+91) 98414-76101

Fax: (+91 44) 2817 3947

Email: [saathii.orc@gmail.com](mailto:saathii.orc@gmail.com), [l\\_ramakrishnan2003@yahoo.com](mailto:l_ramakrishnan2003@yahoo.com)

### **Website**

<http://www.saathii.org/orc>

<http://www.saathii.org>

## **52. Impact of Remote Tele-medicine in Improving Rural Health, India**

### **Keywords**

tele-medicine, e-health, Internet kiosk, medical information, India

### **Geographic coverage**

India

### **Objectives**

The objectives of this project are to study the impact of remote tele-medicine in selected villages in India.

### **Description**

Healthcare service is a major concern for the rural populace in India. Currently, Internet kiosk operator, n-Logue, offers rural people access to quality doctors from its rural Internet kiosks using video-conferencing; however, vital medical information of patients is not available. This project aims to field test a low cost medical kit, called ReMeDiTM, developed by a partner company Neurosynaptic Communications Pvt Ltd., that can work in conjunction with a rural kiosk and transmit data remotely to a doctor in a town. The data sets that can be captured are Electrocardiogram ECG, blood pressure, temperature, and heart rate. The project expects to study the impact of this product in the selected villages over a 24 month period.

### **Target beneficiaries**

Through this deployment, n-Logue seeks to improve the access of the rural population to adequate and timely healthcare services and monitor the direct economic benefits to villagers, and the indirect benefits associated with timely medical support.

### **Outputs**

- Identification of test-site locations;
- Implementation of the remote diagnostic solution;
- Monitoring of the project; and
- Compilation of information and preparation of a final report.

### **Outcomes and impact**

This project is still in process at the time of writing. However, it has made good progress towards meeting its stated goals and objectives. The project has selected the Kiosks to test its programme,

it has trained Kiosk operators in the use of the ReMeDiTM, and has secured a partnering doctor and begun conducting field tests of the system.

The selection of Kiosks was based on criteria defining their readiness to take on the ReMEDiTM kit. The model took into account such factors as distance from nearest hospital, location of nearest pharmacy, gender of users, location and age of the Kiosk, and available space to set up the system. Based on the results of the survey, the project selected villages of Sivagangai District in rural Tamil Nadu. In the Sivagangai District medical facilities of one type or another are available in 163 villages, which constitutes 33.54 percent of the total number of inhabited villages. n-Logue has set up the project with the Access Centre at Tirupattur and five Internet Kiosks in the villages around it. The partnering doctor is a Dr. Sukumar M.D., who has a hospital in Tirupattur, about 25km radius away from the selected villages. Consultation hours are 5pm to 7pm daily.

A Kiosk operator training methodology was developed and implemented in three parts. First, the operator was trained by Neurosynaptic Communications Pvt Ltd in the classroom and later in field, on the use of the ReMeDiTM. This included kit operations, maintenance, trouble shooting and Do's and Don'ts. The second part involved training by a Doctor on how to attend to a patient and administer the tests. Topics included how to deal with a patient, what kind of cases can be handled by the Kiosk Operator, what kind of cases must not be handled under any circumstances, how to get the customer waiver filled and specific training on using the various probes – where to place the stethoscope, thermometer, etc. The third part was training in the business model and promoting the service by n-Logue. The training included revenues and costs, rates for various tests and consultations, features, advantages and benefits of the tele-medicine service and how to communicate these to the villagers.

The project promoted the service through conducting a free Health Camp where all visitors were given a Blood Pressure and ECG test, and through an inauguration of the service by the District Collector, who is the highest-ranking administrative official in the District. The purpose was to get the support of the District Administration for the effort as well as to increase the acceptability of the service in the village.

The villagers in the project areas are involved in designing appropriate health services that meet their needs through PRA (Participatory Rural Appraisal) and surveys. Immediately after the launch of the service, a spike in visitors to the kiosk was observed. Subsequently, the number has dropped to a few regular, repeat visitors. A survey instrument was designed to analyse the reasons for the drop in the consultations. Some of the possible reasons being analysed are: Kiosk Operator's ability to administer the kit properly, acceptability by the villagers, identification of the Kiosk in a place where medical care is already dispensed, lack of awareness of the service,



distance of the doctor from the village, and availability of competing services such as Registered Indian Medical Practitioners Primary Health Centres, local doctors, etc. Based on their feedback the service is being refined.

While the project is still underway and final results have not been reached, the project team has noted the importance of creating public-private partnerships with Governments, NGOs and health institutions for remote health delivery to rural areas. They see that such partnerships improve the quality of services being offered and increase acceptance of it by villagers.

**Duration**

Start Date: January 2005

End Date: October 2006

Total Duration 22 months

**Contact information**

P.G. Ponnappa, Chief Executive Officer

n-Logue Communications Pvt. Ltd.

5th Floor, Gokul Arcade, 2, Sardar Patel Road, Adyar,

Chennai – 600 020, TamilNadu State, India

Tel: +91-44-39181920

Fax: +91-44-24455335

Email: [ponnappa@n-logue.com](mailto:ponnappa@n-logue.com)

**Website**

<http://www.n-logue.com>

### **53. Development of a Web-based Medical Information Repository Integrated with an Artificial Intelligence-based Medical Decision Support System, Malaysia**

#### **Keywords**

Medical Information Repository, Decision Support System, Artificial Intelligence, Malaysia

#### **Geographic location**

Malaysia

#### **Objectives**

The objectives of this project are to provide advanced, quality healthcare information and services for all, through the use of information communication technologies and artificial Intelligence methodology.

#### **Description**

The aim of this project is to provide quality healthcare information and services for the Malaysian people, especially those in rural communities. The project will employ Information Communication Technology as well as Artificial Intelligence (AI) to develop and implement a web-based Medical Information Repository (MIR) integrated with a computerized medical Decision Support System (DSS). The novelty of the project lies in the inclusion of an AI-based DSS into the MIR. The system is able to learn incrementally in real-time, non-stationary environments with minimum intervention. With this autonomous learning capability, medical practitioners are able to train and fine-tune the decision support system, and to assume “ownership” of the system.

#### **Target beneficiaries**

The project serves as a prototype system to demonstrate the significance of information sharing via a web-based repository to synergize activities in medical practice, training, and research using ICT and AI methodologies. It is envisaged that medical practitioners and researchers will be able to access anonymous medical records with heuristic diagnostic rules from the MIR via the Internet. The information obtained helps clinicians to apply the most effective curative and rehabilitative regimes to enhance quality of healthcare of patients, especially for those in poor and remote areas where infrastructure and medical expertise are scarce. The MIR and DSS can be used as a resource, which contains up-to-date healthcare procedures and information, for continuing education and training of clinicians and medical practitioners. In addition, the proposed project can be integrated into the tele-medicine flagship application under the Multimedia Super Corridor (MSC) project spearheaded by the Malaysian government.

**Outputs**

The main output of the project is a web-based MIR and DSS software comprising:

- Anonymous medical records of patients, including physical symptoms, family history, and biochemical test results-useful for medical practitioners and researchers;
- Heuristic prognostic and diagnostic rules elicited from medical specialists as well as from the DSS-useful for junior and inexperienced clinicians; and
- Disease statistics and facts-useful for healthcare administrators and policy makers.

**Duration**

Start Date: January 2005

End Date: July 2006

Total Duration 18 months

**Contact Information**

Dr. LIM Chee Peng, Associate Professor

School of Electrical & Electronic Engineering, Universiti Sains Malaysia,

Engineering Campus, 14300 Nibong Tebal, Penang, Malaysia

Telephone: +604-5996033

Fax: +604-5941023

Email: [cplim@eng.usm.my](mailto:cplim@eng.usm.my)

**Website**

<http://www.usm.my>

## **54. M-DOK: Mobile Tele-health and Information Resource System for Community Health Workers in the Philippines**

### **Keywords**

SMS, Java, mobile phone, tele-health, e-health, security, electronic patient record, Philippines

### **Geographic coverage**

Philippines

### **Objectives**

The objectives of this project are to transmit real-time diagnosis and treatment data from the community health worker to a remote physician.

### **Description:**

Delivery of healthcare services and information at the rural level can be improved with the use of innovative information communication technologies. This project aims to develop a user-friendly graphic interface for a mobile phone tele-health information system over Short Message Service (SMS) and pertinent health information content for rural users customized to the mobile screen. This project employs a Java/Symbian-enabled mobile phone to transmit real time diagnosis and treatment data from the community health worker at the point of care to a remote physician. Deployment of the technology developed in this project is thus applicable to the majority of developing countries that require cost-effective hardware platforms and have little or no General Packet Radio Service (GPRS).

### **Target beneficiaries**

The main beneficiary of this project is a rural community in Lanao del Norte where the project partner, the Philippine Council for Health Research and Development (PCHRD) has an established initiative for an Internet multipurpose community tele-centre. Other project beneficiaries include: technology partners involved in the development of a mobile tele-health system with SMS, and local government units interested in increased health of their constituents.

### **Outputs**

The project seeks to deliver a mobile electronic patient record system using Symbian/Java over SMS Relevant health information references on multimedia card storage, such as diagnosis and treatment guidelines, and drug lists.

### **Project Duration**

Start Date: June 2005

End Date: June 2006

Total Duration 12 Months

### **Contact Information**

Dr. Ayedee Ace Domingo

SynapseHealth

8A Malumanay Street, Sikatuna Village, Quezon City, Philippines 1101

Telephone: +63 917 537 2023

Email: [ayedee.domingo@synapsehealth.com](mailto:ayedee.domingo@synapsehealth.com)

### **Website**

<http://www.synapsehealth.com>

## **55. Development of ICT-Based Mobile Tele-medicine System with Multi Communication Links for Urban and Rural Areas in Indonesia**

### **Keywords**

health care, e-health, tele-medicine, tele-diagnostics, tele-consultation, Indonesia

### **Geographic coverage**

Indonesia

### **Objectives**

The objectives of this project are to develop a tested working mobile tele-medicine system prototype.

### **Description**

This project aims to develop an ICT-Based Mobile Tele-medicine System with Multi Communication Links for urban and rural areas in Indonesia. The main objective is to develop a mobile tele-medicine system prototype based on the use of the existing Internet communication technology, which can be easily moved from one place to another. The mobile tele-medicine system is considered to be particularly useful in many remote areas in Indonesia, with more than 220 million people spread around the country. The tele-medicine application is especially focused on diagnostics, consultation, and recording and reporting patient's information. The system can also be used for distance education and other health care service applications.

### **Target beneficiaries:**

Patients who live in rural area or far from a hospital can be given a routine check up by using the mobile phone. In addition, severely injured patients can be cared for locally, while in contact with medical specialists accessed through the system, providing faster response to critical medical care in spite of geographic barriers. Local hospitals with limited human resources will also benefit by using these technologies. The program for reducing Maternal Mortality Rate (MMR) and improving Mother and Child Health will also benefit local authorities who are in charge of these services.

### **Outputs**

A working and well tested model of an ICT-Based Mobile Tele-medicine System. The system is expected to be used for community health care and can be implemented easily in emergency situations, both in urban and rural areas.

### **Duration**

Start Date: July 2005

End Date: June 2007

Total Duration 24 Months

**Contact information**

Prof. Dr. Ir. Soegijardjo Soegijoko

Research Group on Biomedical Engineering,

Biomedical Engineering Program,

School of Electrical Engineering and Informatics,

Institut Teknologi Bandung

Jalan Ganesha 10, Bandung 40132 Indonesia

Telephone: +62-22-2534117

Fax: +62-22-2534117

Email: [soegi@ieee.org](mailto:soegi@ieee.org)

**Website**

<http://biomed.ee.itb.ac.id>

## 56. Generic Engine for Modules in PrimaCare

### Keywords

primary health care, information management, open source software, Malaysia, Asia-Pacific

### Geographic location

Malaysia, Asia Pacific Region

### Objectives

The objectives of this project are to develop open-source medical software modules to improve the quality of Primary Health Care through better patient, clinical, informational and statistical data management.

### Description

Primary Health Care is of utmost importance to provide the first line of preventive and curative medical services to the individual, the family and the community. However, Primary Health Care's effectiveness is often hindered by poor clinical information and weak statistical data management. This project aims to enhance the existing PrimaCare, an integrated open source medical software for clinical and operational aspects of medical practice. The project aims to develop a Generic Engine for Modules (GEM), with specialized modules for General Pediatrics, General Women's Health and Basic Epidemiology. The GEM provides a platform for other modules, thus creating an important tool that extends far beyond Primary Health Care.

### Target beneficiaries

- Patients of Primary Health Care in Malaysia, including adults, children and women;
- Patients of Primary Health Care in other developing countries, including adults, children and women;
- Primary Care Doctors and clinics in Malaysia;
- Primary Care Doctors and clinics in other developing countries; and
- Development team of PrimaCare.

### Outputs

- Generic engine through which specialized modules can be developed;
- Open source medical software for General Primary Health Care, including modules of Pediatrics, Women's Health and Epidemiology;
- Test of the GEM by the quality assurance team;
- Field test of the specialized modules by local Primary Care Doctors;



- Evaluation and monitoring results of the GEM and specialized modules;
- Regional dissemination to participating countries through international conferences and workshops; and
- Technical and user manuals in English.

**Project Duration**

Start Date:

End Date:

Total (months):

**Contact Information**

Dr Molly Cheah

Primary Care Doctors' Organisation Malaysia (PCDOM)

2-B Jalan SS 3/31, University Garden

47300 Petaling Jaya, Selangor, Malaysia

Telephone: +603-7875 0076

Fax: +603-7874 9208

**Website**

<http://pcdom.org.my/>