

**Establishing an Internet-Based
Information Exchange System for the
KwaZulu-Natal Midlands Rural Development Network
(MIDNET), South Africa**

By

Amare Molla Setegn

BA Degree, Foreign Languages (English) and Literature,
Addis Ababa University, Addis Ababa, Ethiopia, 1989

Supervisor

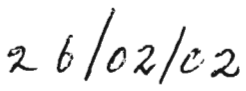
Professor Andrew M Kaniki

Submitted as the dissertation component (which accounts for 50% of the degree)
in partial fulfillment of the academic requirements for the degree of **Master of Information
Studies (MIS)**, in Information Studies Program, School of Human and Social Studies,
University of Natal, Pietermaritzburg, South Africa, 2002.

DECLARATION OF ORIGINALITY

I, Amare Molla Setegn, hereby declare that the content of this thesis is my own original work, unless it is specifically indicated to the contrary in the text.

This dissertation or thesis, whichever you prefer to call it, has not been submitted for any other degree to any other university.

		
_____	_____	_____
<i>Signed</i>	<i>Name</i>	<i>Date</i>

DEDICATION

This work is dedicated to my friends, the late

Geta Baye,

Gezahegne Milkiso

and

Solomon Kebede

who untimely passed away, one after the other, at the
turn of the millennium in the face of good opportunities in their lives.

Together, we roamed in Addis.

I will always remember their warmth, understanding and encouragement.

ABSTRACT

The purpose underpinning the study was to establish the prospect of developing a supplementary Internet-based information exchange system for the Natal Midlands Rural Development Network (MIDNET) and to propose a model of operation for the anticipated system. The study intended to propose, based on findings, steps and strategies that need to be taken on how best to integrate an Internet-based information exchange system into the requirements and capacity of MIDNET members.

To accomplish the objectives of the study, both primary and secondary sources of data were used. Literature on cooperation and networking and application of the Internet for information exchange networking were reviewed, analyzed and conceptualized to establish feasibility dimensions for an Internet-based information exchange system in a network environment and to plan a model of operation for the system. Original research was carried out using a self-administered questionnaire to MIDNET members during July through November 2001. Out of the questionnaires distributed to all 32 members, 18 (56.8%) were returned and used. Data collected was related to current information exchange activities; general information needs; availability of information resources in terms of ICTs infrastructure, organization and human resources and funding; and opinions on establishing an Internet-based information exchange system. Supplementary information was also collected through observation of some aspects of the information exchange and dissemination activities of MIDNET members. Document analysis was done mainly to establish the contents of the information products of MIDNET members, MIDNET and interest groups of MIDNET.

Based on general information needs established in the present study, MIDNET members were found to have similar objectives, activities and disciplines of work geared toward similar goals within rural development, the thematic boundary of the network. MIDNET was found to draw in, within its membership, geographical and thematic boundary, like-minded organizations and individuals that have similar information seeking behavior. Members, when motivated by five reasons, were found to exchange information using nine kinds of communication media and mechanisms and 16 categories of information products and activities which reflected 27 information content categories. The information products of members, MIDNET and interest groups of MIDNET were largely in the category of grey literature.

Most members were found to have a good state of ICTs infrastructure in terms of owning computers, computer networks, Internet connectivity and development of Internet-based information exchange and dissemination systems. Most members do not have information support services backed by conventional information units and professionals. Ad hoc arrangements of responsibility for information work were used in most instances. Findings concerning funding information exchange activities were inadequate to

examine the trend in funding. Findings concerning problems and factors that impeded current information exchange activities and solutions suggested by members reflected the need to improve current communication and information delivery interfaces and to establish an Internet-based information system as a supplementary interface. Members indicated an overwhelming desire to participate in and contribute to the anticipated system, although there was a reluctance in terms of system inputs other than information.

Analysis of the study findings in terms of fundamental feasibility dimensions showed that the Internet, if appropriately and effectively used, has the prospect to facilitate communication and information exchange in MIDNET by way of replicating current interfaces. The study proposes a model plan for the establishment of an Internet-based information exchange system that would suit the requirements and capacity of members. The plan is proposed based on findings of the present study and valid reflections from a review of the literature in terms of prerequisites for networking, basic requirements and general principles. Other aspects considered were models of cooperation on the Internet and methodological approaches for the development and impact assessment of an Internet-based information exchange system in the development sector.

ACKNOWLEDGMENTS

I would like to acknowledge the contributions of many people and institutions to the accomplishment of this piece of work. I am deeply grateful to my supervisor Professor Andrew M Kaniki under whose efficient guidance, support and encouragement this study was conducted.

I would also like to express my sincere thanks to the following institutions: my employer the Ethiopian Agricultural Research Organization (EARO) for offering me the scholarship and study leave, the Agricultural Research and Training Project (ARTP) of EARO and Embassy of Ethiopia in Pretoria, South Africa, for administering the scholarship, and the University of Natal, Pietermaritzburg, for admitting me to the Master of Information Studies Program. I also wish to thank the MIDNET coordination office and its members for approving the study proposal and participating in the study. Special thanks go to Farmer Support Group, Project Gateway, Monique Salomon, Steve Worth, Thelma Trench, Tessa Cousins, Professor Richard Fowler, Dr Auerbach Raymond, Margaretha Wielsma and Ute Gilles for their assistance and ideas.

My sincere thanks also go to all academic and administrative staff of Information Studies Program, University of Natal, Pietermaritzburg, for their concern, support and insightful ideas throughout my study and stay in Pietermaritzburg. I would like to thank Richard A Bell for his editorial assistance on the last two chapters of the thesis. I am also indebted to all my colleagues at the Information Services Department of EARO for their encouragement. I also wish to thank the staff of the main library and student LANs (local area computer networks) of the University of Natal, Pietermaritzburg.

Finally, my sincere thanks go to my family and friends in Ethiopia, South Africa and other places whose encouragement kept me on track. I would also like to thank all other people that helped me in this work. Absence of individual mention does not imply that their assistance has been forgotten.

March 2002

Amare Molla Setegn

CONTENTS

Declaration of originality	ii
Dedication	iii
Abstract	iv
Acknowledgment	vi
Contents	vii
List of tables	xii
Figure	xiii
List of abbreviations and acronyms	xiv
CHAPTER ONE: Introduction	1
1.1. Rationale for Internet-based information exchange	1
1.2. Research problem	5
1.3. Purpose of the study	7
1.4. Research objectives	8
1.5. Research questions	8
1.6. Justification of the study	9
1.7. Summary	11
CHAPTER TWO: Review of related literature	12
2.1. Introduction	12
2.2. Library and information resource sharing and cooperation	12
2.2.1. Definition of some concepts	13
2.2.2. Brief historical overview of the concept of cooperation and resource sharing	13
2.2.3. Library network configurations	14
2.2.4. Requirements and general principles for the development of networks	15
2.2.5. Development of agricultural and development information networks	16
2.2.5.1. Development of agricultural information networking in Africa	16
2.2.5.2. The Southern African Agricultural Information Network (SAAINET)	17
2.2.5.3. Establishment of a rural development information network in India	17
2.2.5.4. Development of sharable information resource in agriculture and development information networks	18

2.3. The nature of networks in the development sector	19
2.3.1. Definition of networks	19
2.3.2. The network life cycle and prerequisites for success	21
2.3.2.1. The evolution of networks	21
2.3.2.2. Preconditions for successful networking	22
2.3.2.3. Defining boundaries for networking	23
2.3.3. Potential advantages and constraints of networks	24
2.3.4. Network configurations	25
2.3.5. Information exchange and provision activities of networks	26
2.3.5.1. Information exchange activities	27
2.3.5.2. Information production and dissemination activities	27
2.3.5.3. Characteristics of publication products	29
2.3.6. Support mechanisms and resources for information exchange and resource sharing in networks	30
2.3.6.1. Information support	30
2.3.6.2. Financial resources	32
2.4. Information and communication technologies (ICTs)	33
2.4.1. Computers, computer networks and the Internet	33
2.4.2. Development of the Internet and related networks	34
2.4.3. Internet facilities and their use	36
2.4.3.1. Electronic mail (E-mail)	36
2.4.3.2. ListServe (Mailing lists or Discussion groups)	36
2.4.3.3. Newsgroups (Bulletin boards)	36
2.4.3.4. Telnet (Remote login)	36
2.4.3.5. File transfer protocol (FTP)	37
2.4.3.6. Archie	37
2.4.3.7. Wide area information server (WAIS)	37
2.4.3.8. Gopher	37
2.4.3.9. World Wide Web (WWW, the Web or W3)	37
2.4.3.10. Intranets and extranets	38
2.4.4. Tools and services for information search on the Internet	39
2.4.4.1. Browsers, search engines and meta search engines	39
2.4.4.2. Virtual libraries	40
2.4.5. Issues and considerations in Internet use	41

2.5. Internet-based information exchange in networks	42
2.5.1. Development of Internet-based information exchange system for networks	45
2.5.1.1. Basic requirements	45
2.5.1.2. Prerequisites and general principles	47
2.5.2. Internet facilities for information exchange activities in networks	48
2.5.3. Trends and models of cooperation on the Web in the development sector	49
2.5.4. Participatory methodology for development and impact assessment of Internet-based information systems	51
2.6. Summary	53
CHAPTER THREE: Research methodology and data collection techniques	55
3.1. Introduction	55
3.2. Research design	55
3.3. Research population	56
3.4. Instrumentation	57
3.4.1. The questionnaire	57
3.4.1. Instrument testing	58
3.5. Data collection procedure	59
3.6. Data analysis and presentation	59
3.7. Summary	60
CHAPTER FOUR: Presentation, interpretation and discussion of research results	61
4.1. Introduction	61
4.2. Distribution of respondents according to membership status and classification of organization or work	62
4.3. General information needs of MIDNET members	64
4.3.1. Objectives of organization or work	64
4.3.2. Activities and disciplines describing programs of organization or work	65
4.3.3. Extent of receiving information	66
4.3.4. Internal and external sources of information	69
4.3.5. Interpretation and discussion	69

4.6.2. Internet-based information exchange for MIDNET	100
4.6.2.1. Favoring participation in Internet-based information exchange	100
4.6.2.2. Contributions to Internet-based information exchange	101
4.6.2.3. Internet facilities recommended and implementation plans	102
4.6.3. Interpretation and discussion	103
4.7. Summary of findings	107

**CHAPTER FIVE: Conclusions and recommendations: establishment of an
Internet-based information exchange system for MIDNET** **109**

5.1. Introduction	109
5.2. Prospect of establishing an Internet-based system for MIDNET	109
5.3. Model plan for establishing an Internet-based system for MIDNET	111
5.3.1. Prerequisites for successful establishment of the anticipated system	112
5.3.2. Basic requirements	113
5.3.3. General principles	113
5.3.3.1. Goals and objectives	114
5.3.3.2. System configuration and responsibilities	114
5.3.3.3. Formal agreement	116
5.3.3.4. Sharable Internet resources	116
5.3.3.5. Written information policy and standards	118
5.3.4. Methodology for system design and impact assessment	119

LITERATURE CITED **120**

APPENDICES **131**

Appendix 1. A questionnaire on establishing an Internet-based information exchange system for the Natal Midlands Rural Development Network (MIDNET)	132
Appendix 2. Letter of introduction from the supervisor	143
Appendix 3. Introductory letter by the researcher	144
Appendix 4. MIDNET evaluation plan	145

LIST OF TABLES

Table 1. Distribution of respondents according to membership status and classification of organization or work	63
Table 2. Organizational or work objectives of MIDNET members according to membership status	65
Table 3. Activities describing programs of MIDNET members	66
Table 4. Disciplines describing programs of MIDNET members	67
Table 5. Some internal and external sources of information used by MIDNET members	68
Table 6. Communication media and mechanisms used by MIDNET members	73
Table 7. Categories of information products and dissemination activities used within different sources of information in the MIDNET community	74
Table 8. Categories of information products and dissemination activities used within different sources of information in MIDNET	75
Table 9. Information categories of information products and activities used for information exchange and dissemination	76
Table 10. Languages of communication and information dissemination and predominantly used language among MIDNET members	77
Table 11. Types of information produced with restricted access and nature of restriction	78
Table 12. Extent of satisfaction of MIDNET members with current communication media and mechanisms and information products and activities	79
Table 13. Problems faced by MIDNET members with communication media and mechanisms and information products and activities	80
Table 14. Suggested solutions to problems with communication media and mechanisms	80
Table 15. Arrangements of responsibility for the production and dissemination of information in the absence of information unit(s) in MIDNET members, MIDNET and interest groups of MIDNET	85
Table 16. Sources of funding of MIDNET members for information exchange activities	86
Table 17. Annual budgets of MIDNET members for information exchange and dissemination activities for the fiscal years of 1999 to 2001	87
Table 18. Availability of computers, computer networks and connectivity to the Internet	88

Table 19. Nature of Internet connectivity of MIDNET members	89
Table 20. Categories of staff of MIDNET members that have access to the Internet .	90
Table 21. Internet access environments for staff of MIDNET member organizations and individual members	91
Table 22. Development of an Internet-based information exchange and dissemination system among MIDNET members	92
Table 23. Internet facilities used by MIDNET members to develop Internet-based information exchange and dissemination system	92
Table 24. Adequacy of information exchange activities according to membership status	97
Table 25. Factors hindering information exchange in MIDNET	97
Table 26. Suggested solutions to overcome problems	98
Table 27. Factors that enhanced information exchange in MIDNET	99
Table 28. Extent of MIDNET members' favor to participate in Internet-based information exchange system	100
Table 29. Contributions of MIDNET members to Internet-based information exchange according to membership status and classification of organization or work	101
Table 30. Internet facilities recommended for MIDNET	102
Table 31. Suggested plans for implementation of Internet facilities recommended for MIDNET	103

FIGURE

Figure 1. Geographical distribution of MIDNET members in 16 locations in the KwaZulu-Natal Midlands region	56
---	----

LIST OF ABBREVIATIONS AND ACRONYMS

ACT	African Conservation Tillage
AISI	African Information System Infrastructure
ARPA	American Advanced Research Project Agency
ARPAnet	ARPA network
ASP	Active Server Pages (a Web authoring tool)
BLDS	British Library for Development Information
CBO	Community based organization
CGIAR	Consultative Group for International Agricultural Research
CIDA	Canadian International Development Agency
CSIR	Council for Scientific and Industrial Research (South Africa)
COORDINET	Cooperative Rural Development Information Network (India)
DESUNSA	Development Support Network for Southern Africa
Devline	Development Information Online
E-commerce	Electronic commerce
E-conference	Electronic conference
ELCI	Environmet Liaison Center International (Nairobi-based)
ELDIS	Electronic Development and Environment Information System (portal information sources on development and the environment)
E-mail	Electronic mail
EUFORIC	Europe's Forum on International Cooperation (portal Internet site on development information)
FTP	File transfer protocol
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IAALD	International Association of Agricultural Information Specialists
IARCs	International Agricultural Research Centers
ICTs	Information and communication technologies
IDRC	International Development Research Center (Canada)
IFAD	International Fund for Agricultural Development

INFORD	Information Provision for Rural Development (an IDRC-funded research project in Malawi, Botswana, and Tanzania)
IP	Internet protocol
ISDLC	Information systems development life cycle
ISOC	Internet Society
ISP	Internet Service Provider
ISRG	Internet Studies Research Group (City University, London)
IVDN	Integrated Voice and Data Network
LAN	Local area network
MIDNET	Natal Midlands Rural Development Network (KwaZulu-Natal, South Africa)
NARS	National Agricultural Research Systems
NGO	Non-governmental organization
OCLC	Online Computer Library Center
ODI	Overseas Development Institute
OSI	Open Systems Interconnection
PAPWEC	People Approach to Produce Web Content
PCs	Personal computers
PDA	Personal Digital Assistants
SAAINET	Southern African Agricultural Information Network
SABINET	Southern African Bibliographic Network (South Africa)
SAEP	Southern Africa Environment Project
SANGOCO	South African National NGO Coalition
SANGONeT	Southern African Non-Government Organizations Network
SBIG	Subject-Based Information Gateway
SCECSAL	Standing Committee of Eastern, Central and Southern African Librarians
SOSIG	Social Science Information Gateway
SPSS	Statistical Package for Social Sciences
TCP/IP	Transmission Control Protocol/Internet Protocol
UKOLN	UK Office for Library Networking
UNDP	United Nations Development Programme

UNFAO	United Nations Food and Agriculture Organization
URL	Uniform Resource Locator
USAID	United States Agency for International Development
VITA	Volunteers in Technical Assistance
WAIS	Wide Area Information Server
WAN	Wide Area Network
WAP	Wireless Applications Protocol
W3	World Wide Web
W3C	World Wide Web Consortium
WML	Wireless Markup Language
WWW	World Wide Web

Introduction

"If ... development is, above all, 'the learning needed by individuals, communities, and nation states to prepare themselves to live in the future', and if development experience shows that the systems in place for development are not able to achieve the communication needed for that learning, then those systems are themselves part of the problem of development."

Woods (1993, 30)

1.1. Rationale for Internet-based Information Exchange

The main objective of development, particularly in developing countries like those of Africa, is or should be to make a difference to livelihoods among poor people in a sustainable manner. The poor, to a large extent, reside in the rural sector which is characterized by, inter alia, low living conditions, illiteracy, poor health, low agricultural productivity, and poor basic infrastructure such as communication facilities and social services. The low development of the rural sector is compounded by such factors as growing birth and death rates, unemployment, water shortage, and natural resources degradation. Woods (1993, 1) chronicled that, over the past five decades, governments, donor agencies, and local development organizations and experts have been concerned about rural development, with countries evolving as independent states and pursuing nation building strategies and development objectives.

Earlier approaches to development, however, pursued the physical, technical and economic priorities of the sector, neglecting its human and institutional dimension which is critical to develop the capacity of people (Woods 1993, 5). The author further argued that learning is the central objective for developing people and institutions for their self-sustaining development, and that information and communication (and, hence, information and communication systems) play important roles for achieving learning (Woods 1993, 11). Related to this, Kaniki (1999a, 3), Boon (1992, 65) and other literature indicated the concern in the African information profession that information is critical to facilitate development in the rural sector. Rosenberg (2001, 11) analogically described the concept information as a vital national resource as follows:

A healthy and prosperous community cannot survive without an adequate supply of clean water, so; too, no modern economy and no modern society can function without a reliable flow of quality information.

As noted in its simplistic form, development is a complex sector embracing several ingredients that require special expertise, approaches and methodologies. Development organizations and experts participate in one or more activities such as education and training, research and advocacy. As some studies showed, however, the general objectives of these organizations remain the same — to achieve sustained improvements in livelihoods of poor people and their capacity to influence the forces which

shape these livelihoods (Edwards 1999, 364). The existence of common goals or problems and common client communities, as Nelson and Farrington (1994, 17) argued, is the main justification for organizations and individuals to develop networks and, among other things, exchange information which is the domain of the present study. Theunis (cited in Meyer 1997, 1132) characterized a network as more than just an institution, constituting “a space for organizing a permanent flow of ideas and resources among the participating organizations, facilitating information sharing and transforming them into a part of a larger entity”. In South Africa, Abugre (1994, 134) noted that development organizations, which were isolated from the global effort for development and denied access to information, have been intensely employing internal networking within and across sectoral or regional interests. The Natal Midlands Rural Development Network (MIDNET), which is the subject of the present study, presents an example.

Networks in the development sector facilitate information exchange and shared learning among their members using several communication media and information products and activities. Nelson and Farrington (1994, 30) discussed the more conventional forms such as face-to-face interaction, meetings and print media. Information and communication technologies (ICTs) have also been hailed in the literature as providing a new paradigm for networking and information exchange in the development sector (to mention but some, Castells 2000, 4; Woods 1994, 132; Chisenga 1997, 19; Sayed 1998, 54). The emergence of modern ICTs is increasingly changing the way people and institutions exchange information. The Internet technology is being used by development organizations and networks as a tool to enhance information exchange and dissemination. The technology can be used, among other things, for Web publishing, distance education, public relations, posting announcements, question-and-answer services, mediating group discussion fora, news services, electronic mail (e-mail), organizing meetings, holding virtual conferences and to provide access to databases. The main advantages of the Internet in a network environment can be to reach the broader community of members and their clients, multimedia presentations, to facilitate communications (mail exchange and discussions), to distribute publications and other information products faster than possible by normal or ‘snail’ mail, to provide a friendly gateway facility to relevant Internet resources for members, and to reduce printing and distribution costs.

Owing to such strategic advantages, the application of ICTs for enhancing socioeconomic change is argued as extremely vital. Castells (2000, 4) argued that information and knowledge have always been essential factors in power and production and that new information and communication technologies are crucial to empower organizations and people and thereby enhance their productivity. However, in order for ICTs to make a meaningful contribution towards information exchange and dissemination, particularly among development organizations and institutions in developing countries, relevant ICTs infrastructure, human and other resources like funds must be in place (Kaniki 1999a, 14). Menou (1993, 90), outlining the basic assumptions about the nature of information, indicated that an effective and efficient information environment requires an investment in human, physical, financial, and technological infrastructure. Information resources, the author noted, do not stand alone, out of context with other resources.

MIDNET, which was established in 1991, is a regional advocacy network of development organizations and practitioners in KwaZulu-Natal. As a network, MIDNET can best be described as an information exchange forum whereby network members can interact, share experiences, and promote rural development. In most African countries where agriculture and the rural development sector is predominant, organizations and institutions engaged in research and development activities either based on government, non-government, parastatal, community-based or other initiatives employ networking as a strategic way of cooperation and shared learning for facilitating integrated socioeconomic development in the sector. Based on the experience of the investigator as an information officer in the agricultural research system in Ethiopia, there are several agricultural networks and professional associations that draw in geographically and institutionally dispersed individuals and provide the opportunity for carrying out joint activities and sharing ideas, information and knowledge.

The form of such networks may be formal or informal. In the more formal agricultural and rural development networks such as MIDNET, information exchange is often regularly conducted through conventional communication mechanisms such as field visits, exchange of publications among network members and externally, network publications such as circulars and newsletters, and workshops. These channels of communication are not always easy, effective and efficient in terms of such factors as timeliness, cost and ease of communication and information dissemination. The main reason is that most of the organizations and individuals participating in rural development networks are far from each other, often located in isolated rural areas. It has also been argued that to facilitate information exchange and dissemination in the rural development sector, as many information delivery systems as possible and appropriate are required.

Woods (1993, 24) noted that each information delivery system has advantages over others for certain purposes and in specific situations. The author concluded the best use of all appropriate and available communication media. Nelson and Farrington (1994, 35) argued that one precondition for successful networking is that the network should ensure that opportunities for information exchange among members are maximized. The production and dissemination of scientific and technical information, in such development subjects as agriculture and sustainable development to potential target groups outside the network, although critical, is also not always easy, cheap and quick through conventional interfaces.

However, the potential of Internet applications, especially the World Wide Web, to replicate such forms of information exchange and communicate resources to a broader audience, particularly within developing countries, has not been fully explored. Levin (1995, 18) noted that for the development process in South Africa to include civil society in a meaningful way, broad dissemination of information is necessary. The author viewed the Internet, and especially its Web facility, as a vital opportunity to offer alternative access to development information that is in the public domain. Among the vital advantages of the new information technology is networking in an interactive mode — “In the information age, the critical organizational form is networking [i.e.] a set of interconnected nodes” (Castells 2000, 5).

MIDNET, as indicated above, is a regional network of organizations and individuals involved in rural development in the KwaZulu-Natal Midlands. MIDNET's geographic area of focus covers KwaZulu-Natal Regional Councils 3, 4, and 5 as of February 1997. While the MIDNET office and some members are located in Pietermaritzburg, other network members are located at several areas in the region. Currently the network has embraced 22 organizational members and 10 individual members. The MIDNET members, who have diverse fields of expertise and experience in the development sector, aim to attain their individual and collective development objectives through MIDNET. Neussl and Trench (1999, 1) explained the ethos of the network as follows:

MIDNET members share the common belief that many of these ends [members' individual and collective development objectives] can best be met through active participation in networking by shared projects, joint advocacy and shared learning.

The constitution of MIDNET (2000, 1) stated that the network shall promote and support rural development and the empowerment of rural communities in the region by operating based on the aims and objectives that the network members set. These aims and objectives are:

1. Sharing information, experience and skills relating to rural development
2. Identifying common needs of member organizations and the communities they serve and facilitating the meeting of these needs ([for instance] in training and adult education)
3. Facilitating discussion and debate on issues of regional and national concern with regard to rural development and contributing to policy formulation in this regard
4. Striving to avoid wasteful overlap between, duplication of services by and to avoid inappropriate rural development by development organizations
5. Facilitating interaction between client communities and their discussion of current issues and strategies affecting them
6. Facilitating links to other regional networks and national forums so as to promote the aims and objectives of the network

The members of MIDNET are required by the network constitution to have a responsibility to contribute to, and participate in, network activities, thereby having the opportunity to benefit from membership of the network. Organizational membership is open only for NGOs and community based organizations (CBOs), while individual membership is allowed only for those individuals who are not part of an organization that is a MIDNET member. More specifically, membership to MIDNET is open to such organizations and individuals who also:

- are active in rural development
- subscribe to the aims and objectives of the network
- demonstrate a commitment to community empowerment and the principle of building community organizations which control their own development
- demonstrate a commitment to working cooperatively with all network members

- are committed to non-racist, non-sexist, democratic principles
- are properly constituted [this criterion applies to organizational membership only]

The above discussion showed, in a simplistic form, the widely noted views that the rural sector is a priority strategy for socioeconomic development in developing countries like those of Africa, information as one of the primary resources for development, networking as a strategic approach for working towards common development objectives and shared learning, and ICTs as technological opportunities for information exchange networking for development. Based on these views, it is deemed necessary to establish the prospect of an Internet-based information exchange system for MIDNET. Developing the anticipated system as a supplementary interface to current systems will facilitate information exchange and shared learning among MIDNET members, and it will ultimately enhance their development goals.

1.2. Research Problem

MIDNET has been promoting, through the active participation of its members, the concept and practice of cooperation for information exchange and resource sharing such as the expertise of partners. An article in *AFRA News* (AFRA 2000,15), which presented different views of how members experienced the network, is evidence of the value of networking. The various benefits and impacts of participation in networking and its ultimate goal can be clearly understood from the satisfaction expressed just by some of the members of MIDNET:

... I see operating a kind of local economic trading system in which we barter experience, skill, and insight rather than currency ... I also like MIDNET, the way we have always worked with and shared with non-members.

The value of MIDNET is as a network of individuals, not organizations, participating in development with varied fields of expertise, who are prepared to share with one another for a greater good — not just their own or their organization's.

MIDNET [is] ... a place to share and work on ideas and issues relevant to members working in rural development. MIDNET is much like a cooperative, and is effectively what its membership is willing and able to do.

MIDNET members can ensure that the network is a viable place of information exchange and shared learning when they are committed to improved information systems, within their capacity and capability. Like most local development networks operating in developing countries, MIDNET communities exchange information largely using traditional communication media such as face-to-face personal communication, field visits, workshops, interest group or general network meetings, and print-based publications. While there are several staff members of the organizations that are MIDNET members, geographical, time and financial constraints do not allow to organize such fora for the larger membership community and as frequently as desired. Only individuals that represent the organizations actively participate in the information exchange activities of the network, and information is diffused to the larger community of organizations through these representatives, air mail, fax, or publications. The inability

of the network to involve the larger staff of MIDNET member organizations makes them largely passive in the information exchange process of the network which rules out the interactive element of networking.

The dissemination of information through individuals is likely to be incomplete and sometimes inaccurate, while print-based publications are costly and time-consuming to produce/reproduce, distribute, and upgrade. For instance, MIDNET used to run a weekly newsletter; but this was changed to a bimonthly publication because the scope of the newsletter was widened which would make it difficult to produce and distribute the publication regularly and timely (Neussl and Trench 1999, 2). Conferences and field visits or other forms of meetings also have their own problems. Because of their tight schedules, geographical, financial and other limiting factors, individual members or those who represent their organizations may be unable to always participate in information exchange activities that require the participants to be physically present at the venues where the activities take place.

The development information emanating from the programs of the MIDNET community is within the public domain, i.e., the public is entitled to access to the information. As an advocacy network, MIDNET also aims to influence policy related to rural development at local, regional and national levels. As such, based on what the constitution of MIDNET (2000) stipulates, the network attempts to involve non-member organizations and individuals in its information exchange activities, establish partnership with other networks and to allow members to share ideas with and disseminate information to a larger community. But this is often a difficult task because the traditional communication channels and information dissemination mechanisms limit the network to reach a broader audience as desired. The MIDNET office often receives several requests for information about MIDNET and its members (Wielsma 2001). The requests range from technical development information related to the programs of the network community to factual information such as contact addresses of members, who does what and project profiles. Inadequate popularization of the network, its members and their activities may result in the lack of knowledge about the network and its programs and thus in a negative impact on fostering cooperative programs with other development networks, potential client communities and organizations and in expanding the network membership as well.

Poor communication may make the network liable to many undesirable consequences: duplication of efforts, inefficient coordination and control of joint projects, lack of control over inappropriate development programs, poor interaction and then poor learning from one another, inadequate outreach and low growth of network membership. The network recognizes the existing inadequate communication among MIDNET members, the limitations in the provision of network information to a broader audience, and the negative impacts of poor information exchange and dissemination to attain the aims and goals of the network (Salomon 2001). Salomon, the chairperson of MIDNET for the period September 2000 to April 2001, was of the opinion that Web-based information system can help greatly to supplement existing channels by way of replicating them with an online package and communication. The MIDNET Executive Committee, in its meeting held on 9 April 2001 at the office of one of the member organizations (Farmers Support Group, University of Natal, Pietermaritzburg) discussed the future vision for the network with an extensive coverage of the need to expand information exchange and

dissemination activities using technological opportunities, particularly the World Wide Web and e-mail. The currently inadequate information services to members was also discussed, with a lack of a database of development practitioners in KwaZulu-Natal cited as an instance for taking action.

The vision for expansion in information exchange and dissemination, presented by the outgoing Executive Committee to the annual general meeting of MIDNET held on 11 April 2001 at Rainman Land Care Foundation, Peacevale, was unanimously accepted. The annual general meeting then decided that further investigations be made for planning and implementation under the supervision of the newly elected Executive Committee (MIDNET 2001). The purpose of this study is, therefore, to assess the potential of establishing the anticipated Internet-based information exchange and provision system for MIDNET and propose a model of operation. The draft proposal of the thesis research, presented to the abovementioned meetings, was also unanimously accepted, and cooperation for the researcher was granted.

1.3. Purpose of the Study

As indicated above, there is an expressed realization in MIDNET that the current information exchange mechanisms are not adequate to facilitate communication and learning among members. The Internet has been perceived as a technological opportunity that can be used to establish a supplementary information exchange system for the network. The establishment of an Internet-based information exchange and provision system, however, requires several resources such as technological infrastructure, information and other resources to be shared, organization and human resources for information production and management, and funding.

As noted, the study intended to investigate the potential of establishing an Internet-based information exchange and provision system for MIDNET and propose a model of operation. The literature on the classical library and information services cooperation and resource sharing networks (Sison 1990, 193; Wesley 1993, 104; Haravu 1994, 255; Raju 1996, 263; Chisenga 2001, 3) and on the nature of networks in the development sector (Nelson and Farrington 1994, 19; Valk et al. 1999, 26) suggest several principles and factors that need to be considered for the planning and successful development of an information system in a network environment. Consideration of such principles and factors is also valid for establishing the prospect and successful development of Internet-based information exchange and resource sharing system and integrating it into the realities of an existing network. MIDNET is an existing network with an established tradition of cooperation and information exchange activities among its members. To replicate existing information exchange activities with supplementary Internet-based system, the current activities need to be identified. The capacity of the network members to support the anticipated electronic information exchange system and their attitude towards it should also be known.

Ballantyne and Addison (2000, 19), based on analysis of the experiences of organizations and networks, reported current trends and different kinds of models of cooperation for the successful development of Web-based information exchange and dissemination in the development sector. Studies on African

Internet sites, however, indicated lack of locally generated content (Adam 1999, 127; Jensen 2000, 4; Yavo 2000, 17; ISRG 2001, 2; Chisenga 1999, 2). According to the authors, Internet site development in Africa is still insignificant mainly because of the inadequate ICTs infrastructure, regulations and the skills in Web authoring or systems operations. South Africa, the most industrialized nation on the continent, was described in the African Internet literature as being in a better position in ICTs application and Web content development (Jensen 2000, 4; Jensen 2001, 11; Adam 1999, 127; Mutala 2001, 21; Yavo 1999, 17). The Internet Studies Research Group (ISRG) of City University, London, argued about the importance of a standard methodology for the development of an Internet-based information system that can impact on the development sector particularly in developing countries like those of Africa. To that end, ISRG developed a participatory Web design methodology called a People Approach to Produce Web Content (PAPWEC) that can be applied in the design and production of Web-based information resources that may be used to achieve development goals (ISRG 2001a, 1; 2001b, 1; 2001c, 1).

The study aimed to investigate the status of MIDNET members in terms of the information resources to be shared and the information resources available in the MIDNET membership. It was anticipated that the results of the study would enable the investigator to establish the prospect of developing an Internet-based information exchange and provision system for MIDNET and plan the steps and strategies that might be taken to successfully integrate the Internet into the requirements and capacity of the network members. This in turn would help the investigator to understand the main issues and requirements that need to be considered in the planning and implementation of the system.

1.4. Research Objectives

The objectives of the proposed research project were:

1. To identify the current information exchange activities and mechanisms used by the members of MIDNET
2. To establish the general information needs of MIDNET members
3. To identify and examine the available information resources in terms of ICTs infrastructure, funding, organization and human resources within the network community
4. To establish the current capacity of MIDNET members to support the anticipated Internet-based information exchange system
5. Based on the findings, to propose a model of operation for the establishment of an Internet-based information exchange system for MIDNET

1.5. Research Questions

Based on the objectives stated above, the following research questions were posed:

1. What are the current information exchange activities and mechanisms used by the members of MIDNET?

2. What are the general information needs of MIDNET members?
3. What information resources are available within the network community in terms of:
 - (a) organization and human resources
 - (b) funding
 - (c) ICTs infrastructure?
4. What is the current capacity of MIDNET members to support the anticipated Internet-based information exchange system
5. What model of operation can be used to establish an Internet-based information exchange system for MIDNET?

1.6. Justification of the Study

Information exchange is one of the main reasons for the often dispersed and hard-pressed community of development organizations and practitioners to network. This is evident in the aims and objectives of MIDNET which are stated as follows:

1. Sharing information, experience and skills relating to rural development
2. Identifying common needs of member organizations and the communities they serve and facilitating the meeting of these needs ([for instance] in training and adult education)
3. Facilitating discussion and debate on issues of regional and national concern with regard to rural development and contributing to policy formulation in this regard
4. Striving to avoid wasteful overlap between, duplication of services by and to avoid inappropriate rural development by development organizations
5. Facilitating interaction between client communities and their discussion of current issues and strategies affecting them
6. Facilitating links to other regional networks and national forums so as to promote the aims and objectives of the network (MIDNET 2000, 1)

Various communication media and information delivery systems have been used in research and development networks. These have included both formal and informal systems such as face-to-face interaction. With the advance of modern technology, electronic networking is being extensively used as a most effective medium for researchers and development workers that are at the cutting-edge of rural development. Development networks, apart from the exchange of information among network members, generate invaluable rural development information (such as agriculture and social welfare) for dissemination to other groups like agricultural extension offices, the rural community, community information centers, libraries, policy makers, advisors, educational and research institutions. The provision of information to such groups is in fact the primary objective of several organizations that participate in rural development networks. The information packages that these organizations produce are often characterized as non-conventional grey literature and ephemera reflecting such contents as activity reports, policy and issues of concern to natural resources management and sustainable development, and 'how-to' farming manuals.

Network communities have a lot to offer and consume in terms of information. Haravu (1994, 256), in his discussion of the information resources in library and information networks in agriculture and the development sector in developing countries, valued collections of locally generated information as most important mainly because they contain location specific information. Sturges and Neill (1998, 170), based on a review of the literature on special library and information services to agricultural research and development sector in Africa, which is or should be a priority development strategy for the continent, argued that grey literature is the most important information source that tended to be elusive in the area of repackaging and database development. In this regard, electronic networking has the potential to increase the information exchange activities of networks by providing access to such literature in the form of databases or in full text. It also has enormous potential to provide quicker and wider access to such research and development grey literature that can be used by various users for various reasons.

Research and development is a strategic sector where the Internet can be more usefully applied for enhancing social change. Evidence of this can be the model of the Southern African Non-governmental Organizations Network (SANGONeT) which is “aimed at the development community, particularly by empowering NGOs [non-governmental organizations] to set up their own Web sites and to use the Internet to disseminate their information both locally and globally” (Levin 1995, 18). The South African National NGO Coalition (SANGOCO) is another example that makes best use of the Internet to attain its mission: “to promote civil society by uniting and strengthening the NGO sector to enable it to influence development policy and advocate for programs that meet the needs of the poor in the best possible way, at the least possible cost” (SANGOCO 2001, 2). Other instances that aim to facilitate information exchange among individuals and organizations in the development sector through the electronic interface include the Development Support Network for Southern Africa (DESUNSA 2000, 1), the Southern Africa Environment Project (SAEP 2001, 1) and the African Conservation Tillage Network (ACT 2001, 1).

There is a recognition that information is a key resource for development and that ICTs have immense potential in facilitating information exchange and dissemination especially, in a situation in which distance is a barrier. A review of the literature on Internet development in Africa (to mention but a few, Jensen 2000; Kaniki 1999a; Adam 1999a, 1999b; Yavo 1999) revealed the prospects and/or encouraging trends in Internet application despite the prevalence of problems in terms of such issues as access to ICTs (and in effect access to information and knowledge), provision of locally generated information and skills and experience in electronic information management. The literature on library and information networks (Wesley 1993, 104; Haravu 1994, 255; Raju 1996, 263; Chisenga 2001, 3) and information exchange networks (Nelson and Farrington 1994, 19) discussed several basic prerequisites and principles that need to be considered in developing such networks. These basic requirements and general principles may be valid considerations for establishing an Internet-based information exchange for rural development networks. The ISRG (2001a, 1; 2001b, 1; 2001d, 1) discussed the application of a standard participatory methodology for the development, evaluation and impact assessment of Internet-based information systems intended to meaningfully contribute to development goals in Africa. In view of the above mentioned and other literature on prospects of ICTs for facilitating information exchange, the current

trends and methodological approaches in their application, and considerations necessary for information network development, it is relevant and justified to establish the prospect of developing an Internet-based information exchange system for MIDNET and propose a model of operation for the anticipated system.

The study is or could also be important to other African countries such as Ethiopia where agriculture and rural development is a priority sector in national development strategies. Research and development organizations located in isolated rural areas of African countries often face similar problems and work in similar agroecological environments. To enhance their mission and objectives, these organizations establish networks and professional associations at local, regional and continental levels to work in collaboration with others that have common interest areas such as animal traction, integrated pest management, participatory rural appraisal, agroforestry or other thematic approaches. The study could therefore provide some feasible and potential propositions upon which a discussion of effective steps and strategies on how the Internet can be best integrated into agricultural and rural development information exchange networks in particular and that of information networking in the sector in general could be initiated and based. In light of this, the study could meaningfully contribute to the literature on sectoral (i.e., agricultural and rural development) information networks.

1.7. Summary

Development networks like MIDNET draw in geographically and institutionally dispersed individuals and provide them with an organization, among other things, for shared learning, joint projects and joint advocacy. Information exchange and dissemination in networks, particularly those of developing countries, is often conducted using traditional interfaces. New trends, however, show that ICTs provide a new paradigm for networking and information exchange in the development sector. MIDNET members have also perceived the Internet as a technological opportunity to overcome inadequacies faced with current traditional interfaces and the undesirable consequences of poor communication on members' networking objectives. It is also noted that the use of as many information exchange systems as possible promotes intense use of information.

However, in order for Internet technologies to make a meaningful contribution as information exchange and delivery platforms, relevant resources must be in place. The literature on library and information networks and information exchange networks also noted basic prerequisites, requirements and general principles that need to be considered in developing such networks. In view of the above notions, the study sought to establish the prospect of an Internet-based information exchange system for MIDNET and plan the steps and strategies that need to be taken to successfully integrate the Internet into the requirements and capacity of MIDNET members.

Review of Related Literature

... I see operating a kind of local economic trading system in which we barter experience, skills, and insight rather than currency...

View of a MIDNET member on network experience (AFRA 2000, 15)

2.1. Introduction

In his discussion of information networks, Chisenga (2001, 2) argued that networking can generally take place at either formal or informal levels of interaction among individuals and/or organizations. This can be valid for any other type of networking as well. Formal networks draw in members that qualify preset membership criteria and provide an organization for these members to act together for a common goal based on set objectives and strategies. Based on the nature of their objectives, membership and other factors, there are different forms of networking. To mention but some, there are professional associations, library and information networks, and research networks. Rural development networks, the subject of the present research, are yet another type of consortia that are formed, among other things, to facilitate the exchange of information, ideas and knowledge on subjects of common interest and thereby ultimately attain organizational and individual ends to ultimately benefit their client rural communities.

Formalized cooperation and information resource sharing can be traced to the classical library and information networks. Before exploring the literature on the nature of development networks and Internet-based information exchange and resource sharing in such networks, Section 2.2 is dedicated to a review of works on library and information cooperation and resource sharing. Library and information networks have an established tradition and rich literature that provide an understanding of the rationale, general principles, requirements and related aspects that need to be considered in the development of new networks. These basic considerations are also valid in establishing and effectively integrating a new information exchange and resources sharing system in an existing network with some kind of information system already in place. The literature on the nature of networks is then explored in section 2.3, ICTs in Section 2.4 and Internet-based information exchange in Section 2.5.

2.2. Library and Information Resource Sharing and Cooperation

This section briefly explores the historical perspective, rationale and the general principles that have traditionally been developed for the establishment of library and information networks. That is thought to provide a useful background to the discussion of the nature of networks in the development sector and their information exchange activities in Section 2.3.

2.2.1. Definition of some concepts

Some key concepts in the context of information and library cooperation and networking are defined as follows:

Network

- (1) two or more organizations engaged in a common pattern of information exchange through telecommunications links
- (2) a series of points or nodes connected by communication channels
- (3) a cooperative organization formed to provide services to members, generally including computer services and telecommunications (Marcusson and Woolls 1980, 413).

A library network, according to Musana (1993, 142) "... provides an enabling and conducive environment in which the information professionals ... can exchange ideas and share resources.... [It] provides the organizational structure which facilitates information resources sharing."

Information network

An organized grouping of information centers and services for the purpose of transferring or promoting the transfer of information, not necessarily making use of informatics, although many information management and dissemination functions can benefit greatly from the use of appropriate information technologies (Wesley 1993a, 105).

Cooperation

[It is] a means of pooling and sharing resources ... the notion of working together to achieve some common end (Muya 1993, 23). There are two forms of cooperation: (1) formal cooperation which implies contractual agreements, participation in a structured program with definite commitment, and (2) informal cooperation which involves activities established on an occasional, unstructured basis (Wesley 1993b, 99).

Resource sharing

... a partnership in which each member has something useful to contribute to others and which each is willing and able to make available when needed (Kent cited in Wesley 1993b, 99).

2.2.2. Brief historical overview of the concept of cooperation and resource sharing

The concept and practice of cooperation and information resource sharing and networking has a long tradition. Over the course of its development, there has evolved established rationale, general principles and guidelines and guidelines for planning and implementation. The rich literature on library and information networks, especially in the developed countries, and the existence of old library networks such as OCLC (Online Computer Library Center, based in the United States) and SABINET *Online* (Southern African Bibliographic Network, based in South Africa) that survived the test of time can be

evidence of that tradition. According to the article by Stevens (1980, 33) on the history of the concept of library networks, the formation and actual development of networks dates back to the mid-1960s in the United States. However, as the author stated, the recognition that no library, not even the largest research library, can be entirely self-sufficient in terms of its collections and the expressed need to join together to share resources goes back to the 1900s.

Over the past four decades the concept of information resource sharing and networking has spread from the United States to other parts of the world. The result has been the actual development of different types of consortia at international, regional, national and local levels. Networks have been developed by drawing in participating members based on geographical boundary, types of function (interlibrary loan, cataloging, acquisition, etc.), specialization (such as medical, agricultural, or engineering) or affiliation of libraries and information centers (school, academic, special or public libraries). Different factors have contributed to the emergence and spread of the concept of networking in information and library services in general. The aspects, based on the literature, include the following:

1. The realization of interdependence among information providers for cooperatively building and providing information resources and services, mainly due to the growth of information users in type and size and information explosion
2. The need for more formal cooperation and coordination of efforts
3. The need to avoid duplication of efforts
4. The need for a central database for the benefit of all members of a network and their information users
5. The advent and increasing sophistication of ICTs which became the backbone of network technology for information storage, delivery and communication among participants, namely, the development of automated library and information services networks and the application of local and wide area networks (Stevens 1980, 37)

Despite the long tradition of development of information resource sharing and library networks in the developed world, an extensive review of the literature by Mambo (1998, 97) indicated that little has been done in library cooperation in Africa or in developing countries in general. According to the author, the major problems hindering the development of library cooperation and networking are poor funding, poor telecommunication infrastructures, a low level of technology and lack of trained staff. In South Africa, the South African Bibliographic Information Network (SABINET) *Online*, established in 1983, and later expanded to serving neighboring countries, has for so long been serving as an instrument for library cooperation and resource sharing. It can be seen as a promising example to other countries and regions in Africa.

2.2.3. Library network configurations

The key to any library network services is the network file. The advancement in ICTs since the 1970s and the development of machine readable cataloging (MARC) format has greatly improved the creation

and retrieval of bibliographic files and facilitated the advent of electronic library networks. The mode of creation and access to network files or communication between network members is determined by the configuration chosen for the development of a network. Siddiqui (1995, 213), based on the literature, mentioned three types of basic structures: star, hierarchical and distributed. Mambo (1998, 68) added another type, mesh network. In a star or centralized network, one member holds the resources and other members access them from that central node or host computer. Communication exists only between a member and the host computer, and there is no communication among the members.

In a hierarchical network, a number of host computers are connected to one another and each is connected in turn to several other computers. In this case, members of a network share information through a host computer to which they are directly connected. In a distributed network, members have the opportunity to communicate with each other. In a mesh network, all members have the opportunity to not only communicate to each other but also to the host computer.

2.2.4. Requirements and general principles for the development of networks

Networks need to be successfully developed to be able to meet their function in facilitating cooperation and resource sharing among members. That requires, *inter alia*, consideration of the basic requirements and the general principles underlying networking at the initial planning for the development and operation of networks. According to Wesley (1993a, 106), Atherton (cited in Sison 1990, 188) and Swank (cited in Sison 1990, 188), some of the major requirements that need to be considered for developing networks include the following:

- Organizational structure that shows responsibilities of the network components.
- Formal agreements to ensure commitment and common purpose to assigned operational responsibilities
- Linkages and communications between the components of the network which may take many forms such as mail, newsletter, exchange of publications or person-to-person meetings and visits
- Securing additional financial resources (funding) for network operations
- Agreement on the use of common standards for bibliographic control and computer hardware and software to ensure compatibility and convertibility which would facilitate bibliographic communication
- Assessment of network activities in terms of measurable changes in relation to such aspects as network staff performance, operation costs, introduction of new services or expansion of existing services
- Training programs to provide instructions to users and operators of the system, including policy and instruction

Behind these requirements, there are general principles that need to be considered when planning networks. These are the setting of network goals, planning the membership of a network and identification of areas for sharing of resources (Haravu 1994, 254). The goals of a network should be

clearly stated in terms of maximizing cooperation and resource sharing for better and more service provision (Wesley 1993b, 102). The planning for a network must also begin with a clearly defined and agreed set of specific objectives that can help to ensure the coordination of efforts and sharing of resources to better satisfy the information needs of users. It is also important to decide on the membership of the network and what type of information resources of participants may be shared, how this can be collected, organized and made available. The sharing of resources may be considered in terms of database development, information and document delivery, resource building (i.e., range and quality of sharable resources), and human resource development and sharing of skills (Haravu 1994, 255).

2.2.5. Development of agricultural and development information networks

The development of library and information networks in the agriculture sector basically follows the steps and strategies used in the classical library networking. Haravu (1994, 253), in his study on library networking and resource sharing with a focus on agricultural research, argued that the concept of networks is not new to the national agricultural research systems (NARS) of the developing world. According to the author, many NARS participate in research networks with other NARS and/or international agricultural research centers to promote collaborative research, exchange of germplasm, transfer and sharing of research-based knowledge, skills, and technology. In all such networks, information is exchanged as input to and output of the research, planning, policy formulation, decision making, problem solving, and human resource development processes.

Information units with either one or more library, publication or other forms of information production and dissemination function are often established to support the research networks in the NARS and international agricultural research centers (IARCs). However, despite the existence of a good tradition of information exchange in research and development networks, Haravu (1994, 253) noted that not so much has been done to formally network libraries and information centers in the NARS and IARCs. The potential of a formally coordinated network to provide wide and efficient access to certain types of information needed by researchers, planners, policy makers, extensionists, and academics has not been fully appreciated and exploited. Rural development organizations and networks also undertake information exchange and resource sharing activities to attain their organizational objectives. This is discussed in detail in Section 2.3.

2.2.5.1. Development of agricultural information networking in Africa

In Africa, Shibanda (1995, 24) reported that although agriculture is a major research and development sector, information resource sharing has been a problem. The author argued that the answer to this problem lies in resource integration via information networking and suggested the need for an all-African network.

2.2.5.2. The Southern African Agricultural Information Network (SAAINET)

The Southern African Agricultural Information Network (SAAINET) presents an example of a regional sectoral network for resource sharing. SAAINET, conceived in 1990 with the aim of setting up a common regional bibliographic database among the countries of the Southern African Development Cooperation (SADC), was established in 1992 with the financial assistance of IDRC. The objectives of the network are promoting information sharing, exchange and dissemination of agricultural research information (Chisenga 2001, 8). More specifically, it was established to attain the following purposes:

- Establishing a resource base in bibliographic, factual and planning information
- Providing backstopping and support for national agricultural information units
- Coordinating all the agricultural information activities of the SADC region (Moshoeshoe-Chadzingwa 1998, 307)

The structure of SAAINET is a centralized and hierarchical model with a Steering Committee and national focal points (NFPs). The SADC Southern African Center for Cooperation in Agricultural Research (SACCAR) serves as a regional coordinating node and NFPs from each participating SADC country as SAAINET national units that would coordinate national activities and link up to SACCAR. NARS of the respective countries are designated to serve as NFPs. To achieve a cooperative build-up of the resources to be shared in the region, responsibilities are distributed to the 14 member countries, with one or more subjects of agriculture and natural resources (such as livestock production or food and agriculture) assigned to each member. Moshoeshoe-Chadzingwa (1998, 307), based on review of the literature on the formation and progress of the network and the NFPs (particularly SAAINET Lesotho), argued that network members should rethink about the shape SAAINET should have so as to be more profitable to members in terms of maximizing cooperation and resource sharing.

2.2.5.3. Establishment of a rural development information network in India

The experience of India presents a good example for establishing a formal national or local cooperation and information resource sharing network in the rural development sector. Raju (1996, 263) reported the development of the Cooperative Rural Development Information Network (COORDINET) in India in 1994. COORDINET was established with the participation of ten organizations and twenty-one state institutes of rural development in the country which had the necessary minimum infrastructure, collection and enthusiasm to work in a cooperative setting. In the initial planning of COORDINET, the objectives, structure, membership criteria, information products and other aspects and activities of the network were decided at a workshop in which the members participated.

COORDINET was planned to have a decentralized network structure, with network activities to be led and coordinated by the National Institute of Rural Development (NIRD). NIRD also took the lead in the formation of COORDINET. The objectives of COORDINET were the following:

- To bring together like-minded and similarly focused institutions
- To build a database on rural development information as a collective effort of all members participating in the network
- To regularly share and exchange information between the members and optimize the use of available resources
- To constantly upgrade skills in information handling through collective efforts and appropriate pedagogy
- To conduct regular studies to determine the information needs and the pattern of the usage of information by the clientele of the network
- To facilitate, design and initiate improved information products for dissemination including information consolidation products (Raju 1996, 263)

The objectives of COORDINET clearly indicate the sharable information resources, the collective responsibility in building the resources, and information sharing and exchange among members. Information repackaging and information dissemination, training and research components are also included in the network objectives. To attain these objectives, an action plan that comprised five activities was adopted. These are:

- Preparation of a directory of ongoing research of not only the participating institutions but also others in the field of rural development
- Union list of publications brought out by the members and other organizations since 1980
- Roster of experts in rural development
- Directory of ongoing regular training activities of the members
- List of audio-visual software and other training material available with the members

As the first three activities of COORDINET imply, the databases deemed useful for members relate to different activities. These are information about ongoing research activities, publications and experts in rural development works. It is also important to note that the information to be shared on these aspects is related to not only members but also non-member organizations. Besides databases of information products, information units of research and development organizations and networks often develop other databases that support the main activities of the parent organizations or network members.

2.2.5.4. Development of sharable information resource in agriculture and development information networks

In the classical network, the creation and maintenance of a central bibliographic database constitutes the information to be shared by network participants. In a network of specialized libraries and information centers, the information resources to be shared may relate to several other aspects. In his discussion of library networks and resource sharing in the NARS, Haravu (1994, 256) dealt extensively with cooperative development of a common database so as to maximize the use of different types of resources. In the context of cooperation for information exchange and resource sharing among members of

agricultural research networks, the author identified two main areas for database development. These are bibliographic databases, which include conventional literature and non-conventional literature, especially collections of locally generated information., and non-bibliographic databases. Non-bibliographic databases may include, among other things, directory of current research programs; statistical or time-series data on area under cultivation, yield export, prices, etc.; germplasm/herbarium collections; directories of subject specialists; and directories of specialized laboratory/testing facilities.

The different kinds of databases are developed as long as they are deemed useful for enhancing the research and development objectives of network members. The classical library network aims to provide access to information packages in physical or electronic form. The specialized type of information network evident in the agriculture and development sector, on the other hand, provides access to different kinds of sharable resources such as information, knowledge, people or other objects. Hence, development of an integrated database may be a helpful strategy. The creation and maintenance of databases describing the various resources indicated above is a crucial activity of the network. Each participant of the information network should contribute information on its resources to the central nodal member that is responsible to ensure receipt of all inputs and add them to a database.

2.3. The Nature of Networks in the Development Sector

This section explores the literature on cooperation and networking in the development sector. The nature of such networks is explored in terms of their definition, development, and configurations. Information exchange activities in networks and information support mechanisms are reviewed.

2.3.1. Definition of networks

Networks are present in virtually all sectors of society and there is no person who is not affected in some way by some network. According to Beam (1980, 49), networks can be categorized based on many ways like their purpose or other parameters such as subject matter; but, despite their differences, networks share a goal in common. That goal, Beam (1980, 49) stated, is “to provide their users with information not otherwise readily available to them, and to do this as easily, comprehensively and economically as possible.” Mchombu (1997, 5), in his discussion of the broad concepts underlying networking, viewed it as essentially an information needs driven process. Mchombu (1997, 11) defined the ultimate goal of networking as follows:

Networking, ultimately, is not about networking. It is about strategic thinking, and forming alliances for the provision of information to support human development. That is the goal. There is no other goal.

However, the definitions given by Beam (1980, 49) and Mchombu (1997, 11) tend to focus on information provision *per se*. Information exchange in development networks essentially assumes interaction and thus two-way information flow. Such networks aim at information exchange, shared learning and problem solving by bringing together individual and organization members that have

common objectives and information seeking behavior. Kaniki (1989, 74), in his dissertation on the study of two-way information flow among Zambian agriculturalists, argued that studies in information flow and/or transfer are closely related to and often clustered together with studies of information seeking and needs. The author further indicated that agricultural libraries (intermediaries who act as 'sign posts' in the two-way information flow of information among agriculturalists such as farmers, extensionists and researchers) play an important facilitator role. However, according to Kaniki (1989, 74), information seeking and needs studies of agriculturalists is important to establish the conditions under which such systems and mechanisms can best enhance or help two-way information flow among agriculturalists. This is a valid concept for networks that aim to facilitate two-way information exchange (i.e., among members or between members and the coordinating center) in designing strategies and opportunities to allow members to effectively interact and promote shared learning.

Valk et al. (1999, 26) noted the increasing realization of networking as an important communication strategy that mobilizes, decentralizes, and disseminates information. According to the authors, networking can take place between independent individuals and individuals affiliated to diverse formal and informal organizations. The purpose can be political, personal, or professional, motivated by the desire of participants for information, solidarity, or the need to meet other personal or professional ends. The literature on library and information networks indicated that the aim of such networks is improved service to their clientele based on cooperation to create a common large-scale information resource by sharing the cost and the work. Agricultural and development networks, as evidenced from MIDNET's objectives (MIDNET 2000, 1) and other literature, aim to facilitate information exchange, shared learning, joint projects or other activities. In all types of networks, however, cooperation and resource sharing of any kind is the underlying principle. The potential advantages and constraints of networks in the agriculture and development sector are indicated in Section 2.3.3.

Nelson and Farrington (1994, 3), in their discussion of information exchange networking for agricultural development, argued that although networking embraces various types of activity, there should be agreed upon criteria which distinguish it from other types of interaction among individuals or institutions. For them, a network, for example, is not a mailing list, nor is it the outreach program of an organization. The authors categorized networking organizations into two: those that exist primarily for the purpose of networking, which they termed as 'information exchange networks (IENs)', and those for which networking is a subsidiary activity, which are termed as 'organizations with a networking function' (ONFs). Nelson and Farrington (1994, 3) defined IENs as,

a collaborative process of information exchange, around a central theme, carried out by actively interested parties.

The information exchange, according to the authors, may be conducted in audiovisual or written modes. As the authors admitted, however, there is difficulty in placing networks into either IENs or ONFs. Hence, while the difference between the functions of IENs and ONFs is recognized, the term network or networking is often used to refer to both types of networks in the development sector.

Valk et al. (1999, 26) argued that the definitions of networks and networking are diverse and biased because they come from diverse individuals from different backgrounds in terms of education, discipline, class and nationality. They, for instance, disagreed with the above definition by Nelson and Farrington because it may not give enough emphasis to the advocacy and empowerment function of networks recognized by those in the women's movement. In an effort to bridge such gaps, the authors proposed the following definition of a network:

Any group of individuals or organizations who, on a voluntary basis or for professional reasons, organize themselves to share knowledge and other resources, exchange information or undertake joint activities around specific interest areas so that they empower themselves, individually or collectively, reach their social objectives or meet their professional goals.

This definition, as the authors claimed, appears to be broad enough to embrace all the concepts underlying the generic term networks or networking. It is not restricted either to IENs or ONFs and it covers all the activities and aims of development networks in general.

2.3.2. The network life cycle and prerequisites for success

Networks are established, based on the will of members for a cooperative venture, to perform specific common objectives on a particular subject of common interest such as rural development within the context of a defined geographical area. This section reviews the literature on the evolution of networks, preconditions for successful networking and boundaries for networking.

2.3.2.1. The evolution of networks

In the process of working towards achieving their objectives, networks pass through an evolutionary cycle as they mature, attain their objectives and change their activities or cease to function. Based on review of the literature and analysis of discussions with network coordinators, Nelson and Farrington (1994, 31) identified five stages evident in the life cycle of a network. These are outlined as follows:

1. **Initiation:** the first stage in networking is initiation which results in the formation of a core group. The initiative may be taken by individuals or organizations or it may occur as a result of discussions between a group of organizations and individuals who recognize the common needs and objectives of the group. The initiation commonly occurs during or after a workshop around a theme of common interest to all participants, and the core group may formalize their association in some way; for instance, by defining a common mandate or organizational structure which would later on be refined further as the network membership grows.
2. **Inventory:** At this stage, the core group starts to identify and draw in more like-minded participants who have the potential to contribute to and gain from the activities of the network. This may involve the use of questionnaires and visits to farms or institutions depending on target areas of the core group.

3. Consolidation: At this stage members of the network begin to act together in a meaningful way. Constitutions and regulations are discussed and formulated; information exchange activities such as meetings, workshops and field visits and other forms of cooperation are undertaken. The need for some regular means of communication among network members also begins to emerge.
4. Sustainance of activity: The network at this stage begins to mature, with activities being carried out regularly and the experience in working together already highlighting strengths and weaknesses in the network. Members adapt to the operation of the network and a cycle of shifting responsibilities among them is exercised. A core membership is maintained and new participants are regularly identified and included. A network newsletter is regularly circulated to exchange views and experiences, and this may be used to stimulate a further expansion of the network membership.
5. Evolution and adjustment: Once a regular set of activities is being implemented, formal or informal evaluation of the network is conducted. This may involve self-evaluation or external evaluation not only to establish financial accountability but also to measure the impact of network activities to meet agreed goals, i.e., to get an indication of the interactive qualities of the network and how the network output has been used among members to influence change in the client communities for whom they work. Based on survey of the network membership, review of existing information or other forms of implicit or explicit evaluation methods, strengths and weaknesses are identified and the relevance of the initial objectives are examined. It may be found that the goals of the network have been reached in which case either the more formal activities of the network may be terminated or a shift in priorities may become necessary to move on to new activities and responsibilities to network member organizations. According to the authors, this is a common consideration in cohesive networks which want to avoid a bias towards information dissemination by encouraging member participation.

2.3.2.2. Preconditions for successful networking

Networks can be successfully established and made viable (i.e., their goals and activities effectively consolidated, sustained, expanded and adjusted as appropriate) if some preconditions are in place in the network community. Based on a survey of coordinators of established networks in the agricultural development sector, Nelson and Farrington (1994, 19) identified the factors that the coordinators considered were crucial to successful networking. According to the findings of the authors, the main preconditions for success were the following:

1. Widely shared problem or goal — This was the most commonly indicated factor as a key precondition to network viability. Identification of an issue of common interest, and thus like-minded communities, is very important to initiate and sustain interaction among individuals and organizations working in different institutional and geographical settings.
2. Realistic strategy for working towards solutions — Network activities cannot be done haphazardly if members should benefit from networking. There should be clear objectives and a strategy which offers viable prospects of achieving the set objectives. The network strategy may be based on a well-formulated conceptual framework or it may be more pragmatic, being based on existing advantages and constraints.

3. Capacity to contribute — Members must have the capacity to contribute resources, time or information if the network is to operate effectively. This is a logical necessity even in informal networks leave alone formal ones in which members agreed to work together. Members should be willing to use their individual comparative advantage in some areas to complement those of others. The authors illustrated this with the following example; institutions with the basic communication infrastructure (telephones, computers, faxes, etc.) necessary to bring network participants together may be able to complement the efforts of smaller organizations who may have field personnel with access to a wide range of experience.
4. Development of skills — Clear strategies and concrete network activities should be devised with the aim to consolidate networks and develop the skills of members. This may be done by arranging specific training programs in relevant issues such as rapid rural appraisal (RRA) or participatory methods, the use of new information technologies such as database management and Internet technologies.
5. Balance between structured and flexible management styles — The management style in a network may be highly structured or flexible based on its objectives. For instance, networks that seek to achieve particular objectives by sharing out work among members so that each contributes to the whole or those that seek to make an impact on a particular audience will need highly structured management processes. On the other hand, local, grassroots-based networks will need a loosely structured network management which allows sufficient responsibility for the diverse and rapidly changing perspectives and experiences generated through close interaction with the rural poor to be captured in the network and shared.
6. Motivational stimuli — According to Vincent (cited in Nelson and Farrington 1994, 20), it is important to stimulate and facilitate the active involvement of members through exchanging information resources, communicating regularly and sharing in management. The most appropriate network processes can begin to emerge through the experience of interaction among members, and a strongly motivated membership can identify and overcome threats and problems that are bound to occur.
7. Balanced partnerships — Networks should ensure a low profile and prevent the development of unequal power relationships. A single member or a group of members should not be dominant actors in the overall development of the network that would marginalize the efforts of individual sources of information and experience. Therefore, a balance between the nodes of the network is crucial in order to realize the full potential of both the network and that of the participants.

2.3.2.3. Defining boundaries for networking

Another consideration for successful networking may be the need to define boundaries in several dimensions of networking. These, according to Nelson and Farrington (1994, 61), include the following:

- Objectives must not be so ambitious as to be beyond the reach of the network within a reasonable time frame
- Themes must be defined clearly enough to allow focused discussion, analysis and action

- Geographical and agroecological boundaries need to be defined
- Limits need to be set on the average size of membership, on the balance between different disciplines, practitioners, administration, academics and policy makers, researchers and other potential groups
- Boundaries need to be drawn around the size and scope of various channels of communication (such as newsletters, network papers, workshops and training courses) and a balance found between them

The definition of network boundaries on the above issues may confer some degree of stability. However, the authors argued that such boundaries should not be rigid to stifle the flexibility and innovation necessary to allow new initiatives that can be taken up as sustainable opportunities emerge.

2.3.3. Potential advantages and constraints of networking

Networks are viewed as important social organizations for development. Nelson and Farrington (1994, 17) traced networks as built on the principles incorporated in the informal networks that have long existed in rural societies. Valk et al. (1999, 27), however, argued that networks are derived, in principle, from human interaction in general terms, regardless of the social settings where it takes place, rural or urban. Nelson and Farrington (1994, 17) attributed the proliferation of networking in the development sector to the existence of a wider agreement that networks can result in a number of potential advantages. These can be summarized as follows:

1. Exchange — Networks promote the exchange of ideas and information around a central theme between individuals and groups who would not otherwise regularly communicate with each other. Through publications and other forms of communication, network participants gain increased access to the experiences of others and to alternative perspectives on problems similar to their own, opening up awareness of other experiences and the range of choices available to them. That is, networks promote interaction and exchange among network members, by providing an active forum for debate. This exchange may be horizontal (between similar types of individuals or organizations) or vertical (between farmers, researchers, policy makers and international agencies).
2. Focus — Networks focus the efforts of an often dispersed and hard-pressed community of development workers. Practitioners at the cutting-edge of development can rarely find time to share their experiences with others or to search out experiences relevant to their own work. Networks play an important role in this regard. They can also provide a common direction for establishing collaborative efforts.
3. Management — Networks combine simplicity of operation with structural flexibility in order to foster a rapid response to the needs of their members. They are often able to facilitate participation by their client communities in the design of processes of change, thereby enhancing their likely relevance and increasing the likelihood that any assets created will be owned by the people.
4. Resources use — Networks have the potential to prevent the duplication of efforts in such activities as experimentation, documentation and publication. They are able to match local needs with resources and reduce the risks faced by individuals who are working in difficult environments.

5. Synergy — Networks offer the opportunity to use the synergy of a group to find solutions to common problems; i.e., they are able to act as a catalyst in encouraging new ideas and forms.

Networks are also susceptible to potential constraints. These usually differ on the type of networks. International networks may face two main problems: heterogeneity of context and heterogeneity of membership (Nelson and Farrington 1994, 18). As members are drawn from numerous countries with diverse social, political, economic and agroecological contexts, most members may face difficulties in relating to the experiences reported from individual locations. Heterogeneity of membership refers to the types and levels of actors drawn from the development process, such as project directors, academics, aid administrators, government extension workers, and NGO field staff. It therefore becomes difficult to identify themes, levels of analysis and modes of communication equally accessible to all. Nelson and Farrington (1994, 19) also identified the constraints often faced by national or local networks in developing countries. Some of these are inadequate financial or technical resources for the satisfactory coordination and operation of networks, inadequate coordination with or learning from other networks, and inadequate infrastructure to allow information handling consistent with the network's communication requirements.

2.3.4. Network configurations

The nature of networks may vary widely depending on their objectives, resource capacity and capabilities. According to Nelson and Farrington (1994, 11), some networks work directly with communities to help them respond appropriately to the problems and opportunities they encounter. Others aim at assisting the grassroots organizations that focus more on policy; they assemble information on practical field experiences and repackage this information in suitable ways accessible to policy makers at various levels. Still other networks aim to influence policy through advocacy and support the activities of members in order to exert influence on particular issues.

The objectives of networks have a strong bearing on how the coordinating center and members ('nodes') in a network 'physical' configuration are structured and managed. Thus, there can be various configurations or organizational hierarchy that networks can take, based on the needs for which they are set up, that determine their eventual design (Sison 1990, 188; Nelson and Farrington 1994, 11). The authors noted that the network configuration is an important specification as it affects the communication channels and the flow patterns of information. Atherton (cited in Sison 1990, 188) discussed three possible configurations of information networks : directed, non-directed, and conglomerated. Nelson and Farrington (1994, 11) identified five types of networking models in information exchange networks for agricultural development.

The authors discussed these network configurations as follows:

1. The hub-and-spoke networking model — This model is a centralized network structure. Members contribute strongly to, and expect to gain considerably from, the information exchange activities of

the network. Thus, members show higher dependence on the coordinating center which implies that good coordination and centralized resources are crucial. The model also assumes that members of the network that are located elsewhere are able to efficiently relay useful information to the central node and also access and retrieve information from it.

2. The rim-effect networking model — This configuration reflects a decentralized networking structure whereby there is far less dependence of members on the coordinating center. Strong emphasis is placed on providing individual members with the opportunity to establish their own links with other network members. The model fosters the skills and knowledge of members in a practical way, and sharing is carried out through active collaboration.
3. Clover networking model — This model is a variant of the rim-effect model. Members join working/interest groups on topics that are closely related to their work and interests. These groups focus on particular topics, organize communication fora such as seminars and produce publications.
4. The non-directed or decentralized networking model — In this model, members actively and regularly communicate amongst themselves. Participants know who is doing what, the resources of each member and how to reach them. The model is thought as ideal for networks that seek free exchange of information amongst network partners. The role of the coordinating center diminishes as the network develops, and dense sub-networks are formed.
5. The devolved secretariat networking model — This is a network model that is coordinated through a secretariat with devolved responsibilities. The formation of a secretariat does not lead to a centralization of power and ideas, it rather is intended to allow for flexibility of operation and a more manageable information exchange process.

It is important to note that it is often difficult to say that particular networks are structured strictly in any one of the above models.

2.3.5. Information exchange and provision activities of networks

Based on the objectives formulated and the nature of the network configuration, networks carry out a range of information exchange and production and dissemination activities (Nelson and Farrington 1994, 30). The aim of such activities may be to facilitate learning among network members, run joint projects, transfer new technologies and provide information to location specific client communities of common interest or other potential target audiences. Networks provide for their members an organization and opportunities whereby they can interact with other organizations and individuals with diverse fields of expertise and experience but similar common interest and information seeking behavior for sharing ideas, information, skills, and experience. This may be done by way of oral communication and other formal and informal channels. In this way, networks serve to draw in together like-minded participants and form communities which are traditionally termed as the “invisible college” in the technical and scientific communication literature. Development networks provide different communication fora which otherwise would be difficult for members with different subject and/or discipline backgrounds and that are geographically and institutionally dispersed.

2.3.5.1. Information exchange activities

There may be various ways in which information is exchanged among members in networks. Some of the common ways, according to Nelson and Farrington (1994, 30), include word-of-mouth, working groups, meetings, postal services, electronic telecommunications, and exchange visits. Network members most commonly use the word-of-mouth informal person-to-person communication to quickly share information. Working groups, also called interest groups, focus on specific sub-sectors, within the network's broad mandate, to provide a forum for discussion and joint activities around certain topics such as sustainable development, land use or training. These groups may hold workshops and produce publications. Meetings in such formal forms as workshops and seminars are used in networks to provide opportunities for small group discussions that aim to refine the work of the network.

Workshops are short and interactive meetings held usually from half a day to a week with a focus on particular ideas, themes or problems facing the development sector. Such meetings are especially usefully used to draw in individuals from different technical disciplines together to work on particular ideas with a multi-disciplinary approach. This also helps to bridge the gaps that exist between subjects and/or disciplines in the development sector. Postal services provide another form of communication within networks, particularly when personal contact is rare and telecommunications nonexistent or expensive. These may be used for organizations which, among other things, provide question-and-answer services. Electronic telecommunications include telephones, facsimile transmissions (faxes) and electronic mail. Exchange visit programs, such as field visits and staff exchanges, promote information sharing among network participants based on practical observations and discussions.

2.3.5.2. Information production and dissemination activities

The only way rural development organizations can justify their existence is when they can meaningfully contribute to social development and betterment in the lives of rural communities. One way of doing this is by providing information which is generally accepted, although not supported by empirical quantitative evidence (Saracevic cited in Menou 1993, x; Woods 1993, 32; Mchombu 2001, 235; Leach 1999, 71), as a fundamental resource for development. To this end, results or new technologies emanating from research and development activities are packaged and repackaged in different formats not only for exchange with colleague research and development workers but also for dissemination to other potential beneficiaries, including the often neglected rural communities. The levels of technicality in presentation, format, language or other information packaging aspects may depend on the target audience.

In a network community, information may generate mainly from three sources: member organizations, the network and working groups of the network. Information generated from these sources on a variety of themes or topics, apart from exchange among members, may cater for the information needs of different groups of information end-users such as rural communities. The network communities may directly provide information to such end-users or through intermediaries such as extensionists, information centers and libraries or mass media. In his studies of the information needs of rural

communities in KwaZulu-Natal and Transkei, South Africa, Kaniki (1995, 14) reported that rural communities in these areas were faced with twenty-eight information seeking situations (critical incidence). When they were confronted with these situations, they resorted to twelve kinds of information providers. Although development organizations were not reported as one kind of the information providers, it is possible that some of the information providers reported such as radio, book, women's group, teachers or church groups were reached by NGOs or used their information products. In an earlier study, Kaniki (1991, 153) identified that Zambian farmers had twenty-seven critical information seeking situations and that the farmers used several information providers which included development organizations such as international NGOs and consultants.

Mchombu (2001, 239), in Phase One of his extensive research project Information Provision for Rural Development (INFORD 1), carried out in three countries (Malawi, Botswana and Tanzania), identified several types of rural development information needs in two broad categories: information needs common to all rural communities (such as income generation, health and soil conservation) and those that were location specific. In his pioneering research on measuring the impact of development on information (INFORD 2), the author reported use of information resources produced by development organizations, mainly in the grey literature format, for providing information in the pilot information centers using various information delivery strategies. As one achievement of the INFORD project, the author viewed that the concept behind the formation of community information centers to address rural development information needs has been received well by the target communities as well as NGOs.

Leach (1999, 75), in his study on how NGOs (including some MIDNET members) provide information to adults in rural KwaZulu-Natal, identified a wide range of subject areas in which they were providing information. These included health (nutrition, AIDS and HIV awareness), land (use, management, ownership, rights), water, housing, agriculture (animal husbandry, broiler production, crops, vegetable/food gardens), law and broader human rights issues, financial management (saving facilities), education opportunities, the environment, resource conservation, and employment creation. The author noted from the NGOs a reluctance to focus on one or two subject areas which might be the core area(s) of an NGO, and a holistic approach to development was adopted. This can be evidenced from the response of one of the interviewees in Leach's study, "... the longer you stay in the communities the more you get involved with the other social and developmental issues ... we do find ourselves having to deal with issues relating to schools, to illiteracy, water, roads when it comes to talking about human rights."

The formats used for the production and dissemination of information in a rural development network community may vary depending on the target audience intended to inform or exchange information. Heydon (1999, 44), in a study of nine Europe-based NGOs working in agricultural research and development in Africa, and Nelson and Farrington (1994, 30), based on similar NGOs working in support of agricultural research and development in developing countries, identified several publication products generated by these NGOs for networking with their local partners and for informing other groups such as policy makers, extension and other NGOs. The most common publication products include the following: newsletters, annual reports, special papers, discussion papers,

conference/workshop proceedings/syntheses, journals, books, working papers, bulletins, and brochures, leaflets, and pamphlets.

Based on the experience of the investigator with agricultural research and development organizations in Ethiopia, the publication products listed above and some others such as consultancy reports, project reports and feasibility studies are also common formats in developing countries. The more technical publications like books and journals are produced in English while the more public awareness documents such as newsletters and brochures are written in local languages as well. However, the qualities and frequencies of the publications do not often meet the desired standards. The main constraints are a lack of financial resources, inadequate publishing infrastructure and a lack of professional information support in local research and development organizations and networks.

Rural development organizations that work directly with client rural communities often employ other less formal formats to communicate with these communities effectively. This is because of the 'hostile' environment of the rural setting in Africa for formal information provision such as print media served in libraries. This is well documented in the literature on the provision of library and information services (to mention but some, Sturges and Neill 1998, Mchombu 1982) and on rural community profiles (Kaniki 1995, 10). Leach (1998, 76) reported several formats that NGOs in KwaZulu-Natal used to provide information to rural communities. Some of these formats included oral communication, print media, visuals, audio, audiovisuals, theatre, and use of intermediary groups or an individual in the community.

2.3.5.3. Characteristics of publication products

The publication products of development network communities, apart from their importance in the exchange of information among network members, are valuable sources of information for a wide range of potential audiences. These may include, inter alia, other research and development organizations and practitioners outside the network membership, policy makers, mass media researchers, academics, donors, ministries and extension departments, and libraries and information centers. Among other things, intermediaries such as extension and community resource centers may use them as sources for information provision to rural communities, the end-users of research and development work (Mchombu 2001, 245).

Haravu (1994, 256), in his discussion of the information resource to be shared in library networks in agricultural research and development, valued collections of locally generated information as most important. These documents, the bulk of which constitute non-conventional or grey literature, contain valuable location specific information. As they are not usually published and made available in conventional channels, information networks and systems in the sector should aim and work to improve access to such information by building databases describing such literature (Haravu 1994, 256). In Africa, based on a review of the literature, Sturges and Neill (1998, 170) argued that special library services tended to neglect grey literature, the most significant category of information source in the continent particularly for its agricultural research and development sector. The authors suggested that

this information resource may well be best exploited through repackaging or consolidation and providing wider access by creating databases.

Grey literature, as defined by Osani (1996, 263), are “literature that are produced and issued by diverse non-conventional publication channels and which are therefore difficult to identify, obtain and process.” The author categorized the literature emanating from and used by the agricultural research and development sector in Africa as grey literature and ‘white’ literature. As the author noted, publication products in the category of grey literature include technical reports, survey reports, feasibility studies, project reports, technical bulletins, technical communications and technical notes), conference proceedings (workshop, symposia and seminar papers), annual reports, dissertation and theses, others (such documents as statistical reports and data, handbooks, manuals, pamphlets, news leaflets, miscellaneous publications, working papers, occasional papers, and memoirs). Whereas, publication products in the category of ‘white’ literature include journals and monographs. Osani (1996, 264) argued that producers of grey literature should promote and upgrade the status of grey literature publications so as to make their information accessible to as many potential users as possible. Agricultural information networks, as Haravu (1994, 256) noted, can play an important role in cooperatively collecting, organizing and sharing these resources.

2.3.6. Support mechanisms and resources for information exchange and resource sharing in networks

Networks and member organizations establish information support mechanisms in order to facilitate information exchange and production and dissemination activities. Financial resources are also required to carry out such activities. Nelson and Farrington (1994, 49) listed two important information support mechanisms for networks both in developing and developed countries. These are libraries and databases. Another desirable component of information support can be publishing units.

2.3.6.1. Information support

Libraries

Networks need specialized libraries that can collect and organize the information products of members. These libraries, which are often small and highly specialized within the subject area of the network, can serve as a valuable resource to members and other users for the otherwise unavailable grey literature discussed in Section 2.3.5.3. They can also collect external materials relevant to the subject area of the network. According to Nelson and Farrington (1994, 49), network libraries can be established and organized based on defined goals and available resources. The goals of a network library may be set by identifying the type of information to be collected, its potential use, the technical level required, the range of topics to be covered, and the language of the material. That is, an accession policy which includes the goal of the library should be formulated so that only materials that fulfill the requirements of members can be collected. Appropriate classification systems, especially those commonly used in the agriculture sector, may also be used to store materials in the library. The basic resources that should be considered

in establishing network libraries include the following: financial, personnel, infrastructure and the ability to share network resources with other organizations.

Databases

Network libraries develop databases to enable network members to share library resources more easily. The use of automated systems and implementing CD-ROM technologies primarily for distribution of bibliographies, abstracts and full text databases to network members and other users are commonly practiced especially among international development networks (Nelson and Farrington 1994, 54). As Haravu (1994, 256) argued, databases can be developed in the agriculture sector for organizing not only bibliographic but also non-bibliographic information. To facilitate the sharing of databases and library resources in networks, Nelson and Farrington (1994, 54) suggested that adopting standard library thesauri and choosing widely available and widely used database software packages are necessary.

Electronic telecommunications

Apart from accessing databases using computers in libraries, electronic telecommunications have facilitated direct communication among network members and the transmission of hard and/or soft copies of documents. Such facilities include telefacsimile, telex and E-mail. Prospects and trends in the use of Internet facilities for information exchange and resource sharing in networks is discussed in Section 2.5.

Publishing

Network communities are responsible for generating information emanating from their research and development activities. In the course of producing the information output in the form of publication, different actors may be involved to contribute different inputs to the output. Some of these include authors/writers, reviewers, editors and proof readers, typesetters and a publication management body. The information output in the form of print or electronic publication is often regarded as one ultimate means of conveying research and development works. Organizations and networks, therefore, require publishing support to produce good quality publication products on a regular basis. Publishing support activities may include, among other things, writing news articles or activity reports, collecting and compiling manuscripts from authors, processing peer review processes, and editing and design of publications as appropriate for electronic or print media and the intended target audience. Organizations and networks may employ different strategies to handle publishing tasks. Based on the experience of the investigator in agricultural organizations and six national professional associations in Ethiopia, the common ways are the following:

- Establishing a publication unit or a public relations unit that may also be responsible for publications tasks.
- Using the assistance of another organization (local or international) that has established a publication unit.
- Copublishing with such established organization in which case ownership of the product may be shared.

- Using the paraprofessional expertise of network members or staff of an organization to perform publishing tasks for a limited period of time. This is usually done by setting up a publications/editorial committee.
- Using freelance writers/editors and commercial publishers.

The choice of these strategies depends on such considerations as the capacity of the network to support full time workers with the necessary expertise and skills and the frequency of publishing activities. Scientific journals often have policies that guide their production and administration function and promote their qualities. This concept may be valid for network publications as well. A network publications policy may state rules and regulations concerning such aspects as the types of formats for producing outputs, authorship, the responsibilities of the different actors in publication production, the media (print/electronic), copublishing, legal aspects such as identification of copyrighted materials and distribution and disposal of products. A publications policy may also dictate that contents of information outputs are within the general theme and objectives of the network and specify sub-themes that need to be covered.

2.3.6.2. Financial resources

Nelson and Farrington (1994, 57) argued that networking is a relatively inexpensive opportunity for resource sharing, considering its potential to accomplish a great deal through the effective use of the synergy generated by collaboration. However, networks obviously need resources in order to be able to operate effectively in the long term and particularly as their activities become more formalized. The authors listed a range of sources of financial resources for networking activities. The potential sources for international and local networks may be broadly categorized as public sources, private sources and crossover sources. The private sources for networks in the development sector include: sales of publications, membership fees, fund-raising through private donors, corporate/business sources, and private foundations. Crossover sources include sales of services of network members (expertise) to public and private institutions, mother institutions, universities and research institutes (especially by housing networks and providing logistical and communication support). Whereas, public sources of finance include national governments, international multilateral institutions, international development banks, bilateral grants, embassy funds, NGOs and other networks.

2.4. Information and Communication Technologies (ICTs)

The emergence and convergence of modern communication and information technologies (ICTs) has been increasingly playing a vital role in local, national and international socioeconomic transformations. ICTs, as broadly defined by Kaniki (1999a, 8), are “the tools used in the production, storage, access, distribution, transmission and use of information (and indeed data and knowledge)”. As such, ICTs include a range of technologies: type-writers, computers with the various peripherals and software, radio, television, and (digital) camera. It also includes telecommunications technologies like telephones (digital and analog), cellular telephones and satellites. Other technologies like networks and/or linkages between

and among several systems and computers in the form of the Internet are also part of ICTs. Advancements in such technologies and their integration has resulted in “easy production, easy distribution, and easy access and usage of information” as long as various preconditions such as access to the technologies and the ability to use them are in place (Kaniki 1999a, 9). The author also noted the current understanding that the development of the Internet is often synonymous to ICTs.

2.4.1. Computers, computer networks and the Internet

The computer technology, which dates back 5000 years to the early computing machine Abacus from Asia Minor, was advanced throughout its history from Charles Babbage’s steam-powered Analytical Engine to contemporary Fourth and Fifth Generation modern computers. The computing technology has been noted in the literature to have significantly epitomized modern life, infiltrating every aspect of society (LaMorte 2001, 1). In its simplest description, a computer is a computing device capable of performing specific tasks that it has been programmed to do. The introduction of mini and personal computers during the Fourth Generation of modern computers (1971–present) and progress and convergence in ICTs in general has allowed small individual computers to network and share resources such as data as opposed to one powerful mainframe computer that shared time with many terminals for many applications (LaMorte 2001, 6).

Computer networks are data communications networks that bring together numerous computers to communicate and share data or other resources. There are two types of computer networks based on geographical coverage: local area networks (LANs) and wide area networks (WANs) (Rowley 1996, 104). A LAN links computers, terminals, printers and backing storage devices over a limited geographical area. The aim in developing a LAN is to share computing resources such as processors, disk storage, printers and communications gateways to other gateways among a group of users. Each device, called a node, is connected to the network by direct cables in the form of twisted wire cable, coaxial cable or fibre optic cable. In a WAN, computers are linked via telecommunications links to communicate with one another regardless of their location. Such telecommunication systems may include digital telephone, microwave, satellite dish and radio or physical data transmission media such as twisted copper wires or cables, coaxial cable, and fibre optics.

The network configuration in LANs and WANs can have various topologies: star, ring or bus depending on various factors. In star networks there is a single central network node attached to terminals, and the terminals must communicate through the central node. This topology is appropriate for terminals that need to access a central database. If the central processor or transmission fails, the system as a whole fails as well. In ring (loop) networks, all nodes are linked together on an equal basis. Data is input via any node and communicated through the network. A bus network uses a single end-to-end cable and terminals are linked to the peripherals of the cable. All terminals are in direct contact to one another (Rowley 1996, 102).

Stevens (1980, 31) and other literature on the emergence of library networks in the 1960s considered the advent of computers and computer network technologies as one of the major factors that facilitated the development of library networks. Hence, automated library networks are structured based on computer network structures. It is also important to note that the 'human' network configurations of development networks discussed in Section 2.3.4 bear striking similarities with computer networks. For instance, the hub-and-spoke network model is basically the same as the star network and so is the rim-effect model with the ring network. In any case, the functions of the network coordinating center and the host computer of a computer network and the relationships between these central nodes and their participant nodes (network member organizations and connected computer nodes, respectively) or among participating nodes are similar.

LANs and WANs and computers can be connected in an all-embracing network. This all-embracing network of computer networks and computers is called the Internet, the Information Superhighway or simply the Net. The Internet provides "global connectivity via a mesh of networks based on the TCP/IP [Transmission Control Protocol/Internet Protocol] and Open Systems Interconnection (OSI) protocols" (Rowley 1996, 109). TCP/IP software and OSI are standard protocol suites that facilitate connectivity or communication among computers. The standardization and subsequent adoption of the protocol suites was one major factor for the development of the Internet from a single network of four computers (ARPAnet) to an amorphous global net (Luyin 1999, 1).

2.4.2. Development of the Internet and related networks

Hardy (1993, 4), in his thesis research on the history of the Internet, traced the network to the 1960s with the establishment of the packet-switched networks in which digital data are sent over distributed networks. Packet-switching is a method of fragmenting digital data or messages into several sub-parts or small units called packets, routing these sub-parts to their destinations, and reassembling them into a whole message at the receiving end. Moschovitis et al. (1999, 61), Luyin (1991, 1) and several other authors traced the Internet more specifically to 1967 when four computer sets were linked together in an internetting project sponsored by the American Advanced Research Project Agency (ARPA), a military administration, and established the 'ARPA network' or simply called the 'ARPAnet'. The preliminary connections of the ARPAnet, the first multiple-site computer network, were created successfully in December 1969. The ARPAnet, intended to link research centers across the United States, provided the foundation for advanced networking and paved the path toward the Internet (Moschovitis et al. 1999, 61).

The ARPAnet, noted as a major breakthrough in network technology which provided that computer networking was possible, was a research attempt to find a way to supply normal communications in case some of the computers were damaged. That is, it was designed to be a 'fail-save' communication system as it would be a fundamentally decentralized network. Computers across the nation could send packets of information from one to the other and those packets could travel through a variety of different routes to reach their destination. If one or several routes were destroyed or malfunctioned, the packets would find alternative routes and eventually reach their destination (Richardson 1997, 21). During the research

an agreement had been reached, TCP/IP Agreement, to stipulate the standards and rules that made it possible to allow dependable data exchange among interconnected computers (Luyin 1999, 1).

The successful implementation of TCP/IP Suite Agreement and many other factors such as the birth of personal computers (PCs) helped for the rapid increase of computers in the network, with the addition of new 'nodes' and routes nationally and a spread to western Europe and Japan in the mid 1970s. Because it was a decentralized network, there was little way to control its popular expansion, and it soon transcended its mentors in the ARPA project. In the mid 1980s, all scientific and research institutions of the United States were connected. In the late 1980s and early 1990s, computers and computer networks all over the world joined the network, building more and more virtual communities, and the Internet as it is known today was developed to be a global network. Richardson (1997, 21) viewed that the Internet, as its essence reflected as a human relationship enhancement tool in its history, today is the people's network.

Other network technologies related to the Internet were also created in the 1970s and 1980s in the United States and Britain (Raish 1994, 4; Hardy 1993, 7; Vinton n.d., 3). Some of these include the store-and-forward networks such as BITNET and Usenet which use the technology of electronic mail systems and whose services focused on discussion groups (also known as ListServ or discussion forums) and news groups. These networks began as separate networks, but as their protocols were made more compatible, became part of the Internet (Raish 1994, 4). Usenet, a network of computer systems that together share and propagate an enormous number of different newsgroups, began in 1979 preceding the Net, while BITNET was established in 1981, both in the United States. Another network worth mentioning may be FIDONET, a series of DOS-based computers that uses modems to directly link one computer to the next. It is the largest privately-owned computer network in the world (Raish 1994, 5).

In the late 1990s, progress in the mobile communications technology and convergence of ICTs has resulted in the development of new Internet-related services and products and new mode of transmitting data through the Wireless Application Protocol (WAP). WAP technologies that date back to 1997, are bringing the Internet everywhere, anywhere and at any time. The Internet Studies Research Group (ISRG 2001a, 11) defined WAP as "multi-layered protocol that is designed to deliver Internet content to devices such as mobile phones, palmtops, pagers and PDA (Personal Digital Assistants)."

The WAP operating system consists of:

- a proxy server/gateway that is a bridge between the wireless and IP networks. It can also be used to convert HTML content to WAP content.
- a WAP browser enabled device to view and interact with content and applications
- WML (Wireless Mark-up Language), i.e., the programming language used to design Web content (ISRG 2001a, 12).

2.4.3. Internet facilities and their use

The Internet has revolutionized computer-based communication and network technology. The literature on the use of the Internet is also vast. The various Internet facilities created over the course of its development and their uses are discussed below based on, to mention but some, Raish (1994, 5), Kaniki (1999a, 9), Gorelick (1997, 14), Chisenga (1997, 18), Luyin (1999, 2) and Behrens (2000, 2).

2.4.3.1. Electronic mail (E-mail)

The e-mail technology allows users to create/compose documents (mails), attach files to the mails and send them to individuals or groups of individuals, i.e., recipients. It also permits the recipients to view and read, print or forward to others the mails and attachments that they have received.

2.4.3.2. ListServ (Mailing lists or Discussion groups)

ListSers are specialized mail systems through which people exchange ideas and experiences with others who share a common interest. ListServ is an Internet facility based on the Internet's e-mail system and it is managed by an Internet ListServer. Individuals subscribe to the list and then join the discussion group. Inquiries and any other messages that are assumed relevant to the group are sent to the ListServer which then distributes them to all subscribers. Responses from any participant, to the inquiries are in turn distributed to all group participants.

2.4.3.3. Newsgroups (Bulletin boards)

These services are, like ListSers, discussion facilities based on the Internet-based e-mail system that allow subscribers to the group to discuss on a particular topic. Thus, newsgroups are used by people with similar interests for discussion and debate. Newsgroups differ from ListSers in one respect: in ListSers messages are individually sent to each subscriber while in newsgroups the messages are posted or kept at a computer administering the group, which is called a news server. The discussions in newsgroups are known as 'postings', messages addressed to the newsgroup as a whole, not to individuals. These postings may be questions needing answers by anyone in the group, opinions which members can reply to or lists of useful information resources. A newsgroup participant can then access the newsgroup using an appropriate newsreader program, read the messages posted and reply.

2.4.3.4. Telnet (Remote login)

This Internet facility enables a user to log in to a remote machine (Internet host computer) and operate it, i.e., manipulate files on its hard drive and then log out. For instance, one may log in to a remote computer to search a library catalog or other types of databases. Using telnet, one may also access 'his/her' computer at the work place and work from home or any other place in the world.

2.4.3.5. File transfer protocol (FTP)

FTP permits a user to transfer (copy) files from one computer to another. 'Anonymous FTP' enables one to do this on computers that have been programmed to accept requests from people who do not have accounts on them.

2.4.3.6. Archie

This facility locates programs, data, and text files stored on several computers around the world based on their file names. The system maintains a database of all the file names at Internet sites that allow FTP. Based on search terms, it automatically identifies files containing those words and tells a searcher where they are located. With this information the files can then be obtained by way of regular FTP procedures.

2.4.3.7. Wide area information server (WAIS)

WAIS not only locates files based on file names as Archie, but also by identifying what is in the files. That is, it permits searching through files that are indexed. It searches both file names and texts. WAIS can also display the documents as search results in a weighted list (i.e., closest hits first in the list) from which a user can select items. The system will then retrieve the selected items.

2.4.3.8. Gopher

Gopher allows a user to browse Internet resources using menus, i.e., it is used to search sites and documents without knowing their addresses or file names. It was a very popular Internet facility before the creation and rapid growth of the World Wide Web.

2.4.3.9. World Wide Web (WWW, the Web or W3)

The Web, created in 1989 by Tim Berners-Lee, has been exponentially growing to be one of the most popular facilities of the Internet. The Web has revolutionized electronic publishing on almost any subject. It allows users to locate and view multimedia documents or pages, i.e., documents with text, graphics, animations, audios, and/or videos. These Web documents are created using Hyper Text Mark-Up Language (HTML), a Web document coding language, and other Web authoring tools such as Java, Active Server Pages (ASP), JavaScript and ActiveX. The unique feature of the Web is thus its hypertextuality (text documents with links to other documents) and hypermedia (multimedia documents with links to other documents) i.e., it links documents together even if the documents are on computers in different locations.

Documents on the Web thus consist of hypertext and hypermedia with hyperlinks. Clicking on the hyperlink calls up the linked page where other links to other pages are also found. A Web site is thus a collection of pages written in HTML. Access to these pages is via an addressing system, Uniform

Resources Locator (URL), using a browser. A URL identifies the protocol, the name of the computer where the resource is stored and the location of the resource on the computer. The pages can also be searched using client software programs known as search engines.

The Web operates based on the client-server network architecture. There are three key innovations behind the operation of the Web technology, according to Berners-Lee (1999, 39) to whom these innovations are credited, that have made possible the authoring of Web resources and universal access to the resources. These are the addressing system the URL; the HTTP, the language the client-server computers use and whose rules define procedures like which one speaks first and how they speak in turn; and the HTML, the language which is used to code hypertext/hypermedia documents that bear hyperlinks. Before the advent of the WWW, Internet users were limited to e-mail communication and cumbersome methods for retrieving files of information from other computers. The Web changed that quite dramatically, allowing retrieval of information, documents, and audio-visual material by simply clicking a hyperlinked word(s) or a picture. The clicking activates transformation of the document, within moments, from a computer (Web server) whose location the user should not even have to know, to the computer of the user (client computer). Burke and Ornstein (cited in Richardson 1997, 22) argued that the Internet's WWW is humanity's second major communication revolution, the first being the Gutenberg Press in 1439.

2.4.3.10. Intranets and extranets

As noted, the essence of the Internet is internetworking — a network of computer networks. According to Reisman (1997, 1), apart from convergence in multimedia content and related hardware platforms, convergence of the various uses of electronic media has led to the development of intranets in 1996 and later extranets. Rowley (1998, 194) defined an intranet as “an organization's internal communications system using Internet technology.” Intranets are also known as an organization's internal Web site or ‘inner’ Web, i.e., a ‘private’ Web not connected to the global Internet. The author identified two types of intranets: flat-content intranets and interactive intranets.

In flat-content intranets, files may simply be requested from the intranet server, received by the client computer and viewed through the Web browser. Whereas, interactive intranets, which are slightly more complex, are intranets that offer many opportunities for two-way communication within an organization. A specific program or script, held on an internal Web server that uses TCP/IP, is used to process the sending, changing, responding to or forwarding information from one location to another in a corporate network. Interactive intranets can be used for such applications as e-mail, computer-based training and learning, video conferencing, interactive services facilitated by ‘forms processing’ and ‘mailto’ HTML commands and access to library catalog from the World Wide Web.

The extranet, like the intranet, uses the Internet technology. The difference between extranets and intranets is access. That is, while access to Intranets is restricted to the staff of an organization, extranets are made accessible to people outside the organization with authorization. These external users may be,

for instance, clients or suppliers of the organization hosting the extranet site. Therefore, extranets are intranets connected to the public telecommunications network and thus allow external access to the information resources of an organization.

2.4.4. Tools and services for information search on the Internet

2.4.4.1. Browsers, search engines and meta search engines

Search tools are important parts of the Internet that are designed as interfaces that help users to search the information resources and services available on the Internet. Browsers and search engines are two commonly used tools to conduct searching on the Web (Rowley 1998, 185). Browsers support browsing on the Web, i.e., the successive retrieval of individual documents or Web pages that are linked by a hypertext/hypermedia system. Web browsing is supported by:

- an addressing system (Uniform Resource Locator, URL) that uniquely identifies the location of any object
- a markup language (HTML) used to identify the source of the links within a document, and the location of the target of those links
- a transfer protocol (HTTP) that allows copies of target documents stored on remote servers to be retrieved and displayed
- a client program or Web server (Rowley 1998, 186)

A search engine is a retrieval mechanism on the Internet “which performs the basic retrieval task, the acceptance of a [search] query, a comparison of the query with each of the records in a database, and the production of a retrieval set as output” (Rowley 1998, 187). A search engine, which is a collection of software programs, has three major components to provide access to a large and distributed document collection over the Internet: a spider program, indexing an program, and a search interface (Ackermann and Hartman 1999, 41; Rowley 1998, 187). The spider program (also called robot or crawler) visits Internet sites, picks up hyperlinks and URLs of the pages that it can find and downloads copies of those links, URLs and titles of pages. The indexing program then stores the contents of each Internet site or Web page in a record and builds a database. The search/user interface supports the interaction between the user and the system by prompting the user for search, providing a ‘form’ for query formulation and submission and presenting search results.

Meta search engines or meta crawlers do not crawl the Internet themselves and build databases. Instead, they accept search queries, allow the searches to be sent to several search engines all at once, and present search results blended together onto one page (Liu 2001, 1; Search Engine Watch 2001, 1).

2.4.4.2 Virtual libraries

Another strategy for finding information on the Internet is the use of virtual libraries, applications of the World Wide Web for information provision. In the past, and even currently especially in developing countries, the role of the library was that of collector, custodian, maintainer and provider of resources (physical collections) to its users. However, the advent of the electronic information era, particularly Internet-based library and information services, has transformed the role of the library with the evolving concept of the “library-without-walls”, described by three terms — “digital library”, “electronic library” and “virtual library” — with slightly different meanings. These terms, often used synonymously to refer to the same thing, lack a generally accepted definition in the literature (Saunders 1999). Before discussing the literature on virtual services that may be used for information search on the Internet, therefore, it is important to describe these and related terminologies. *Harrod's librarians' glossary and reference book* (Prytherch 2000, 227) defined a digital library as “An umbrella term a) for conceptual models of libraries of the future that focus on the provision of services associated almost totally with digital content and b) used to describe those aspects of the existing library service that have a significant digital component. Also referred to as electronic library.”

Another terminology, a hybrid library, is defined as “...the retrieval and delivery of information in a mixed-mode environment, electronic and print...” (Prytherch 2000, 352). Whereas, a virtual library is defined as follows:

Techniques of virtual reality — sophisticated computer simulations — could be used to provide users with library and information services by electronic means, with network document delivery and access, as if from a 'real' library but without a physical entity actually being necessary” (Prytherch 2000, 763).

The term virtual library, although it is often used loosely for networked access to conventional library resources (Prytherch 2000, 763), may also describe Internet-based information provision and access to Internet resources such as primary (full-text) publications, databases, Web sites, discussion forums and even print-based conventional library resources. In the context of the Internet, users can therefore make use of virtual library services for finding information easily and economically. Some of the major virtual library services that may be used to find information on the Internet include Web resources such as subject guides, reference works, specialized databases and portals.

A **subject guide**, also called a directory or subject tree, is a Web site that hierarchically arranges a subject index of Web resources according to subject categories or classes and subcategories (Behrens 2000, 34). Subject guides, which work in the same way as the subject catalogs of libraries, contain links to the files they index, and thus serve as starting points to browse the Web by selecting a subject. By clicking on the hyperlinks, users can surf for ‘good sites’ on the subject of their interest. While search engines can be used for finding specific information, subject guides are designed for browsing general topics (Kansas City Library 2001, 1; Gray 2001, 7). Yahoo! is a good example of subject guide (Yahoo! 2001, 1).

Reference works collected by virtual libraries are full-text documents with self-contained information, without necessarily containing hyperlinks to other resources. Directories, encyclopaedias, handbooks, dictionaries and other types of reference works can be included in virtual libraries on the Web and browsed using hyperlinks. Virtual libraries can also be used for finding information in **specialized databases** as well. Such a database is an index that catalogs a set of a particular material such as patent information, agricultural journal article citations and meteorological data (Ackermann and Hartman 1999, 69).

A **portal**, defined by Strauss (2000, 3), is “a gateway to Web access ... a hub from which users can locate all the Web content they commonly need.” That is, a portal is a Web site that provides an entry point to the Internet and offers value-added services such as directories, search facilities, links to related Web sites and e-mail access. Portals can be created on intranets (i.e., intranet or enterprise portals that focus on internal enterprise functions) or on the Internet which are called Internet gateways or libraries. There are different types of portals on the Internet: search engine portals such as Yahoo!, Internet Service Provider portals, and subject portals.

Subject or thematic portals, also known as subject-based information gateways (SBIGs) or quality controlled subject services, are “subject entrances (clearing houses) to quality assessed Internet resources” (NetLab 1999, 1). SBIGs focus on coverage of a specific subject(s) and aim at serving a community with similar information seeking behavior. The resources in SBIGs are selected by subject specialists based on an officially published list of quality criteria, and they are indexed. The core activity in SBIGs, selecting resources and attributing meaning to them, is a human intellectual activity, i.e., the selection and indexing function is not automatically done as in search engines or Web crawlers (DESIRE Consortium 2000, 2). A good example of SBIGs is the Social Science Information Gateway (SOSIG 2000, 1) which helps Internet users by collecting and organizing Internet resources on the social sciences. InfoRurale presents another example of a SBIG specializing on rural development information (NREC, 2001, 1). InfoRurale consolidates information on rural development from around the world and provides a ‘first-stop-shop’ for those involved in rural development activities in the UK.

2.4.5. Issues for consideration in Internet use

The Internet can be applied for communication and networking people and organizations in virtually any field. Some of the major areas of Internet application may be for education (distance learning), research and development, doing Internet research (such as survey), business, public relations, news service, publishing and entertainment. Hence, the names virtual libraries, electronic commerce (e-commerce), virtual universities and so on. Although the Internet, or ICTs, experienced a flourishing growth from the beginning and offered lots of opportunities for facilitating communication in such fields as those mentioned above, its growth is in varying degrees and its use not evenly distributed. It has resulted in the digital divide among the haves and have nots both among and within countries. There are, therefore, various issues to consider in the use of ICTs.

Kaniki (1999a, 14), in his discussion of the role of ICTs in rural Africa, and ISRG (2001a, 8) argued that one of the fundamental issues to consider is the availability of and access to the technologies. That is, the basic infrastructure such as telecommunications (both digital phone and satellite) and electric power, the availability of computers and other necessary hardware and software, and Internet connectivity services are often not affordable. A related problem in Africa is the inability for the community to determine and dictate the type of ICT which should be available to them. Most African countries often depend on donations and end up as 'dumping grounds' of out-of-date or incompatible technologies (Kaniki 1999a, 14). Some other critical issues relate to publishing information, i.e., freedom of access to information vs intellectual property rights (copyright) or confidentiality and security. Hacking or accessing information which one has no right to access, falsifying an e-mail sender's address through 'spoofing' and 'sniffing' electronic traffic or intercepting messages ('data hijacking') can possibly occur on the Internet. Another issue of concern is that of free access versus fee which may result in the vicious cycle of the haves and have nots. Costs for electronic information (payment for access including telephone time, access to databases or connectivity and content) is critical to rural communities.

ISRG (2001a, 10) argued that wireless technologies have the potential as information delivery platforms to improve Internet access in Africa. WAP mobile phones, still to appear in many African countries, are mentioned as alternative ways to be deployed to access the Internet and partially solve the data and voice communication problems in the continent. Other strategies to widening Internet access in the African urban and rural settings, as evidenced in some countries like South Africa, lie through the provision of cyber cafes (Internet cottages), kiosks, and telecenters.

2.5. Internet-Based Information Exchange in Networks

The literature by Nelson and Farrington (1994, 30) cited in the previous sections provides a clear picture that network activities are mostly related to the exchange of information, experiences or people. The information exchange activities are implemented through a variety of media within the network community, produced in different types of formats and disseminated to network members, and, as appropriate, made available to a wider audience than the network membership alone. Since the 1980s and more so in the 1990s even in developing countries such as South Africa and Ethiopia, the Internet has increasingly become an important medium to facilitate networking and resource sharing. This capacity of the Internet stems from its nature of being a network of computer networks and computers using the Internet Protocol and other protocols. In their discussion of women's networks for development, Valk et al. (1996, 30) argued that, despite significant problems of uneven participation and access, ICTs, especially the Internet technologies and electronic mail, have facilitated the distribution of women's information as well as communication among women. The increasing presence of development networks on the Internet can be evidence of their strategic utilization of the technology for facilitating information exchange among network partners.

This is particularly true of development networks in the developed world and international networks such as the Canadian-based International Development Research Center (2001) and agricultural research

networks that operate under the Consultative Group for International Agricultural Research (CGIAR 2001). All research centers under the CGIAR have their own Internet sites and the site of the Consultative Group serves as a gateway to 'network' the other sites and allow a central access. The CGIAR Internet-based information network system initiative is called Integrated Voice and Data Network (IVDN). The IVDN services include Internet services (FTP, telnet, gopher, www, etc.), free telephone calls within the network, lowest-cost international direct dialing (no need to use call-back services), detailed call reporting and cost control, voice mail, audio-conferencing, desktop computer conferencing ('digital whiteboard'), electronic mail (with value-added fax and telex services) and directory management services (Richardson 1997, 30). Among consortia, the International Association of Agricultural Information Specialists (IAALD) presents an example of Internet-based information exchange system that aims to facilitate "professional development of, and communication among, members of the agricultural information community" located at different countries (IAALD 2001). The IAALD Internet site, located at <http://www.lib.montana.edu/~alijk/IAALD.html>, provides access to rich information resources in three languages, i.e., English, Spanish, and French. As the structure of IAALD is hierarchical with a central node and regional chapters, the site also provides links to its regional chapters. The site is hosted by the library of the University of Montana, United States, and it is maintained by one individual member.

In Africa connectivity to the Internet is a relatively recent history, and encouraging trends started since 1998 (Adam 1999a, 127). At the end of 1996 only 11 countries had Internet access, but by November 2000 all the 54 countries had achieved permanent connectivity and the presence of local full service dial-up Internet Service Providers (ISPs) (Jensen 2000, 1). However, in the area of Web content development, the contribution of Africa to the global content is very insignificant (Adam 1999, 127; Jensen 2000, 4; Yavo 1999, 17; ISRG 2001b, 2; Chisenga 1999, 2). According to Adam (1999, 127), Africa generates only 0.4% of the global Web content, and one big missing link is the lack of African scientific and technological information. The author broadly classified the African content as largely business information, i.e., about institutional activities, products and services and news. The author argued that access in any way does not guarantee the production and availability of local, or indigenous, content and concluded that Africa's contribution to the expanding global web of content has so far been insignificant. Web site development in Africa is still poor mainly because of the inadequate ICTs infrastructure, regulations and skills in Web authoring (Yavo 1999, 17, Jensen 2000, 4).

Internet sites that aim to network development communities on various sectors in Africa can be studied in two categories: those that are locally based and those based in Europe and North America. The sites maintained from the developed world could either be by international development assistance agencies, NGOs, or those created and maintained by individuals. For instance, the site of the Development Support Network for Southern Africa (DESUNSA), founded and maintained by a single person, aims to "facilitate the dissemination and exchange of scientific and technological information in the fields of rural development, knowledge management and science and technology" (DESUNSA 2000, 1). Another site with a similar purpose is maintained by Southern Africa Environment Project (SAEP), an environmental NGO founded by one person and with offices in Cape Town. The SAEP site, operational since 1998,

serves as a gateway to environment and development information in the region (SAEP 2001, 1). The aim of such virtual network initiatives, as reflected in the objective DESUNSA (2000, 1), is generally providing a response to one major problem Africa has been facing — the continent's research and development sector is 'brain-drained' and that there is a need for a South–South initiative. The Internet site of the African Conservation Tillage Network (ACT) also presents an example of development networks that employ Internet-based information exchange. The ACT site, hosted at the site of the United Nations Food and Agriculture Organization (UNFAO), aims to network all individuals and groupings from within and outside Africa interested in practicing and/or promoting conservation tillage in the continent (ACT 2001, 1). ACT publishes its newsletter *ACT NOW* on its Web site, and it also distributes copies using an electronic mailing list.

South Africa was among the first few African countries to have a direct connection to the Internet (Chowdhry 1998, 9). Internet access in the country first became available in 1989 when the Council for Scientific and Industrial Research (CSIR) developed a research network to link universities and research institutions (Goldstuck 1995, 16). The Internet market in South Africa is much larger than any other nation in the continent, placing the country in the top 20 Internet usage countries worldwide (AISI 2001, 1). Corporate, government and academic networks are well developed. The country alone generates a larger proportion of the 0.4% of the global content that Africa generates, with the rest of Africa combined generating 0.02% (Adam 1999, 127). Jensen (2001, 11) and Mutula (2001, 21) also noted better standing of South Africa in terms of ICTs infrastructure. In 2000, there were 650,000 Internet subscribers, 75 ISPs, and over 1000,000 Internet users (Jensen 2001, 11).

Because of such encouraging trends in the country in ITCs infrastructure and utilization, South African development organizations and networks appear to be in a better position to harness the opportunities of the Internet for information exchange. Good examples of this can be SANGONeT (2001) which is a regional electronic information and communication network for development and human rights workers, SAEP (2001) and SANGOCO (2001), the umbrella body of South African NGOs. SANGONeT, an example of an indigenous NGO that is also an Internet Service Provider in Africa, aims to network the development key players in NGOs, community based organizations (CBOs), government and private sectors, and to provide them with the information they need. It serves the specific needs of the development sector in gaining access to, and publishing information electronically. SANGONeT, based in Johannesburg, South Africa, does this by providing full Internet access to its subscribers, including the Internet facilities e-mail, file transfer protocol (FTP), Telnet, World Wide Web and electronic conferences. The SANGONeT Web site provides news service and information related to, among other things, education, open government, environment, labor and economy, women, information and technology development, health, housing, culture and human rights. Information available on the SANGOCO Web site is mainly related to the programs and resources of the organization.

2.5.1. Development of an Internet-based information exchange system for networks

The literature on library and information networks and networks in the development sector noted basic requirements and general principles that need to be considered in the development of such networks. This may be valid for the establishment of an Internet-based information system in networks with some kind of information exchange activities already in place.

2.5.1.1. Basic Requirements

According to Carbo (2000, 240), the Internet, although it is often thought of as only a technology-driven and technology-laden physical infrastructure, has six fundamental components. These are people, information content, hardware or other physical components, software and other electronic delivery platforms, financial resources and standards, codes, laws, regulations and other policies. In planning the development of an Internet-based information exchange and resource sharing system for networks, the above mentioned basic components of the Internet may provide guidance in understanding the basic requirements in specific terms in the context of networks. The requirements may be conceptualized in five basic categories as follows:

1. Participants: There should be like-minded organizations and individuals (i.e., depending on network membership boundaries) who are willing to cooperatively develop an Internet-based information system and participate in information exchange and resource sharing activities using the system.
- 2 Information content: There should be as much as possible significant and locally generated information content to be contributed and shared by members of the network and, as appropriate, disseminated to a specific target audience or the general public.
3. Hardware, other physical components and software: The network members should have the capacity to support the development of the system and to be able to use it. The necessary capacity may be in terms of the following basic requirements:
 - (a) appropriate computer hardware which includes client computers of system users, Internet server computer and devices like modem and scanner
 - (b) appropriate computer software which include operating systems software such as Windows 95, Windows 98, Windows XP or Windows NT; networking software (TCP/IP), and software designed for creating and accessing documents
 - (c) Knowledge and skills to create and maintain the system and Internet literacy of participating members
 - (d) Telecommunications (telephone lines, satellites or radio) and power infrastructure
 - (E) Connectivity to the Internet.
4. Finance: There should be financial resources or funding, i.e., for covering initial and operational costs in a sustained manner.
5. Standards and policy: A policy on standards and regulations that would guide the administrative and technical aspects of the system should be prepared based on the agreement of members. Internet standards set for the whole Internet community such as TCP/IP and OSI or other protocols, and the standard HTML approved by the World Wide Web Consortium (W3C) and other languages should also

be adopted. The importance of rules and regulations that may guide the production and dissemination of information products is discussed in Section 2.3.6.1.

Connection to the Internet can be made in three ways: full, dial-up and gateway (Rowley 1996, 111). With a full or dedicated connection there is a permanent telecommunications link and the computer has a registered Internet name and address. Dial-up connection is made via a temporary telecommunications link to a machine that has full access (Internet Service Provider, ISP); i.e., a user's modem connects to the ISP's modem for transmission of information via telephone line. In the case of gateway connection, the connection is made through another network such as CompuServe.

The information resources and services form the core of the information exchange process in a network community. These can be based on the general forms described by Nelson and Farrington (1994, 31) and other literature as the information exchange and information production and dissemination activities of networks. These activities are discussed in Section 2.3.5. The organizations and individuals who exchange information are primarily network partners; but, as Nelson and Farrington (1994, 31) noted, there could definitely be some types of information products and services that need to be made available to a wider audience other than the network membership alone. The organizations and individuals that can participate in the information exchange process and the nature of the information to be exchanged may determine the configuration of the electronic network to be either a private one, a free access type or a combination of the two.

Financial and human resources are also necessary for development networks to develop and sustain an Internet-based information exchange system. These may come from the network community which requires arrangement and commitment by the network partners. The other options can be partial or full support by funding organizations and development assistance agencies. Richardson (1997, 18) argued that many of locally initiated Internet services in developing countries emerged with little or no external support, and that many have become commercial or not-for-profit services run by NGOs. Today, however, the author noted that many international development agencies and international NGOs provide assistance in the development and strengthening of indigenous Internet services, infrastructure and information providers. Some of the notable larger agencies that have one or more Internet projects include the World Bank, International Fund for Agricultural Development (IFAD), United Nations Development Programme (UNDP), International Development Research Center (IDRC), US Agency for International Development (USAID) and Canadian International Development Agency (CIDA).

Besides such larger agencies, there are many NGOs that specialize, as Richardson (1997, 20) noted, in providing Internet services to other NGOs, governments, educational institutions, health care organizations and other types of government or civil society organizations in developing countries. Good examples of such NGOs are the Volunteers in Technical Assistance (VITA 2001, 1), the Internet Society which focuses on support for global cooperation and coordination for the Internet and its internetworking technologies (ISOC 2001, 1), and SANGONeT (2001, 1). SANGONeT is an example of an indigenous NGO that is also an Internet service provider. SANGONeT assists member development organizations

in southern Africa by offering full Internet access and training and on-going support. At international level, there are various initiatives by development assistance agencies that aim to support African development organizations with the ability to apply ICTs to their own social and economic development. Some of these initiatives are the Nairobi-based Environment Liaison Center International (ELCI) and the Acacia Initiative of IDRC (Kanfi 2001). Generally, the potential sources of finance for networks in the developing world are discussed in Section 2.3.6.2. In either case, there should be reliable funding not only to establish but also to sustain the system.

2.5.1.2. Prerequisites and general principles

Behind the basic requirements discussed above, prerequisites and general principles should be considered for the development of an Internet-based information exchange and provision system for networks. As Nelson and Farrington (1994, 19) argued, some desirable preconditions should exist for successful networking. These are discussed in Section 2.3.2.2. Such preconditions for networking for research and development, according to Haravu (1994, 254), can be valid for information networking in the sector. The requirements and general principles for library cooperation and resource sharing also bear particular relevance in establishing Internet-based information exchange system for networks (see 2.2.4.). Plucknett and Smith (cited in Haravu 1994, 254) provided the following list of prerequisites for library and information networks in the agricultural network environment:

- The problem should be clearly defined and an agenda for action to be drawn
- The problem should be widely shared among the potential participants
- There should be evidence of strong self interest in participating in the network
- Trained personnel should represent participating members and contribute to specific tasks and network coordinating meetings
- Strong leadership comprising of a steering committee and full time coordinator. All participants must be involved in the decision making process affecting the activities of the network and be treated as equal partners

It is important to note that some of such defined prerequisites may not always be met by network members. For instance, the presence of information personnel to provide library and publishing services. According to Haravu (1994, 255), such gaps in participating members should be identified in the pre-networking phase so that they can be addressed in the strategy to develop an information network. Based on the literature on library and information networks (Atherton cited in Sison 1990, 187; Swank cited in Sison 1990, 188; Wesley 1993a, 106; Haravu 1994, 255; Raju 1996, 263) and the factors discussed by Nelson and Farrington (1994, 19), the general principles that need to be considered in the development of an Internet-based information system may be conceptualized as follows:

- Setting goals and objectives for the system
- Formulating the structure of the system and entrusting responsibilities for administrative and technical tasks

- Formal agreements to ensure commitments to assigned responsibilities
- Collaborative development of resources
- Planning and identification of priorities on the basis of surveying resources and identifying needs
- Strategies and action plans for the operation of the system
- Identification of the information exchange requirements of participating organizations and guidelines for selection of the resources to be placed on the system and shared
- Identification of source of funding for financing the system
- Standards and policy for the development of information content and exchange as appropriate for sharing resources using the anticipated system (for instance, guidelines/house styles and policy for Web publishing and standards and software packages for the development of bibliographic and non-bibliographic databases)
- Evaluation methods for assessing the contribution of the Internet-based system towards agreed goals
- Training programs to provide instructions to users and maintainers of the system, including instruction in policy and procedures

Established networks like MIDNET already have some kind of information exchange system. The development of an Internet-based system in such networks can be done by replicating the existing information exchange systems. The question will therefore be how best to integrate the Internet into the existing requirements and exchange activities of a network. The general principles like those listed above should be considered in light of the principles underlying the existing information exchange activities of networks and identifying gaps. Therefore, it is very important to survey the existing information systems and find out the general principles behind the formation of the network and the structure, administration, policy, funding or other issues in the existing information activities.

2.5.2. Internet facilities for information exchange and resource sharing in networks

In his discussion of networking among library and information professionals, Chisenga (1997, 19) stated that, traditionally, professionals share ideas, discuss latest developments and issues of interest via such fora as professional associations' meetings, seminars, workshops, conferences, professional journals, newsletters and personal contacts. Networking is done through these fora at various levels — local, national, regional and international. The author argued that some of these traditional mechanisms are not always efficient because they place limitations and constraints on professionals to effectively participate in the information exchange activities of networks. The various facilities of the Internet, as Chisenga (1997, 19) noted, provide an alternative channel for facilitating information exchange activities in networks at local and global levels. The author identified the following Internet facilities for networking purposes: e-mail, discussion groups (ListSers or mailing lists), newsgroups, and the World Wide Web.

Adam (1999b, 2) also discussed the use of these Internet tools for scientific publishing and communication. He added to the list other facilities: file transfer protocol (FTP) and deployment of intranet. However, for the successful application of such Internet facilities for networks, the relevant ICT infrastructure, human resources, funding and other requirements and principles discussed in Section 2.5.1

must be in place. As it has been argued by Menou (1993, 90), information resources do not stand alone, out of context with other resources.

Electronic mail can be used by development network communities to discuss and share ideas and experiences, coordinate network projects, for document exchange, arrangement of meetings and general correspondence. Its benefit is fast access, convenience, low cost and informality. Discussion (mailing) lists and newsgroups, which are based on the Internet's e-mail system, can provide a development network community and non-member subscribers with a forum for discussion and sharing of ideas on topics of common interest. These Internet tools can replicate the theme-based working groups that Nelson and Farrington (1994, 30) identified as one type of information exchange media common in agriculture and development networks. Networks that allow members the opportunity to form interest groups based on specific individual topics of interest are characterized by the clover networking model.

The World Wide Web offers various opportunities for networking activities. These include electronic publishing; information on various issues like periodic or occasional news about network activities or from other sources, announcements, events and conferences; membership information and services; databases of development programs, profiles and contact addresses of network members, links to relevant documents and Web sites, etc. Web content, the information to be made available, and issues and mechanisms relating to the creation, hosting and maintenance of a Web site are critical for a network site. This requires an investigation into the information exchange activities and the capacity of the network community to support a Web-based information exchange system. Chisenga and Rorissa (2000, 151) developed a prototype Web site for the Standing Conference of Eastern, Central and Southern African Librarians (SCECSAL) based on analysis of the relevant information contents to be made available. The authors also suggested the possible options for the maintenance and hosting of the site.

The other Internet facility that can be used for networking is deployment of local Web-based information services using Intranet. Intranet technology can make available internal Web sites, e-mail, publishing and information distribution, form completion and filing, database front-ends, etc., for the information exchange needs of a network community. But, according to Adam (1999b, 3), in Africa very few institutions are making use of this Internet facility. As the literature discussed above showed, the various facilities of the Internet can be effectively used to facilitate information exchange and resource sharing in networks. Information resources and human resources (expertise) can be shared using the Internet. The e-mail, ListServes and newsgroups, for instance, allow easy access to human expertise. Network participants can also have access to in-house (network) databases and full text documents and links to resources located at other sites that are relevant to the objectives of the network.

2.5.3. Trends and models of cooperation on the Web in the development sector

Despite the technological capacity of the Internet to provide high opportunities for information provision and exchange, it also poses difficulties for users to find the information they need. Ballantyne and Addison (2000, 19) argued that the use of the Internet for systematic information retrieval in the

development sector is limited by a number of factors. Some of the major limiting factors for accessing information include the increasing availability of information on more topics than ever before (information explosion) and the production of information from a variety of sources than in the past (Internet anarchy). Other limiting factors noted in the literature as impeding information search on the Internet are information scatter across thousands of institutional homes which makes searching difficult, problem of finding relevant information despite sophisticated search tools (indexing nightmare), and information myopia, i.e., with more choice than ever before, Internet users are led to less and less of what is actually available. In an effort to address these problems, organizations in the development sector are focusing on cooperation on the Internet (Ballantyne and Addison 2000, 15). The authors identified five important trends as influencing the ways in which such cooperative action is happening. These are discussed as follows:

- Decentralizing tasks and technologies — Organizations form groups, work on a shared Web site and take responsibilities for certain tasks or areas; i.e., dispersed responsibilities for content creation and its upgrading, combined with some central coordination and facilitation.
- Increasing use of databases — the view that a well-indexed database is the most important asset of an Internet service
- Providing content — replacing lists of links by fewer links and focusing on site content and full text documents
- The emergence of thematic gateways or portals — emphasis on linkages between and among Web sites and offering seamless travel across organizational boundaries. Europe's Forum on International Cooperation (EUFORIC), Development Information Online (Devline) and Electronic Development and Environment Information System (ELDIS) are good examples of development information gateways.
- Building communities — Internet strategies of development organizations are becoming more and more linked with network communities of individuals and organizations as these communities share certain characteristics and information seeking behavior.

Cooperation of organizations on the Internet, as in any other form of information exchange and resource sharing system, can take different forms. Ballantyne and Addison (2000, 17) identified three main emerging categories of cooperation of development organizations on the Internet. These are:

1. Self-standing, namely, I contribute to my system and I make it available. An organization builds an information resource or system and makes it available under conditions of its own choosing.
2. Functional collaboration, i.e., I contribute to your system and you make it available or you contribute to my system and I make it available. An organization invites another to contribute to its information resource or system, making it available under its own conditions.
3. Partnership, i.e., we contribute to our system and we make it available. Several organizations agree to jointly produce an information resource or system. Each contributes to the costs, and each accepts ownership of the results.

2.5.4. Participatory methodology for development and impact assessment of Internet-based information systems

As noted in Section 2.5, the literature on the status of the Internet in Africa indicated that the continent's contribution to the global Web content is insignificant (0.4%), especially in the area of scientific and technical information (Adam 1999a, 127; Jensen 2000, 4; Yavo 1999, 17; Chisenga 1999, 2 and ISRG 2001b, 2). Driven by the prevalence of content and related problems in African Web sites, there has been a recognition for the need for a standard methodology that can be applied in the development of Web-based information systems in the context of Africa and developing regions with similar settings, i.e., an approach that can be used to build Web resources that can impact on development. A project carried out in Zambia and Zimbabwe by the Internet Studies Research Group (ISRG) of City University, London, developed a participatory Web design methodology called a People Approach to Produce Web Content (PAPWEC) that can be applied in the design and production of Web-based information resources that can be used to achieve development goals (ISRG 2001a, 1; 2001b, 1; 2001c, 1).

The cornerstone of the PAPWEC methodology, as defined by the ISRG (2001b, 1), is "... the recognition that development of web based information should involve the eventual users of the resource from the inception of the web development project's life-cycle and more so, after the web site has been uploaded to the Internet." That is, a participatory approach should guide the design and implementation of Web resources involving the beneficiaries of the resources. Such participation can be best attained by conducting an information needs analysis of the target audience and assessing their current socio-economic circumstances, development goals and objectives. PAPWEC provides a standard Web design methodology consisting of the following steps: identify the audience and define the purpose of the Web site, design the navigation structure of the Web site, prepare the content, use a Web authoring package to build the site, and implement the site — upload the site to a Web server, market the site (ISRG 2001b, 5). A Web site development project should aim to produce information resources that are, among other things, accessible, relevant, current, and understandable to the intended audience. To this end, PAPWEC (ISRG 2001b, 6), based on the traditional information systems development life cycle (ISDLC), outlines four stages (iterative in practice) that can guide Web developers in the Web weaving process. These are:

- Needs analysis — This is the first stage that involves such activities as examining existing sources of information; identifying the information needs/gaps of the users; studying the socio-economic circumstances of the target audience, their culture and environment and through this determining the development goals to be met.
- Content architecture — Activities at this stage include analysing the source of the content, determining the nature of the content, matching or establishing how the Web resource/information is going to meet the development goals, i.e., establishing goal congruence — the relationship between information and development — and considering any constraints the eventual user is likely to face when accessing the Web resource.
- Authoring — This stage involves designing and producing the Web site using appropriate Web editing packages and Web programming languages.

- Implementation, evaluation and impact assessments — Activities carried out at this stage are publishing the Web resource on the Internet, carrying out impact assessments, analysing Web log results, and revising and up-dating the content.

As much a technological opportunity as it has been as an information delivery platform, the Web is also a challenge because of the increasing information explosion and difficulty to access the right information (Ballantyne and Addison 2000, 19). Many Web resources encounter problems such as lack of clear purpose and target audience, lack or currency of content, credibility of authorship, access (longer download time), and navigation. Yavo (1999, 5), in his discussion of African Web sites, argued that, owing to the above-mentioned and other problems, Internet users are becoming more selective and time-conscious in visiting Web sites that offer incomplete, inaccurate, out-dated, disorganized or difficult-to-access content. This has called for the need for evaluation of Web sites, and it has established the justification for libraries and other types of information brokers to develop Web evaluation criteria based on the general guidelines used for evaluating traditional media.

UKOLN (UK Office for Library Networking) Metadata Group (1999, 1), for instance, provided a list of quality selection criteria that can be used by subject gateways for evaluating Web resources. The ISRG (2001d, 4) provided a Web evaluation checklist, derived from the guidelines of the PAPWEC model, reflecting features of an ideal Web site to be used to meaningfully contribute to the development process. Some other literature (UKOLN Metadata Group 1998a, 1; 1998b, 1; 1998c, 1) also provided criteria for selecting Web resources and a list of several other online resources concerning quality selection.

Apart from the need for Web site evaluation based on its scope, content, form (medium) and other factors, assessment of the impact of Web resources on the user community should be an ongoing practice. The ISRG (2001d, 1) argued for the use of a general impact assessment model that can be used to analyse the impact of Internet services such as e-mail and the Web on a specific target audience. Menou (cited in ISRG 2001d, 1) indicated three main drives behind the concerns of the impact of the Internet — political, managerial and intellectual drives. Policy and decision makers need to see the evidence which supports the claim that Internet technologies can bring about the ‘said benefits’ promulgated by the proponents of the technologies. Managers in the public and private sectors are concerned about how the technology is going to bring success to their organization and improve its operations. The academia are concerned with analysing the nature of this ‘new object, or phenomena’ and its potential effects. Menou (cited in ISRG 2001d, 2) also argued that impact assessment of Internet tools should be done over a period of time. That, according to the author, helps to assess changes on a “continuum which goes from the mere appearance of a novel object to leaving lasting material or behavioral transformations at the individual or social level.”

2.6. Summary

This chapter reviewed pertinent literature on the broad concepts of networking and the application of the Internet for networking in the development sector. Formalized cooperation and resource sharing, which can be traced to the birth of the classical library and information networks in the mid 1960s, presupposes basic considerations such as existence of prerequisites for successful networking, requirements and guiding principles. In the classical library network, development of a central bibliographic database constitutes the information resource to be shared by participants. Whereas, according to the literature on specialized library and information networks in agricultural and development networks, potential sharable resources in these networks include bibliographic and non-bibliographic databases. Information exchange systems in development networks provide access to different kinds of sharable resources such as information, knowledge, people or other objects.

Networks in the development sector are described in the literature as organizations established, based on the will of actively interested members for a collaborative venture, to attain common objectives within defined thematic and geographical boundaries. Similar to library and information networks, information exchange networks in the development sector can be successfully established and made viable if some prerequisites are in place in the network community. Some of the desired preconditions include widely shared problem or goal, realistic strategy for working towards solutions, capacity to contribute and balanced partnerships. The proliferation of networking in the development sector is attributed to the existence of a wider agreement that networks offer several potential advantages. The major advantages include exchange of ideas and information, focus for the efforts of an often dispersed and hard-pressed community of development workers, the opportunity to use the synergy of a group for problem-solving, and efficiency in resources use by preventing duplication of efforts. International and local networks face unique problems as well, with local ones particularly confronting inadequate financial or technical resources, coordination and information infrastructure.

Various network configurations are identified in the literature. The design of a network configuration is noted as an important specification which affects the communication media and flow patterns of information. Based on their objectives and the nature of their configuration, networks carry out a range of information exchange and dissemination activities. Some of the communication media and mechanisms used in networks include face-to-face personal interaction, interest groups, meetings, postal services, electronic telecommunications and exchange visits. Development networks are described as communication and information intensive both as producers and consumers of information. Information in networks may generate from three sources — network members, the network and interest group(s) of the network, if a network has such group(s) and subgroup(s).

The literature characterized the information products of development network communities as constituting largely grey literature and ephemeral. The information products which carry locally generated information, apart from their importance for exchange among network members, are considered in the literature as valuable sources of information for a wider range of potential audiences.

The literature on information provision to rural communities in different African countries such as South Africa, Zambia, Malawi, Botswana and Tanzania indicated that information produced by development organizations and networks may cater for the needs of different groups of information end-users such as rural communities who may receive it either directly or through information brokers. Various mechanisms and resources for information exchange and resource sharing are described in the literature. Information support mechanisms for networking include special libraries, databases, electronic telecommunications facilities and publishing. The potential sources of financial resources for networks are broadly identified to be public, private and crossover sources.

The emergence and convergence of modern ICTs have been hailed in the literature as providing a new paradigm for communication and information delivery. The literature chronicled that the Internet, developed from a single ARPAnet which was in essence set up for networking research centers across the United States, has evolved over the last three decades into a global mesh incorporating an array of facilities that can be used for communication and information delivery. However, for ICTs to meaningfully contribute to development especially in developing countries like those of Africa, the literature discussed several fundamental issues that need to be considered. Some of these include the availability of and access to the technologies, copyright issues related to Internet publishing, and the issue of free access versus fee. The literature also chronicled that since the 1980s and more so in the 1990s even in developing countries like those of Africa, the Internet has increasingly become an important technology to facilitate networking and resource sharing in the development sector. A review of Internet sites developed by such networks as SANGONeT, SANGOCO, DESUNSA, SAEP, IAALD, CGIAR, and ACT present an example. The status of the Internet in Africa, despite encouraging trends since 1998, has been characterized by insignificant Web content especially in the areas of scientific and technological information. South Africa has been described to have developed a relatively better ICTs infrastructure and Internet sites hosted in the country such as SANGONeT present good examples.

The Internet has been defined in terms of several fundamental components which constitute a feasibility dimension for establishing the prospect of developing an Internet-based information exchange system for networks. Basic considerations discussed as important in the development of cooperation and resources sharing library and information networks and information exchange networks may also be valid for an Internet-based information exchange system for networks. New trends and models of cooperation identified in the literature and methodologies for Internet site design and impact assessment also revealed important issues worth considering in planning an Internet-based information exchange system that can meaningfully contribute towards development objectives of network members.

Research Methodology and Data Collection Techniques

3.1. Introduction

This chapter presents the methodology underpinning the study. The purpose of the study was to establish the prospect of establishing an Internet-based information exchange system for the Natal Midlands Rural Development Network and to propose a model of operation for the anticipated system. To answer the research questions posed in the study and attain the objectives stated, the study covered the following areas: the information exchange activities of the network community, the general information needs of members, funding of information exchange activities, computerization and communication infrastructures and human resources available in the network community to support Internet-based information exchange system. The opinions of MIDNET members on establishing an Internet-based information exchange system were also included. These areas were covered because they were considered vital preconditions for assessing the prospect of establishing anticipated Internet-based information exchange system and plan the steps and strategies to be taken to best integrate the system into the requirements and capacity of the MIDNET community.

3.2. Research Design

The research strategy considered suitable for conducting the study was the survey research method. The reason for choosing the survey method was because of its ability to gather a wide spectrum of information from a geographically dispersed and large population at a reasonable cost and in a short time. Although literature on the subject of the Internet and its uses is immense, the investigator was not able to locate empirical studies on establishing Internet-based information exchange in a network environment and to review the methodologies used in previous studies. In broadly related investigations into library network establishment, the use of survey research using questionnaires has been noted to facilitate the collection of a large amount of data at a reasonable cost and time (Siddiqui 1995, 160; Mambo 1998, 111). These studies were successfully conducted using similar methods.

Survey research shares similar characteristics common to most other research methods. But it also has certain important differences. For instance, survey research is used to collect contemporary data while historical research is concerned primarily with past data (Powell 1997, 58). Survey research is also differentiated from experimental research in that it provides less control of the research environment and, thus, it is not capable of establishing causal relationships. It is also less rigorous than experimental research. However, survey research is better suited to studying a large number of, and geographically dispersed, cases.

The basic steps of survey research are: formulating research objectives, selecting data collection techniques, selecting the sample (if the whole population is not to be considered for data collection), collecting the data, and analyzing and interpreting the results (Powell 1997, 62). The study was, therefore, conducted based on these steps.

3.3. Research Population

The study population included all development organizations and individuals that were members of MIDNET at the time of the study. A list of all MIDNET members and their postal, e-mail, telephone and fax addresses were obtained from the MIDNET office in April 2001. There were 22 organizational and 10 individual members. As MIDNET is a regional rural development network, its members are organizations and individuals involved in rural development within the geographically defined boundary of the KwaZulu-Natal Midlands.

MIDNET's (and thus its members) geographical area of focus covers KwaZulu-Natal Regional Councils 3, 4, and 5. At the time of the study, the MIDNET coordination office was located in Pietermaritzburg. Network members were dispersely located in 16 locations in the KwaZulu-Natal Midlands region. Thirteen members were based in Pietermaritzburg, three members each in Howick and Hillcrest and one each in the remaining thirteen locations. The geographical distribution of MIDNET members is presented in Figure 1 according to membership status.

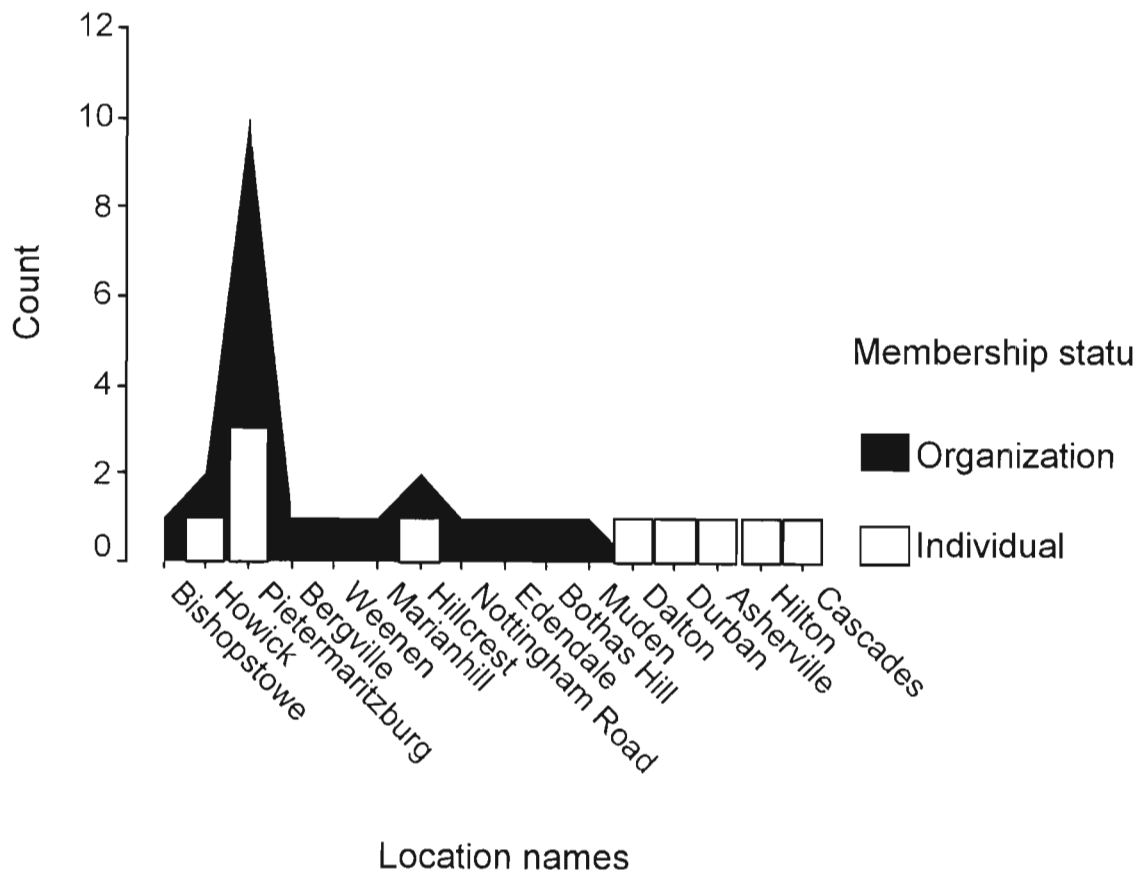


Figure 1. Geographical distribution of MIDNET members in 16 locations in the KwaZulu-Natal Midlands region

3.4. Instrumentation

The self-administered questionnaire method was used for collecting the data needed for the study. The questionnaire was considered the more appropriate procedure mainly because the information needed might require respondents to consult documents in their offices to provide well-thought-out, accurate answers. The fixed format of the questionnaire also helps to eliminate variation in the questioning process. The other reasons considered were the suitability of the instrument to facilitate the collection of large amounts of data in a relatively short time and its being relatively inexpensive to administer (Bless and Higson-Smith 1995, 111; Powell 1997, 90). The self-administered questionnaire has also disadvantages, notably elimination of personal contact between the researcher and the respondent (Powell 1997, 91). As much as possible, observation of the information exchange activities of the network and review of related literature were also done to supplement the information collected using the questionnaire. Initially the structured interview protocol method was also considered and an interview schedule for the current and preceding chairpersons of the MIDNET Executive Committee was designed. However, the interview, which was scheduled to be conducted in November 2001, was found unnecessary after evaluation of the data collected through the questionnaire and the supplementary information obtained through observation and review of pertinent documents for the study.

3.4.1. The Questionnaire

A questionnaire consisting of 47 questions/items was designed to collect necessary data for the study (Appendix 1). The questions/items were organized into four parts. Part I sought information about MIDNET members for statistics and their general information needs, while part II dealt with current information exchange activities. Part III of the questionnaire inquired the availability of information resources within the MIDNET community and part IV sought opinions of MIDNET members on establishing an Internet-based information exchange system.

The researcher was unable to locate similar studies on establishing an Internet-based information exchange system for a network community and copy or adapt the questionnaire employed for the studies. The questionnaire was, therefore, designed by the researcher on the basis of analysis of various literature broadly related to the study in different aspects and by combining those aspects to cover the information needed for the study in the questionnaire. Questions/items in part I were developed based on the discussion of Avison and Shah (1997) on information systems in organizations. Questions/items in Part II of the questionnaire were generated based on analysis of the literature by Heydon (1999) and Nelson and Farrington (1994) that discussed the nature of information exchange activities and mechanisms in the development sector. Some questions/items on computerization and Internet connectivity (part III) were adapted from a questionnaire developed by Kaniki (1999b) to study Internet facilities, use and training needs within the esAL consortium, KwaZulu-Natal. Questionnaires used by Siddiqui (1995, 263) and Mambo (1998, 232) to establish computer networks among academic libraries in Saudi Arabia and Tanzania, respectively, were also partly used to generate questions/items in part III that were related to the status of computerization, organization and human resources, funding and in part IV that were

concerned with the attitudes of network members towards establishing electronic network and the extent of their cooperation to support the system. The experience of the researcher as an information officer in support of agricultural research and development activities in Ethiopia during 1989–1999 was also an advantage in many instances.

Two covering letters were prepared to accompany the questionnaire, one by the supervisor of the study (Appendix 2) which introduced the researcher to MIDNET members and the other by the researcher (Appendix 4). The letter by the researcher contained self-introduction, brief explanations about the purpose of the study and its importance, confidentiality of responses and the address of the researcher for returning the questionnaire. Each questionnaire posted included a self-addressed, stamped, return envelope. The researcher and the supervisor examined the questionnaire for consistency. As much as possible, an easy-to-administer questionnaire was prepared. Linguistic ambiguities were removed and explanations or definitions on the questions/items and/or corresponding options were provided as appropriate. Clarity of the questions was emphasized. Closed questions, also known as fixed response or structured questions, and, to a lesser extent, open-ended or unstructured questions were used to make the questionnaire clear and easy to follow. An introductory statement was included in the questionnaire to briefly restate the purpose of the study, ensure confidentiality of the respondents and to provide instructions on how to complete the questionnaire and return it to the researcher.

3.4.2. Instrument Testing

The draft questionnaire was distributed to one doctorate and two masters students and three staff members at the Department of Information Studies, University of Natal, and one subject librarian for the Information Studies desk at the Main Library of the university, to examine the clarity, content validity, and relevance of the questions. The researcher also sought input from two MIDNET members, one organizational and the other individual, who were affiliated, respectively, to the Center for Rural Development and Agriculture Faculty at the University of Natal, Pietermaritzburg. The information professionals and the MIDNET members were purposely selected based on their knowledge of the content of the study and/or their experience with the intended respondents. They were requested to critically review the questionnaire, give their opinions, delete or revise the questions or add new ones.

The group that examined the questionnaire made several comments. Some of the issues raised were related to the length of the questionnaire, possible difficulty of some ICTs terminologies to the intended respondents and lack of comprehensiveness in the list of options in some limited answer questions. All these and other issues were considered in developing the ready-for administration copy of the instrument. Although, as Powell (1997, 106) and other literature noted, a shorter questionnaire is preferred to encourage complete responses, the researcher considered the longer one feasible for this study in view of respondents' motivation by the study and their expectation of some benefits from it. This special preference is supported by Powell (1997, 106).

3.5. Data Collection Procedure

The method used for distributing and collecting questionnaires was postal service. One questionnaire was distributed to each MIDNET member organization and individual. Mails to organizational members were posted to individuals who represented their organizations in MIDNET. Each questionnaire was mailed together with a self-addressed and stamped envelope to facilitate the return. A total of 32 questionnaires were posted on 16 July 2001. A fixed date for returning the questionnaire, 15 August 2001, was stated in the covering letter by the researcher and it was restated in the introductory statement of the questionnaire.

The response rate, which remained a problem throughout, was initially poor, with only 11 completed questionnaires returned within the fixed date. Most of the questionnaires returned within the fixed date were from individual members which constituted less than one-thirds of the MIDNET membership. This might be partly explained by the reluctance of respondents who had to complete the questionnaire on behalf of organizations that they represented in MIDNET. Two more questionnaires were returned within two weeks after the deadline. In an attempt to produce a significant response rate, the investigator set another deadline (on or before 15 September) and mailed questionnaires together with a reminder covering letter stating the importance of members' cooperation in providing information to successfully conduct the study. A self-addressed and stamped envelope was included in each questionnaire. However, only one questionnaire was returned within two weeks after the second deadline. The researcher then made an aggressive follow up inquiry by contacting respondents through telephone and e-mail which resulted in a return of three questionnaires in October and the last one on 10 November 2001. By then, a total of 18 questionnaires were received, which produced a response rate of 56.75%. All the questionnaires received were found usable for the study, although there were some instances in which questionnaires were not fully completed.

Supplementary information was obtained throughout the study by way of obtrusive and unobtrusive observation of some information exchange activities of MIDNET members. This was done mainly through invitation of the MIDNET Executive Committee and some members to participate in meetings and visit their offices. Supplementary materials relevant to the study, particularly information products and internal documents of MIDNET, some MIDNET members and interest groups of MIDNET, were also collected and reviewed to supplement information obtained through the questionnaire.

3.6. Data Analysis and Presentation

The Statistical Package for the Social Sciences (SPSS) for Windows, Version 9.0, was used to analyze the questionnaire data after a data cleaning process was done. A coding key was prepared in which numerical values were assigned to all limited answer options in the questionnaire with 0 representing 'No answer'. The data was entered on a data matrix designed using SPSS for Windows. The data was then processed in terms of descriptive statistics by frequency counts and percentages. The data is presented in Chapter 4 in both quantitative form using descriptive statistics and qualitative form.

3.7. Summary

To accomplish the research objectives, the study covered the following areas: current information exchange activities; general information needs; availability of information resources in terms of ICTs infrastructure, organization and human resources and funding; and opinion on establishing an Internet-based information exchange system. The study was conducted using the survey method because of its suitability to study a large number of, and geographically dispersed, cases.

The research population included all the 32 development organizations and individuals that are currently members of MIDNET. The members were distributed in 16 locations in the KwaZulu-Natal Midlands region. The self-administered questionnaire method was chosen for collecting the data needed for the study because of its appropriateness, among other things, to facilitate the collection of large amounts of data in a relatively short time and its being relatively inexpensive to administer. A questionnaire was designed and examined by some information experts and two MIDNET members, and issues raised were considered in developing the ready-for-administration copy of the instrument. The questionnaire was distributed by post on 18 July 2001 and collected until 10 November 2001.

Out of the questionnaires distributed to all 32 members, 18 (56.8%) were returned, mainly as a result of an aggressive follow-up, and used. Supplementary information was obtained through observation of some aspects of the information exchange and dissemination activities of MIDNET members. Document analysis was done mainly to establish the contents and categories of the information products of MIDNET, its interest groups and some members. SPSS for Windows, Version 9.0, was used to analyze the questionnaire data. A coding key was prepared and data was entered on a data matrix designed using SPSS for Windows. However, while SPSS was used to process limited answer questions of the questionnaire, content analysis was used for the analysis of responses to open-ended questions and the 'other(s)' category in some limited answer questions. The data was processed in terms of descriptive statistics and presented in both quantitative and qualitative forms.

Presentation, Interpretation and Discussion of Research Results

Information resources do not stand alone, out of context with other resources.
(Menou 1993, 90)

4.1. Introduction

The general purpose underpinning the present study was to establish the prospect of developing an Internet-based information exchange and dissemination system for the Natal Midlands Rural Development Network (MIDNET) and to propose a model of operation for the anticipated system. In order to achieve the desired goals, the following research objectives were formulated:

1. To identify the current information exchange activities and mechanisms used by the members of MIDNET
2. To establish the general information needs of MIDNET members
3. To identify and examine the available information resources in terms of ICTs infrastructure, funding, organization and human resources within the network community
4. To establish the current capacity of MIDNET members to support the anticipated Internet-based information exchange system
5. Based on the findings, to propose a model of operation for the establishment of an Internet-based information exchange system for MIDNET

In order to accomplish the objectives of the study, the following research questions were posed:

1. What are the current information exchange activities and mechanisms used by the members of MIDNET?
2. What are the general information needs of MIDNET member organizations?
3. What information resources are available within the network community in terms of:
 - (a) organization and human resources
 - (b) funding
 - (c) ICTs infrastructure?
4. What is the current capacity of MIDNET members to support the anticipated Internet-based information exchange system
5. What model of operation can be used to establish an Internet-based information exchange system for MIDNET?

The study was carried out using the survey method. The data necessary to study the variables reflected in the research questions were collected mainly using a self-administered questionnaire to MIDNET members. Supplementary, qualitative information was also collected through observation of some aspects

of the information production, exchange and dissemination activities of MIDNET members. According to Powell (1997, 119), observation, as a data collection technique, makes it possible to record behavior as it occurs and allows the investigator to compare what people actually did with what they said they did. As the researcher had established a working relationship with the MIDNET administration while developing the proposal for the study, he was able to make both unobtrusive and obtrusive observations with invitations from the MIDNET Executive Committee to participate in, and observe, some of the network activities. He was also invited by two organizational members of MIDNET to visit their offices and collect copies of their documents. Document analysis was done mainly to establish the contents and categories of the information products of MIDNET, its interest groups and some members.

Out of the questionnaires distributed to all 32 MIDNET members, only 18 (56.8%) were returned. A coding key for the questionnaire was drawn up whereby numerical values were assigned to all limited answer options with 0 representing 'No answer'. Data were then entered on a data matrix designed using the SPSS for Windows, Version 9.0. Descriptive statistics (frequency counts and percentages) were used in analyzing the data and describing the variables considered in each question/item in the questionnaire. Responses to open-ended questions and the category of 'other(s)' in questions with limited option answers could not be precoded. A combination of content analysis and qualitative coding was used to interpret these types of responses.

This chapter presents, interprets and discusses the results of the study. Section 4.2. covers data on background information about MIDNET members. Each of the subsequent sections are organized around a single research question to cover data elicited to answer that question. The last section summarizes the findings.

4.2. Distribution of Respondents According to Membership Status and Classification of Organization or Work

Two questions, one about membership status and another about classification of organization or work, were designed to elicit background information about MIDNET members' distribution. These questions were intended to establish the types of MIDNET members that participated in this study. All the 18 respondents who participated in this study answered the first question of the questionnaire which required them to indicate whom they represented in MIDNET. Those who represented their organizations could state the name of the organizations and those who were individual members could indicate their affiliations, private enterprises or their names if they wished to.

Out of the 18 respondents, 10 (55.6%) indicated that they represented their organizations and eight (44.4%) themselves as individual members. All the 10 respondents who represented their organizations stated the names of the organizations, with three further indicating the names of the parent organizations of which their organizations were a part. While responding to other questions, one respondent also mentioned that the organization he/she represented was a country program of an international organization. Among the respondents who indicated to be individual members, three stated

that they owned a private enterprise and two as affiliated to an organization. The results are presented in Table 1 according to classification of work.

Networks aim to draw in, within defined boundaries, institutionally dispersed individuals. That allows network members, inter alia, to exchange knowledge and experience with other members working in the same area or for a similar goal. Development organizations and practitioners often engage in more than one activity. Respondents were asked to indicate the most appropriate classification that described their organization or work, if they were individual members. Four classifications and the 'other' category were listed. Respondents could indicate only the most appropriate classification, even though their organizations or works could be described by more than one classification, as is often the case. The results are presented according to membership status in Table 1.

Seven (38.9%) respondents classified their organizations or work as NGOs, three (16.7%) academic institutions, two (11.1%) private enterprises and one (5.6%) CBO. However, this does not appear to be a true reflection of the organizational or work classification within MIDNET. During his participation in MIDNET meetings in April 2001, the investigator was able to learn that CBOs also constituted a major part of MIDNET membership. Out of 5 (27.8%) respondents who answered the 'other' category, two specified the classification of their organization or work as parastatal, two freelance development consultancy service and one development consultancy and research, which is rather a vague classification.

Table 1. Distribution of respondents according to membership status and classification of work

Membership	Classification of organization or work					Total
	NGO*	Academic institution	CBO*	Private enterprise	Other [†]	
Organizational	6	2	1	—	1	10 (55.6) [‡]
Individual	1	1	—	2	4	8 (47.1)
Total	7 (38.9)	3 (16.7)	1 (5.6)	2 (11.1)	5 (27.8)	18 (100.0)

* NGO, non-governmental organization; CBO, community-based organization

[†] Parastatal, freelance development consultancy, development consultancy and research

[‡] Figures in parentheses represent row and column percentages

As noted by Nelson and Farrington (1994, 31), the definition of a central theme, and building membership around that common theme of action, are important activities in the initiation and sustenance of development networks. That, as evidenced from the experience of MIDNET (MIDNET 2000, 1), can best be done by formulating network objectives and boundaries for membership. According to its constitution (MIDNET 2000, 1) MIDNET accepts both organizational and individual membership. Whereas organizational membership is open to NGOs and CBOs, individual membership is open to development experts who are not affiliated to organizational members of MIDNET.

Findings showed that MIDNET members surveyed indicated two types of membership and seven classifications that best described their organization or work. All the seven classes that described MIDNET member organizations and the works of individual members were within the domain of civil society, or as Jorday (2000, 2051) described them, the citizen sector. However, some of the classifications are noted in the development literature to lack commonly agreed-upon definitions. For instance, NGOs are often simply defined by what they are not, namely, non-governmental organizations. Vakil (cited in Jorday 2000, 2052) defined NGOs as “self-governing, private, not-for-profit organizations that are geared toward improving the quality of life of disadvantaged people”. Community-based organizations (or CBOs in NGO parlance), as described by Abugre (1994, 122) based on the South African experience, are civil organizations that include various neighborhood bodies such as community crisis committees and land claims committees.

The findings on classification of organization were contrary to MIDNET’s rule that organizational membership is open to NGOs and CBOs. However, it is important to note that development organizations, as discussed in the next section, are often involved in several activities. This might make it difficult to describe them by just one classification. For instance, one organizational member that answered as an NGO also replied that the organization was part of an academic organization. Besides, the functions and interests (and thus classifications) of development organizations and practitioners may change over time. Related to such changes, Nelson and Farrington (1994, 31) suggested that regular re-registration and consequently reclassification of members is essential to track their changes of functions and improve information exchange and dissemination activities accordingly.

4.3. General Information Needs of MIDNET Members

Questions in part one of the questionnaire were designed to answer the following research question: “What are the general information needs of MIDNET members?” General information needs, within the context of development organizations and practitioners, can be defined in terms of information that is necessary to enhance the objectives and activities of an organization or work of a development practitioner. It was necessary in this study to identify the information needs of MIDNET members because they would largely determine the kinds of information to be supplied, the modes of delivery and, in effect, guide the researcher on the question of usefulness of the Internet.

4.3.1. Objectives of organization or work

Objectives, simply defined, are attainable ends. Organizations and practitioners formulate specific development objectives to convert their succinct mission statements into specific performance targets or yardsticks by which the performance and progress of the organization can be measured. Respondents were asked to state the specific objectives of their organizations or work. Each member could describe or give more than one objective. Content analysis was used to analyze the statements and count the responses. Fifteen (83.3%) respondents answered the question, with two providing copies of documents that stated the objectives of their organization. Related to objectives, some MIDNET members also

indicated methodological approaches they use to attain development goals such as holistic, sustainable and integrated methods. Table 2 presents the results according to membership status.

Table 2. Organizational or work objectives of MIDNET members according to membership status

Objectives	Membership status		
	Organization	Individual	Total
Capacity building of practitioners	1	—	1
Training and development	2	1	3
Applied research	1	1	2
Community development and poverty alleviation	1	—	1
Job and/or skills development of communities	4	—	4
Rural enterprise development	1	1	2
Development and dissemination of training methodology	1	—	1
Community forestry	—	1	1
Children's rights	—	1	1
Agriculture related potentials of natural resources, financial and other resources, individuals and organizations	1	—	1
Facilitating learning in self and development of poor rural people (via consultancy)	—	1	1
Consultancy services in agricultural extension, rural development and/or rural enterprise	—	2	2
Promote organic farming through research, training and demonstration	1	—	1
Assist farmers and other communities in improving livelihood by providing training, support and advice in sustainable agriculture and natural resource management	1	—	1
Total	14	8	22

MIDNET members indicated 14 specific organizational or work objectives. The objectives, indicated by different types of members with different classifications of organization or work, reflected a similar overview of goals geared toward rural development, which is the thematic boundary of the network.

4.3.2. Activities and disciplines describing programs of organization or work

Organizations design development programs to achieve their targeted results. While objectives are the ends, programs or strategies are the means to achieving the objectives. Respondents were asked to indicate the activities or fields of work that describe the programs of their organization or work. A number of activities and the 'other' category were listed, and each respondent could indicate more than one activity. However, the total number of responses for any one activity could not exceed more than the number of respondents that answered the question. Sixteen (27.6%) respondents indicated that they are

involved in development, 15 (25.9%) education and training and 11 (19.0%) research. Two ‘other’ activities, skills development and welfare, were stated by two (3.5%) respondents who indicated the ‘other’ category. Table 3 presents the results.

Table 3. Activities describing programs of MIDNET members

Activity	Response	
	Number	Percentage
Education and training	15	25.9
Development	16	27.6
Research	11	19.0
Consultancy	8	13.8
Advocacy	6	10.4
Other*	2	3.5
Total	58	100.0

*Skills development (1 response) and welfare (1)

The development programs of organizations and practitioners are based on one or more specific disciplines in which they specialize. MIDNET members were asked to indicate, among six options and ‘other’ category listed, the discipline(s) that describe their organizational or work programs. Respondents could select more than one discipline in which they are involved. Fifteen (29.4%) members indicated sustainable development and 11(21.6%) agriculture and food security. Ten ‘other’ disciplines were specified by nine (17.6%) respondents. These included adult education and enterprise development, both mentioned by two respondents. The others given by one respondent in each case include: community education, participatory development, human rights, rural development, nature conservation, rural water supply, land reform, and agricultural extension. Table 4 summarizes the results.

4.3.3. Extent of receiving information

The literature on the relationship between information and development noted that information is one of the primary inputs for development (Woods 1992, 65; Kaniki 1999a, 3; Boon 1992, 65). At organizational and individual level, useful information is needed to enable decision-making and problem-solving, while undertaking development activities to attain the programs planned and enhance the objectives formulated. The information needed at various levels of organizations must be, among other characteristics, timely with respect to its intended use, appropriate for the objectives and activities being undertaken and in a form understandable to the intended users (Avison and Shah 1997, 39). The information needed by development organizations and practitioners may be generated and made available both internally, within the organization, and externally, from outside sources.

Table 4. Disciplines describing programs of MIDNET members

Discipline	Response	
	Number	Percentage
Agriculture and food security	11	21.6
Forestry	3	5.9
Sustainable development	15	29.4
Land use	9	17.6
Economics	2	3.9
Emergency relief	2	3.9
Other*	9	17.6
Total	51	100.0

*Disciplines mentioned in this category include adult education, enterprise development, community education, participatory development, human rights, rural development, nature conservation, rural water supply, land reform and agricultural extension

MIDNET members who stated their objectives and indicated the activities and disciplines of their development programs were further asked to indicate the extent to which they receive information necessary to enhance their objectives and activities. Although three individual members did not state the objectives of their work, they indicated their activities. Therefore, all the 18 respondents could respond to what extent they received necessary information from internal and external sources. Four options were listed in each information source category: receiving information in all cases (always), in some cases (sometimes), in rare cases (rarely) and never receiving. Out of 17 (94.4%) MIDNET members who responded to internal sources, 12 (70.6%) indicated that they or their organization received information from internal sources in some cases, four (23.5%) always and one (5.9%) rarely. All the 18 members responded to external sources, with 14 (77.8%) indicating that they received information in some cases and four (22.2%) always.

An open-ended question asked MIDNET members to explain the instances in which information was received in rare cases, i.e., the type of information necessary to enhance the objectives and activities of members but received in rare cases or never received at all. The results on the extent of receiving information showed that none of the MIDNET members encountered a situation in which they could access information from external sources in rare cases or never at all. However, one (5.9%) MIDNET member indicated that in rare cases information is obtained from internal sources. The explanation stated by the member, based on content analysis, did not indicate specific instances in which information was received in rare cases and the response was discarded.

Table 5. Some internal and external sources of information used by MIDNET members

Source	Organization	Individual	Total
INTERNAL SOURCES			
Parent organization or headquarters	1	—	1 (4.2)*
Resource center of organization	1	—	1 (4.2)
Other organizations/programs within the parent organization	2	—	2 (8.3)
Personal experience/reflections on work done	—	3	3 (12.5)
Staff members, chatting to colleagues	1	1	2 (8.3)
Staff and student projects	—	1	1 (4.2)
Meetings in organization (formal and informal)	1	—	1 (4.2)
Records/internal documents (reports, minutes, etc.)	—	2	2 (8.3)
Workshops and seminars organized by regional department	1	—	1 (4.2)
Volunteers assisting the organization and their membership	1	—	1 (4.2)
The communities with whom work is done	1	1	2 (8.3)
Facilitators/resource people the organization works with to reach client communities	1	—	1 (4.2)
People and organizations through the projects I work on	—	1	1 (4.2)
Reading — white and grey literature, print media	3	—	3 (12.5)
Trustees	1	—	1 (4.2)
Work carried out (work experience)	—	1	1 (4.2)
Total Response	14 (58.8)	10 (41.7)	24 (100.0)
EXTERNAL SOURCES			
Other organizations involved in similar work	4	—	4 (9.1)
Partnership	1	—	1 (2.3)
Networking	7	3	10 (22.7)
Internet resources	4	5	9 (20.5)
Reading — white and grey literature, print media	5	4	9 (20.5)
Conferences/workshops organized externally	2	1	3 (6.8)
Academic institutions	1	—	1 (2.3)
Professional associations	1	—	1 (2.3)
Colleagues	—	2	2 (4.5)
Work carried out (work experience)	—	1	1 (2.3)
Exchange of scientific publications	1	—	1 (2.3)
Mass media	1	1	2 (4.5)
Total Response	27 (61.4)	17 (38.6)	44 (100.0)

* Figures in parentheses represent percentages of total response

4.3.4. Internal and external sources of information

The information needed by development organizations and individuals to enhance their activities and objectives may have several dimensions. As Avison and Shah (1997; 4, 41) noted, information can be accessed from internal or external sources. The information accessed from either source may be formal or informal and in print, oral, visual, audio or electronic form. As reflected above, most MIDNET members indicated that they received the information they required in some cases. MIDNET members who indicated that they received information in all cases or in some cases from internal sources (16) and external sources (18) were further asked to state some of the sources of information they used within and outside the organization or work. Respondents could mention more than one internal or external source. However, in each internal and external source, total number of responses could not exceed 16 and 18, respectively, i.e., the total number of respondents that indicated to have received information always or sometimes. As summarized in Table 5 according to membership status, 16 internal and 12 external sources were indicated.

Among internal sources, 'own experience/reflections on work done' and 'reading' were indicated by 3 (12.5%) MIDNET members each. Chatting to colleagues and external entities working within organizations or those involved in the works of practitioners were among the internal sources indicated. These included the communities that organizations or practitioners work with (8.3%), intermediaries used to reach client communities (4.2%) and those connected with projects undertaken (4.2%). Among external sources used to access information, networking was indicated by 10 (22.7%) MIDNET members and the Internet and reading nine (20.5%) each (Table 5).

Some of the members that mentioned use of networking provided instances of national and regional networks such as SANGOCO, SANGONeT, MIDNET, and the National Land Committee. Some of the international networks mentioned were the Overseas Development Institute (ODI) and Sussex University. One organizational member (2.3%) indicated use of professional associations such as the Organic Agriculture Association of South Africa. Some of those MIDNET members who indicated use of the Internet gave examples of specific Internet resources such as education and government Web sites, newsgroups (Internet interest groups, to use the word of one respondent) like 'Mountain Forum' and Internet newsletters. Nine (20.5%) members stated reading of scientific and technical publications such as journals, books, newsletters and magazines.

4.3.5. Interpretation and discussion

It is widely noted in the information and development literature that information is a critical resource to facilitate development in the rural sector (Woods 1993, 11; Kaniki 1999a, 3; Boon 1992, 65; Rosenberg 2001, 11). Development organizations and practitioners seek information to resolve problems, make wise (informed) decisions and answer questions. As stated in Section 4.2., general information needs of development organizations and practitioners can be defined in terms of information that is necessary to enhance the objectives and activities of an organization or work of a development expert. To establish

the general information needs of MIDNET members, a number of issues were surveyed, including members' specific objectives and activities, extent to which necessary information is received, types of information that are rarely or never received and internal and external sources of information used.

The findings revealed that the MIDNET members surveyed had 14 specific objectives. The objectives stated by members with different membership status and classification of organization or work reflect similar goals, geared toward rural development which is the thematic boundary of MIDNET. There is some evidence that MIDNET encompasses a community of institutions and individuals with similar information seeking behavior. Whereas objectives are conversions of mission statements, often into more than one specific performance target, most MIDNET members provided just a single objective, either in the form of mission statements or description of activities. Generally, the objectives of MIDNET members were geared toward similar goals, with community development and poverty alleviation reflected as the value underpinning their operations, which were described by seven classifications. Sustainability and holistic or integrated approaches were also indicated in the objectives of MIDNET members surveyed. Edwards (1999, 364), in a study of the performance of NGOs in South Asia, found the general objectives of NGOs studied to be the same — to achieve sustained improvement in the livelihoods of poor people and their capacity to influence the forces which shape these livelihoods. In broader terms, therefore, it can be said that the objectives of MIDNET members are similar to those of development organizations and experts operating in developing countries.

Development organizations and practitioners formulate strategies or programs of action to achieve their objectives. The findings on activities describing the programs of MIDNET members surveyed revealed seven activities, with 27.6% members indicating development, 25.9% education and training, 19% research and 13.8% consultancy. The programs of MIDNET members were also found to fall within 16 disciplines such as sustainable development (29.4%), agriculture and food security (21.6%) and land use (17.6%). A study by Sayed (1998, 27) found 12 similar disciplines or fields of activity practised by NGOs in Cape Town. The findings of this study showed that MIDNET members, like development organizations in other areas, were involved in more than one activity and discipline of work to achieve their objectives. That may be explained by the holistic approach adopted by MIDNET members to attain their development ends. Leach (1999, 75) identified a wide range of subject areas in which NGOs in rural KwaZulu-Natal (including some MIDNET members) were providing information to adults. This can be evidenced from the response of one interviewee (NGO staff) in Leach's study, "... the longer you stay in the communities the more you get involved with the other social and development issues ... we do find ourselves having to deal with issues relating to schools, illiteracy, water, roads when it comes to talking about human rights".

Developmental objectives and activities such as education and training, capacity building, research and social change are information intensive (Meyer 1997, 1130). As noted in Section 4.2.2., development organizations need information, from both internal and external sources, that would enhance their objectives and activities. The information needed should ideally be received, inter alia, timely with respect to its intended use, appropriate for the objectives and activities being undertaken and in a form

understandable to the intended users (Avison and Shah 1997, 39). The findings on the extent of receiving necessary information disclosed that 70.6% of MIDNET members received information from internal sources sometimes, 23.5% always and 5.9% rarely. Findings on external sources indicated that 77.8% of MIDNET members received necessary information sometimes and the remaining 22.2% always.

Only one (5.9%) MIDNET member indicated rare cases of receiving information from internal sources. However, the member could not articulate the instances in which that was the case. The study thus could not establish the general information needs in terms of information necessary to enhance members' objectives and activities, but received in rare cases or never at all. That may be a reflection of disadvantage of using a self-administered and mailed questionnaire in which the researcher is not present to clarify questions or probe responses (Schutt 1993, 299). The open-ended question method used in this instance, as Neuman (1997, 241) and Powell (1997, 107) pointed out, is also partly disadvantageous, as respondents may give different degrees of detail, provide irrelevant information, interpret questions differently or may not understand them clearly. Open-ended questions also demand more time to complete, which may discourage respondents from responding completely and articulating adequately.

The study found out that MIDNET members who indicated that they had received necessary information in all or some cases used 16 internal and 12 external sources. As reflected in Table 5, information was received from internal sources mainly by way of communication through work situations with people such as staff, client communities, persons and organizations with whom work was done; by way of reading scientific and technical literature; personal experience; work done; parent organizations and resource centers. The findings also revealed that, among external sources, 22.7% MIDNET members used regional, national and/or international level networking; 20.5% each Internet resources and print resources, 9.1% other organizations and 6.8% meetings. Other sources related to networks were partnership and professional associations (2.3% each). In a survey of information sources used by NGOs in Cape Town, Sayed (1998, 27) found seven sources — scientific and technical literature, networking, other organizations, academic institutions, training, meetings and the Internet (e-mail lists, discussion groups and the Web).

In many instances, both organizational and individual members used similar sources of information. It must be noted that all the sources used can be appropriate, in specific situations, to meet the information needs of MIDNET members. For instance, information received from client communities may help to enhance the participatory approach to development or explore the problems facing rural communities, on the basis of which new strategies or priorities may be set. Use of the Internet and print media (reading) may notably improve the scientific and technical knowledge of development experts in their fields of work. In addition, use of other organizations or people, networking, meetings or exchange programs may broaden the experience of organizations and development experts in their fields of interest. MIDNET members' use of the Internet as a source of information is some evidence that the concept of Internet-based information exchange is not a new experience to them. Moreover, MIDNET members' participation in other networks, partnerships and professional associations can be an indication of their commitment to cooperation and information exchange.

4.4. Current Information Exchange Activities

Establishing a new information system for facilitating information exchange in networks requires a thorough understanding of the activities currently in place. To this end, several questions were designed in part two of the questionnaire to achieve the following research objective: “to identify the current information exchange activities and mechanisms used by the members of MIDNET”.

4.4.1. Reasons for participation in information exchange activities

The constitution of MIDNET (2000, 1) states that one of the objectives of the network is to facilitate the exchange of information among members. It was, therefore, assumed in the present study that all MIDNET members participate in one or more information exchange activities. MIDNET members were asked to indicate the reasons for their participation in exchanging information with other members. Four reasons and the ‘other’ category were listed and members could give more than one reason. Seventeen (35.4%) of the respondents indicated that they or their organizations were engaged in information exchange activities to share ideas and experiences with other MIDNET members and 12 (26.7%) to discuss and debate on topics of common interest, nine (18.8%) to share expertise and six (12.5%) to plan and implement joint projects and activities. Three (6.2%) members indicated the ‘other’ category and stated, ‘to keep abreast of developments in my/my organization’s field(s) of work’.

As noted above, MIDNET members indicated five reasons why they participate in information exchange activities with other members. How they conduct the exchange activities when they are motivated by such drives is another important consideration to understand their current information exchange activities. Two main aspects of information exchange in networks come to the fore in this regard, namely, communication media and mechanisms such as word-of-mouth or interest groups and information production and dissemination activities or, simply, information products like newsletters and activities like training (Nelson and Farrington 1994, 30). Other considerations include language of communication, domains of information that may or may not be sharable, and information policy.

4.4.2. Communication media and mechanisms

MIDNET members were asked to indicate the communication media and mechanisms they use for exchange of information. A list of nine media and mechanisms traditionally used in development networks (Nelson and Farrington 1994, 30) and the ‘other(s)’ category was provided. Face-to-face interaction was explained in the instrument to mean one-to-one, one-to-many, many-to-many, etc. modes of verbal face-to-face communication, whereas meetings were explained as those that take such formal forms such as conferences, workshops and seminars. MIDNET members could indicate one or more options. However, the total response to a medium or mechanism could not be more than 18, 18 being the number of respondents that answered the question. Sixteen (20.5%) members indicated use of e-mail, 15 (19.2%) face-to-face interaction and 13 (16.7%) meetings. Other means of communication and frequency of use are presented in Table 6.

Table 6. Communication media and mechanisms used by MIDNET members

Media and mechanisms	Response	
	Number	Percentage
Face-to-face interaction	15	19.2
Interest group(s)	8	10.3
Meetings	13	16.7
Postal services	8	10.3
E-mail	16	20.5
Telephone	8	10.3
Fax	4	5.1
Field visits	4	5.1
Exchange visits	2	2.6
Total response	78	100.0

4.4.3. Information products and activities

Information products, especially those that contain locally generated information, constitute a vital part of the sharable resources among network members and for information delivery to other target audiences (Haravu 1994, 256; Sturges and Neill 1998, 170). In a local network environment, local development information may emanate from the activities of three main potential sources and disseminate to network members and other potential targets. These sources are network members (organizational and/or individual), the network and interest groups of the network. MIDNET members were asked to indicate categories of information products and dissemination activities that are outputs of one or more of these sources. Based on Nelson and Farrington (1994, 30) and Heydon 1999, 70), 11 information products and activities commonly produced in agricultural and development organizations and networks were listed, together with the 'other' category. Public awareness documents such as brochures, leaflets and pamphlets were grouped as one category of products.

A total of 14 categories of information products and two activities were said to be produced by one or more of the different information sources within MIDNET. As presented in Table 7, 15 (13.8%) MIDNET members indicated newsletters and 13 (11.9%) each annual reports; training and brochures, leaflets and/or pamphlets. Five (4.6%) respondents who indicated the 'others' category mentioned three categories of products (course materials, fact sheets/flyers, and resource guides/manuals) and one activity (focus group sessions).

Table 7. Categories of information products and dissemination activities used within different sources of information in the MIDNET community*

Category of products and activities	Response	
	Number	Percent
Newsletters	15	13.8
Annual reports	13	11.9
Magazines	1	0.9
Special papers	9	8.3
Discussion papers	9	8.3
Conference/workshop proceedings/syntheses	12	11.0
Journals	4	3.7
Books	6	5.5
Working papers	6	5.5
Bulletins	3	2.7
Brochures, leaflets and/or pamphlets	13	11.9
Training	13	11.9
Others**	5	4.6
Total response	109	100.0

*Sources of information include MIDNET members, MIDNET and interest groups of MIDNET

** Course materials, fact sheets/flyers, resource guides/manuals and focus group sessions

Among the 14 categories of products, 11 were indicated to be produced by organizational members of MIDNET, 10 MIDNET, nine individual members and five interest groups of MIDNET. However, some products, indicated to be outputs of interest groups such as newsletters and annual reports, were not true reflections. That was ascertained by the present investigator through discussion with some interest group coordinators. Analysis of MIDNET newsletters and annual reports also reflected incorporation of information emanating from the activities of the different interest groups of the network. Among the two categories of information dissemination activities indicated, training was mentioned to be used within organizational members of MIDNET, MIDNET and MIDNET interest groups. Focus group sessions were indicated to be used only by organizational members. Table 8 summarizes the categories of information products and activities according to sources of information.

4.4.4. Content categories of information products and activities

Information products of network communities can be more useful sharable resources when, among other things, they are able to cater for the needs of different network members that have different objectives, fields of work and disciplines. Identifying the information content categories of products helps networks

to identify gaps in addressing the different information needs of members and for planning information exchange activities. MIDNET members were asked to indicate the categories of information content reflected in the 16 information products and activities used within the network community. Based on the work of Heydon (1999, 40), and comments made by the group used for pretest of the instrument, 14 information categories of publications commonly used among development organizations and networks were listed. Twelve (10.4%) out of the total 18 MIDNET members surveyed indicated sustainable development information; 11 (9.6%) information about organization, work of individual members, or network; 10 (8.7%) sustainable livelihood information and 9 (7.8%) each policy-related information and gender information. Five (4.3%) members indicated the 'other' category and mentioned 13 content categories. The results are summarized in Table 9.

Table 8. Categories of information products and dissemination activities used within different sources of information in MIDNET

Category of products and activities	Number of response			
	MIDNET	MIDNET interest groups	Organizations	Individuals
Newsletters	11	3	4	1
Annual Reports	6	2	6	—
Magazines	1	—	—	—
Special papers	—	—	5	4
Discussion papers	3	4	3	3
Conference/workshop proceedings/ syntheses	5	1	5	3
Journals	1	—	1	2
Books	2	—	2	2
Working papers	—	—	2	4
Bulletins	2	—	—	1
Brochures, leaflets and/or pamphlets	7	2	8	3
Training	3	3	7	5
Others*	1	—	2	—
Total response	42	15	45	28

*Network = fact sheets/flyers; organizations = resource guides/manuals and focus group sessions

4.4.5. Other issues of communication and information exchange

Some other important considerations in the planning and conduct of information sharing in networks may relate to language of communication, information policy and information domain. Language, a vital aspect of human communication, bears a special significance in networks that attempt to draw in people

with different ethnic, societal, institutional and geographical backgrounds. Information exchange may take place in a monolingual, bilingual or multilingual mode. However, one of the languages used often appears to be the lingua franca of the network community. MIDNET members were asked to indicate the language(s) they use when they exchange information through the nine communication media and mechanisms and 16 information products and activities. Two languages, English and Zulu, widely used in KwaZulu-Natal, which is the area of operation for MIDNET members, and the 'other(s)' category, were listed. MIDNET members could indicate more than one language. However, responses to one language could not exceed 18, the number of respondents who answered the question.

Table 9. Information categories of information products and activities used for information exchange and dissemination

Information category	Response	
	Number	Percent
Sustainable development information	12	10.4
Sustainable livelihood information	10	8.7
Agricultural information (like technology development or appropriate technology)	8	7.0
Agricultural extension information	8	7.0
Policy-related information	9	7.8
Gender information	9	7.8
Economic information (information on market, price, etc.)	3	2.6
Research information	7	6.0
Food security information	8	7.0
Environmental information	7	6.0
Land reform information	8	7.0
Legal entities information	2	1.7
Participatory rural appraisal information	8	7.0
Organizational/Work/Network information	11	9.6
Other categories*	5	4.3
Total response	115	100.0

*Thirteen 'other' information categories were stated. These were:

Development facilitation skills	Education (adult education, community education and/or teacher training)	General interest
Entrepreneurship		Current news/issues
Language and literacy	Health	Human rights (gender, economic justice, citizenship)
Life skills	Voter/democracy	Training methodology
Forestry	Civil responsibility	

Table 10 summarizes results according to membership status. All the 18 MIDNET members indicated use of English in all instances and nine (50%) both English and Zulu. The nine members who indicated use of English and Zulu were further asked the language predominantly used. Eight (88.8%) members used English predominantly and one (11.1%) Zulu. Although the investigator did not ask the instances in which the languages are used, the respondent who indicated dominant use of Zulu explained the use of English and Zulu during workshops and Zulu for other communication purposes. Another respondent mentioned translation of some publications from English to Zulu.

Table 10. Languages of communication and information dissemination and predominantly used language among MIDNET members

Membership	Number of responses			Total
	English	Zulu	English and Zulu	
LANGUAGES USED				
Organization	3	—	7	10 (55.6)*
Individual	6	—	2	8 (44.4)
Total	9 (50.0)		9 (50.0)	18 (100.0)
LANGUAGE PREDOMINANTLY USED				
Organization	6	—	—	6 (66.7)
Individual	2	1	—	3 (33.3)
Total	8 (88.9)	1 (11.1)	—	9 (100.0)

*Figures in parentheses represent percentages of total response

In a network and information sharing environment, it is important to identify the domain of information emanating from the activities of development organizations and practitioners. Some types of information may be in the public domain and other types in the private domain, with restricted access. Four (23.5%) MIDNET members indicated that they produce information with restricted access and the remaining 13 indicated open access. Out of two organizational members who indicated that they produce information with restricted access, one was an NGO and the other an academic institution. Out of two individual members, one owned a private enterprise and one was a freelance consultant.

MIDNET members who indicated that they had produced information with restricted access were further required to state the type(s) of information and nature of restriction. The results are presented in Table 11. Two organizational members that belong to the same parent academic institution indicated that course materials developed by them and/or partners are limited to internal use.

Table 11. Types of information produced with restricted access and nature of restriction

Type of Information	Nature of restriction	Response by membership		
		Organization	Individual	Total
Course materials developed by organization and/or partners	Limited to internal use	2	—	2
Information from some consultancy done for a client*	Report submitted to client	—	1	1
Information about on-going consultancy work	Information not released until completion of work	—	1	1
Information about consultancy work treated by client as confidential	Information treated as confidential in respect of client's request	—	1	1
Total response		2	3	5

*For instance, evaluation reports

Weingarten (cited in Rowlands 1996, 14) defined information policy as comprising “the set of all public laws, regulations, and policies that encourage, discourage, or regulate the creation, use, storage, and communication of information.” In development organizations and networks, rules and regulations that guide the generation, production, repackaging, dissemination, disposal and collection of information positively contribute to intense use of information exchange activities. MIDNET members were asked whether or not they, MIDNET or MIDNET interest groups have written policy. Policy was explained to mean rules and regulations concerning such instances as editorial, review, distribution and disposal of information products or other information management aspects. All the 18 MIDNET members indicated that they did not have any policy. Eight (44.4%) responded to existence of policy in MIDNET, with two (25%) indicating existence and six (75%) non-existence. Out of five (29.4%) members who responded to existence of policy in interest groups, one (20%) indicated existence and four (80%) non-existence. However, the results on policy in MIDNET and interest groups do not reflect the reality as there could only be one correct answer — existence or non-existence.

4.4.6. Satisfaction with current information exchange activities

For proper planning of the development of a supplementary information exchange system in networks, it is important to study the current communication and information delivery systems in terms of members' satisfaction, review problems faced by network members, and to determine whether or not problems and solutions indeed lead to new systems requirements. It was therefore important for the study to establish the levels of MIDNET members' satisfaction with current communication media and mechanisms and information products, and to identify problems and solutions.

4.4.6.1. Extent of satisfaction

MIDNET members were asked to indicate the extent to which they were satisfied with the exchange of information through the nine communication media and mechanisms and the information received from different sources via the 16 information products and activities they indicated. Five degrees of satisfaction were listed — very satisfied, satisfied, somewhat satisfied and never satisfied. A ‘no opinion’ option was also included. Eleven (61.1%) and 13 (72.2%) members were satisfied with communication media and mechanisms and information products and activities, respectively. The results are summarized according to membership status in Table 12.

Table 12. Extent of satisfaction of MIDNET members with current communication media and mechanisms and information products and activities

Extent of satisfaction	Number of responses by membership		Total	
	Organization	Individual	Number	Percentage
COMMUNICATION MEDIA AND MECHANISMS				
Very satisfied	—	3	3	16.7
Satisfied	7	4	11	61.1
Somewhat satisfied	3	1	4	22.2
Total	10	8	18	100.0
INFORMATION PRODUCTS AND ACTIVITIES				
Very satisfied	—	3	3	16.7
Satisfied	9	4	13	72.2
Somewhat satisfied	1	1	2	11.1
Total	10	8	18	100.0

4.4.6.2. Problems with communication media and information products

The four MIDNET members who were somewhat satisfied with communication media and mechanisms and two somewhat satisfied with information products and activities were further asked to name the problems they faced. Content analysis was used in analyzing the explanations. The results are summarized in Table 13. Related to communication media and mechanisms, two (40%) members mentioned time constraint to attend meetings, field visits and to keep in touch with the MIDNET office. One member (20%) each indicated problems related to information disseminated from the MIDNET office via e-mail. Regarding information products and activities, one (33.3%) member each indicated time constraint, lack of awareness of new products and lack of materials in Zulu each (Table 13).

4.4.6.3. Suggested solutions to problems

As noted in Tables 12 and 13, four MIDNET members indicated that they were somewhat satisfied with communication media and mechanisms and had faced several problems. The four members were asked

to comment on how to overcome the problems. Content analysis was used to analyze the comments made. Several solutions were suggested by one (14.3%) member each. The results are presented in Table 14.

Table 13. Problems with communication media and mechanisms and information products and activities

Problem	<i>Responses by membership</i>		<i>Total</i>	
	Organization	Individual	Number	Percent
COMMUNICATION MEDIA AND MECHANISMS				
Time constraint to attend meetings, field visits, etc.	2	—	2	40.0
E-mail information disseminated by MIDNET not selected, reformatted, and selectively distributed based on subject interest	—	1	1	20.0
E-mail-based information dissemination experienced as 'over-kill'	1	—	1	20.0
Duplication of information disseminated by other networks	1	—	1	20.0
Total	4	1	5	100.0
INFORMATION PRODUCTS AND ACTIVITIES				
Time constraint (to collect new materials and read publications)	1	—	1	33.3
Lack of awareness of new products (poor marketing via e-mail and newsletters)	1	—	1	33.3
Shortage of written materials in Zulu	1	—	1	33.3
Total	3	1	3	100.0

Table 14. Suggested solutions to problems with current communication media and mechanisms

Solution	<i>Responses</i>	
	Number	Percent
Marketing new publications via e-mail	1	14.3
Expanding network membership, i.e., involving more people	1	14.3
Web-based information exchange system (to allow members access to information at times suitable to them)	1	14.3
E-mail newsletter, not just a Web site	1	14.3
Reformatting/repackaging information disseminated via e-mail	1	14.3
Selective dissemination of e-mail information by subject interest of members	1	14.3
Quality assessment of information disseminated by e-mail	1	14.3
Total responses	7	100.0

4.4.7. Interpretation and discussion

Supplementing existing information exchange activities in development networks with an Internet-based system by way of replication requires a thorough understanding of the current activities. Surveying current information exchange activities in MIDNET was, therefore, intended as an important consideration in establishing the prospect of developing a new system and in planning steps and strategies for developing the system. As noted by Meyer (1997, 1133), development organizations and practitioners, by investing in networking, exchange information and strengthen each other's production processes. Sayed (1998, 28) found an overwhelming positive response if NGOs in Cape Town communicate with other NGOs and the value of communication for development was stressed as 'essential'.

The present study investigated MIDNET members' participation in information exchange with other members, because facilitating information exchange, as stated in the MIDNET constitution (MIDNET 2000, 1), was one major objective of the network. Analysis of the reasons for exchanging information with other MIDNET members indicated that all members surveyed participated in information exchange. MIDNET members indicated five reasons for engaging in information exchange, with 35.4% seeking to share ideas and experiences, 27.1% to discuss and debate on topics of common interest, 18.8% to share expertise, 12.5% to plan and implement joint projects and activities and 6.5% to keep abreast of developments in their areas of interest. The reasons indicated by MIDNET members for participating in information exchange imply that shared learning and, to a lesser extent, joint projects, were the motives underpinning their participation in information exchange. Learning, as Woods (1993, 11) stated, is the central objective in developing people and institutions; information and communication play important roles for achieving this learning. Shared learning can build solidarity, cutting costs through saving human and financial resources and strengthening individual organizations and practitioners and the rural development sector as a whole (Meyer 1997, 1133; Sayed 1998, 30).

Findings on how MIDNET members carried out information exchange activities when they were driven by five reasons revealed that nine communication media and mechanisms, and 16 categories of information products and activities, were used, as reflected in Tables 6 and 7 and 8. Sayed (1998, 28) found use of eight media, newsletters and training by NGOs in Cape Town. The information reflected in the 16 information products and activities of MIDNET members, MIDNET and interest groups of MIDNET was described by 27 content categories (Table 9). These were largely reflections of the activities and disciplines in which MIDNET members were engaged to achieve their organizational or work objectives. Findings on the information exchange activities showed that MIDNET members are, in general, information-intensive development organizations and experts both as producers and consumers of information. Social change, the goal of such organizations and individuals, is indeed information and communication intensive (Meyer 1997, 1133).

The communication media and mechanisms, to a large extent, and the forms of information products and activities currently in use in MIDNET, were traditional interfaces of information exchange widely used

in agricultural and development networks (Nelson and Farrington 1994, 30; Heydon 1999, 40). The information products indicated by MIDNET members were largely characterized by grey literature and thus ephemera. Jorday (2000, 2055) also noted the importance of an appropriate mix of communication media and mechanisms in an information exchange environment. Related to this, as indicated by Woods (1993, 24), research worldwide has concluded that "... each medium of communication has advantages over others for certain purposes and in specific situations". This leads to the conclusion that the best use of all communication media is needed.

However, as Woods (1993, 132) claimed, ICTs provide a realm of new opportunities to address a wide variety of communication and information exchange needs and hence human and institutional development functions through investing in a single ICTs-based system. The Internet, for instance, provides an array of facilities that can be used to replicate the communication media and mechanisms and information products currently used by MIDNET members. The Internet facilities for communication such as e-mail, newsgroups, discussion forums, chat rooms, and Web-based communication allow online conversation, virtual conferencing, interest group communication and exchange of documents among organizations and individuals distantly located. Web publishing enables network members to publish primary and secondary information outputs for dissemination to other members, whereas portal technology can be used to provide gateways to information resources produced by members and other relevant resources to network members. Web-based training may also be used to replicate current information exchange by way of training.

The findings on information products of MIDNET members showed that 12 out of 14 categories of information products can be categorized as grey literature, but two categories of products, journals and books, are in the category of white literature (Osani 1996, 170). Grey literature, as defined by Osani (1996, 263), is "literature that are produced and issued by diverse non-conventional publication channels and which are therefore difficult to identify, obtain and process." Behrens (2000, 374) described grey literature as simply 'non-trade materials'. Grey research and development literature in developing countries have been widely valued as the most important location-specific information sources, but largely neglected by special library services (Haravu 1994, 256; Sturges and Neill 1998, 170). In this case, the Internet, or Web publishing, provides the opportunity to 'produce and/or reproduce' grey literature and disseminate it more easily, quickly and widely than is the case with printed documents (Behrens 2000, 394). In real terms, if effectively and appropriately applied, the Internet can effectively be used to transmit most, if not all, of the information that is normally communicated through ephemeral and grey literature.

All MIDNET members surveyed indicated use of English as a language of information exchange and dissemination when they used nine communication media and mechanisms and 16 information products and activities. Nine (50%) members also used Zulu. Of the nine members who exchange information in a bilingual mode, eight (88.9%) indicated predominant use of English. As English is the lingua franca of MIDNET members in current information exchange scenarios, an Internet-based information exchange system may therefore be conducted using English. However, use of Zulu may be an important

consideration to cater for the needs of bilingual members and for dissemination of information to non-members, particularly in KwaZulu-Natal. As Zulu uses the same Latin script as English, its use for Internet-based systems does not require special software and thus does not incur additional cost for buying and/or customizing software.

The findings concerning the domain of information emanating from the MIDNET community revealed that it was largely an open access type. However, there were some instances in which 23.5% of MIDNET members surveyed produced information with restricted access. As reflected in Table 11, four types of information that can be broadly categorized as consultancy reports and, to some extent, course materials of some MIDNET members, are produced for internal use or for the clients of particular consultancy works. The production of information with restricted access is an important consideration in planning sharable resources in the context of the current, as well as the anticipated, Internet-based information exchange system.

A written policy on the overall management of information production, exchange and dissemination activities in networks is essential to promote intense use of useful information. This is a valid consideration, especially in an Internet-based information exchange, as Internet resources are often characterized, *inter alia*, by lack of authority, credibility, authorship and copyright rules, originality and quality of content, and accuracy of information (Yavo 1999, 12). All MIDNET members surveyed indicated that they did not have a written information policy. Findings on existence of policy in MIDNET and interest groups of MIDNET were contradictory. The formulation of rules and regulations that would guide information exchange activities in MIDNET should consider existing policies within the network community. Related to this, Mchombu and Miti (1992, 140) recommended that existing policies and lacunas should be taken into account before proposing any new information policies.

4.5. Information Resources Available Within the MIDNET Community

Information resources, as Menou (1993, 90) noted, do not stand alone, out of context with other resources. The development and sustaining of an Internet-based information exchange system in development networks requires different resources to serve, as well as access, information via the electronic information delivery platform. The Internet, as noted in the literature, is not only a technology-laden physical infrastructure. It has several fundamental components (Carbo 2000, 240). Several questions were designed in part three of the questionnaire to identify and examine available resources for information support within the MIDNET community. The aim was to review the extent to which current resources may be used to support Internet-based information exchange. Resource availability is defined here in terms of organization (information units) and staffing, funding and ICTs infrastructure within MIDNET members, the network coordination office and interest groups of the network.

4.5.1. Organization and human resources for information support

Identifying current information support systems within network communities is important to establish the capacity for, and plan, new information exchange systems. It was therefore important for the study to investigate the information support systems within the MIDNET community.

4.5.1.1. Information units

MIDNET members were asked to indicate the existence of an information unit(s) responsible for the production and dissemination of information in their organization, MIDNET coordination office and interest groups of MIDNET. Of the 18 respondents, 17 (94.4%) answered the question. Four (23.5%) of those who responded indicated existence and 13 (76.5%) non-existence of information unit(s). MIDNET members who indicated existence of information unit(s) were further asked to indicate the type of unit(s) and in which of the three network entities, namely, member organizations, MIDNET and interest groups of MIDNET. Three types of units that may be set up in development organizations and networks — library, publishing and information technology — and the ‘other’ category were listed. Each respondent could indicate more than one unit and for more than one entity. However, in each unit to be indicated to have existed in one entity, there could only be a possible total of four responses, four being the number of respondents who indicated existence of information unit(s). Two MIDNET members indicated to the possession of a library unit, three publishing units and one information unit. One member each indicated existence of library and publishing units in MIDNET and two information technology units. Respondents did not indicate existence of any unit in interest groups.

4.5.1.2. Information staff

MIDNET members were asked to state the number of information personnel working in each information unit indicated to have existed in MIDNET member organizations and MIDNET. The reason for this is because number of staff can be one indicator for availability of capacity in the MIDNET community, either to host or provide expertise for the development of an Internet-based system for the network. Findings in this question were not intended to include staff of units other than information professionals. Staff indicated to have worked in more than one unit were counted for the combination of the units mentioned. Regarding units available in members, one member each indicated one staff to run library and both publishing and information technology units, while one member indicated two staff to run a publishing unit. In MIDNET, one member each mentioned one staff responsible for an information technology unit and for library, publishing and information technology functions.

The results concerning the existence of information units in MIDNET, the types of the units indicated, and the number of staff mentioned to have worked in the units, were contradictory. That might have arisen due to respondents’ different perspectives of the definition of each unit and the professionalism of staff to run the units. Another reason could be lack of clarity with the instrument.

Table 15. Other arrangements of responsibility for the production and dissemination of information in the absence of information unit(s) in MIDNET members, MIDNET and interest groups of MIDNET

Arrangement	<i>Responses by membership</i>		
	Organization	Individual	Total
MIDNET MEMBERS			
Teaching staff	1	—	1
Information officers of parent organization	1	—	1
Part-time worker	1	—	1
Director of organization (for preparation of public relations information)	2	—	2
Project team	1	—	1
Project coordinator	1	—	1
Ad hoc committee (coordination) with freelance workers and commercial publishers	1	—	1
Self	—	3	3
Ad hoc committee	—	1	1
Designation of a person(s) in specific project	—	1	1
Total	8	5	13
MIDNET			
MIDNET members based on their subjects of interest and responsibility	—	2	2
MIDNET office (production and/or dissemination)	—	2	2
Delegated person(s)	—	1	1
MIDNET Executive Committee	—	1	1
Sub-committee	—	1	1
Total	—	7	7
MIDNET INTEREST GROUPS			
Members of interest group based on their areas of interest	—	1	1
MIDNET office	—	1	1
Convener of interest group	—	1	1
Designated person	—	1	1
Sub-group(s)	—	1	1
Total	—	5	5

4.5.1.3. Other arrangements of responsibility for information support

MIDNET members were asked to explain who was responsible for the production and dissemination of information in cases of absence of one or more information units in organizations, MIDNET and interest groups of MIDNET. Examples were provided to clarify the question. A number of ways of doing the information work were explained and content analysis was used to identify, categorize and count the instances. The part of the question that referred to the situation in members was answered by 10 respondents, MIDNET four and interest groups three. The results are summarized in Table 15.

4.5.2. Funding for information exchange and dissemination

Finance is one of the crucial resources for network members to carry out communication and information exchange activities effectively in the long run. One of the preconditions for successful networking is the capacity of members to contribute, among other things, financial resources (Nelson and Farrington 1994, 19).

Table 16. Sources of funding of MIDNET members for information exchange activities

Classification of organization or work	<i>Responses by source of funding (number)</i>				Total
	Government	Donor agency	Private sources	Other sources*	
ORGANIZATIONAL MEMBERS					
NGO	3	5	1	1	10
Academic institution	1	1	—	1	3
Sub-total	4	6	1	2	13
INDIVIDUAL MEMBERS					
NGO	1	1	1	—	3
Academic institution	—	—	—	1	1
Private enterprise	—	—	2	—	2
Other	—	1	1	—	2
Sub-total	1	2	4	1	8
Grand total	5	8	5	3	21

* Parent organization, trusts, foundations and churches

4.5.2.1. Sources of funding

MIDNET members were asked about their sources of funding for information exchange and dissemination activities. Three sources and an 'other' category were listed and respondents could indicate more than one. Total responses for each funding source could not, however, exceed 13 (72.2%), the number of respondents who answered the question. The results are shown according to membership status and classification of organization or work in Table 16. Among organizational members, six

received their funds from donor agencies, four government, two other sources and one private sources. The sources indicated in the 'other' category were parent organization, trusts, foundations and churches. Among individual members, four obtained their funds from private sources, two donor agencies, one government and one other source which was not specified.

4.5.2.2. Annual budget

Budgets for information exchange and dissemination activities of development organizations and practitioners can be indicators of their capacity to support network-based information sharing operations. MIDNET members were asked to state the trend of their total annual budget for information exchange and dissemination activities from 1999 to 2001. Thirteen (72.2%) members answered the question. One (7.7%) member each indicated a budget of R25 000 to 50 000 for each fiscal year. For 2001, one (7.7%) member indicated a budget of over R50 000. Ten (76.9%) MIDNET members indicated that they did not know the amount of budget for information exchange. One (7.7%) member indicated that there was no budget specifically for information exchange in 2001, two (15.4%) in 2000 and two (15.4%) in 1999. Table 17 summarizes the results.

Table 17. Annual budgets of MIDNET members for information exchange and dissemination activities for the fiscal years of 1999 to 2001

Budget (Rand)*	2001		2000		1999	
	Number	Percent	Number	Percent	Number	Percent
25 000–50 000	1	7.7	1	7.7	1	7.7
Over 50 000	1	7.7	—	—	—	—
No budget	1	7.7	2	15.4	2	15.4
Don't know	10	76.9	10	76.9	10	76.9
Total response	13	100.0	13	100.0	13	100.0

*November 2001 exchange rate, US\$1= R9.50

4.5.2.3. Percentages of budgets

MIDNET members were asked to indicate the approximate percentages of the budgets for information exchange activities for the fiscal years 1999 to 2001. Only those members who indicated the amount of budget they allocated could answer the question, i.e., one respondent for the fiscal years 1999 and 2000 and two for 2001. One member indicated <5% for 1999 and one 33% for 2001. Although one member indicated a budget for 2001 in the range of R25 000–50 000, this was not expressed as a percentage.

4.5.3. ICTs infrastructure

A number of questions were designed to survey existing and/or planned ICTs infrastructure among MIDNET members. The aim was to identify and examine the extent to which existing infrastructure may be used for creating and maintaining the anticipated Internet-based information exchange system for MIDNET and the capacity of MIDNET members to participate in the system.

4.5.3.1. Availability of computers and computer networks

Seventeen (94.4%) out of the 18 MIDNET members answered that they owned computers. The remaining one (5.6%), who was a CBO organizational member, indicated not to have owned a computer. The 17 members who owned computers were further asked if they or their organization developed a computer network. Sixteen (94.1%) responded, with 10 (62.5%) indicating existence of a computer network and the remaining six (37.5%) non-existence. Out of the 10 MIDNET members that indicated to have developed a computer network, seven (70%) indicated the network configuration to be a local area network and three (30%) a wide area network. The results are presented in Table 18, according to membership status and classification of organization or work.

Table 18. Availability of computers, computer networks and connectivity to the Internet

Classification of organization or work	Computers	Computer networks			Internet connectivity
		LAN*	WAN	Total	
ORGANIZATIONAL MEMBERS					
NGO	6	4	1	5	6
Academic institution	2	2	—	2	2
Other	1	—	1	1	1
Sub-total response	9 (52.9) [†]	6	2	8 (80.0)	9 (52.9)
INDIVIDUAL MEMBERS					
NGO	1	—	—	—	1
Academic institution	1	1	—	1	1
Private enterprise	2	—	—	—	2
Other	4	—	1	1	4
Sub-total response	8 (47.1)	1	1	2 (20.0)	8 (47.1)
Grand total	17 (100.0)	7 (70.0)	3 (30.0)	10 (100.0)	17 (100.0)

*LAN, local area network; WAN, wide area network

[†] Figures in parentheses represent percentages of row and column grand total values

4.5.3.2. Internet connectivity and access

As reflected in Table 18, all the 17 MIDNET members who replied that they owned computers also indicated to have connectivity to the Internet. These members were further requested to indicate the nature of their connectivity. Three options of connectivity and the 'other' and 'don't know' category were listed. Fifteen (88.2%) members responded, with seven (46.7%) each indicating direct connection and dial-up and one (6.7%) both direct connection and dial-up. Table 19 presents the results according to membership status and classification of organization or work. Connectivity of an organization does not necessarily guarantee all staff access to the Internet. The 17 MIDNET members that indicated to have connectivity were further asked about who has access to the Internet. Four categories of staff and the 'others' category were listed. Respondents could either indicate 'everybody' or one or two of the other three categories and/or the 'other' category. Thirteen (76.5%) members responded, while the remaining four (23.5%) who were individual members did not respond. Ten (62.5%) MIDNET members said that everybody in the organization or private enterprise had access to the Internet, three (18.6%) management and one (6.3%) each indicated access for practitioners, administrative staff and other staff. Staff mentioned in the 'other' category included project managers and other regular staff. Table 20 presents the results according to membership status and classification of organization or work.

Table 19. Nature of Internet connectivity of MIDNET members

	<i>Number of responses by nature of connectivity</i>			
	Dial-up	Direct	Both	Total
ORGANIZATIONAL MEMBERS				
NGO	3	2	1	6
Academic institution	—	2	—	2
Other	—	1	—	1
Sub-total	3	5	1	9 (60.0)*
INDIVIDUAL MEMBERS				
NGO	1	—	—	1
Academic institution	—	1	—	1
Private enterprise	1	—	—	1
Other	2	1	—	3
Subtotal	4	2	—	6 (40.0)
Grand total	7 (46.7)	7 (46.7)	1 (6.7)	15 (100.0)

* Figures in parentheses represent percentages of grand total responses

The environment in which staff have or may have access to the Internet may reflect the extent of access. MIDNET members were asked to indicate the environment of access in which they or staff of the organization they represent in MIDNET access the Net. Two Internet access environments and the 'other arrangement' category were listed for organizational members. Access environments could be indicated according to the category of staff indicated to have access, as presented in Table 20. Fifteen (88.2%) out of 17 MIDNET members that indicated to have connectivity responded to this question, making a total of 16 responses. The results are summarized in Table 21, according to membership and classification of organization or work. Among organizational members, six indicated that everybody in the organization had access to the Internet using personal work-stations (computer terminals) in their office. One NGO organizational member indicated that everybody had access using general work-station that was shared with other staff members and one NGO organizational member indicated access in similar arrangement for management staff. Four individual members had access using a personal work-station in the organization they were affiliated with, while four used their personal computers at their homes.

Table 20. Categories of staff of MIDNET members that have access to the Internet

Classification of organization or work	Staff category					Total
	Management	Practitioners	Admin.	Everybody	Other	
ORGANIZATIONAL MEMBERS						
NGO	2	—	1	4	1	8
Academic institution	—	—	—	2	—	2
Other	—	—	—	1	—	1
Sub-total	2	—	1	7	1	11 (68.7)*
INDIVIDUAL MEMBERS						
NGO	—	—	—	1	—	1
Academic institution	—	—	—	1	—	1
Private enterprise	—	—	—	1	—	1
Other	1	1	—	—	—	2
Sub-total	1	1	—	3	—	5(31.2)
Grand total	3 (18.6)	1 (6.3)	1 (6.3)	10 (62.5)	1 (6.3)	16 (100.0)

*Figures in parentheses represent percentages of number of grand total responses

4.5.3.3. Development of Internet-based information system and Internet facilities used

Existence of Internet-based information exchange and dissemination systems developed by MIDNET members and the specific Internet facilities used can be one consideration in examining the extent to which capable members may contribute in expertise and Internet site hosting for MIDNET. It was also intended that existence of Internet-based information exchange and dissemination within MIDNET members could indicate their experience with the technology and, not least, it could be considered in

planning the configuration of an Internet-based system for MIDNET. MIDNET members were asked if they have developed an Internet-based information exchange and dissemination system. A list of options including 'yes', 'no' and 'don't know' was provided. Out of 17 members that indicated to have computers and connectivity, 14 (82.4%) indicated that they have developed an Internet-based information exchange and dissemination system. One (5.9%) respondent indicated that he/she did not know and two (11.8%) non-existence of the system. Table 22 presents the results according to membership status and classification of organization or work.

Table 21. Internet access environments for staff of MIDNET member organizations and individual members

Classification of organization or work	Access environments*				Total
	A	B	C	D	
ORGANIZATIONAL MEMBERS**					
NGO	3	2	—	—	5
Academic institution	2	—	—	—	2
Other	1	—	—	—	1
Sub-total	6	2	—	—	8 (50.0) [†]
INDIVIDUAL MEMBERS					
NGO	—	—	1	—	1
Academic institution	—	—	1	1	2
Private enterprise	—	—	1	1	2
Others	—	—	1	2	3
Sub-total	—	—	4	4	8 (53.3)
Grand total	6 (37.5)	2 (12.5)	4 (25.0)	4 (25.0)	16 (100.0)

* A = personal work-station in their office
 B = general work-station to be shared with other staff

C = Personal work-station within the organization I am affiliated with
 D = Personal computer at home

** Category of staff in organizational members was indicated to be everybody in all instances

[†] Figures in parentheses represent percentages of grand total responses

The 14 MIDNET members that said they had developed an Internet-based information exchange and dissemination system were asked to indicate which Internet facilities were used. Eight facilities, with brief definitions of the use of each, and the 'other(s)' category were listed. All 14 (45.2%) members indicated to have developed an e-mail system, 10 (32.3%) World Wide Web, four (12.9) mailing lists, two (6.5%) intranets, and one (3.2%) telnet. Table 23 summarizes the results according to membership status and classification of organization or work.

Table 22. Development of an Internet-based information exchange system among MIDNET members

Classification of organization or work	Response			Total
	Yes	No	Don't know	
ORGANIZATIONAL MEMBERS				
NGO	5	1	—	6
Academic institution	2	—	—	2
Other	1	—	—	1
Sub-total	8	1	—	9 (52.9)*
INDIVIDUAL MEMBERS				
NGO	1	—	—	1
Academic institution	—	—	1	1
Private enterprise	2	—	—	2
Other	3	1	—	4
Sub-total	6	1	1	8 (47.1)
Grand total	14 (82.4)	2 (11.8)	1 (5.9)	17 (100.0)

*Figures in parentheses represent percentages of grand total responses

Table 23. Internet facilities used by MIDNET members to develop Internet-based information exchange and dissemination system

Classification of organization or work	Number of responses by facility					Total
	E-mail	WWW*	Mailing list	Intranet	Telnet	
ORGANIZATIONAL MEMBERS						
NGO	5	3	2	1	—	11
Academic institution	2	1	—	1	—	4
Other	1	1	1	—	—	3
Sub-total	8	5	3	2	—	18 (58.1) [†]
INDIVIDUAL MEMBERS						
NGO	1	1	—	—	—	2
Private enterprise	2	1	—	—	—	3
Other	3	3	1	—	1	8
Sub-total	6	5	1	—	1	13 (41.9)
Grand total	14 (45.2)	10 (32.3)	4 (12.9)	2 (6.5)	1 (3.2)	31 (100.0)

*World Wide Web

[†] Figures in parentheses represent percentages of grand total responses

4.5.3.4. Plans for building ICTs infrastructure

Reviewing the existence of plans for building ICTs infrastructure among network members who do not have one or more of the necessary technologies may be an important consideration in planning an Internet-based information exchange and dissemination system for MIDNET. MIDNET members who did not own computers, did not develop computer networks, were not connected to the Internet and/or did not develop Internet-based information exchange and dissemination system were asked if they had plans to do any of these. Based on the results reflected in the previous section, there could be only one response for plans for each of owning computers and connectivity and six for developing computer networks. Three MIDNET members responded, with one each indicating plan to own computer(s), develop computer network, Web site and intranet and using Internet cottages.

MIDNET members were asked to indicate their implementation plans for owning computers and development of LAN, WAN, connectivity, Web site, intranet, use of Internet cottages and the 'other' technologies category. Three options for implementation (immediate, up to one year; short term, between one and two years and the 'no idea' option) were listed. In the case of each technology, total responses could not exceed the total number of responses that indicated to have plans for each technology, namely, one for each. One member, a freelance development consultant, indicated to have 'no idea' on implementing his/her plan to build a Web site while one indicated short term plan. One NGO organizational member each indicated long term plan for local area network development and 'no idea' for wide area network and using Internet cottages. One NGO organizational member indicated a plan to develop intranet in the short term.

4.5.4. Interpretation and discussion

The third research objective of the present study sought to identify and examine the available information resources within the MIDNET community, in terms of organization and human resources, funding and ICTs infrastructure. These resources are among the basic considerations for an Internet-based information system to have a prospect for MIDNET. Carbo (2000, 240) defined the Internet as having six fundamental components — people; information content; hardware or other physical components; software and other electronic delivery platforms; standards, codes, laws, regulations and other policies and financial resources. Kaniki (1999a, 14), ISRG (2001a, 8) and other researchers noted in the literature review have argued that resources such as availability of, and access to, ICTs are fundamental issues for ICTs to have a prospect in Africa.

This study collected data about the availability of information units within the MIDNET community, the number of information professional staff in the units and other arrangements of responsibility in instances in which information units and personnel were not available. This was done to establish how information support units and staff or other arrangements may assist in Internet-based information exchange activities. According to the findings, two MIDNET members indicated that they had a library unit, three a publishing unit and one an information technology unit. One MIDNET member indicated availability

of library unit at the MIDNET coordination office, one publishing unit and two information technology unit. Members did not indicate availability of any unit in interest groups of MIDNET. One member each indicated one staff to have run its library unit, two publishing unit and one publishing and information technology duties. One MIDNET member indicated one staff to have been responsible for MIDNET information technology unit and another member indicated one staff as being responsible for all information support duties.

The study findings indicated that very few MIDNET members have one or more information units and that these units are poorly staffed. Through observation, the present investigator noted that the MIDNET administration office was run by one office manager until July 2001, when one more staff member was employed for network coordination duties. The office manager, in addition to management functions, provided information support such as processing and distribution of network publications, referral services and information dissemination via e-mail.

Findings on other arrangements for the production and dissemination of information revealed an array of innovative methods used in MIDNET members, MIDNET and interest groups of MIDNET. The investigator, based on his experience in agricultural research organizations and professional associations, also noted that such approaches are commonly used in developing countries, mainly because of lack of capacity to afford information support services. These arrangements, as reflected in Table 15, relied more on paraprofessional support using the time and expertise of development experts and management staff on an ad hoc basis. The presence of voluntary subject experts can be exploited mainly for generating, selecting and processing the production of information for an Internet-based information exchange system as well. The advantage in the use of subject experts may be subject expertise, dedication and reduction in staff costs. The innovative approaches, however, are not without disadvantages. For instance, such approaches are based on ad hoc arrangements which results in high turnover of responsibilities, they lack professional information expertise such as librarianship, publishing and systems management and they can best be used more for selection of materials, editorial/writing and technical consultancy than routine activities that require full-time attendance. Another disadvantage may be time constraint to balance regular research and development works and information support duties with a tendency of treating the latter as a secondary activity.

Adequate funding is an essential requirement for the establishment of an Internet-based information exchange system for development networks. Members constitute one source of finance for network operations, including information exchange. Network members, in turn, as the findings of the present study showed (Table 16), may receive funding from different sources. MIDNET members indicated seven sources, with donor agencies, private sources and government indicated by many members. Findings on annual budgets for information exchange showed that most respondents (76.9%) did not know the budgets and five members did not respond. One member indicated that there was no budget for information exchange for the year 2001 and two members each for 2000 and 1999. Only one member indicated the budget for information exchange as a percentage of the total budget for the year 2001 and another one for 1999 (<5%). The 'don't know' response and non-response could be due to respondents'

reluctance to provide financial information, or it could indicate lack of time in order to consult financial documents.

In general, the data gathered in this study could not reflect the trend in funding information exchange and dissemination activities for the fiscal years 1999 to 2001. It was thus not adequately informative to examine how members could financially support the establishment of an Internet-based information exchange system for MIDNET. Through discussion with MIDNET members, however, it was noted that there has been significant deterioration in funding, particularly among South African NGOs since 1994 which could impede their information work. For instance, one NGO affiliated to an academic institution had to stop producing its bilingual newsletter for distribution (mainly to newly literate rural client communities) because of lack of funding.

ICTs infrastructure forms the backbone for establishing an Internet-based information exchange system for networks. The Internet operates based on the client-server network architecture. Network members, therefore, require adequate ICTs infrastructure to process and produce information in electronic form, serve the information resource on the electronic delivery platform and access the information for use. The present study collected data on the availability of computers, computer networks, Internet connectivity and existence of plans in the case of absence of one or more of these technologies within the MIDNET community. The nature of Internet connectivity, access of staff and access environments and development of Internet-based information exchange and dissemination system by MIDNET members were also surveyed.

Findings revealed that 94.4% of MIDNET members surveyed owned computers and were connected to the Internet, while 62.5% of members have developed computer networks. Among the 17 members that indicated connectivity, 46.7% each had direct and dial-up connection, while 6.7% indicated to have both types of connection. Out of 10 members that developed computer network, 70% indicated a local area network configuration and 30% a wide area network. Findings on access to the Internet showed that in 62.5% of MIDNET members everybody had access. In six (37.5%) organizational members staff had access using 'their' personal work-station in their office and four (25%) individual members used similar access environment in the organizations to which they were affiliated. Members also indicated use of general work-station (12.5%) and personal computers at home (25%). Results also indicated that 82.4% of MIDNET members surveyed developed Internet-based information exchange and dissemination system using one or more of five Internet facilities — e-mail, the Web, the mailing list, intranet, and telnet.

The results on available ICTs infrastructure in general showed that MIDNET members are 'digital' development organizations and practitioners and that Internet-based information exchange and dissemination is not a new phenomenon to them. This is not surprising because, as noted in the literature review, South Africa has a relatively better ICTs infrastructure in Africa, with significantly higher number of teledensities (teledensity), ISPs, Internet hosts, and Internet users (Jensen 2001, 11; Mutula 2001, 21). The good state of ICTs infrastructure available and existence of plans for computerization and Internet-based systems development in the MIDNET community provides a technical prospect for the

establishment of Internet-based information exchange system for MIDNET in terms of three major aspects. Firstly, MIDNET has members whose ICTs infrastructure and expertise in developing an Internet-based system may be used for establishing an Internet-based system for MIDNET. Secondly, most MIDNET members are connected to the Internet and provide good access environment for their staff. This provides the opportunity for staff of members to participate in the anticipated system without incurring significant cost for access and training. Thirdly, development of Internet-based systems by members can be useful in planning the extent of cooperation for establishing the anticipated system for MIDNET and the possible configuration the system would have. As noted by Ballantyne and Addison (2000, 17), members that have developed particularly Web-based systems have shown a self-standing model of cooperation by developing and contributing to their own system and making it available to other members and non-members that have connectivity.

4.6. Opinion on Establishing an Internet-based Information Exchange System

Central to information exchange activities within networks are network members. Members are the prime contributors of inputs necessary to conduct information exchange activities. Therefore, plans for a new information exchange system should be within the interest, capacity and requirements of network members to contribute to, and participate in, the system. Reviewing members' opinions on the adequacy of current information exchange activities, identifying problems and factors hindering and/or enhancing information sharing and suggested solutions to overcome problems are important considerations in establishing the prospect of a new system. Based on the traditional information systems development life cycle (ISDLC), such initial considerations also help to obtain a more thorough understanding of problems, determine whether or not problems indeed lead to new systems requirements and propose steps and strategies that may be taken in establishing a new system in the light of weaknesses and strengths with the current situation (Avison and Shah 1997, 95). Questions in part four of the questionnaire were designed to survey opinions of MIDNET members on these aspects.

4.6.1. Adequacy of current information exchange activities

As noted, a thorough understanding of information exchange systems currently in place is crucial to establish the prospect of a new system. The present study therefore sought to collect data on the adequacy of the current information exchange activities practiced in MIDNET.

4.6.1.1. Extent of adequacy

MIDNET members were asked to give their opinions on the extent of adequacy of current information exchange and dissemination activities to attain the goals and objectives of the network. Four ranks of adequacy (very adequate, adequate, inadequate, and very inadequate) and a 'no opinion' option were provided. Nine (50.0%) members indicated that the current activities were adequate, four (22.2%) inadequate, three (16.7%) no opinion and two (11.1%) very adequate (Table 24).

Table 24. Adequacy of information exchange activities according to membership status

Level of adequacy	Response		Total
	Organization	Individual	
Very adequate	—	2	2 (11.1)*
Adequate	5	4	9 (50.0)
Inadequate	2	2	4 (22.2)
No opinion	3	—	3 (16.7)
Total response	9 (55.6)	8 (44.4)	18 (100.0)

*Figures in parentheses represent percentages of total responses

Table 25. Factors hindering information exchange in MIDNET

Hindering factor	Number	Percent
Inadequate funding	5	23.8
Lack or shortage of professionals for information support services	3	14.3
Lack of cooperation among members	2	9.5
Poor coordination	1	4.8
Time constraint; i.e., difficulty to use organization's time for attending network meetings*	3	14.3
Heterogeneity (divergence) of members' interests or their work*	2	9.5
Lack of capacity*	1	4.8
Distance*	1	4.8
Lack of active participation of all MIDNET members; i.e., not all members optimize use of MIDNET*	1	4.8
MIDNET not well-equipped and responsive to members' needs and to expand membership*	1	4.8
Don't know*	1	4.8
Total response	21	100.0

*Response stated in 'other' category.

4.6.1.2. Reasons for inadequacy of information exchange activities and hindering factors

MIDNET members who were of the opinion that the information exchange and dissemination activities currently in use were 'very inadequate' or 'inadequate' were further asked to indicate their reason(s). Six reasons and an 'other' category were listed. Information overload was explained to mean too much

information disseminated at the same time. As reflected in Table 24, only four members could respond. Members could indicate one or more reasons, but the response to one reason could not exceed more than four. Five reasons, each of which had one response (20%), were indicated. These were information overload, lack of relevance to my or my organization's objectives, poor packaging, poor communication across wider membership and lack of assessment of information needed by members.

MIDNET members were asked to indicate the factors that hindered information exchange. Four factors and an 'other' category were provided. Members could indicate more than one factor. Table 25 summarizes the results. Five members (23.8%) indicated inadequate funding to have been a hindering factor, three (14.3%) each time constraints and lack/shortage of information staff, two (9.5%) each lack of cooperation and poor heterogeneity of members' interest.

Table 26. Suggested solutions to overcome problems

Problem	Solution	Response	
		Number	Percent
Time constraint	Internet-based information exchange system; i.e., establish supplementary mechanism	2	16.7
	Better planning	1	8.3
Distance	Make time	1	8.3
Capacity	Allocate bigger budget	1	8.3
Participation of members	Members need to be stimulated	1	8.3
Responsiveness of MIDNET	Equip MIDNET well and make it more responsive (build network capacity)	1	8.3
	Expand network membership	1	8.3
	Plan new information service strategy based on recent network evaluation initiatives	2	16.7
Coordination and information support	Need for dedicated/capable person in MIDNET responsible for finding/selecting, sorting, packaging/repackaging and disseminating information according to a members' subject list	1	8.3
	Develop existing staff to improve information support services	1	8.3
Total response		12	100.0

4.6.1.3. Suggested solutions to problems with current information exchange activities

MIDNET members were requested to comment on how to overcome the problems they indicated to have faced and on factors hindering information exchange. Content analysis was used to analyze the comments and the problems and the respective problems addressed. As reflected in Table 26, several solutions were suggested. Two solutions were stated to remedy time constraint – two (16.7%) members suggested

establishing Internet-based information exchange systems and one (8.3%) better planning. To overcome problems related to coordination and lack/shortage of information support, one (8.3%) member suggested the need for a dedicated and capable person in the MIDNET office and one (8.3%) development of existing staff.

4.6.1.4. Factors enhancing information exchange

MIDNET members who were of the opinion that current information exchange activities were either very adequate or adequate were further asked to explain the factors that enhanced the exchange activities. Content analysis was used to analyze the explanations and categorize the factors for counting responses. MIDNET members could state more than one factor. However, the total number of responses in each factor could not exceed 11, namely, the number of members that indicated information exchange as very adequate (two) and adequate (nine), as reflected in Table 24. Eleven enhancing factors were stated, with use of e-mail, exchange of cutting-edge information disseminated by MIDNET office, and members' commitment indicated by two (14.3%) members each. Table 27 summarizes the results.

Table 27. Factors that enhanced information exchange in MIDNET

Enhancing factor	Response	
	Number	Percent
Good mix of different information exchange activities; face-to-face interaction, newsletter, e-mail	1	7.1
Use of network newsletter	1	7.1
Use of e-mail	2	14.3
Efficient network administration	1	7.1
Regularity of information exchange activities	1	7.1
Relevance of information to members' objectives	1	7.1
Exchange and dissemination of cutting-edge information	2	7.1
Members' commitment (energetic networking)	2	14.3
Knowing people for a long time (maturity in the evolution of MIDNET)	1	7.1
Planning of information exchange using written communication	1	7.1
Effective use of telephone and meetings in joint activities	1	7.1
Total response	14	100.0

*Response stated in 'other' category.

4.6.2. Internet-based information exchange for MIDNET

Development of a new information system, especially a computer-based system, should consider the human factors feasibility dimension, namely, willingness of users to utilize the system. In establishing an Internet-based information exchange system for networks, this may be conceptualized as members' opinion on the desirability of the system, their willingness to participate in, and contribute to, the system, the facilities they recommend for use and plans to implement the recommended facilities. It was therefore found important in the study to survey the opinions of MIDNET members on these aspects.

4.6.2.1. Favoring participation in Internet-based information exchange

As noted in Table 26, problems with current information exchange activities have indeed led to envisaging an Internet-based information exchange system as a solution by way of replicating current systems. MIDNET members were requested to indicate to what extent they would favor or oppose participation in an Internet-based information exchange with other MIDNET members to supplement current information exchange activities. The extent of favoring or opposing participation could be indicated by choosing one of four options or the 'no opinion' category. Eleven (61.1%) of MIDNET members indicated that they would favor participation and seven (38.9%) strongly favor. It is surprising that the CBO organizational member that indicated not to have owned computers and plans for connectivity was among members who indicated to strongly favor participation. The results are summarized in Table 28, according to membership status and classification of organization or work.

Table 28. Extent of MIDNET members' favor to participate in Internet-based information exchange

Organization or work	<i>Number of responses by extent of favor</i>		Total
	Strongly favor	favor	
ORGANIZATIONAL MEMBERS			
NGO	2	4	6
Academic institution	—	2	2
CBO	1	—	1
Other	—	1	1
Sub-total response	3	7	10 (55.6)
INDIVIDUAL MEMBERS			
NGO	—	1	1
Academic institution	1	—	1
Private enterprise	1	1	2
Other	2	2	4
Sub-total response	4	4	8 (44.4)
Grand total response	7 (38.9)	11 (61.1)	18 (100.0)

4.6.2.2. Contributions to Internet-based information exchange

As cooperation is the underpinning factor in the operation of development networks, contribution from network members is a logical necessity. The 18 MIDNET members who indicated to strongly favor or favor participation in an Internet-based information exchange were further asked to indicate the input(s) they would contribute to the system. Three inputs (information, funds, expertise) and the ‘don’t know’ and ‘other’ categories were listed. Expertise was defined in terms of such skills as consultancy, editorial, review, repackaging, and Internet site design. The ‘other’ contributions category was explained with examples such as Internet site hosting. MIDNET members could indicate more than one input to the system. However, in any one of the contributions, there could be no more than 17 total responses, 17 (94.4%) being the number of members who responded to the question. The results are summarized in Table 29.

Thirteen (65%) MIDNET members indicated that they would contribute information, two (10%) expertise and one (5%) funds. Two (10%) members indicated that they did not know what to contribute and two (10%) indicated the other category without specifying the type of contribution. One of the members who would contribute information further explained the form of contribution — link service from the Web site it was developing to MIDNET’s site.

Table 29. Contributions of MIDNET members to Internet-based information exchange according to membership status and classification of organization or work

	Contribution					Total
	Information	Funds	Expertise	Don't know	Other	
MEMBERSHIP STATUS						
Organization	7	1	—	1	1	10 (50.0)
Individual	6	—	2	1	1	10 (50.0)
Total	13 (65.0)*	1 (5.0%)	2 (10.0)	2 (10.0)	2 (10.0)	20 (100.0)
CLASSIFICATION OF ORGANIZATION OR WORK						
NGO	6	1	—	—	1	8 (40.0)
Academic institution	3	—	1	—	1	5 (25.0)
CBO	—	—	—	1	—	1 (5.0)
Private enterprise	1	—	1	—	—	2 (10.0)
Other	3	—	—	1	—	4 (20.0)
Total	13 (65.0)	1 (5.0)	2 (10.0)	2 (10.0)	2 (10.0)	20 (100.0)

*Figures in parentheses represent percentages of row and column totals

4.6.2.3. Internet facilities recommended and implementation plans

The Internet provides an array of facilities that may be used for networking communities that have similar information seeking behavior. However, in development networks, each communication and information dissemination facility may be useful in specific situations and for specific purposes. MIDNET members were asked to recommend Internet facilities they could use in the communication and exchange of information with other members. Eight facilities and the 'other' category were listed, and respondents were referred to question 36 of the questionnaire that provided brief definitions of the purpose of each facility. The World Wide Web, which offers several uses, was represented by three of its uses that may be more useful to development networks — MIDNET's Web site, Web-based communication (Web sites for posting announcements, organizing conferences and electronic conferences) and chat rooms. The inclusion of e-mail, already in use in MIDNET, was intended to survey members' opinion on its further use and plan better application of e-mail-based communication and information dissemination in MIDNET. MIDNET's Web site and e-mail were recommended by 13 (16.9%) MIDNET members each, listserv (mailing list) and Web-based communication by 10 (13%) each and newsgroups by 7 (9.1%). Table 30 summarizes the results.

Table 30. Internet facilities recommended for MIDNET

Facility	Number	Percent
MIDNET Web site	13	16.9
Web-based communication*	10	13.0
Chat rooms	6	7.8
Intranet	4	5.2
E-mail	13	16.9
Listserv	10	13.0
Newsgroups	7	9.1
FTP (file transfer protocol)	6	7.8
Telnet	4	5.2
Portal	4	5.2
Total response	77	100.0

*Web sites for posting announcements, organizing conferences and e-conference

MIDNET members who recommended Internet facilities could also suggest implementation plans in terms of time frames for the facilities they recommended. A list of three options was provided — immediate (less than one year), short-term (between one and two years) and 'no opinion'. Respondents could indicate only one plan in the case of one facility. The implementation plans suggested by members are presented in Table 31. Although some members recommended the same facility, their suggested plans on implementing the facility differed, with some indicating immediate implementation, others short-term and, in some instances, still others indicating no opinion. For instance, out of the 13 members who

recommended Web site for MIDNET, seven suggested short-term implementation and six immediate. Out of 10 members who recommended listservs, five suggested that it be implemented immediately, four in the short term and one indicated no opinion. In some instances, chat rooms and portal, there was equal distribution of members among the three options.

Table 31. Suggested plans for implementation of Internet facilities recommended for MIDNET

Facility	<i>Immediate</i>		<i>Short term</i>		<i>No opinion</i>	
	Number	Percent	Number	Percent	Number	Percent
MIDNET Web site	6	16.7	7	26.9	—	—
Web-based communication*	5	13.9	4	15.4	1	6.7
Chat rooms	2	5.6	2	7.7	2	13.3
Intranet	2	5.6	—	—	2	13.3
E-mail	8	22.2	3	11.5	1	6.7
Listserv	5	13.9	4	15.4	1	6.7
Newsgroups	3	8.3	3	11.5	1	6.7
FTP (file transfer protocol)	2	5.6	1	3.9	2	13.3
Telnet	1	2.8	—	—	3	20.0
Portal	2	5.6	2	7.7	2	13.3
Total response	36	100.0	26	100.0	15	100.0

*Web sites for posting announcements, organizing conferences and e-conferences

4.6.3. Interpretation and discussion

As noted earlier, establishing the prospect of Internet-based system and planning the steps and strategies to be taken to develop the system for networks requires a thorough examination of the current information exchange activities and members' requirements for participation in the anticipated supplementary system. The present study collected opinion survey data on these issues to partially attain the research objectives related to current information exchange activities, the capacity of MIDNET members to support Internet-based system and to develop an operational model for the establishment of the system. Findings showed that half of the MIDNET members surveyed were of the opinion that current information exchange activities are adequate, while four members viewed it as inadequate and two very adequate.

MIDNET members stated five problems and ten factors that hindered information exchange activities. The problems included information overload, irrelevance of information, poor packaging, poor contact across wider membership and lack of information needs assessment. Some of the factors that contributed to these problems and impeded information exchange and dissemination were inadequate funding, lack/shortage of professionals for information support, lack of cooperation among members, time,

distance, lack of capacity, heterogeneity of members' interests, and MIDNET's irresponsiveness to members' needs. These roadblocks to information exchange revealed several dimensions such as financial and human resources, potential disadvantages of or barriers in traditional communication media and information delivery tools (such as problems of distance and time) and lack of defined network boundaries in terms of objectives, themes, membership composition and scope and balance between different information exchange activities.

Nelson and Farrington (1994, 61) noted the importance of defining boundaries in several dimensions of networking for a focused, manageable and successful information exchange. Rural development, the central theme of MIDNET, is so complex that it involves, as reflected in Table 4, many subjects and disciplines of work which might result in heterogeneity of members' interests and backgrounds. As such, information that is relevant to one member may appear irrelevant to another. Financial and human resources problems that MIDNET faced are common and peculiar problems of networks in developing countries (Nelson and Farrington 1994, 19).

Findings also indicated that the current information exchange activities in MIDNET reflected a number of enhancing factors that need to be maintained and that there are several solutions and opportunities that may be used to overcome the roadblocks indicated to have impeded information exchange. The factors that enhanced information exchange activities, as reflected in Table 27, revealed three dimensions — use of a mix of information exchange activities on a regular basis, existence of some prerequisites for successful networking (members' commitment and efficient coordination) and network maturity and availability of relevant information content. These factors, which need to be maintained to facilitate information sharing using current or new communication and information delivery interfaces, are also noted in the communication and development literature (Woods 1993, 24; Nelson and Farrington 1994, 19).

The solutions suggested by MIDNET members (Table 26) to overcome problems impeding current information exchange activities focused on two major requirements — improving current communication and information exchange activities and establishing an Internet-based system to supplement the current interfaces. MIDNET members suggested, *inter alia*, capacity building, meeting financial and human resources requirements and planning new strategies based on network evaluation initiatives to strengthen information exchange activities. The initiatives mentioned were this external thesis study, an internal study conducted by a new MIDNET staff member during September to October 2001 (Gilles 2001), and the MIDNET network evaluation workshop held on 7 November 2001 to discuss the preliminary results of the two studies and plan strategies for strengthening the networking capacities of MIDNET. The plan for the evaluation workshop is presented in Appendix 4.

Findings showed that MIDNET members have overwhelmingly viewed the Internet as a technological opportunity to facilitate information exchange by supplementing current information exchange activities. Out of 18 members surveyed, 11 said that they favored participation in the anticipated Internet-based system and seven indicated to have strongly favored. The result is not surprising, in view of the

popularity of the Internet as a new paradigm in communication and information exchange for development, members' experience in the use of the Internet as one major external source of information (Table 5), the models set by other networks such as SANGONeT and SANGOCO in the use of the Internet technology for networking, use of e-mail as one major communication medium mainly between members and the coordination office (Table 6) and development of Internet-based information exchange and dissemination system by many members (Table 22). MIDNET members also showed willingness to contribute three inputs crucial to build an Internet-based system and make it available. These were information, funds and expertise.

While most members (65%) were willing to contribute information, there was a reluctance to commit to other contributions. As Menou (1993, 90) noted, information resources do not stand alone, out of context with other resources. One possible explanation for this might be the fact that, as reflected in Table 11, in most instances MIDNET members produce information that is in the public domain and all members participate in information exchange activities for shared learning in a barter system in which exchange is conducted in kind. As many members did not know the amount of budget allocated for information exchange or had no budget for this (Table 17) and lacked the organization and human resources for professional information support (Section 4.5.1), MIDNET members could have been in a difficult situation to show commitment for contribution of funds, expertise or other requirements.

However, despite the good state of ICTs infrastructure and development of Internet-based system by many members, lack of one or more members willing to host the system was surprising. Another possible interpretation can be members' desire to participate in an Internet-based system in a self-standing model, namely, "I contribute to my system and I make it available" (Ballantyne and Addison 2000, 17). This may be explained, as shown in Table 22, by the development of an Internet-based system by many members.

As noted in the literature review, the Internet offers an array of facilities that may be used to facilitate communication and information dissemination in networks (Chisenga 1997, 19; Adam 1999b, 2). MIDNET members recommended ten Internet technologies to be used in MIDNET and suggested implementation plans (time periods) for developing information exchange and dissemination systems based on the Internet facilities recommended. Thirteen members each recommended the Web and e-mail (Table 30). These are widely noted as the most popular facilities of the Internet. As the e-mail technology was already indicated to be used in MIDNET (Table 6), the recommendation and suggested plan for its immediate implementation could be an indication of favoring its continued and improved use. It was noted that most of the problems and suggested solutions with communication media and mechanisms, as reflected in Tables 13 and 14, respectively, were related to communication based on this one most recommended facility.

In view of the explanations of the functions of Internet facilities noted in the literature review (Raish 1994, 5; Kaniki 1999a, 9; Gorelick 1997, 14; Chisenga 1997, 18; Strauss 2000, 3; SOSIG 2000, 1; Behrens 2000, 21; Rowley 1998, 194), the facilities that MIDNET members recommended can replicate

the current one-to-one, one-to-many and many-to-many communications and information exchange activities in MIDNET (Tables 6 and 7). For instance, theme-based interest groups can be replicated by newsgroups and/or listservs, meetings by e-conferencing, casual face-to-face or telephone conversations by chat rooms on cyberspace and postal services and facsimile by e-mail or FTP. Web-based information systems can replicate activities like print-based primary and secondary (bibliographic and/or non-bibliographic databases) publications and marketing information products or distance learning or training. Portals can fill in the gap created by the absence of 'physical' libraries in MIDNET and most MIDNET members. However, plans on facilities should fit into the requirements of MIDNET members. For instance, based on findings concerning information with restricted access (Table 11), the intranet technology may not be necessary in the presence of a plan for a Web site. Instances of limited access to information within network members were not indicated. Plans should avoid duplication of facilities that serve basically the same function; for example, newsgroups and listservs. Telnet services can also be made available via the World Wide Web — the more sophisticated Internet information delivery technology for databases and other resources.

Findings showed that MIDNET members have perceived a step-by-step implementation of the various Internet facilities deemed important to facilitate communication and information dissemination. In the case of each facility recommended for use, however, members showed a difference as to when to implement the facilities. For instance, out of the 13 members who recommended development of a Web site for MIDNET, seven suggested that it be implemented in the short term and six immediately. However, a phased implementation plan for establishing the system should consider which facilities to use, the order of their implementation (prioritization), where to host the system (in-house development or outsourcing) and when and how to implement the system. Plans on these issues may be made based on examination of current requirements and technical as well as financial capacities within MIDNET for hosting the system.

Experiences in the development sector also reflected the importance of strategic planning for the establishment of a networked Internet-based information exchange system. The development of Development Information Online (Devline), a program focused on a public networked information service hosted by the British Library for Development Studies (BLDS), presents a good example. Devline was developed in two phases, based on technical and financial capacity for hosting an Internet-based information provision and resource sharing. Phase I of Devline started with a telnet service in 1994 and Phase II expanded the Internet-based scheme by developing a Web-based information system in 1995 (Beer 1996, 163). Through time, Devline evolved into an exemplary Internet resource on development information, offering numerous pages of information in WWW format which are organized into different service categories, such as ELDIS that later evolved to be a cooperative portal site funded by two international development agencies and hosted by the Institute of Development Studies, Sussex (ELDIS 2001, 1; Ballantyne and Addison 2000, 19).

4.7. Summary of Findings

The study found that MIDNET members have two types of membership, namely, organizational and individual. Both types of members indicated seven classifications that best described their organization or work. The classifications indicated were NGO, academic institution, CBO, private enterprise, parastatal, freelance development consultancy and development consultancy and research, which is rather a vague description. Most organizational members were NGOs and the works of individual members were largely related to development consultancy, either freelance or owning private enterprises.

MIDNET members stated 14 organizational or work objectives which reflected similar goals geared toward rural development, which is the thematic boundary of the network. Members indicated seven activities and 16 disciplines in which they were engaged to achieve the 14 specific objectives stated. The activities included education and training, development, research, consultancy, advocacy, skills development and welfare. In broader terms, the objectives, and thus the activities and disciplines that described the programs of action to achieve the objectives, were found to be similar, falling within the development of the rural sector which is defined to be the thematic boundary of MIDNET. The similarity in goals and activities undertaken to attain goals reflect that MIDNET members form a community with similar information seeking behavior.

Most members indicated to receive information necessary to enhance their objectives, sometimes from both internal and external sources. An array of internal and external sources used were mentioned. These include networking, the Internet, print media, communities, colleagues, meetings and several other sources. In many instances, both organizational and individual members used similar sources. All the sources indicated were noted to be useful in specific situations to meet the information needs of members and enhance their work-related problem solving, decision making and question answering capabilities. Members' use of the Internet as an external source of information revealed that Internet-based information exchange is not a new phenomenon to them, while their use of networking, partnership and professional associations reflected their wide experience in cooperation and information sharing.

MIDNET members indicated five reasons for participating in information exchange with other network members. The reasons reflected that shared learning and, to a lesser extent, joint projects, were the motives underpinning their participation in information exchange. Learning, as noted in the literature, is indeed the central objective in the development of people and institutions. Findings concerning how MIDNET members carried out information exchange activities when they were driven by five reasons revealed that nine largely traditional communication media and mechanisms and 16 categories of information products and activities were used. The information products and activities, which were described to reflect 27 information content categories, were products of three main sources of information, namely, members, MIDNET and interest groups of MIDNET. Most of the information products were found to be grey literature. The Internet, if appropriately applied, can effectively be used to address the communication needs of members and transmit most, if not all, of the information normally delivered through ephemeral and grey literature and traditional communication interfaces.

English and Zulu were used as the languages of information exchange in MIDNET, with English serving as the lingua franca of the network community. Most of the information emanating from the MIDNET community was in the public domain, with consultancy reports and, to a lesser extent, course materials of some members produced with restricted access. However, all members indicated not to have a written information policy that guides the overall management of information exchange and dissemination activities. Restriction of access to information that is in the private domain may be done based on implicitly existing policies. Findings concerning the existence of information policy in MIDNET and interest groups of MIDNET were rather contradictory.

Findings on general information needs of MIDNET members and current information exchange activities generally revealed that members are information- and communication-intensive development organizations and experts, both as producers and consumers of information. Most members have also a good state of ICTs infrastructure in terms of computers, computer networks, Internet connectivity and development of Internet-based information exchange and dissemination systems. This indicates that MIDNET members are 'digital' development organizations and experts with good arrangements of Internet access for staff. The good state of ICTs infrastructure indicates a technical feasibility for hosting an Internet-based information system for MIDNET and for accessing (using) the system. However, findings showed that most members do not have information support services backed by information units and professionals. Ad hoc arrangements of responsibility that largely rely on the use of development experts for information work are practiced. Findings on funding information exchange activities were also inadequate to examine the trend in funding and analyze the extent to which members can financially support the anticipated system.

Most members were of the opinion that current information exchange activities are adequate. However, despite the intense use of several communication media and mechanisms and information products and activities, members indicated a number of problems and factors that hindered information exchange. These roadblocks and solutions suggested by members reflected the need to improve current information exchange interfaces and establish an Internet-based information system as a supplement. Members indicated an overwhelming desire to participate in the Internet-based information exchange system, which they perceived as a technological opportunity. However, apart from information, members were reluctant to indicate willingness to contribute other resources to the anticipated system.

Members recommended a number of Internet facilities which, if appropriately applied, can be used effectively to replicate current information exchange activities in meeting the information and communication needs of members. Suggested implementation plans of the facilities recommended reflected a step-by-step approach. In view of the complexity of the information needs identified in the study, the Internet facilities envisaged to replicate current interfaces, the reluctance of members to contribute resources other than information, and several other factors that may require a detailed feasibility study, the strategic planning reflected in members' implementation plan is a useful consideration for planning the establishment of an Internet-based information exchange system for MIDNET.

Conclusions and Recommendations: Establishment of an Internet-Based Information Exchange System for MIDNET

The success of networking depends on the commitment of people to make it work.
Sison (1990, 87)

5.1. Introduction

This chapter presents conclusions and recommendations of the study, based on the last research objective, which was stated as follows: “Based on the findings, to propose a model of operation for the establishment of an Internet-based information exchange system for MIDNET”. More specifically, based on implications of the findings, the study sought to establish the prospect of developing the anticipated system and propose a model plan for the establishment of an Internet-based information exchange system that would suit MIDNET.

5.2. Prospect of Establishing an Internet-Based system for MIDNET

It was noted in 2.5.1.1. that the Internet, as dealt with by Carbo (2000, 240) and other authors, can be described in terms of several fundamental components. The basic requirements of an Internet-based system have been conceptualized according to the fundamental components. These components, which constitute feasibility dimensions to assess the prospect of an Internet-based information exchange system in development networks, are like-minded participants (organizations and/or individuals), sharable resources, appropriate ICTs infrastructure, financial and other resources and standards and policy. This section examines the prospect of establishing an Internet-based system for MIDNET in terms of the reflections of findings of the study, with respect to the above-mentioned feasibility dimensions.

Based on the general information needs of MIDNET members established in the present study, members were found to have similar or interrelated objectives, activities and disciplines of work geared toward similar goals within the broad thematic boundary of the network, namely, rural development. MIDNET was found to encompass, within its membership, geographical and thematic boundaries, like-minded organizations and individuals that have similar information seeking behavior. According to current trends of cooperation on the Internet in the development sector, organizations and networks are replicating the traditional ‘invisible college’, formed by like-minded groups of organizations and people, by a ‘virtual college’ (Ballantyne and Addison 2000, 16). Some models of such new trends, like the Internet sites of SANGONeT (2001, 1), SANGOCO (2001, 1), IAALD (2001, 1), CGIAR (2001, 1), DESUNSA (2000, 1), SAEP (2001, 1), and ACT (2001, 1), have been noted in the literature review. Findings have also revealed that MIDNET members overwhelmingly favor the replication of their current information exchange through the ‘invisible college’ by the ‘virtual college’.

Sharable information content, or other resources like people's expertise, to be transmitted or communicated, whether in traditional or Internet-based interfaces, form the core of information exchange activities in research and development networks or 'knowledge networks'. Examination of current information exchange activities in MIDNET has revealed that member use nine communication media and mechanisms and 16 information products and activities that are outputs of members, MIDNET and interest groups of MIDNET. Twenty seven information content categories were indicated to be reflected in the information exchange activities currently in place. Most of the information products identified were categorized as grey literature. Review of the general information needs and current information exchange activities established in this study showed that MIDNET members are information- and communication-intensive development organizations and experts, both as producers and consumers of information.

Information resources, as noted by Menou (1993, 90), do not stand alone, out of context with other resources. This is valid to Internet resources as well, whereby other resources such as ICTs infrastructure, finance and organizational and human resources form the backbone of the system. As the Internet is based on the client-server network architecture, such resources are important both to develop (serve) and access (use) the system. In development networks, such resources may be cooperatively contributed by members while external support (funding or outsourcing Internet site development) may be a secondary option if internal capacity is non-existent in some instances. Findings showed that MIDNET members have established a good state of ICTs infrastructure which may be used for developing and using the anticipated Internet-based system for MIDNET. All except one of the members surveyed were connected to the Internet and in many instances all staff members of organizational members accessed the Net using 'their' personal work-station in their offices. Some individual members accessed the Net using their computer at home and others using 'their' personal work-station in the office in the organizations to which they were affiliated. Many organizations indicated that they had developed an Internet-based information system and some indicated plans to do so.

Findings concerning organization (information units) and human resources for information support showed that such desirable conventional systems are largely not available within the MIDNET community. Information work was indicated to be done using other innovative arrangements which relied mostly on the time and paraprofessional support of development experts. While conventional professional support systems are desirable, the current innovative arrangements, if effectively used, may contribute in different ways to the development of the anticipated system. Information collected on funding current information exchange activities did not inform well enough for the study to examine the financial capacity of members. In view of the good state of ICTs infrastructure in members, availability of good access environment for staff, emerging self-standing models in the development of Internet-based information exchange and dissemination system, and the overwhelming willingness to participate in and contribute to the anticipated system for MIDNET, it can be concluded that there is sufficient cooperation and capacity among members to support the anticipated system. But this requires a detailed feasibility study to identify the extent to which members can cooperate in supporting the system by contributing necessary resources when needed and to propose more feasible members, who can share more demanding responsibilities like Internet site hosting.

Standards and policy form another component of an Internet-based information system. It is important that standards developed for the whole Internet community such as TCP/IP, OSI, Z39.50 the HTML approved by the W3C, and other Internet protocols or languages, are adopted in developing an Internet-based system. Internal network policies that stipulate rules and regulations on the conduct of cooperation and information exchange activities also facilitate communication and information exchange among members. Findings showed that none of the MIDNET members surveyed have a written information policy, while results concerning existence of policy in MIDNET and interest groups of MIDNET were contradictory. This requires further investigation, to identify existing explicit and implicit rules of conduct, which may be considered in formulating written policy that would guide and regulate the development of an Internet-based information exchange system for MIDNET. The experience and expertise of members may be used for drafting the necessary policy at no or lower cost.

The Internet, if appropriately and effectively used, has the prospect of facilitating communication and information exchange in MIDNET. The technology can supplement current information exchange activities by way of replication, and it can transform the 'invisible college', revealed in current interfaces used by like-minded members, into a 'virtual' system. That reflects the prospect of a hybrid system of traditional and Internet-based communication and information delivery interfaces to facilitate shared learning and joint projects among members.

5.3. Model Plan for Establishing an Internet-Based System for MIDNET

The present study has established the general information needs of MIDNET members and identified members' current information exchange activities. The Internet was found able to meet the information needs of members by way of replicating current communication media and information dissemination mechanisms. Members have perceived the Net as a technological opportunity to solve some of the problems they faced with current interfaces such as time. Members have also indicated cooperation to participate in and contribute to the anticipated system. To that end, members have recommended several Internet technologies for use and their implementation plans. Findings on the availability of information resources have shown that MIDNET members, to a large extent, have the capacity to support the system by way of serving and accessing (using) Internet resources.

The study, in view of the findings noted in 5.2. in terms of the fundamental components of the Internet or feasibility dimensions, has established the prospect of an Internet-based system as a supplementary interface to current information exchange activities. In conclusion, it is therefore recommended that MIDNET proceeds with the planning, design and implementation of the anticipated system. One guiding principle behind networking in the development sector is equality of partnership (Nelson and Farrington 1994, 19). It is therefore recommended that plans include strategies that will allow the few members, who do not have computers or who have computers but do not have connectivity, to participate in the anticipated system by way of receiving Internet resources through soft copy (diskettes like stiffy or CD-ROM) or print formats. For the long run, these members should be encouraged to possess computers and have connectivity. The study has found only one CBO organizational member who did not have a

computer but has plans to possess it. However, an inventory of all members concerning ICTs infrastructure is necessary to identify the real gaps on which strategies to address the gaps can be based.

This section proposes a model plan of operation for the anticipated system, based on findings and valid reflections, from a review of pertinent literature in terms of prerequisites for successful networking, general principles and models of cooperation and methodological approaches for the development of an Internet-based information exchange system. No attempt has been made, at this stage, to design technical blueprints or prototypes such as weaving Web pages, search interfaces or specifying discussion forum topics. Such technical aspects and cost estimates are out of purview of this study and may only be prepared using detailed investigations of systems analysis and design stages.

The model plan was rather intended to inform the steps and strategies that should be considered on how best to integrate the Internet into the requirements, capacity and anticipation of MIDNET members, as reflected in findings on their information needs, current information exchange activities and available resources. More specifically, it was aimed at discussing a framework of operation for a successful planning and establishment of an Internet-based information exchange system that may meaningfully contribute to the development goals of MIDNET members.

5.3.1. Prerequisites for successful establishment of the anticipated system

As noted in 2.3.2.2., Nelson and Farrington (1994, 19), based on the experience of agricultural and development information exchange networks, explained that some desirable preconditions should exist for successful networking. Such preconditions for networking for research and development, listed by Haravu (1994, 254) and Raju (1996, 263), are valid for information networking in the development sector, and are also reflected in the literature on the classical library and information cooperation and resource sharing networks (Plucknett and Smith cited in Haravu 1994, 254) (see 2.2.4 and 2.5.1.2). The present study considered the widely noted desirable prerequisites as valid for establishing an Internet-based information exchange system for networks in the development sector.

Findings concerning the general information needs of members showed that MIDNET is a network encompassing a community of like-minded organizations and individuals with widely shared goals and information seeking behavior. Members participate in information exchange mainly to facilitate shared learning and joint projects. Examination of current information exchange reflected the existing tradition of cooperation and shared learning, opportunities perceived by members as solutions to problems with current information exchange activities and existence of factors that enhance current information exchange such as energetic networking, commitment of members, administrative efficiency and the desire and cooperation to use a mixture of communication media and mechanisms. Members have also favored participation in, and contribution to (and thus commitment to), an Internet-based information exchange.

Research has established the existence of some of the major prerequisites for successfully establishing the anticipated system. Therefore it is recommended that plans to establish the system may be developed

in the light of the prerequisites identified in the study. One important precondition noted in the literature for the development of library and information networks is strong leadership (governance) and coordination body drawn from participants. In existing development networks like MIDNET, which has a developed tradition of information exchange, it is suggested that current leadership and coordination structures be used in the planning and development of a supplementary Internet-based system. During his participation in network activities, the present investigator has observed that the MIDNET Executive Committee and coordination office play a proactive role in setting agendas for members on information services expansion, particularly establishing an Internet-based system, and in facilitating internal network evaluation. Plans, therefore, may consider the continuation of existing leadership and coordination structures for the successful establishment of the anticipated system. As there is a high turnover of office holders in the MIDNET Executive Committee (every year), plans should stress the role of a strong and capable full-time coordinator for information exchange activities in general, who should be backed by efficient administrative support. This may be done by developing existing staff and/or recruiting new ones.

5.3.2. Basic requirements

Plans for the development of library and information networks should include some basic requirements necessary to build cooperation and resource sharing. The requirements for an Internet-based system in networks, conceptualized on Carbo's view of the Internet and on other literature, are discussed in 2.5.1.1. The present study has established the existence of pertinent requirements in MIDNET in terms of participants; information needs; sharable resources; and the capacity of members to support the anticipated system in terms of ICTs infrastructure, finance and organization and human resources. The findings have revealed that the basic requirements to establish the anticipated system are in place both to serve and use the system and, based on this, concluded that there is a prospect for an Internet-based information exchange system. Therefore, it is suggested that further plans and some detailed investigations, particularly in terms of cooperation on contributing resources such as funding and Internet site hosting, may be done on the strength of the findings of the study.

5.3.3. General principles

General principles, as noted in the literature review, underpin cooperation and resource sharing in the classical library and information networks (Atherton cited in Sison 1990, 187; Swank cited in Sison 1990, 188; Wesley 1993a, 106; Haravu 1994, 255; Raju 1996, 263). These principles are sought to guide development of networks in order to enhance cooperation and greater efficiency in information services. Based on the above literature, and on factors considered by Nelson and Farrington (1994, 19) in the development of information exchange networks in the development sector, the general principles that need to be considered in establishing an Internet-based system in networks have been drafted in 2.5.1.2. Relevant basic principles, proposed in terms of specific cooperation and information exchange scenarios, are sought to guide the successful planning and establishment of an Internet-based system that can meaningfully contribute to development goals and objectives of network members. The basic

principles are discussed below and laid out, based on findings, in a way suitable for planning and establishment of an Internet-based system for MIDNET.

5.3.3.1. Goals and objectives

A new information system in development networks should be planned and established based on defined goals and specific objectives. Defined aspirations and ends to be attained are yardsticks by which, among other things, the impact of the system on development objectives can be measured. The present study has established the general information needs of MIDNET members, identified the reasons that draw members to information exchange activities and examined problems with current information exchange interfaces that have led members to envisage a hybrid system by establishing a supplementary electronic interface. It is recommended that these findings form the basis for formulating goals and objectives for the anticipated system. It is also suggested that goals and objectives should be within the limits of the information exchange objectives of MIDNET, as stipulated in the constitution of the network (MIDNET 2000, 1).

5.3.3.2. System configuration and responsibilities

As noted in 2.2.3., 2.3.4., and 2.5.1.2., designing the configuration of a cooperation and information sharing system for networks, and entrusting responsibilities for administrative and technical tasks, is an important principle to guide how the coordinating center and members (nodes) are structured and managed. The Internet, the anticipated platform, which is essentially a network based on the client-server model, also presupposes some kind of configuration in the conduct of Internet service provision and access to Internet resources. The Net, a decentralized and open system in terms of participation of the whole global Internet community, may be designed in a different configuration when used in information exchange networks based on members' needs and requirements. The structure of an Internet-based information exchange system for development networks may be visualized based on similar models reflected in development networks (Nelson and Farrington 1994, 11), information networks (Atherthon cited in Sison 1990, 188) and automated library networks (literature reviewed in Siddiqui 1995, 213 and Mambo 1998, 68).

Findings concerning current information exchange activities showed that information within MIDNET generates from the activities of three main sources, namely, members, the network and interest groups of the network. Members, or nodes, communicated with each other through such modes as casual one-to-one or one-to-many or many-to-many interactions and exchange of publications which reflect the rim-effect networking model or decentralized structure. Members also exchanged information through arrangements by the network, or central node, such as meetings and other delivery services of information, emanating from network activities or external sources. This reflects the hub-and-spoke networking model or centralized network structure. MIDNET members participate in interest groups that focus on particular topics, such as sustainable development, and conduct group meetings or other exchange activities and produce publications. Information exchange of MIDNET members through

participation in interest groups of the network reflects the clover networking model, which is a variant of the rim-effect model.

In view of reflections from the current information exchange activities, it can be concluded that MIDNET is structured in three networking models — the hub-and-spoke, rim-effect and clover models. The existence of more than one model in a network is supported by Nelson and Farrington (1994, 11), who argued that it is often difficult to say that particular networks are structured strictly in any one of the five models they identified in information exchange networks. The models were discussed in 2.3.4. Findings on information support mechanisms showed that responsibilities for administrative support and technical tasks were arranged in a number of innovative ways in all the three internal sources of information and thus the models reflected in current activities.

It is recommended that plans to design the configuration for an Internet-based information exchange system for MIDNET may consider replicating models reflected in current information activities. This suggestion may be feasible, particularly in the light of emerging Internet-based networking models within MIDNET. Many members have developed an Internet-based system using one or more facilities and the central node (MIDNET) has developed an e-mail-based information delivery system. According to Ballantyne and Addison (2000, 17), who discussed the current trends of cooperation on the Internet in the development sector, the development of, and even plans to develop, an Internet-based system by members reflect an emerging self-standing model, namely, “I contribute to my system and I make it available”. The e-mail-based information dissemination from the network office is an emerging instance of a partnership model, namely, “we contribute to our system and we make it available”. It can therefore be concluded that a combination of self-standing and partnership models of an Internet-based system are already emerging in the MIDNET community, each reflecting entrusted responsibilities for administrative and technical tasks in distinct ways. In view of networking models reflected in current traditional mechanisms and emerging trends in Internet-based systems, the study recommends that designing a combination of models based on the findings, and entrusting responsibilities accordingly, may suit an Internet-based system for MIDNET.

Sison (1990, 188) and Nelson and Farrington (1994, 11) pointed out that network configurations are important specifications that affect communication channels and the flow patterns of information. It is important to note that models specified for an Internet-based system may affect the feasibility of Internet facilities to be developed. MIDNET members recommended an array of Internet facilities. It is suggested that plans concerning the feasibility and use of these facilities should first consider, among other things, suitable configurations. For example, the clover networking model, reflected by the current use of interest groups, may best be replicated by ‘Internet interest groups’, namely, newsgroups or discussion forums. In view of the emerging self-standing Internet-based systems in members, particularly Web-based information delivery, it is suggested that the central node develops a subject-based information gateway (portal) rather than just a Web site. This implies that, in terms of cooperation or responsibility, information is made available by members, the network and interest groups of the network in distributed (self-standing) systems and the portal technology, developed in partnership by the central node, serves

as a central entry point to the Internet, and even print-based resources of the different information sources within the network community.

5.3.3.3. Formal agreement

Formal agreement, which is a logical necessity in a formal networking scenario, constitutes another principle in cooperation and information sharing. Formal agreement ensures the commitment of participants to assigned responsibilities. The responsibilities may be administrative or technical duties (shared works) and contributions to be made available when needed (shared resources such as information, funds, or time). Findings concerning factors that enhanced current information exchange activities in MIDNET revealed that members are committed to cooperation. Current information outputs reflected cooperative development of information resources and exchange. Related to an Internet-based information exchange system, members overwhelmingly favored participation, and indicated that they would contribute one or more resources although, to a large extent, there was a reluctance in terms of system inputs other than information. The findings reflected members' commitment to entrusted responsibilities, which is one prerequisite for the successful establishment of the anticipated system. However, it is recommended that actual plans to develop the system should consider formal agreements to ensure commitment to entrusted responsibilities. Details of the agreements may be developed after formulating actual strategies and action plans for the operation of the system and assignment of responsibilities to participants, be it in self-standing and/or partnership models of cooperation.

5.3.3.4. Sharable Internet resources

Sharable resources, for example a central bibliographic database in library networks, form the heart of cooperation and resource sharing in networks. Resource sharing is "... a partnership in which each member has something useful to contribute to others and which each is willing and able to make available when needed" (Kent cited in Wesley 1993b, 99), whereas cooperation is a means of pooling and sharing resources available in network participants (Muya 1993, 23). Depending on the types of networking, several principles need to be considered in planning sharable resources (Haravu 1994, 254; Wesley 1993b, 102).

In planning resource sharing in information exchange development networks, the basic principles related to resources may be envisaged as follows. Firstly, development of sharable resources should aim at meeting the information exchange requirements of network members. The requirements, therefore, need to be identified. Secondly, based on requirements, sharable resources should be identified. Thirdly, resources need to be developed in a collaborative manner, as collaboration underpins networking. Each member should have something to contribute and be willing and able to make it available when needed. Fourthly, as appropriate, guidelines should be developed for selection of resources. Guidelines may be important, particularly in terms of sharing information resources such as primary and secondary publications that need standard production (publishing), organization (indexing) and retrieval systems.

The present study established the work classifications and general information needs of MIDNET members. The reasons members participated in current information exchange activities with other members were identified. These findings reflect the information exchange requirements of members that an Internet-based system need to meet. Members' reasons for participating in information exchange reflect the resources that they currently share or would like to share. These are ideas and experiences of members, expertise of members, information necessary to enhance joint projects and information related to members' fields of work. Sharable Internet-based resources may be planned based on these anticipations. For instance, development of a database of subject experts within the network, or even external expertise deemed pertinent to members' needs, may facilitate the sharing of expertise among members. Special databases such as directories and profiles of new, on-going and completed research and development projects may meet members' requirements to plan and implement joint projects, or to know who is doing what. Web-based access to scientific and technical Internet, as well as print-based literature, may meet members' needs to keep abreast of developments in their fields of work and broaden their knowledge. Internet resources for communication such as e-mail, newsgroups, discussion forums and chat rooms may be planned to meet members' motives to share ideas and experiences, to debate on topics of common interest and to share the special subject expertise of other members.

In conclusion, reflections from the findings noted above and the communication media and mechanisms and information products and activities identified in the study have established the main feasible sharable resources in MIDNET. These include people and organizations, primary and secondary (bibliographic databases) literature that largely carry locally generated information in grey literature formats and specialized (non-bibliographic) databases that can support joint projects and access to subject experts. In view of the current information dissemination practice via e-mail and packaging or other problems associated with the interface, a database of electronic records and archival information is suggested. Three sources that make one or more of these resources available were identified. These were members, MIDNET, and interest groups of MIDNET. Haravu (1994, 256), in the context of cooperation and resource sharing in agricultural research and development networks, identified two main areas for database development. These are bibliographic databases, especially locally generated information in conventional and grey literature, and non-bibliographic databases which include directory of current research programs; statistical or time-series data on areas under cultivation, yield export, etc.; germplasm/herbarium collections; directories of subject specialists; and directories of specialized laboratory/testing facilities. Action plans for the development of similar resources are noted in the establishment of the Cooperative Rural Development Information Network (COORDINET), India (Raju 1996, 263).

The resources identified in MIDNET reflect the feasibility of members' recommendations on Internet facilities for communication that may be developed to provide access to remotely located people and organizations (and hence access to their ideas, experiences, opinions/arguments and subject expertise), facilities for information production and dissemination (Web publishing and e-mail-based information delivery) and technologies for an information retrieval service (virtual libraries which include applications such as portal, subject guides, reference works, like manuals or handbooks and specialized databases).

However, it is recommended that the development of sharable Internet resources be guided by the principles discussed above and other factors such as network configuration. For instance, a centralized structure (the hub-and-spoke model) or partnership model of cooperation is suitable for sharing resources developed using retrieval service facilities, to be served by a central node such as portal and communication facilities like newsgroups. A decentralized structure (rim-effect model) or self-standing model of cooperation may be appropriate for information production and dissemination facilities like Web publishing and e-mail served by members and other sources within MIDNET.

5.3.3.5. Written information policy and standards

Information policy and standards, whether they exist in implicit or explicit (written) forms, underpin almost every activity in communication and information exchange activities (Horsnell 1989, 2). In a network environment, policies and standards may set common guidelines and specifications that govern the generation, production, selection, storage, retrieval and disposal of information and thus facilitate communication and information exchange among members. As such, development of common standards and adoption of relevant national or international standards and formulating internal policy contributes to cooperation and intense exchange of information.

As noted in 5.3.3.4., findings showed the feasibility of several resources in MIDNET that may be shared on the Internet. Three major areas of information work were visible for the development of or access to the resources — publishing, database development (indexing) and communication (network technologies). The main activities that may be involved in publishing are information generation (manuscript writing and authorship), processing (manuscript collection, review, editing, design, etc.) and placing the resource on the Internet (Web authoring). Development of bibliographic and non-bibliographic databases on the Internet also involves several activities such as selection and indexing. In a cooperation and resource sharing environment there should be common standards to carry out all the activities associated with the development of resources deemed sharable.

Findings showed that MIDNET members who indicated that they participate in several information exchange activities do not have written information policy that would be a basis for developing a policy framework for the anticipated Internet-based system. Findings concerning the existence of a written policy in MIDNET and interest groups of MIDNET were also contradictory. According to findings, some of the problems members faced with current information exchange activities were partly policy problems. Some of the problems were related to selection of relevant resources, language, lack of cooperation among members and lack of an information needs assessment.

It is recommended that plans to develop the anticipated system consider formulating a suitable written policy and suitable standards aimed at facilitating cooperation and information exchange among MIDNET members. Findings concerning information domain, language of communication, sources of information, categories of information products, thematic boundaries or information content categories may constitute contents of the policy. The policy should include other aspects based on plans concerning

the general principles discussed in this section, common standards noted above with respect to development of sharable resources and a checklist of Web evaluation or quality selection criteria for a subject gateway.

5.3.4. Methodology for system design and impact assessment

Planning the design and implementation of an Internet-based information exchange system is critical to develop useful sharable Internet resources that can enhance the development objectives of network members. The literature on the status of the Internet in Africa showed that the continent's contribution to the global Web content is insignificant (Adam 1999a, 127; Jensen 2000, 4; Yavo 1999, 17; Chisenga 1999, 2 and ISRG 2001b, 2). Many African Web sites encounter Web design problems such as lack of clear purpose and target audience, lack of currency of content, credibility of authorship, access (longer download time), and navigation support (Yavo 1999, 5). Web sites that offer incomplete, inaccurate, out-dated, disorganized or difficult-to-access content discourage Internet users and thus impede the impact of the information delivery technology on development.

In view of the rich information content reflected in current information products of the MIDNET community, the present study established the sharable resources and feasibility of Web-based systems such as Web publishing and subject portal. It is recommended that the design and implementation of Web-based information exchange systems for MIDNET should be guided by a standard methodology. To this end, the PAPWEC model (ISRG 2001a, 1; 2001b, 1; 2001c, 1) may be used to plan the design, implementation and impact assessment of Web-based systems and other Internet technologies within the MIDNET community. The concepts and techniques underpinning the PAPWEC methodology are discussed in 2.5.4. PAPWEC, developed along the lines of the traditional ISDLC, is a participatory approach which involves the eventual system user from the inception of the system development life cycle to the impact assessment stage.

A subject gateway for MIDNET may serve as an entry point to Internet resources within MIDNET, as well as pertinent external resources on the Internet. As such, plans to develop a subject gateway for MIDNET need to develop a checklist of Web evaluation or quality selection criteria to provide members access to Web resources that can meaningfully contribute to their development objectives. The quality selection criteria developed for the MIDNET portal may be included in the policy document suggested in section 5.3.3.5.

Literature Cited

- Abugre, Charles. 1994. NGOs, institutional development and sustainable development in post-apartheid South Africa. In: Ken Cole (ed.) *Sustainable development for a democratic South Africa*. London: Earthscan Publications. p. 121–134.
- Ackermann, Ernest and Hartman, Karen. 1999. *The information specialist's guide to searching and researching on the Internet and the World Wide Web*. Chicago: Fitzroy Dearbon Publishers.
- ACT (African Conservation Tillage Network). 2001. *About the network*. <<http://www.fao.org/act-network/home.htm>>. Accessed 11/9/2001.
- Adam, Lishan. 1999a. Web content for Africa. *Information development*. 15(2): 127–133.
- Adam, Lishan. 1999b. Connectivity and access for scientific communication and publishing in Africa. Paper presented to the *Workshop on Scientific Communication and Publishing in the Information Age*, 10–12 May 1999, Oxford. <<http://www.inasp.org.uk/psi/scpw/papers/adam.html>> Accessed 9/3/2001.
- AFRA (Association for Rural Advancement). 2000. Upholding the 'core values' of rural development work. *AFRA News*. July 2000. p. 14–15.
- AISI (African Information Society Initiative). 2000. *AISI-connect national ICT profile, South Africa (ZA)*. <http://paradigm.sn.apc.org/africa/countdet.CFM?countries_iso_Code=ZA> Accessed 3/9/2001.
- Avison, David and Shah, Hanifia. 1997. *The information systems development life cycle: a first course in information systems*. London: McGraw-Hill.
- Ballantyne, Peter and Addison, Chris. 2000. Cooperation on the Web: trends and practice in the development sector. *Information Development*. 16(1): 152–3.
- Beam, Karen. 1980. Non-library networks. In: Barbara Evans Marcusson and Blanche Wools (eds) *Networks for networkers: critical issues in cooperative library development*. London: Neal-Schuman Publishers.
- Beer, Debbie. 1996. Devline: building a networked host service for development information. *Information development*. 12(3): 163–169.

- Behrens, S.J. 2000. *Bibliographic control and information sources*. 3rd ed. Pretoria: Unisa Press.
- Berners-Lee, Tim. 1999. *Weaving the Web: the past, present and future of the World Wide Web by its inventor*. London: Orion Business Books.
- Bless, Claire and Higson-Smith, Craig. 1995. *Fundamentals of social science research methods: an African perspective*. 2nd ed. Lusaka: Juta.
- Boon, J.A. 1992. Information and development: towards an understanding of the relationship. *South African journal of library and information science*. 60(2): 63–74.
- Carbo, Toni. 2000. The global information highway in the 21st century: one individual's perspective. *International information and library review*. 32: 237–250.
- Castells, Manuel. 2000. *Possibilities for development in the information age: information technology, globalization, and social development*. Paper prepared for the United Nations Research Institute for Social Development, Geneva, 22–24 March 1998. <<http://www.chet.org.za/castells/devinfo.html>>. Accessed 6/2/2001.
- Chisenga, Justin. 1997. Using the Internet to facilitate networking and resource sharing. In: *Proceedings of a Workshop on Electronic Networking and Resource Sharing in Namibia*, 21–22 April 1997, Windhoek, Namibia. Windhoek, Namibia: Namibian Information Workers Association. p. 17–26.
- Chisenga, Justin. 1999. Global information infrastructure and the question of African content. Paper presented to the 65th IFLA Council and General Conference, Bangkok, Thailand, August 20–August 28, 1999. <<http://www.ifla.org/IV/ifla65/118-116e.htm>> Accessed 5/4/2001.
- Chisenga, Justin and Rorissa, Abebe. 2000. The World Wide Web as a networking and communication tool: a prototype of the SCECSAL Web Site. In: Justin Chisenga and Agnes Chitambo (eds) *Information 2000: a vision for the SCECSAL region: Proceedings of the 14th Standing Conference of Eastern, Central and Southern African Librarians (SCECSAL 2000)*, 10–15 April 2000, Windhoek, Namibia. Windhoek, Namibia: NIWA. p. 151–157.
- Chisenga, Justin. 2001. Features and significance of information networks. Paper prepared for the *National Symposium on Information and Communication Technologies (ICTs) Infrastructure and strategies for Establishing National Information Networking in Zambia*, April 24–27, 2001, Kitwe, Zambia.

- CGIAR (Consultative Group for International Agricultural Research). 2001. <http://www.cgiar.org> Accessed 15/3/2001.
- Chowdhury, G.G. 1998. The changing face of Africa's information and communication scenario. *International information and library review*. 30: 1–21.
- DESIRE Consortium. 2000. *About us*. <http://www.desire.org/html/aboutus.html> Accessed 10/1/2001.
- DESUNSA (Development Support Network for Southern Africa). 2000. *Mission statement*. [Http://www.geocities.com/desnsa/mission.htm](http://www.geocities.com/desnsa/mission.htm) Accessed 20/4/2001.
- Durrheim, Kevin. 1999. Research design. In: Martin Terre Blanche and Kevin Durrheim (eds) *Research in practice: applied methods for the social sciences*. Cape Town: University of Cape Town Press. p. 29–53.
- ECA (Economic Commission for Africa). 1999. *NICI in Africa: developing national information and communication infrastructure (NICI) policies, plans and strategies, the 'why' and 'how'*. <http://www.bellanet.org/partners/aisi/NICI%20in%20Africa.htm> Accessed 4/5/2001
- Edwards, Michael. 1999. NGO performance — what breeds success? New evidence from South Asia. *World development*. 27(2): 361–374.
- ELDIS. 2001. What is ELDIS? <http://www.ids.ac.uk/eldis/eldwhat.htm>. Accessed 20/11/2001.
- Gilles, Ute. 2001. Report about the investigation concerning MIDNET's possibilities and capabilities in networking. Paper presented to the *MIDNET Evaluation Workshop*, 7 November 2001, Africa Enterprise, Pietermaritzburg, South Africa.
- Goldstuck, A. 1995. *The hichhiker's guide to the Internet: a South African handbook*. Sandton: Zebra.
- Gorelick, Nahum. 1997. What is the Internet: how does it work? In: *Proceedings of a Workshop on Electronic Networking and Resource Sharing in Namibia*, 21–22 April 1997, Windhoek, Namibia. Windhoek, Namibia: Namibian Information Workers Association.
- Gray, Terry A. 2001. *How to search the Web: a guide to search tools*. <http://daphne.palomar.edu/TGSEARCH/>. Accessed 18/6/2001.

- Haravu, L.J. 1994. Library networking and resource sharing in the NARS and possible role of IARCs. *Quarterly bulletin of the International Association of Agricultural Information Specialists*. Vol. XXXVIII(1): 253–259.
- Hardy, Henry Edward. 1993. *The history of the Net*. Masters thesis, School of Communications, Grand Valley State University, Allendale.
<<http://www.vrx.net/usenet/thesis/hardy.htm>> Accessed 9/3/2001.
- Heydon, David. 1999. *Information support for agricultural policy formulation in Africa: role of non-governmental organizations and research institutes: study report*. Wageningen: Technical Centre for Agricultural and Rural Cooperation (CTA).
- Horsnell, Verina. 1989. International standards. *Library and information briefings*. No. 10.
- IDRC (International Development Research Center). 2001. <<http://www.idrc.ca>> Accessed 25/3/2001.
- IAALD (International Association of Agricultural Information Specialists). 2001. *Mission*. <<http://www.lib.montana.edu/~alijk/IAALD.html>> Accessed 28/4/2001.
- ISRG (Internet Studies Research Group), Department of Information Science, City luniversity. 2001a. *A participatory approach to produce Web content: project report*. <<http://www soi.city.ac.uk/research/isrg/papreport.htm>> Accessed 21/8/2001.
- ISRG (Internet Studies Research Group), Department of Information Science, City luniversity. 2001b. *A participatory Web methodology, handbook*. <<http://www soi.city.ac.uk/research/isrg/papmethod.htm>> Accessed 8/21/2001.
- ISRG (Internet Studies Research Group), Department of Information Science, City luniversity. 2001c. *A participatory approach to produce Web content: final report*. <<http://www soi.city.ac.uk/research/isrg/papwec.htm>> Accessed 21/8/2001.
- ISRG (Internet Studies Research Group), Department of Information Science, City luniversity. 2001d. *Carrying out impact assessments of Web sites — concepts and techniques*. <<http://www soi.city.ac.uk/research/isrg/papeval.htm>> Accessed 21/8/2001.
- ISOC (Internet Society). 2001. *All about the Internet Society*. <<http://www.isoc.org/isoc/>> Accessed 15/11/2001.
- Jensen, Mike. 2000. *African Internet status*. <<http://www3.wn.apc.org/africa/afstat.htm>> Accessed 9/3/2001.

- Jensen, Mike. 2001. *African Internet connectivity: maps and tables*.
 <<http://demiurge.wn.apc.org/africa/afrmain.htm>> Accessed 4/5/2001.
- Jorday, Lisa. 2000. Political responsibility in transnational NGO advocacy. *World development*. 28(12): 2051–2065.
- Kaniki, Andrew M. 1989. *Agricultural information needs in Zambia: a study of a two-way information flow*. PhD dissertation, University of Pittsburgh, USA.
- Kaniki, Andrew M. 1991. Information seeking and information providers among Zambian farmers. *Libri*. 41(3): 147–164.
- Kaniki, Andrew M. 1995. Exploratory study of information needs in the Kwa-Ngwanase (Natal) and Qumbu (Transkei) communities of South Africa. *South African journal of information science*. 63(1): 9–18.
- Kaniki, Andrew M. 1999a. The role of information and communication technologies in education in rural Africa; keynote address to the *Workshop on Information and Communication Technologies in Community Rural Secondary Schools in Africa*, 29 November – December 1999, Harare, Zimbabwe.
- Kaniki, Andrew M. 1999b. *Internet facilities, use and training needs of the esAL consortium in KwaZulu-Natal; library staff questionnaire*. Unpubl.
- Kanfi, Shady. 2001. *Electronic networking in Africa*.
 <http://www.idrc.ca/nayudamma/african_45e.html> Accessed 1/4/2001.
- Kansas City Public Library. 2001. *Introduction to search engines*.
 <<http://www.kcpl.lib.mo.us/search/srchengines.htm>> Accessed 18/6/2001.
- LaMorte, Christopher. 2001. *Computers: history and development*.
 <http://www.digitalcentury.com/encyclo/update/comp_hd.html> Accessed 28/11/2001.
- Leach, Athol. 1999. The provision of information to adults in rural KwaZulu-Natal, South Africa, by non-governmental organizations. *Libri*. 49(2): 71–89.
- Levin, Lydia. 1995. Building development information on the Internet: SANGONeT's model. *Information and Development. Innovation*. No. 11. p. 18–25.
- Lui, Jian. 2001. *Meta search engines*. <<http://www.indiana.edu/~librcsd/search/>>. Accessed 18/6/2001

- Luyin, Liu. 1999. Internet: contribution to Asia and Oceania information resources' construction. Paper presented to the 65th IFLA Council and General Conference, Bangkok, Thailand, August 20–August 28, 1999.
<<http://www.ifla.org/IV/ifla65/papers/014-129e.htm>> Accessed 5/4/2001.
- Mambo, Henry L. 1998. *An investigation into the development of a computer library network among institutions of higher learning in Tanzania*. PhD dissertation, Department of Information Studies, University of Natal, Pietermaritzburg, Republic of South Africa.
- Marcusson, Barbara Evans and Woolls, Blanche. 1980. Glossary and list of acronyms for library networking. In: Barbara Evans Marcusson and Blanche Woolls (eds) *Networks for networkers: critical issues in cooperative library development*. London: Neal-Schuman Publishers. p. 405–417.
- Mchombu, Kingo J. 1982. On the librarianship of poverty. *Libri*. 32(3): 241–250.
- Mchombu, KJ. 1997. Networking, resource sharing and information technology. In: *Proceedings of a Workshop on Electronic Networking and Resource Sharing in Namibia, 21–22 April 1997, Windhoek, Namibia*. Windhoek, Namibia: Namibian Information Workers Association. p. 17–26.
- Mchombu, Kingo J. 2001. Measuring the impact of information on rural development. In: Christine Stilwell, Athol Leach and Simon Burton (eds.) *Knowledge, information and development: an African perspective*. Pietermaritzburg, South Africa: University of Natal, School of Human and Social Studies. p. 12–17.
- Mchombu, Kingo J and Miti, K. 1992. Formulation of national information policies in Africa: some unlearnt lessons. *International information and library review*. 24: 139–171.
- Menou, Michael J. 1993. Preface. In: Michael Menou (ed) *Measuring the impact of information on development*. Ottawa, ON., Canada: International Development Research Centre. (Also available at
<http://www.idrc.ca/showdetl.cfm?&DID=6&Product_ID=184&CATID=15> Accessed 10/8/2001.
- Meyer, Carrie A. 1997. The political economy of NGOs and information sharing. *World development*. 25(7): 1127–1140.
- MIDNET (Midlands Rural Development Network. 2000. *Constitution of the Natal Midlands Rural Development Network*. Amended version. Unpubl. Doc.

- MIDNET (Natal Midlands Rural Development Network). 2001. *Minutes of the MIDNET Annual General Meeting*, held on 11 April 2001, Rainman Land Care Foundation, Peacevale, KwaZulu-Natal.
- Moschovitis, Christos JP; Poole, Hilary; Schuyler, Tami and Senft, Theresa. 1999. *History of the Internet: a chronology, 1843 to the present*. Santa Barbara, California: ABC-CLIO.
- Moshoeshoe-Chadzingwa, Matšelis. 1998. In search of a niche for SAINET Lesotho: a feasibility study in retrospect. In: Matšelis Moshoeshoe-Chadzingwa, Albert K Kakoma and Mampiala M Lebotsa (eds.) *Libraries and information services in the 21st century and beyond: Proceedings of the 12th Standing Conference of Eastern, Central and Southern African Libraries (SCECSAL XII)* held in Maseru: Lesotho Library Association.
- Musana, A. Information resources sharing and networking: an overview. In: Augustes Musana and Lutz Hüttemann (eds.) *Information resource sharing and networking, report of three training courses held in Arusha, 22 October –2 November 1990; Mombasa, 15–26 April 1991; Arusha, 23 March – 3 April 1992*. Bonn: German Foundation for International Development. p. 141–147.
- Mutula, Stephen M. 2001. The impact of Y2K in Southern Africa. *Information development*. 17(1): 19–27.
- Muya, Edward Waiguru. 1993. Networks: an overview. In: Augustes Musana and Lutz Hüttemann (eds.) *Information resource sharing and networking, report of three training courses held in Arusha, 22 October –2 November 1990; Mombasa, 15–26 April 1991; Arusha, 23 March – 3 April 1992*. Bonn: German Foundation for International Development. p. 231–28.
- Nelson, John and Farrington, John. 1994. *Information exchange networking for agricultural development*. Wageningen: Technical Centre for Agricultural and Rural Cooperation (CTA).
- Neuman, W.L. 1994. *Social research methods: qualitative and quantitative approaches*. Boston: Allyn and Bacon.
- Neussl, Vincent and Trench, Thelma. 1999. *MIDNET — changes in the organizational profile*. Unpubl. Document.
- NetLab. 2000. *Subject based information gateways*.
<<http://www.lub.lu.se/desire/sbigs.html>> Accessed 2/10/2001.

- NREC (National Rural Enterprise Centre). 2001. <<http://www.inforurale.org.uk/inforurale/>> Accessed 16/10/2001.
- Osani, Lanre. 1996. IITA conducts study on the use of grey literature. *Quarterly bulletin of the International Association of Agricultural Information Specialists*. Vol. XLI(3/4): 263–264.
- Powell, Ronald R. 1997. *Basic research methods for librarians*. Greenwich, Conn.: Ablex.
- Prytherch, R (Comp.). 2000. *Harrod's librarians' glossary and reference book: a directory of over 9,600 terms, organizations, projects and acronyms in the areas of information management, library science, publishing and archive management*. 9th ed. Aldershot, Hants: Gower.
- Raish, Martin. 1994. *Network knowledge for the neophyte: stuff you need to know in order to navigate the electronic village*. <<http://www.ifla.org/documents/internet/netneo/>> Accessed 9/3/2001.
- Raju, KA. 1996. COORDINET aids rural development in India. *Quarterly bulletin of the International Association of Agricultural Information Specialists*. Vol. XLI(3/4): 263.
- Reisman, Ricahrd R. 1997. *Extranets and intergroupware: a convergence for the next generation electronic media-based activity*. <<http://www.teleshuttle.com/media/InterGW.htm>> Accessed 18/6/2001.
- Richardson, Don. 1997. The Internet and rural and agricultural development; an integrated approach. <<http://www.oac.uoguelph.ca/res>> Accessed 10/3/2001.
- Rosenberg, Diana. 2001. The sustainability of libraries and resource centers in Africa. In: Christine Stilwell, Athol Leach and Simon Burton (eds.) *Knowledge, information and development: an African perspective*. Pietermaritzburg, South Africa: University of Natal, School of Human and Social Studies. p. 12–17.
- Rowlands, Ian. 1996. Understanding information policy: concepts, frameworks, and research tools. *Journal of information science*. 22(1): 13–25.
- Rowley, Jennifer. 1996. *The basics of information systems*. London: Library Association Publishing.
- Rowley, Jennifer. 1998. *The electronic library*. London: Library Association Publishing.
- SAEP (Southern Africa Environment Project). 2001. *About SAEP*. <<http://www.saep.org/about/about.html>> Accessed 28/4/2001.

- SANGOCO. 2001. *About SANGOCO*. <<http://www.sangoco.org.za/about.html>> Accessed 2/17/2001.
- SANGONeT. 2001. *About SANGONeT*. <<http://www.sn.apc.org/sngonet>>. Accessed 17/2/2001.
- Saunders, LM. 1999. The virtual library: reflections on an evolutionary process. In: LM Saunders (ed.) *The evolving virtual library II: practical and philosophical perspectives*. Medford, NJ: Information Today. p. 1–3.
- Sayed, Zuber. 1998. *Globalization, the Internet and NGOs; a Cape Town study*. Msc thesis, University of Natal, Durban, South Africa.
- Schutt, RK. 1995. *Investigating the social world: the process and practice of research*. California: Pine Forge Press.
- Shibanda, George Gundu. 1995. Agricultural information networking in Africa: status and prospects. *Third world libraries*. 6(1): 24–28.
- Siddiqui, Moid Ahmad. 1995. *A comparative study of interlibrary loan functions and the development of a model interlibrary network among academic libraries in Saudi Arabia*. PhD dissertation, Department of Information Studies, University of Natal, Pietermaritzburg, South Africa.
- Sison, Josephine C. 1990. The implementation and management of networks. *Quarterly bulletin of the International Association of Agricultural Information Specialists*. Vol. XXXV(3): 187–195.
- SOSIG (Social Science Information Gateway). 2000. *What is SOSIG?* <wysiwyg://55/http://SOSIG.esrc.bris.ac.uk/about_us/what_is.html> Accessed 10/2/2001.
- Stevens, Norman D. 1980. An historical perspective on the concept of networks: some preliminary considerations. In: Barbara Evans Marcusson and Blanche Woolls (eds) *Networks for networkers: critical issues in cooperative library development*. London: Neal-Schuman Publishers. p. 29–48.
- Strauss, Howard. 2000. *What is a portal, anyway?* <<http://www.cren.net/know/techtalk/events/portals.html>> Accessed 15/6/2001.
- Sturges, Paul and Neill, Richard. 1998. *The quiet struggle: information and libraries for the people of Africa*. 2nd ed. London: Mansell.

- UKOLN (Uk Office for Library Networking) Metadata Group. 1998a. *Appendix IV: selection criteria of selective subject gateways*.
<<http://www.ukoln.ac.uk/metadate/desire/quality/appendix-4.html>> Accessed 10/2/2001.
- UKOLN (Uk Office for Library Networking) Metadata Group. 1998b. *Appendix V: selection criteria of other Internet services*.
<<http://www.ukoln.ac.uk/metadate/desire/quality/appendix-5.html>> Accessed 10/2/2001.
- UKOLN (Uk Office for Library Networking) Metadata Group. 1998c. *Appendix VI: selection criteria found via the literature review*.
<<http://www.ukoln.ac.uk/metadate/desire/quality/appendix-6.html>> Accessed 10/2/2001.
- UKOLN (Uk Office for Library Networking) Metadata Group. 1999. *A list of quality selection criteria: a reference tool for Internet subject gateways*.
<<http://www.ukoln.ac.uk/metadate/desire/quality/report-2.html>> Accessed 10/2/2001.
- Valk, Minke; van Dam, Henk and Cumings, Sarah. 1999. Women's information centers and networks: a development perspective. *Information development*. 15(1): 27–31.
- Vinton, Cerf. (N.d.). A brief history of the Internet and related networks.
<<http://www.ifla.org/documents/internet/history/>> Accessed 3/9/2001.
- VITA (Volunteers in Technical Assistance). 2001. *More about VITA*.
<<http://www.vita.org/morevita.com>> Accessed 15/11/2001.
- Wesley, Cecile. 1993a. Information networks. In: Augustes Musana and Lutz Hüttemann (eds.) *Information resource sharing and networking, report of three training courses held in Arusha, 22 October –2 November 1990; Mombasa, 15–26 April 1991; Arusha, 23 March – 3 April 1992*. Bonn: German Foundation for International Development. p. 105–110.
- Wesley, Cecile. 1993b. In: Augustes Musana and Lutz Hüttemann (eds.) *Information resource sharing and networking, report of three training courses held in Arusha, 22 October –2 November 1990; Mombasa, 15–26 April 1991; Arusha, 23 March – 3 April 1992*. Bonn: German Foundation for International Development. p. 99–104.
- Wielsma, Margretha. 2001. Office Manager, the Natal Midlands Rural Development Network (MIDNET), February 2001, personal communication. Pietermaritzburg, South Africa.

Woods, Bernard. 1993. *Communication, technology and the development of people*.
London: Routledge.

Yahoo!. 2001. *Yahoo!*. <<http://www.yahoo.com>> Accessed 4/9/2001.

Yavo, Noel. 1999. *TOP50 African Web sites; in search for quality Web content*.
<<http://www.woyaa.com/topweb/top50report.html>> Accessed 4/17/2001.

APPENDICES

APPENDIX 1

A questionnaire on establishing an Internet-based information exchange system for the KwaZulu-Natal Midlands Rural Development Network (MIDNET)

Amare Molla

Information Studies Programme, School of Human and Social Studies
University of Natal, Pietermaritzburg
Private Bag X01, Scottsville 3209, PIETERMARITZBURG
amare_m@hotmail.com or 200275965@studs.unp.ac.za

This questionnaire is intended to collect data on an investigation into the prospects of and necessity for establishing an Internet-based information exchange system for the Natal Midlands Rural Development Network (MIDNET) as a supplement to the existing communication mechanisms. It is specifically intended to collect data on the current information exchange activities of the network community, the general information needs, the currently available resources like information and communications technologies, funding, human resources, and opinions of members on establishing an Internet-based information exchange system. Information on these aspects is essential to assess the potential of establishing an Internet-based information exchange system and to develop a plan of operation for the anticipated system.

- Please complete this questionnaire as completely and honestly as possible.
- To ensure confidentiality, you are not required to write your name on the questionnaire. However, one question requires you to indicate the name of the organization you represent in MIDNET. In case you are an individual member, you are requested to indicate your affiliation if necessary and, should you wish to, your name. Information in this question will help the researcher make inferences and conclusions about MIDNET members.
- Please return the questionnaire at your earliest convenience, but **before 15 August 2001**, using the self-addressed and stamped envelope provided.
- Please tick the appropriate box(es) that represent your choice(s) or answer(s) to each item/question and/or write your answer in the space provided. If you need more space to write your answer(s) you may use the back page of the questionnaire; but please make sure that you indicate the number corresponding to the relevant question/item in the questionnaire.
- Please note that in the questionnaire respondents are referred to as "you" to mean individuals who represent themselves in MIDNET and "your organization" to those who represent their organization in MIDNET.

PART I. INFORMATION ABOUT NETWORK MEMBERS AND THEIR GENERAL INFORMATION NEEDS

1. What is the status of your membership in MIDNET? (Please indicate whom you represent in MIDNET)

- Organization** (Please state the name of the organization) _____
- _____
- Individual** (Please state your affiliation or private enterprise, if any) _____
- _____

2. Below is a list of classifications of work and organizations. Please tick the most appropriate box that describes the classification of your work or your organization.

- | | |
|---|---|
| <input type="checkbox"/> Non-government organization | <input type="checkbox"/> Private enterprise |
| <input type="checkbox"/> Academic institution | <input type="checkbox"/> Other (Please specify) _____ |
| <input type="checkbox"/> Community based organization | _____ |

3. What are the specific **objectives** of your organization or your work? _____

4. Which activity(ies) or field(s) of work describe the programme(s) of your organization or your work? (You may tick more than one box as necessary.)

- Education and training Consultancy Other(s) (Please specify) _____
 Development Advocacy _____
 Research _____

5. Which of the following discipline(s) listed below describe the programme(s) of your organization or your work? (You may tick more than one box as necessary.)

- Agriculture and food security Land use Other(s) (Please specify) _____
 Forestry Economics _____
 Sustainable development Emergency relief _____

6. To what extent do you or your organization receive information necessary to enhance the objectives and activities indicated in Questions 3 to 5 both from internal and external information sources?

	In all cases (always)	In some cases (sometimes)	In rare cases (rarely)	Never
From internal sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
From external sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. If your answer to Question 6 is "In rare cases" or "Never", please explain the instances in which this is the case. _____

(Please go to Question 9)

8. If your answer to Question 6 is "In all cases" or "In some cases" please indicate some of the sources of information within or outside the organization from where you get the information.

Within organization _____

Outside organization _____

PART II — INFORMATION EXCHANGE ACTIVITIES AND GENERAL INFORMATION NEEDS

9. What is/are the reason(s) for you or your organization's participation in exchanging information with other MIDNET members. (You may select more than one answer as necessary.)

- To share ideas and experiences
- To discuss and debate on topics of common interest
- To plan and implement joint projects and activities
- To share expertise
- Others (Please list or briefly explain) _____

10. What communication media and mechanisms do you or your organization use in the exchange of information with other MIDNET members? (You may indicate as many as appropriate.)

- Face-to-face interaction (one-to-one, one-to-many, etc.)
- Interest groups
- Meetings (workshops, seminars, conferences, etc.)
- Postal service
- Electronic mail
- Telephone
- Fax
- Field visits
- Exchange visits
- Other(s) (Please specify) _____

11. To what extent are you or your organization satisfied with the exchange of information using the communication media and mechanisms selected from Question 10?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Very satisfied	Satisfied	Somewhat satisfied	Never satisfied	No opinion

12. If your answer to Question 11 is "Somewhat satisfied" or "Never satisfied", what are the problems? _____

13. Would you please comment on how to overcome the problems indicated in Question 12? _____

14. Listed below are various information products and dissemination activities used within organizations, networks, interest groups and by individuals. Please tick all the information products and activities that are outputs of yourself, your organization, interest group or MIDNET. For instance, if all the four entities (organizational member, network, interest group and individual member) produce newsletters, you need to select newsletters and tick all the four boxes for newsletters like below.

<i>Products and activities</i>	<i>Organization</i>	<i>Network</i>	<i>Interest group</i>	<i>Individual</i>
<input checked="" type="checkbox"/> Newsletters	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

<i>Products and activities</i>	<i>Organization</i>	<i>Network</i>	<i>Interest group</i>	<i>Individual</i>
<input type="checkbox"/> Newsletters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Annual reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Magazines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Special papers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Discussion papers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Conference/workshop proceedings/syntheses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Books	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Working papers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Bulletins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Brochures, leaflets and/or pamphlets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Others (<i>Please specify</i>)				
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. What language(s) do you or your organization use in the communication activities indicated in Questions 10 and 14? (*You may select/specify more than one answer.*)

- English Other(s) (*Please specify*) _____
- Zulu
- _____
- _____

16. Which of the languages indicated in Question 15 do you or your organization predominantly use? _____

17. What are the general information categories reflected in information products chosen from Question 14? (You may select more than one.)

- | | | |
|---|---|--|
| <input type="checkbox"/> Sustainable development information | <input type="checkbox"/> Economic information (for instance, market or price information) | <input type="checkbox"/> Participatory rural appraisal |
| <input type="checkbox"/> Sustainable livelihood information | <input type="checkbox"/> Research information | <input type="checkbox"/> Work/organizational/network information |
| <input type="checkbox"/> Agricultural information, i.e., technical such as technology development or appropriate technology | <input type="checkbox"/> Food security information | <input type="checkbox"/> Other(s) (Specify) _____ |
| <input type="checkbox"/> Agricultural extension information | <input type="checkbox"/> Environmental information | _____ |
| <input type="checkbox"/> Policy-related information | <input type="checkbox"/> Land reform | _____ |
| <input type="checkbox"/> Gender information | <input type="checkbox"/> Legal entities | _____ |

18. To what extent are you or your organization satisfied with the information provided through the information products chosen from Question 14?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Very satisfied	Satisfied	Somewhat satisfied	Never satisfied	No opinion

19. If your answer to Question 18 is "Somewhat satisfied" or "Never satisfied", what are the problems with the information provision? (You may tick more than one box.)

- | | |
|---|--|
| <input type="checkbox"/> Irrelevance to my or my organization's objectives and work | <input type="checkbox"/> Others (Specify). _____ |
| <input type="checkbox"/> Outdated information (currency) | _____ |
| <input type="checkbox"/> Inaccuracy of information | _____ |
| <input type="checkbox"/> Poor packaging (language, style, medium used, etc.) | _____ |

20. Do you, your organization, MIDNET or MIDNET interest groups have a written policy (i.e., editorial, review, distribution, etc., rules and regulations) for guiding the production, exchange and dissemination of information?

	Yes	No
Your organization	<input type="checkbox"/>	<input type="checkbox"/>
Yourself (individual member)	<input type="checkbox"/>	<input type="checkbox"/>
MIDNET	<input type="checkbox"/>	<input type="checkbox"/>
MIDNET interest group	<input type="checkbox"/>	<input type="checkbox"/>

21. Do you or your organization produce information with restricted access?

- No (Our information is open access)
- Yes (Please indicate the type of information and nature of the restriction). _____
- _____
- _____
- _____
- Don't know

PART III — INFORMATION RESOURCES AVAILABLE IN THE NETWORK COMMUNITY

22. Is there an information unit(s) responsible for the production and dissemination of information in your organization, interest group or the network?

- No (Please go to Question 24)
- Yes (Please indicate the type of information unit(s) in the list below.)

Library Publishing Information technology Other unit (Specify) _____

Your organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MIDNET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MIDNET interest group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. If the answer to Question 22 is YES, please state the number of information personnel in the unit(s).

Library Publishing Information technology Other (Specify) _____

Your organization	_____	_____	_____	_____
MIDNET	_____	_____	_____	_____
Interest group	_____	_____	_____	_____

(Please go to Question 25.)

24. If the answer to Question 22 is NO, please briefly explain who is responsible for the information exchange function and how information outputs are produced and disseminated (e.g., ad hoc committees, public relations office, using free lancers, using commercial publishers, etc.).

Your organization _____

MIDNET _____

MIDNET interest group _____

25. Please indicate the source(s) of funding for information exchange and dissemination activities for you or your organization. (You may tick more than one answer.)

- Government
- Donor agency

- Private sources
- Others (Specify) _____

26. What was your personal or your organization's total budget for information exchange activities in Rands for the fiscal year of:

- 2001 R _____ 1999 R _____
- 2000 R _____ Don't know (Please go to Question 28)

27. Please indicate the approximate percentage of the total budget in Question 26 that was allocated for information exchange and dissemination activities.

- 2001 % _____ 1999 % _____
- 1000 % _____ Don't know

28. Do you or your organization own computers?

- Yes
- No (Please go to Question 37)
- Don't know (Please go to Question 37)

29. Is/are there computer network(s) in your organization?

- Yes
- No (Please go to Question 31)
- Don't know (Please go to Question 31)

30. What is/are the structure(s) of the computer network(s)?

- Local area network, LAN (i.e., network of computers over a limited geographical area, say, a room or a building, via cables)
- Wide area network, WAN (i.e., network of computers via telecommunications links irrespective of their location)
- Don't know

31. Are you or your organization connected to the Internet?

- Yes
- No (Please go to Question 37)
- Don't know (Please go to Question 37)

32. What is the kind or nature of Internet connectivity stated in Question 31?

- Dial-up access**, i.e., the user has to first "dial" up the Internet service provider (ISP) to access the Internet services and resources
- Full Internet or direct connection**, i.e., the computer is directly connected to the Internet and one simply clicks a button/icon to get connected and use the Internet
- Both** dial-up and direct connection
- Other (Please specify) _____
- Don't know

33. Who has access to a computer(s) or work-station(s) within the organization on which to access the Internet?

- Management
 Administrative staff
 Others (*Specify*). _____
 Practitioners
 Everybody

34. Please indicate the environment in which staff have access to the Internet.

ORGANIZATIONAL MEMBERS

	Management	Practitioners	Administrative staff	Everybody	Other (<i>Specify</i>) _____
<input type="checkbox"/> "Personal" work-station (computer terminal) in their office	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> General work-station to be shared with other staff members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other arrangement (<i>Please specify</i>) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INDIVIDUAL MEMBERS

- Personal work-station within the organization I am affiliated
 General work-station within the organization I am affiliated
 Using my personal computer at home
 Using Internet cottages/cafes

35. Have you or your organization developed an Internet-based information exchange and dissemination system?

- Yes
 No (*Please go to Question 37*)
 Don't know (*Please go to Question 37*)

36. If the answer(s) to Question 35 is YES, which of the following Internet facilities are used? (*You may tick more than one box.*)

- Electronic mail (E-mail):** facility which allows to create, send, receive, and view or print electronic mails
 World Wide Web (WWW): facility which allows to publish, locate and view multimedia documents or Web pages the collection of which forms a Web site
 Intranet (Inner Web): an internal Web site with restricted access only to the staff of an organization or network community.
 Mailing lists (listservs): specialized mailing systems through which people exchange ideas and experiences with others who share a common interest
 Newsgroups (Bulletin boards): facility which enables discussion group subscribers to discuss on a particular topic irrespective of their geographical locations
 File transfer protocol (FTP): FTP permits to transfer (copy) files from one to another machine irrespective of their location
 Telnet (remote login): facility which enables to log into a remote computer machine and operate it, i.e., manipulate files on its hard drive and then log out. For instance, one may access the computer at his/her office from home or anywhere in the world.
 Thematic gateway (portal or subject guide): A Web site which serves as a gateway to access selected Internet resources on a specific theme or subject such as rural development.
 Other(s) (*Please specify*) _____

37. If the answer to Questions 28, 29, 31, and 35 are NO, do you or your organization have any plan for computerization, networking or creating connection to the Internet?

	Owning computers	Developing network	Internet connectivity
No	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yes (Please also indicate the implementation plan by choosing item(s) below.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IMPLEMENTATION PLAN

	Immediate (up to 1 year)	Short term (1-2 years)	Long term	No idea
Computers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local area network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wide area network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet connectivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developing Web site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developing intranet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using Internet cottages/cafes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PART IV — OPINIONS ON ESTABLISHING INTERNET-BASED INFORMATION EXCHANGE

38. In your opinion, how adequate are the information exchange activities and dissemination mechanisms currently practiced among MIDNET members to attain the goals and objectives of the network?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Very adequate	Adequate	Inadequate	Very inadequate	No opinion

39. If your answer to Question 38 is either "Very Inadequate" or "Inadequate", please indicate the reason(s). (You may tick more than one box.)

- Lack of information content
- Information exchange activities are not done regularly
- Information overload, i.e., too much information disseminated at the same time
- Lack of relevance to my or my organization's objectives
- Poor packaging
- Lack of alternative information exchange mechanisms
- Others (please specify). _____
- _____
- _____
- _____

40. What are the factors that hinder information exchange and dissemination among MIDNET members? (You may give more than one problem.)

- Inadequate funding
- Lack or shortage of professionals for information support services
- Lack of cooperation among members
- Poor coordination
- Other (Please specify) _____

41. Would you please comment on how to overcome the problems you indicated in Question 40? _____

42. If your answer to Question 38 is either "Very adequate" or "Adequate", please explain the factors that enhanced the information exchange activities. _____

43. In your opinion, to what extent would you or your organization favour or oppose participation in an Internet-based information exchange with other MIDNET members to supplement current activities and mechanisms?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strongly favour	Favour	Oppose	Strongly oppose	No opinion

44. If your answer to Question 43 is 'Strongly favour' or 'Favour', what would your organization contribute? (Please choose as many as applicable.)

- Information
- Funds
- Expertise (consultancy, editorial, review, repackaging, design, etc.)
- Don't know
- Other (hosting a site, etc). Please specify _____

45. If your answer to Question 43 is 'Oppose' or 'Strongly oppose', please provide the reasons for your answer. _____

46. What Internet facility(ies) do you or your organization recommend for MIDNET for immediate (less than 1 year) and short term (1 to 2 years) implementation? (You may refer to the brief definitions given in Question 36 to understand the purpose of the facilities listed below).

	<i>Immediate</i>	<i>Short term</i>	<i>No opinion</i>
World Wide Web:			
MIDNET Web site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web-based communication (Web sites for posting announcements, organizing conferences, e-conferences)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chat rooms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intranet (Inner Web)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electronic mail (e-mail)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mailing list (ListServ or discussion group)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Newsgroup (Bulletin board)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
File transfer protocol (FTP)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telnet (Remote login)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thematic gateway (portal)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

47. If you or your organization have any other comments to make please state them. _____

Thank you for your cooperation!

Please return the questionnaire before 15 August 2001 using the stamped and addressed envelope provided.

APPENDIX 2: Letter of Introduction from the Supervisor



UNIVERSITY OF NATAL

School of Human and Social Sciences

Private Bag X01, Scottsville
Pietermaritzburg 3209, South Africa
Telephone: (033) 260 5320/5290
Fax: (033) 260 5092
General enquiries:
e-mail: mkhize@nu.ac.za
acutt@nu.ac.za

17 July 2001

To whom it may concern

This is to confirm that Mr. Amare MOLLA is a bona fide student at the School of Human and Social Studies, University of Natal. He is a candidate for Master of Information Studies degree. Mr. Molla is currently collecting research data necessary for his thesis entitled: **Establishing an Internet-based information exchange system for the Natal Midlands Rural Development Network (MIDNET)**. I would be most grateful if you can assist him in anyway you could to facilitate the exercise.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'A. Kaniki', written over a circular scribble.

Professor Andrew M. Kaniki
Information Studies Programme, SHSS
Major Supervisor

APPENDIX 3: Introductory Letter by the Researcher

18 July 2001

Dear MIDNET members,

Re: Establishing an Internet-based information exchange system

I am an Information Officer at the Ethiopian Agricultural Research Organization, Addis Ababa, currently on study leave and pursuing a Master of Information Studies degree at the University of Natal, Pietermaritzburg.

The Internet is changing the way organizations and people communicate. One of the strategic areas where it is being increasingly used for information exchange. Its facilities like the World Wide Web, E-mail, discussion groups, file transfer protocol, Intranet, and subject guides (portals) and Telnet (remote login) offer an array of networking opportunities. The challenge, however, is how to establish an Internet-based system for networks so that its potentially useful facilities can best be integrated into existing information exchange activities and resources to meet the information needs of network communities. To effectively establish the Internet into development networks, the following, among other things, must be available: people with common interest and information seeking behavior, the information to be exchanged, information and telecommunications technologies (i.e., computerization and connectivity to the Internet), sustainable source of funding and the human resources with the knowledge and skills to develop and maintain the system.

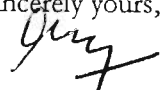
There has been an increasing awareness in MIDNET that the Internet has the potential to enhance the mission and objectives of the network by replicating and supplementing existing information exchange mechanisms. To this end, I am undertaking a thesis research on the topic: **Establishing an Internet-based information exchange system for the Natal Midlands Rural Development Network (MIDNET)**. I will be very grateful if you could take some time to complete the attached questionnaire and kindly mail it using the addressed and stamped envelope provided with the following address:

C/O Professor Andrew M Kaniki
Amare MOLLA
Information Studies Programme,
School of Human and Social Studies
University of Natal
Private Bage X01
Scottsville 3209, PIETERMARITZBURG

The information you provide through the questionnaire will be confidential and it will only be used for writing the thesis.

I look forward to receiving your response at your earliest convenience, but **before 15 August 2001**. Thank you very much for your cooperation and assistance.

Sincerely yours,


Amare MOLLA

Encl: As above

Midnet Evaluation Plan¹

Co-ordinating various evaluative initiatives in Midnet.

Ute Gilles is assisting Midnet “to find out how Midnet can extend its capacity in networking so that it is more useful to its members”.

Webster Whande’s brief is “to evaluate the effectiveness of Midnet, and together with the network members, develop guidelines for the future.”

Amare Molla is undertaking a thesis by research on “ investigation into the prospects of and necessity for establishing an internet-based information exchange system for Midnet as a supplement to its existing information exchange activities.”

There is a very limited budget for evaluation, and clearly the processes need to be closely linked.

Amare is getting a few responses to the questionnaire he send out to members. Ute has 2 days a week allocated to assisting Midnet, and she is undertaking a series of interviews, and wherever possible visits, to members. Webster is based in the Cape and is available to work with Ute on the outcomes of her investigations, and from this to design and facilitate a one-day workshop with Midnet members, and to write a report on this workshop.

Suggested process

Interviews and meetings with Midnet members result in:

A **network inventory** – a list of the organisations and their areas of work, and sorted into type of organisation.

Ute undertakes the interviews during September and October and develops this inventory

The results of discussions Ute holds are analysed in the following way:

- Perceptions of the network are ranked by each informant/ member in terms of what they see as important for the network and its member institutions.
- What the informal networks of participating members/ institutions are
- The amount and frequency of information exchange and learning
- Level of involvement in cross-visits and interest groups
- Sources of finance and resources contributed my members

¹Message distributed to MIDNET members via e-mail

- Perceptions/ observations of hindrances and blockages to networking

Ute gathers the information, and draws on Amare's questionnaire results. Ute and Webster analyse the information and prepare it for the workshop with members.

A one-day workshop is held in early November with as many members as are willing to participate. Ute and Webster present the results of Ute's and Amare's investigations, Webster facilitates the group to interact with the results, to agree on the meaning of these for Midnet and to develop guidelines for the future.

Webster and Ute write up the results of the workshop by mid November.

Ute works with the Midnet Exec to develop any proposals that emerge from this, to be completed by the end of November.

Exercise	Timing	D a y s work:WW	Who	Amount: Whande
1. Familiarisation	Sept - October		Ute	
2. Inventory	Mid-October		Ute	
3 . N e t w o r k perceptions	Late October/ early Nov	2 (two)	Ute and Whande	ZAR2400
4. Group focussed workshop ¹	Early November	2 (two)	Ute and Whande	ZAR3600
5. Evaluation write up	Mid November	2 (two)	Ute and Whande	ZAR2400
6 . T r a v e l , accommodation and subsistence ²				ZAR3000
Total	6 (six)	R10 200		

¹ 2 days including the preparation for the workshop, with Webster focusing on design and Ute doing the practical work needing more time.

² to cover return flight.