R8067 SUSTAINABLE ICT CASE HISTORIES

PROJECT TECHNICAL REPORT

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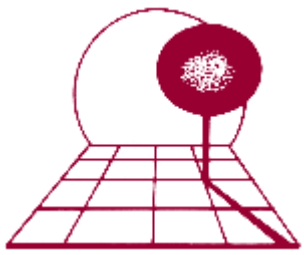

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R8067 Sustainable ICT Case Histories

Final Technical Report

Batchelor S, Norrish P, Scott N, Webb M Jan 2003

Executive Summary

This document is the final technical report for the research programme into Information and Communication Technology (ICT) sustainability factors, carried out in collaboration with Big World. Funded by the Department of International Development, the research programme identified development activities that sought to benefit the poor and with an emphasis on programmes run by NGOs. In particular it considered the work of organisations where ICTs had enhanced ongoing development activities, the ICT activity could be replicated without sizeable investment, and there was a measure of sustainability. Drawing from lessons learned in other development sectors, sustainability involves a combination of factors including among others, clear objectives, institutional frameworks, local capacity and development benefits. While perhaps not fulfilling all the features of a strong sustainable activity, each of the case studies was felt to hold points of interest for the wider global development community.

There is of course considerable debate over the term sustainability. The accompanying paper "What is Sustainability?" discusses the background review the team undertook for this project. Accordingly the complexity of sustainability was taken as a core premise behind the research. Sustainability was taken to be more than just "ongoing financial cost recovery".

The research framework was developed through an iterative process with the project collaborators.
20 case studies were examined, and 12 of these were identified for further investigation. The overview paper presents an analysis of the 12 Level 2 Studies only, although the remaining 8 Level 1 Studies are presented on the web site for visitors interest.

The initial framework was developed after piloting and the final list of factors is given below. The sustainability factors considered in the analysis are summarised below:

- ***Objectives***

Hypothesis : - Clear objectives are which are held by the majority of stakeholders are needed to ensure organisational aspects of the activity are effective . The sustainability paper differentiates between Economic, Social and Institutional sustainability. The objective clarifies where the benefits may be found, what is the intended sustainability and whether these are intended to be based on direct or indirect cost recovery.

The case studies seem to support the hypothesis. There are various forms of sustainability and some of the case studies are not intended to show economic sustainability, but are supporting social and institutional sustainability.

- ***Target groups***

Hypothesis : - the groups of people to whom information will be made available need to be clearly identified - the target group of the activity may not be directly the poor. Some target groups may be institutions that support development processes. Sustainability may therefore be affected by whether the institution significantly contributes to the development process and whether the institutional factors are in place.

While the case studies illustrate a range of target groups, and support the premise that an ICT activity may not be targeted directly at the poor, there is little in the studies that demonstrates what the essential features of a target group are for sustainability. Some features can be deduced by considering the contribution to the development process and the benefits which is discussed below.

- ***Intermediaries***

Hypothesis : - ICT are said to "disintermediate", ie to provide the poor with more direct access to information. Potentially this removal of the "middle man" in transactions (both information and economic transactions) would credit the ICT activity with enough value to ensure its sustainability.

The case studies seem to illustrate re-intermediation rather than dis-intermediation. There are examples of removing the "middle man", and this has proved beneficial particularly where the intermediary had a vested interest in the transaction. The studies show that there often remains a need for technical facilitation, though - what we might call an ICT intermediary. The difference between the original intermediary and the ICT intermediary is significant. In the former case, there was probably only a few people who could access information (or services), and therefore they had near monopolistic power which could be abused. In the latter case, although the ICT intermediary has the vested interest of earning a salary or commission, there are potentially thousands of ICT intermediaries for each activity, and the abuse of that position is unlikely.

The case studies partly support the hypothesis and show that ICT activities therefore re-intermediate rather than dis-intermediate, and that although this may present a degree of vulnerability to users, the risks are generally much less than in traditional transactions.

- ***Policy environment***

Hypothesis : - ICT activities cannot be in isolation from the policy environment. ICT policies may restrict the ICT activity. Other policies may encourage or discourage the application of ICTs. If ICTs are to be part of a sustainable activity there will need to be a suitable policy environment.

The case studies support the hypothesis. They illustrate that ICT policies can affect the day to day working of the ICT activity (particularly negatively, e.g. ACISAM and Revistazo). They also illustrate how the ICT activity is particularly enhanced when planned to be set in the context of other policies, and in some cases can even influence change of policies.

- ***Institutional arrangements***

Hypothesis : - Institutional sustainability is said to be achieved when prevailing structures and processes have the capacity to continue to perform their functions over the long term. What are the arrangements for the case study?

The studies demonstrate the link between the target group, the intended form of sustainability and the institutional arrangement. They seem to indicate that the capacity of the institution has in each case has been enhanced such that "processes and structures will perform over time".

- ***Key linkages***

Hypothesis : - Any development activity cannot be undertaken in isolation, and any organisation cannot work without links to the relevant authorities and other organisations working in connected areas. Links are needed to external sources of information.

This section is closely related to institutional arrangements and policy frameworks. The hypothesis is reflected in the case studies and key linkages can be seen. These links are supportive of the institution, of the implementation of policy and in capacity (both technical, informational and organisational) support.

- ***The project process***

Hypothesis : - Sustainability is said to be closely associated with the planning process of an activity, and its inclusion of both the target group and in some cases the long term indirect beneficiaries.

The studies describe a variety of approaches in project processes and seem to support the hypothesis. There is some evidence from within the studies that participatory planning processes enhance the project as a whole, although this seems to be more in terms of tailoring the ICT activities to the information needs as opposed to an intended ownership of the ICT activity by the target group.

- ***Capacity***

Hypothesis : - The sustainability will be affected by the human capital available – the capacity of staff, volunteers and users to undertake the ICT activity. This may be technical capacity but is likely also to include organisational and management capacity.

The case studies illustrate the hypothesis, ie the need for both technical and organisational capacity. However, they seem to draw out three important principles. First, most of the case studies have an identifiable "Champion" - either a person or group who want to see the project succeed. Second, the project does not need to start with the required capacities - it can gain the capacities as the project develops. Third, the capacities need not be within the project organisation or target group. The studies show three mechanisms for gaining capacity: it is possible to buy-in expertise when necessary, to hire specific skilled staff or to train existing staff (or volunteers).

- ***Technology***

Hypothesis : - Sustainability of an ICT activity is likely to be strongly influenced by the technology used e.g. operation and repair may be critical to the success of the activity. In other sectors it has been found that some form of standardisation of a technology instrument has helped development ensuring a sufficient use to encourage a market that can supply spares and technology support.

In terms of sustainability, the key issues in technology seem to be:

- **the use of commercially available equipment i.e. that there is a local (within country) IT industry that can do repairs and source spare parts,**
- **a willingness to overcome technical difficulties, which are the bane of all users of ICTs, and which in many cases will get easier in the longer term e.g. increased opportunities for connectivity, more robust operating systems,**
- **a quantity and style of equipment that matches the use, which is a factor of matching the plans to the resources available.**

- ***Finance***

Hypothesis : - Replacement costs will form part of the economic sustainability, and cost recovery will encourage institutional sustainability.

For those case studies that intend to be economically sustainable, there are indications of progress towards this end. However, it remains early days to see whether cost recovery includes replacement costs for all the equipment involved. For those who have used an ICT activity to move towards institutional sustainability, there have been signs of some cost recovery, but generally at levels insufficient for replacement of equipment. Some of the cases note a reluctance from donors to fund ICT activities that might nevertheless in the longer term increase effectiveness and efficiency.

- ***Development benefits***

Hypothesis : - overall benefits of the ICT activity justify the costs.

Regarding the hypothesis, we can see then that ICTs when employed in the support of other developmental objectives – general livelihood support or good governance – can have an immediate and identifiable benefit. These benefits seem to be cost effective although a detailed analysis was not possible. However, when ICTs are installed for the purpose of raising incomes directly, there is still room for debate. The measurement of the impact of the ICTs on local businesses and the local economy was beyond the scope of this research.

Other factors:- the case studies also drew attention to the role of language, literacy, content and information flow.

The overview includes factors that were a hindrance to the success of the ICT activity and factors that contributed to the successful implementation. These factors are summarised in the tables below.

Factors that hindered the ICT activity.

Issue	*Examples*
Not enough or poor quality equipment	ACISAM, KUMINFO, MIGIS, Deniva, Global Voices, UDS
Poor ICT infrastructure (restricting efficacy)	Almost all the case studies.
Language	CARDIN required 4 languages; Digital Village, Gyandoot, MANAGE, UDS, users would benefit from more content in local languages
Illiteracy	Gyandoot, MIGIS – partly overcome by use of icons
Self esteem of users	ACISAM, Gyandoot, Global Voices, MANAGE - a belief that they do not have the capacity to use technology, particularly women.
Social power conflicts in Users	ACISAM, FOOD, Revistazo – traditional holders of power threatened by innovations
Organisational Capacity of target group	CARDIN, UDS, MIGIS, Revistazo – matching goals to staff capacity
Donor reluctance (funding ICT actvities)	CARDIN – funding delays, Deniva, Revistazo – lack of willingness for donors to fund ICT support activities
Security and theft	Digital Village, failure of other centres due to theft
Loss of technical personnel	Digital Village, UDS continually lose trained technical people
Lack of technical personnel	Deniva, UDS – lack of technical capacity in organisation, KUMINFO lack of technical capacity among users
Low purchasing power of users	Digital Village, Gyandoot, UDS

Factors that contributed to the success of the ICT activity:

Issue	*Examples*
The use of "off the shelf" technology	All the case studies
Locally tailored Software or content development	Almost all the case studies
Appropriate content	CARDIN, Digital Village, Gyandoot, MANAGE, UDS, Global Voices, MIGIS
Commercial models	Gyandoot, Digital Village, FOOD
Entry process to target group	Gyandoot, Digital Village, Global Voices, MANAGE, CARDIN, MIGIS
Enthusiasm from the user communities	ACISAM, Gyandoot, Global Voices, MANAGE, UDS
Support from local authorities	ACISAM, FOOD, MANAGE, Digital Village, UDS Gyandoot, MIGIS
"Champion" leadership	Gyandoot, MIGIS, CARDIN, MANAGE, Digital Village
Intermediation by ICT familiar person	CARDIN, Gyandoot, FOOD, Digital Village
Close connections to the community	Digital Village, Gyandoot, MANAGE, FOOD, UDS, ACISAM, Global Voices
Clear objectives	Almost all case studies
Attachment to and support of existing development activities	All case studies
Good Timing	Revistazo, MANAGE, Gyandoot,
Networking several organisations	CARDIN, UDS, MANAGE, Gyandoot,

In conclusion, the case studies show that ICTs can enhance development projects. The research has not conclusively proven that an ICT activity directed at increasing income for the poor can, on its own, generate cost recovery inclusive of set-up and replacement costs, i.e. achieve economic sustainability. However, the studies do indicate that this is beginning to happen in some cases, and the prospects for the future are encouraging. More importantly the

case studies clearly show elements of institutional and social sustainability. They also show significant developmental impact, and there are indications that ICT activities can be regarded as cost effective.

Acknowledgements

A large number of people were involved in this research. Each case study has at its heart the very dedicated people who have been innovative and implemented an ICT activity. These are the real authors of this report, and we are grateful for the opportunity to learn from their experience.

Then there are the reporters for each case study. A number of consultants were asked to gather the initial and in some cases the final data. We are especially grateful to the following:-

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Contents

1 Introduction

This document has been generated as part of a research programme into Information and Communication Technology (ICT) sustainability factors. Funded by the Department of International Development, the research programme identified development activities that sought to benefit the poor and had an ICT component. In particular it considered the work of organisations where ICT had enhanced ongoing development activities, the ICT activity could be replicated without sizeable investment, and there was a measure of sustainability. Sustainability was taken to be more than financial cost recovery. Drawing from lessons learned in other development sectors, sustainability involves a combination of factors including among others, clear objectives, institutional frameworks, local capacity and development benefits. While perhaps not fulfilling all the features of a strong sustainable activity, the case studies were felt to hold points of interest for the wider global development community and have the potential to be replicated.

The Goal of the research was to investigate "ICTs role in achieving development goals". To this end the purpose of the research was "To compile & disseminate selected case histories and income-generating models to show how ngos and csos are successfully and sustainably mediating ICTs to their wider, non-connected communities". This is the final technical report for the project. However as dissemination is key to making research available and therefore useful, the research has generated multiple outputs including website, printed summaries and a CDROM. It also has had programme of seminars and workshops for active dissemination. This technical report is mainly for institutional memory.

The main part of this document is the overview and analysis that was generated after the case studies were examined. Supplementary papers are included as appendices :- a discussion of sustainability that provided the framework of the research, and ICTs in the context of Livelihoods - a piece of work begun before the research and which has has now been informed by the research.

This document now presents the overview and analysis.

2 Twelve Case Studies

A general description of the case studies is presented in Table 1. The cases have been presented as 4 page summaries, and a 6 to 12 page full study is available for each case.

Table 1 General description of twelve case studies

Organisation	***Objectives***	***Description***
ACISAM	To enable members of a community to acknowledge their human capacity and address common mental health problems in order to improve their social, economic, cultural and ecological environment.	Community use audio and video to capture their local mental health problems and feed the outputs back to the community via loudspeakers, radio, cable television.
KUMINFO	To make data available and accessible to stakeholders involved in natural resource management.	This is an GIS information gathering activity on a province wide scale.

Organisation	*Objectives*	*Description*
MIGIS	To make a significant contribution to the quality and effectiveness of participatory planning; by introducing the use of GIS and advanced graphic techniques into the PRA process; using the images produced to enhance the presentation and therefore the authority and impact of information collected in and provided by communities in which development intervention was planned.	The project uses computer GIS systems and enhanced graphics to validate and present information gathered participatorily from illiterate and semi literate communities.
FOOD (commerce)	To explore whether E-commerce can be a source of income for women co-operatives and non-profits working in rural areas.	The project has explored using "e-marketers" to set up a mechanism for ecommerce of handicrafts. To see if they can train educated unemployed youth to function as E-marketers to promote products online and obtain a sustainable source of income for themselves
DENIVA	To make use of new technologies to facilitate vertical and horizontal integration of members. Focus on information management, gender mainstreaming, environment, decentralised information exchange etc.	This case study concerns an NGO network which is using modern ICT media for communication.
Gyandoot (egovernance)	To improve the efficiency, effectiveness, accountability and transparency of local government through increasing access to services, information and policy documentation by the public. To enhance the livelihoods of the public by providing better access to agricultural information, commerce, education and training facilities.	After a consultation on information needs, this project has set up a network of financially self standing kiosks which offer various services including gateways into local government
MANAGE (microcredit and extension)	To help increase rural farmers access to information services.	As an experiment in information extension, MANAGE has also set up a network of information kiosks, with an agricultural extension emphasis.
Global Voices	1.Globally: to inform Oxfam in its strategic review process so that it could be more effective in alleviating poverty; 2. Locally: to give people a tool that would give them a voice so they could be heard expressing their concerns and possible solutions on issues that affect them	Born from a strategic review process in Oxfam, this is a case of communities using video to increase awareness among government and their fellow community of the community needs.
CARDIN	To strengthen the capacity within the Caribbean community, for the collection indexing, dissemination and use of disaster related information serving as a sub-regional disaster information centre.	This is a network of institutions across the Caribbean using ICT to archive and retrieve data which is vital to their disaster preparedness planning.
UDS	To help the poorest uplift themselves, in consultation with them, by providing appropriate information to facilitate development; communication technology to receive and distribute information; and training people in its practical applications.	A small NGO has facilitated the setting up of centres which offers access to ICT and training services for small business
Revistazo	To provide an alternative communication media source to inform the public about issues surrounding corruption and social injustice in order to promote Good Governance within Honduras.	Using a web site, Revistazo is an online magazine that tackles sensitive political issues.
Digital Village	To provide training in and access to information and communication technology to previously disadvantaged communities.	Digital Village is an "original" Telecentre. It was set up to be a resource for the a poor community to enable access to computers for training, information gathering and communication.

The sustainability framework discussed in Section 3 was used as the basis for preliminary

investigations into over 20 potential case studies. 12 of these were then identified for further investigation, primarily on the basis that they best met the criteria for the research - enhanced ongoing development activities, possibility for replication, and some measure of sustainability.

The case studies have been compiled from information gathered during field visits to the areas in which projects are operating. This information is based on a mixture of factual data provided by case study projects, and information and opinion gleaned from a range of stakeholders in order to ensure that complete and balanced views of projects were obtained. Four categories of stakeholders were identified:

those ***directly involved*** with the project e.g.:

Project team	Management, Technical and software staff, Educationalists?, experts
Users committee or development committee	Chairperson, treasurer, volunteers?

users and beneficiaries:

Users	Particularly women, disadvantaged groups
Institutions (schools, clinics)	Head teachers, community health workers
Local business users	Information needs

those having an ***overview*** of project

National and regional government staff	Regulators ?
NGOs	Staff from related projects
Donor (if present)	Technical staff
Local government staff	Technical and political representatives

local people ***affected*** by the project:

Private sector	Tech and Soft providers, maintenance support
Other vendors	Local alternative access

A summary of the preliminary (or Level 1) case studies is presented in Appendix 3.

3 Sustainability

There is of course considerable debate over the sustainability of ICT in development interventions. 'In any discussion on sustainability it is important to clarify what is being sustained, for how long, for whose benefit and at whose cost, over what area, and measured by what criteria'. The accompanying paper presented in Appendix 1 (Sustainable Information and Communication Technology) discusses the background review the team undertook for this project. Accordingly the complexity of sustainability was taken as a core premise behind the research. Sustainability was taken to be more than just "ongoing financial cost recovery". While this should play a part in the use of ICT in development, there are many occasions where the development benefits, or "non direct cost recovery", may justify expenditure on

ICT by Government, donors or NGOs from central budgets.

The accompanying paper draws upon lessons learned in other sectors. Experience from technology orientated interventions intended to serve the poor, has found that there are a number of factors which contribute to sustainability. Using lessons and principles from the water, agriculture, environmental and livelihood sectors a framework was created to guide the case study writers.

The research framework was developed through an iterative process with the project collaborators. A draft research framework, developed from the literature, was used to categorise the key sustainability factors and develop a guiding set of questions for local consultants to work through with the case study interviewees. In most cases, a selection of people were interviewed both those who were directly involved (e.g. project staff, users of the ICT or ICT output) and indirectly (authorities who knew of the project but were not involved).

20 case studies were identified and some basic interviews were conducted. These were called level 1 case studies. 12 of the 20 were identified for further investigation, and these have been designated Level 2 studies. The analysis refers to the 12 Level 2 Studies only, although the remaining 8 Level 1 Studies are presented on the web site for visitors interest.

The initial framework was developed after piloting and the final list of factors is given below.

- *Objectives*

Hypothesis : - Clear objectives are which are held by the majority of stakeholders are needed to ensure organisational aspects of the activity are effective . The sustainability paper differentiates between Economic, Social and Institutional sustainability. The objective clarifies where the benefits may be found, what is the intended sustainability and whether these are intended to be based on direct or indirect cost recovery.

- *Target groups*

Hypothesis : - the groups of people to whom information will be made available need to be clearly identified - the target group of the activity may not be directly the poor. Some target groups may be institutions that support development processes. Sustainability may therefore be affected by whether the institution significantly contributes to the development process and whether the institutional factors are in place.

- *Intermediaries*

Hypothesis : - ICT are said to “disintermediate”, ie to provide the poor with more direct access to information. Potentially this removal of the “middle man” in transactions (both information and economic transactions) would credit the ICT activity with enough value to ensure its sustainability.

- *Policy environment*

Hypothesis : - ICT activities cannot be in isolation from the policy environment. ICT policies may restrict the ICT activity. Other policies may encourage or discourage the application of ICTs. If ICTs are to be part of a sustainable activity there will need to be a suitable policy environment.

- *Institutional arrangements*

Hypothesis : - Institutional sustainability is said to be achieved when prevailing structures and processes have the capacity to continue to perform their functions over the long term. What are the arrangements for the case study?

- *Key linkages*

Hypothesis : - Any development activity cannot be undertaken in isolation, and any organisation cannot work without links to the relevant authorities and other organisations working in connected areas. Links are needed to external sources of information.

- *The project process*

Hypothesis : - Sustainability is said to be closely associated with the planning process of an activity, and its inclusion of both the target group and in some cases the long term indirect beneficiaries.

- *Capacity*

Hypothesis : - The sustainability will be affected by the human capital available – the capacity of staff, volunteers and users to undertake the ICT activity. This may be technical capacity but is likely also to include organisational and management capacity.

- *Technology*

Hypothesis : - Sustainability of an ICT activity is likely to be strongly influenced by the technology used e.g. operation and repair may be critical to the success of the activity. In other sectors it has been found that some form of standardisation of a technology instrument has helped development ensuring a sufficient use to encourage a market that can supply spares and technology support.

- *Finance*

Hypothesis : - Replacement costs will form part of the economic sustainability, and cost recovery will encourage institutional sustainability.

- *Development benefits*

Hypothesis : - overall benefits of the ICT activity justify the costs.

The premise was that all these factors would have to be in balance for a project to be in some form sustainable. The analysis therefore considered these factors and draws some of the common points arising from them.

During the analysis it became clear that this framework did not present all the significant factors and the sections on content and language completed the analysis.

4 Observations and Findings

The DFID Policy paper on ICT role in the alleviation of poverty states that ICT must be embedded in the every day development process, and not isolated as a new sector. These case studies emphasise how the ICT in the study has been included in the context of an ongoing

project in order to enhance or co-ordinate an action or activity. The one exception to this is perhaps Digital Village, which was a specific ICT project, standing alone, set up with the view to tackling a particular ICT related community need.

4.1 *Objectives*

Hypothesis : - Clear objectives are which are held by the majority of stakeholders are needed to ensure organisational aspects of the activity are effective . The sustainability paper differentiates between Economic, Social and Institutional sustainability. The objective clarifies where the benefits may be found, what is the intended sustainability and whether these are intended to be based on direct or indirect cost recovery.

The objectives of each case study have been presented in Table 1, and not surprisingly, have a common theme of access to information. Most ICT projects represent the application of ICT in support of development objectives. Having said that, there are some projects that deal solely with technology, notably computer training projects. However, these are targeted at well defined groups where skills have been identified as an enabling factor. Overall, we can group projects around a core set of objectives although many of the studies address more than one facet:

- Enhancing information to planners
- Increasing citizens access to governance
- Enhancing livelihood incomes of the poor
- Enhancing livelihoods of the poor.

Enhancing information to planners:- To CARDIN, MIGIS, and KUMINFO, the ICT is primarily a mechanism for increasing the accuracy of data available to planners – both Government and NGO. Whilst the indirect beneficiaries are poor communities and the projects each have a poverty theme, the direct users of the data are planners. In the case of MIGIS, the technology facilitates participatory collection of data and enhances and endorses the data coming from the rural people.

One might put Deniva in to the same category, as the NGO network facilitates information exchange and flows among its members and to the government, again allowing the planning processes of development activities to have increased efficiencies.

Increasing citizens access to governance (promoting good governance):- Revistazo and Gyandoot specifically seek to help citizens in their project area to access and exercise their rights through e-links to the relevant government departments. In the case of Gynadoot this is directly in facilitating users to access government forms and information services. This has had considerable impact on corruption levels. In the case of Revistazo, sensitive information about corruption is brought into the public arena and discussed often with the desired effect.

One might put the MANAGE study in the same category since it attempts to facilitate communication between service organisations and ensure that access by citizens to finance (credit, banks) is eased.

Enhancing livelihood incomes of the poor:- UDS, Digital Village and Food Marketers primarily seek either to prepare users for employment or to enhance existing employment opportunities. The Food Marketers are attempting to find new or increasing markets for traditional production by artisans. Digital Village on the other hand is seeking to prepare

young people for the new markets by giving them new skills in computing. UDS offers access and training specifically to enhance opportunities for income. However, Gyandoot and MANAGE, by offering access to ICT also enhance livelihoods, and in particular MANAGE offers mechanisms for finance.

Enhancing livelihoods of the poor:- The ACISAM project, with its distinct emphasis on mental health, illustrates how a community can be enhanced by broadcasting of relevant critical information. All the other cases also offer opportunities for communities to enhance their livelihoods by access to strategic information either directly or indirectly. For instance UDS aim to serve as an information resources for local NGOs and CBOs

Table 2: Overview of organisational ICT project objectives

Name of Organisation	**Enhancing information to planners**	**Increasing citizens access to governance**	**Enhancing livelihood incomes of the poor**	**Enhancing livelihoods of the poor**
ACISAM				x
KUMINFO	x			x
MIGIS	x	x		x
FOOD (ecommerce)			x	x
Deniva	x			x
Gyandoot (egovernance)		x	x	x
MANAGE (microcredit and extension)		x	x	x
Global Voices	x			x
CARDIN	x			x
UDS			x	x
Revistazo		x		x
Digital Village		x	x	x

The case studies seem to support the hypothesis. There are various forms of sustainability and some of the case studies are not intended to show economic sustainability, but are supporting social and institutional sustainability.

4.2 *Target Groups*

Hypothesis : - the groups of people to whom information will be made available need to be clearly identified - the target group of the activity may not be directly the poor. Some target groups may be institutions that support development processes. Sustainability may therefore be affected by whether the institution significantly contributes to the development process and whether the institutional factors are in place.

The target groups are those group) that actually use and benefit from the project itself; they may be distinct from the intended final beneficiaries. Categories of target groups include:

- Government - highly educated, but, as the recent e-governance debates have illustrated, not always very ICT aware in terms of the realities of what ICT can do or how to commission them.
- Donors INGO and Large international NGO– highly educated, relatively ICT aware, access to resources (not only financial);
- Networks (national) – highly educated and resource rich, in order to perform function as a resource for other NGOs;
- NGOs (national) – large range of ability from very small, local initiatives driven by a charismatic individual, to large, professionally run organisations;

- CBOs – tend to be small, local organisations; since they have a reliance on community members this can often mean that levels of education and awareness may be low;
- Citizens – poor members of communities intended as ultimate beneficiaries of development interventions.

Table 3: Overview of target groups for each organisation

	Government	*Donor/INGO*	*Networks (national)*	*NGOs (national)*	*CBOs*	*Citizens*
ACISAM			x			x
KUMINFO	x	x	x			x
MIGIS	x	x				x
FOOD (ecommerce)					x	x
Deniva	x		x	x	x	
Gyandoot (governance)	x	x			x	x
MANAGE (micro credit and extension)	x				x	x
Global Voices	x	x			x	x
CARDIN	x	x	x			
UDS					x	x
Revistazo	x	x		x		x
Digital Village					x	x

CARDIN, MIGIS and KUMINFO who each have objectives focussed on enhancing the planning process, the target group are the institutions involved in the planning process. This is not to say they do not have interaction with poor communities. MIGIS for instance is intended to be used with communities to enhance the **participatory** planning process.

Of the rest we can identify a difference between the cases that intend their services to be accessed by those who are to some degree computer literate and those that are for everyone in the community.

ACISAM is broadcasting within a community, effectively acting as community television. Almost all the community will have some exposure to the broadcasts and no degree of computer literacy is required to reap the benefits of the service.

The target group of Revistazo on the other hand, is the internet users of Honduras - "There are approximately 125,000 internet users in Honduras, mostly middle to upper class citizens, including NGOs, businesses, and government users. This obviously limits the accessibility and impact for lower classes. However, the middle and upper class people are the ones who have the power and influence to make legal/policy changes which will ultimately benefit the poor at a structural level." Revistazo Case Study

While the case studies illustrate a range of target groups, and support the premise that an ICT activity may not be targeted directly at the poor, there is little in the studies that demonstrates what the essential features of a target group are for sustainability. Some features can be deduced by considering the contribution to the development process and the benefits which is discussed below.

4.3 *Intermediaries*

Hypothesis : - ICT are said to "disintermediate", ie to provide the poor with more direct access to information. Potentially this removal of the "middle man" in transactions (both information and economic transactions) would credit the ICT activity with enough value to ensure its sustainability.

Associated with the target group is the role of intermediary. A much discussed aspect of ICT is the potential they have for "disintermediation" i.e. removing intermediaries from the process of enhancing livelihoods by allowing the poor a direct voice to the authorities and in their own planning, and direct access to the information they need.

In any discussion of intermediaries in ICT, one notes a distinction between those who intermediate with some vested interest in the information (e.g. the corrupt official who might offer advice that leads to a bribe), and those that are "technical intermediaries" or intermediaries for access e.g. in Gyandoot and MANAGE. Many rural people need assistance to access information on the ICT. They may not have keyboard skills, their literacy may be low and they may require items to be read aloud to them, key information may not be in a local language, they may require assistance to search for the information, or to fill in forms on screen..

However although intermediaries are needed to help in access, there is a removal of intermediaries, in the form of government officials, in terms of "gatekeeping". Gyandoot has evidence that villagers who previously had to spend time travelling to an office, and then wait for a particular official to issue the required piece of paper can now gain the papers via the ICT. This is quoted as an example of increased transparency, and is said to have lowered corruption. The ICT has removed the gatekeeping role of the official.

Table 4 The role of intermediaries

Name of organisation	**Has it removed "gatekeepers"**	**Does ICT activity need an intermediary to collect and collate information for it to then provide for the community?**	**Do clients generally need intermediary to access information**
ACISAM	Takes discussion of mental health beyond health professionals	Builds Capacity so community can express themselves and have "control"	Audio and visual presentations in own language allowing direct access by illiterate and semi literate users who have basic knowledge of video.
KUMINFO	Takes mapping beyond official "storehouse"	Although involves community, it needs intermediaries to digitise the data	Data held in relatively sophisticated way and communities need intermediaries to access data
MIGIS	Takes mapping beyond official "storehouse"	Although involves community, it needs intermediaries to digitise the data	Data fed back by "access intermediaries"
FOOD (ecommerce)	Created alternatives to local marketers	Uses e-marketers to assist handicraft makers to present their products	Uses e-marketers to assist handicraft makers to present their products
Deniva	Not known. Has made communication more effective.	Institutional collection of data as part of ongoing work. May or may not need ICT specialist	Accessed by other NGOs, who may or may not have required ICT skills.

Gyandoot (egovernance)	Has brought information out of physical offices, made useful for villagers.	Requires Government to co-operate and make information available.	Villagers may need assistance to operate ICT and identify relevant information.
MANAGE (microcredit and extension)	Has brought information out of physical offices, made useful for villagers.	Requires Government to co-operate and make information available.	Villagers may need assistance to operate ICT and identify relevant information.
Global Voices	Has allowed communities to describe and advocate their situation to development actors	Capacity builds so community can express themselves and have "control"	Audio and visual presentations in own language, but may require intermediary to present to development actors outside community
CARDIN	Collation of data that was available only in traditional form (removes need to travel)	Very much so. Role of CARDIN is as intermediary to collect and collate information	Data held in relatively sophisticated way and target groups may need intermediaries to access data
UDS	Makes available information not previously available mainly due to weak infrastructure	UDS intermediates the information available	Clients may need assistance to operate ICT and identify relevant information.
Revistazo	Makes available information not previously available. Disintermediates journalistic constraints	Revistazo intermediates the information available	Clients may need assistance to operate ICT but target group generally able to access without assistance.
Digital Village	No obvious gatekeepers to editorial content	Staff have collected key information required for training	Clients may need assistance to operate ICT and identify relevant information.

In most of the cases the introduction of ICT has "disintermediated" in making information that was previously only accessible through a particular office more available, through alternative access points. However, the access requires some knowledge of ICT and those who are illiterate have not necessarily direct "disintermediated" access. Even if the information is not being mediated in the sense of being translated or adapted for a different group, there are still intermediaries in terms of access. In many cases the final users need assistance to access the information – young people who help the computer illiterate or semi literate. The assistants mediate the information although the information could in theory be accessed directly by the poor. As such ICT are potentially a long term mechanism for removing intermediaries.

The case studies seem to illustrate re-intermediation rather than dis-intermediation. There are examples of removing the "middle man", and this has proved beneficial particularly where the intermediary had a vested interest in the transaction. The studies show that there often remains a need for technical facilitation, though - what we might call an ICT intermediary. The difference between the original intermediary and the ICT intermediary is significant. In the former case, there was probably only a few people who could access information (or services), and therefore they had near monopolistic power which could be abused. In the latter case, although the ICT intermediary has the vested interest of earning a salary or commission, there are potentially thousands of ICT intermediaries for each activity, and the abuse of that position is unlikely.

The case studies partly support the hypothesis and show that ICT activities therefore re-intermediate rather than dis-intermediate, and that although this may present a degree of vulnerability to users, the risks are generally much less than in traditional transactions.

4.4 *Policy environment*

Hypothesis : - ICT activities cannot be in isolation from the policy environment. ICT policies may restrict the ICT activity. Other policies may encourage or discourage the application of ICTs. If ICTs are to be part of a sustainable activity there will need to be a suitable policy environment.

Most of the case studies report that they are working within existing policy arrangements. Many of them are using ICTs as a tool in their development activities which are being carried out within the policy context of development programmes and national ICT policies (where these exist). In most cases the ICT policy for the country was in a fledgling state. The case studies therefore shed very little light on the form or structure of ICT policies, and their influence on ICT activities.

With the creation of PRSPs more governments are beginning to look at new ways of collecting information in order to meet donor and World Bank 'participatory' requirements. The use of ICTs in both increasing access to government facilities and improving data collection is shown through a number of the case studies.

Gyandoot seems to be an excellent example of how ICTs can add value to existing policies. Through the ICTs the villagers were able to access government services that otherwise would take days to access. Policies put in place that were intended to assist the communities had had their value eroded by long delays on bureaucracy and the presence of corruption. The ICTs seem to bypass the delays and have contributed to government policies being what they were intended to be.

There are two case study ACISAM and Revistazo examples that show the need for changes in ICT policies. Special arrangements were needed for ACISAM to overcome policy restrictions. It would have been helpful if ACISAM as a small NGO could have bid for radio and television space. However, policy in Honduras is such that this was not possible. Therefore the alternative, cable television was used. Revistazo found that some laws pertaining to publishing were not clear when applied to an internet site. They registered as a magazine to overcome the possible confusion.

Regarding wider policy restrictions the only affect on an organisations work was concerned on Digital Village. Digital village built upon the policies on youth and employment within South Africa. However in this case, the absence of certification for their training DIGITAL VILLAGE Access to government support When the centre meets the policy framework requirements it can access government funding for the delivery of learnerships. It will also stand a chance of financial support for the development of new learnerships. National government as a stakeholder has facilitated a positive policy environment for projects such as the centre. For instance, previously such projects could not give recognised qualifications unless they were an extension of an educational institute. Currently they can apply for registration as accredited providers. This also opens other benefits such as state subsidies, contracts and subsidised learners under special conditions. has lessoned the value of the centre to its clients. It seems important that specialist ICT activities not only fit within the existing policy environment but also be seen to do so.

The case studies support the hypothesis. They illustrate that ICT policies can affect the day to day working of the ICT activity (particularly negatively, e.g. ACISAM and Revistazo). They also illustrate how the ICT activity is particularly enhanced when planned to be set in the context of other policies, and in some cases can even influence

change of policies.

4.5 *Institutional arrangement*

Hypothesis : - Institutional sustainability is said to be achieved when prevailing structures and processes have the capacity to continue to perform their functions over the long term. What are the arrangements for the case study?

We can group the case studies as follows:-

Network model – CARDIN is very much a network of independent institutions. "The model chosen for the network is a distributed system with the regional nodes, national nodes, coordinating units and collaborating agencies having clear agreements regarding responsibilities and benefits of participation." CARDIN Case study. For the model to work there had to be a clear definition of tasks, roles and responsibilities. The role of ICTs was not only the core one of management of disaster information, but also for communication between institutions. Regular contact within the network is only possible through modern communication.

Deniva is also described as a network, although its structure is more of a formal institution co-ordinating membership. It draws its Board of directors from all over the country, however it nevertheless has a traditional Board of directors – i.e. a single frame of reference managing the whole.

Networking environment – The difference between say Deniva and FOOD is that one is a network whereas the other is trying to facilitate networking. FOOD in its action with artisans hoped to create a networking environment. It undertook activities including short-listing women cooperatives and NGOs producing indigenous products, collecting information on products manufactured by them, orienting the short-listed organisations on e-commerce, designing and hosting the e-commerce store, setting up Internet access and related infrastructure, researching online promotion and customer relations strategies, training the e-marketers in online promotion and customer relations, monitoring and evaluating the performance of the e-commerce store as well as e-marketers**.** Food itself is an NGO with a clear institutional structure, however its use of ICTs is more as a key to networking.

Similarly, MANAGE placed their ICT component within the institutional structure (MACTCS) where self help groups had already been established. Gyandoot also create a networking environment for small institutions (SOOCHAKs - Manager/owner of the kiosk - The person operating the kiosk is a local matriculate operator and is called Soochak. A Soochak is not an employee but an entrepreneur).

These examples show the role of an NGO to co-ordinate between existing community level structures whether communal (civil society) or private.

Non Government Organisation (Information Resource) - The co-ordinating institutions above are in most cases NGOs. Revistazo, ACISAM, Digital Village, are classical NGOs with an independent structure and management. In some cases the organisation was registered specifically for the ICT action – Digital Village and to a certain extent Revistazo. KUMINFO seeks to serve the planning process for natural resources although it is registered as an NGO with a definable organogram. In the other cases, the ICT work is only part of the

overall activities of the NGO and is therefore a department or integrated into all sections of the NGO.

Once again we conclude that there is perhaps nothing special about the institutional arrangements required to make an ICT activity successful. The role of the ICTs is, not surprisingly, to enhance communication whether the organisation is part of a formal network or is trying to promote networking. When the institutional framework is a widespread network, such as in CARDIN, the ICT component is essential in maintaining contact between the actors. Where a more singular institution is involved, such as Digital Village, the role of the inter-organisation communication seems less essential in the day to day operation of the institution.

Linkages between institutions and clients are of course important, but the case studies show little evidence that the ICT plays an essential role in communicating to the community. What is obvious from the studies is that it is important to these organisations that the connections to the communities they serve are strong. Digital Village calls the community a stakeholder and there is representation on the Board. ACISAM intends the community to take responsibility for the equipment and produce their own programmes, and therefore involves them in decision making even though they are not an actual part of the NGO institutional management. The community is drawn in using traditional mechanisms for communication – word of mouth, advertising posters, community meetings. The importance of this is discussed in the next section on project processes.

The studies demonstrate the link between the target group, the intended form of sustainability and the institutional arrangement. They seem to indicate that the capacity of the institution has in each case has been enhanced such that "processes and structures will perform over time".

4.6 *Key Linkages*

Hypothesis : - Any development activity cannot be undertaken in isolation, and any organisation cannot work without links to the relevant authorities and other organisations working in connected areas. Links are needed to external sources of information.

When considering sustainability, it is not always desirable to have a project independent and self sufficient. Indeed in many cases it is the interdependence of projects on other institutions and projects within a country that make them work.

In the case studies we see many linkages that are vital to the success of the project. For CARDIN, the network, there are extensive linkages across the Caribbean. For Acisam links to local government are critical for undertaking their project. Deniva notes "Linkages between members themselves can be an effective means of capacity building.". Continuing on the theme of capacity building the MIGIS study notes : "**HIMS** (Honghe Institute of Minority Studies) saw the MIGIS project as a chance to extend their international connections and make a contribution to development work. MIGIS was to train a group of their researchers in PRA so that they could undertake work for development agencies and make PRA a part of their literacy training programme."

So the projects themselves can provide useful links to capacity building activities (not necessarily related directly to ICTs) and often depend on key linkages in order to operate.

ICTs enable access to information and no single project has a monolpoly on information. Gynadoot has an obvious success in its links to local authorities who were prepared to release information to be delivered by the ICT. UDS is a resources centre and as such is of itself of limited value unless there are links to other sources of relevant information.

This section is closely related to institutional arrangements and policy frameworks. The hypothesis is reflected in the case studies and key linkages can be seen. These links are supportive of the institution, of the implementation of policy and in capacity (both technical, informational and organisational) support.

4.7 *Project processes.*

Hypothesis : - Sustainability is said to be closely associated with the planning process of an activity, and its inclusion of both the target group and in some cases the long term indirect beneficiaries.

Having stated above the need for "connecting" to the clients, it is interesting to consider the project processes involved in these case studies. In the development community generally the premise that participation by users of a service in its planning and implementation leads to a greater sense of ownership and therefore a greater sustainability has gained considerable momentum. It is said that if people own a service then they will be willing to pay higher rates for the service, and perhaps undertake volunteer work to ensure the service is maintained.

The case studies offer very little evidence to support this premise. In the case of information technology there may be a need to distinguish between ownership of the technology, and ownership of the information provided (or the deliverables).

In each of the case studies discussed below the focus is on ownership of the information by the community, not the ownership of the ICTs.

Ownership of information

MIGIS is a clear case in point. It is a tool for the community to use. The communities that ended up using it would have been unlikely to conceive it, and do not own or retain the equipment. A clear case where the question is not so much their ownership of the ICT but their ownership of the outputs.

Participatory processes to establish information needs

In the cases of CARDIN, MANAGE, Revistazo and Deniva, the inclusion of, or activity based on ICTs was conceived by the NGO and although implemented with due sensitivity to its clients, it cannot be said to have been planned participatively. However, some sense of ownership of the ICTs may well have been generated by the needs surveys.

FOOD specifically reports that its plans were designed in consultation with the artisans, NGOs and women cooperatives

ACISAM works closely with the community, planning the details of each action. "The topics are based on community themes. When entering a community initially they will do an

assessment (community diagnosis) of the community to identify themes, as well as the most vulnerable groups, those who are the most needy for the project. They involve a few of these people in the first community video, show it to the rest of the community, and then, once a group of people (usually groups of 10 - 15 youths from 15 - 28 yrs old) are enthusiastic and committed to the training process (which takes 6 months), they'll let them start taking on their own projects based on their own themes. The important thing to ACISAM is to help construct alternative means for communication at a local level, and this has both a technical and a conceptual side to it as well. However, the overall involvement of ICTs in advocacy and education was an informed decision taken by the NGO." ACISAM Case Study

"The services/facilities on Gyandoot have been chosen through a participatory process involving the community, government officials and the Gyandoot team. During the formation of the project proposal, a detailed RRA/PRA exercise was taken up involving the villagers and the community. The selection of the services was a result of this interactive exercise and was based upon the advice and the felt needs of the villagers." Gyandoot Case Study.

Similarly KUMINFO collects data from villages, and it is the responsibility of the villagers to provide that data. The study admits "The data is not forthcoming because there is nothing in it for these target groups as far as funding of their activities is concerned since they incur cost in gathering and bringing data. There is also a format for collecting the data and they sometimes find it difficult getting it into that format." The classic "no funding, no co-operation" is perhaps evident that the community do not own the project, and this may be due to the large area that KUMINFO deals with in and around Kumasi. In this case the lack of consultation perhaps caused a weakness. It is not clear whether target groups were consulted on the data collection format, whether they were asked if they wanted to participate in data collection, or who made those decisions?

We see that there were connections and consultations in the planning process of the project and have a description of some consultative processes and the kind and extent of ownership. However there is little evidence that people feel ownership of the information (to some extent it is implicit by willingness to pay). Ownership of the ICT per se by the community is not necessarily a feature of all the case studies. Community committees do operate and manage the ICTs in the cases of FOOD, MANAGE and Gyandoot, although it is not clear what the current levels of ownership and "buy-in" are.

Ownership by communities can grow with sufficient dialogue and consultation. Other studies[1] show that an exit strategy that desires to hand over technology to a target group can be planned and be successful regardless of the entry strategy. In these case studies Digital Village intends to fully hand over the ICT assets to the community without future NGO control, and a number of other cases may do in the longer term. The other studies consider ICTs role in the context of ongoing institutional and community development.

Gender

Gender did not seem to be an issue with any organisation except with regards to Gyandoot's internet cafes. Here the issue was lack of access by men. They could only access the facilities through their wives or a female member of their family. How this affects the traditional social roles was not noted. In contrast MIGIS noted that the use of technology

[1]Ref Exit strategies?

during the PRA exercise did not create barriers to either men or women's participation.

The studies describe a variety of approaches in project processes and seem to support the hypothesis. There is some evidence from within the studies that participatory planning processes enhance the project as a whole, although this seems to be more in terms of tailoring the ICT activities to the information needs as opposed to an intended ownership of the ICT activity by the target group.

4.8 *Capacity*

Hypothesis : - The sustainability will be affected by the human capital available – the capacity of staff, volunteers and users to undertake the ICT activity. This may be technical capacity but is likely also to include organisational and management capacity.

How much does the success of the project depend on having the capacity to set up, operate and maintain technology?

Some crucial capacity building can be identified in each of the case studies. In some cases, such as CARDIN and Revistazo, the key person is technical and knows how to handle the ICT. However they both need further training in the more systemic aspects of their work – collation of data, interpretation of data. MANAGE and Gyandoot both have technically qualified personnel and attempt to pass on this technical knowledge to their clients.

FOOD go one step further and take educated unemployed youth who have at least a basic graduate degree and reasonable understanding of English. FOOD has trained these e-marketers on various aspects from basic communication skills to technical aspects like updating the web site and online marketing.

Acisam staff have art and social work qualifications and needed basic training on the technical aspects of the work. MIGIS trains its clients in PRA techniques alongside the ICT use.

It is therefore stating the obvious to say that the projects depend on a mix of skills. The fact that each project did not start with the skills but has sought and is seeking to build the capacity of its staff into the missing skills areas is important.

When considering the lack of capacity at the start of the project, and the persistence that overcomes problems and develops appropriate capacity we need to note the role of the "Champion". In most of the studies there is an identifiable Champion who has overcome the inevitable difficulties presented by pioneering new ways of working. In CARDIN, Beverley Lashley the project co-ordinator; in MIGIS, John McKinnon; for Digital Village the project manager Johannes Mphahlele kept the centre evolving when other similar centres closed.

In the Indian Case studies there are institutional champions, organisations who have the idea and take it forward. In Global Voices the lack of good leadership has lead to poor co-ordination and continued lack of motivation for the project.

The Champions do not necessarily start with the required skills. But their intention to succeed motivates them to find the skills and gain the capacity.

The case studies illustrate the hypothesis, ie the need for both technical and organisational capacity. However, they seem to draw out three important principles. First, most of the case studies have an identifiable "Champion" - either a person or group who want to see the project succeed. Second, the project does not need to start with the required capacities - it can gain the capacities as the project develops. Third, the capacities need not be within the project organisation or target group. The studies show three mechanisms for gaining capacity: it is possible to buy-in expertise when necessary, to hire specific skilled staff or to train existing staff (or volunteers).

4.9 *Technology*

Hypothesis : - Sustainability of an ICT activity is likely to be strongly influenced by the technology used e.g. operation and repair may be critical to the success of the activity. In other sectors it has been found that some form of standardisation of a technology instrument has helped development ensuring a sufficient use to encourage a market that can supply spares and technology support.

Alongside staff capacity, there is of course some ICT hardware employed by the project. The range of technology within the case studies is quite broad.

At one end, Digital Village with its 35 mid range computers, fully networked with latest software is an example of what can happen when the donor is a computer and software manufacturer. Both Gyandoot and MANAGE installed mid range PC into villages. In these circumstances there is considerable expense on other items such as stabilisers and wireless networks.

FOOD has encouraged some of its marketers to use cyber cafés, effectively renting the equipment. This is an interesting concept as it makes the point that there may not be a need to invest in technology and it is an approach that supports local businesses. The UDS study mentions that UDS as a resources centre had had an impact of suppressing local (ICT access) businesses.

MIGIS has a limited number of sets of equipment. These sets contain not just standard PCs but specialist equipment such as GPS. They had to invest in generators to ensure they could work in remote locations.

CARDIN, being part of a university, used the infrastructure already available. The library had 15 computers all of which can be used to digitise the data. And each networked organisation had computers for their own administration purposes.

In contrast Deniva has a few PC but only one is connected to the email, Revistazo has a single PC and ACISAM has almost no digital equipment but relies instead on analogue video.

What conclusion if any can we draw from this breadth of technology? If anything it should be that there is no standard yet for ICT projects. Technology changes so quickly. ACISAM would benefit from going to digital cameras but this has only been potentially cost effective in the last twelve months. What have been installed as "mid range" PCs will be almost bottom end PCs by the time this document is published.

In other sectors, sustainability is often linked to standardisation. Standard spare parts are necessary to ensure maintenance of equipment. ICTs change so quickly it is unlikely that

anyone could ever prescribe a standard product. What is important is that the projects are using equipment that can be found internationally. None of the studies shows a specialist innovation in technology that directly and "magically" eliminates poverty – they all demonstrate a use of standard technology within a developmental context that within that context addresses poverty issues.

There is a need for different tools for different applications.

What has become apparent is the unreliability and high repair costs attached to second hand computers. UDS and KUMINFO among others highlighted this as a major cost and hindrance of their projects. The limited life of ICT hardware can often make it a false economy to acquire second hand equipment.

Unreliability of power supplies (often grid electricity) was a technical problem mentioned in many of the case studies, and should be considered when planning projects.

Similarly connectivity still remains an issue in many of the projects. Sometimes this can be overcome by planning and management - MANAGE has got around the poor phone connections by down loading the most demanded information first thing in the morning, so that the local communities are still able to access the information offline.

Alongside ICT hardware, there is of course some software employed by the project.

Some of the case studies have developed or use adapted software. KUMINFO developed a database, and created a specific user interface. MIGIS adapted software to illustrate the outputs of the participatory process. Most of the other studies which use computers (as opposed to say Global Voices that only uses video) use standard programmes and have used them to design their interfaces (eg Revistazo web space, Digital Village training packages).

There seemed to be little awareness during the interviews for the case studies about alternatives to Microsoft. Although there is an ongoing debate in the ICT development community about open source software, this did not feature in the studies, with the exception of FOOD who use Linux for their operating system.

In terms of sustainability, the key issues in technology seem to be:

- **the use of commercially available equipment i.e. that there is a local (within country) IT industry that can do repairs and source spare parts,**
- **a willingness to overcome technical difficulties, which are the bane of all users of ICTs, and which in many cases will get easier in the longer term e.g. increased opportunities for connectivity, more robust operating systems,**
- **a quantity and style of equipment that matches the use, which is a factor of matching the plans to the resources available.**

Table 5 Summary of technology and funding sources for case studies

	Technology	***Funding***
ACISAM	6 sets of pf video equipment	international funding agencies; sale of services to NGOS
CARDIN	Training room at the main library has 15 computers. Server to host network Industrial scanner Computers and printers	ECHO
DENIVA	1 email connected PC 80% of the leaders of member organisations have mobile phones, only around half have email addresses, and some of these may be accessing via cyber cafes	NOVIB, HIVOS (NL), SNV, MS Uganda, Ford Foundation, ActionAid. DANIDA
Digital Village	35 computers networked using Windows NT connected permanently to the internet.	The emphasis on membership (and membership fees) was to encourage financial sustainability Sponsorship from Africare and Microsoft Fees are charged to learners
FOOD	Web site; Server hosted in the USA, with a 64kbps dedicated line. Operated using Linux, and connected to a UPS.	IDRC, FOOD difficult for emarketers to make profit
Global Voices	Community video	seed funding from Oxfam
Gyandoot government	Intranet system that connects rural cyber kiosks Each kiosk is supplied with one multimedia computer, a modem, an UPS with 4hours of back-up, a printer and a telephone	modest initial funding, remainder by private parties. kiosks run commercially
KUMINFO	Three PCs, three printers (2 A4s and 1 A3), one laminator and one scanner. Software	UK – DFID, IRNR
MANAGE	Each village information kiosk was equipped with a multimedia PC, a dot matrix printer, modem and UPS	MANAGE (funded by Ministry of Agriculture) Limited revenue is generated through the kiosk
MIGIS	Laptop, roll-up digitiser, digital camera, a video projector a scanner and a generator to provide a reliable source of power	New Zealand secretary of foreign affairs and trade.
REVISTAZO	1 high capacity computer (Pentium 4, 1.5 Mhz, 40GB, 502 ram), 2 lower capacity ones for word processing and simple design; a digital camera.	Initially through a surplus in ASJs general fund, but more recently through a support network of friends in the USA.
UDS	2 laptops, 1 PC, 1 printer, 1 photocopier, and 1 fax in the Kampala office. In Kumuli 1 fax, 1 laptop, 3 PCs, 2 printers.	Private individuals, UK national lottery.

4.10 *Finance*

Hypothesis : - Replacement costs will form part of the economic sustainability, and cost recovery will encourage institutional sustainability.

There are many examples of ICTs projects that have made some impact on their target group. The criticism of some of these projects is that they have had hundreds of thousands of dollars, sometimes millions of donor funding put into them, and a casual cost benefit analysis does not seem to many onlookers to be reasonable. In their defence, many people would note the

experimental pilot nature of ICT projects, that as the technology changes new ideas and approaches need to be investigated.

The case studies were chosen because they had limited donor funding. They are all under approximately $200,000. Having said this it is difficult to know where the system boundary is. One of the difficulties of a cost benefit analysis is defining where the system boundaries are for the costs. Most of the case studies report on how much equipment they purchased but few describe the overall costs in detail.

Revistazo has a single high specification PC, purchased at a little over $1000, although the overall project had a budget of $70,000 later reduced to $1500 per month.

The FOOD Emarketing also attempts to explain the overall balance of costs "Out of the project cost about 30% is towards capital equipment, 10% is towards salaries for the project team, 15% towards e-marketing research expenses, 25% towards training and the rest towards administrative and maintenance expenditure.".

CARDIN, the network, built upon many institutions and while the project itself had a grant of $230,000, one would have to note that much of the technical infrastructure was already in place, and that much of the expenditure was in the soft system expenses of networking – communication, workshops, publicity.

ACISAM has ongoing grants since its work is concerned with the welfare of the community, although it has stories of replication by local people – a key indication that the costs of the project are reasonable. "The community where beneficiary interviews were conducted is run by a sugar mill. The sugar mill owners have also taken an interest in the community and the video team, and will be donating video equipment for their use. Also, the group of community video and radio teams (around 120 total) is forming an association called COPAK, with the goal of purchasing their own equipment, thus guaranteeing that the community video and radio process will continue."

In Gyandoot, a single kiosk was estimated at $1500, although the whole project is at $50,000.

To many people who discuss ICTs one of the main concerns for sustainability focuses on the economics of the system. However as noted in the consultation one must "Be clear about what exactly it is you are trying to sustain".

ACISAM has no aspirations for economic sustainability. As a project that is effectively social work on mental health, it is reasonable for it to expect support from either central government or benevolent outsiders.

The national service of KUMINFO, dealing with a subject that has little direct return for people but has long term benefit for the region has found that "The project is trying to charge for services but they are having difficulties with how much to charge."

Digital Village has continually changed its cost structure to try to reach a level that can sustain its ongoing costs. While it has achieved some stability on recurrent costs it has not been able to replace equipment and has needed a further injection of capital from donors to upgrade outdated equipment.

For e-marketing the recurring expenses for FOOD has been to maintain the e-commerce server. The artisans pay between 2 to 5% to FOOD to maintain this server with credit card facilities.

Gyandoot on the other hand is seeking to make the kiosks a private enterprise that can survive. They have spent money on the backbone of the ICT infrastructure and from this the kiosks can generate enough income to pay their own operation and maintenance costs. Most of the Soochaks comfortably earn their livelihood.

One must ask the question as to whether revenue in these early years is due to an initial enthusiasm or likely to be sustainable? All indications are that it has longer term benefits and that because of this new investor such as banks are expanding the system. The answer is best illustrated by Gyandoot:-

On-line Registration of Applications (Rs. 10):
The villagers can file applications for land records, driving licenses, caste/income/domicile certificates or for getting demarcation done etc. through the kiosk. They also get intimation when the certificate is ready for collection. The service leads to time and money saving for citizens. It also helps in lowering of corruption, as everyone has to work in deadlines, and there is a minimum interaction between the customer and the department official

On-line Public Grievance Redressal (Rs. 10):
Complaints ensure a pro-active and super-efficient department:
In the village Bagdi, the people no longer feel the need of complaining about the hand pump. A complaint was made through the kiosk about the malfunctioning of the hand pump of the village, which was corrected within 3 days. Another complaint was made of the hand pump of a nearby village, which too got corrected in a week. The administration reprimanded the department with the result that the mechanic himself keeps monitoring & inquiring about the status of hand pumps.

These anecdotes on the benefits of the Gyandoot system leads to the crucial question of benefits generally (see next section).

What then can be said about the Hypothesis? The case studies say very little about replacement costs. For example Gyandoot intends to be economically sustainable and has made significant progress towards this end, yet it still is too early to comment clearly on replacement costs.

While Gyandoot seems to be showing a case where information is important enough for users to pay for it, this is not so for other cases. Filling the information gap drains finances, and although people want the information many are not willing to pay for it. This is illustrated by comments on the difficulty to get donors to fund ICT activities made by a number of the studies. There is often a lack of recognition that to get information on the different topics together takes time and energy.

Global Voices in contrast would say that the project was never intended to be cost recovering, and therefore no provision was made for replacement. Future activities that might require other equipment would be funded externally in order to obtain the developmental benefits.

For those case studies that intend to be economically sustainable, there are indications of progress towards this end. However, it remains early days to see whether cost recovery includes replacement costs for all the equipment involved. For those who have used an ICT activity to move towards institutional sustainability, there have been signs of some

cost recovery, but generally at levels insufficient for replacement of equipment. Some of the cases note a reluctance from donors to fund ICT activities that might nevertheless in the longer term increase effectiveness and efficiency.

4.11 *Development benefits*

Hypothesis : - overall benefits of the ICT activity justify the costs.

Although financial sustainability, including all replacement costs and system costs would be desirable, the reality is that investment by donors is made against more indirect benefits to poor communities. We have already noted how Gyandoot has facilitated clean water for a community and increased the opportunities for "good governance" (lower opportunities for corruption and increasing the response of the government to deliver statutory rights), among other benefits.

MANAGE has similar reports. "These programmes have evinced keen interest from the villagers, from the point of view of their utility and the participation of village community in the same. Recently when the Home Minister of the State inaugurated the second MACTCS building at *Keesara Mandal,* the village ladies asked a number of questions on implementation of various welfare schemes, particularly those for women. They also expressed their unhappiness about paucity of drinking water in their area. They also suggested the schemes under which the development works could be undertaken. Thus the information access at the village level has improved the information about the state programmes meant to support the village community and the communities are able to articulate their needs and demands much more clearly to the concerned officers."

CARDIN is an interesting example of an activity that has had multiple benefits. The general public benefits in two ways. The first is a direct benefit, from the training seminars given by CARDIN. These training seminars not only give the participants the capacity to access disaster information, but also give a broad understanding of the world wide web. They are trained how to access disaster information and how to analyse and apply it, which in itself is an obvious benefit, but in doing this they learn key skill about access information in general from the Internet.
The second way that the public benefit from this project is indirect. Due to CARDIN, all the key organisations involved in disaster management have access to useful information, this means that they can carry out their jobs with more confidence and competence.

Regarding the above, we note that more information is not always good. Information overload is a common problem of out times, and this can often lead to an inability to process and act on it. In CARDIN the timely access to key data is being used by institutions that can apply it, and use it in their disaster preparation activities.

ACISAM, which is not attempting cost recovery, is having strong developmental benefits. The main benefit with the development process is that there is greater participation and communication within the community. They feel more like a community, they feel they have access to the world by owning their own means of communication, and therefore they have a greater chance for emotional stability and development. There is evidence that the project has helped raise people's self-esteem through their own reflections at viewing the videos.

However, when analysing these benefits, we should refer back to the objectives.

Enhancing information to planners:- CARDIN, MIGIS, and KUMINFO, were said to have this objective. In the above we note that CARDIN has had a capacity building effect on many institutions. The case study on MIGIS also talks about capacity building. It demonstrated that it is possible to integrate indigenous and scientific knowledge. It engaged illiterate male and female farmers, representing a wide range of ages in a research project. It presented farmers knowledge and needs in a high quality and critical medium in which it has to be taken seriously and was incorporated into development plans. KUMINFO is in its early stages and potentially could benefit the management of natural resources.

Increasing citizens access to governance:- Revistazo and Gyandoot have both given examples above of some fulfilment of their objective. Revistazo also measures its success by its effect on society Having an independent media source gives civil society a chance to participate and have a voice on issues. Otherwise only the 10 wealthiest families get to control what issues are heard and how they are heard. An anecdote as evidence that this ICT has added value... “Normally when supreme court judges are picked, government or congress members "pick their own people". However, Revistazo published an issue in which one of the candidates was a woman with a terrible track record of corruption, which Revistazo highlighted. This woman was ultimately not elected to the Supreme Court and was very angry about it.”

Enhancing livelihood incomes of the poor:- Digital Village and Food Marketers. This is where the questions of cost benefit analysis and sustainability can be questioned. Digital Village with its fairly direct model of selling services to the poor has found it difficult to cover all costs. It has survived its recurrent costs but has not generated income to cover replacement costs. It follows the standard “telecentre” model promoted by IDRC which is now being questioned and was not set up as a multi purpose community centre. However over the years it has become focal point for the community and the associated library and community hall is well used.
FOOD emarketers has a few anecdotes of income, but it is early days. However when this action is seen in the light of the research “Ecommerce options for Third World craft producers” it seems likely that Food emarketers will be constrained by the barriers mentioned by that research.

Facilitating livelihoods of the poor:- ACISAM do not attempt cost recovery, but can identify direct developmental benefits.

Table 6 Summary of identifiable developmental benefits

	Enhancing information to planners	**Increasing citizens access to governance**	**Enhancing livelihood incomes of the poor**	**Enhancing livelihoods of the poor**
ACISAM		Example of Mayor increasing his social responsibility through local video generating discussions		Examples of a sense of community being created through various issues were addressed through videos and radio. Impact on local self esteem.
KUMINFO	Example of village Chief seeing erosion and undertaking action			In one example the quality of water was improved through the identification of a local polluting source.

	Enhancing information to planners	**Increasing citizens access to governance**	**Enhancing livelihood incomes of the poor**	**Enhancing livelihoods of the poor**
MIGIS	Produces more coherent information for planners, government officials and local communities to work together in addressing problems.	Clear examples of greater acceptance of community information by local government	Indirect impact of better planning.	Indirect impact of better planning.
FOOD (ecommerce)			Some limited examples of sales made through emarketing	
Deniva	Gives a couple of examples of where improved access to information and networking has increased the effectiveness of member organisations in their work			Indirect impact of Deniva through increasing the capacity of member organisations who work with the poor
Gyandoot (egovernece)		Clear examples of communities accessing key information	Time saving an d economical; the kiosks are creating an income	
MANAGE (microcredit and extension)	Increased information to women's groups is increasing their ability and capacity to participate in local government plans.	Clear examples of communities utilising key information obtained to lobby for improvements in the welfare state of the local community.	Indirect impact through improved information access on crop management.	Utilising the information available to improve family nutrition levels, health, and crop production. Learning about the importance of child education.
Global Voices		Example of the community using a video to highlight to the local press and in turn cause the local government to clean up the area.		Videos have caused some of the women to take responsibility for their own lives. A video on AIDS has caused a group of boys to question their sexual lifestyle.
CARDIN	Improved access to disaster preparedness, management and mitigation information for governments and planners.			Indirectly through improved government planning in disaster preparedness, management and mitigation.
UDS			Indirectly through improved IT skills increasing the employability of local community members.	
Revistazo		Example of the recent local elections where Revistazo highlighted the corrupt practices of one candidate causing the local populace to reject her.		Encouraging the local press to tackle some of the real issues affecting people. Examples include access to water and electricity
Digital Village			Indirectly through improved IT skills increasing the employability of local community members.	

The above table is not exhaustive but summarises points mentioned in the case studies.

Regarding the hypothesis, we can see then that ICTs when employed in the support of other developmental objectives – general livelihood support or good governance – can have an immediate and identifiable benefit. These benefits seem to be cost effective

although a detailed analysis was not possible. However, when ICTs are installed for the purpose of raising incomes directly, there is still room for debate. The measurement of the impact of the ICTs on local businesses and the local economy was beyond the scope of this research.

4.12 *Other issues*

During the course of the research it became clear that there were important issues to do with content and language, gender, and information flows, which were not covered by the original framework. These are dealt with below.

Language:- Many of the case studies expressed concern about the format of the information provided. For the projects involving the internet, an issue is the lack of information available in the local language. MANAGE notes that most content on the Internet is insufficiently localised, it is in English, with some in Hindi, and very little in Telugu. Where there is relevant information in a local language it is still often too general for village level use. They note a need for staff with comprehensive knowledge of local languages for translation purposes.

Even where English is used there remains a number of difficulties. Digital Village, which is training people in computers in English, has found that it had to develop its own training materials because many of those supplied by its sponsors were "too American". KUMINFO notes that the content of the information at a workshop was relevant because the workshop centred on edited information that had been collected by the team. However, "the information was very technical and was presented in English, which did not go down well with some participants. They recommended that in the future the local language be used for such programmes for optimal benefit".

Illiteracy:- Another issue is illiteracy, both computer and written. MIGIS have introduced the use of symbols to make the GIS information available in a more appropriate format. Others have introduced training programmes to raise the computer literacy rate in their communities, though this obviously operates with an assumption of a basic written literacy component. This comes to back to the discussion on re-intermediation.

Content:- Regarding this shortage of local content in local language, this is not being helped by some technical constraints. The current network of MANAGE is limited in not allowing users to post their own information to a web site, which prevents others getting access to useful information that is already available in traditional formats. MANAGE plans to introduce an interactive web site that can be accessed by users themselves, so they can publish their own content.

Information flow:- in development programmes the flow of information to beneficiaries has often and traditionally been one way, from top down e.g. newspapers, radio, extension services. Lessons learned from over 30 years of extension work in subjects such as health and agriculture have shown the importance of two way communication. Communication theory now emphasises the role of feedback loops, contextualisation of information, etc. Modern ICTs have a contribution to make in moving away from a one way communication and give user the ability to interact with systems e.g. talk radio, internet, policy consultation exercises. The studies show the benefit of this interaction with the information to the target

groups and to the ultimate beneficiaries.

5 Summary of hindrances

In some cases the technology was a limiting factor to the projects efficiency and reach. We can note this is influenced by two factors; On the one hand there were occasions when there was not enough equipment, a hindrance that could have been addressed by increased resourcing. On the other hand there were limits imposed by the poor infrastructure, although these were less of an obstacle than might previously been thought (e.g. Gyandoot describes ongoing problems with telephone connections).

Table 7 Summary of technology and infrastructure hindrances

	Not enough or poor quality equipment	**Poor ICT infrastructure (restricting efficacy)**
ACISAM	x	x
KUMINFO	x	x
MIGIS	x	x
FOOD (ecommerce)		x
Deniva	x	x
Gyandoot (egovernance)		x
MANAGE (microcredit and extension)		x
Global Voices	x	
CARDIN		
UDS	x	x
Revistazo		x
Digital Village		

Regarding socio-economics, there is a much wider range of hindrances although there are interesting common elements.

Table 8 Summary of socio-economic hindrances

Issue	Examples
Language	CARDIN required 4 languages; Digital Village, Gyandoot, MANAGE, UDS, users would benefit from more content in local languages
Illiteracy	Gyandoot, MIGIS – partly overcome by use of icons
Self esteem of users	ACISAM, Gyandoot, Global Voices, MANAGE - a belief that they do not have the capacity to use technology, particularly women.
Social power conflicts in Users	ACISAM, FOOD, Revistazo – traditional holders of power threatened by innovations
Organisational Capacity of target group	CARDIN, UDS, MIGIS, Revistazo – matching goals to staff capacity
Donor reluctance (funding ICT actvities)	CARDIN – funding delays, Deniva, Revistazo – lack of willingness for donors to fund ICT support activities
Security and theft	Digital Village, failure of other centres due to theft
Loss of technical personnel	Digital Village, UDS continually lose trained technical people
Lack of technical personnel	Deniva, UDS – lack of technical capacity in organisation, KUMINFO lack of technical capacity among users
Low purchasing power of users	Digital Village, Gyandoot, UDS

6 Summary of what helped it succeed

There was a range of technology related and socio- economic factors which helped to promote the success of projects.

From a technology point-of-view the equipment, although not standardised, was nevertheless "off the shelf" equipment in all of the cases. There was no special design of technology but rather a use of a system made up of "off-the-shelf" components (subsystems). This use of market available equipment meant that there was a support network in terms of training in the use of equipment and repairs. Links with trainers within the country, enabled most organisations to avoid bringing in expertise from overseas.

In addition, a common feature of success from a technology point of view was the development of locally tailored software or the creation of local content.

Table 9 Summary of technology factors

	The use of "off the shelf" technology	**Locally tailored Software or content development**
ACISAM	x	x
KUMINFO	x	x
MIGIS	x	x
FOOD (ecommerce)	x	x
Deniva	x	
Gyandoot (egovernance)	x	x
MANGE (microcredit and extension)	x	x
Global Voices	x	x
CARDIN	x	x
UDS	x	x
Revistazo	x	x
Digital Village	x	

In terms of technology, all the studies use "off the shelf" ICTs. Sometimes it is the combination of components that leads to the project success – wireless networks working on a hub (Gyandoot).

In addition FOOD were able to resource a reliable and trustworthy internet service payment provider thus securing the trust of on-line buyers.

Regarding socio-economics, there is a much wider range of success factors although there are interesting common elements.

Table 10 Summary of socio-economic factors in successful projects

	Examples
Appropriate content	CARDIN, Digital Village, Gyandoot, MANAGE, UDS, Global Voices, MIGIS
Commercial models	Gyandoot, Digital Village, FOOD
Entry process to target group	Gyandoot, Digital Village, Global Voices, MANAGE, CARDIN, MIGIS
Enthusiasm from the user communities	ACISAM, Gyandoot, Global Voices, MANAGE, UDS
Support from local authorities	ACISAM, FOOD, MANAGE, Digital Village, UDS Gyandoot, MIGIS
"Champion" leadership	Gyandoot, MIGIS, CARDIN, MANAGE, Digital Village
Intermediation by ICT familiar person	CARDIN, Gyandoot, FOOD, Digital Village

Close connections to the community	Digital Village, Gyandoot, MANAGE, FOOD, UDS, ACISAM, Global Voices
Clear objectives	Almost all case studies
Attachment to and support of existing development activities	All case studies
Good Timing	Revistazo, MANAGE, Gyandoot,
Networking several organisations	CARDIN, UDS, MANAGE, Gyandoot,

7 Conclusions

The objective of the action is important. ICTs can support developmental activities and can do more than directly enhance income options for livelihoods. In many cases the new opportunities offered by the ICT have affected the whole system of developmental activities – for instance setting up CARDIN gave opportunity for institutional support to, and strengthening of, the disaster preparedness network; kiosks in India have offered new ways of tackling corruption and encouraging good governance.

While the objective is very important, we also note the role of the project processes. In all cases the process of the project was an opportunity for more involvement by staff and clients. This is not to say that full participatory processes involving the final clients were always necessary. The case studies show many projects that were conceived by "Champions" or in an office. However a key theme running through all the projects is that there is then a conscious effort to involve the client community in the detailed planning and execution of the project in order to tailor the information to the targets groups needs.

The institutional form of arrangement does not seem to be critical to the success of the project. The case studies show a variety of institutional frameworks, from networks to single organisations. Neither too does it seem that there is a need for a special policy environment. The case studies mostly build upon the existing policy environment but do not have to institute new policies in order to undertake their project.

Capacity building is (almost) always required. Where there is strong technical competence, there is generally a need to build capacity on project processes. Where project processes are the focus there is a need for technical capacity. In some cases linkages can overcome this, using the links to either gain capacity or build it in other institutions. One mechanism for obtaining capacity is to use the commercial sector (eg FOOD uses cyber cafés effectively "renting" equipment).

The cases support the idea (proposed by many writers on digital opportunities) that ICTs can disintermediate – to a certain extent. There are examples of how the ICT has removed some of the gatekeepers of information making the information more available to the poor and their supporting NGOs. However, the cases also suggest that full disintermediation is not possible as many users require assistance in the technical operation of the ICT (from kiosk owners or support staff). Abetter term might be re-intermediation, where technical people must intermediate ICT use (access) but are not gatekeepers as such of the information.

The technological tools have nothing special that ensures project success. And there are few if any opportunities for standardisation. Technology is constantly changing and the central prescription of a standard technical package would probably negatively affect the project. None of the studies show any indication that standardisation is necessary.

However, the use of second hand technology was a noted hindrance on many of the projects. There was an increased need for maintenance and repair, and often the technology was out of date leading to other difficulties (e.g. inability to run current software)

The cases suggest that the cost of the technology can be minimal and the cost of the technology as a part of the whole was not raised as an issue in the case studies (although this was part of the selection criteria). The overall project costs can be quite significant even where the project includes only a single PC (e.g. Revistazo), becoming an annual budget of tens of thousands of dollars. Most cases show that ICTs are part of a bigger developmental programme or system, and the costs of the technology therefore are small compared to the whole.

When we consider the project processes in the cases, we find strong support for the premise that direct provision of ICT services to the poor should be a part of some greater community mobilisation. Some of the factors that helped success are social mobilisation issues e.g. support from local authorities, close connection to communities, entry processes to target group, communication and networking.

Finally, the developmental benefits of the projects support the case that ICTs can be a useful part of an overall developmental action. The benefits range from good governance to good mental health to income generation, i.e. influencing all parts of the livelihood system, and as such are worthwhile.

In conclusion, the case studies show that ICTs can enhance development projects. The research has not conclusively proven that an ICT activity directed at increasing income for the poor can, on its own, generate cost recovery inclusive of set-up and replacement costs, i.e. achieve economic sustainability. However, the studies do indicate that this is beginning to happen in some cases, and the prospects for the future are encouraging. More importantly the case studies clearly show elements of institutional and social sustainability. They also show significant developmental impact, and there are indications that ICT activities can be regarded as cost effective.

Appendix 1

Sustainable Information and Communication Technology

Batchelor and Norrish, April 2002

This document forms part of the working papers generated as part of a research programme into Information and Communication Technology (ICT) sustainability factors. Funded by the Department of International Development, the research programme identified activities that sought to benefit the poor and had an ICT component. In particular it considered programmes where ICTs had enhanced ongoing development activities, the ICT activity could be replicated without sizeable investment, and there was a measure of sustainability. Sustainability was taken to be more than financial cost recovery. Drawing from lessons learned in other development sectors, sustainability involves a combination of factors including among others, clear objectives, institutional frameworks, local capacity and development benefits. While perhaps not fulfilling all the features of a strong sustainable activity, the case studies were felt to hold points of interest for the wider global development community and have the potential to be replicated.

Can we build a picture of good ICT sustainability from the theories and lessons learned used in other development sectors?

Definitions of sustainability

There is considerable debate over the term sustainability. According to Pretty 1998 writing in relation to sustainable agriculture 'Sustainability is a complex and contested concept, to many it implies persistence and the capacity of something to continue for a long time'. It is also ' a property which arises out of the interactions among stakeholders, sustainability is negotiated.' The notion of negotiating sustainability is useful as it addresses the 'short term' or 'lack of need for' sustainability. For example the lifetime of a project, the span of a series of TV programmes which might have been agreed by all parties. In an ICT expert discussion (Imfundo April 2002), sustainability was defined (for the purpose of the discussion) as: 'Investments which continue to produce a return'. "Return" was defined in its broadest sense (i.e. beyond financial and including educational, social, etc.). In this definition an activity could be sustainable if it produces a return which is not necessarily financial.

The sustainable livelihoods framework (Ashley and Carney 1999) developed and used in slightly different forms by a number of agencies has as its focus four capital assets: financial, human. social and physical between which a balance has to be sought. Within this framework it is considered that sustainable systems – whether livelihoods, communities or national economies – accumulate stocks of assets; they increase the capital base over time. Unsustainable systems deplete or run down capital, spending assets as if they were income, and so leaving less for future generations. The approach differentiates between different kinds of sustainability which are useful in relation to ICTs:

• **Economic sustainability**; achieved when a given level of expenditure can be maintained over time.

• **Social sustainability**; achieved when social exclusion is minimised and social equity maximised.

• **Institutional sustainability**; achieved when prevailing structures and processes have the capacity to continue to perform their functions over the long term. For institutional sustainability to be achieved it is important to have in place:

- well-defined laws
- participatory policy-making processes
- effective public and private sector organisations that create a framework within which the livelihoods of the poor can be continuously improved.

Sustainability and ICTs

In bringing together these definitions and approaches for looking at the sustainability of ICTs it is important, as with all approaches to sustainability, to clarify what is being sustained, for how long, for whose benefit and at whose cost, over what area, and measured by what criteria (Roling and Jiggins 1998). Consideration of these issues formed the core premise underlying the research, for selecting the case studies and making decisions on what research questions to ask.

We considered that ICT involvement with long term development goals could not be achieved without the following capital assets:-

- **Financial capital** –mechanisms for (re)covering costs and replacing equipment (two separate issues)

- **Physical capital** – obviously the technology is one of the keys, choice of technology may well be important. As will be the infrastuctures which enable the technologies to operate.

- **Social capital** – social and institutional arrangements that will keep the ICT being used for its intended developmental benefit.

Issues which need special attention here include access and control. These are still critical issues, who controls what information comes in and what goes out, who controls content and how it is presented, how is that control exercised, what feedback mechanisms are in place etc. Where does information come from, is it in an immediately usable form, does it need rewriting, translating...? This will affect sustainability and needs to be investigated. (INTERMEDIA Special Report December 1997/Volume 25, No 6)

- **Human capital** – human resource training and skill development that not only keeps the ICT running but can plan future changes to the resources.

This is an area which needs careful consideration in relation to sustainability. Research (Norrish et al 2000, Norrish 2001) on communication strategies and dissemination has shown that the capacity and reach of GO and NGO intermediaries is a critical factor in uptake and

impact of research outputs, this is directly linked to the information dissemination and support which they are able to put in place. This may sound very obvious, but capacity is often taken as read, when in fact NGOs are stretched way beyond their capacity to deliver adequately, but have to take on work because of the need for funds. Relationships with communities are not always as effective as they might be because resources are stretched and overall cover is thin.

It's not just the organisations which need to be considered, but the working population more generally, if there aren't enough of those skills around then projects will almost certainly fail if the key person leaves (INTERMEDIA Special Report December 1997/Volume 25, No 6).

Some would argue that the need for human capital goes wider than this suggesting that the pre-requisites that need addressing by countries themselves are not simply technological and economic, but also legal, political and cultural. The 'Ability of the population to absorb, produce, transmit, in other words, manage information' is increasingly recognised as vital INTERMEDIA (1997) .

- **Content capital** – the information communicated by the ICT seems to be one of the key capitals that prompt sustainability. If the information becomes out of date or irrelevant then as this capital fails so too the whole "ICT project".

Content capital is a vital issue with many dimensions which need to be considered when considering ICT case studies. In particular it raises questions to do with information and knowledge and the differences, however crudely expressed, between the two. Information and Knowledge are often used interchangeably. There is a significant difference, a difference which may be crucial to the understanding of sustainability. The definitions all suggest that something needs to be done to turn information into knowledge, something active that leads to learning. This will be an important component of sustainability.

For information to be really useful and usable and for people to be able to act on it organisations need capacity to determine needs, to manage and process information (understanding and knowledge of topic, language issues - both level and choice of language, ability to select and produce illustrations, design and deliver training???), provide backup where needed (or be able to pass people on to whoever can provide back up .

The critical question in all this is where is information to come from if it is to be relevant and usable to local populations and where is the support to come from if information is to become knowledge? Are information only projects sustainable? Or is the step to knowledge vital for sustainability?

Typology of ICT projects

Having noted the complexity of the sustainability question, a framework is required within which to collect and analyse the data. The initial typology evolved further after piloting. The following typology was developed based on the discussions around sustainability above and after application. Hypotheses were developed for each section and these are given in the main section of the report.

Sustainability factor	*Quantitative data*	*Qualitative data*
Objectives	• development targets for this project • timescales	• What do people think the objectives are • opinion of objectives
Policy environment	• Policy documents • legislation	• Political will – ask a few people
Institutional arrangements	• roles and responsibilities clear • project design	• coordination / communication
Target groups	• Definition of target groups. • Nature, composition and capacity of target groups	• Relationships with target groups • ICT Awareness of target groups • what they know about project • commitment/motivation • roles and responsibilities • use of other facilities • sense of ownership • exclusion or conflict
Technology	• Technologies in use; • performance • Availability of upgrade, spares, maintenance • Design criteria – e.g. number of users	• Appropriateness of technology • User satisfaction • Willingness to maintain
Finance	• Capital contributions • Maintenance resources • training resources • Replacement of equipment • Cost recovery mechanisms	• Cost effectiveness • Poverty in community • Trust and transparency
The project process	• Clear objectives/benefits • Project document • Timing/phasing	• Participatory approaches • Demand responsive
Key linkages	• Training activities • IEC (information, education, communication) activities • Private sector stimulus • links with information sources	• links with other stakeholders • Integration with other services / organisations • awareness of sources of information
Development benefits	• Use of information and communication • Progress towards development targets	• Anecdotal livelihood stories • Unexpected outcomes
Intermediaries	• Roles and responsibilities • Access and control • Level of training	• capacity to determine needs • Liaison with target groups; (mechanisms, relationships) • capacity to manage and process information • Commitment to project / organisation • availability of backup
Capacity	• Level of training of staff (technical, info. Management) • Training (not necessarily technical) given to target groups	• Capacity of organisation and target groups

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Appendix 2

The Role of ICTs in the Development of Sustainable Livelihoods: A set of Tables

Simon Batchelor and Nigel Scott[2]

Dr Andrew Barnett developed (and is continuing to develop) a set of tables to relate the sustainable livelihood framework to the cross-sectoral subject of energy. Energy is a neglected element of the livelihood framework and the construction of a fairly simplistic set of tables was intended to be a discussion starter and a prompt to include energy in livelihoods planning. It struck a cord with engineers who find it difficult to relate to the sociological thinking of the framework.

This documents takes Andrew's basic idea of a set of tables, and attempts to make a first draft for Information and Communication Technologies. Again this is a subject that is not a sector in its own right and cuts across many development themes. New opportunities are available in asset development in education, health, agriculture, organisational development, community capacity building, etc. At the same time, there is considerable discussion of the digital divide. ICT specialists (enthusiasts) are claiming that it is vital to bridge the digital divide and are intiating specific ICT projects that focus on the clients who are the very poor. These ICT specialists tend to be technologists and there is the possibility that ICT projects or programmes will be implemented without due regard to the lessons learned that has resulted in the livelihood framework.

This documents is to couple the practicalities of ICT work with the framework to make it easier for ICT specialists to discuss their programmes with social advisers, and to assist the project planning to take adequate account of all the factors revealed in the livelihood framework.

[2] The following five tables are produced by Simon Batchelor and Nigel Scott and are based on a core idea for energy created by Andrew Barnett regarding the Sustainable Livelihoods Guidance Sheets provided by DFID,

The Sustainable Livelihood Framework – "the diagram"

Sustainable Livelihoods Guidance Sheets, Dfid, 2000.

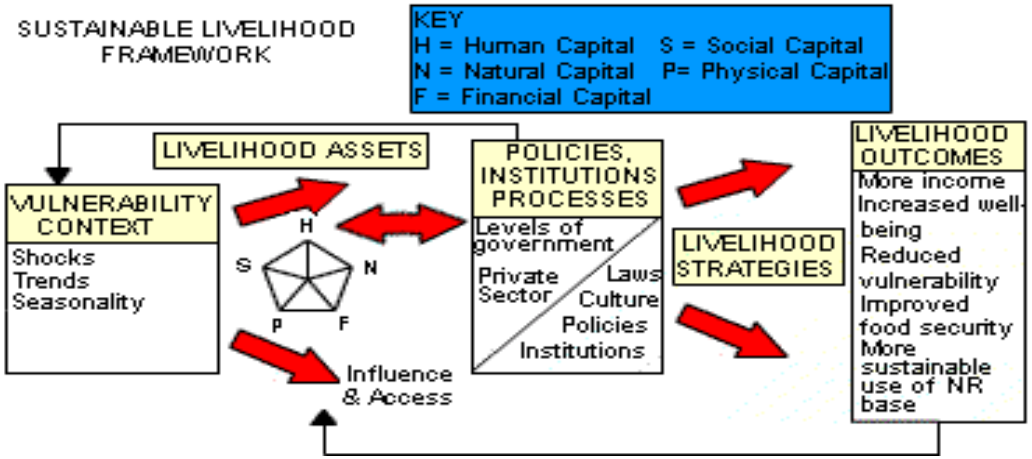

Table 1: Linkages between livelihood assets and ICTs

"The livelihoods approach is concerned first and foremost with people. It seeks to gain an accurate and realistic understanding of people's strengths (assets or capital endowments) and how they endeavour to convert these into positive livelihood outcomes. The approach is founded on a belief that people require a range of assets to achieve positive livelihood outcomes; no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek". Sustainable Livelihoods Guidance Sheets, Dfid, 2000.

Capital Asset	**Link with ICT intervention/improvement**	**Examples from Case Studies**
1. Natural Capital (natural resource stocks from which resource flows useful for livelihoods are derived)	1. GSM positioning can assist accurate mapping. 2. Satellite images and aerial photography can be stored and communicated through ICTs, leading to more accurate monitoring of natural resource changes and changes in land use. 3. Global communication offers increased ease of opportunity for advocacy. Global campaigns can be started by community groups in remote areas by use of global ICTs (satellite, internet, mobile phones, video) 4. Similarly Mobile and internet technology lessens the centralised control of communications and co-ordination of civil protest.	1. MIGIS 2. MIGIS, Kuminfo 3. Revistazo, Global Voices 4. Revistazo
2. Social Capital (social resources on which people draw in pursuit of livelihoods i.e. relationships, membership of networks)	1. Global and national communications allow migrant workers to remain in touch with families and remit finances. 2. Community groups have access to both e-governance and related information. 3. Community groups and individuals have access to international advocates whether civil society or	1. Digital Village 2. Gynadoot, Manage 3. Global Voices 4. Food Indiashop 5. Digital Village, UDS, Gyandoot, Manage, Cardin 6. Not in case studies but

Capital Asset	Link with ICT intervention/improvement	Examples from Case Studies
	commercial. 4. Increase opportunities for national and global economic activities 5. Advice for life events – Telecentres and other public of semi public for a offer opportunities for getting advice and information re life events 6. Linkages in education between teachers and pupils across continents	available in examples of Birmingham schools linkages and british councils schemes
3. Human Capital (skills, knowledge, ability to work, good health which enable people to pursue different livelihood strategies)	1. Distance learning through specialist broadcasts (satellite and internet), capacity building at community, government and organisational levels. 2. Combining traditional media with new ICTs to enhance livelihoods 3. Schools – learning through and with ICTs 4. Health advice – connecting rural centres 5. Capture and retention of indigenous knowledge 6. New working skills – learning specific computer based skills, but also operating phones shops, etc	1. CARDIN, UDS, Manage, Gyandoot 2. Manage, Gyandoot, UDS 3. Gyandoot, Manage, 4. Manage, Gyandoot, UDS 5. MIGIS, Kuminfo, ACISAM, 6. Gyandoot, Manage, UDS,
4. Physical Capital (basic infrastructure for the supply of energy, shelter, water, transport and communications, production equipment)	1. Access to information and communication technology 2. Knowledge of basic rights to infrastructure and therefore enhanced ability to lobby utility providers. 3. Reduction of transport needs through the use of ICTs – eg market data 4. Access to improved production equipment through more extensive researching of products (through ICTs).	1. Manage, Gyandoot, UDS, Deniva, 2. Revistazo 3. Manage, Gyandoot, UDS, Deniva, CARDIN 4. Manage, Gyandoot, UDS

Capital Asset	Link with ICT intervention/improvement	Examples from Case Studies
5. Financial Capital (financial resources available which provide livelihood options e.g. savings, credit, remittances, pensions).	1. The increases in profit margins that result from increased access to improved information – eg ability to sell at best market prices, ability to sell beyond local market. 2. Possible increased access to financial services 3. Increased remittances from migrant workers	1. Gyandoot, Manage 2. Gyandoot 3. Digital Village

Table 2: Linkages between Vulnerability Context and ICTs

*"The Vulnerability Context frames the external environment in which people exist. People's livelihoods and the wider availability of assets are fundamentally affected by critical **trends** as well as by **shocks** and **seasonality** – over which they have limited or no control.*

The box below provides examples (this is not a complete list):

Trends	**Shocks**	**Seasonality**
• Population trends	• Human health shocks	• Of prices
• Resource trends (including conflict)	• Natural shocks	• Of production
• National/international economic trends	• Economic shocks	• Of health
• Trends in governance (including politics)	• Conflict	• Of employment opportunities
• Technological trends	• Crop/livestock health shocks	

Sustainable Livelihoods Guidance Sheets, Dfid, 2000.

Vulnerability Context	**ICT Link**	**Examples from Case Studies**
1. Geography	1. Climate prediction with associated early warning systems 2. Volcano and earthquake monitoring 3. GSM and resource mapping (satellite and aerial photography)	1. CARDIN, MIGIS, KUMINFO 2. CARDIN 3. MIGIS, KUMINFO
2. Location	1. Remoteness can be overcome 2. Difficulties with operation and maintenance	1. MIGIS, Grameen Phones 2. MIGIS, DENIVA, UDS

Vulnerability Context	ICT Link	Examples from Case Studies
3. Seasonality	1. Weather patterns may affect radio and satellite links. 2. Flooding may increase importance of ICTs, and may reduce effectiveness for turning requests for help into action.	1. CARDIN, KUMINFO 2. Gyandoot
4. Population density	1. Public ICTs may be overwhelmed by demand?	1. Gyandoot, Manage, Digital Village,
5. Trends in governance (including politics)	1. Restructuring of the telecom sectors is largely a political process resulting in both threats and opportunities for poor people's access to ICT services.	1. Gyandoot, Manage,
6. Technological trends	1. Massive technical change in recent years has altered people's ideas of what is possible. Video and broadband offer even more opportunities	1. GYandoot, Manage, ACISAM, Revistazo, CARDIN
7. Shocks	1. Share price shocks in technology companies make users vulnerable to disappearance of supplier and maintenance contracts.	1. All organisations whose equipment relies solely on supplier and maintenance contract for repairs.

Table 3: Linkages between structures, institutions, processes and ICT

"Transforming Structures and Processes within the livelihoods framework are the institutions, organisations, policies and legislation that shape livelihoods. Their importance cannot be over-emphasised. They operate at all levels, from the household to the international arena, and in all spheres, from the most private to the most public. They effectively determine:
• access (to various types of capital, to livelihood strategies and to decision-making bodies and sources of influence);
• the terms of exchange between different types of capital; and
• returns (economic and otherwise) to any given livelihood strategy".

"Structures in the framework are the hardware – the organisations, both private and public – that set and implement policy and legislation, deliver services, purchase, trade and perform all manner of other functions that affect livelihoods. They draw their legitimacy from the basic governance framework".

"If structures can be thought of as hardware, processes can be thought of as software. They determine the way in which structures – and individuals – operate and interact. And like software, they are both crucial and complex: not only are there many types of processes operating at a variety of different levels, but there is also overlap and conflict between them. The box shows just some of the transforming processes of importance to livelihoods.

Policies	Legislation	Institutions	Culture	Power Relations
• Macro • Sectoral • Redistributive • Regulatory	• International agreements • Domestic	• Markets • Institutions that regulate access to assets • 'Rules of game' within structures	• Societal norms and beliefs	• Age • Gender • Caste • Class

Sustainable Livelihoods Guidance Sheets, Dfid, 2000

Institution/Process	ICT Link
1. National government	o Responsible for the regulation of Telecoms and often for the supply of major if not all services. o Responsible for much of the "enabling environment" required for efficient public and private sector development in the Telecom service industries. o The main source of subsidies of Telecom related services. o The main regulator determining the type of ownership and degree of competition at each part of the Telecom supply chain.
2. Local government	o Often responsible for public supply of ICT equipment – libraries, phone shops, schools. o Responsible also for basic infrastructure (electricity, roads, housing), which affects the availability, reliability and cost of ICT delivery. o Responsible for regulation and permits associated with small scale ICT retail businesses (eg phone shops, Telecentres, Internet cafes)
3. Community Level Institutions	o Often crucially important in the mobilisation, organisation and development of schemes to introduce publically available ICTs (Telecentres, Libraries, Phone shops)
4. Firms	o Providers of telecom services and, often in partnership with government, suppliers of ICT related infrastructure. o Small and micro firms are likely to be the main actors in the supply and use of improved ICT services that are used by poor people. o Larger firms willing to donate equipment in order to gain publicity and secure market hold.
5. Civil society	o Can play important role in interventions to improve ICT services at the local level e.g. Telecentres for the poor, schools equipment. o Represent an important sources of technical and other information. o Sometimes restricted by funding, inclination or expertise to a limited range of technical options.

Institution/Process	ICT Link
6. Laws	o Regulate the provision of telecom services. o Regulate contract tender procedures for infrastructure construction o Determine the monopoly powers of the state and utilities in the supply of telecom services.
7. Gender relations	o Determine how telecom assets and technologies are used. The poverty impact of ICT related interventions will be largely determined by the end-use technologies that are adopted, and the gender impact will in turn will depend on the extent to which women are empowered to choose.
8. Other Power Relations	o Village hierarchies, caste, belief systems play important roles in determining the "space" in which ICT services can be offered (access to information; the 'rights' to set up retail outlets, etc) o Religious beliefs might influence use of ICTs – young people not allowed to surf in unregulated environments.

Table 4. ICT related Livelihood Strategies

"The livelihoods approach seeks to promote choice, opportunity and diversity. …Livelihood strategies [is] the overarching term used to denote the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals (including productive activities, investment strategies, reproductive choices, etc.)"

Sustainable Livelihoods Guidance Sheets, Dfid, 2000

1. Gaining additional income by retailing ICT services	o Phone shops o Telecentres
2. Gaining access to improved ICT services at the household level	o Mobile phones replacing delayed land lines o Improved education through television, radio and computers.
3. Gaining access to improved ICT services, by increasing production efficiency	o Improved information services result in increased productivity (eg through timeliness) which results in a greater ability to pay for improved ICT services. Opportunities range from the lowest technologies, and the smallest scales upwards (agro-processing, small and micro enterprises etc).
4. Grouping with others to obtain access to improved ICT services, for production, household consumption or for community services (health centres, schools, security lighting).	o Community based activities enable labour to be converted into capital (eg through civil works) and capture the economies of scale. Public Telecentres can become a repository of knowledge that enhances the whole community.

Table 5. Livelihood Outcomes

"Livelihood Outcomes are the achievements or outputs of Livelihood Strategies. Once again, the important idea associated with this component of the framework is that we, as outsiders, investigate, observe and listen, rather than jumping to quick conclusions or making hasty judgements about the exact nature of the outcomes that people pursue. In particular, we should not assume that people are entirely dedicated to maximising their income. Rather, we should recognise and seek to understand the richness of potential livelihood goals. This, in turn, will help us to understand people's priorities, why they do what they do, and where the major constraints lie".

Sustainable Livelihoods Guidance Sheets, Dfid, 2000.

1. More Income	o Income from the sale of ICT services o Income from ICT related productivity gains o Income from remittances of migrant workers o Improved income from reduced transport o Improved income through timeliness of sales
2. Increased well-being	o Reduced drudgery by replacing transport with "distant enquiries" o Increased education as a result of better schools o Better health from health services that have access to improved information and knowledge o Better health from health services through improved timeliness o Improved access to information through radio, television and other Information Technology. o Sense of inclusion in the "modern" world.
3. Reduced Vulnerability	o Early warning for climate and geographical catastrophes o Access to wider social networks – stronger coping mechanisms o Access to advocacy networks and government

4. Improved Food Security	o Improved timeliness of purchases and sales o Wider access to production equipment o Improved knowledge for production and storage
5. More Sustainable Use of Natural Resources	o Greater awareness of global issues o Access to advocacy networks and government
[6. Improving the position of women]	o Reduction of time consuming tasks (eg travel to markets) o More reliable remittances from migrant family members o Access to the outside world through radio and other information and communication technology (increased knowledge and social position) o Better and more timely health care both through knowledge and access to health workers.

Appendix 3

Level 1 Case Studies

Organisation	*Objectives*	*Description*
Sustainable Development Network (SDN)	To strengthen the institutional capacity of public and private institutions in working towards Honduras' sustainable development through the promotion and exchange of information on behalf of the country's social, cultural, political, economic, and environmental development.	Honduran NGO that initiated within the United Nations Development Program in 1994. The main purpose of SDN is to link the multiple actors involved in sustainable human development through access to electronic information.
Global Village	Strengthening democracy in the country with an emphasis in training the population for rational decision-making. Changes by non-violent means. Accountability and transparency	Project Global Village initiated a television program called *"Strengthening Democracy"* within their Civil Society program with the main purpose of educating the Honduras population on their responsibility as decision-makers and voting citizens during the last presidential elections (November 26, 2001).
FOOD Remote Area Networking (RAN)	To enhance the networking capability of development organisations in remote and rural areas through ICTs and act as backbone for providing cost-effective Internet access to NGOs, CBOs and telecentres in remote areas utilising wireless networking wherever appropriate to facilitate social and sustainable development.	The RAN project envisages the establishment of a remote area electronic networking using packet radio modems in 10 remote sites in India. The overall strategy in operating the network was to be an Internet Information Provider rather than just be an Internet Access Provider
Gomukh Trust	To develop a network of Agri business and food processing sector ultimately to work as network to supply technology information, market intelligence, prices, demand supply and international scenario.	Gomukh trust works in 4 main sectors (Water resources, Environment, Agriculture and Livelihood). Their main ICT-related project is the establishment of Information Centres in different villages of India.
National informatics centre	To create appropriate Information Technology infrastructure in a cluster of contiguous villages. The objective of the project is to demonstrate the use of IT infrastructure in the accelerated socio-economic development.	Networking telecentres in villages within the Warana Co-operative Complex in India; each will provide Tele-education, Computer-based education, and Open University access (Indira Gandhi National Open University). The Warana project is jointly carried out by the National Informatics Centre (NIC), Government of Maharashtra and the Warana Education Department.

Organisation	*Objectives*	*Description*
M.S. Swaminathan Research Foundation	To set up village information shops that enable rural families to access information and communication technologies. The project trains educated youth, especially women, in rural areas in operating information shops and maintaining a system that generates locally relevant information from generic information;	This project has established a hub-and-spoke model of data-cum-voice communication in a group of six villages in South India. The village centres can communicate with each other as well as to the Internet. A hybrid of technologies is used-wired with wireless for communication and solar with mains for power supply. The hub provides connectivity to the Internet through dial-up telephone lines, and the staff creates locally useful content.
Katha	To empower the lower income group community if boys and girls from the community through ICT training. This is especially important to the are as a KATHA conducted surveys showed that small business houses in India are slowly but surely moving to computerised work and the need for IT professionals to serve this growing population of small businesses, is immense.	In partnership with BT they have set up the Katha Information Technology and eCommerce School (KITES) which caters for the youth from lower income communities. KITES also has a Business English Lab and a Lifelong learning Centre for adults in the community (India).
Swayam Krishi Sangham (SKS)	To reduce poverty through the provision of financial services to the poor in an efficient and sustainable manner.	SKS currently operates four branches in Medak district, AP India), offering a range of credit and savings services to the poorest women, who would never get loans from a bank. They use a computerised management information system, handheld computers for data entry, and are piloting electronic passbooks.
Madudu Catholic diocese	No specific aim as it is not a formal development project. Justified as part of the church's overall service to the community	A public phone booth is installed at the Madudu Catholic Diocese headquarters (Uganda). It is operated under a contractual relationship between the diocese and telephone company. The diocese runs an informal system whereby diocese worker verbally deliver messages.