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Information Needs For A Developing Country

Stewart T. Fleming
Department of Computer Science, University of Otago, New Zealand, Tel: +64 3 479 5728, Fax: +64 3 479 8529, stf@cs.otago.ac.nz

ABSTRACT

Developing countries have special needs for information and communication. In the rush towards globalization of economies and communications, there is a danger that developing nations will get left behind. If we are to close the gap between the "information rich" and "information poor", then we must take these specific needs into account. This paper draws on my experiences of teaching and developing information systems in Papua New Guinea (PNG). I aim to identify the information needs of that country and relate them to the needs of other developing countries. In doing so, I will draw parallels between market forces and the globalizing force of the Internet.

INTRODUCTION

A developing country is one that has the potential for economic strength, but lacks skills, capital or technical equipment to immediately exploit its own resources. People of these nations may have poor healthcare, limited education and inadequate nutrition. The developing nations are those at the low- and low/medium end of the United Nations Development Index.

Some developing countries are in a post-colonial state of development, or dependencies that are gradually distancing themselves from governing nation-states. The poorest nations are the ones that did not benefit from 19th century globalization (colonization) because they had no resources to be exploited.

The most important aspect of globalization for a developing country is the sustainable management of its own socio-cultural and natural resources. The growth of the Internet as an influence in globalization runs the risk of replacing the diverse cultural resources of individual countries with a few dominating languages and cultures.

Papua New Guinea has massive potential wealth in the form of mineral resources, timber, coffee, copra and other cash crops. It is a country rich in diversity of culture, with over 800 languages and many distinct tribal groups. As a former protectorate of Australia, it enjoys a large contribution of Australian monetary aid delivered through the Australian Agency for International Development (AusAID). However, PNG does not live up to its potential, being ranked towards the low end of medium human development – 129th in the United Nations Development Index for 1998 (UNDP, 1998.) Its problems are due to the difficult terrain and climate, economic and political instability. For a country where many areas were not explored until 1930, it represents a unique challenge to our ideas of cross-culturalism and the universality of information.

TRENDS IN GLOBALISATION

Current economic trends are towards globalization of markets, convergence of currencies and consequent alignment in social policies (Zarsky, 1997). For developed nations, international economic union is one way to grow their markets.

However, economic union creates greater interdependence and homogeneity while the global economy is still fragile. Temporary problems, often due to natural causes, which affect key economic indicators such as interest rates, can lead to massive outflows of capital. Developing countries are particularly vulnerable to such effects.

In particular, strategies based on economic, not geographic, principles do not tend to empower local populations. Rather, they can lead to a sense of helplessness that the local voice cannot be heard or does not influence events.

The Internet and (separately) the World Wide Web (WWW) are powerful forces in the growth of globalization. A consideration of the economic forces behind globalization indicates that the end result is homogeneity of geography and of cultures. Market forces act to eliminate the differences between peoples and societies, not to enhance diversity. How can the Internet and access to information in general act as a force for change, particularly in developing nations, to enhance diversity?

At worst, the Internet has no government, no legal system, economic policy or elected representation. At best, it is controlled by voluntary organizations such as the Internet Engineering Task Force (IETF), the World Wide Web Consortium (W3C) and a mix of private enterprise and public service to implement address and domain name allocation.

INFORMATION NEEDS OF DEVELOPING NATIONS

Communication for development

A key approach is "communication for development." Valuable information must be made available to those who need it in order to solve their own problems.

There are particular groups who can benefit from wider access to information. Young people and women who may be left out of the traditional decision-making processes of their societies may find a voice in the "information society."

Developing countries often have a great reliance on agriculture. The same problems, solutions and resources can often be found in geographically disparate regions. National Agriculture Research Centres can act as agents to support local access by farmers to participate, gain access to resources and tools that they need to solve their own problems, set their own agendas and empower themselves through knowledge.

The barriers here are language and other cross-cultural factors. In Papua New Guinea, there are over 800 separate languages. Communication between people from different regions, indeed even adjacent villages may be possible only through recourse to common tongues of English, Melanesian Pidgin or Motu. Children growing up in villages learn their own village or local language (*tok ples*) first, then Pidgin and English if they are lucky enough to attend high school. Literacy among the older generations is low. For effective communication amongst peoples, if the solution is to adopt a common tongue, then diversity will be lost.

Local and regional content is important in a developing country. That is, content that is provided by nationals of those countries intended primarily for their peers or for others in the region. Publication of this information for the external world is secondary when the information is of greatest importance to those in similar situations.

Some aspects of foreign cultures may be completely unacceptable. The separate cultures in PNG have their own taboos and their own ways of making decisions. Pornographic material is illegal in PNG, but is widely available on the Internet. Clearly, there must be some control, but how is that to be achieved? Government control over Internet content as seen in China and Singapore is one approach that can control access to some material. But how will a cooperative society cope with technology that empowers individuals, or empowers women?

Sustainable Development

Land is an important resource for developing nations. A good understanding of land ownership issues is essential for the responsible

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exploitation of natural resources, however traditional landowner rights often conflict with macro-economic development. Cadastral systems link land titles to accurate surveys of the terrain to formally establish ownership. A cadastral system is essential for the transition of a developing country to "developed" status (Williamson, 1997.) Work is ongoing in PNG to establish a digital cadastre (Burrage, 1997.)

The work of the MASP project to document Agriculture Systems in PNG provided valuable information to assist with relief aid during the recent frosts and droughts in PNG (Bourke et. al., 1997.) The work of researchers on the social and economic impact of the Lihir gold mine in New Ireland highlight the importance of wealth distribution. Payment of royalties and issues relating to land rights were major factors in the Bougainville conflict over the Panguna mine.

In the developed world, we are inured to rapid change in IT. Advances tend to be made in an incremental fashion, with one small refinement made on a chain of backwards-compatible products. The cost of following this path, in terms of change management, administration and training, is significant.

Developing countries simply cannot sustain progress along this incremental path. However, due to the lack of investment in legacy systems, hardware and software, they can be in a good position to "leapfrog" over some of the incremental steps and to select a new position on the technology curve (Chapa, 1998).

The precise nature of this "leapfrog effect", particularly in relation to sustainable development, is worthy of further study. In this regard, it is worth noting that donations of outdated or discarded equipment from developed nations are often unsuccessful as they prevent this leapfrog effect.

Rural Telecommunications

Telecommunication is an important link in the development process (Hudson, 1995). Electronic commerce and the Internet assume the widespread availability of low-cost global telecommunications. In developing countries, a regulated telecommunication industry acts as a barrier to competition whilst providing ready profits for governments (often valuable foreign currency.) The market forces of the Internet demand competition amongst telecommunications providers and ready access at the point of need.

Telecommunications can be hard to guarantee effectively in rural areas. The cost of hard-wiring telecommunications services to remote locations has led many organizations to explore digital wireless telephony as a more effective solution.

Wireless local loop (WLL) developed by the Indian Institute of Technology demonstrates an effective solution for low-cost access in rural areas (Jhunjhunwala, 1998.) The Bushnet project (www.bushnet.net) in Africa uses HF radio to distribute Internet and email services to remote subscribers. NGOnet (www.ngonet.org) is an initiative to create Internet access for NGOs in Africa to enhance communication and provide access to information.

Rural telecommunications do not necessarily have to support high-rate communication. Email is still the most valuable form of communication for many individuals. Even though they have access to the Web, the complex graphics and heavy content of many pages act as a significant barrier to information access.

The obvious beneficiaries of widely available telecommunications are rural commercial enterprises and educational institutions. Healthcare can benefit from a reliable communication infrastructure for tele-medicine and to improve access to medical records (Fleming, 1998.)

Local providers will spring up to meet the demand, once there is deregulation. In Papua New Guinea, the initial round of 5 licensed Internet Service companies in 1996 was augmented a year later by a second round to allow any private enterprise to distribute Internet access. In Egypt, 11 Internet companies immediately began providing access when commercial licensing began in 1996. Across Africa, private companies and individuals are exploiting technologies as systems become deregulated.

People will use the Internet if it provides them with answers to their questions, or practical solutions to their problems. They will not use it if it presents them with social, cultural or intellectual barriers that they cannot or will not cross.

Low-Literacy and Technical Skills

Adult literacy is a major barrier to the uptake of Information Technology in the developing world. There is a significant challenge here for Human-Computer Interaction (HCI): to be able to design and create interfaces to complex systems for use by illiterate or low-literate peoples.

The Cybertracker project (www.cybertracker.co.za) involves the use of mobile computers for use by bush trackers to record the movements of wild animals. One of the designers of this system spent time in the bush with native trackers, learning some of their craft and sharing their experiences. The development of this system demonstrates truly participatory design.

Intuitive iconic interfaces have great application here. Reading skills and comprehension of pictures are separate (Fordham, 1995). Simple icons and pictures can convey information of direct relevance to users. Complex information can be communicated by referring to ideas already introduced. The approach of eliciting requirements described by Pimenta and Faust (Pimenta, 1997) has a lot to offer in this regard since it emphasizes both *mutual learning* and a *language-centred* style.

In Papua New Guinea, spoken or written English may be a second or even third language. Rural schools often use local languages first, then introduce English at provincial or national high school levels. The COMNET project is working to introduce communication and translation of simple texts at an early stage in education. The system uses simple pictures accompanied first by text in the child's own language and then by text in other languages.

Primitive peoples are not uneducated. Negroponte cites Sheik Yamani's observations on the differences between primitive and uneducated peoples: "The answer was simply that primitive people were not uneducated at all, they simply used different means to convey their knowledge from generation to generation, within a supportive and tightly knit social fabric. By contrast, he explained, an uneducated person is the product of a modern society whose fabric has unraveled and whose system is not supportive." (Negroponte, 1995.)

Primitive peoples do have their own cultures, societies and abstract thoughts. To support people and empower them with technology, we simply cannot eliminate our differences. We must understand their minds through observation of the customs, traditions and methods that have been handed down, often over centuries.

Environmental Factors

The devices that we take for granted when interacting with personal computers – system units, storage devices, mouse, screen and keyboard – are actually fragile and prone to failure in an adverse environment. The breakdown of equipment causes intense frustration, particularly amongst those learning computer skills for the first time.

Difficult environmental conditions put up barriers to high-capacity, low-cost, reliable telecommunications. Sabotage of telecommunications or power equipment can occur during disputes over land ownership and royalty payments from public utilities to landowners. The infrastructure of a developing country may not have extra capacity or backup systems to take account of network failures. The uptake of technology will be limited unless personal computer manufacturers achieve significantly higher reliability in an uncontrolled environment.

Supply of electrical power is a problem, particularly to rural areas. In PNG, the domestic supply voltage is 240V AC on *average*, not nominal. Over-voltages, brownouts and blackouts are common. The infrastructure does not extend to rural areas, forcing them to fall back on generators, solar power or batteries. Much of the rural population is without any source of electrical power. The inadequate power infrastructure is a major barrier to foreign investment in PNG.

ISSUES FOR DONOR FUNDING

The players in the business of foreign aid are those such as national governments, the World Bank, International Monetary Fund

(IMF), World Trade Organization (WTO), Organization for Economic Cooperation and Development (OECD), global extra-national government organizations under the auspices of the United Nations and regional forums such as the Commonwealth, Asia-Pacific Economic Consortium (APEC) and Association of South-East Asian nations (ASEAN). There is no shortage of power brokers in the economic world.

Donor agencies offer overseas aid to tackle global poverty and promote sustainable development. Large-scale funding initiated by governments appears to be out of fashion. Government-sponsored donations are falling amongst OECD nations. Non-government organizations and private sources account for increasing amounts of funding. In Papua New Guinea, the Australian Agency for International Development (AusAID) is increasing the amount of "tied aid" – funding committed to specific projects that must be matched by national government funds. All donor organizations are becoming more concerned about the need for positive evaluation of sponsored projects.

Donor funding can be a boon and a curse to a developing nation. Aid given in the form of loans will incur the burden of debt servicing. Unless real benefits are achieved through the use of the funding, this will lead to a negative flow of funds. However, aid tied to specific projects must be done in a way to make those projects sustainable.

For example, donor funding to acquire computers for education may provide the initial capital, but no recurrent funding for training or maintenance. Such a project may fail when the full burden of support falls on the recipient.

Developmental aid given to develop a nation should benefit that nation more than it does the donor. It is common to hear tales of "boomerang" aid where money given to one country is used to purchase goods and services from the donor nation.

Donor aid can only provide for the first generation. Technical aid should be devoted towards training the next generation of planners and staff. The goal of any expatriates contracted to a developing nation should be to train their own replacements.

THE INTERNET AS AN ECONOMIC RESOURCE

Capitalist market forces are driving the rush towards globalization (Greider, 1997, p. 11) As a force for economic change and development, the Internet has many of the characteristics of these market forces. There is little government of the Internet and it does advance under its own momentum.

In order to establish a true global market, legal and regulatory frameworks are needed. However, at present, there is little or no government on the Internet and the Web is held together by a loose consortium of corporations held together by techno-centric 'geek' factors. I believe that if the Internet is to become established as a real force in the global economy, it will have to adopt some form of governance over all or part of its domain.

Bandwidth is becoming thought of as a commodity, to be bought and sold, aggregated and the costs involved to be offset against the potential benefits of information (Cavanaugh, 1998)

Bandwidth is generally less in developing countries than in the North. Many developing countries have less bandwidth for the entire nation than commercial Internet providers. In PNG, the bandwidth for the commercial service introduced in 1996 was only 256Kbps. Between 1996 and 1998, the University of Technology in PNG operated its entire Internet and email service over a 9.6Kbps analogue leased line.

Low bandwidth connections may preclude access to some services, limiting the access to potentially valuable information. How can you build a so-called "knowledge economy" when your infrastructure lacks the capacity to communicate effectively with all your people?

CONCLUSIONS

The overall picture of the information needs for a developing country is quite different to the one found in the developed world. Access to relevant information at the point of need is critical for the empowerment and development of rural people. Robust computer systems and low-cost rural telecommunications are required to establish points of presence in remote areas.

HCI practitioners must work to consider the needs of low-literate or illiterate peoples and find ways to deal with multi-lingual cultures. Approaches to eliciting requirements must involve a dialogue between end-user and designer. It is difficult to establish common ground between disparate cultures, but we must try.

Developing nations must adopt the Internet, but not at the expense of their own culture. The entire information society must value diversity and not seek to eliminate differences by imposing a monoculture.

Globalization proceeds so as to reduce the differences between peoples and between nations. The net effect is to make nation-states more interdependent and more homogenous. While the East-West divide may have lessened in recent years, the economic gap between "North and South" will cause friction in the process of globalization.

In economic terms, there is a gap between rich and poor. In technology, there is a gap between "information rich" - those with ready access to relevant information - and "information poor", for whom accessing information and communicating is a real struggle. We have not even begun to address these gaps in the design of information systems. There is a danger that the globalization accelerated by the Internet and the Web will end with the homogenization of socio-cultural resources.

On the positive side, while a developing country may be lacking in modern infrastructure, technological developments have the potential to progress in leaps and bounds, rather than incremental steps. Indeed, in order to keep up with the current trend towards globalization, the developing nations will need to "leapfrog" in order to close both the economic and information gaps.

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