**Achieving Digital Inclusion:
Innovative Uses of Information and Communications
Technologies for Sustainable Development**

Trefor Munn-Venn, BA

Thesis submitted to
The Faculty of Graduate Studies
In partial fulfillment of
The requirements for the degree of

Master of Arts

School of Journalism and Communication

Carleton University
Ottawa, Ontario
December 2003

National Library
of Canada

Bibliothèque nationale
du Canada

Acquisitions and
Bibliographic Services

Acquisitions et
services bibliographiques

395 Wellington Street
Ottawa ON K1A 0N4
Canada

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence

ISBN: 0-612-93917-0

Our file Notre référence

ISBN: 0-612-93917-0

The author has granted a non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

In compliance with the Canadian Privacy Act some supporting forms may have been removed from this dissertation.

Conformément à la loi canadienne sur la protection de la vie privée, quelques formulaires secondaires ont été enlevés de ce manuscrit.

While these forms may be included in the document page count, their removal does not represent any loss of content from the dissertation.

Bien que ces formulaires aient inclus dans la pagination, il n'y aura aucun contenu manquant.

Canada

PAGINATION ERROR.

ERREUR DE PAGINATION.

TEXT COMPLETE.

LE TEXTE EST COMPLET.

Abstract

Development initiatives struggle to achieve sustainable impacts. Central to this objective is delivery of projects that relate to stakeholders' requirements in a meaningful way. Increasingly, information and communications technologies (ICTs) have become a familiar element in the promotion of international development. While still central to the mix, the provision of radio and telephone services are being eclipsed by Internet-based solutions. This thesis explores how advanced communications technologies are being deployed in rural regions of Madhya Pradesh, India. It highlights the critical importance of being able to “manage” the technology – particularly by villagers in the Pilot Project region. The process by which rural villagers negotiate technologies – and the social institutions represented therein – are explored through the theoretical frameworks provided by Anthony Giddens' structuration and the middle-theory contribution of Social Construction of Technology (SCOT) theory.

Acronyms

BSNL	Bharat Sanchar Nigam Limited
CIDA	Canadian International Development Agency
GE/SE	Gender Equality / Social Equity
ICT	Information and Communications Technologies
ICTOP	India-Canada Telecommunications Operations Project
IFI	International Financial Institution
NGO	Non-Governmental Organization
NICT	New Information and Communications Technologies
OBC	Other Backward Castes (Official Indian Term)
PMIA	Project Management Implementation Approach
PRA/RRA	Participatory Rural Appraisal / Rapid Rural Appraisal
SCOT	Social Construction of Technology
VIC	Village InfoCentre
WBS	Work Breakdown Structure

Acknowledgements

Seldom are meaningful tasks accomplished in isolation. My achievements rest very much on the strengths of others.

Simon Cheesman: You have literally been there every step of the way – from Keele to Itarsi and home. I'm indebted to your deep friendship, true brilliance and unmatched wit.

Dr. Paul Attallah: We have seen international institutions come and go. We have seen topics change. We have gone right to the wire. Your pragmatic optimism and steady reassurance are much appreciated.

Dr. Jennifer Venn: You greet us as we arrive and prepare us as we leave. You have been and always will be among my dearest friends. Your powerful mind has challenged me, your benevolent soul has calmed me.

Dr. Thomas Grandy: You have demonstrated, in a manner unsurpassed, the poise, diligence and sincerity required to deliver the impossible. I count myself lucky to have worked so closely with a true thought leader and a man of such gentleness and generosity.

Karri: Your depth of character and immovable conviction have been a powerful motivation. They are surpassed only by your faith. All of which leave me humbled. I follow in your footsteps and count myself blessed for every moment we share.

Table of Contents

INTRODUCTION	1
CHAPTER 1: “PROMISING” TECHNOLOGIES	4
Technology and Development	10
Bridging the Digital Divide	12
Overcoming Challenges of Rural Telephony in India	14
Achieving Flexibility and Adaptability	15
From Scale to Scope	16
CHAPTER 2: INDIA-CANADA TELECOMMUNICATIONS OPERATIONS PROJECT	19
Overview and Objectives	24
Team Structure	27
Situation Assessment	32
Situation Assessment Methodology	34
Pilot Project Research Locations	36
Pilot Project Survey Instruments	39
Data Collection	43
Technical Survey	45
Building a Sustainable Model	47
CHAPTER 3: SCRIPTING NEW TECHNOLOGIES	50
Social Construction of Technology (SCOT) Theory	50

Middle Theory	52
Scripts	55
Stabilization	58
Design	59
Negotiation	67
Frames	69
CHAPTER 4: AGENCY, PERVERSE CONSEQUENCES AND RECURSIVENESS	74
Duality	76
Agency	77
Perverse Consequences	79
Recursiveness	82
CHAPTER 5: PURSUING SUSTAINABILITY	90
Roots in Rio	90
ICTOP and Sustainability	93
Key Characteristics	93
Accessible	95
Adaptable	97
Profitable	97
Reliable	98
Replicable	98
Partnership	98
Communications and Awareness	103
Capacity Building	103
Local Ownership	104

CHAPTER 6: A PATH FORWARD	107
Looking Ahead	112
Appendix A: Key Findings of the Situation Assessment	115
Summary Findings	115
Familiarity with Media Technologies	119
Media Use	120
Phone Use	121
Literacy and Language	121
Education	122
Potential VIC Operators	123
Villager Needs Assessment	124
Health	124
Education	126
Government and Social Services	128
Agriculture and Commerce	130
Communications	131
BIBLIOGRAPHY	133

List of Tables

Table 1. Characteristics of the Pilot Project Region	38
Table 2. Key Characteristics of Sustainability	94

List of Figures

Figure 1. Structure of the ICTOP Project	27
Figure 2. Location of the Pilot Project	37
Figure 3. Topographical Map of the Pilot Project Region.....	39
Figure 4. Sample of PRA Resource Map	42
Figure 5. Sample of Village Recommendation for Telephone Location	43
Figure 6. A Primary Research Survey Team	44
Figure 7. Sustainability Through Partnership	100

Introduction

This thesis examines the interaction between the basic tenets of sustainable development and the use of information and communications technologies. In particular, it looks at the India-Canada Telecommunications Operations Project (ICTOP) to examine its design and structure in order to identify the critical success factors for the project. The analysis will draw on Giddens' work on structuration to assist our understanding of the relationship between the villagers in rural India and the social institutions with which they interact. Social Construction of Technology Theory (SCOT) – a middle theory – will also be applied to the project (particularly the work of Mansell, Silverstone and Samarajiva) to help unpack the interaction between individuals and technology.

“In the increasingly globalizing interdependent world economy, a holistic approach to the interconnected national, international and systemic challenges of financing for development – sustainable, gender-sensitive, people-centred development – in all parts of the globe is essential.”

~ United Nations,
Monterrey Consensus. January 2002

The major objective of this thesis is to analyze the ICTOP project from the perspective of SCOT. Its main particularity is that whereas SCOT analyzes technologies *after* their social introduction in an attempt to reconstruct the social interests embedded within them, this thesis analyses the design of a technology *before* its social introduction in order to illustrate how an awareness of social interests can be built into a technology with beneficial effects. Its secondary goal is to reflect on the general process of development communications and the idea of sustainable development with a view to answering why some projects succeed and others fail. Finally, a tertiary objective is to contribute to our overall understanding of the development and social application of technology and of the role and utility of theory in understanding it.

This project provides a context to help uncover why some technologies thrive and others wither. By examining the manner in which individuals negotiate with technology – use it in unexpected and unintended ways – we gain insight into a dialectical process involving technological artifacts scripted with social interests and the active users of these technologies. To achieve the stated objectives, this thesis has been organized into the following six chapters:

- Chapter 1: An overview of the recent growth in importance of information and communications technologies (ICTs);

- Chapter 2: A description of the India-Canada Telecommunications Operations Project including the primary objectives, organization, research methodology and directions;
- Chapter 3: A discussion of the interaction between users and technology from the perspective of Social Construction of Technology (SCOT) paying close attention to the role of “scripting”;
- Chapter 4: A deeper investigation into the power or “agency” of individuals and a discussion of intended and unintended consequences resulting from the use of technologies, drawing heavily on Giddens’ concepts of agency, recursiveness and perverse consequences;
- Chapter 5: An investigation into the concept of “sustainable development”, including its roots, key tenets and how it plays a role in the ICTOP initiative; and
- Chapter 6: Consideration of the path forward.

Chapter 1: “Promising” Technologies

With each new era of technological innovation, confident proponents promise radical change to production processes, social equality, political organization and everyday life. The emergence of the so-called “information age” has been no different. With increased convergence between computing devices and communications technologies, we have witnessed a response to the potential of technological transformation unrivalled in recent times; perhaps in history. With a bravado and an enthusiasm that were both contagious and hypnotic, business, political, social and academic leaders promised unparalleled change to the way we think, act, transact, communicate, vote and learn.

With each new advance, each new generation of computer chips, each new service that was launched and each new overnight billionaire, the promise seemed somehow closer. And yet it has remained elusive.

For instance, true video-on-demand (VOD), loudly promised in the early 1990s (and well before), remains as intangible today as ever. The retreat of the financial markets from technology stocks and the cancellation of much-publicized IPOs heralded the end of Wall Street’s and Bay Street’s patience with the promise of the Internet revolution.

Nonetheless, while much of the hype has subsided, it is important to recognize that some changes have taken place, at least in some parts of the world. The prevalence of email and the Web have made a notable impact. Worming their way into all other media forms, the “.com” suffix and the inevitable “@” sign have quickly become ubiquitous and important components of our communications systems. The prevalence of computers in libraries, schools, homes and offices is a testament to how willingly countries such as Canada and the United States, among others, have embraced new tools. Combined with the rapid adoption of cellular phones, video game consoles, personal digital assistants, and so on, it is impossible to deny that something important is happening.

It is also important to recognize that, even in the best of situations, the true impact of the future painted by techno-cheerleaders will, nonetheless, take a long time to manifest itself. Not simply because technology is complicated (though that is certainly true), nor because it is very expensive (which is also true), but especially because the radical future promised by new technology requires major transformations of human behaviour. Confusing the importance of human behavioural change with technological change results in a situation in which we consistently overestimate short-term changes (by focusing on technology) and underestimate long-term impacts (by ignoring the significance of human behavioural shifts).

Already some changes are occurring. We have learned new communications patterns, new shopping patterns, and new protocols and etiquettes. We're accustomed to mobile telephony services and digital programming guides. We've got our email addresses (typically more than one), our favourite home pages, digital cameras and listservs. Together, these patterns, tools and techniques lend important momentum to the ongoing adoption of new information and communications technologies. But we are far from the end game.

As individuals, corporations and governments have sought to reap the benefits of new technologies, we have seen very different approaches on how best to tap the promised potential. Community-based FreeNets seek to make Internet communications and resources available to all; industrial trading exchanges are trying to deliver new economic benefits to companies, industries, sectors and even geographic regions; and national governments are pursuing a range of information infrastructure improvement projects with goals such as improved education, health, civic and economic opportunities.

Each of these approaches requires that users, however they might be defined, believe in the technology, opportunity and, to a certain extent, the ideology of those advocating an approach, application or service.

Because these technological solutions are based on the marriage of communications with computing, they inherently adopt Metcalfe's Law as central to their function. Metcalfe's Law argues that the value of the network is equal to the square of the number of nodes. Basically, the value of any network increases exponentially as each new user joins. Imagine you are the only person who has a telephone. The value of that phone is zero. But with each new opportunity to contact others, the value of the infrastructure increases.

Now imagine a network where there is a device in every person's home or in every person's pocket. The *potential* to yield the benefits of Metcalfe's Law is very high. However, that potential can only be unlocked by the actions of those individuals. So there are two parts to the equation. First, the infrastructure or service must be available. Second, people must be willing to adopt and use the service.

The question we are still left with is "Are these changes positive?". We can't simply accept that adoption of these technologies and use of these tools automatically constitute a benefit – only a difference in practice. And yet the notion of "benefit" is central to this discourse as it is the premise on which these new technologies are promoted, sold and adopted. We are told that we will save more money or more time; that our lives will be easier, our relationships stronger, our businesses more prosperous. At a higher level, we are told our democracies will be stronger and more inclusive, our economies more vibrant, our education

systems more relevant. We are told that the poor will have more opportunity, the disenfranchised, voice, and the disillusioned, hope.

A connection to development rapidly emerged out of this discourse. National leaders were quick to recognize that new information and communications technologies (NICTs) had the potential to bring benefits to their countries in the form of:

- Emerging economic centres;
- Improved national infrastructures;
- Enhanced public sector service delivery; and
- New jobs.

Two aspects were particularly interesting about this discourse. First, it was remarkably similar from nation to nation. Recognizing that some countries had, and continue to have, extensive controls over the Internet, virtually every nation in the world seemed to concur with the imminent benefits.

Second, virtually no one disagreed. It wasn't really a contested discourse at all. North-South, rich-poor, developed-developing; the benefits articulated were basically left unchallenged. While there was certainly informed debate about

whether these changes were a continuation of a much larger trend or represented some kind of rupture (hats off to Frank Webster and his text *Theories of The Information Society*¹), the discussion never seemed to settle on the short-comings or whether the analysis behind the benefits was sound.

In spite of the asymmetries in their development and use, the prospect of accessible, easy-to-use, interactive communication networks is consistently associated with beneficial social and economic transformations. Applications in support of education, health services, public sector information services, environmental protection, teleworking and faster, leaner, just-in-time design and manufacturing processes are also expected to transform the qualitative, as well as the quantitative, experience of productive employment and leisure time. This favourable scenario is found both persistently and insistently in the rhetoric of the producers and advertisers who promote the use and application of growing quantities of electronic information.²

Perhaps that's because the benefits were so obvious or because the issues well-understood. More likely, however, is that the inherent flexibility of the Internet and its underlying protocols made it easy to project one's own objectives and

¹ Frank Webster, *Theories of the Information Society*. (London: Routledge). 1995.

² R. Mansell and R. Silverstone, *Introduction*. In R. Mansell and R. Silverstone (Eds.). *Communication by design: The politics of information and communication technologies*. (Oxford: Oxford University Press). 1996. pp. 1-14.

agendas onto these new technologies. This was as true for the business community as it is for the development community.

Technology and Development

Nitin Desai, United Nations Under-Secretary-General for Economic and Social Affairs and Secretary-General of the World Summit on Sustainable Development, argues that technology has always played a critical role in development. He states that “The very nature of human existence is such that we as humans could not survive without the use of technology in one form or another.”³ However, he goes on to suggest that some important differences regarding the relationship between technology and development have emerged that are critical to understanding how they interact with one another. He argues that today we can see evidence that technology is becoming the driving force of development, rather than simply a tool of development.⁴

³ Nitin Desai (United Nations Under-Secretary-General for Economic and Social Affairs and Secretary-General of the World Summit on Sustainable Development)., Opening Address at the Beijing Forum on New And Emerging Technologies for Sustainable Development. (Beijing, China). April 2002. pg. 2.

⁴ Ibid. pg. 2.

This shift has been prompted by some central changes. First, he argues, is the rapid rate of technological change and the correspondingly short amount of time available to respond to these changes. Desai also suggests that the nature of technological change, including infotech, biotech and nanotech, is very different from the technological transformations of the earlier industrial revolutions. There is a deeper relationship between basic science and technological change than has been seen previously. As a result, it is much more difficult to develop competence in these areas only through applications at the industrial level. A corresponding development in related areas of basic science is required in order to use and develop these technologies. Desai points to the increasing importance NICTs play in economic development as another critical shift. These technologies are becoming enablers of a larger and larger portion of a national economy. In a knowledge economy, he argues, success will be contingent on having the technological infrastructure to support creativity and innovation. This, in turn, requires a supporting infrastructure of education, communication, and venture capital funding.⁵

⁵ Ibid. pp. 2-4.

Bridging the Digital Divide

In the discussion of the possibilities of NICTs, the concept of the “digital divide” has emerged to describe the “vast and growing gap that divides the knowledge-intensive developed countries from less fortunate and less developed nations. It also refers to the increasing disparity between fortunate and less fortunate citizens within developed countries.”⁶

Bridging the digital divide in and among countries has assumed a critical importance on our respective national agendas. Everyone should be able to enjoy access to information and communications networks. We reaffirm our commitment to the efforts underway to formulate and implement a coherent strategy to address this issue. We also welcome the increasing recognition on the part of industry and civil society of the need to bridge the divide. Mobilizing their expertise and resources is an indispensable element of our response to this challenge. We will continue to pursue an effective partnership between government and civil societies responsive to the rapid pace of technological and market developments.⁷

⁶ Dr. Thomas Grandy, Trefor Munn-Venn and Graham Sibthorpe, Digital Inclusion: Canada's Community-Based Approach to Building the Innovative Economy. (Report prepared for Information Highway Applications Branch, Industry Canada). 2001. pg. 3.

⁷ www.g8.gc.ca/2000/Okinawa_Charter/GISS0722-e.asp

As this quotation suggests, the G8 and its Dot Force initiative rapidly rallied to the cause of the digital divide. Moreover, the language of their proposals was remarkably similar to the language of those on the periphery who have long been arguing for universality, affordability and accessibility. For instance, Dot Force stated that “A key component of our strategy must be the continued drive toward universal and affordable access. We will continue to:

- a) Foster market conditions conducive to the provision of affordable communications services;
- b) Explore other complementary means, including access through publicly available facilities;
- c) Give priority to improving network access, especially in underserved urban, rural and remote areas;
- d) Pay particular attention to the needs and constraints of the socially underprivileged, people with disabilities, and older persons and actively pursue measures to facilitate their access and use;
- e) Encourage further development of “user-friendly”, “barrier-free” technologies, including mobile access to the Internet, as well as greater utilisation of free and publicly available contents in a way which respects intellectual property rights.”⁸

While the term may be new, countries around the world have sought to address the “digital divide” for some time. This has involved the development of national radio broadcasting networks, microwave telecommunications infrastructure and advanced fibre optic networks.

Overcoming Challenges of Rural Telephony in India

In India, the government has actively sought to address this issue through efforts to improve telephone penetration in rural areas where service was non-existent or, at best, intermittent.

According to the traditional service delivery model in most parts of the world, a basic service provider delivers telephony services to rural and remote areas. However, this approach has been unsuccessful in India – and for good reason. Indeed, this is a key factor driving the India-Canada Telecommunications Operations Project.

Delivery of telephony services to rural and remote regions around the world has followed a single basic approach; cross-subsidization. Canada is an excellent example. In a country where the vast majority of residents live in urban areas,

⁸ Ibid.

they are relatively easy to serve in a cost-effective and lucrative manner. However, even within these circumstances, governments have provided monopolies within serving areas in recognition of the tremendous costs involved in serving customers even in densely populated areas. Coupled with the benefits of monopoly serving areas, governments have required that operators serve less lucrative markets – often rural and remote customers. To do so, telephone companies have used revenues from business and urban clients in order to serve rural and remote clients. This practice of cross-subsidization continues today.

The challenge faced in India is that the vast majority of the population lives in rural and remote areas. As a result, public telephone companies are not able to successfully cross-subsidize from the urban and business markets to the rural and remote markets – there is insufficient scale in the system. Furthermore, private telephone companies (including those in India) do not have the same mandate to serve rural areas. Finally, while the regulatory scheme for telephony is oriented to a cost-based pricing structure, pricing restrictions designed to keep service affordable in rural areas make it more difficult for telcos to recover the higher costs required to serve rural customers.

Achieving Flexibility and Adaptability

First, any attractive approach must be substantially more adaptable. Instead of pursuing scale – the long-respected deliverer of increased efficiencies – the approach needs to focus on responding to the unique requirements of different stakeholders. This presents a significant challenge to telcos. The strength of phone companies has conventionally been in large-scale network management. Only recently have telcos, anywhere in the world, started to develop real strength in customer service. Yet, the rise of the Internet and the move to the “On-Demand” era of service delivery has pushed organizations to focus on the customization of services to smaller and smaller customer segments.

In order to move in this direction, a new kind of player is required. One who can take the core capabilities of the telcos and translate them to the unique requirements of villages. This player could be a new entity, a unique operating unit or a business spun-off from existing telecommunications companies. By working with major organizations to transform their services to the unique requirements of smaller market segments, new players have the potential to increase the value of their partner’s services, improve service to customers and secure their role as an important value adding partner.

From Scale to Scope

Second, the approach must privilege economies of scope over economies of scale. Instead of trying to address the challenges of rural telephony simply by seeking greater network efficiency with the hope of reducing the cost to provide service, telephone companies should be seeking new ways to expand the range of uses of the network – to provide new services. By increasing the number and breadth of services offered, telcos also improve their ability to offer more customized packages of services that could be combined to reflect the unique requirements of different villages. In many ways, this too is a radical departure for delivery of telephony services. However, where economies of scale cannot be achieved, only two options remain; pursue economies of scope or exit the market.

Where there is a mandate to serve that market, only one option remains. In the case of the India-Canada Telecommunications Operations Project, it is believed that economies of scope will be delivered primarily through the introduction of information and communications technology (ICT) services. Not only do they capitalize on the same architecture, they open up the possibility of many new revenue sources.

To assist the Government of India in achieving these objectives, the Canadian International Development Agency signed a Memorandum of Understanding to enable a Canadian-led solution to be developed. Chapter 2 describes this project in detail.

Chapter 2: India-Canada Telecommunications Operations Project

The India-Canada Telecom Operations Project (ICTOP) was designed to facilitate the improved penetration of telecommunications infrastructure into rural India. The author was actively involved in the development of the key concepts of the project and spent five months in India during the detailed design phase leading the Sustainable Model workstream (described below) and playing a senior role in managing stakeholder relations, project management and overall project coordination. Primary areas of responsibility included the design and execution of the Situation Assessment and the development and communication of the Pilot Project model.

“Far from being a burden, sustainable development is an exceptional opportunity.”

~ United Nations

The project was comprised of three basic phases.

1. **Inception Phase:** During this phase, a small group of project team members traveled to India to meet with partners from Bharat Sanchar Nigam Limited (BSNL), the incumbent telecommunications service provider. Visits to the Pilot Project region were undertaken to conduct a

preliminary assessment of conditions and potential requirements.

Research about relevant national conditions (e.g., regulatory environment) was conducted along with an inventory of other initiatives involving the use of ICTs in a development context. Based on the Inception Mission, a Project Management and Implementation Approach was developed to guide the activities of the project.

- 2. Detailed Design Phase:** During this phase, the entire project team traveled to India to conduct the detailed research required to design the delivery model (an in-depth description of the services to be offered, structure of the organization that would offer them, economic model, operating model, etc.) and the technological solution (the engineering design of the communications infrastructure to be used for service delivery).
- 3. Implementation Phase:** During this phase, the plan developed in the Detailed Design Phase is implemented, operated and evaluated. It is expected that the original design will evolve during this process to yield a solution flexible enough to work in most rural areas of India.

The project has recently entered the implementation phase and the author is playing an advisory role to each of the workstream leaders.

Like many other developing countries, India has wrestled with the challenge of improving its communications infrastructures, particularly in rural and remote areas. This certainly is not a new problem; for India or for virtually any other country. In fact, this has been a critical feature on the agendas of many developing nations.

This development agenda (improvement of communications infrastructure) is premised on the notion that improved connectivity will yield improved economic growth and thus improve the socio-economic development of the nation. The idea is certainly not new and there is definitely precedent for it. A useful example is the development of the freeway system in the United States. The roads do not simply facilitate the movement of goods from one place to another, but also spur development alongside them. Improved penetration of communications infrastructure, it can be argued, effectively creates more destinations while also creating more roadside opportunities for growth.

It should be recognized that this has not been a concern unique to developing countries. Canada, for example, has wrestled, and continues to wrestle, with its own connectedness. In his book *Documents of Canadian Broadcasting*, Roger Bird succinctly describes the Canadian perspective.

Canada is a large country with a relatively small population. For it to function politically, culturally, and spiritually, it requires efficient internal communications. Recognizing this, colonial officials and later the federal government have from the earliest times pursued such communication in the teeth of high costs and physical barriers.⁹

Canada's geography results in a situation where the vast majority of territory is rural and remote. It includes extensive mountain regions, vast distances and extreme temperatures. Furthermore, the country's sparse population is dispersed into small pockets. There is, however, a very important characteristic to Canada, that is also common to most developed countries, that distinguishes it substantially from developing countries: Canada's population is largely urban. In the 2001 Census conducted by Statistics Canada, the population was 79.4% urban and 20.6% rural¹⁰ a trend that has been continuing for decades.

In India, however, the figures are very different. The 2001 Indian Census reported that only about 38% of the population was urban with the remaining

⁹ Roger Bird, Documents of Canadian Broadcasting, (Ottawa: Carleton University Press). 1989. pg. 3.

¹⁰ Statistics Canada, 2001 Census, Found at http://geodepot.statcan.ca/Diss/Highlights/Page1/Page1_e.cfm Cited September 2003

population being located in rural areas.¹¹ The significance of these figures becomes clear when we consider how various countries have gone about delivering telecommunications services to rural areas. In Canada, at the most basic level, revenues derived from urban and business customers are used to cross-subsidize the higher costs of serving rural and remote customers.

As previously discussed, in India, there is simply not the volume of urban customers, and hence the necessary revenue base, to cross-subsidize the delivery of service to almost three quarters of the country's population. Even where economies of scale exist – in nations like Canada, the United States, etc. – the capital intensity of the telecommunications network makes it a failed enterprise in rural areas without cross-subsidization from lucrative, urban markets.

Consequently, economies of scope become essential as an alternative approach to addressing this market failure. Where the enormous costs of the infrastructure cannot be profitably shared among users, the provision of additional services over the same infrastructure presents the opportunity to offset those costs. In the case of the India-Canada Telecommunications Operations Project, those

¹¹ Office of the Registrar General & Census Commissioner, Census of India 2001, (New Delhi: www.censusindia.net/press/pr200701.html) Cited November 2003.

additional services are Internet-based services intended to address the unique requirements of the rural villagers in the Pilot Project region.

Views about delivery of ICT-based applications and services to developing regions tend to fall between two ends of a continuum. At one end, are the techno-optimists who fundamentally argue that new technologies – particularly, but not exclusively the Internet – will facilitate the connectivity required to address development challenges. At the other end of the continuum are those who argue that every dollar spent on new information and communications technology is a dollar wasted and that the money should instead be spent directly addressing basic human needs such as an adequate supply of food, fresh water, basic education, and so forth. Against these polarities the India-Canada Telecommunications Operations Project falls somewhere in the middle but with a definite bias toward the benefits of technology in the achievement of development objectives.

Overview and Objectives

The India-Canada Telecommunications Operations Project is primarily intended to develop, test and communicate a financially viable, sustainable model for expansion of telecommunications services and information and communications

technology (ICT) applications in rural areas of India. The project budget is slightly greater than C\$7,000,000 and is funded by the Canadian International Development Agency (CIDA). The Canadian Executing Agency for the project was comprised of resources from IBM Canada¹² and SaskTel International. It is expected that the project will contribute to poverty reduction and to improved social and economic development by providing access to affordable telecommunications services and ICT-based applications in rural regions of India. To achieve the objective described above, a number of basic activities and outputs will be pursued including:

- A design of the Pilot Project within which the concepts, services and technologies will be evaluated;
- Communications infrastructure provided to approximately 30 rural villages (representing approximately 30,000 people);
- Implementation of ICT-based applications and services suitable to rural areas (could include applications related to education, health, local business and local government);

¹² It should be noted that part way through the project (October 1, 2002), the management consulting division of PricewaterhouseCoopers was purchased by IBM and rebranded IBM Business Consulting Services. Henceforth in the document, I will refer to IBM as it is under this brand that the majority of work is being conducted in India.

- Training in communications infrastructure management, operations, maintenance, customer relationship management and ICT applications development and implementation;
- Development of a model(s) for the rollout of rural telecommunications and ICT applications across India; and
- Project communications and awareness, particularly related to dissemination of the model(s).¹³

Three overarching outcomes are sought in the delivery of this project. First, is the development of sustainable approaches for the provision of telecommunications services and ICT-based applications in rural areas of India. Second, is an increased awareness of the potential of telecommunications services and ICT applications for sustainable socio-economic development in rural regions. Third, is improved opportunities for women and the poor.¹⁴

¹³ Thomas Grandy and Trefor Munn-Venn, Project Management and Implementation Approach. (Ottawa: Document submitted to the Canadian International Development Agency for the ICTOP Project). 2002.

¹⁴ Ibid.

Team Structure

In the design of the ICTOP project, five primary workstreams (Sustainable Model, Connectivity, ICT Applications, Skills Development, and Gender Equality / Social Equity) were developed along with three supporting workstreams (Project Management, Communications and Awareness, and Environment). (See Figure 1 below.)

Figure 1. Structure of the ICTOP Project

Each workstream identified in Figure 1 is made up of a team that included members from the Canadian Executing Agency and from the incumbent telco, Bharat Sanchar Nigam Limited (BSNL). The objectives of each stream are described below:

Sustainable Model: This workstream focuses on the development and application of a model for the future expansion of telecommunications services and ICT

applications in rural areas. This workstream provides a base operating model for all other workstream Leaders to work from and co-ordinates with all other workstreams. In the Pilot Project, this team is responsible for implementing the model, assessing its performance and determining its applicability in other contexts.

Connectivity: This team is concerned with the provision of basic telecommunications voice and data connectivity to the Pilot Project region. The work includes the technology installation, operations and maintenance components of the Pilot Project. This team provides the platform on which other workstreams will develop approaches to the provision of rural telecommunications services and ICT applications that can be incorporated into the model.

ICT Applications: This workstream is responsible for the delivery of ICT applications to the rural villages in the Pilot Project. The team facilitates the engagement of local, state and national organizations with interest in or responsibility for community development to support the development of ICT applications and content. Stakeholders could include business, government, non-governmental organizations (NGOs), women's groups, educational organizations, health organizations, etc.

Skills Development: This team provides administrative, professional and technical skills development support pertaining to rural telecommunications. It is responsible for delivering a training strategy and a skills development plan for the provision of the training.

Gender Equality / Social Equity (GE/SE): This workstream is responsible for the development of a strategy and action plan to ensure that GE/SE issues are cross-cutting throughout all aspects of the project. Specifically, this team is developing and is implementing a strategy where women and the disadvantaged have increased and more equitable access to, and increased knowledge and meaningful use of, telecommunications services and ICT applications for sustainable returns.

Project Management: This team provides the overall management of the Project to ensure it achieves the desired developmental results.

Communications and Awareness: This workstream is responsible for establishing effective communications with stakeholders and creating broad awareness of the project. This includes building understanding of the potential of telecommunications services and ICT applications in the promotion of socio-economic development in rural areas.

Environment: This workstream is responsible for the development and implementation of the environmental strategy. This is an important aspect of the project since the construction of telecommunications infrastructure requires an environmental assessment under the Canadian Environmental Assessment Act.

As mentioned previously, this project includes both a Detailed Design Phase and an Implementation Phase. As such, it attempts both to conceptualize and to actualize a sustainable approach to delivering communications services to rural India. Both phases are being conducted in partnership between the Canadian Executing Agency and BSNL (the recently corporatized national telecommunications provider). A range of other public- and private-sector organizations along with NGOs and other civil society organizations also contribute actively. The Detailed Design Phase of the project has been completed (2002-2003) and the implementation phase of the Pilot Project is currently underway (2003-2004).

From its inception, the project team was designed to be cross-functional including engineers, business strategists, sociologists, gender specialists, project managers and educators. This approach is increasingly considered essential to successfully delivering development projects in order to take an holistic perspective on the wide range of issues and factors at play. Furthermore, this is considered an essential strategy for achieving sustainability. Nitin Desai reminds us that:

It is not just a matter of getting the natural sciences together. If you are talking of sustainability, the natural scientists and social scientists must talk to one another, and must understand one another. We need that combination of engineering, economics and ecology working together and not in separate compartments.¹⁵

The involvement of a wide range of stakeholders was also undertaken in order to facilitate stakeholder involvement and commitment, obtain a broad range of ideas and to encourage “cross-fertilization” of ideas among individuals and groups who do not typically work together. Stakeholders included:

- The Canadian Executing Agency: IBM Canada and SaskTel International;
- BSNL: Resources from New Delhi, circle (regional) headquarters, district headquarters and local exchange offices;
- State Government Departments / Agencies: Madhya Pradesh State Electronics Development Corporation (MPSEDC), The State Department of Education, The State Department of Agriculture, State Department of

¹⁵ Nitin Desai (United Nations Under-Secretary-General for Economic and Social Affairs and Secretary-General of the World Summit on Sustainable Development). Opening Address at the Beijing Forum on New And Emerging Technologies for Sustainable Development. (Beijing, China). 2002. pg. 8.

IT, The State Department of Health, The State Department of Industry and the Secretary to the Chief Minister;

- Central Government Agencies: Education, Agriculture, Health and Local Governance;
- Non-Governmental Organizations: In a wide range of disciplines; and
- Villagers from the Pilot Project region.

Situation Assessment

A primary criticism of development projects in general, and technology-oriented projects in particular, is that solutions are provided for problems that are not understood. Indeed, this is a commonly faced dichotomy. Yet innovative organizations are embracing these kinds of dichotomies and recognizing that only by considering both sides together can they overcome the barriers that would otherwise be faced.¹⁶

This project has made a conscious attempt to adopt this kind of approach.

Accordingly, two main activities were undertaken to maximize the knowledge of

¹⁶ Brian Guthrie and Trefor Munn-Venn. Trading in the Global Ideas Market. (Ottawa: The Conference Board of Canada). 2003. pg 3.

the Pilot Project region and to develop an in-depth understanding of the conditions and needs of villagers in this rural region. This approach is consistent with the guidance of the United Nations. Nitin Desai, himself from India, exhorts the development community to expend greater effort in the understanding of traditional systems.¹⁷

The objective of the ICTOP situation assessment is to establish a gender-disaggregated baseline of data against which to measure the status of telecommunications and ICT development and socio-economic indicators to assess the developmental results of the project on rural communities in India. This will include assessment of perceived needs of end users, assessment of infrastructure requirements, socio-economic status of the villages included in the Pilot Project, etc. It also includes completing the selection of the villages to be included in the Pilot Project.

The situational assessment process will go beyond the gathering of village specific data to information on providing telecommunications services and ICT

¹⁷ Nitin Desai (United Nations Under-Secretary-General for Economic and Social Affairs and Secretary-General of the World Summit on Sustainable Development). Opening Address at the Beijing Forum on New And Emerging Technologies for Sustainable Development. (Beijing, China). 2002. pg. 8.

applications in rural India and elsewhere, addressing specifically the issue of sustainability of such services and applications.¹⁸

The design and execution of the research project drew heavily on the Participatory Rural Appraisal methodology (described below). In this study we conducted village meetings that included a cross-section of stakeholders, focus groups with various sub-groups of villagers (e.g., women only, the very poor, youth) and door-to-door surveys of a minimum of 10% of households (over-sampling was conducted of sub-groups depending on village size and composition). The Participatory Rural Appraisal methodology is also beneficial because it is a very rapid process whereby an extensive amount of data (thousands of data points) was collected from a village in a period of three days.

Situation Assessment Methodology

The research methodology was developed by a cross-functional team that included input from all of the project workstreams as well as from a local NGO research partner familiar with the specific region in which the Pilot Project would be implemented. Local knowledge was considered important for a number of reasons:

¹⁸ Thomas Grandy and Trefor Munn-Venn, Project Management and Implementation Approach. (Ottawa: Document submitted to the Canadian International Development Agency for the ICTOP Project). 2002.

- Deep knowledge of the survey region and unique characteristics that would provide insight into research analysis;
- Credibility with the surveyed population to facilitate collection of accurate and meaningful data;
- Ability to respond rapidly to situational challenges such as transportation and accommodation changes;
- Familiarity with the most effective ways of framing questions in order to obtain critical information;
- Ability to put the objectives and activities of this project into the wider context of other development activities underway in the region; and
- Capacity to involve other useful parties in the collection, collation, tabulation or analysis of data.

The general approach was predicated on a process whereby similar information would be collected using more than one technique, thereby allowing for accurate cross-checking and enabling a more subtle understanding of the unique conditions of the Pilot Project region. The objective of the survey was to provide the detailed knowledge necessary for the design, development, deployment and operation of a sustainable solution for rural telephony. The organization of the research was categorized as follows:

- **Community Profile:** demographics, village profiles, household profiles, location and accessibility, literacy, language, major public buildings, village organizations and social / cultural activities;
- **Household Profile:** Housing, goods ownership, annual expenditures and energy;
- **Communications:** needs, media profile and telephone use;
- **Wealth:** labour distribution, wages, land ownership and use, and sources of income;
- **Gender-Related Indicators;**
- **Education;**
- **Health;** and
- **Additional Project Information:** Including experiences with project stakeholder, awareness of CIDA, etc.

Pilot Project Research Locations

The Pilot Project Research was conducted in the State of Madhya Pradesh, located in central India.

Figure 2. Location of the Pilot Project

The state was selected by BSNL in consultation with the Project Team based on the following factors:

- A state in which it is possible to build on CIDA's concentration of projects (ability to reinforce development objectives within this project);
- State government is an active supporter of telecommunications and ICT applications as an enabler of socio-economic development;
- Proactive support and assistance from the state departments of education, health, agriculture, etc.; and
- Complementary to the state's need for connectivity.

From the region, 32 communities located in the Babai and Khirkiya Blocks were selected as the survey territory. The table below provides the basic relevant information about the two survey regions selected for this project.

Table 1. Characteristics of the Pilot Project Region

Block Name	Babai	Khirkiya
Terrain	Flat to Hilly	Flat to Hilly
Villages in Survey Region	20	12
Area (sq. km)	650	875
Distance between the two Blocks	130 km	
Population (Households)	1651	917
Proximity to existing infrastructure	3.5 – 10 km	4.5 – 8 km
Existing BSNL infrastructure	Fibre, Switch	Fibre, Switch

The following map provides the geographic detail and relative proximity of villages in the Khirkiya Block. The larger circles represent clusters of villages being surveyed. The smaller circles identify important “Haats” or markets that are visited regularly by villagers. Haats are critical locations to rural villagers as the vast majority of economic activity takes place in these markets.

Figure 3. Topographical Map of the Pilot Project Region

Pilot Project Survey Instruments

Three approaches were selected to facilitate the collection of data in the survey region; Household Surveys, Focus Groups, and Participatory Rural Appraisal (PRA).

Household Survey: A detailed questionnaire was carried out in at least 10% of homes in each village. Surveyors “over-sampled” certain minority segments (e.g., landless households, or a minority caste groups) by visiting at least 10% of these

households. Two hundred and ninety two household surveys were conducted out of a total of 2,568 households or 11.4% of all households.

Research teams worked in each village for two days. The Household surveyors collaborated with Participatory Rural Appraisal and Focus Group researchers to ensure they contacted a representative sample from the village. Male and female surveyors worked in tandem to help ensure that all household members were heard from directly. Results were recorded in the field, and tabulated at the end of the two days to minimize errors and omissions.

Focus Groups: Discussion groups were formed to draw opinion and feedback from villagers, aimed at hearing from all strata of the community. Focus groups were organized by social and gender groupings to allow open discussion and full participation.

Typically three Focus Group Discussions were organized in each village. Researchers were provided with a list of topics and questions to pursue with participants in a relatively unstructured manner. Topics focused most directly on ICT applications, and areas of latent demand and needs at the village level (e.g., agriculture, education, healthcare, governance issues, media and telephone use, etc.).

Participatory Rural Assessment: Participatory Rural Assessment or Rapid Rural Assessment (PRA/RRA) was developed as a “toolbox” of methodologies that enable a research team to quickly develop an accurate picture of an area’s critical characteristics: activities, populace, and physical and social resources, etc. In cooperation with village residents, physical and social resources of the village are mapped in detail and recorded in a database. The Participatory Rural Appraisal process involves literally hand-drawing maps of the village, facilitated by researchers but conducted by residents of the villages. The drawings are used to identify:

- Households and inhabitants;
- Land ownership;
- Personal assets;
- Public buildings and resources (village infrastructure); and
- Settlement patterns, etc.

The hand-drawn “Resource Maps” provide a wealth of information about the village.

Figure 4. Sample of PRA Resource Map

Each village presented its own suggestions as to where services could be located and provided relative strengths and weaknesses based on level of access, convenience, safety, and so forth. Villagers went so far as to identify potential Village InfoCentre locations.

Figure 5. Sample of Village Recommendation for Telephone Location

Data Collection

The Primary Research survey data were collected by three teams of five researchers. Each team visited a single village enabling three villages to be surveyed simultaneously. The team members were allocated in the following roles:

- Two household surveyors;
- Two senior researchers with experience in focus group and PRA research;
and
- One team leader charged with overseeing research activities and data collection.

Figure 6. A Primary Research Survey Team

It was considered imperative that gender balance be maintained among research teams. Specifically, at least one household surveyor on each team was female and all field research team leaders were women. Gender representation within the survey team was considered important for two primary reasons. First, it was considered absolutely essential that we serve as an example wherever possible. One of the critical outcomes of this project is increased awareness and adoption of Gender Equality / Social Equity analysis and solutions by stakeholders, leading to greater empowerment of women and the disadvantaged. The second reason is somewhat more tactical. We were advised during the design of the survey by the leader of the Gender Equality / Social Equity (GE/SE) workstream

that it would be essential to involve female researchers during the Household Surveys. We were informed that female research participants would be less forthcoming providing detailed information about themselves and their households to a male researcher than they would another woman.

Technical Survey

The second activity undertaken to maximize our knowledge of the Pilot Project region was an in-depth technical survey. This included developing network maps of all the existing telephony infrastructure in the region. Some stranded technologies (e.g., first generation wireless solutions) were still present in a few areas in the region but no longer operated. The topography of the region was also carefully mapped in order to assess potential wireless solutions should they become the most appropriate option for delivering service.

Field survey planning was coordinated with BSNL personnel from the very beginning to ensure an efficient work pattern. Initial work conducted in the Bhopal offices included final selection of villages to be surveyed, location of same on 1:50,000 topographic maps, co-ordination with the NGO survey teams and co-ordination of field transport.

Village selection was governed by certain criteria established during joint discussion, including:

- Village Population: Villages should have a minimum of 100 people;
- Existing Telecommunications Service: Villages should not be currently served or if service exists it must be significantly impaired or non-operational; and
- Distance: Villages must be located more than 3 km from an existing BSNL exchange office. BSNL plans are for villages within 3 km to be connected via copper cable in the near future. Villages greater than 10 km would be considered but may require alternate technical solutions.

District BSNL staff assisted in the process by providing local information, locating the village authorities and translating between Hindi and English, plus providing access to local exchange offices. SaskTel International staff recorded village and exchange data in the form of site sketches, photographs, GPS (Global Position Satellite) readings and written notes.

Building a Sustainable Model

The primary purpose of the Situation Assessment – and indeed, all tasks in the design phase – was to inform and contribute to the development of a self-sustaining model to facilitate increased penetration of telecommunications services and ICT applications adoption in the Pilot Project region and, ultimately, to all of rural India. All ICTOP project workstreams contribute to the development of the model by bringing their unique expertise and knowledge to be integrated in an open and transparent assessment process. The Sustainable Model team ensures that the interrelationships and requirements between the various workstreams are identified and taken into account. For example, the technologies and bandwidths adopted in the Connectivity Plan will very much depend on the ICT applications that are to be developed in the ICT Applications workstream and vice versa.

To achieve a model that will be tested in the Pilot Project, it is necessary to develop a number of model options in order to test potential solutions in the delivery of telecommunications services and ICT applications in the villages comprising the Pilot Project. These model options question long-standing assumptions, policies and constraints as they explore new organizational approaches, appropriate technologies for service needs, improved operational and maintenance procedures, customer relationship management, ICT

applications development, ICT operations, partnership arrangements, new pricing approaches, new revenue settlement arrangements, etc.

This activity generates a number of scenarios and decision criteria that will yield a business decision model whereby the economic sustainability of the model can be assessed. The model builds on the understanding of perceived user needs identified during the situation assessment. The model includes the growth in service provision to meet projected future teledensity levels (the number of telephones per thousand population) and ICT adoption rates. Throughout the development of the model, structured opportunities to obtain stakeholder input and achieve buy-in to the approach have been provided.

Central to development of the model is the preparation of a business case that enables the forecasting of revenues and expenses for a rural telephony cum ICT project under various model options. Based on the Situation Assessment, factors including market size, available revenue sources and market trends are identified and assessed. The ability of the business case to reflect a wide range of possible scenarios is a necessary consideration to incorporate various sensitivities based on the levels of usage by villagers, the equipment costs, the operations and maintenance costs, revenue sharing arrangements, etc.

A preliminary version of the Sustainable Model was submitted to the Project Steering Committee in March of 2003 and received its endorsement in principle. Since that time, additional valuable input has been received from CIDA and the model continues to evolve – much as it was intended.

Chapter 3: Scripting New Technologies

Until recently this movement of [Luddite] opposition to nascent industrial capitalism by a nascent working class, has been characterized as stupid, doomed opposition to beneficent progress. It was no such thing. It was rather a struggle not about technology itself (the weavers wanted relief from backbreaking toil), but about choices of technologies and the uses to which technology was to be put. The [Luddites] were against the introduction of a technology that favoured centralized control by capital in factories over decentralized control by the weavers themselves.¹⁹

Social Construction of Technology (SCOT) Theory

This thesis adopts the Social Construction of Technology (SCOT) theory to inform our understanding of the relationship between users of new information and communication technologies (NICTs) and the technology itself (which

¹⁹ H. Schiller, Communication and cultural domination. (New York: International Arts and Sciences Press). 1976. pg. 56.

represents the locus of institutional decision-making). Bijker's work helps to orient us properly to the fundamentals of SCOT:

In the SCOT descriptive model, *relevant social groups* are the key starting point. Technical artefacts do not exist without the social interactions within and among social groups. The design details of artefacts are described by focusing on the *problems and* solutions that those relevant social groups have with respect to the artefact. Thus, increasing and decreasing degrees of stabilization of the artefact can be traced.

A crucial concept in SCOT ... is *interpretative flexibility*. The interpretative flexibility of an artefact can be demonstrated by showing how, for different social groups, the artefact presents itself as essentially different artefacts. The theoretical concept of *technological frame of a social group* is employed to explain the interactions within and between social groups that shape the artefacts; these technological frames shape and are shaped by these interactions.²⁰

Social Construction of Technology (SCOT) theory is characterized by a few basic concepts. Most important among them is that actors and technologies are co-determinate in a dialectical process during which there are both intended and

²⁰ W.E. Bijker, "The Social Construction of Fluorescent Lighting, Or How an Artefact Was Invented in Its Diffusion Stage". In W.E. Bijker, and J. Law (Eds.). Shaping technology/Building Society: Studies in Socio-technical change. (Cambridge, MA: MIT Press). 1992. pg. 76.

unintended consequences. It is only by examining the dynamics between actors and technologies – the process by which meaning and use are negotiated – that we can expect to develop a more robust and nuanced understanding of this dialectical process.

The India-Canada Telecommunications Operations Project is a useful context for this discussion since it presents a situation where the technological solution had not been defined, the services to be offered had not been defined and the villagers had very little experience with these kinds of technology. The Project seeks to allow the technology chosen to be as “interpretable” as possible. It does not see technology as a given but instead sees it as open to interpretation and negotiation.

Middle Theory

Theory doesn't necessarily construct the social world but it gives us questions to ask about it. Theory provides us with access to a partial world – it shows us part of the social world but never the entire social world at once. Robert Merton favors the terms “theoretical orientations or perspectives” rather than theories because of some of the inherent limitations that typically accompany metatheory. Merton's “theoretical orientations” act as approaches to solving problems and developing

explanations instead of claiming to be the solutions or explanations themselves.²¹

Following Merton's perspective good theory should spawn good questions – questions that motivate us to inquire in new areas, ask new questions and follow new paths.

Probably considerably more important, however, is the call to "theory-building" promoted by Merton's celebrated declaration in favour of developing generalizations of the "middle range" in sociology. Merton's manifesto was originally part of a general reaction to what was seen as the over-ambitious endeavours of the classical founders of sociology to produce general theories of social transformation.²²

Merton's position clearly has links to reactions against the orthodox consensus whose view of the social sciences as being akin to the logic of natural science very much dominated the discourse of sociology. While it can be argued that vestiges of this view linger, that kind of logic fails even within the realm of the natural sciences. For example, Newtonian physics has been essentially disproved by relativity. Nonetheless, it appears that room has been made to

²¹ C. Calhoun, Critical Social Theory: Culture, History, and the Challenge of Difference. (Blackwell: Cambridge). 1995. pg. 6.

²² Anthony Giddens, Social Theory and Modern Sociology. (Stanford University Press). 1987. pg. 42.

accommodate both and draw from each the analytical strengths that best inform ongoing research.

SCOT is a middle theory. Middle-range theory provides us with a way to conceptually frame issues to bring salient research questions to the fore. Middle theory doesn't attempt to provide an overarching theoretical framework like British Cultural Studies or Political Economy. It can be criticized for being overly descriptive and for lacking a political edge. However, middle theory is very flexible. Middle theory, particularly SCOT, is an effective approach to examining the domestic context in which NICTs are located. Ang states that "the domestic is a pre-eminent site of everyday life and the everyday is, according to Michel de Certeau, the terrain in which ordinary people often make use of infinite local tactics to 'constantly manipulate events in order to turn them into opportunities.'"²³ Robins and Webster emphasize the importance of the domestic space as "a sphere in which capital seeks to influence, not ideas or profits, but the very rhythms, patterns, pace, texture, and disciplines of everyday life."²⁴

²³ I. Ang, "Living-room Wars: New technologies, audience measurement and the tactics of television consumption". In Roger Silverstone and Eric Hirsch (Eds.). Consuming Technologies: Media and information in domestic spaces. (Routledge, London). 1982. pg. 133.

²⁴ K. Robins and F. Webster, "Cybernetic capitalism: Information, technology and everyday life". In V. Mosco and J. Wasko (Eds). The political economy of information. (Madison, MI: University of Wisconsin). 1988. pg. 46

Before continuing, it is worth making explicit some assumptions about technology. They are as follows:

- **Technology can't be separated from power relations.** There are no neutral technologies – they always conceal social relations and they often congeal social relations.
- **Technology is ubiquitous.** The objective of this thesis is not just to find out about the relationships between users and NICTs but to inform how we think about phones and batteries and light bulbs.
- **Technology is scripted.** Scripts can be open (particularly when new technologies are being introduced) or closed (when technologies have become stabilized). However, technology can be described and rescripted by users. Technology can follow many different paths or trajectories.

Scripts

Technologies don't just show up in society. They are not simply invented and then introduced to society where they have a subsequent impact. This kind of thinking privileges technology and provides an overly simplistic and naïve perspective of power relations in society. Nor do technologies simply enter the home and let us participate in consumer society in new ways. Those “ways” or

means of participation are carefully constructed, designed and scripted into the technology. Considered this way, technology innovation is not just engineering; technologies are also social products – both symbolic and aesthetic as well as material and functional.²⁵

Schiller highlights the fact that technologies are not created in a vacuum.²⁶ In his work “Communication and cultural domination”, Schiller points the reader to the work of Raymond Williams:

In no way is this [television and related electronic developments] a history of communications systems creating a new society or new social conditions. The decisive and earlier transformation of industrial production, and its new social forms, which had grown out of a long history of capital accumulation and working technical improvements, created new needs but also new possibilities, and the communications systems, down to television, were their intrinsic outcome.²⁷

²⁵ R. Silverstone and L. Haddon, “Design and the domestication of information and communication technologies: Technical change and everyday life”. In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies (Oxford: Oxford University Press). 1996. pg. 44.

²⁶ H. Schiller, Communication and cultural domination. (New York: International Arts and Sciences Press). 1976. pp. 50-51.

²⁷ Ibid.

How we participate – or how we are meant to participate – represents social relationships that can be observed in the scripting of the artifact. That is, we can look at a technical object and read back to the assumptions and perceptions guiding the process of design.

By scripting or designing a technological artifact to be used in a particular way, designers are, in effect, scripting the user into the technology.

Designers thus define actors with specific tastes, competencies, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. A large part of the work of innovators is that of “*inscribing*” this vision of (or prediction about) the world in the technical content of the new object.²⁸

Typically, the scripting of an artifact is more contestable and open to negotiation when it is first introduced. Over time, however, the ‘black box’ begins to stabilize in terms of social relations, property relations, or spatial and temporal activities, and so forth. These scripts can become naturalized and even reified as the

²⁸ M. Akrich, “The De-Scripture of Technical Objects”. In W.E Bijker and J. Law (Eds.). Shaping technology/Building Society: Studies in Socio-technical change. (Cambridge, MA: MIT Press). 1992. pg. 208.

technology, and that which it facilitates, develops symbolic relationships which are left uncontested.

Stabilization

Rosenberg argues that “early pressures and decisions can “lock-in” a certain technology or market structure.”²⁹ Once locked-in, these technologies become stabilized. When a technology has been scripted and has stabilized, it becomes what can be called a “black box”. Its contents are inaccessible – it is a completed object. Its use is virtually uncontested and non-negotiable.

A stabilized technology means that more than the function of the artifact has been fixed. It also means that social relations, property relations and living space, as they relate to the artifact, have also become fixed and naturalized. Once stabilized, “the innovator is no longer present, and study of the ordinary user is not very useful because he or she has already taken on board the prescriptions implied in interaction with the machine.”³⁰ The stabilized artifact conceals the

²⁹ N. Rosenberg, “Telecommunications: complex, uncertain, and path-dependent”. In Exploring the black box: Technology, economics, and history. (Cambridge, UK: Cambridge University Press). 1994. pg. 207.

³⁰ M. Akrich, “The De-Scripton of Technical Objects”. In W.E Bijker and J. Law (Eds.). Shaping technology/Building Society: Studies in Socio-technical change. (Cambridge, MA: MIT Press). 1992. pg. 211.

process by which it was scripted and the causal links they established are naturalized.³¹

This trajectory of stabilization indicates that technology loses its malleability over time and moves towards a state that can be considered naturalized. For the India-Canada Telecommunications Operations Project, we have not yet reached the point of naturalization. Not only are new technologies being used to deliver service, they are being assembled, configured and organized in an entirely novel manner. Success in this case is very much predicated on the active involvement of the villagers in the design and on-going evolution of the service. In fact, the service has been designed to maintain that participation indefinitely. It begs the question “What if you never achieved black box? What if the technology remained open for scripting indefinitely?”.

Design

Central to addressing these questions is understanding the design process. Social Construction of Technology theory is particularly useful when considering the process by which technologies are designed. Technologies have to be designed as objects, mediating in their aesthetic, the tension between the familiar and the strange, desire and unease. In the case of the ICTOP project, the

³¹ Ibid. pg. 222.

“object” is the Village InfoCentre (VIC). This is the location in which the telecommunications and computer equipment are located. Villagers who choose to use these technologies will typically do so outside their homes (though some may purchase residential telephone service).

However, technology should be considered as more than an object. Woolgar encourages us to think of technology as text. In this sense the machine provides instructions for the ideal and eventual user to read in ways that provides for, and legitimate, the machine itself. From this perspective, the design process becomes the means through which the user is incorporated into the hardware (and software) of the machine in such a way as to enable the user's relationship to fit both with the intentions of the designer and the embodied possibilities in the functional apparatus of the machine itself.³²

In fact, from the perspective of the designer, failure to develop technology without extensive consideration of the end user is a serious concern. Edward Tenner refers to this failure as “tunnel design” and warns that such machines often “bite back.”³³ That is, these technologies create as many problems as they solve.

³² R. Silverstone and L. Haddon, “Design and the domestication of information and communication technologies: Technical change and everyday life”. In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies (Oxford: Oxford University Press). 1996. pg. 44.

³³ E. Tenner, Why Things Bite Back: Technology and the Revenge of Unintended Consequences. (New York: Vintage Books). 1997.

Moreover, “If badly designed technologies bite back, the good ones often fight back. Well-designed technologies, that is, refuse to retreat meekly in the face of tunnel design.”³⁴

Moreover, the distinction between designers and users are blurring. Brown and Duguid argue that:

In the digital world ... many of the distinctions between designers and users are becoming blurred. We are all, to some extent, designers now. Many questions about design are thus becoming questions for us all. It is important then to understand our own limitations as designers, too, and to know where to look for resources.³⁵

Individuals have affected the design of technologies, using the definition broadly, in many ways. Moreover, their “involvement” occurs throughout various stages of the design process.

For the India-Canada Telecommunications Operations Project, the extensive primary research conducted before a single plan was formulated reflects the

³⁴ J.S. Brown and P. Duguid, The Social Life of Information. (Harvard Business School Press, Cambridge, Massachusetts). 2000. pg. 2.

³⁵ J.S. Brown and P. Duguid, The Social Life of Information. (Harvard Business School Press, Cambridge, Massachusetts). 2000. pg. 3.

importance of reflecting users in the design. Villagers provided their opinions on which services they wanted, where facilities should be located, who should operate the service locally and their anticipated levels of use. They described the features they felt were essential in the design of the Village InfoCentre and provided detailed advice on virtually every facet of the service. Moreover, processes have been established to enable villagers to continue to provide continuous feedback. Furthermore, the VIC will be staffed by villagers who have been provided with extensive latitude to design the service in a manner that reflects the needs and requests of those they serve.

In their book "Communication by design: The politics of information and communication technologies", Silverstone and Haddon remind us that the history of technology is as social as it is technological. They argue that it is a social history in so far as the production of new technology depends on a politics of adjustment and negotiation.³⁶ They refer us to Carolyn Marvin who argues that the history of technologies is a history of the habits, beliefs, and procedures embedded in elaborate cultural codes of communication. The arrival of new

³⁶ R. Silverstone and L. Haddon, "Design and the domestication of information and communication technologies: Technical change and everyday life". In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies (Oxford: Oxford University Press). 1996. pp. 44-74.

technology in a household is a social and cultural as well as a technological event.³⁷

Adopting new technologies cannot simply be considered as a fresh start with a new tool because existing social relations are constructed or embedded within them. However, neither are these technologies introduced in a state of maturity. Thus the introduction of new technologies provides room for negotiation and contestation before those technologies are fully stabilized or scripted.

Mansell and Silverstone indicate that we have some experience with understanding the introduction of new technologies including the printing press, telegraph, radio broadcasting, computers, and television.³⁸ Shaun Moores suggests that "Broadcasting is a taken-for-granted part of everyday life. Radio and television sets are an unobtrusive presence in the geography of domestic space" and as such have become naturalized in the home.³⁹ This naturalization, however, is in no way natural.

³⁷ Ibid. pg. 14.

³⁸ R. Mansell and R. Silverstone, "Introduction". In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies. (Oxford: Oxford University Press). 1996. pp. 1-14.

³⁹ S. Moores, "The box on the dresser': memories of early radio and everyday life". In Media, Culture and Society. Vol. 10(1). 1988. pg. 23.

Moore also states, "As Raymond Williams (1974: 24) has pointed out, there was nothing in the technology of radio which made its transmission into individual homes inevitable."⁴⁰ It is important to recognize that the integration of technology into domestic space was and is a constructed process. For instance, the BBC (in the early days of radio broadcasting) began to plan its schedule around the everyday routines of its listeners in order to stitch itself "unobtrusively into the fabric of everyday life, underpinning its routines".⁴¹ Further, Moore documents how the artifact also adapted and was reconstructed. He states that "the form of wireless sets was going through a rapid change. The radio began to blend into the furnishings of the living room".⁴² He cites Pegg who writes:

At first, design was limited to the improvement of control facilities, such as clearer tuning dials and illuminated panels Using traditional materials, or more often exploiting the flexibility of new materials like Bakelite, a whole new vista was revealed. Murphy employed a furniture designer ... whilst Ecko employed architects. Radio sets were now fashionable living room items.⁴³

⁴⁰ Ibid. pp. 23-24.

⁴¹ Ibid. pg. 36.

⁴² Ibid. pg. 32.

⁴³ Ibid. pg. 32.

Adrian Forty also traces the design history of radio and demonstrates the evolution of meaning of radio as text. In 1924, the radio appears as a technical object displaying wires, valves and controls – a functional object. Over time, the radio mutates into a symbolic object. As technical change slowed, the radio became an object of mass consumption and emphasis shifted towards its appearance. Radio linked the purchaser into a network of communication that could be both comforting and disturbing thereby bringing a distinct and other reality into listener's homes. Technology was hidden in a wooden cabinet but the cabinet was designed in such a way as to indicate its distinctive status and function. Finally, the radio evolved to signify future progress bringing with it the futuristic designs that became the norm for consumer electronics. While Forty is arguing that this design approach diverts attention from the uncomfortable present towards an uncomplicated and appealing future (and so feeds into unequal class struggles),⁴⁴ his description also reinforces the fact that the meaning of the technology – the scripts embedded in the artifact – are flexible and adaptable over time. Ien Ang notes that:

The day-to-day, domestic practice of television consumption is accompanied by the implicit and explicit promotion of “ideal” or “proper” forms of consumer behavior, propelled by

⁴⁴ R. Silverstone and L. Haddon, “Design and the domestication of information and communication technologies: Technical change and everyday life”. In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies (Oxford: Oxford University Press). 1996. pp. 44-74.

either ideological or economic motives and instigated by the social institutions responsible for television production and transmission. More generally, the acceptance and integration of television within the domestic sphere did and does not take place “spontaneously”, but was and is surrounded by continuous discursive practices which attempt to “normalize” television viewing habits.⁴⁵

According to Madeline Akrich, neither simple technological determinism nor social constructivism can help us describe the role that technical objects play in building networks that bring actants together. Technological determinism ignores that which is brought together and social constructivism denies the obduracy of the artifacts and assumes that only people have the status of actors. She argues that we constantly move between the technical and the social in order to “find a way of studying the conditions and mechanisms under which the relations that define both our society and our knowledge of that society are susceptible to partial reconstruction.”⁴⁶ Hence, technical objects and people are actualized through a process of reciprocal definition in which objects are defined by subjects and vice versa.⁴⁷

⁴⁵ I. Ang, “Living-room Wars: New technologies, audience measurement and the tactics of television consumption”. In Roger Silverstone and Eric Hirsch (Eds.). Consuming Technologies: Media and information in domestic spaces. (Routledge, London). 1982. pg. 133.

⁴⁶ M. Akrich, “The De-Scripton of Technical Objects”. In Bijker, W.E., and Law, J. (Eds.). Shaping technology/Building Society: Studies in Socio-technical change. (Cambridge, MA: MIT Press). 1992. pg. 206.

⁴⁷ Ibid. pg. 222.

Indeed, in *The Social Life of Information*⁴⁸, authors Seely and Duguid encourage us to maintain our focus on “all the fuzzy stuff that lies around the edges – context, background, history, common knowledge, social resources.” They argue, in effect, that the social conditions surrounding technology provide valuable balance and perspective offering alternatives, breadth of vision and a range of choices. Seely and Duguid go on to say:

Ignoring clues that lie beyond information doesn't only lead to a narrow world of deception. It leads to a world of what we think of as tunnel design – a kind of purblind design of which, in the end, we are all victims.⁴⁹

Negotiation

The SCOT perspective on audience use of technology is similar to the way audiences are described in media studies. SCOT argues that audiences may interpret messages differently from whatever may originally have been intended by the sender or producer of the message.

⁴⁸ J.S. Brown and P. Duguid, *The Social Life of Information*. (Harvard Business School Press, Cambridge, Massachusetts). 2000. pg. 1.

⁴⁹ Ibid. pg. 2.

With this in mind, I turn now to a separate but similar question: the way in which audiences interpret the messages delivered by technology. This is particularly easy to understand if we continue to use the case of radio, which is not only a device (technology) but also a stream of content whose specific intention is to reach audiences.

Audiences can subvert texts, negotiate texts or accept texts as sent. Giddens argues that the “author of a text may intend it for a particular audience, and intend to convey certain meanings through it. But in principle the text can reach audiences quite removed from its author, and can be read in ways which he or she might never have imagined.”⁵⁰ Critical to this is the notion that individuals have the power and ability to negotiate with texts. Information and communication technologies are both shaping and being shaped through this interaction. As reinforced by Murdock, Hartmann and Gray, new technologies “are not just commodities that are traded for a price in the market. They are also the site of a continual cultural struggle over the meaning of the machine and its appropriate uses.”⁵¹

⁵⁰ A. Giddens, The Nation-State and Violence: Volume Two of a Contemporary Critique of Historical Materialism. (Polity Press, Cambridge). 1985. pg. 42.

⁵¹ G. Murdock, P. Hartmann and P. Gray, “Contextualizing home computing: resources and practices”. In Roger Silverstone and Eric Hirsch (Eds.). Consuming Technologies: Media and information in domestic spaces. (Routledge, London). 1992. pg. 146.

Messages are a secondary feature of SCOT as it is not a theory of social meaning but a theory of the embeddedness of social interest within design. It is a polemical attitude to technological determinism not a view of audience freedom. Nonetheless, as noted previously, this negotiation becomes more difficult as time passes. Orlikowski makes the point that technology can quickly become reified, and that the opportunities for creative consumption are short-lived.⁵² Nathan Rosenberg describes the process by which early pressures and decisions can “lock-in” a certain technology or market structure as “path dependency”.⁵³ In this way, social interests become more firmly embedded over time in the design of technology making it more difficult to dislodge and transform those interests. Furthermore, the “negotiating” positions are by no means equal. Users of information technologies are not given the power to define levels of discourse – they come embedded in the technology.

Frames

⁵² R. Silverstone and L. Haddon, “Design and the domestication of information and communication technologies: Technical change and everyday life”. In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies (Oxford: Oxford University Press). 1996. pp. 44-74.

⁵³ N. Rosenberg, “Telecommunications: complex, uncertain, and path-dependent”. In Exploring the black box: Technology, economics, and history. (Cambridge, UK: Cambridge University Press). 1994. pp. 203-231.

In *Technologies of freedom*, de Sola Pool reinforces the idea that “the electronic transformation of the media occurs not in a vacuum but in a specific historical and legal context.”⁵⁴ When we begin to consider the historical and social and legal and technological context we quickly recognize that, because we can’t consider everything, we have to make decisions about what is relevant and what is not. It is in the process of making these decisions that frames are formed. Technological artifacts don’t frame themselves. In the design process, meanings are constructed and technologies shaped as a result. Samarajiva tells us that:

A ‘frame’ can be understood as a conceptual means of organizing and delimiting the scope of what one pays attention to (Bateson, 1936, 1972; Goffman, 1974). All organization, conceptual or otherwise, is bias (Schattscheider, 1960). Each frame, privileging as it does a particular unity, relation and level of analysis, conditions the questions that are asked, and thereby the answers obtained.”⁵⁵

Frames link selected social groups with a body of knowledge, images and concepts of how a technology should be designed, constructed and used.

⁵⁴ I. de Sola Pool, Technologies of freedom. (Cambridge, MA: MIT Press). 1983. pp. 6-7.

In his discussion of Thomas Edison, Carlson provides a case study that helps to illustrate how frames are formed and more importantly the kind of effects they have on how technology is defined. Carlson writes that:

In any given culture there are many ways in which a technology may be successfully used. Although individuals often claim that they employ a technology in a way that optimizes the return on investment, at the time they make their decision there are often several alternatives with equivalent economic outcomes. To select from among these alternatives, individuals must make assumptions about who will use a technology and the meanings users might assign to it. These assumptions constitute a frame of meaning inventors and entrepreneurs use to guide their efforts at designing, manufacturing, and marketing their technological artifacts. Such frames thus directly link the inventors unique artifact with larger social or cultural values.⁵⁶

The ways in which the potential inscribed in the machine and underwritten by the institutions of power and economy are mobilized, negotiated, transcended or denied, depend at every level of social life on the patterns and structures of the

⁵⁵ R. Samarajiva and P. Shields, "Emergent institution of the Intelligent Network: Toward a theoretical understanding". In Media, culture and society, 14(3), 1992. pg. 398.

⁵⁶ W.B. Carlson, "Artefacts and Frames of Meaning: Thomas A. Edison, His Managers, and the Cultural Construction of Motion Pictures". In W.E. Bijker and J. Law (Eds.). Shaping technology/Building Society: Studies in Socio-technical change. (Cambridge, MA: MIT Press). 1992. pg. 177.

local or the domestic settings into which they are introduced. In this way, technology is neither uniform in its effects nor isolated in its effectiveness.⁵⁷

Several key messages can be derived from this discussion. First, while technology is “designed” with an intended use in mind, there is room for negotiation between the actor and the artifact when it comes to actual use. Central to this is that actors or users are by no means powerless.

Second, this room for negotiation, while never dwindling entirely, diminishes over time. Uses become normalized and, indeed, technologies can become all but invisible as their functions become engrained in day-to-day life.

For the ICTOP initiative, an attempt has been explicitly made to avoid the stabilization of the solution and so resist the likelihood of the project becoming a technological black box. Underlying this decision is the recognition of the complexity of the solution and, even more important, the desire to extend the solution to all parts of rural India. Achieving this kind of flexibility with any hope of success necessitates a solution capable of morphing in response to the requirements of its users.

⁵⁷ R. Silverstone, “Time, Information and Communication Technologies and the Household”. In Time & Society. 2(3), 1992. pp. 283-311.

Unknown at this time is the effect on the actor. There are two basic outcomes possible. Actors may find it easier to negotiate with the technology since it has been designed with an inherent openness. Conversely, the lack of a fixed definition may result in a situation where actors find it difficult to know where to engage the technology. The frustration from trying to negotiate with so fluid an artifact may leave actors tired or mistrustful.

Chapter 4: Agency, Perverse Consequences and Recursiveness

There are important continuities

between the Social Construction of Technology approach and the work of Anthony Giddens. First, both emphasize the importance of understanding the role, and indeed

“We are experiencing a period of social transformation as spectacular as anything that has occurred in earlier phases of the modern era.”

~ Anthony Giddens

the power, of the individual. This is an aspect typically lacking from the political economic analyses of writers such as Innis, Bell and Schiller. Second, neither SCOT nor Giddens tend to construct a dichotomy between institution and technology. Rather, because all of the actors, including artifacts, are bound through social interactions, they cannot be isolated in any easy way. Third, they make no assumption concerning perfect knowledge. Both intended and unintended consequences result from the actions taken by agents as they reflexively interact with social structures and other agents.

Perhaps more than any other theorist, Giddens provides a theoretical framework for this investigation. Giddens' theory of structuration rests on a few fundamental concepts – concepts that harmonize with those presented by the perspectives of Social Construction of Technology:

- **Unintentional Outcomes.** Change occurs over time as a result of unintended consequences. Human will cannot be imposed on society uncontested so you cannot know with certainty what the outcome of any particular action will be.
- **Knowledgeable Actors.** Giddens critiques functionalists and Marxists for failing to see individuals as knowledgeable actors. People reflexively monitor their environment and the flow of activities within that environment. Actions both influence and are influenced by the social context. Structure and agency influence each other.
- **Structuration.** The rules and factors of power that form social structures affect how action occurs. However, the use of those rules, while perhaps legitimating the structures, also affects the rules and power relations that support them. Considered in this way, social structures are not fixed or immovable.⁵⁸

These points link to the notion of power. They suggest that top-down models of domination do not occur uncontested and may not be the only or most useful models. They also suggest that social structures and the ability of individuals to act – agency – are mutually constitutive.

⁵⁸ R. Silverstone and L. Haddon, "Design and the domestication of information and communication technologies: Technical change and everyday life". In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of

Giddens provides a mechanism for explaining how individuals negotiate with social institutions. In doing so, his theory of structuration attempts to rationalize the dichotomy of Objectivism and Subjectivism. Objectivism prioritizes the social object (society) over the individual and argues that social institutions are the core concern of sociology. This view, however, does not adequately address factors that can only be attributed to human agents (self-understanding, intentionality and acting for reasons). Conversely, Subjectivism argues that the individual human agent is the core concern of analysis and that the social sciences need to focus on the actor instead of on social institutions. However, as Giddens points out, this view fails to address adequately the evolution of long-term processes of change and the large-scale organization of institutions.⁵⁹ By introducing structuration, Giddens seeks to reach beyond the too rigidly dualistic notions of structure and agency and the overly mechanistic view of social structures.

Duality

Giddens' approach is to recognize this dualism and to propose a shift whereby they are viewed instead as a duality. This duality recognizes that "structure is

information and communication technologies (Oxford: Oxford University Press). 1996. pp. 57-58.

⁵⁹ A. Giddens, Social Theory and Modern Sociology. (Stanford University Press). 1987. pp. 59-60.

both the medium and the outcome of the human activities which it recursively organizes.”⁶⁰ On the surface, while this approach simply appears consistent with Marx’s dictum that “men make their own history but not under conditions of their own choosing”, Giddens considers human activities at more than the aggregate or class level. He actually sees action at the individual level. At a fundamental level, Giddens is also attempting to clarify and position the objective of social science. Ultimately, he declares that “Social science is concerned with concept-bearing and concept-inventing agents, who theorize about what they do as well as the conditions of doing it.”⁶¹

Agency

A major contribution of the work of Giddens is the renewed recognition of the central role played by the individual actor in society. Understanding Giddens requires understanding his view of agency. Giddens believes that “... human beings are concept-bearing agents, whose concepts in some part constitute what it is that they are up to, not contingently, but as an inherent element of what it is that they are up to. In addition, **human actors have reasons for their actions,**

⁶⁰ “Ibid. pg. 61.

⁶¹ B. Dervin, L. Grossberg, B. O’Keefe and E. Wartella (Eds.) “The Orthodox Consensus and the Emerging Synthesis.” In Rethinking Communication, Volume 1., Paradigm Issues. (Sage: London). 1989. pg. 62.

reasons that consistently inform the flow of day-to-day activities”⁶² (emphasis added) .

Central to this view is the notion of intent. Human actors are aware of their environment or context and have the power to decide, or at least understand, their course of action. In fact, Giddens argues that intent is fundamental to being a human agent. Moreover, he goes on to state that intent on its own is an insufficient condition for agency. “To be a human agent, one must not only know what one is doing, but must also demonstrate this to others in a visible fashion.”⁶³ According to this view, having intent – recognizing one’s environment and choosing one’s course of action – is a necessary but insufficient condition for human agency and that only through exercising that agency, “in a visible fashion”, do individuals actually achieve agency.

It is worth noting that the idea of intent is distinct from the idea of simple reflex. “Human action does not unfold as the result of programmed impulses. Rather, human beings reflexively monitor what they do as an intrinsic part of what it is that they do.”⁶⁴ A process of constant assessment, evaluation and decision-making underlies actions taken by actors.

⁶² A. Giddens, Social Theory and Modern Sociology. (Stanford University Press). 1987. pg. 2.

⁶³ Ibid. pg. 7.

⁶⁴ Ibid. pg. 99.

Perverse Consequences

Giddens introduces several qualifications to the conditions within which these intent-based actions take place. First, he states that we “inhabit a restricted milieu within a culturally variegated world”⁶⁵ – we have an incomplete picture of the world in which we live and that world is an extremely complicated and complex place. Second, he argues that we are “able discursively to identify only little of the complex conventional frameworks of our activities.”⁶⁶ Of the complex world within which we live, much is beyond our discursive grasp, beyond our capacity to explain or understand. Third, Giddens indicates that our intended actions regularly yield unintended or, what sociologists have labeled, “perverse consequences”.

This concept is supported by the work of de Sola Pool who discusses the “double life of technology” by which he argues that producers of technology are never totally in control of the ways in which their products or technologies will be

⁶⁵ Ibid. pg. 8.

⁶⁶ Ibid. pg. 8.

used.⁶⁷ Morely and Silverstone reinforce this position by pointing the reader to the work of Noble who states that:

A close inspection of technological development reveals that technology leads a double life, one which conforms to the intentions of designers and interests of power and another which contradicts them – proceeding behind the backs of their architects to yield unintended consequences and unanticipated possibilities (Nobel, 1984, quoted in Keen, 1988: 9).⁶⁸

Giddens goes on to suggest that the analysis of unintended consequences and intended actions is fundamental to the entire sociological process. This fundamental nature, he argues, reflects the fact that “while social agents we are necessarily the creators of social life, social life is at the same time not our own creation”.⁶⁹

⁶⁷ R. Silverstone and L. Haddon, “Design and the domestication of information and communication technologies: Technical change and everyday life”. In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies (Oxford: Oxford University Press). 1996. pg. 50

⁶⁸ D. Morely and R. Silverstone, “Domestic Communication – Technologies and Meanings”. In Media, Culture and Society. (SAGE, London) Vol. 12. 1990. pg. 35.

⁶⁹ A. Giddens, Social Theory and Modern Sociology. (Stanford University Press). 1987. pg. 10.

Up to this point we have explored Giddens' explanation of why and how the individual has power. He also, however, indicates the limits of that power and the extent to which we can achieve the objectives of our intentions or foresee the potential consequences of our actions. Giddens is emphatic about recognizing that "Actors always know what they are doing (under some description or potential description), but the consequences of what they do characteristically escape what they intend."⁷⁰ These unintended consequences, he argues, "are deeply involved in the reproduction of social institutions, however much such reproduction is also governed by intuition and contrivance".⁷¹

Giddens argues that "All large-scale social reproduction occurs under conditions of "mixed intentionality". In other words, the perpetuation of social institutions involves some kind of mix of intended and unintended outcomes of action."⁷² This statement is particularly useful for contextualizing the activities undertaken in the ICTOP project. For instance, several years of planning were undertaken before the initiation of the detailed design phase. This planning included reviews of similar projects, evaluation of available technologies, literature reviews, visits to the villages in the Pilot Project region, discussions with stakeholder groups in Canada and India and standard project management planning. During this planning process, the objective was to establish a clear set of activities, tasks

⁷⁰ Ibid. pg. 67.

⁷¹ Ibid. pg. 10.

⁷² Ibid. pg. 69.

and actions to be conducted by each workstream and to ensure coordination and integration.

Each of these activities is intended to contribute to the design of a service to be operated from within these rural Indian villages. It was recognized in the design of the project, that, at best, the project team would be able to set a direction for the services to be offered, but that the moment the service was turned-up (and arguably, even before that), and local village members stepped into the role of managing and operating the Village InfoCentres, the service would begin to evolve and shift as users negotiated with these technologies. Recognizing this, the design of the Pilot Project has been explicit about *not* delivering a “black box” to the villages.

As we approach the boundaries of the individual’s control over consequences, Giddens introduces the second element in his theory, social institutions, which are inextricably bound to human agents through the process of recursiveness.

Recursiveness

Giddens argues that social institutions are reproduced through our day-to-day actions. As such, social institutions are not simply a part of the world in which we live – not just part of the environment or the background – but enter constitutively

into what we do as agents.⁷³ He states that “activities are thus embedded within, and are constitutive elements of, structural properties of institutions stretching well beyond myself in time and space.”⁷⁴ This process by which our actions, which draw on established conventions but also reconstitute these conventions and social institutions, is labeled by Giddens as “the recursive nature of social life”.⁷⁵ With this in mind, Giddens exhorts sociologists to study the long-term patterns of institutional stability and change with recognition of the interaction between the day-to-day activities of life and their role in the continuity of large-scale social institutions.⁷⁶

When we consider the ICTOP project, it can be argued that, by enabling government services and programs to be delivered more effectively to communities that might otherwise have limited or no access, we are extending the reach of social institutions more deeply into the villages. However, it is also important to recognize that we are also facilitating a change in interactions between these institutions and rural villagers. For example, ICT-based applications made available in the villages include the ability to make complaints about government services or to communicate directly to state ministers using IP-based video conferencing.

⁷³ Ibid. pg. 11.

⁷⁴ Ibid. pg. 11.

⁷⁵ Ibid.

⁷⁶ Ibid. pg. 14.

One service that has been particularly successful allows users to file complaints to (and about) the government for a fee. This service has proven to be among the most popular services offered.⁷⁷ The high volume of complaints is causing serious challenges for civil servants who attempt to respond to the complaints within a guaranteed time frame. Failure to do so results in complaints about the complaints service. Civil servants and villagers alike are facing the question of quality of service emerging from electronic government services.

To return to Giddens and his views on structuration, it is useful to consider how he sees the role of sociology. He contends that sociology has its roots in the coming of modernity⁷⁸ – a generally accepted view. He identifies the arrival of industrialism, increased urbanization, mass democracy and other fundamental institutional changes as defining components of modernity.

When considering the state of the world at the end of the twentieth century, he goes on to argue that “we are experiencing a period of social transformation as

⁷⁷ Center for Electronic Governance, An Evaluation Of Gyandoot. (Indian Institute of Management, Ahmedabad, India). 2002.

⁷⁸ A. Giddens, Social Theory and Modern Sociology. (Stanford University Press). 1987. pg. 15.

spectacular as anything that has occurred in earlier phases of the modern era".⁷⁹

He includes changes such as:

- Exceptionally rapid technological innovation;
- The impact of the computer and robotics;
- Erosion of the Western manufacturing base;
- Transfer of basic industrial production to the East;
- Increased global division of labour; and
- Widespread political disaffection within Western democracies.⁸⁰

It is important to recognize that the current changes he describes in no way replace the changes he uses to characterize modernity. Both sets of changes can be observed today and, in fact, they are quite complementary.

For example, it could be argued that the ICTOP project, in many ways, is extending the reach of the social institutions characteristic of modernity into rural, agricultural regions of India. However, instead of requiring villagers to relocate to urban centres, social institutions are reaching into rural India through new information and communications technologies. Increased capacity to

⁷⁹ Ibid. pg. 16.

communicate and interact with government means that democratic participation in the form of lobbying, policy engagement, and so forth, need not necessarily take place in major cities.

Arguably, ICTOP can facilitate changed relations between villagers – whether they be poor, female, or of “Other Backward Castes” – and the social institutions of the country. Certainly new opportunities for under-represented individuals to participate in the democratic process hold promise for improved responsiveness and discourse. This has been a central theme in all discussions promoting e-Democracy.

In the ICTOP project, a critical component is the Village InfoCentre. Its importance rests on a number of factors:

- Access to the technology;
- Control of the business – revenue;
- Knowledge of who’s communicating to whom;
- Gatekeeper of knowledge and social services;
- Strong interaction with government; and

⁸⁰ Ibid.

- Location in the village.

Maintaining maximum flexibility in the operation of each Village InfoCentre was recognized as a critical aspect of providing a service that would achieve sustainability. While it is easily recognized that different regions of India are different enough to require different approaches to how service is delivered, this can also be the case village by village.

For example, over the course of the Detailed Design Phase, a debate centred around whether or not women should have a separate space within the Village InfoCentres. This was an issue particularly in villages where “purdah” (the limited mobility of women in the village, e.g., they are not allowed to move freely outside the home and would definitely not be allowed to spend time in an enclosed space like the Village InfoCentre with another man unless supervised by their husband) was in effect. By creating a separate space within the Village InfoCentre, it was argued, women would be able to use the services with greater freedom. On the other side of the debate were those who argued that creating separate spaces for women would, as Giddens might put it, effectively reinforce existing social patterns that run counter to gender equality. Ultimately, the project suggests that a course of flexibility be adopted to allow each village to choose the solution most appropriate to its needs but with a strong emphasis on ensuring accessibility to all.

To return to arguments made by Nitin Desai, he cautions that the emergence of the knowledge economy brings with it the risk of loss of traditional knowledge and of traditional practices. He suggests that “as the new practices derived from the new technologies become much more widespread much more quickly, there is a serious risk of the loss of traditional capacities and traditional knowledge”.⁸¹

Giddens theory is consistent with Chaney’s argument that, in studying the forms of cultural reproduction we also need to engage with the practical, everyday use of culture in creating identities. In many ways this is entirely the point of the project. Success of the Village InfoCentre is contingent on making the services so essential that villagers integrate them into their everyday lives and make the VIC the new village square. Indeed, in some villages it has been proposed that the VIC be located exactly in the village square. This is a radical transformation for these villages, from a situation where there is little if any technology to the extensive availability of a number of media technologies including phones, Internet access, digital cameras, computers and fax machines along with new buildings, new jobs, new ways to communicate, and new products and services to buy.

⁸¹ N. Desai (United Nations Under-Secretary-General for Economic and Social Affairs and Secretary-General of the World Summit on Sustainable

To return to Giddens' concept of recursiveness, villagers are embedded in this process. Their actions or lack of action are critical to the constitution of the services offered by the VIC. The challenges faced by the ICTOP project include presentation of the services so they do not overwhelm the villagers and treading carefully around traditional practices central to village life.

Chapter 5: Pursuing Sustainability

The concept of “sustainability” is, at best, a rather nebulous one. At a basic level, it suggests the notion that

something will last over time. And yet, it is somewhat more nuanced than that. Buried in the term is the suggestion of autonomy. Not only that something will last, but that it will thrive; it will stand independently and take on a life of its own.

“And while sustainable development may be the new conventional wisdom, many people have still not grasped its meaning.”

~ United Nations
Press Release, 25 February 2002

Roots in Rio

The term “sustainable development,” which had been floating around the development community for some time, emerged as a central organizing concept at the Earth Summit held in Rio de Janeiro, Brazil in 1992, and became a central lens through which all development activities were considered. It was a recognition, in some ways, of the interconnectedness and “systemness” that were becoming increasingly evident globally. While these ideas were clearly a

part of the development rhetoric prior to Rio, they had been largely confined to economic development.

However, the first signs of “global warming, accelerated desertification, the depletion of the oceans and the ozone hole”⁸² began to clearly remind the international community, in the broadest sense, that an increase in economic efficiency might result in an improved economy but not necessarily in an improved environment. Indeed, “The whole idea of sustainable development, reflected in the Rio Earth Summit 10 years ago, is that development and environment are inextricably linked.”⁸³

It was thought, at the time, that environmental protection would no longer be regarded as an afterthought or a luxury. “Rather, environmental factors would be integrated with economic and social issues and become a central part of the policy-making process.”⁸⁴ Through the development and adoption of Agenda 21 – a blueprint for sustainable development – at the Earth Summit it was thought

⁸² K.H. Segschneider, 10 Years After Rio: Debating Development Perspectives. (Thailand: Heinrich-Böll-Stiftung). 2003. pg. 9.

⁸³ United Nations, Sustainability not ‘A Pious Invocation’ But a ‘Call to Concrete Action’ Secretary-General Tells European Forum for Sustainable Development. (United Nations Press Release. 5 March 2002). 2002. pg. 1.

⁸⁴ N. Annan, Towards a Sustainable Future. From the American Museum of Natural History’s Annual ‘Environmental Lecture. (New York, 14 May 2002). pg. 1.

that rich and poor countries had come together on a “common vision for growth, equity and conservation over the long-term.”⁸⁵

It should be recognized that all of this good news did not necessarily manifest itself as expected. Around the definition of “equal rights”, Northern countries defined the concept very much in economic terms and stressed the notion of “equal responsibility”. As such, “a consumer is not liable for the costs created by production, but only for those created by consumption. And as 80% of world resources consumed by the North originated to a very large extent in the South, the North was only willing to be responsible for the impact of its consumption.”⁸⁶

Over the last 11 years, the term “sustainable development” has morphed and evolved from its environmental roots to become synonymous with “sustainable economic development” connoting, among mainstream international leaders, an attitude which believes that economic growth must be defended at all costs.

⁸⁵ Ibid.

⁸⁶ K.H. Segschneider, 10 Years After Rio: Debating Development Perspectives. (Thailand: Heinrich-Böll-Stiftung). 2003. pg. 13.

ICTOP and Sustainability

The CIDA-funded India-Canada Telecommunications Operations Project follows directly the trajectory established in Rio to achieve sustainable development objectives. The definition of “sustainability” is a critical aspect of the ICTOP project and must be clearly understood in order to make informed decisions about the design and operation of the Pilot Project.

Key Characteristics

“Sustainability” in the context of the Pilot Project model can be considered to have five basic features. In *Table 2. Key Characteristics of Sustainability* below, each feature is listed in the left-hand column. The table articulates the basic characteristics of each feature as well as the potential benefits that can accrue from ensuring each facet is addressed.

Table 2. Key Characteristics of Sustainability

	Characteristics	Benefits
Accessible	<ul style="list-style-type: none"> • Open to all community members • Publicly and centrally located • Easy to use 	<ul style="list-style-type: none"> • Maximum participation and developmental impacts
Adaptable	<ul style="list-style-type: none"> • Meets unique requirements of different villages in different regions 	<ul style="list-style-type: none"> • Can work in all villages • Meets the needs of a wide range of people
Profitable	<ul style="list-style-type: none"> • Does not require long-term subsidization • Generates revenue and profit for Local Service Providers and Franchisees 	<ul style="list-style-type: none"> • Becomes self financing • Improves economic conditions of villagers • Enables expansion of service
Reliable	<ul style="list-style-type: none"> • Sound infrastructure with minimal maintenance requirements • Performs under load 	<ul style="list-style-type: none"> • Lower operating costs • Higher levels of user satisfaction
Replicable	<ul style="list-style-type: none"> • Can be easily reproduced throughout rural India 	<ul style="list-style-type: none"> • Enables network effect • Improves operation and value to all users

The concepts included in this definition of sustainability are consistent with the research and case studies evaluated thus far. They address developmental requirements, technology infrastructure issues, business imperatives, gender and social disparities, and requirements for scalability. Each of the project teams was represented in the discussions and ultimately adopted this definition without reservation.

Accessible

Accessibility entails that the project facilitate maximum participation of all members of the villages in and around the Pilot Project area. It is critical to take into account “issues of equity, of access to these technologies – issues about much broader capacity to understand, adapt and develop these technologies.”⁸⁷

Particular challenges related to access to new technologies are faced by women, members of Other Backward Castes (OBCs) and the very poor. As van Zoonen stresses:

⁸⁷ N. Desai (United Nations Under-Secretary-General for Economic and Social Affairs and Secretary-General of the World Summit on Sustainable Development), Opening Address at the Beijing Forum on New And Emerging Technologies for Sustainable Development. (Beijing, China). 2002. pg. 5.

The relations between gender and technology – which might take on the form of a struggle over the definition of technology – are as much a cultural issue, as it is about social and economic phenomena such as unequal access of women to technology, or the detrimental effects of technology on women's labour and women's lives.⁸⁸

Not only must women be able to access the technology, they must be able to access the decision-making process that establishes what the technology "means".

Maximum accessibility to the process by which the services are developed and designed helps to ensure the relevancy of the project. It helps build knowledge about the project, establish a base of users, identify potential VIC operators and clearly understand the realities of operating a service like this in rural India.

Increased accessibility also helps to facilitate the "network effect" as it relates to this project. Each new user of the service increases the overall value of the network and the potential to serve the Pilot Project region. Finally, it cannot be overlooked that greater levels of participation facilitate higher revenue levels that will help to sustain the service.

⁸⁸ L. van Zoonen, Feminist Theory and Information Technology. (Department of Communication, University of Amsterdam). 1992. pg. 9.

Adaptable

No single solution will work everywhere. Furthermore, the solutions that are established must remain relevant over time and respond to the changing needs of users. Flexibility in carrying out the program promotes empowerment, as it allows the project to meet the needs of the users, rather than the reverse.

Profitable

Without the ability to be self-sustaining, the development activities will not be able to exist and thrive in the long-term. A profit focus forces emphasis on activities that have tangible meaning to users. Furthermore, it releases the program from the whims of governmental decision-making. Where programs are reliant primarily on government funding for long-term sustainability, they remain susceptible to changes in policy, national economic crises and other actions that can interrupt the flow of public funds.

Ownership and operation at the local level encourage active participation, real meaning in terms of the services offered and an incentive to ensure success as both the service and the profit benefits remain in the community.

Reliable

Sustainability requires a reliable infrastructure. While this is particularly true for ICTOP, it is by no means unique to this project. Whether it be roads that don't get washed out during monsoons or educational programs with constant support from teachers, development projects need a stable foundation on which to operate in order to reap the full range of benefits they promise. For the ICTOP project, reliability includes both the technological components of the network and the operational reliability of the individuals responsible for staffing the project positions.

Replicable

If the solution works only in one location or in one particular set of conditions, tremendous challenges will present themselves related to the long-term sustainability of the project. Without the ability to scale, the true capability of ICT projects will not be revealed. It will be more difficult to encourage the participation of local entrepreneurs and to capitalize on the network effect (described above).

Partnership

An important aspect of the Johannesburg Summit of the United Nations (the 10th Anniversary of the Rio Summit) was the discussion of partnerships. This included “partnerships between groups of Governments, partnerships between Governments and industry, between industry and local authorities, between non-governmental organizations and Governments – a variety of partnerships, each focused on a particular objective or a particular dimension of sustainability with goals, targets and responsibilities clearly identified.”⁸⁹

When considering how best to achieve the objectives of this project, it was immediately evident that the centrality of partnership would be an overarching factor to achieving a truly sustainable solution. These partnerships would include the villages, the public sector and the private sector.

Interrelationships among these stakeholder groups already exist. The challenge will be in determining how to build on these relationships. In *Figure 7*.

Sustainability Through Partnership below, we have illustrated how the interests of each group intersects.

⁸⁹ N. Desai (United Nations Under-Secretary-General for Economic and Social Affairs and Secretary-General of the World Summit on Sustainable Development), Opening Address at the Beijing Forum on New And Emerging Technologies for Sustainable Development. (Beijing, China). 2002. pg. 2.

Figure 7. Sustainability Through Partnership

Villages interact regularly with the Public Sector; particularly with regard to the delivery of social programs. Villages are active participants in the Private Sector as well through markets, trade, purchase of products, etc. In fact, Desai argues that “it would be a mistake to believe that all of these things can be done in the public sector. We need partnerships. We need partnerships between Governments and the private sector, between the private sector and local authorities, and between local authorities and non-governmental organizations.”⁹⁰

⁹⁰ Ibid. pg. 10.

The intersection of the public and private sectors takes many forms including taxation and, most commonly, regulation. It can be argued that when interests overlap, the opportunity for longer-term, sustainable solutions increases. Where the interests of all three stakeholders intersect in the design of the solution, the likelihood of enduring sustainability is substantially improved. It follows that sustainability is achieved where the three groups interact with one another as a cohesive unit. The development of a sustainable model depends on the maintenance of balance among all three stakeholders. This approach continues to gain support and has become a central component of the development discourse and debate around the digital divide. The G8, through Dot Force, argues that:

The private sector plays a leading role in the development of information and communications networks in the information society. But it is up to governments to create a predictable, transparent and non-discriminatory policy and regulatory environment necessary for the information society. It is important to avoid undue regulatory interventions that would hinder productive private-sector initiatives in creating an IT-friendly environment. We should ensure that IT-related rules and practices are responsive to revolutionary changes in economic transactions, while taking into account the principles of effective public-private sector partnership, transparency and technological neutrality. The rules must be

predictable and inspire business and consumer confidence.

91

Inherent in all of this is a recognition of agency at a variety of levels. Where Giddens' focus is largely at the individual level, it is not difficult to extend his thesis to organizations or nations. For example, the Canadian Centre for International Studies and Cooperation suggests that "it is essential to respect *partners' paces* (faced with donors' schedules and payments) and learn to draw lessons from problems and mistakes. Such an approach allows local organizations to be *actors, not operators or providers of services*."⁹² (Emphasis in original.) This emphasis on "actors" recognizes factors such as intent and a capacity to effect change. It also suggests that the relationship between developing nations and international financial institutions (IFIs) reflects Giddens' view of the recursive interaction between individuals and social institutions. In addition to notionally having agency, there are those who are actively exhorting developing nations to put their capacity into action as it is essential to achieving critical development objectives. For instance, the United Nations has stated that "Achieving ... internationally agreed development goals, including those contained in the Millennium Declaration, demands a new partnership between

⁹¹ www.g8.gc.ca/2000/Okinawa_Charter/GISS0722-e.asp

⁹² Canadian Centre for International Studies and Cooperation (CECI), "Lessons in Aid Effectiveness from Civil Society: Case Studies Prepared for the Canadian Council for International Cooperation, March 2003". In Coalitions for Women's Rights and Citizenship: A Collective Force for Action and Influence, Canadian Centre for International Studies and Cooperation (CECI). pg. 2

developed and developing countries.”⁹³ This approach underscores Giddens’ “recursiveness” at work.

Communications and Awareness

Achieving sustainability at the village level is very much related to successfully describing the project, explaining the potential, finding new participants, keeping existing ones up-to-date and telling the project story to as broad an audience as possible. For the ICTOP project, a wide range of communications approaches is being adopted. Among the most interesting is the use of puppet shows to describe the benefits of the project. Low literacy levels make it impossible to communicate reliably with a wide range of villagers using posters or flyers. Likewise, the low levels of television and radio penetration make it impossible to count on those channels to reach villagers. As a result, puppet shows have been created for villagers attending the various “haats” or markets in the region.

Capacity Building

At a fundamental level, it is critical to build the skills and knowledge of villagers – both those who will use the service and those who will operate it. Capacity building involves training programs, exchange of experiences, experiments in

⁹³ United Nations, Report of the International Conference on Financing for Development. (Monterrey, Mexico). 2002. pg. 2.

collaboration and the management of action plans and projects, and support.

Success appears to be most likely when the process happens at a local level and is driven primarily by local people.

Local Ownership

Until individuals understand, use and “own” technology, it is impossible to anticipate a long-term, sustainable solution. The word “own” has been put in quotation marks in order to highlight the dual nature of its definition in this context.

First, there is the physical, tangible financial ownership that must occur at the local level to facilitate the greatest potential for success. In a related project, sponsors found that when they provided the facilities and funding to launch a local communications centre, their odds of success were dramatically lower than when local entrepreneurs used their own money to fund the centre. Those who did not invest their own money were much less motivated in providing valuable, reliable service.

Second, ownership must also occur at a more basic, personal level. The community has to be able to endorse and commit to the service. This is not a mere marketing challenge. This is a requirement to work with stakeholders in the

design and development of the applications, services and operations that are to be introduced into their community. Without a substantial belief in the importance and value of the service, it can be expected that the objectives of the project will not be fully met.

In the document “Local ownership and development co-operation – the role of Northern civil society: An Issues Paper” prepared by John Saxby for the Canadian International Development Agency in March, 2003, the author argues that “The idea of ownership in development is hardly new, but since the mid-1990’s ‘local ownership’ and its variants have taken on particular prominence in the policies of bilateral and multilateral development agencies.”⁹⁴ Saxby goes on to identify a number of well-known examples demonstrating the clear recognition of the value of local ownership. They include statements from:

- The Development Assistance Committee (DAC) of the Organization for Economic Co-operation and Development (OECD), in its 1996 statement *Shaping the 21st Century*;
- A proposal to the World Bank three years later, by James Wolfensohn, President of the Bank, outlining the case for a Comprehensive

⁹⁴ J. Saxby, Local ownership and development co-operation – the role of Northern civil society: An Issues Paper. (Prepared for the Canadian International Development Agency, March 2003). 2003. pg. 1.

Development Framework that included local ownership as a key factor;
and

- CIDA's recent 2002 Policy Statement, *Canada Making a Difference in the World*, that highlights local ownership as one of the principles of effective development.⁹⁵

In the development discourse, 'ownership' does not have its conventional meaning, i.e., rights of exclusive possession. Nor is it used in the organizational sense, referring to the owners of a business firm, or to the members of a non-profit association. 'Ownership' refers instead to relations among stakeholders in development, particularly their respective capacity, power or influence to set and take responsibility for a development agenda, and to muster and sustain support for that.⁹⁶

⁹⁵ Ibid. pg. 1.

⁹⁶ Ibid. pg. 2.

Chapter 6: A Path Forward

There is nothing inevitable about technology. The capacity to contest new technology or affect the scripting of new technology suggests that information and communication technologies are both shaping and shaped by the social and cultural dynamics of their adoption and development.⁹⁷ This notion recognizes the work of Mansell and Silverstone and the concept of double articulation. Individuals have agency – the power to contest technological scripting and define artifacts on their own terms.

Orlikowski (1992) states that technology is created and changed by human action, yet it is also used to accomplish human action. The duality of technology mimics precisely the more widely assumed duality of structure. It is both an objective force and a socially constructed product.⁹⁸ With this in mind, we can state that scripting and stabilization can also be turned around so that the

⁹⁷ R. Silverstone and L. Haddon, "Design and the domestication of information and communication technologies: Technical change and everyday life". In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies (Oxford: Oxford University Press). 1996. pg. 58

⁹⁸ Ibid.

development of new information and communication technologies can be contested both functionally and symbolically.

SCOT and Giddens show that the individual has the capacity to act. As Wise also advocates, we must adopt approaches that examine situations in terms of the social efficacy of actors and always ask which actors have the ability to affect a particular situation.⁹⁹ Not only must we look to see how individuals can act, we must also recognize that we cannot adopt an approach that does otherwise if we are to understand the relationships between technology and society.

For instance, Morely and Silverstone tell us that television's *meanings*, that is the meanings of both texts and technologies, have to be understood as emergent properties of contextualized audience practices.¹⁰⁰ This argument is not unique to television. It is as true for computers as it is for light bulbs. Spigel argues that there is no singular discourse on technology, but a variety of discourses from a variety of sources¹⁰¹ – and this position can certainly apply to all media.

⁹⁹ J.M. Wise, Exploring Technology and Social Space. (Sage Publication, Thousand Oaks, CA). 1997.

¹⁰⁰ D. Morely and R. Silverstone, "Domestic Communication – Technologies and Meanings". In Media, Culture and Society. (SAGE, London) Vol. 12. 1990. pg. 32.

¹⁰¹ L. Spigel, Make room for TV: Television and the family ideal in postwar America. (The University of Chicago Press, Chicago). 1992. pg. 8.

This suggests that while technology is scripted and stabilized, designers cannot be assured that their scripts are being followed. As Roger Silverstone (1990: 179) has put it, meanings are “vulnerable to exigencies, the social structuring, the conflicts and the rituals of domestic daily life.”¹⁰²

Giddens’ theory of structuration is very important in this discussion and it is worth revisiting some of the features described earlier. Giddens begins his model with the recognition that individuals are knowledgeable actors (and goes on to critique functionalists and Marxists for failing to see them as such). Individuals are presumed to be reflexively monitoring the environment in which they are situated and the flow of action in that environment.

However, they are not simply flotsam and jetsam buffeted about in the social environment. Individuals both fit into a flow of events as well as shape their environment. In more formal terms, structure and agency are mutually constitutive – this is structuration. As stated previously, in this process of structuration, actors and objects are co-determinate in a dialectical process in which there are intended and unintended consequences. Consequences are not always predictable because control is never complete. The actions of some are

¹⁰² I. Ang, “Living-room Wars: New technologies, audience measurement and the tactics of television consumption”. In Roger Silverstone and Eric Hirsch (Eds.). Consuming Technologies: Media and information in domestic spaces. (Routledge, London). 1982. pg. 133.

inevitably contested by others, and while individuals are considered to be knowledgeable actors, there is no assumption of perfect knowledge.

The ways in which the potential inscribed in the machine and underwritten by the institution of power and economy are mobilized, negotiated with, transcended or denied, depend at every level of social life on the patterns and structures of the local or the domestic settings into which they are introduced.¹⁰³

Use is a very important way for us to demonstrate Giddens' notion that the weak always have some capabilities of turning back against the strong. For Giddens, power is never pervasive. There is always room for resistance. This is generally in agreement with the perspective of Foucault who sees power everywhere but recognizes that not everything is under its invincible unity. In this way, where there is power, there is resistance. Ultimately the meanings and significance of all our media and information products depend on the participation – with varying degrees of commitment and interest – of the user, the consumer.¹⁰⁴

¹⁰³ R. Silverstone, "Time, Information and Communication Technologies and the Household". In Time & Society. 2(3). 1993. pp. 283-311.

¹⁰⁴ R. Silverstone and L. Haddon, "Design and the domestication of information and communication technologies: Technical change and everyday life". In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies (Oxford: Oxford University Press). 1996. pg. 60

Orlikowski offers a processual account of technological innovation which recognizes that different kinds of technologies will have different routes towards their complete definition and that there will be an indeterminacy in those routes, as users intervene in the structuring process. The final meaning and significance of technology is not predetermined or prescribed – nor perhaps ever final. It is historically and sociologically situated in quite particular ways.¹⁰⁵

It is useful to draw on the work of Phillip Vitone to lend perspective. He writes that:

Orwellian tropes on intellectual barbarism and brutal force segue into Foucault-style detailing of the reflexive compulsions to self-surveillance engendered by exotic electronic panoptics. Many are tempted to leap hastily from the totalizing feeling evoked in the rhetoric of the prose to seeing technological possibility as a grid for the empirical world. Yet, the world, or virtually any section of it, has fallen short of being totally controlled and continues to do so. There remains some margin for movement, some room for eccentric configuration.¹⁰⁶

¹⁰⁵ Ibid. pg. 59

¹⁰⁶ P. Vitone, "Reflections on Surveillance". In Canadian Journal of Communication. Vol. 19. 1994. pg. 102.

It's increasingly misleading to consider technology in isolation. Rather, it must be seen as embedded in a technical and consumer culture that's both domestic and national (and international), a culture that's simultaneously private and public. For example, while televisions are all basically the same, they are used in very different ways. They occupy different positions in the household, have different levels of status in daily ritual and vary in their relations to the individuals and families that use them.

The meanings of technologies are constructed not only through scripting by the designer but also in the different ways people create private meanings through patterns of use – both intended and unintended.

Looking Ahead

Like their predecessors, advanced information and communication technologies have become intimate parts of our social and economic lives. They bring us information about the world around us and we engage with information and communication systems in an increasing proportion of our waking (and occasionally sleeping) lives.

By analyzing the scope for choice in the development and implementation of information and communication technologies, we have become more aware of

the fact that technologies represent sedimented social interests and that there is latitude for actors to re-script them. However, the scope and nature of relationships in a world of NICTs are creating new challenges to conventional forms of resistance. The increasing integration of the user into the design process can be viewed either as a source of power through involvement in the original scripting or as surreptitiously co-opting actors early in the process in order to stabilize the scripting earlier in the process.

The increased level of computerization in new information and communications technologies, combined with the rate and scale of proliferation, is making it increasingly difficult for users to comprehend the nature of artifacts entering their communities and their homes. Decades separated the introduction of radio from television. Today, new operating systems come out every three years – new micro-processors every few months. No longer will it suffice to imagine new technological gadgets without any conception of the relationships they will share with other technologies in the home.

Complexity is multiplied by the interrelationships of artifacts. Once a phone was a phone. Today a phone can be used to send a fax, surf the Internet, receive email, act as a pager or operate as a daily planner. Furthermore, a computer is also a phone, as is a cell phone, a PCS phone, a satellite phone, the television and, yes, even a microwave is a telephone (NCR has created a microwave that lets users surf the Web, order food, receive email and take phone calls.)

Yet even when these artifacts are dropped on individuals, families and villages who have little or no prior experience with them, there is still room for negotiation. This negotiation – the ability to choose, to decide and to enact decisions about how technologies are used – is central to achieving the objective of sustainability in the India-Canada Telecommunications Operations Project.

Appendix A: Key Findings of the Situation Assessment¹⁰⁷

Summary Findings

The Ability to Pay Exists in Both Khirkiya and Babai

The villages in the Pilot Project region are not characterized by abject poverty, though segments of these communities are certainly among the very poor. Based on a poverty line of approximately Rs 15,000 in this rural area of Madhya Pradesh, both communities have available income for communications services. The average annual income in Khirkiya is about Rs 55,786 (with 23% of households below the poverty line) and in Babai that amount jumps to Rs 140,955 (approximately C\$4,700) with only 16% of households living below the poverty line.

Demand for Telephony is Strong

A recognized benefit of the presence of telephony plus a willingness to pay for it coupled with explicit demand for private line service in addition to community telephones indicates that the introduction of telephone services into the Pilot

¹⁰⁷ "Situation Assessment Pertaining to the Design of the Sustainable Model and the Pilot Project: Primary Research Conducted in Rural Madhya Pradesh, India", Trefor Munn-Venn and Simon Cheesman, Bhopal, India. pp. 1-2, pp. 79-87.

Project region will be well-accepted. The research demonstrates that about 43% of households are making telephone calls today but that almost three quarters of those calls are originated in the wealthier Babai region. On average, these households are making 7.6 calls per month. About 80% of the calls are local. The average expenditure per month on telephony among households making phone calls is Rs 73.5. What is most notable about these figures is that villagers have to travel an average of 10.8 km in order to make a telephone call. Every village identified benefits they would gain from access to a telephone.

Adoption of ICT Applications Will Likely Be Slow

Many villagers in this region have never used a phone (and have requested training) let alone used a computer. The most complex communications technology they have likely encountered is a VCD Player. Coupled with low levels of formal education and very low literacy rates, it will take time for villagers to understand the benefits of ICT applications and engage in their use.

Women Face Particular Challenges Adopting These Services

The 'Purda' system is in effect in two thirds of the villages in the Pilot Project region thus substantially limiting the mobility of women within the community. Furthermore, the literacy rates of women are substantially lower than they are for men in these communities posing challenges to their ability to use the services.

Finally, women seldom have decision-making authority over money in the household and are thereby limited from paying for these services.

Nonetheless, women stand to benefit greatly if they are provided access. For example, there is documented demand for women, who have typically been separated from their families through marriage, to communicate with their family members.

Agricultural Activities Open Opportunity

The entire livelihood of this region is predicated around agricultural activities. Crops account for over 90% of income and virtually all community members are engaged in agricultural labour activities. The Focus Group Discussions consistently indicated interest in the use of new communications facilities to obtain prices of seeds, crops and fertilizers, identify potential market opportunities, engage in transactions and develop new farming techniques. Villagers identified the opportunity to more easily communicate with mechanics and obtain parts in order to reduce operating downtime. Those without land indicated that they would be able to more quickly locate employment opportunities in the region.

Particular Needs Exist Around Health

Almost 60% of households indicated they required medical assistance from outside of the village in the last year, underlining the lack of requisite local medical facilities. Villagers must regularly travel to towns and cities in order to seek advice and obtain treatment. Almost all focus groups conducted with villagers indicated that they recognize a substantial benefit from the introduction of services into their communities as it related to health care.

As a related point, a number of villages saw these technologies as essential Life Line services for both medical emergencies and law enforcement crises.

Educational Resources are Minimal

Most villages have nothing more than a primary school and many children regularly travel to other towns or cities to receive additional education. Of the facilities in the villages, while many have some books, naturally, none have computers. The ratio of teachers to schools is about 1:1 however, the levels of absenteeism among teachers in a number of villages presents serious obstacles to regular education.

Most villagers therefore have low levels of formal education and correspondingly low literacy skills. There is a recognized need among villagers for additional means of gaining information and education whether it be through additional access to materials, vocational training or other support services. Teachers also

recognize that communications technologies may be able to help them conduct their classes.

Access to the InfoCentre is Critical

The range and conditions of buildings in the villages is limited and generally quite poor. By far, most buildings are constructed of Kutcha materials and only official buildings – typically government buildings – are made of concrete.

In the course of the research, it became clear that ensuring equitable access to the Village InfoCentre facilities would be critical to success. Facilities that ensured access regardless of gender or castes were identified as essential during the focus group discussions. Villagers also sought privacy when using these services. In some villages quite energetic discussions took place about this topic.

Familiarity with Media Technologies

Generally, the villagers are not familiar with ICT technologies beyond basic media appliances such as televisions, radios and tape decks (owned by 53%, 27%, and 17% of households respectively). Only a small minority of homes use video players (about 3%), but focus group discussions revealed that a larger segment of the population has some familiarity with these devices from attending

local video cinemas. No villages are currently being served by a cable or community antenna television system. One household was identified as having a satellite dish, but this marks the high-end of technical sophistication in terms of electronic media. Focus group discussions revealed a small degree of familiarity with home computers and computer technology by having seen it used on television.

Contact and experience with technology divides along caste and gender lines. Women had far less experience with using electronic media in general, because of restrictions on their mobility. For example, women who do not have a TV in their household have less opportunity to watch than men in the same household: there exists a significant level of evening TV viewing at the house of friends' and family, which women are typically not free to participate in.

Media Use

Electronic media technologies are strongly associated with entertainment content by the vast majority of villagers; they are sources of television soap operas, Hindi cinema and popular music. News broadcasts are of secondary importance. For relevant local information on Panchayat initiatives, relevant government programs, prices and activities at the local markets, word of mouth is the critical medium. Access to this information is thus strongly affected by caste and

community lines. Higher income earners use media (electronic and non-electronic) much more often than lower income earners for finding out about government programs, health and business information.

Phone Use

A large minority (42%) of households use the phone on a regular basis (usage was estimated by respondents on an annual basis and averaged out on a monthly basis). In focus group discussions, it was often women who expressed the least familiarity with the operation of telephones. In addition to illiteracy, innumeracy is also common in the villages and the ability to use the phone's keypad or record phone numbers was a concern expressed in a number of focus groups. Some groups suggested using a set of symbols or icons in addition to numbers as a memory aid.

Literacy and Language

Because so much of the content and applications to be found online are text-based, illiteracy will be the greatest barrier to villagers using ICT as a commonly used channel for their common transactions. It is also an area where gender and caste inequalities stand out most starkly. Research found that basic literacy levels stood at 48% for the both regions. Divided between Babai and Khirkiya we find that levels of literacy stand at 69% in Babai and 28% in Khirkiya, which is

dominated by residents belonging to scheduled tribal groups. Divided by gender, we see that 65% of men are literate, compared with only 43% of women.

The two major languages spoken in these regions are Hindi and tribal languages, mostly Korku. Hindi is by far the dominant language in the villages with 80% describing their spoken Hindi as 'Good', with 20% of the population favouring Korku. Almost all Korku speakers are located in the Khirkiya region, where 10% describe their Hindi as 'Poor'.

While speaking proficiency is important for the provision of services at the VIC, the ability to read and write is critical to the use of ICT services. About 60% of villagers say that their ability to read Hindi is either good (44%) or fair (16%). The number of Hindi-language applications and online services continues to grow, and many of the applications anticipated to be important to the project for revenue-generating and development-oriented reasons have been designed in Hindi. But because so much of the content generally available online is in English, we also tested for proficiency in this language: only 13% describe their ability to read English as either good or fair.

Education

Formally educated people make up about 52% of the village population, but only 34% of women have had any schooling vs. 66% of men (this proportion is similar in both Babai and Khirkiya). The overall level of education differs considerably between the blocks: 42% of villagers in Khirkiya have some education vs. 56% in Babai.

Of the villagers with some formal education, the majority have not gone beyond high school (approximately 90%), and slightly more than half (51%) have not gone beyond fifth grade.

Potential VIC Operators

Survey results also point to a number of existing constituencies and individuals that might play a role in delivering VIC services. First, shops and stores have been identified in almost every Pilot village indicating there is already a group of individuals with experience in running their own business, however small. Stores are typically operated out of the entrepreneur's home rather than an entirely separate structure.

Aside from these store owners villagers often suggested particular individuals they felt would be appropriately qualified to operate or act as custodian for the telecom facility. These individuals were usually named because they were looked

on as community leaders, were respected as responsible people and/or owned or occupied an appropriate structure to house the facility. These people ranged from village headmen, Panchayat Sarpanches, teachers, or simply people considered sensible and trustworthy. The specific recommendations made by the villagers can be found in the individual focus group discussion notes in the appendices.

Villager Needs Assessment

Health

Only three of the Pilot villages contain any medical clinic at all, and all three are primary-level Sub-Health Clinic facilities. Eight of the villages have some sort of medical professional living locally.

The closest medical facility outside of the village is on average over 7 km away, and in most cases is a Sub-Health Clinic (40%), a Primary-Health Clinic (25%) or a Private Clinic (25%). The average reported time it takes to reach the closest facility outside of the village is approximately one and a half hours.

Only two of the villages said it was practical to use a phone in order to call for emergency medical help. The rest either retrieved medical help to the village in person or transported hurt individuals to receive medical attention directly.

Almost 60% of households had someone who needed to travel outside of the village to receive medical attention in the last year: accounting for an estimated 3,700 person-trips to the doctor. Actual trips taken to seek medical attention do not, however, provide a complete picture of local need. For example, villages in the Khirkiya block have less medical resources available to them in the villages, but the number of trips made each year by village residents is significantly lower: 53% of households in Khirkiya vs. 61% in Babai. Differences in distance and other difficulties (e.g. financial, social and linguistic) can dissuade residents from accessing available medical resources despite need. Thus, the fact that women make about as many medical trips as men do does not necessarily mean that they have the same level of need, but rather that their ability to travel and see a doctor depends to a greater extent on men. This possibility is reinforced by the findings that the most commonly cited means of transportation for medical purposes by men is the bullock cart, and for women is by foot.

Aside from requiring medical attention from outside the village, villagers also require medical intelligence: over half said they had had questions or concerns in the last year that they could not have answered inside the village.

Education

Slightly more than half of the all the villagers have attended school. But only 34% of women have had any schooling vs. 66% of men (this proportion is similar in both Babai and Khirkiya). And only 42% of villagers in Khirkiya have some education vs. 56% in Babai.

The majority of educated villagers have not gone beyond high school (approximately 90%), and slightly more than half (51%) have not gone beyond fifth grade.

These figures reflect the educational resources available to the villagers and the attendance figures returned from the survey.

While almost all the villages in the Pilot region have a local Primary School (two do not), only two villages have an institution providing higher than fifth-class education. Students typically attend school from the ages of six to eleven, after which time they must travel outside of the village in order to continue their education. On average, these schools are about 7 km from the village.

Most of the village schools have books to teach the children with. None have any computer-based teaching resources. In fact, when asked what resource would best improve the level of education in the village, almost all responses centred on basic resources such as a building, building infrastructure such as toilets, and ways to ensure teacher's arrive regularly to teach their classes.

Differences in female participation in educational pursuits do not stop with the students: the ratio of male to female teachers is 6:1 across all the Pilot villages, and there are no female teachers working in Khirkiya.

The overall level of satisfaction with existing educational resources differed quite dramatically between blocks: in Khirkiya 68% of households with children attending school said that they were dissatisfied with the existing school resources in the village, compared with only 32% in Babai. This reflects a difference in material resources evident from our survey: of 12 villages surveyed, two had no school at all, one had only recently organized schooling in the village, and many other villages had only marginal facilities. The Babai cluster on the other hand has a primary school in every village, and two villages have secondary schools.

In many villages, parents pay a tax or user fee that goes toward school maintenance and supplies. Including this and all other associated costs, parents reported paying an average of Rs 750 for each child in school.

Only a relatively small percentage of students do actually continue their schooling beyond fifth class: 27% of male school-attending children are attending school outside the village (including children at boarding school). The same figure stands at 14% for female school-attending children. Almost all of even these children stop attending school altogether by age 16. In Khirkiya, 50% of villages have children living away from home to study, vs. 85% in Babai.

Government and Social Services

There is a significant government presence in all of the villages – even those that explicitly downplay the importance of government in their everyday lives. The most immediate presence is that of government employees themselves, e.g. Anganwadis, forest officials, school teachers, medical professionals and Panchayat members. These individuals often serve as village leaders, are among the most economically well off and also require the greatest need for communicating outside of the village.

A quarter of the villages we surveyed contained a Panchayat headquarters. In focus group discussions (FGDs), the Panchayat was the most cited level of government by which villagers would like to have improved communications with. This is not surprising given that 62.5% of the villages charge user fees and taxes for the services and initiatives provided by the Panchayat Raj. These initiatives often make an immediate and material impact on the lives of the villagers: the construction of roads, schools, sub-health centers, Anganwadi centers, and wells are all subsidized with Panchayat funds. Current initiatives mentioned during Focus Group Discussions were the construction of a Panchayat headquarters and the construction of two new tarred roads. In many focus groups, villagers stated that they had no significant contact with government, *except* for their Panchayat. A quarter of the villages belonged to a female-headed Panchayat.

A number of block, district and state level government programs and departments were mentioned numerous times during Focus Group Discussions as being important to the village, including:

- Watershed and forestry committees
- Pensions for the elderly or disabled
- Departments responsible for health and welfare;
- Land registration

- Mother and child programs, and;
- Water and electricity resources.

Agriculture and Commerce

The economic life of the villages is overwhelmingly dependent on agriculture (with agricultural wage labour included, this sector accounts for almost 95% of all revenues generated in the region), and within agriculture, overwhelmingly dependent on the growth of crops (89%). The Kharif harvest, which is rain fed by the monsoons, is more important to the overall economy than Rabi crops, which typically rely on some form of irrigation.

Soya bean is the main Kharif crop, grown by 61% of all households in the region (the proportion is approximately the same in both Babai and Khirkiya). Other major Kharif crops include Cotton, Tuhar, Paddy, Jawar, and Kutki.

The major Rabi crop is Wheat, named by almost 50% of all households in the region. Other major crops for this cycle include Gram and Channa. Rabi crops are much more commonly grown in the Babai region, where land irrigation is more often practiced. Improved irrigation would have a dramatic effect on Khirkiya's economy.

Aside from physical resources, the farmers need constant informational inputs in order to grow and sell crops, and manage their farms. Issues and potential applications stemming from needs such as weather information, crop prices, resource costs and availability, repair and maintenance services, borrowing and credit are discussed in more detail in the following section.

Communications

Even aside from the absence of telecommunications facilities in the Pilot regions, the entire communications infrastructure on which the villages depend, including all other communications media is severely limited.

Families have members away from the village on average for 21 person-months of the year, including absent daughters married into other villages.

Most communications with family and non-family members (over 50%) are hand delivered to the recipient, and thus are dependent on the travel patterns of third parties.

A consistent response among women participating in Focus Group Discussions was interest in the presence of a phone in the village as a means to contact family members – absent parents or absent daughters – away from the village.

Bibliography

Adrian, R. Infobahn Blues, C Theory, 1995.

Akrich, M. (1992). *The De-Description of Technical Objects*. In W.E Bijker and J. Law (Eds.) Shaping technology/Building Society: Studies in Socio-technical change. Cambridge, MA: MIT Press.

Ang, I. (1992). *Living-room Wars: New technologies, audience measurement and the tactics of television consumption*. In Roger Silverstone and Eric Hirsch (Eds.) Consuming Technologies: Media and information in domestic spaces. Routledge, London.

Annan, N. (2002). "Towards a Sustainable Future", Speech given at The American Museum of Natural History's Annual Environmental Lecture. New York, 14 May 2002.

Bates USA. (1996). Projections: 2005: Techthusiasts of the Americas: Interactive Leaders for the New Millennium. New Media & Interactive Research Department.

Bausinger, H. (1984). *Media, technology and daily life*, In Media, Culture and Society. Vol. 6(4).

Berners-Lee, T. (1990). Information Management: A Proposal, Geneva, Switzerland, CERN Report.

Bijker, W.E. (1987). "The Social Construction of Fluorescent Lighting, Or How an Artifact Was Invented in Its Diffusion Stage". In W.E. Bijker and J. Law

(Eds.) Shaping Technology – Building Society: Studies of sociotechnical change. Cambridge, MA. MIT Press.

Bird, R. (1989). Documents of Canadian Broadcasting. Ottawa, Canada. Carleton University Press.

Bliss, R. (1994). "Roadkill on the Information Superhighway". In Curmudgeon's Corner, www.takeourword.com (Cited April 1994).

Briggs, A. (1977). The Pleasure Telephone: The Social Impact of the Telephone. Ithiel de Sola Pool (Ed.). Cambridge, MA: MIT Press.

Bush, V. (1945). "As We May Think". In "The Atlantic Monthly". July 1945.

Butterick, M. (1996). On Interactivity, Information and Digital Design. Lecture given March 1996 at the Netscape Developers Conference.

Canadian Centre for International Studies and cooperation (CECI). "Lessons in Aid Effectiveness from Civil Society: Case Studies". Prepared for the Canadian Council for International Cooperation, March 2003, Coalitions for Women's Rights and Citizenship: A Collective Force for Action and Influence, Canadian Centre for International Studies and cooperation (CECI).

Carlson, W.B. (1992). "Artifacts and Frames of Meaning: Thomas A. Edison, His Managers, and the Cultural Construction of Motion Pictures". In W. E. Bijker and J. Law (Eds.). Shaping Technology, Building Society: Studies in Sociotechnical Change. Cambridge, MA: MIT Press.

Cassell, P. (Ed.). (1993). The Giddens Reader. Stanford, CO: Stanford University Press.

Center for Electronic Governance. (2002). An Evaluation Of Gyandoot. Ahmedabad, India: Indian Institute of Management.

Cheesman, S. and Munn-Venn, T. (2003). Situation Assessment Pertaining to the Design of the Sustainable Model and the Pilot Project: Primary Research Conducted in Rural Madhya Pradesh, India. Bhopal, India: Report Submitted to IBM Canada pertaining to the India-Canada Telecommunications Operations Project.

Comerford, R. (1996). Interactive Media: an Internet Reality, The Institute of Electrical and Electronic Engineers, Inc.
<www.spectrum.ieee.org/publicaccess/9604teaser/9604web.html> (Cited December 1996).

Cushman, J.H. Jr. (1996). "Western Governors Back On-Line University". In The New York Times CyberTimes, June 25, 1996.

Davis, T. (1996). "Squeezing money from the Internet". In Broadcaster Magazine. September 1996.

de Sola Pool, I. (1983). Technologies of freedom. Cambridge, MA: MIT.

Dervin, B., Grossberg, L., O'Keefe, B. and Wartella, E. (Eds.) (1989). "The Orthodox Consensus and the Emerging Synthesis". In Rethinking Communication, Volume 1., Paradigm Issues. Sage: London.

Desai, N. (2002). "Opening Address at the Beijing Forum on New And Emerging Technologies for Sustainable Development". Beijing, China.

Douglas, M. and Isherwood, B. (1979). The World of Goods. New York, NY: Basic Books, Inc., Publishers.

Ducey, R.V. (1995). A New Digital Marketplace in Information and Entertainment Services: Organizing Around Connectivity and Interoperability. National Association of Broadcasters.

Ducey, R.V. (1996). Multimedia Broadcasting and the Internet, INET '96, National Association of Broadcasters.

Evans, M. (1996). "Television Web boxes seen spurring growth of Internet users". In The Financial Post, December 5, 1996.

Frissen, V. (1992). "Trapped in electronic cages? Gender and new information technologies in the public and private domain: an overview of research". In Media, Culture and Society. London, England: SAGE Publishing, Vol. 14.

Gandy, O.H. (1993). The Panoptic Sort: A Political Economy of Personal Information. Boulder, Colorado: Westview Press.

Giddens, A. (1976). New Rules of Sociological Method: A Positive Critique of Interpretative Sociologies. London, England: Hutchinson of London.

Giddens, A. (1985). The Nation-State and Violence: Volume Two of a Contemporary Critique of Historical Materialism. Cambridge, MA: Polity Press.

Giddens, A. (1987). Social Theory and Modern Sociology. Stanford, CO:, Stanford University Press.

Goddard, J.B. (1991). "New Technology and the Geography of the UK Information Economy". First published in 1991 as Networks of Transactions. Times Higher Education Supplement, 22 February: vi.

Grandy, T. and Munn-Venn, T. (2002). Project Management and Implementation Approach. Ottawa, Canada: Document submitted to the Canadian International Development Agency for the ICTOP Project.

Grandy, T., Munn-Venn, T. and Sibthorpe, G. (2001). Digital Inclusion: Canada's Community-Based Approach to Building the Innovative Economy. Ottawa, Canada: Report prepared for Information Highway Applications Branch, Industry Canada.

Guthrie, B. and Munn-Venn, T. (2003). Trading in the Global Ideas Market. Ottawa, Canada: The Conference Board of Canada.

Hafner, K. and Lyon, M. (1996). Where did the Net Come From, Daddy?, Simon & Schuster Publishing.

Hardy, H.E. (1993). The History of the Net, Grand Valley State University, September 20, 1993.

History of the Internet, <www.ccit.arizona.edu/internet/inthist.html> (Cited January 1998)

Hoderich, T. (Ed.). (1995). The Oxford Companion to Philosophy, New York, NY: Oxford University Press.

Johnson, C. (1997). "Breaching the Great Wall". In The American Prospect, Inc., no. 30 (January-February 1997).

Jütting, J. (2003). Institutions and Development: A Critical Review. Paris, France: OECD Development Centre, Technical Papers No. 210.

Kroker, A. and Weinstein, M.A. (1997). The Political Economy of Virtual Reality: Pan-Capitalism, C Theory, Downloaded April 22, 1997.

Mansell, R. and Silverstone, R. (Eds.). (1996). Communication by design: The politics of information and communication technologies. Oxford, England: Oxford University Press.

Mendels, P. (1996). "Study Shows Value of Wired Classroom". In The New York Times CyberTimes, October 26, 1996.

Merton, R.K. (1963). Social Theory & Social Structure. New York, NY: Glencoe, Free Press.

Miller, A. (1996). "The Interactive Device for the Information Age". In New Telecom Quarterly, Volume 4, Issue 1, 1Q 96.

Moore, S. (1988). "The box on the dresser: memories of early radio and everyday life". In Media, Culture and Society. Vol. 10(1).

Morely, D. and Silverstone, R. (1990). "Domestic Communication – Technologies and Meanings". In Media, Culture and Society. (SAGE, London) Vol. 12.

Moudourides, M.A. (1995). Social and Psychological Effects in Computer-Mediated Communication, Greece: Democritus University of Thrace.

Murdock, G., Hartmann, P., and Gray, P. (1992). "Contextualizing home computing: resources and practices". In Roger Silverstone and Eric Hirsch (Eds.). Consuming Technologies: Media and information in domestic spaces. London, England: Routledge.

OECD. (2003). "Internet and Broadband Infrastructure". In OECD Communications Outlook 2003.

Office of the Registrar General & Census Commissioner. (2001). Census of India 2001. New Delhi: India. <www.censusindia.net/press/pr200701.html>
Cited November 2003.

Oxfam Canada and Oxfam Quebec. (2003). "Lessons in Aid Effectiveness from Civil Society: Case Studies Prepared for the Canadian Council for International Cooperation, March 2003". In Making "Local Ownership" a Reality: Case Study of the Horn of Africa Capacity Building Program, Oxfam Canada and Oxfam Quebec.

Robins, K. and Webster, F. (1988). "Cybernetic capitalism: Information, technology and everyday life". In V. Mosco and J. Wasko (Eds). The political economy of information (pp.44-76). Madison, MI: University of Wisconsin.

Rose, F. (1996). "The End of TV as We Know It". In "Fortune", December 23, 1996.

Samarajiva, R. (1994). "Privacy in Electronic Public Space: Emerging Issues". In Canadian Journal of Communication. Vol. 19. pp. 87-99.

Samarajiva, R. (1996). "Surveillance by design: Public networks and the control of consumption". In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies. (pp. 129-156). Oxford, England: Oxford University Press.

Samarajiva, R. and Shields, P. (1992). "Emergent institution of the Intelligent Network: Toward a theoretical understanding". In Media, culture and society, 14(3), 397-419.

Saxby, J. (2003). Local ownership and development co-operation – the role of Northern civil society: An Issues Paper. Prepared for the Canadian International Development Agency.

Schiller, H. (1976). Communication and cultural domination. New York, NY: International Arts and Sciences Press.

Segschneider, K.H. (2003). 10 Years After Rio: Debating Development Perspectives. Thailand: Heinrich-Böll-Stiftung.

Silverstone, R. (1993). "Time, Information and Communication Technologies in the Household". In Time and Society, Vol.2, No.3.

Silverstone, R. (1994). Television and Everyday Life. London, England: Routledge.

Silverstone, R. and Haddon, L. (1996). "Design and the domestication of information and communication technologies: Technical change and everyday life". In R. Mansell and R. Silverstone (Eds.). Communication by design: The politics of information and communication technologies (pp. 44-74). Oxford, England: Oxford University Press.

Spigel, L. (1992). Make room for TV: Television and the family ideal in postwar America. Chicago, IL: The University of Chicago Press.

Statistics Canada. (1996). Household Facilities and Equipment. Catalogue no. 64-202-XPB.

Statistics Canada. (2003). 2001 Census.
<http://geodepot.statcan.ca/Diss/Highlights/Page1/Page1_e.cfm> (Cited September 2003).

Sterling, B. (1993). "A Short History of the Internet". In The Magazine of Fantasy and Science Fiction. February 1993.

Tenner, E. (1997). *Why Things Bite Back: Technology and the Revenge of Unintended Consequences*. New York, NY: Vintage Books.

United Nations Industrial Development Organization. (2003). *Industrial Development Report 2002/2003: Competing Through Innovation and Learning*. Paris, France..

United Nations. (2002). *Report of the International Conference on Financing for Development*. Monterrey, Mexico, 18-22 March 2002.

United Nations. Sustainability not "A Pious Invocation" But a "Call to Concrete Action" Secretary-General Tells European Forum for Sustainable Development. Paris, France: United Nations Press Release. 5 March 2002.

van Zoonen, L. (1992). Feminist theory and information technology. London, England: SAGE Publishing, Vol. 14. pp. 9-29.

Vitone, P. (1994). "Reflections on Surveillance". In Canadian Journal of Communication. Vol. 19.

Webster, F. (1995). "Information, the Nation State and Surveillance: Anthony Giddens". In Theories of the Information Society. New York, NY: Routledge.

Webster, F. (1995). Theories of the Information Society. London, England: Routledge.

Weick, D., Castle, V. and Sather, J. (2002). Detailed Site Surveys. Bhopal, India: Report Submitted to IBM Canada pertaining to the India-Canada Telecommunications Operations Project.

Wise, J.M. (1997). Exploring Technology and Social Space. Thousand Oaks, CA: Sage Publication.