Integrating mobile data services into an existing information ecology

Andy Dearden
Sheffield Hallam University, UK
a.m.dearden@shu.ac.uk

An ecological viewpoint

Information and communication technologies (ICT) do not exist in a vacuum and their appropriation by communities or individuals is always conducted within a specific context. This context involves not just technical and economic factors, but also individual and social factors.

The sustainable adoption of a technology can be understood as similar to the evolutionary process by which a new organism finds a niche within a broader ecology. Authors such as Warschauer (2003) have argued that successful uptake of new digital technologies in development situations requires: physical resources, in the form of equipment, networks, electricity supplies etc.; digital resources in the form of meaningful content and applications that have relevance to peoples lives and aspirations; human resources in terms of the skills to make effective use of the technology on hand and to evaluate the information obtained; and social resources such as social structures that can support the technology and that provide an institutional context that encourages and validates people's use of ICT.

At the same time, the processes of socio-economic development can also be approached from a systemic, ecological viewpoint, in which development is dependent on the dynamic combination of interdependent elements. The livelihoods framework (DfID, 1999) reflects this perspective. The livelihoods framework highlights the complex networks of resources that individuals and communities deploy to generate and protect their livelihoods. These resources include:

- physical assets (tools used in building and maintaining livelihoods, including buildings, roads, water supplies, energy supplies and access to information),
- human assets (the knowledge, skills, health and labour capabilities of the people),
- natural assets (the available natural resources such as rivers, land, trees etc.),
- social assets (human networks, social structures, connections, trust), and
- financial assets.

These assets are applied to enable livelihoods in a context that is supported and constrained by what the framework calls *transforming structures* (government, civil society, and private sector) *and processes*: (institutional arrangements, policies, legislation and cultural norms). These factors impact heavily on the terms under how different assets can be employed and the rates of return that are possible from different livelihood strategies. Interventions to support development need to consider how what they contribute to, and what demands they place upon, these different forms of resources. Duncombe (2007) argues that applications of ICT in development can focus either on directly contributing to the assets of the poor, by providing information to help them utilise their available assets effectively, or by supporting the activities of structures and institutions that influence the lives of the poor (e.g. government agencies, media organisations and NGOs), organisations that Duncombe describes as infomediaries, i.e. contributing to new social assets.

In thinking about how mobile web technologies can support people to develop their capabilities and their livelihoods, it is clear that: improving network coverage and reducing handset prices can make the physical resources for uptake available to many more people and reduce the demand on financial resources; renewable power solutions may allow people to deploy natural resources for their benefit; easy-to-use and easy-to-learn interfaces can reduce the human resources (new skills and knowledge) required to make effective use of the connection.
What is lacking in many discussions however, is examination of how to create digital resources in the form of relevant (and trustworthy) content, and how to support social resources in the form of human networks and organisations to enable the mobile web to contribute directly to livelihoods. These issues are particularly significant when trying to create sustainable arrangements when resources (financial, social, human, natural) are extremely constrained, and usage of the technology may involve sharing of physical devices. In these situations, the existing state of the ecology may be such that a 'one person-one device' model is not sustainable. Although there is a very high level of penetration of mobile handsets in the world, owning a handset is still beyond the reach of a large proportion of the planet's population. Consequently, the one-person, one-handset model of use will have limited reach, and models of mobile device use that are located within the context of community based organisations (CBOs) should be considered. The Rural e-Services project presents one such model (linux.odi.org.uk/eservblog).

Rural e-Services

The Rural e-Services project, supported by the UK Engineering & Physical Sciences Research Council, has been working with an NGO (PRADAN), and a farmers co-operative in Madhya Pradesh, India. Many of the farmers hold only a few hectares of land, and have earnings of less than $2 per day, to improve the flow of agricultural information within the co-operative. The co-operative has 600 members most of whose villages are within a 40 Km radius from the central town of Sironj. Through an extensive process of participatory project planning and participatory technology design (Dearden & Rizvi, 2008a, b), a solution was arrived at that includes:

- a (web based) database of co-operative members, their land holdings, the crops they have planted and any notes on treatments they have applied;
- mobile camera phones with a messaging application implemented in Symbian 60 Python which can be used to create a message consisting of up to 6 images plus an audio track (this format was inspired by the Storybank project (Jones et al, 2008);
- a group of community service providers who visit each village on a regular basis to collect queries from farmers, these service providers are trained to collect key pieces of information from the farmer such as the crop, the soil type, whether the soil has been tested, previous treatments etc.;
- a messaging service so that queries from the farmer's field (or from some local point where network signals are stronger) can be uploaded to a web server – these are uploaded, as a series of discrete image and audio file transfers, using the locally available low bandwidth GPRS service, thus accommodating weak and unreliable network connectivity;
- an easy to use interface such that the technology requires limited literacy;
- a web repository where the advisor can collate messages, view the images in full resolution, consider them in relation to the information he has about that

farmer's previous practices, and use the internet to investigate possible responses;
- telephone-based follow up advice to the farmer, which allows the advisor to ask follow up questions where necessary.

A key innovation in this design is the goal of embedding the agricultural advice network within an existing community-based social structure, i.e. the farmers' co-operative. Similar co-operatives and other community based organisations exist throughout the India, and in many countries in Africa. This has a number of consequences, some of which are listed below.

1. The information available to the farmers is coming via a source that they have experience with and who is accountable to them (their local service provider and the advisor who works with their own co-op). In other projects using internet services to provide agricultural advice, farmers have been sceptical about the advice and the advisors, and so have been reluctant to use the services (Srinivasan, 2007; Veeraraghavan, 2007).
2. The service providers provide a cadre of staff within the community who could be supported to widen the range of service domains, for example providing a link to health advice, microfinance systems, government or other relevant services.
3. The regular contact provided through the visits of the service providers helps to cement relationships within the co-operative, thus increasing the stock of social capital available to community members in relation to other concerns;
4. The service providers and the advisors are acquiring new skills that are useful for the labour market, and for investigating ways to provide a broader range of web-based services.

One way to view this system is as a business information system that combines the conversations between farmers and service providers, the multimedia messaging, the membership database and the internet capabilities, but which does not rely on the individual service providers having very deep skills managing computer based data. Instead, the farmers, the service providers and agricultural advisor work together to meet their information needs, and in doing so each develop new information skills.

Conclusion

This type of solution involves mixed systems to deliver the benefits of internet services to the poorest, without assuming a single user-single device model. This basic framework of non-text local multimedia communication, in combination of human intermediaries using large screen systems with full internet access could support a wide range of applications designed for particular types of social institution. The particular formulation will be different in different African contexts, but there will be some commonalities. The approach reflects a wider view of development that recognises knowledge as more than just access to documents, but as embedded in an ecology of social relationships, diverse skills, and existing practices.

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