

Village Computing: A State of the Field

Reflections on the Village
Computing Consultation

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This report is dedicated to the men, women and youths around the world working to bring the benefits of the Information Age to disadvantaged rural communities throughout the developing world. The organizers would like to thank all those who took time out of their busy schedules to participate in both the design and realization of the Village Computing Consultation. Your perspectives, insights, experiences, and support have helped illuminate some of the complex influences and interplays that are shaping the growth and development of village computing initiatives around the world.

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Introduction

Over half of the world's roughly 6 billion people live in rural or peri-urban communities often beyond the reach of communication networks and services. These very communities, however, are the ones in which access to information and communication technology (ICT) can play a profound role in helping individuals and whole communities lift themselves out of poverty. Over the past decade or so, many initiatives have been undertaken around the world aimed at bringing the benefits of the Information Age to these communities. Various referred to as Information Kiosks, Telecenters, Community Technology Learning Centers, and the like, these initiatives have experimented, to varying degrees of success, with a variety of approaches (e.g., business models, service offerings, target populations, technologies employed) in service to their constituents.

The different aspects of village computing¹ have been widely discussed in multiple studies, reports, conferences, meetings, and online networks and have helped to shape our collective understanding of and engagement in village computing. This knowledge, however, has often remained fragmented in micro-level case studies or isolated reports and communication between people who work in different areas and who have expertise in different aspects of this increasingly complex and interrelated field remains impaired. As the sector matures, however, it is increasingly important to develop and continually refine an understanding, at the macro-level, of trends in the field's development and the possible implications of these trends on the field moving forward.

The Village Computing Consultation

The Grameen Technology Center (part of the Grameen Foundation), in partnership with the University of Washington Center for Internet Studies, the University of Southern California Annenberg School for Communication, and in consultation with IDRC's telecentre.org initiative, organized a consultation begun in mid-2005 to both address some of the shortcomings in the collective understanding of the global village computing field and to encourage the sharing of knowledge and understanding across relevant domains. The consultation brought together practitioners, scholars, researchers, and others with deep knowledge and experience of village computing from around the world to comment on its current state and the environment that is shaping its development. (For a list of consultation participants and advisors, please see Appendix B.)

The consultation was organized as a two phase process. During the first phase, a detailed questionnaire was administered to over 70 participants from a range of area specializations and geographic focus with intimate knowledge of and experience in village computing. The questionnaire was divided into multiple sections as follows:

1. Technology and Infrastructure
2. Policy
3. Business and Financial Strategies
4. Funding
5. Content and Services
6. Human Resources, Socio-cultural Context, and Community Engagement
7. An Example
8. Additional Themes and a Personal Reflection

¹For the purposes of this consultation we defined "village computing" as follows: A project that offers access to information and services via at least one shared-use computing device (e.g., PC, PDA, Smart phone) to rural or peri-urban communities. By using the term "village computing", we are not trying to just add a new name or provide a final definition to a very diverse field. We are using this term simply to make clear that the goal of this consultation was to learn from experiences geographically confined to the rural and peri-urban spaces that may sometimes be quite different but that often share many commonalities. We expect that this term is sufficiently encompassing to achieve this goal.

Each participant was assigned to at least two of the first six sections and could, if they chose, respond to any additional questions from any of the eight sections. All participants were asked to respond to sections seven and eight. (To review the full questionnaire, please see Appendix A.) In cases where responses to specific questions were unclear, the consultation organizers followed up with participants for clarification and included these responses as addendums to the participant's original answer. During the course of the questionnaire phase participants did not review each others' responses.

Following the conclusion of the questionnaire phase, the organizers reviewed participants' responses and developed a draft document outlining the salient themes that arose from each of the sections. This extensive document was then used to frame the discussions during the second phase of the consultation: an in-person meeting held in Seattle, Washington in December 2005 at which a sub-set of consultation participants and advisors met to further discuss the findings of the first phase in small teams and group format.

Chaired by Peter Cowhey (Board member and Technology Center advisor, Grameen Foundation, and Qualcomm Chair in Communications and Technology Policy, UCSD), the second phase meeting was designed to give participants an opportunity to interact directly with one another to discuss and tease out particularly relevant themes both in the aforementioned questionnaire categories, as well as where those categories or domains intermingled and intersected one another. Over the course of two full days, participants engaged in a dynamic interchange of ideas, both normative (i.e., should do this or that) and descriptive (i.e., is/are doing this or that) that added additional depth, breadth, and clarity to the themes that were percolating from the first phase.

This Report

This report is not a consultation report and, as such, does not trace the activities of the consultation detailing who said what and when. Furthermore, this report does not purport to reflect all divergent viewpoints on the topics under consideration nor does it present or attempt to rectify the contentious or competing viewpoints proffered either by the participants in the consultation or their colleagues in the field. Rather, this report attempts to divine from the participants' commentaries and subsequent discussions a picture of the particularly relevant themes shaping the growth and development of village computing around the world.

The report's structure roughly follows that of the questionnaire dealing with each primary category (i.e., technology and infrastructure, policy, business and financial strategies, funding, and content and services) in separate sections. Responses from the remaining three sections of the questionnaire have been integrated into the aforementioned sections where appropriate. Each section begins with a summary of the main themes. This is followed by a brief introduction to the section and then a more thorough examination of the primary issues. Direct quotes from consultation participants are included when relevant and are useful to further illustrate or substantiate a point. Finally, each section concludes with a number of proposed recommendations relevant to the themes and trajectory of the given section.

This report attempts to presents "a" picture of village computing: a particular interpretation of the myriad views, examples, experiences, and suggestions provided by consultation participants. As such, the picture of village computing presented herein reflects the interpretations of this report's author and not necessarily those of each of the consultation's participants. This report is not meant to be definitive or to conclude discussion. Rather, it is hoped that in addition to providing an initial snapshot, this report will 1) suggest a way of approaching a macro assessment of village computing, 2) encourage continued discussion particularly between domains, and 3) illustrate the value of understanding that interplay between the macro-level forces shaping the village computing field.

Chapter One

Technology and Infrastructure

Summary

- In spite of the many advances in the capabilities of alternative computing devices (e.g., smartphones, PDAs), PCs continue to serve as the primary computing device for village computing initiatives.
- The potential functionality of the PC is, in theory, very useful for many village computing projects; in practice, however, PCs are usually difficult to afford, operate and maintain in most rural situations.
- The increasing computing capability of mobile devices along with their power and connectivity attributes suggests that these may play an increasingly important role in village computing in the near future.
- In spite of the challenges inherent in using computing devices designed for the developed world in village computing environments, there is not a need for *new* computing technologies specifically for the rural market, but instead for adoption, adaptation, and reconfiguration of existing technologies.
- Terrestrial wireless technologies will dramatically change the rural connectivity landscape in the short- to medium-term, enabling voice, data, and video on the same network.
- Computing devices, and the technical infrastructure that enables them (e.g., power, connectivity), are less critical to the growth and development of village computing initiatives than the business models that enable sustainability and the relevant content and services that make them useful.

The digital revolution that has both increased the capabilities of computing devices and made them more widely accessible, lies at the very heart of the emergence of village computing, and continues to play a central role in its development. Yet, with few exceptions, developments in the technology space are driven by the demands of the developed world and not that of the poor in rural communities around the world.

Although we are beginning to see deviations from this norm, particularly as the major technology corporations look to address this enormous market potential, village computing initiatives continue to use the standard PC as the primary computing device and suffer from the same vulnerabilities to power instability, connectivity and other issues that have plagued it since its adoption. Local ingenuity – for example, the use of automotive batteries as a Universal Power Supply (UPS) – has helped overcome some of these shortcomings. Still, when assessing the state of technology and infrastructure in village computing, it must be noted that the benefits of major technological advances, for example, wireless connectivity, computational power and energy efficiency of mobile devices and the like, have yet to be fully realized in the village computing space.

There are certainly many reasons for this, including a complex intersection of market forces, standards adoption, and the persistence of the “cult of the PC”, among others. As we look towards the near future, we can expect the technology and infrastructure of village computing to see little substantive deviation from this norm, except for pilot and experimental projects on the margins. In the mid-term, however, as long range wireless solutions come online and mobile devices continue their dramatic growth, we can expect to see these devices become more prominent in village computing.

PCs remain the primary computing device in village computing

Since the inception of village computing, PCs have served as the primary, if not exclusive, computing device. In spite of dramatic advancements in the development of alternative computing devices (e.g., smartphones, PDAs, thin clients), with few exceptions, the PC continues to predominate and seems to be perceived *a priori* as one of the prerequisite elements of any village computing initiative. This perception is certainly understandable given the platforms computational power and ability to perform widely divergent functions – contingent, of course, on available software.

Yet this perception, formed from the experience in the socioeconomic and infrastructural ecosystem of the developed nations, and adopted at the dawn of the “digital divide” movement, is not inherently portable to the particular contexts in which village computing initiatives operate. Certainly, there are instances where the functionality of the PC is most appropriate and desired – technology training and the education sector more broadly, are very good examples. The point is not that the PC is inappropriate for village computing, but rather that more often than not, decisions regarding the computing device used are not made from an assessment of the specific local context, capacities, information needs, or desires of the community being served.

Given this larger context, it is not surprising that although PCs remain central to village computing initiatives, their potential in many instances remains unrealized. As mentioned above, the village computing context by definition is significantly different from that of the PC’s origin. As such, village computing initiatives based around the PC platform continue to face many challenges that make the PC’s operation and maintenance difficult, even in cases where a PC is (in actuality) the most appropriate computing device for the problem being addressed. For example, existing PCs continue to require relatively high amounts (~300 Watts) of stable power to function, a commodity often in short supply in rural communities of the developing world, and are particularly susceptible to harsh (e.g., dusty, hot, humid) environmental conditions. Further, although prices for PCs have dropped significantly, they remain relatively expensive to purchase, operate and most certainly maintain (a fact particularly relevant with respect to business models discussed later).

This does not, however, suggest that the design and development of future computing solutions should focus exclusively on the particularities of the rural context. Although the jury is still out on the OLPC B1 (i.e., “\$100 Laptop”), It appears clear that designing solutions specifically for rural communities of the developing world continue to face significant challenges from underdeveloped and fragmented markets that tend to drive costs up. It is still quite simply hard to beat the economies of scale provided by solutions designed for more mature markets and then adapted to village computing.

Recent developments along this line clearly indicate that at least some attention is paid to the unique challenges of computing in rural communities of the developing world and have the potential to overcome several of the shortcomings of the PC for village computing. Some of the players experimenting in the adaptation of existing and development of new technologies in this space include Intel, AMD, HCL India, HP, Ndiyo, and Microsoft, among others. Intel’s ‘Community PC’ initiative, for example, has introduced features such as an integrated UPS, dust filtering and cooling solutions, and increased energy efficiency (~100 Watts) that should make the PC platform more robust.

The success or failure in the marketplace of any of these initiatives, and other related efforts, remains an open question. Suffice it to say they have yet to have a significant impact on village computing, a state of affairs that will most likely continue for the near term due

"Communities have the know-how to convert technologies to uses that satisfy their needs in ways often not anticipated by the producers of technology."

- Francis Tsubira

"Attempts to replace the PC with a new device that is more focused on some pre-defined functionality runs the risk of jettisoning the very adaptability and versatility that brought us to the device in the first place."

- Roger Harris

"The real innovations haven't been in technology, but in local business models that make village computing more or less sustainable."

- Tony Salvador

to high transitional costs and the uncertainty of the rural market, among other challenges. In the interim, other adaptations to the PC platform, such as self-contained, limited function devices exemplified by AMD's Personal Internet Communicator (PIC) or thin client solutions, like Ndiyo's ultra-thin client NIVO device, will likely play marginal roles even though reducing the cost of computing solutions while retaining much of the PC's highly desired functional flexibility. As mobile devices, such as smartphones and PDAs, become more powerful and equally flexible, they will become increasingly popular both as primary and adjunct computing devices: a role to which they are particularly well suited given their existing robust solid-state construction, built-in connectivity, low power consumption, and relative cost/revenue generation potential.

Stable Power Remains an Issue

In addition to developments shaping the computing device itself, there are several technological developments on the horizon that may dramatically alter the infrastructural context in which village computing initiatives operate. Of salient factors, the provision of stable electrical power and affordable connectivity options are perhaps the most critical. The provision of stable power, unfortunately, will continue to remain beyond reach in the near- and mid-term. Although interesting experiments have emerged in the field of local power generation (e.g., hydroelectricity for an initiative in the Dominican Republic, bicycle power generators in India and Uganda, and fuel cells in rural Mali), these solutions will not significantly impact village computing initiatives' ability to overcome significant instability in, or lack of, access to the power grid for some time. As mentioned above, this will remain particularly disruptive given the current reliance on the power-hungry PC platform.

Connectivity Options Expand

More promising, however, are the emerging developments in connectivity that will significantly increase the ability of village computing efforts to move beyond the low bandwidth and instability of fixed line solutions or the high cost of VSAT connections. These developments are emerging in two distinct, yet potentially convergent, spaces: 1) mobile telephony networks (e.g., EVDO, GPRS, EDGE) and 2) mobile computing networks (e.g., WiFi, WiMAX). Although not the primary driver behind the expansion of these networks, their rapid deployment will afford all but the most remote village computing efforts access to alternative and potentially more stable, lower cost and higher throughput connectivity solutions in the near term. The result of this expansion, and the potential for the integration of voice, data, and video on the same network, will encourage the development of new services, such as the spectacularly popular Voice over Internet Protocol (VoIP), for village computing initiatives based on the traditional PC model. Simultaneously, it will also support the emergence of alternative computing platforms arising from the mobile space as the connectivity infrastructures and enabling computing devices to converge.

The dramatic transformation of the connectivity infrastructure available to village computing and changes in other relevant technologies do not inherently mean that village computing initiatives will be able to take advantage of these new developments. Local technical and organizational capacity to maintain the networks, particularly IP networks, at the village level will likely be critical and remain a challenge. Although the cost of connectivity is likely to decline, there currently exist very few cases that prove the affordability of wireless networks in poor communities of the developing world, a situation that although eased by the decline in prices will remain a central issue.

Technology Solutions Are Not a Panacea

It is clear from the discussion above that technology developments do not exist in a vacuum and that their impact on village computing is contingent upon a host of external

"We can speculate about the impact of new technologies (such as WiMAX, solar power, open source software, and so on), but none of the trends driving such developments emanate from the imperatives of village computing."

- Roger Harris

"The computational context among the global non-rural population assumes and repeatedly reinforces a continuous co-evolution of needs and technological innovation. Village computing is a leaf, an end-node, and most often not a part of that context. Things happen to rural populations; they are not participating and partnering with tech development. Technologies and infrastructure need to be designed to include them in a continuous social process of technological development."

- Tony Salvador

factors. Technology developments are not a panacea. Although technology plays an important role in defining the trajectory of village computing, the development of highly articulate business models defining how technology will be used in conjunction with a suite of content and service offerings to provide relevant and sustainable operations in the community being served are arguably more critical to the continued growth and development of village computing.

Recommendations

- PCs should not be a predetermined technology solution for village computing initiatives. The choice of appropriate technology for village computing initiatives should depend on specific project goals (including human development goals), the economic and human capital of the individual or organization in charge of the operation, and the local conditions (socioeconomic, political, infrastructural) of the rural communities that host these initiatives.
- Attention should be placed primarily on the adaptation of existing computing devices, not on the development of highly specific *new* devices. Further, it is critically important to engage rural communities in the process of technology design and reconfiguration.
- Research and development of power generation, storage solutions, and low power consumption devices for rural areas should become a priority. Innovations in this area (e.g., developing compact multipurpose solar-powered chargers, fuel cells) could have a significant impact on village computing operations.
- Mobile devices appear to be more technically suited to the village computing environment (e.g., power consumption, connectivity, solid-state) and their use, both as primary and adjunct computing devices, should be vigorously explored.

"So the first step is to determine what you want the technology to do, and then figure out what device is necessary."

- George Scharffenberger

Chapter Two

Policy

Summary

- With few exceptions, village computing is not a specific policy priority in developing countries. Village computing initiatives seldom drive or influence policy changes. But government policy plays a critical role in village computing.
- Governments foster the development of an enabling ecosystem in which village computing exists in a number of ways including: (a) providing public funds to increase rural access to computing technology (through direct public investment or in partnership with the private sector), (b) enforcing policies to increase competition in the telecom market and (c) developing online content and services.
- In addition to governments, there are a number of actors advocating policies to support village computing — particularly international donor agencies, NGOs, and local grassroots organizations. However, rural communities in developing countries, in general, do not participate in policy-making.
- There are many policies, or lack thereof, that hinder village computing. Among government policies and programs that negatively affect village computing initiatives are telecom market monopolies (including the lack of political will to break them) and license requirements for wireless service provision.
- Public-private partnerships are central to how governments engage in village computing. However, public-private partnerships are often challenging to establish and operate because public and private actors have different goals and ways of doing business.

It is difficult to overstate the importance of policy initiatives on the growth and development of village computing. Often operating in what might be considered the background, policies introduced from the international level down to the local level have helped shape how, when, and where village computing initiatives have arisen, the form they have taken, as well as their ability to achieve their stated mission. Through a wide array of often disparate and apparently unrelated areas such as import duties, telecommunications liberalization, records digitization, international convention, infrastructure investment, and direct investment in village computing, policy is shaping both the ecosystem in which village computing exists (e.g., relevant content, connectivity, power) and giving rise to specific village computing efforts.

In spite of a few notable exceptions, however, village computing has become less of a specific focus area for policy makers in recent years, particularly at the international level. Nevertheless, many players (e.g., World Bank, United Nations, international donors, national governments) remain actively engaged in advocating favorable policies, specifically related to village computing or to the development of the ecosystem in which it exists. Of particular importance are national and local governments who are playing an understandably critical role in shaping such policies. Given the wide variability of national and local political realities, it is not surprising that policies vary widely from state to state and from sector to sector within a state. One might find policies, for example in India, that support the establishment of village computing initiatives, and e-government content for those initiatives, while also encountering policies that hinder the availability of connectivity options in order to protect the incumbent telecommunications operator.

Given the position of computing at the intersection of many policy areas, it is not surprising to find such apparent contradictions and variability, making generalizations about specific policy moves (e.g., telecom liberalization, e-government content creation) globally is quite

difficult. When national and local governments seek to enable village computing, both through direct involvement or through cultivating an enabling environment, two related forms of intervention predominate: 1) incentivizing private sector engagement; and 2) creating public-private partnerships. As we look toward the future, we can expect few major shifts from these types of approaches.

National and local policy plays a critical role in village computing

In the past few years, village computing has lost much of its priority status in policy circles both internationally and at the national and local level. Perceptions of information technology's transformative power particularly with respect to the rural areas of the developing world have been tempered significantly from their previous highs as policy makers realize the complexities inherent in village computing initiatives. With few exceptions, for example in India or Rwanda where village computing initiatives are receiving significant policy level attention, village computing is not a high policy priority. Furthermore, the imperatives of village computing – such as the need for relevant content and services, stable power generation, or connectivity – seldom drive or directly influence policy making.

Nevertheless, policy, and the actors who shape it, continue to play an active role in determining how and if village computing initiatives develop in a given location. At the international level, a number of actors, particularly international agencies and NGOs, continue to play a role in advocating policies in support of village computing. Institutions including the World Bank and the United Nations, are active in policy dialogues, facilitating international conferences, like the World Summit on the Information Society (WSIS), promoting research and development programs, and establishing international development targets that ultimately inform state and local policy positions. Both international and local NGOs, are also active participants contributing their considerable on-the-ground experience to the policy formation process internationally, regionally, and locally.

The effectiveness of the aforementioned actors, particularly on the international stage, has been and remains limited. WSIS, the Millennium Development Goals (MDGs), and other such initiatives are effective at creating high-level targets and raising awareness, but do little to directly affect village computing development on the ground. Of even less influence have been the local communities where village computing initiatives reside which, for the most part, remain conspicuously absent from policy formation dialogs.

The primary focus of policy formation that directly affects village computing resides, understandably, in national and local governments. Although less of a specific policy priority, village computing's position at the intersection of many different policy areas (e.g., telecommunication, infrastructure development, education, import duties) makes it susceptible to a wide range of national or local policy movements. Even if not directly targeting the development of village computing, policies can have a significant impact on an initiative's ability to, for example, acquire reasonably priced computing equipment, access stable power, offer desirable and unfiltered content, or establish a connection to the Internet.

Although it is difficult to generalize the national policy movements globally, given the variability in socio-political and cultural contexts, it is relatively clear that the government's impact on village computing comes from primarily two sources of policy intervention: 1) the creation of an enabling environment and 2) the establishment of village computing initiatives primarily through public-private partnerships.

"Village computing is no longer seen as trendy in policy circles."

- Heather Hudson

"We are unable to sustain the discussions and factor clear objectives into our development agenda after events such as WSIS. It is difficult to say whether we are convinced about its conclusions and ideals. Consequently, developing countries are caught on the wrong foot when funding intent is premised on adherence to those ideals."

- Jonnie Akakpo

"There is a need for promoting better understanding of the potential impact of information system services on community development to help make a better case for these projects as a policy priority."

- Hernan Galperin

Enabling Environments

Although the imperatives of village computing do not generally drive policy formation, as noted above, governments are promulgating policies that foster an enabling environment for village computing initiatives. Policies of particular importance include: (a) the provision of public funds to expand rural infrastructure, (b) the liberalization of the telecommunications sector, and (c) the development of online content and services.

In facilitating infrastructural development in rural areas, particularly of the telecommunication sector, governments have used public funds to either invest directly in such projects and/or incentivize private sector engagement. In Indonesia and the Philippines, for example, public funding has been used to undertake regional backbone network infrastructure projects. In many other countries (e.g., Chile, Colombia, Uganda, Tanzania, Nepal, Sri Lanka), universal access or universal service policies have been established to mandate and/or encourage the private sector to serve rural and remote areas that appear less commercially attractive. The government of Chile, for example, has established the Chilean Telecom Development Fund through which public funds are used to provide competitive subsidies to telecommunications providers who serve remote areas of the country.

Another policy area that is transforming the connectivity environment is the continued liberalization of the telecommunication sector, particularly the mobile sector. This process, which has been going on for quite some time, has literally transformed the ability of communities in rural (and urban) areas of the developing world to gain access to the most basic telecommunications services. In countries such as Peru and Brazil, for example, where acquiring a telephone line was an onerous proposition that could take years, connections to the mobile network can now take place almost instantaneously. This breakthrough has led to an explosion in access throughout the developing world as incumbent providers are striped of their monopoly status and competition is allowed to enter the marketplace, especially in conjunction with the aforementioned incentivization agendas and universal access/service requirements. As broadband wireless technologies (e.g., 3G, WiMAX) come online we can expect to see them extend across the growing mobile networks further enhancing the connectivity environment, something that is already happening, for example, in Uganda. When coupled with liberal policies and effective enforcement regimes related to the unlicensed spectrum, in particular those in the 2.4 GHz and 5 GHz frequency range in which Wi-Fi and other networking devices operate, we anticipate the organic development of wireless IP networks, further expanding the core connectivity infrastructure from the local level to the national backbone.

In addition to the allocation of public funds and liberalization policies mentioned above, an increasing number of developing country governments are also implementing policies aimed at delivering e-government content and services that complement village computing efforts. Some examples of this trend can be seen in South East Asia:

- The Ministry of Agriculture and Rural Development in Vietnam, has initiated a program to offer agriculture support services to farmers through village computing centers;
- The Government of Malaysia, likewise, is rolling out several village computing programs, including one that involves 1,700 PC-enabled centers that will deliver access to online applications for farmers;
- Several ministries of the Government of Nepal are providing content and education services through village computing initiatives.

It is clear that the movement towards the digitization of government content and services (e.g., land records, birth certificates, agricultural extension information, healthcare

information, educational curriculum) and their distribution through village computing outlets is perceived by policy makers to provide both economic and social value to their constituents and will likely continue to expand. (See the Content and Services section for more on this topic.)

In spite of these positive movements supporting the development of an enabling environment for village computing, the marginalization of village computing as a policy priority has given rise to uncoordinated and contradictory policies that are hindering, rather than facilitating, the growth and development of village computing in developing countries. Even when appropriate policies are in place, regulatory agencies are often politicized, mired in corruption, or simply incapable of enforcing policy decisions. In many cases, the provision of connectivity to rural communities continues to be curtailed by market monopolies and a lack of political will or ability to change the status of dominant incumbents. In others, cumbersome license requirements for wireless provision restrict the chances of rural connectivity in many developing countries.

A good example comes from India — one of the leaders in village computing experimentation — where despite the remarkable growth in access to telecommunication services that has been achieved since the telecom sector was liberalized over a decade ago, telephony continues to be highly regulated. Smaller operators (including ISPs) who want to offer telephony in rural areas are not allowed to do so. The Indian government-owned incumbent is reluctant to share its infrastructure with private operators. This position is further compounded by the fact that spectrum charges — the amount of money charged for a license to use a particular part of the radio frequency spectrum — tend to be high and are based on physical area covered rather than population density: a deterrent to serving areas of low population density (e.g., rural communities).

Furthermore, there is a tendency among national regulatory agencies, and other policy actors, to understand village computing as primarily a collection of technical problems which are often addressed as part of larger ICT policy processes. The effect of this is to diminish the importance of policies aimed at enabling the social and cultural context that surrounds village computing. For example, ICT policies tend to be gender-neutral. However, there is ample evidence to conclude that in the absence of specific policies, in addition to relevant business practices, women and other disadvantaged groups are often left behind in village computing.

Where policies reflecting a concern for the social aspects of village computing are put in place there is a trend among some governments to focus on monitoring or restricting access to content and services that it deems corrupting, inappropriate, or dangerous. For example, monitoring and restricting online content in Tunisia and China and blocking free online content production tools in Saudi Arabia limits opportunities for access to and creation of content and services of potential benefit to village computing initiatives. In spite of innovative efforts to circumvent these restrictions, we can expect governments, particularly those with authoritarian or paternalistic impulses, to continue to monitor and restrict access as part of national policy. Further, given the difficulties of controlling access inherent to the Internet, governments will increasingly put pressure on the private sector to contain access as a condition to enter or access their market: note Google's censorship in China as an example.

Public-Private Partnerships

In addition to policies helping to shape the environment in which village computing exists, governments are also instituting policies through which they have become directly involved in the establishment and/or operation of village computing initiatives most notably through

"A common problem in developing countries is unprivatized and unprivatizable incumbents with bloated staffs acting as a break on broader sector reform, and governments that view the telecoms sector as a cash cow for the treasury."

- Charles Kenny

"The prevalence of hindering policies for village computing is often a result of perceiving ICT policy as purely a technical matter. Therefore, it is important to raise awareness among the rural populations who don't have technological expertise that what is being discussed is their right to communicate."

- Nancy Hafkin

"Bridging the digital divide and promoting free expression without fear of government retribution should go hand in hand."

- Andy Carvin

"Partnerships must be done in a way that benefits the local communities and according to their needs, not the other way around."

- Derrick Cogburn

"If the private sector can make a profit from village computing they should be free to do so, but that shouldn't interfere with governments implementing workable development strategies to reduce poverty that also incorporate ICT."

- Roger Harris

"Advocacy and change around ICT policies must come from the grassroots. There is a need to educate grassroots organizations and communities to work for policy changes that enable village computing."

- Chat Garcia-Ramilo

public-private partnerships. These partnerships take on many different shapes, but usually integrate diverse combinations of a wide variety of stakeholders, including national and local governments, multinational companies, national industry, individual grassroots entrepreneurs international donors and NGOs. Through public-private partnerships, governments are playing a critical role in overcoming financial and capacity hurdles restricting the establishment of village computing. To be certain, these partnerships have been central to the success of many village computing initiatives tapping the power of government's ability, willingness and, indeed, obligation to serve their constituents, even in situations where the market alone has been insufficiently mature or understood to attract the interest of the private sector.

An often cited example of a highly successful public-private partnership is that of the Hungarian Telecottages in Hungary. In this initiative, the local government authority controls the premises in which the telecottage exists while management of the system is controlled by an NGO and the service provider is a private entrepreneur (see the Business and Financial Strategies section for more on the Hungarian Telecolleges project). Another example is Akshaya in India which is configured slightly differently. In the Akshaya example, a state agency planned the village computing project, set up the connectivity, marketed the idea, developed an e-literacy program, and facilitated region-specific applications and services. Local entrepreneurs, selected by the government in conjunction with local village councils, provided the physical space, equipment, and operation of the centers. The government planned the locations in such a way that no home in the district was more than three kilometers from a village computing center. (See also the Content and Services section for more on government's role in providing content for village computing.)

Governments are embracing public-private partnerships as part of multi-pronged public policy initiatives. Aimed at addressing a variety of objectives for and obligations to their constituencies (e.g., education, agricultural outreach, healthcare, economic development), these partnerships allow governments to take advantage of the private sector's business acumen and civil society organizations' on-the-ground expertise to achieve their ends. Challenges with the establishment and operation of these partnerships remain, however, due to the disparate organizational cultures and engagement objectives of the stakeholders. For example, alliances between governments and the private sector can be quite challenging as companies are driven largely by profit and not rural poverty reduction, while governments have a public service mission. As we look towards the future, it is clear that governments will continue to play a prominent role in the establishment and operations of village computing initiatives. In the mid to long-term, however, we expect governments' direct involvement in village computing will likely recede – save for in areas that have traditionally been the domain of government (e.g., education) – as the private sector becomes increasingly interested in entering rural markets of the developing world.

Recommendations

- Emphasis should be put on creating opportunities for local communities and grassroots organizations to (a) learn the basics of local telecommunication policy and how it affects local rural populations, (b) get involved in policy dialogue, and (c) network with each other to work for policy changes that enable village computing.
- There is a patent lack of compelling evidence about the impact of village computing on rural development. There is a pressing need for more and better research on the cost-effectiveness and socioeconomic impact of village computing in order to (a) inform better policy making in this field, and (b) raise awareness about the challenges and opportunities involved in village computing.

- Village computing should be understood holistically at the intersection of multiple technical and socioeconomic objectives and community needs. Policy should then be coordinated to avoid contradictions and, when appropriate, incentivize and support the access and use of village computing by all segments of society.
- The restricting of access to publicly available information by a government or its proxy is generally unacceptable and should be discouraged as broadly counter-productive to development.
- The liberalization of the telecommunications sector (both in the licensed and unlicensed spectrums) should be diligently continued in conjunction with licensing requirements for rural and remote service obligations and universal access funds to incentivize the continued expansion of telecommunications access to rural communities.

Chapter Three

Business and Financial Strategies

Summary

- There is abundant variability in how village computing projects prioritize their business and development goals, depending on local capacity and conditions. The relationship between financial sustainability expectations and development goals is both dynamic and elastic.
- Opportunities for financial viability and sustainability of village computing initiatives are highly context-specific. Although some village computing initiatives are identified as “models”, there is not yet a clear set of business models nor a clear understanding of the conditions under which these models are feasible and adequate.
- Cybercafés, an urban variant of village computing seem to be the only model to have achieved commercial viability.
- The vast majority of village computing initiatives rely increasingly on commercial activities to ensure their financial sustainability. For most village computing initiatives, adopting an entrepreneurial approach (i.e., a clear business plan with identified revenue sources) to service provision is critical to reaching financial sustainability.
- In spite of significant differences in geneses, objectives, and approaches, financially viable village computing initiatives often share several macro-level similarities, including a network to support local operations, applications and services derived from and responsive to local demand, and “win-win” relationships between all stakeholders through which the viability of the entire system can be established.
- Scaling-up village computing projects requires the support of a back-end network to provide content, management, marketing and other services to the local village computing operator. However, the ability of village computing operations to generate and capture sufficient revenue to support the back-end operations remains a challenge.
- Management capacity at both the local and network levels is critical to overcoming the myriad micro-level operational challenges faced by village computing initiatives. Community assessments, partnership development, project location, and gender inclusion, among other factors, are key concerns facing village computing operators and network managers.
- Our collective expectation of the wide range of responsibilities for the village computing operators, in particular, is most certainly unrealistic but at the same time central to the ability of village computing initiatives to reach financial sustainability. This disconnect will likely continue into the future as capacity building is often a costly and time consuming undertaking beyond the ability of village computing initiatives to address and outside the scope of external funding agencies.

Village computing initiatives have long struggled with devising and implementing business and financial strategies to ensure their financial viability and thereby their sustainability. Village computing initiatives continue to experiment with complex and varied strategies shaped as much by the context in which they arise as business rationales. The quest for financial viability is particularly challenging for village computing initiatives because in contrast to other purely commercial efforts, village computing initiatives are generally attempting to accomplish two often contentious objectives: generating revenue of which at least a portion comes from the local community while at the same time providing content and services that serve a social or economic development goal.

As village computing initiatives struggle to address these competing objectives they are often highly dynamic and elastic in how they structure their businesses. They are *dynamic* in

that project goals may change over time. They are *elastic* in their business structure, responding to context-specific variability by prioritizing their business and development goals on the fly. For example, a commercial cybercafé may begin operations offering simple internet access or email facilities and over time may start proactively offering development-oriented services; inversely, a community-owned and publicly-funded telecenter that starts as a typical development project may gradually transform into a fully functional small business.

This dynamism and elasticity is illustrative of a high sensitivity to context specific variables that make generalizations about business strategies and by extension the identification and successful deployment of models exceptionally difficult. By extension the identification and successful deployment of models exceptionally difficult. For instance, business models taken from areas of high population density, like India, which can count on end user fees for the generation of revenue, may not work in remote, low population density villages of the Pacific. The Foundation for Development Cooperation in Australia, for example, supports a village computing project in a very small community of Papua New Guinea, where they train local youth to attract web-development jobs from clients in the United States and Europe. This project has also developed a website to market local arts and crafts online for diaspora communities and former resident expatriates. The financial sustainability of the project, in contrast to the India context where income can be derived from the local population, depends on generating revenue from outside the village.

The point here is that business models such as private sector start-ups in rural India, or small entrepreneurial efforts in Latin America or Africa, cannot be directly replicated in other contexts. Although some specific project examples have been identified as “models”, a clear understanding of the conditions under which these models are feasible and thus amenable to replication in different contexts remains elusive, and potentially of little functional utility. Although the identification of exemplary initiatives is a useful exercise and most certainly instructive, it is important to keep in mind that these models are merely indicative, not authoritative, and most certainly will require adjustments commensurate with the context in which they are placed.

Most Village Computing Models Increasingly Rely on Commercial Activities

Of existing shared-access computing initiatives, the cybercafé model has been the most successful at achieving both financial as well as commercial viability.¹ Found in communities throughout the developing world, cybercafés are privately owned and operated, and generally provide very basic services (e.g., Internet access, email, games) to their communities through which revenue is generated. Cybercafés, however, do not have an explicit development orientation and are almost exclusively an urban or peri-urban phenomenon where they take advantage of high population densities, high demand for and familiarity with ICT, and relatively easy access to power and connectivity options to sustain their operations: all of which are most often absent in rural communities.

At the other end of the commercial spectrum there exist a variety of projects that, in stark contrast to the cybercafé’s reliance on user fees to sustain operations, rely on donor funding and do not have plans or the capacity to generate revenues to cover their operational costs. These are fully-funded initiatives often founded on the notion of providing a “public good,” like libraries, and in many cases offer their services for free or at a nominal price. A few still survive and even flourish following this model such as the Biblioredes library

¹ A financially viable village computing initiative is not necessarily commercially viable. Commercial viability denotes an initiative that relies on revenue generated solely from its operations to sustain itself. Financial viability simply indicates that operations are sustained through funding derived from a variety of sources potentially including local and/or international donors.

"We cannot just identify one telecenter business model in a research lab and then 'ship' it. Rather, there is a need to document what people are trying on the ground so that people can riff on the inspiration given by others, and then recapture what the next person is trying and so on. Business models need to be constantly evolving."

- Mark Surman

telecenters in Chile which are well funded by the national government and international funding agencies. However, when applied more generally, these types of initiatives are highly susceptible to the whims of their patrons and are prone to failure with most village computing initiatives of this ilk perishing after funding dries out. This is the well-known fate of many village computing projects funded by multilateral and bilateral organizations as 'pilot projects' across the developing world. Although having fallen from favor in recent years, this type of business and financial model remains important particularly in sectors traditionally dominated by the public sector (e.g., education) or in certain contexts (e.g., low-income, sparsely populated, remote rural areas with deficient or nonexistent infrastructure) where other existing models have yet to succeed.

The vast majority of village computing projects, however, exist somewhere between these two poles and, as mentioned above, embrace a variety of strategies in their efforts to become financially sustainable. This mix includes both local support, such as revenue from end user fees, and external support from government, international donor, corporate, or civil society sectors. It is beyond the scope of this work to conduct an in-depth examination of each possible configuration. Rather, we will note here a few influential examples and highlight some of the particularly prominent factors of their formulation.

The case of Hungarian Telecottages, discussed briefly in the previous chapter, is one good example of a structure in which multiple players – including the national and local government, NGOs, and private sectors – come together to enable the system to sustain its operations. Established in 1995 and now operating a network of over 550 centers, telecottages provide a range of services including training, Internet access, government services, local information, and entertainment to communities throughout Hungary. In this significantly donor-reliant model, income is generated through a roughly equal mix of end user fees, government grants, and other sources of income, including from the private sector. Startup costs, similarly, are from a mix of government funding (between 30%-50% based on community situation) and in-kind support (primarily through the provision of equipment and the telecottage facilities), and external funding sources. The entire network is supported by an NGO called the Hungarian Telecottage Association, which plays a critical business and resource development roll, facilitating and advocating for the continued expansion of the network and overseeing its design and growth.

In contrast to the Hungarian Telecottage example's close affiliation with the public sector and significant reliance on donor and government-based funding, many village computing initiatives are increasingly relying on commercial activities with a particular emphasis on generating revenue in the communities they serve to ensure their financial sustainability. Two particularly noteworthy examples of commercially focused village computing initiatives come from India where a great deal of experimentation is taking place. The first, e-Choupal, is a corporate-based approach – one of but a few comparable efforts (e.g., EID-Parry, Hindustan Lever Limited) – that has been well regarded as both effective and sustainable. Established by ITC Limited, a major Indian conglomerate with interests in a wide variety of areas (e.g., hotels, paper products, tobacco, apparel), e-Choupal village computing centers operate in rural communities and provide market information on agricultural outputs (e.g., soy bean, coffee, spices) with the objective of encouraging farmers to sell their agricultural goods directly to ITC. e-Choupal is at the core a vertical supply chain integration initiative designed to allow ITC to access farmers directly. At the same time, however, e-Choupal has brought benefits to the local farmers primarily in the form of higher prices for their agricultural outputs. This fundamental 'win-win' relationship lay

"The important objective is to find a way to sustain operational capacity to the extent possible and then solicit subsidies for programmatic initiatives. In other words, generate revenue to subsidize what funding agents do not wish to (managerial and operational capacity), and then request money for the things they do fund (program-related aspects)."

- Jonathan Peizer

²It could be argued that the simple provision of commodity price information does not warrant the relatively high-cost PC infrastructure being used and that the financial sustainability model could be significantly enhanced with the adoption of lower cost, mobile computing devices or mobile phones.

at the heart of e-Choupal's effectiveness and potential for sustainability. Although we do not have a clear understanding of the income and cost structures of the model given to its corporate parentage it is generally believed that it is financially sustainable, a sustainability that is enhanced by its ability to distribute costs up and down the chain, and across the network.²

Another example of a commercially-focused village computing initiative comes from Drishtee: one of several similar initiatives in the Indian context (e.g., n-Logue, TARahaat) that focus primarily on driving applications and services through entrepreneurial-based village computing centers. In the Drishtee model, village computing centers are owned and operated by local entrepreneurs who purchase a franchise from Drishtee. These centers then gain access to applications and services developed for the rural market by Drishtee. Revenue primarily comes from end user fees for a range of services (e.g., technology training, e-government, horoscopes, job listings, internet access) and is then used to cover ongoing operational costs, repayment on any loans taken to start up the franchise, and flows up the chain to Drishtee to cover its continued support and development of revenue generating content, localization, and the further expansion of the network, among other tasks. Currently, Drishtee has over 1000 village computing centers throughout India and is continuing its expansion. Although particularly promising, it remains to be seen whether Drishtee has been able to generate sufficient income to sustain the ongoing operation of its back-end network support functions, a particularly costly endeavor given the need for constant innovation, through computing center revenue.

Although the two aforementioned commercially-focused approaches are particularly reliant on local demand for their services to sustain operations, a discussion of the particular applications and services offered through these village computing centers will not add significantly to our understanding of the model given their contextual variability and constant need for revision to remain financially viable. What is worth noting, however, are the several macro-level structural elements they share, along with the Hungarian Telecottages example, in spite of their significant differences in geneses, objectives, and approaches. Of particular note are the following: 1) the existence of and need for an umbrella organization to support the network of village computing centers, 2) the need to focus applications and services on specific and clearly defined community needs or desires with the understanding that these may and will likely evolve over time; and 3) the need to establish an appropriate funding mix through the creation of 'win-win' relationships between all stakeholders to ensure the financial sustainability both of the village computing center and the network that supports it.

As we have seen above, there are many potential benefits (or economies of scale) that can stem from solid village computing networks benefits that may ultimately influence the financial sustainability of these initiatives. However, it is difficult to predict if scaling-up village computing initiatives can be financially feasible with current cost structures, devices and approaches, or commercially viable, in the long run. Creating a commercial enterprise to expand the reach of village computing in a specific region or country requires significant management expertise. While single village computing operations can be cash-flow positive at the local level, a considerable infrastructure is needed to support each individual operation – including back-end teams with strong management capacity and experience, and resources for software development, client support services, and marketing. This back-end infrastructure that supports and stimulates the scaling-up of a village computing initiative demands substantial investment capacity. The potential profitability of that investment depends on growing a critical mass of village computing operations – a significant risk that the private sector has been generally reluctant to take.

While some promising movements have been made (e.g., Drishtee), a model in which retail revenues are able to support the financial viability of the back-end expenditures

"Ideally, governments can step into third party payer relationships where they are benefiting from the existence of telecenters. So, if a telecenter offers government services and lowers operating costs for government programs, some of these savings need to be passed on to telecenters so they can keep their doors open."

- Mark Surman

"Financial viability is not a top-down decision: it depends on grassroots initiative. The challenge is not to fit a community to a business model - it is quite the opposite."

- Dario Goussal

necessary for scaling-up village computing initiatives has yet to be proven – a troublesome situation, given that funding agents in village computing tend to avoid subsidizing the costs of back-end operations. As we look towards the future, we can expect to see a continuation of the current experimentation in end user generated revenue as well as other forms of experimentation in revenue generation (e.g., e-commerce portals) and funding mixes particularly in support of the network management component. There is the potential to see a segmentation of the market and an offloading of content creation and localization efforts from village computing networks to external content and service providers as the market develops thereby eliminating one particularly costly component of the back-end sustainability equation.

Management Capacity is Critical to Overcoming Micro-Level Operational Challenges

In addition to the macro-level structural issues explored above, there are a variety of operational and contextual factors at the micro-level that significantly impact the ability of village computing projects to reach financial sustainability. Of particular importance to operations is the capacity of project management and staff at the network and local levels. The importance of this capacity is hard to overstate and remains an ongoing challenge from the recruitment and retention perspectives. Furthermore, the importance of management capacity is not limited only to entrepreneurial and more generally, commercially-focused initiatives, but also affects purely donor-based and mixed initiatives as well.

We should not underestimate the ability of grassroots entrepreneurs to rise to the challenge. Experience has shown that these entrepreneurs can be exceptionally innovative and highly motivated when it comes to growing their businesses. Nevertheless, managing a village computing initiative requires a highly complex mix of knowledge in areas of technology, business, marketing, customer service, content and application (particularly in those initiatives offering a suite of services). Also required is the ability to manipulate these variables to respond to the constantly changing supply and demand context in which they exist.

In many rural communities across the developing world, village computing initiatives are reported to be underutilized due to a variety of existing socioeconomic inequalities and locally-embedded cultural dynamics (e.g., social status, education, gender, age, technophobia) that can discourage access and hinder the attainment of financial sustainability. Although some village computing services develop and grow organically — as the rapid expansion of mobile telephony in rural areas demonstrates — village computing is a demand-creating endeavor that often requires a strong outreach capacity. For example, the use of formal and informal strategies to assess and understand local needs, including focus groups and surveys, establishment of community advisory groups, and periodical multi-stakeholder meetings, are common and effective tools in divining local needs.

Yet, ‘participation’ in village computing and the cultivation of use generally requires more than simply identifying desirable applications and services. In this regard, strategic marketing and awareness-building activities are often necessary components of village computing operations. For instance, local radio in Uganda has been used to popularize village computing centers. In India, traditional community events such as cattle shows are connected to the promotion of village computing initiatives. In the Philippines, parents are introduced to information technologies through the training that their young children obtain from mobile computer labs. In Ghana, people are drawn to village computing facilities by weekend film shows and by speakers on important current issues in the local community. Furthermore, encouraging participation and attracting clients is often enhanced through the creation of formal or informal local partnerships with grassroots organizations, businesses, government offices, and community leaders.

"Farmers, fishermen, laborers, and those in related occupations in the Philippines, feel they are outside of the loop of services that village computing provides; or, conversely, village computing operators can't immediately place a direct link to these occupational groups, hence limiting the community services that village computing can provide."

- Merlita Opena

In addition to marketing efforts, where a village computing center is located can also affect its ability to draw patrons. This is true not only of its proximity to high-traffic areas, but also its relationship to the other public or private spaces that surround it. In many instances, village computing facilities become part of the space of a local organization in an effort to integrate the new services within the already existent communication and information structure of a community. But the type of local hosting organization matters and can affect differential patterns of access. For example, locating a village computing center inside a library or government building has often been reported to intimidate certain portions of rural populations.

One of the persistent challenges village computing initiatives face, and often fail to address, is the inclusion of women, roughly 50% of the potential client base. In fact, it could be argued that village computing has mostly overlooked women, in general. Although gender issues vary depending on specific cultures, this general statement seems to apply across the field of village computing. In some contexts, women are not allowed to access village computing services at the same time as their male counterparts, in others, the premises are located in areas that are considered inappropriate for women, while others schedule operations at times that are not convenient for women. Whatever the case, most village computing efforts reflect, rather than disrupt, gender relations in rural communities if proactive measures to counter this situation are not taken.

In spite of this general trend, however, organizations such as the Committee for the Democratization of Informatics and the Association for Progressive Communications-Women's Networking Support Program, are actively using village computing to reach out to rural women. There are many examples where women are purposely selected to be village computing managers and operators – an effective approach built on the early work by Grameen in their village phone programs in Bangladesh, Uganda, and elsewhere. Other approaches seek to attract women to village computing as a way to support their existing economic activities. For example, SEWA in India has adopted computing technology in a way that reinforces and enhances women's cooperatives. Another project in South India is introducing women to village computing through self-help groups in which members are trained in information management skills and, in turn, serve as catalysts for involving their peers in computing operations related to self-help group activities.

It is quite clear that village computing initiatives at the micro-level are exceptionally complex both operationally and as related to their integration into the socioeconomic and cultural context of the communities they serve. Village computing managers and staff have been exceptionally resourceful and often highly capable in implementing programs and policies that identify and address many salient issues. However, the fact remains that village computing managers and, in particular, center operators remain overtaxed and under-resourced. Our collective expectation of village computing operators, in particular, is unrealistic. However, management capacity and the personal character of these operators is central to the potential viability of any village computing effort. Without this capacity at the local level, an initiative is certainly not doomed to failure, but the probability of achieving financial sustainability, and in some cases profitability, is significantly enhanced by local management capacity. Although village computing networks are able to provide some of this capacity, the need for solid management capacity both at the local and network levels will certainly remain a challenge into the future. This is because capacity building is often a costly and time consuming undertaking beyond the ability of village computing initiatives to address and outside of the scope of external funding agencies. (See the Funding section for more on this.)

"The key is context - what works in one area may not work in another. In each case, the vital element is inclusion. This is difficult in many villages, where for centuries the model has been exclusion. The most difficult element is not engaging local people, but rather engaging a broad selection of local people."

- Nancy Hafkin

"Village computing in the future will not be a one-stop shop that requires a 'superman' office person, but a place where computing is a means for delivery of services from many back-ends that support individual retail outlets."

- John Sherry

Recommendations

- Significant attention should be focused on developing mechanisms to enhance the capacity of village computing managers, such as the World Corps approach, as they are ultimately one of the critical components to achieving financial sustainability. In this regard, there is a need to facilitate peer and collaborative learning, particularly between networks and teams of village computing personnel. Drawing financial and other resources for back-end support of training and capacity building efforts has the potential to benefit a broad community of village computing operators nationally and regionally.
- Business model development for village computing, regardless of its revenue source mix, is highly context-specific and therefore likely to be highly variable. When structuring an appropriate model, it is important to focus on establishing "win-win" relationships in which all stakeholders benefit.
- There is a pressing need to reinforce strategies aimed at making village computing initiatives more socially inclusive, particularly as they relate to the integration of women and other marginalized communities in these initiatives. In this regard, opportunities for knowledge-sharing among village computing stakeholders are critical to stimulate changes at the policy level and facilitate program design at the operational level.
- Economies of scale are important to the financial viability of village computing initiatives and business models should generally be structured to include both local village computing components and an umbrella network that provides a variety of support functions to the local operators.
- Efforts should be made to encourage the development of the content and service provider marketplace in order to ease the revenue burden on village computing network management organizations while enhancing service provision and economies of scale.

Chapter Four

Funding

Summary

- There is a wealth of funding agents providing capital for the development of village computing initiatives and the enabling environment that supports their operations, among them are multilateral and bilateral institutions, governments, and technology corporations.
- Funding directed specifically towards village computing efforts is in a state of transition. Direct multilateral and bilateral funding, once predominant, is declining and donors are moving to ‘mainstream’ ICT expenditures within existing development interventions. In contrast, village computing funding from governments and the private sector is notably increasing in many countries.
- Universal service funds are playing a significant role in shaping the connectivity landscape in which village computing initiatives exist.
- There is generally a missed opportunity for synergies due to a lack of coordination among funding agents in village computing.
- Although financial resources for content creation, training, capacity building, and networking of village computing management and staff exists, funding for infrastructure, and in particular telecommunications infrastructure rollout receives the most attention from funders.
- While funds usually go into the rollout of village computing retail outlets, funding agencies (chiefly international donors) do not focus on back-end aspects of village computing, particularly the managerial capacity necessary for scaling-up these initiatives.

The nature and availability of funding for village computing has and will continue to play a significant role in shaping the growth and development of village computing around the world. As we have seen in the previous chapter, the variability of existing business and financial models, as well as their dynamism and elasticity, necessitates a multitude of funding structures (e.g., grants, loans, investments) and actors to provide the capital required to start and maintain village computing operations. These are also needed to further develop the enabling environment (e.g., connectivity, content and services, power generation) in which these initiatives exist.

Some of the various agents currently active in providing capital for village computing include: international organizations – the most visible of which currently are IDRC, USAID, the World Bank, and several bilaterals such as DANIDA, DFID, SIDA, and SDC – multinational technology companies – such as Microsoft, Intel, and Hewlett Packard – and governments. Additionally, there are numerous smaller, secondary agents operating at the international and national levels, particularly NGOs, foundations, local companies, microfinance institutions, and social venture capital agents who are providing investment and/or grant capital to village computing initiatives. Although international organizations have traditionally been the most visible vehicles for funding village computing initiatives, the presence of governments and the private sector has been growing (see the Policy section for more on the role of government investment in village computing).

Funding Levels are in a State of Transition

In absolute terms, it is difficult to gauge exactly to what extent aggregate village computing funding is actually increasing or decreasing. The reason for this is that there is a lot of

"The most sustainable means for funding village computing initiatives comes from universal service obligations, from telecom operators and national government budgets."

- Sarah Tisch

"There is no holistic or joined-up approach to funding in the field of village computing."

- Dylan Winder

"Each funding sector in village computing works on a different timeframe, has different rationales and motivations, and uses different languages."

- John Sherry

"With major international donors, it's now hard to get funding for village computing per se, although not so hard if it is folded into a wider strategy for poverty reduction."

- Roger Harris

"Much of the lack of success of international donors has to do with supply-side funding models of implementation, lack of appropriate support over a sufficient amount of time, and lack of coordination between efforts even when they were funded by the same entity."

- Jonathan Peizer

"Bottom of the pyramid markets are starting to appear as a legitimate business opportunity as opposed to a chance for corporate philanthropy."

- John Sherry

variability in funding direction depending on the type of donor or investment agent. Additionally, there is no sufficiently encompassing and precise data available about funding trends. Nonetheless, the general patterns of funding levels for village computing are visible.

On one side, funding from multilaterals and bilaterals is declining, particularly with respect to direct investment in village computing initiatives. After years of 'pilot' projects that failed to bring about their anticipated benefits, as well as on-going sustainability challenges, international funding agents are suffering from 'donor fatigue'. In response to these experiences, coupled with a general perception that international donors have done a poor job of structuring their funding programs focusing on less than optimal top-down strategies, major international and bilateral donors are transforming how they engage in village computing. Instead of focusing on direct investment in village computing initiatives, international funding agents are increasingly moving to integrate, or "mainstream," village computing into expenditures for wider development interventions while at the same time supporting advancements to the infrastructure environment in which village computing initiatives exist. As a result of the former, funds specifically for village computing initiatives are increasingly more diffused across operational groups within international organizations. This is not inherently a bad thing for village computing as this mainstreaming has the potential to more tightly bind the technical side of village computing with the application or content side. Nevertheless, this shift in focus and integration of village computing into operational groups is raising some concern regarding the ability of these disparate groups to target and coordinate their funding activities effectively. Furthermore, this process of mainstreaming does not address the outstanding structural issues (e.g., length of commitment to a given project, intra- and inter-organizational coordination) that have hindered multilaterals' and bilaterals' effectiveness in the past. In fact, given the fragmentation of ownership inherent in mainstreaming it would suggest that intra-organizational coordination will become more of a challenge moving forward.

In contrast to the downward funding trend in the international and bilateral sectors, funding from government and the private sector seems to be notably increasing in many countries. Through rural telecommunication funds and other direct public-private funding mechanisms, governments are providing funding both to enhance the enabling environment for village computing, as well as extend and improve their own ability to serve their constituents particularly in those projects that align with traditional public sector roles (e.g., e-government services, education). For example, in Rwanda the government has placed a focus on village computing, along with a range of other ICT initiatives, as part of its VISION 2020 national socioeconomic development plan; while in Uganda, the government has contracted with local telecommunications providers to establish village computing centers in underserved rural communities across the country.

The private sector is also increasing, if tentatively, its involvement and investment in village computing. National and international telecom operators, for example, are increasing their investments in wireless telephony in rural areas of many developing countries - often in response to the presence of universal access funds or universal service requirements put in place by the government - that is enhancing the enabling connectivity environment (see the Policy section for more on this topic). Furthermore, technology companies are also moving to expand their engagement in village computing programs as they come to see the markets of the developing world as the next great frontier for business growth. Take for example Microsoft which is making a major commitment to village computing - and the larger telecenter movement - through its Unlimited Potential initiative, as well as its support for telecentre.org. Both of these corporate social responsibility (CSR) initiatives are in addition to the work being done in the product groups (e.g., Windows Starter Edition, PAYG computing in Brazil).

It is unclear and exceptionally difficult to determine to what extent the myriad of other,

less prominent, funding agents (e.g., microfinance institutions, banks, venture capitalists, individual angel investors, NGOs, diaspora communities) are increasing or decreasing their funding of village computing initiatives. Most certainly, various sectors have been experimenting with how they might best engage. Microfinance institutions as well as local banks, for example, in Bangladesh, India, and elsewhere have experimented with providing loan capital for village computing operators. Angel investors, NGOs, and venture capitalists have invested in village computing networks to support their expansion, for example, across India. Yet, it remains unclear if these various experimentations either as a group or individually constitutes a trend.

The Focus of Funding is Varied, Incomplete, and Uncoordinated

In one respect, the number and variety of funding agents participating in village computing is a blessing: providing the potential for significant capital in support of a number of different elements of the village computing ecosystem. At the same time, however, this diversity, coupled with a lack of clear lines and modes of communication within and between agents across the spectrum has led to the establishment of a funding environment characterized by a general lack of coordination. This is neither a particularly new development nor one that is unique to village computing. Nevertheless, given the diversity of funding objectives and, therefore, funding foci (e.g., infrastructure development, startup capital, network expansion, content and services development, technology development, capacity building) this lack of coordination is most certainly a missed opportunity for developing synergies that could prove transformative.

Of funding being invested or made available to support village computing the vast majority is not focused directly on village computing. Rather, the primary locus of funding is on infrastructure development and, in particular, the expansion and enhancement of telecommunications networks including both cellular (e.g., cdma2000, EDGE) and IP-based networks (e.g., WiMAX) with some advancement in satellite coverage (e.g., BGAN) as well. The development of computing devices, particularly among international technology companies, has also received some particular focus. The OLPC project to develop an inexpensive laptop for education in the developing world (supported by AMD, Red Hat, and Google, among others), the 'Community PC' developed by Intel, and Microsoft's Prepaid computing solution, are all good examples of this focus.

Of particular significance, however, is the substantial shift currently taking place, particularly at the international level, with respect to the nature and direction of funding. For example, the increasing importance and role of the private sector in supporting village computing, primarily as a business proposition as opposed to a corporate social responsibility initiative, is increasing the focus on and importance of financial sustainability and, indeed, profitability. As a result, considerable interest is being targeted on scaling village computing projects. Additionally, as mainstreaming of village computing takes place within the major international donor community, and funding is tied to specific development sectors (e.g., agriculture production and marketing, healthcare), we will likely see a transformation of at least some segments of village computing from what has primarily been a multidisciplinary approach to a more targeted, sector specific configuration.

There are several areas of village computing that require significant funding attention, but remain relatively marginalized. Content and services development and deployment (discussed in more depth in the following chapter), particularly those with the potential to serve multiple village computing networks and communities, are in general not receiving adequate attention. Additionally, funding and agile funding apparatuses to support entrepreneurs' efforts at starting and growing local village computing businesses are significantly lacking and much needed. Some experimentation has been taking place in this area particularly

"One approach that holds promise is the introduction of small-scale, nimble funding mechanisms - either loans or grants. These can target much more closely to the ground level and be available to independent operators and smaller programs."

- Mark Surman

"There is a need for more investment in programming that will help the whole village computing ecosystem grow, and not just in individual implementation programs."

- Mark Surman

among microfinance institutions and the banking industry in some developing countries, but the number of products and their pervasiveness within the finance sector remains woefully inadequate.

Finally, as we have noted in the previous chapter, capacity building, both at the local village computing center level and at the network level, is an absolutely critical component to enabling village computing initiatives to grow and, indeed, thrive. Yet, existing funding initiatives tend to focus on program-based expenditures and avoid back-end, administrative costs and capacity building; both areas, as we have seen, that are central to scaling-up village computing initiatives. A notable exception to this general rule is telecentre.org, the village computing support organization funded by Microsoft, IDRC, and SDC that is working to facilitate village computing networks globally and build capacity among village computing management and staff, among other efforts.

Recommendations

- Directing funding initiatives to encourage the development of the content and services ecosystem should become a priority to ensure that once the technical infrastructure is in place village computing centers will have a sufficient array of offerings to sustain their operations and add value to their communities.
- Funding for village computing networks —specifically creating opportunities for capacity building and knowledge sharing— which can have a critical influence on the ability of village computing initiatives to become financially viable and scalable, should be pursued.
- Developing and strengthening flexible and agile microfinance instruments for village computing is a promising strategy to make funds more accessible to ground-level social entrepreneurs.
- Steps should be taken to encourage the coordination of funding agent activities across the village computing spectrum. Linkages that encourage communication between agents and a shared understanding of existing strengths and weaknesses within the funding target environment are essential steps in this direction.

Chapter Five

Content and Services

Summary

- The content and services sector supporting village computing is still in its infancy.
- The most active agents in content and service creation for village computing are the village computing centers and networks where significant resources are expended on retrieving content from different external channels and sources; principally adapting and repackaging the content to suit local needs. The most tangible examples of village computing content and services are from Asia, with a few from Latin America and a very few from Africa.
- Governments are becoming increasingly active in generating content for village computing, both for their own centers and networks as well as others. While public-private partnerships to invest in village computing infrastructure are increasingly common in the developing world, such alliances rarely happen to create content and services for rural populations.
- The private sector has for the most part not yet entered this space in a significant way, neither alone nor in partnership with other social actors. Companies and entrepreneurs have yet to realize the business opportunity in creating or promoting content development for rural areas.
- There are a variety of actors with the *potential* to contribute content and services for village computing (e.g., international organizations, the private sector, universities) that could add significant value but they have yet to do so.
- Village computing initiatives that actively create and disseminate content rely on central support units in charge of information brokering and service design. Providing back-end content and services support for village computing in a financially viable way remains a key challenge.
- Aside from often used base communication options (e.g., Internet access, email, IM, and increasingly popular VoIP), there is a high degree of variability in content and services offered between village computing centers based on socioeconomic and cultural contexts as well as the centers' missions. There is no one set of service offerings that are applicable or particularly relevant and, therefore, financially viable for all centers.
- Content and services that are particularly relevant and that have an increased potential to generate revenue are those that are integrated into business and trading activities – particularly when content itself is embedded in a specific business practice.
- The development of content and services for village computing remains particularly expensive to undertake given the lack of economies of scale, high localization costs, and rapidity of content and services life-cycles, among other factors. Content that is generated at the local level is particularly underdeveloped and underutilized and lacks a clear business model to sustain its generation.
- Infomediaries, such as village computing operators, play an integral role in the distribution of content and services. It is common to use non-PC media (including community radio) to reach out to village computing hosting communities.

Content and services are, quite simply, the life's blood of village computing. They give meaning and purpose to village computing centers, in some instances generate revenue, and optimally provide value to the community. However, in many respects, the content and services sector for village computing is still in its infancy and there remains a patent lack of computing-based content and services that are relevant for communities in the developing world. Nevertheless, village computing initiatives, and other actors (e.g., governments, NGOs, multi and bilaterals, the private sector) in the village computing

"The critical factors that facilitate content generation in village computing are local language materials that use easy-to-access, low-tech innovative channels."

- Mark Surman

"For universities in developing countries to become relevant content providers for village computing they need to practically reinvent themselves. This will require investment in the reinvention process, but it has a long term payoff."

- Royal Colle

ecosystem, are experimenting on both the content generation and dissemination sides. Web access, email, instant messaging, and the increasingly popular VoIP are some examples of particularly prevalent content and services being offered at village computing centers throughout the developing world. Other specifically development-focused offerings include market prices, public transportation schedules, practical tips on family planning, applications of a new agricultural technique, land title retrieval or job postings. Additionally, less development-oriented offerings such as inspirational messages, matrimonial facilitations, or sports scores, are often also available and particularly popular.

Given the high variability of socioeconomic and cultural contexts in which village computing initiatives exist, there is often a great deal of variability between individual village computing centers both in content and services offered and the mode in which they are provided. Development of content and services continues to be a primarily local endeavor emanating from individual centers or independent networks of village computing centers and, as such, are often not made available to the broader community, a failure of the market that will likely continue into the future. Furthermore, in many instances a variety of non-computing device distribution channels (e.g., community radio, bulletin boards, newsletters) serve as adjuncts to the computing channel but are generally underserved by the content generation community. Finally, given the high degree of variability between centers, the multiple distribution modes, and the unrealized potential of economies of scale, content and service development remains an expensive proposition; and one that will continue to weigh heavily on the financial viability of village computing networks into the future.

The Content and Services Ecosystem Remains Significantly Underdeveloped

There are many agents currently involved in the creation of content and services targeted at village computing including governments, NGOs, the private sector, as well as multilateral and bilateral institutions. Content and services creation and localization, however, continues to be driven primarily by village computing centers or networks who, in developing their product offerings, often establish a mix of locally generated content drawn from the communities being served and external content developed through relationships with a variety of partners. For example, the M.S. Swaminathan Research Foundation not only taps the local community for content relevant to the constituents of its village computing centers in Tamil Nadu, India, but has also built alliances with a variety of partners (e.g., agricultural researchers, governments, banks, insurance companies, multinational organizations) to provide an assortment of offering to their constituents.

Of the aforementioned partners, the efforts of national and local governments to provide both content and services to their constituencies through the village computing channel is of particular note. As we have seen elsewhere, governments are increasingly becoming active in village computing, developing their own centers as ways to more effectively reach out and serve their constituencies. The creation of e-government services is a natural adjunct to this movement. Through projects such as the Bhoomi or Akshaya initiatives in India, e-government services (e.g., land title retrieval, complaint rectification), as well as other offerings (e.g., e-education), are being offered to patrons of government operated village computing centers. Additionally, some of these services are also being made available to non-government run village computing initiatives within the relevant district, state, or national jurisdiction. A wonderful example of this can be seen in the Drishtee network, also from India, where government has taken advantage of Drishtee's existing network of village computing centers and partnered with them to provide content and services through this existing channel: a 'win-win' relationship for both the private-sector village computing network (i.e., Drishtee) that can generate revenue from the highly desirable government services and the government that can piggyback on existing infrastructure to serve its constituencies more effectively.

In addition to village computing networks and governments, there are a variety of other agents who are marginally engaged in content and services creation, but who have the *potential* to make significant contributions, particularly, the private sector, international organizations, and universities.

While 'bottom of the pyramid' initiatives are gaining momentum, in general, the private sector has yet to enter the broader content and services sector in any significant way. Although some experimentation is taking place, companies and entrepreneurs have not fully realized the business opportunity in creating or promoting content for rural areas. The notable exception to this is exemplified by the case of e-Choupal where content development becomes an integral part of the business process (see the Business and Financial Strategy section for more on e-Choupal and other like initiatives). This is not a particularly unique phenomenon to history and is reminiscent of the minimal role that rural and isolated communities played in the history of corporate mass media development. Nevertheless, given the general increase in sensitivity towards bottom of the pyramid opportunities and the participatory nature of communication inherent in village computing, content and service provision through village computing affords a potential market opportunity significantly different from that of the mass media, advertisement-driven business model.

International agencies, like the private sector, have also been marginal participants in the creation of content and services for village computing. In spite of possessing a significant amount of potentially relevant content, international agencies generally lack the capacity to make this content available in a useful way to village computing initiatives. The FAO, for example, has a considerable amount of information related to agricultural production in reasonably accessible electronic formats. Although some of the available resources are not particularly applicable to the village computing market, others most certainly are but have not been made available to the village computing channel and/or localized accordingly. The opportunity here is quite significant and, when coupled with the approach illustrated above in which content and services are channeled through existing village computing networks (segmentation by core competencies) the potential for significant value addition at the village level is considerable.

Universities in developing countries are also a significantly underutilized resource, in spite of their potential as content generators, aggregators, and/or support centers for village computing. A notable exception to this general trend and one that illustrates the potential of universities to contribute to the generation of content is the village computing project in India supported by the Tamil Nadu University of Veterinary and Animal Sciences. For this project, university experts from a variety of scientific fields provide the resources for adapting external knowledge and local research – principally with respect to veterinary care and other information of particular relevance to farming communities – to the language, capacity and cultural context of the community hosting the village computing center.

In spite of the importance of content and services to the function and financial sustainability of village computing initiatives, the content and services marketplace remains in its infancy and significantly underdeveloped. Although some examples of intra-network alliances exist, exemplified by the Swaminathan Foundation example above, there is a general lack of coordination among potential content providers and village computing operators and networks. This lack of coordination, coupled with a primary focus on content and services creation within specific centers or networks of centers, has significantly restricted the development of economies of scale and the sharing of relevant content and services across the larger village computing movement.

"How to link up NGOs and the private sector in content and services provision is a major challenge in village computing today."

- Scott Robinson

Examples of Content and Services

Throughout this examination we have made the point that village computing centers are exceptionally complex intersections of technology and socioeconomic and cultural norms reflecting the context and community in which they arise. As such, it is little surprise that the content and services offered at the various village computing centers throughout the developing world generally reflect this diversity and, recalling the discussion of dynamism and elasticity in the Business and Financial Strategies section, often change their formulation over time.

In spite of this inherent diversity, however, many village computing centers offer a suite of basic communication services (where connectivity is available) including Internet access, email, Instant Messaging (IM), and increasingly VoIP which, by their nature, require little in the way of content generation – the conversation *is* the content. In many situations computer training courses have also become very popular being perceived as a way to directly enhance one's livelihood. There are many other examples of value-added content and services currently used in village computing initiatives, particularly in the areas of government, education, healthcare, agriculture, and business. Furthermore, many initiatives also offer a range of additional services (e.g., fax, photocopies, bulletin boards, photography, games, movies, telephone, radio broadcasts, meeting spaces) that may or may not directly utilize a computing device or devices but enhance the centers utility to the community and financial viability. For the purposes of this section we will limit our discussion to those content and service offerings that focus on the computing device as a primary mode of dissemination. We could not hope to cover them all in this space; but as elsewhere a few representative cases will suffice to outline the general trends within the field.

Of particular import in recent years is the growing number of governmental institutions in developing countries moving to provide standard Internet-based services that are relevant for—and in many cases actively used by—a variety of village computing initiatives. This shift is part of a larger transformation within governments (both in developing and developed countries) to digitize their processes to enhance transparency, increase efficiency, and expand their outreach. For instance, Biblioredes village computing users benefit from several online services developed by the Government of Chile, including a public portal designed to facilitate exchanges among smalls and medium enterprises in the country. Another example is the Bhoomi initiative in the state of Karnataka in India. The Karnataka Department of Revenue has computerized 20 million records of land ownership of nearly seven million farmers in the state. Previously, farmers had to seek out the village accountant to get a copy of the Record of Rights, Tenancy and Crops (RTC), a document needed for many tasks such as obtaining bank loans. Delays, harassment, and bribes used to be the norm in RTC processing and delivery. Today, for a fee of 15 rupees (0.33 USD), a printed copy of the RTC can be obtained online at computerized land record kiosks (Bhoomi centers) in nearly 200 districts or at Internet kiosks in rural area offices. Government services have proven to be particularly relevant in the developing world, as elsewhere, because they provide a means to bypass the existing deterrents to accessing law makers and the bureaucracy (e.g., distance, cost, corruption) for rural populations in pursuit of important government services.

Some of the most integrated models of content development in village computing are appearing particularly in the area of agricultural trading and business where content creation and consumption are directly tied to business processes and, at the end of the day, income generation. e-Choupal, again, is a useful example in which computing technology is being used to help local farmers buy agricultural inputs and sell their produce (see the Business and Financial Strategies section for more on e-Choupal). Another project from Ecuador, although embracing a different approach, is similarly enhancing the ability of small farmers

"Even when the content is useful, it is very difficult to train village computing operators in promoting this content to the communities and getting people to come in and look at it - let alone pay for it."

- Michael Tetelman

"Providing localized content for village computing is actually harder than providing low-cost hardware because low-cost hardware is a technical problem that may one day be solved. Localized content is an economic problem. Content localization is expensive. If there is not a sufficiently large economic base to support it, it must be backed by non-end-customer funds."

- Kentaro Toyama

to increase their production and receive a better price for their outputs. Cocoa is one of the Ecuador's main export industries. The majority of the crop is grown by small-scale landholders in the remote hills of Esmeraldas on the country's northwest coast. Their distance from world markets and heavy reliance on a handful of traders left them vulnerable to exploitation. By organizing small cocoa farmers and connecting them to a network, however, they are now creating their own content about cocoa production and preparation methods, market strategies and prices. This knowledge is shared from village computing centers connected to a central information network managed by a small, local NGO. All the information gathered in this central unit is processed by NGO staff and sent back to the farmers through a variety of channels (including radio broadcasts) to be used as a guide for cocoa production and marketing. As was the case with government services, agricultural information is highly relevant to rural communities and as such generally desirable. But what is more important to note here is the tight integration of the information provided, in this case agricultural, into an existing and also highly relevant business process that can significantly affect income generation.

At the level of village computing networks, content is usually retrieved from different external channels or sources to be adapted and repackaged to suit local needs. The Swaminathan Foundation's village computing project in India, for example, has a value-added content facility with the sole purpose of creating, repackaging and disseminating content to its village computing centers in Pondicherry and other areas of Tamil Nadu. In a similar way, initiatives such as n-Logue or Drishtee have developed a range of information products and services (e.g., health, education and training, agriculture, e-government, entertainment) in partnership with external content generators that are then provided through its network of village computing centers scattered around several Indian states.

The Pallitathya Help-Line, a project developed by D.Net in Bangladesh, uses a similar centralized content support system as the ones in India just described. However, the process of content dissemination and the dynamics of content access it enables set this project apart. To use the Pallitathya services, end-users place queries through a shared-access mobile phone business in their communities. These queries are responded to by helpdesk operators at D.Net in Dhaka, who are supported by a database-driven software application and the Internet. The use of mobile phones as the information access mechanism to sophisticated data repositories enables traditionally disadvantaged villagers, such as the mobile phone ladies, to be effective operators and providers of critical livelihood information.

The grassroots level has long been considered simply a target for the consumption of content and services generated elsewhere. Yet, the grassroots level has tremendous potential to generate particularly relevant content. At the same time, however, facilitating the creation of content at the local level is not without its challenges, particularly related to motivating local participation in content generation activities. The FADECO village computing center in Tanzania, for example, has attempted to overcome this lack of motivation on the part of local farmers by printing their contributions in the community newsletter and the webpage published by the center. In addition, FADECO rewards those who contribute by inviting them to seminars or training sessions and awarding them symbolic prizes in public events.

In most cases, relevant content generation at the village level is facilitated when the benefits of that effort are clearly perceived by community members. A clear case is the village computing initiative for small cocoa farmers in Ecuador described above. For instance, some farmers prepare their cocoa in ways that improve the quality and aroma of the seeds, consequently raising their market value. Because the economics of cocoa at the level of the small farmer encourages cooperation as opposed to competition, this knowledge is shared with other producers in order to deliver large amounts of high quality cocoa and thereby receive a higher price in the marketplace. This common goal, to create better

"There is a problem in the way that many village computing projects deal with content because they usually focus on 'broadcasting' knowledge while they miss the true power of the Internet and telephony as tools for human interaction and local creativity."

- Francisco J. Proenza

"Mobile phone banking to support remittance economies will be an important feature for village computing in the coming years."

- Don Richardson

products and thereby receive higher prices, has encouraged the practice of content creation and sharing among farmers in the area.

Local content is generally perceived to have significant intrinsic value and in some instances this general perception has been borne out. Still, our understanding of the value – both financial and social – of local content, like much of our understanding of the content and services ecosystem in general, is not yet fully developed. In this context, there is almost a ‘Field of Dreams’ mentality that exists with respect to the generation and provision of local content (“If we build it; they will come”) that is reminiscent of the early days of the digital divide movement. It is clear that content generated locally can be of value; however, there is little consensus as to how and if content will be used, how cost-effective different content creation and dissemination approaches are, or what the conditions are under which such content can have a maximal impact.

Although from very different sectors and targeting many different purposes, these examples have several things in common that are of interest to note. First, the creation and provision of content and services through village computing remains in its infancy and lacks an efficient infrastructure to enable both the creation and dissemination of content and services across networks and up and down the value chain.

Second, because of this deficiency in the marketplace, there is a need for extensive human and financial capital support to sustain content creation and dissemination. With the notable exception of such examples as the Open Knowledge Network and the public sector, independent village computing initiatives and networks will continue to shoulder this burden. This is particularly challenging to the financial viability of village computing initiatives because content and service production is expensive and time-consuming. For instance, D.Net in Bangladesh is facing challenges to sustain and scale its Pallyathya Help-Line project described above and is looking to partner with Internet and mobile service providers for subsidized rates in return for business opportunities to reach the rural market. Given the underdeveloped nature of the content and services space, village computing initiatives will continue to build alliances with public and private agents that see a value proposition in the project.

Third, and following from the previous point, content and services at the local level are often channeled through infomediaries where they are transferred into multiple non-PC channels (e.g., community radio, bulletin boards) that are often more accessible to the community. At the grassroots level, village computing operators are, again, critical components to the function of village computing where they assess their community’s needs, drive demand, and then mediate between the community’s capacities and the content and services delivery mode.

Finally, where particularly effective, content and services create ‘win-win’ relationships. These ‘win-win’ relationships can take the form of social returns, as was the case in the FADECO example, or financial returns, as was the case in the e-Choupal and Ecuadorian examples. Of the later, it is interesting to note that when content and services are integrated into business and/or trading activities, particularly when content itself is embedded in a specific business practice, it can be both a sociocultural benefit as well as a clearly financial one.

Recommendations

- Significant attention needs to be paid to the development of business models for content creation in the village computing context and the development of a content and services ecosystem. Attention should be paid to: 1) cultivating the content marketplace outside of existing village computing networks, 2) leveraging existing

"Voice [communication] will remain the most important resource for village computing in the near future."

- John Sherry

content and services providers that have previously been marginal to village computing, and 3) facilitating the creation and dissemination of content at the local level particularly through 'win-win' structures.

- Priority attention should be placed on furthering our understanding of the content and services space. Particular attention should be placed on 1) how content and services delivered through village computing initiatives fit within communities, 2) their relative value – both social and financial – and 3) how we might best encourage the local development of content and services to maximize their potential impact, provide revenue for the village computing operator, and establish the 'win-win' relationship that is the hallmark of sustainability.
- Given the importance of village computing operators functioning as infomediaries for their communities, significant focus should be placed on supporting their efforts in this role through capacity building and knowledge-sharing tools.

Appendix A

Village Computing Consultation Questionnaire

Technology infrastructure

The digital revolution lies at the very heart of the rise and expansion of village computing and continues to play a central role in its development. The goal of this section of the questionnaire is to explore the trends in technology that are having or have the potential to have a significant impact on the nature and development of village computing. For the purposes of this consultation, we are not only interested in the PC, which has traditionally played a central role in village computing initiatives, but in the whole host of both computing devices (e.g., PDAs, Smartphones, Thin-Clients, etc.) and supporting information and communication technologies.

1. Computing devices (such as PCs, PDAs, wireless telephony, etc.) form the core around which village computing solutions are developed. Please identify the technical factors (e.g., local language interface, low power consumption, ability to integrate with existing infrastructure, etc.) critical to making a computing device useful or successful at the village level. Briefly explain and provide examples as appropriate.

2. In addition to computing devices, a host of other related technologies serve to support village computing initiatives. Please identify up to three key developments in technology and infrastructure (such as wireless technology, software, innovative sources of electricity power, standards adoption, processing power, or voice/data convergence, among others) that you believe will significantly affect village computing initiatives in both (a) the short-term (1-2 years), and (b) the medium-term (3-5 years). Briefly explain and provide examples as appropriate.

3. Many of the technologies currently being used in village computing are adapted (and also directly adopted) from technologies designed for industrial economies. What key solutions, if any, are being developed specifically for the village computing market? In your answer, please identify some of the key players currently developing technology solutions for village computing.

4. Describe at least one example of local creation or modification of technology to better fit the needs of a specific village computing initiative.

5. The (a) development and the (b) effective deployment of technologies for village computing projects certainly depends on factors other than strictly technological, for example political, regulatory, economic, and socio-cultural factors, among others. In your opinion, what are the three most important non technical factors that can facilitate the development and the effective deployment of technologies for village computing? Provide examples when possible

Business, financial models, and scaling-up

As you well know, the financial sustainability of village computing projects has been a widely discussed topic. Often described as “social enterprises”, village computing initiatives usually seek to both fulfill a social mission as well as acquire (often through a mix of donor funding and revenue-generating sources) the financial ability to sustain its operations. In this section we would like to focus specifically on the ‘enterprise’ component of these initiatives and understand how village computing projects are attempting to reach financial sustainability and ultimately scale. For the purposes of this exercise we are generally defining financial sustainability as follows: a village computing initiative is considered to be financially sustainable if its revenues meet or exceed its operating

and capital replacement costs.

6. What types of business strategies or models appear to be more promising for the financial sustainability of village computing projects? Please use examples (from specific countries or projects) to illustrate your answer when possible.

7. In addition to business strategies and models, other operational aspects at the local level - such as assessing community needs, or the capacity and training of the project manager, among many other possible factors - can significantly impact the ability of village computing projects to reach financial sustainability. Using examples from your experience, indicate with as much detail as possible some of the operational factors critical to ensuring the financial sustainability of village computing initiatives.

8. Based on your experience, what is the appropriate mix of funding and revenue generating sources (e.g., government funding and subsidies; business partners; funding from non-governmental organizations; revenue recollection from users) to encourage the financial sustainability of village computing projects? Please give as much detail as possible with respect to innovative funding formulas with which you are familiar and have seen working effectively in practice.

9. After years of pilot testing different approaches to village computing, many actors in village computing initiatives are discussing ways to scale-up village computing projects regionally or nationally. Using examples from your own experience with village computing or other related areas, indicate some of the essential factors that make (or have the potential to make) a village computer initiative scalable.

Funding

There are many different kinds of organizations (NGOs, multilateral organizations, governments, foundations, and corporations, among others), as well as individuals and venture/angel investors, funding village computing efforts around the world. In this section we are interested in identifying general trends in the funding community with respect to village computing, what the organizations and/or individuals are seeking to accomplish with their funding effort, and where they may focus their attention in the future.

10. Many different actors (e.g., governments, NGOs, venture capital, angel investors, multilaterals, equipment manufacturers, etc.) have historically been involved in providing funds for village computing initiatives. What are the key funding sources currently investing in or supporting village computing initiatives?

11. For each of the key funding sources you identified in your answer to the previous question, indicate if interest in funding village computing projects is currently increasing, decreasing, or remaining the same. Explain why you believe this is the case and if possible provide examples or specific evidence to support your response.

12. In general, are there any specific aspects of village computing projects that are receiving particular attention from funding organizations (for example, infrastructure, content creation, staff training, etc.)? Provide specific examples as appropriate.

13. According to your experience, in what regions or countries are funding organizations and individuals particularly focusing their giving/investment in village computing? Please explain why you believe this is the case.

14. What impact, if any, are the priorities of the World Summit on the Information

Society, the Millennium Development Goals, or the Poverty Reduction Strategy Papers having on funding intent or direction? Provide examples from your experience when possible.

15. Where do you believe funding organizations should be putting their resources in order to have the greatest impact on village computing in the next 1-3 years? Please rank your answers in order of importance, justify your selection, and provide examples when possible.

Content and services

In this section we are interested in understanding some of the challenges and opportunities involved in the creation and delivery of content and services for village computing initiatives. We aim to gather evidence from practical examples about present and future opportunities for village computing content and services.

16. Give examples with which you are familiar of content or services that you believe are particularly useful and providing value to rural communities in each of the areas listed below. Include the name of the developer(s), when available, and explain the content or services' value.

- a. Government services
- b. Education
- c. Healthcare
- d. Agriculture
- e. Enterprise and trade
- g. Communications
- h. Other

17. Ideally, village computing projects have some services that both produce a social or economic benefit to the people served and provide a source of revenue at the same time. Give examples with which you are familiar of content or services that have proven to be effective at both generating revenue and providing a service to the community.

18. Describe at least one example where a village computing project creates its own content and/or repackages outside content to adapt to the local context. In your answer, address (a) what types of channels and formats are used to create that content and diffuse it, (b) what people in the community contribute to this task, and (c) what actions are taken to insure that the content responds to the needs of the people it tries to reach?

19. Based on the example(s) you provided in your answer to the previous question, describe the critical factors that enable the local generation of content by a village computing project. Support your arguments with specific evidence when possible. In your answer, discuss how strategies for effective local content creation can (or cannot) be replicated by other village computing projects in different contexts.

20. In addition to content created or repackaged at the local community levels, there are many other actors who provide content and services specifically targeted at (or that at least could be useful for) village computing initiatives. What is the role of (a) international organizations, (b) universities and research institutions, (c) governments, (d) local nongovernmental organizations; and (e) the private sector, in the creation and diffusion of content and services for village computing initiatives? In your answer, address some of the challenges faced by these different actors in their role as content and service providers for village computing.

21. Describe in what ways are the open source and proprietary development options helping or hindering the development of content and services for village computing. Explore the opportunities and challenges of both approaches. Cast your answer in operationally practical terms and avoid purely philosophical or ideological criteria. Provide examples when possible.

Policy

Governments, regional associations and other policy making bodies around the world are undertaking a variety of policy initiatives aimed at encouraging the growth and development of the telecommunications and information technology sector. In this section we are interested in understanding what key policy trends are currently affecting or have the potential to affect the development of village computing, and what actors are driving these policies. Naturally, policies vary geographically, and we encourage you to illustrate your answer with examples from specific countries or regions when necessary.

22. What key policy trends (e.g., dominance of incumbent providers or conversely the liberalization of telecom sector; the creation of telecom development funds, etc.) are currently hindering or facilitating the development of or access to technology and telecommunication and computing infrastructure for village computing initiatives? Please make reference to specific country or regional experiences that you are familiar with.

23. What key policy trends are currently encouraging or discouraging the development of content and services for village computing projects? Please make reference to specific country or regional experiences that you are familiar with.

24. What other policy trends do you believe are playing (or have the potential to play) a particularly important role in the development of village computing initiatives? Provide specific examples when appropriate.

25. In general, who are the different actors (such as national governments, international initiatives such as the World Summit of the Information Society, regional associations such as ASEAN or ECOWAS, civil society, international organizations, etc.) advocating these policy trends and what is their relative level of importance? Provide specific examples to support your answer when possible.

26. Indicate up to three main challenges to implementing favorable policies for village computing in developing countries. Illustrate your answer with examples or specific evidence.

27. What role do private/public partnerships play in policy implementation in village computing? Illustrate your answer with examples or specific evidence.

28. What region or country would you consider a model for enabling policy for the development of village computing? Provide specific evidence to support your answer.

Human resources, socio-cultural context, and community engagement

The goal of this section is to better understand a variety of human, social, and cultural factors at the grassroots level that influence the nature and operations of village computing projects.

29. Many village computing projects purport to serve the needs of their communities and, in many cases, aim to assist those at the very bottom of society. Based on your

own experience, describe some of the key strategies being used and/or with the potential to be useful to understand the needs of the communities served by village computing initiatives. This may include methods for eliciting community information and communication requirements, and procedures to engage local people in the planning and operations of village computing projects, among others. Provide specific examples as appropriate.

30. There have been many discussions about the critical importance of “local champions” in enabling the success of village computing initiatives at the grassroots level. Particularly, local village computing project operators are usually described as essential elements in the relative “success” or “failure” of these projects. According to your experience, (a) describe the key competencies that a local village computing operator needs to have, and (b) indicate any training resources or strategies that have been used to build the capacity of village computing operators. Provide specific examples when appropriate.

31. Now consider not only operators but also other village computing “champions”, such as local leaders and community volunteers. According to your own experience, what kinds of incentives and initiatives are being used (and/or have the potential of being useful) to support village computing “champions” working at the grassroots level? Be as specific as possible, and provide examples when appropriate.

32. The dynamic tension between genders in a community can play a significant role in how and/or if a village computing initiative is used and by whom. Based on your experience, explain in what key ways gender is hindering the use of village computing initiatives. Please provide examples when appropriate and note ways in which these gender related challenges are being effectively overcome.

33. Many practitioners and researchers point out that (a) the lack of community awareness about the value of village computing services, and/or (b) low personal motivation of local people to access these services, are factors that often hinder the effectiveness of village computing projects. Based on your experience, (a) provide specific evidence of how these two factors affect village computing projects; and (b) provide some examples of local, national, or international agents (such as governmental and nongovernmental organizations, mass media, entrepreneurs, community volunteers, etc.) that have attempted to mobilize and stimulate villagers’ interest in the possible benefits of accessing the communication and information services offered by village computing initiatives. In your answer to (b), specify what kind of mobilization strategies have been effectively used by each of the agents you mention.

34. In addition to awareness and motivational factors, there are other factors (e.g., cast divisions, physical location) operating at the community level that hinder or conversely enable/facilitate the use of village computing initiatives. Please identify up to three of these factors playing a significant role in hindering or enabling community access and use of village computing initiatives. Explain your reasoning and illustrate your answer with examples where appropriate.

An example

In this section we are interested in identifying village computing projects that you consider to be “successful” or effectively serving their communities. Because we are interested in your own opinion, we are not providing any definition of what “successful” means.

35. Briefly describe one village computing project that you find particularly interesting, effective or “successful”. Among other basic identifying information (name, location,

size, etc.), please indicate the project's goal, its business model, and key services.

36. What are the main current strengths of this project?

37. There are different factors that condition village computing projects, such as political, social, economic, cultural, and technological factors, among others. What are the key factors that enable this project to be “successful”?

38. In your opinion, what are the main challenges this project will face in the next 1-2 years?

Additional themes and a personal reflection

In this section, we are primarily interested in any additional comments or insights you might have relevant to village computing that were not addressed in other sections of the questionnaire.

39. Key international organizations such as the United Nations, many national governments in developing countries, and other influential actors in international development are promoting the idea that village computing initiatives are useful in development and poverty alleviation. Indicate: (a) at least two reasons that make you support this general statement, and (b) at least two reasons that make you disagree with this general statement.

40. Finally, what else would you like to comment about village computing that hasn't been covered in any of your earlier responses?

Appendix B

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