The Information Society and the Developing World: A South African Perspective

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Letter from Deputy State President Thabo Mbeki

South Africa is currently facing a range of historic challenges, some bequeathed to us as a result of distorted past policies and others which have arisen as a result of a rapidly changing international environment. The key to addressing these challenges is to develop a practical spirit of innovation at every level of society. When discussing innovation, it is important to stress that South Africa is in some aspects already a rather innovative society. We only need to recall how intractable our political and social problems seemed a decade ago to understand the truly radical break we have made with our past.

The principal new trend in the international industrial and social communities is the simultaneous rapid emergence of an ever more sophisticated and widespread information technology and its associated applications. The World Wide Web was developed at CERN a mere five years ago and talk of it now dominates debates on development in the context of a global society!

This information revolution presents great opportunities for the developing world. In particular, it raises the question as to whether IT can assist developing countries in leapfrogging stages of development or in going in entirely new directions towards achieving a good standard of living and quality of life. Indeed, the ability to use information effectively is now the single most important factor in deciding the competitiveness of countries.

The aim of this Position Paper is to set the scene for placing South Africa on a competitive trajectory in IT applications for human and economic development. It represents a synthesis of contributions from across all sectors of society, from government to the private sector, from universities to NGOs. I am proud to present it at this most prestigious and influential forum, the Information Society and Development Conference. I am sure that in stating our views and aims clearly in this arena we will stimulate debate of a high order. I look forward to participating in this debate and to co-operating with my ministerial counterparts from the other countries present here in using the information society for the purpose of global development and prosperity.

A special note of thanks must go to the National Information Technology Forum , an umbrella body of South African IT oriented organisations, which put in much of the hard work and creative thinking which went into this paper.

Yours sincerely,

EXECUTIVE SUMMARY

0 A Way Forward to the Global Information Society for South Africa and the Developing World

0.1 Introduction

To highlight the importance of the information revolution for developing countries;

To raise issues for the developing world regarding the information revolution;

To suggest policy pillars to empower developing countries in the global information society.

This paper sets out South Africa's position for the May 1996 Information Society and Development Conference. It aims to encourage debate rather than give definitive positions.

The world is in the throes of a new and highly potent revolution, leading to a Global Information Society. Information Technology is a universal technology - its applications are only limited by the ingenuity of the human mind. There is great potential for the Information Society to promote development in many countries, but dangers as well that policy needs to address. The objective of the process around the Information Society and Development Conference must be empowering developing countries in the new information age. Four issues are key:

The Information Community (IC) Perspective: This focuses on the implications for social groups as well as individuals. The Information Revolution should benefit society as a whole.

The Role of the Information Community in Promoting Development: The development needs of each country, as set out in South Africa by the RDP, should be the focus for the IC.

Ensuring equity in the Information Community: The IC must be an instrument of emancipation and empowerment, appropriate to the environment and needs of each country.

The role of the state in the Information community: The state has a role to play in ensuring universal access and supporting establishing the economic environment for the IC.

A number of policy pillars are suggested for discussion at the ISAD Conference:

The importance of Information Community Planning;

IT as an Engine of Development and Empowerment of the People;

Education and Training for the Information Community;

Encouraging innovation; IT for economic growth and industrial development;

South African Content: Contributions to World Knowledge & Culture;

An Equitable International Approach; Sectoral Co-operation;

Creating and Enabling Environment.

Funding mechanisms must be developed at National, Sub-Regional, Regional and Global levels.

0.2 Using the Global Information Society to meet the needs of the Developing World

To examine the role of an Information Community to promote economic growth and social development;

To suggest responses to the development challenges of the Information Community;

To raise awareness of the particular development needs of developing countries.

The Information Community (IC) has great potential to address the social, political and economic challenges facing South Africa and the developing world. The IC can address the pressing social and development needs in developing countries, as well as supporting export- oriented industrial growth.

South Africa's social and economic development needs are articulated in the Reconstruction and Development Programme (RDP). The emerging Information Community can assist with:

Meeting basic needs: Capacity should be built for developing countries to meet their own needs in areas such as education, health care, crime prevention and transparency of government.

Developing human resources: The Information Community can encourage life-long learning, support indigenous arts and culture, be used for recreation and to assist youth programmes.

Building the economy: The Information Community can create new industries, and support all sectors of the economy. There needs to be investment in this area. Measures must be taken to prevent any negative impact this could have on employment and skill levels; and to ensure democratisation of the workplace.

Democratising the state: The efficiency and co-ordination of government can be improved. The transparency and accountability of government can also be increased.

Most theorists focus on the promises of this new era. In South Africa, as with most of the developing world, the political constraints force us to consider both the opportunities and threats, such as redundancies, scarce financial resources, relatively low levels of human resource development, the absence of a comprehensive national informatics vision and policy, technological illiteracy, and fragmented initiatives for information infrastructure development. South Africa is not willing to pursue global competitiveness at the expense of labour, environmental and other standards.

0.2.1 Recommendations

1. Develop a report on the "Vision, principles and Strategy of the Information Community";
2. Establish South African Information Community Pilot Projects;
3. Produce an Inventory Project for Economic Development, reviewing best practice;
4. Establish Developing World Information Community Pilot Projects, jointly between South Africa and other developing countries.

0.3 Creating the Information Society through co-operation between all sectors in a global way

To demonstrate the creative power of an Information Community that draws on the knowledge and values of all sectors in our society;

To design a process that will ensure participation by all sectors of society in the planning and implementation of the Information Society;

To support sub-regional initiatives while ensuring linkages to regional and Global Information Society development.

The current information society is far from "global". There are huge gaps in the information infrastructure and content that must be addressed. There are five main social sectors that need to be brought together for policy formulation, planning and implementation. They are the public sector, private sector, organised labour, civil society and academia.

South Africa should move towards a consensus vision of the Information Community through a Green and White paper process, and possible legislation. This would bring together all stakeholders in the emerging Information Community.

Co-ordination should also happen at the sub-regional and regional level. For South Africa this means actively working in SADC for co-ordinated efforts; and through the Economic Commission for Africa.

Finally, at the global level, South Africa should work with other partners to ensure an effective African and developing world perspective is articulated in the building of the Global Information Society. These global planning organisations include the ITU, World Bank, WTO, G-7 and GIIC.

South Africa proposes 5 pilot projects for the developing world:

1. Multi-Purpose Community Centres;
2. Centres of Excellence, Expertise and Resources;
3. Information Technology National Qualifications Framework;
4. Open and efficient government;
5. Contemporary African Music and Arts Archive.

0.3.1 Recommendations

1. The Green and White Paper process on the Information Community must be launched;
2. A representative policy and control body must be created;
3. A Government On-line pilot project should be developed;
4. S A should support SADC creating an equitable Southern African Information Community;
5. S A should work with the ECA on the Action Plan for Africa;
6. S A should co-operate with international bodies on a range of Information Community projects.

0.4 Developing a South African Information Infrastructure for the Information Community, in a Global Context

To promote the provision of an information infrastructure to meet national needs;

To argue for an information infrastructure that will enable affordable universal service;

To promote the vision of a national information architecture.

The Information Infrastructure (II) is the basis the Information Community's ability to develop content applications. This II includes telecommunications networks, standards and protocols for data interchange, and some basic software for infrastructure operability.

There are 4 significant aspects of II provision:

Basic Telecommunications Infrastructure and Telematics Services: South Africa has a very skewed information infrastructure - very advanced in the cities, totally lacking in large areas. An action plan to expand access and upgrade the network is required.

Developing an information architecture: A South African data model is required to co- ordinate information collection and provision. Other important issues here are freedom of access to information, privacy of personal information, copyright and intellectual property, and security and integrity of information.

Management structures and regulatory frameworks: An overall management structure is required to co-ordinate South African infrastructural priorities. The Telecommunications White Paper calls for the establishment of a Regulatory Authority, and a Universal Service Agency to work for universal service as an intrinsic part of telecommunications development.

Domestic exploitation of the economic opportunities of the II: Currently South Africa is largely an importer of IT. Investment in II offers great opportunities for developing South African businesses to meet this need, for example through consortiums of smaller companies. The provision of II should benefit the domestic economy

0.4.1 Recommendations

1. The White paper on telecommunications will guide development towards universal access in the shortest possible time.
2. Develop an indigenous service industry for infrastructural provision. There are many opportunities for SMME growth in this area.
3. Launch a national project to define an information architecture for coherent development of applications in South Africa to support national delivery processes for development.

0.5 Applications to serve the needs of the developing world

To locate applications development within the needs of developing countries;

To examine the capacity required by developing countries to produce relevant applications;

To analyse the economic issues related to applications development.

Applications are the heart of the information society. The real role of IT is as a universal enabler acting in almost all fields of human endeavour. IT cuts across the traditional divisions of our communities and working lives. Software and computer systems do not themselves constitute applications. The human

aspects - usability, usefulness, empowerment, appropriateness, linguistic and cultural compatibility - are often more important to success or failure than the hardware and software themselves.

It is crucial for all countries to be able to develop applications to meet their own needs. This has a major impact on how appropriate the IT applications will be, and on the economic strength of the country. The developing world has already developed many useful applications of IT that affect all areas of life. These countries should collaborate to develop systems to meet their common needs.

There are applications for IT in all areas of human life, certainly in the major areas of meeting basic needs, human resource development, building the economy and democratising the state. One application that applies to all four areas is the establishment of Multi-Purpose Community Centres, using IT as an enabler. Establishing Centres of Excellence to develop applications is strongly urged for a country effectively to meet its own economic and social needs.

IT plays such a central role in the economic life of a country that it should be considered as a strategic asset. Developing countries must ensure that they promote their own ability to develop applications. The emergence of indigenous applications development could cause competition between developing and developed countries, but this should be supported by all as a sign of the developing world maturing into full contributors to the global economy.

0.5.1 Proposals and Recommendations

1. Establish Centres of Excellence to develop applications meeting the needs of the communities they serve.
2. Multi-Purpose Community Centres for universal access. IT will be the backbone for a range of services defined by their communities.
3. Co-ordinate ways for developing countries to co-operate in IT applications.
4. Run a study on resolving threats to co-operation between developed and developing countries.
5. Address the financial weakness of developing countries to support the key enablers of applications development.

0.6 People empowerment: Investing in Human Resources

To argue for a new Human Resources paradigm appropriate to an Information Community;

To describe necessary reforms in formal education and training;

To suggest qualifications standards & career path development for an Information Community.

The Information Community is primarily for the benefit of people. A new system which integrates education and training is required to provide equal opportunities to all South Africans to allow them to take advantage of the new opportunities available. This system should address the development of knowledge and skills which may be used in the production of high-quality goods and services which will enable South Africans to develop their culture, society, and economy.

This requires a transformation to a new paradigm in education and training. This paradigm is underlined by a set of principles which address the issues of integration, relevance, credibility, standards, legitimacy, portability, progress, prior learning and access to all. It incorporates the concept of life-long learning and the striving towards a Learning Nation.

Issues need to be addressed in formal education institutions, in the availability of IT education and training, in developing common standards for the Information Community and in building IT career development paths.

0.6.1 Recommendations

1. Sensitisation: Active steps should be taken to raise levels of awareness of the potential of IS in all sectors of the South African society, from political and community leaders to the business community and the population at large.
2. National Qualifications Framework: The majority of people of South Africa have been exposed to such poor education in the past that there is a need to overcome scepticism regarding education, training and certification. There is a need to create research teams as proposed in the Project Plan

for the Information Technology Qualifications Framework (IT- NQF) for applied research and development of IS outputs as they relate to work, research and social environments.

3. Access to Education, Training and Development: A system of education, training and development accreditation is useless unless it is accessible to all South Africans, irrespective of race, gender, social class, or geographic location. There is therefore a need for the establishment of Multi-Purpose Community Centres (MPCCs) throughout South Africa.

Projects

1. The development and implementation of an IT-NQF should be supported.
2. The Contemporary African Music and Arts Archive should be supported to record and promote South African national cultural and artistic heritage.

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1 INTRODUCTION
Creating and Utilising a "Global" Information Society for World Development — A South African Perspective

1.1 Introduction

The objectives of this chapter are to:

Highlight the importance of the information revolution for developing countries in general and South Africa in particular;

Raise key issues underlying the approach of South Africa and the developing world to the information revolution;

Suggest policy pillars to empower developing countries to participate meaningfully in the information revolution.

The world is in the midst of a new and highly potent revolution which will forever change the way we live, work, play, organise our societies, and ultimately how we define ourselves. Unlike previous technological revolutions, which were focused on energy and matter, this fundamental change involves our understanding of time, space, distance and knowledge. Information Technology is a universal technology - the scope and flexibility of its applications are only limited by the ingenuity of the human mind.

The exact nature of this information revolution is still being determined. However, the implications of this revolution are already being felt with increasing force. What are these implications - for the developing world in general, and for South Africa in particular? What strategic approach can South Africa and the developing world adopt to take full advantage of these new global realities? It is these questions this paper will attempt to address.

We are entering a new age of economic globalisation. There are differing views on how this will affect the developing world, but it is clear, as Deputy President Thabo Mbeki pointed out in his address to the G-7 Ministerial Secretariat on the "Information Society" in Brussels, that it implies "colossal challenges"[1]. This new high-speed global economy resembles a world- wide race for competitiveness in which the finishing line keeps moving away. A real danger exists that the increasing globalisation of production and the mobility of global corporations could undermine environmental, labour, human rights, and social policies around the world. Even in developed countries unprecedented retrenchments of workers in IT companies have taken place.

The South African perspective on the information society and the developing world presented here is structured around the Information Society and Development (ISAD) Conference. This introduction is followed by two chapters corresponding to the two ministerial sessions, and then by three chapters mirroring the three theme fora on Infrastructure, Applications and Human Resources.

1.2 Key issues on the information society from a developing world perspective

The essential objective of this document is to develop a perspective that empowers South Africa as a developing country in its approach to the new information age. It is premised on the need for a developing countries' vision of the meaning and implications of the Information Society.

The information revolution is changing the world very rapidly. These changes are global and inescapable. Further, the rate of change in the information revolution continues to increase exponentially. This will have enormous economic consequences, and great potential for spreading benefits currently enjoyed by developed countries. This great rate of change demands a very flexible approach to policy formulation. However, the challenges facing developing countries are different in many respects to those facing developed countries. In developing countries, the Information Society must serve national development needs, and focus on the disadvantaged sectors and under-developed areas.

The following are some of the key issues needed to underlie the approach of the developing world to the information revolution:

The development of an Information Community perspective;

The role of the Information Community in promoting development;

Ensuring equity within the Information Community;

The role of the state within the Information Community.

1.2.1 The Development of an Information Community Perspective

As a developing country, South Africa has to ask certain questions of the information revolution. How can developing countries ensure that they are not marginalised by the accelerating global rate of innovation in information technology? Developed countries that are confidently able to remain at the forefront of such accelerated change will steadily increase their competitive advantage over the others. How can developing countries participate globally without merely opening up their markets for the penetration of foreign products and thus increasing their dependency on the developed world? To prevent such a scenario, it is necessary to go beyond the global adoption of basic infrastructure and open interchange standards to empower developing countries with a capacity for IT innovation and development. Such empowerment needs to include the equitable transfer of technology so that intellectual property rights are used to support innovation and not in a protectionist fashion to safeguard vulnerable software industries from outside competition.

The South African vision of the Information Society is best characterised as that of an Information Community. It is a vision that seeks to shift the emphasis of the advantages offered by the information revolution towards a fuller balance between individuals and social groups, communities and societies. In developed countries, even where social issues are taken into account, the bias has tended to remain that of individual advancement via personal universal access and, at a public level, on competition between firms and nations. Our vision seeks to ensure the creation of an equitable information order, nationally, regionally and internationally. The vision of an Information Community therefore takes into account the undoubted potential of communities at various levels to co-operate, to bridge differences, to work for mutual upliftment and for the meeting of basic needs, and to redress the social imbalances of under-development. The development of an Information Community perspective aims to ensure that the information revolution benefits society as a whole.

IT's most significant influence until recently has been on services and manufacturing and, like all new technologies, it has also played a very significant military role. At its best this has led to integrated manufacturing encompassing participative and co-operative organisation. On the whole, and leaving aside the recent explosion in the Internet, the information age has been rather less successful in supporting education in schools, in providing household services such as tele-banking and shopping and in enabling social development. The major economic result of the Information Age thus far has been the further globalization of economic and particularly financial activity. It has contributed to a global culture of increased competition and increased risk. World-wide the information infrastructure has been used as a justification and a lever to achieve greater liberalisation and privatisation, frequently with negative consequences for developing countries. This age has also seen a globalization of culture that is characterised by local cultures being submerged in a global trade of cultural "goods and services", although the potential exists to record and distribute previously inaccessible indigenous culture in new ways.

1.2.2 The Role of the Information Community in Promoting Development

For South Africa, emerging from years of international isolation and from the internal ravages and inequities of the apartheid years, most governmental and increasingly private sector strategies are driven by the objectives of the Reconstruction and Development Programme (RDP). The principles of the RDP are further elaborated in terms of six pillars identified within the National Strategic Vision agreed in November 1995. There are four basic programmes of the RDP:

Meeting basic needs;

Developing human resources;

Building the economy;

Democratising the state and society.

Each of the programmes identified above can be leveraged by the development of information infrastructure and content, and the building of an Information Community in South Africa (see chapter 5). As well as benefiting service delivery, the efficiency and openness of government, and community empowerment, an Information Community can enable South Africa to "leap- frog" some developmental stages, to create jobs and greatly to increase social development and economic growth and competitiveness. However, "leap-frogging" can also lead to economic, social and political problems if it is implemented in a way that does not benefit society as a whole.

Additionally, the nature and structure of the global economy have changed substantially. The increased application of information technology and "knowledge" to the production processes around the world facilitates the emergence of new models of industrial organisation. Information and communications technologies are increasingly important to the nature of work in the information age, and an effective Information Community is increasingly seen as a crucial factor in ensuring domestic and foreign investment within a country. The creation of an Information Community also significantly stimulates entrepreneurial development and strengthens small, medium and micro enterprises (SMMEs). Further, the Information Community is a vital enabler for widespread economic growth, for job creation and for all- round socio-economic development.

South African information technology policy is part of a broad front of new thinking on a range of issues, such as telecommunications, education and health. This thinking has resulted in Green and White Paper processes in Science and Technology and in Telecommunications. The central thread connecting all government-led policy initiatives is the need for innovative approaches to the social and economic challenges faced by South Africa as a developing society in the post-apartheid era. Indeed, innovation is no longer seen just an option, but as a matter of survival. That this is also an international perception is borne out by the recent European Commission Green Paper on Innovation and by similar initiatives in a number of developing countries.

The Organisation of Economic Co-operation and Development (OECD) defines a national system of innovation as "a network of institutions in the public and private sectors whose activities and actions initiate, import and diffuse new technologies." While South Africa has the components of a national system of innovation, what has been lacking until now is a national plan for enabling these components to work cohesively in service of commonly perceived national goals, particularly as regards quality of life and economic development. It is this lack that the policy initiatives mentioned above are designed to address.

1.2.3 Ensuring Equity within the Information Community

The information age has not so far contributed to a reduction of inequalities between people, regions and countries. Where it has entered the social arena, IT has not operated on a communal basis but rather on an individual one: personal computers rather than community access. To date it has served to concentrate wealth and power. The main social changes resulting from the information age have been in the workplace and in the interrelations between firms.

The introduction of IT into an organisation or a society produces major impacts of a social, economic and political nature. Like other technologies, IT is not neutral. Its impacts are determined by the values, policies and frameworks governing its implementation. For example, many IT applications are based upon work designs focusing only on the individual's task productivity. Such a narrow approach often leads to the design of applications that are inappropriate, difficult to use, and hence likely to fail. Such an approach to IT fails to grasp that the problems and issues of IT implementation are fundamentally social rather than technical. Therefore, rather than emphasising efficiency and effectiveness, the focus should be on social acceptability, appropriateness and sustainability as key criteria within the Information Community.

The Information Community needs to become an instrument of emancipation and empowerment. Office and factory workers can be emancipated from positions of disempowerment if the introduction of IT is aimed at their needs as well as at the needs of management. Empowerment through IT means that information-literate individuals and communities are able to take advantage of the educational, work and communications possibilities offered by IT to hold their own in the Information Community.

As IT spreads from developed to developing countries, it encounters new cultures, differing vastly from the culture within which it originated. Within these cultures, automation and computerisation are viewed differently, often with apprehension, since it affect the lives of communities and individuals in ways they may neither understand nor desire. It is also necessary to understand the possible detrimental impacts of IT in order to prevent further dehumanisation of our society. Not all societies can absorb IT without harmful side-effects such as loss of privacy, unemployment, de-skilling, disempowerment, computer crime and techno-stress.

Therefore, the adoption and diffusion of IT in developing nations should be in line with basic "core values" of economic development as expressed by the development economist M P Todaro. For instance, IT should address:

Life-sustenance (the ability to provide for the basic needs of the individual and the community);

Self-esteem (using IT to enhance rather than de-skill a particular job);

Freedom from servitude (the ability to assert personal and popular control over one's life).

The approach to the Information Community should therefore be based on development being focused on people rather than on objects. The introduction of IT into developing countries is frequently accompanied by very little real technology transfer. This means that users become permanently indebted to (foreign) suppliers for help and maintenance, thus creating dependency. The technology should "fit" the circumstances in all respects, being not only technically and economically appropriate, but also culturally and socially acceptable. If IT is centred on the real needs of communities and is appropriate, it is easier to integrate after transfer and thus becomes sustainable through proper use and maintenance.

1.2.4 The Role of the State within the Information Community

Participation in the Information Community by all South African citizens and communities is severely constrained by the massive inequalities inherited from the apartheid era, and in particular by lack of both IT infrastructure and applications in townships and rural areas. While provision of infrastructure in itself does not guarantee effective participation in the Information Community, its absence makes such participation impossible. The provision of universal access through the rapid expansion of the telecommunications network thus becomes a central requirement and a pre-requisite for the broad exploitation of information technology and applications for social and economic ends.

Public sector reform, including reform of the telecommunications sector, has been on many national agendas since the early eighties. In the case of telecommunications such reform has included restructuring the monopoly network provider and the introduction of private sector players and competition. This has frequently been accompanied be deregulation and the opening of telecommunications and other IT markets to local and international competition. However, reform in the developed world takes place in a very different context from that of the developing world. Most developing countries began with a platform of virtually universal service and consequently of large markets capable of exploiting information products and services so that reform has been driven by technological innovation and the globalisation of business. In developing countries the situation is very different. Levels of telecommunications penetration are much lower and distribution is skewed between urban and rural areas, and in the case of South Africa between communities artificially separated by apartheid. Universal access and universal service are far from the reality of developing countries.

The extent to which countries open their markets to external competition in the circumstances faced by most developing countries must therefore be determined by their own particular goals. The experience of the developed world cannot serve as an exact guide to the regulatory mechanisms needed to ensure the rapid and massive network expansion needed to ensure a truly global Information Community. The free market alone will not provide infrastructure and content to those sectors and communities where the needs (rather than the profits) are greatest. Nor did developed countries achieve universal service through open market mechanisms. The State had a key role to play in defining appropriate tariffs and incentives, and in protecting the often monopolistic position of the main network provider.

Even within a global economic environment of liberalisation there must be room for a new kind of public / private sector partnership, for new and innovative approaches to the balance between liberalisation and regulation, if we are collectively to achieve a truly global Information Community

whose benefits are shared by all sectors of society. Without such a new balance of public and private sector investment, governed by a new set of rules and expectations, the world risks increased polarisation between those societies whose growth is based on access to information and information-based productivity tools and those who are doomed to poverty. Governments of all political and economic persuasions, as well as global industry, share an interest in developing together regulatory frameworks capable of ensuring equitable access to telecommunications infrastructure and the benefits it can deliver, to citizens and to business alike. There also is a key role for the state to ensure strategic investment through "funding jabs", incentives and offset arrangement in certain key areas based on national needs and priorities.

1.3 Components of the Information Community

The components of a successful and "global" Information Community are explored in later chapters. Such an Information Community will only be built if all components are addressed at national, sub-regional, regional and global levels. A truly global Information Community depends upon the full integration of the developing world - as players and participants, not just as spectators, resources and markets - into the global knowledge-based economy and the global information society.

1.3.1 "Infra"structure and "Info"structure

Information infrastructure is not an end in itself, but simply a means to an end. Appropriate, timely, culturally relevant content must be made available. Indeed, the creation of content is the raison d'e\^tre for the development of infrastructure. Thus, many writers in the developing world are now speak of an "infra"structure, and an "info"structure. "Infra"structure refers to the backbone information and communications networks, together with data interchange standards and some basic related software, which serve as conduits for all electronic communications. "Info"structure refers to the higher order delivery systems of the Information Community, including programs and software, the information content, and the methods for producing content, as well as services and applications. (These issues are explored more fully in chapters 4 and 5).

1.3.2 The development of a Learning Nation

If developing countries are not to be left behind by the changing nature of global production and the increasing rate of technological change, they need to think strategically about ensuring social and economic development, about developing competitive advantage and exploiting niche markets. In a knowledge-intensive global economy, this means creating a "learning nation" where innovation and knowledge are promoted and rewarded. To quote Lester Thurow, "If you can buy natural resources, borrow capital and copy technology, what are you left with? Skills. It's the only source of long-term competitive advantage left for the individual, the company, the country."[2] Without sufficient investment in human resources, developing countries will be unable to participate in the Information Community. (These issues are more fully explored in Chapter 6).

1.4 Pillars of an Information Community

Below are a number of suggested pillars that should underpin and guide the vision, strategy and policy for South Africa and developing countries to achieve and participate in the Information Community. The ISAD Conference will undoubtedly expand this understanding and highlight other key themes.

Importance of Information Community Planning

Information Society planning must take place at the highest levels within South Africa and include all relevant stakeholders. Agencies at a national, regional and local level must play a crucial role in producing a workable strategy successful integration into the global information society. A national vision meeting national needs must be developed. This will ensure that the Information Community is driven by the needs and participation of communities at local and national levels.

IT as an Engine of Development and Empowerment of the People

The information society must contribute to reconstruction and development. The potential emerges through access to information, job creation, political participation, cultural preservation, increased quality of life, strengthening the capabilities of civil society, and maximising resources for service delivery. Very real dangers also emerge in the potential elimination of some jobs, challenges to cultural

and political sovereignty, and government and corporate information manipulation. Our vision of the information society must respond to these fears, ensuring a people-centred and people-driven approach.

Education and Training for the Information Community
Education and training for the information age is a high priority. This means creating what some people call a "learning nation" to empower citizens with the skills and understanding for participation and innovation in the IS. It implies an integrated vision and approach, ranging from basic literacy to the certification of IT professionals.

Encouraging innovation
With the exponential rate of change of the information age, it is crucial to develop the capacity for innovation in content and applications development. Innovation is key to enabling countries to utilise IT to serve national needs of social development and economic growth.

IT for economic growth and industrial development
The successful development of an Information Community should greatly enhance all aspects of national economic life. IT has a key enabling role to play in all sectors of industry, as well as being an important industry itself.

South African Content: Contributions to World Knowledge and Culture
In order for South Africa to maintain its cultural and intellectual identity, it is crucial that local knowledge and cultural production is preserved and extended. Not only will this protect the rich cultural and intellectual traditions in South Africa and make them available to the rest of the world, but it will also provide numerous avenues for job creation and economic development.

An Equitable International Approach
Effective Information Community planning in South Africa should have an integrated approach at national, sub-regional, regional and global levels. As the 1994 Alexandria Declaration of Principles states, "each country and each region should make its own decisions about the development of the GII. There are real risks in imposing international objectives on national or regional entities which can be illustrated by the failure of many international development programs that have brought experts to a country to create wonderfully designed projects that did not work in the context of the local political and economic situation".

Sectoral Co-operation
In developing national Information Community policies, co-operation between the public and private sectors, labour, academia and the wider civil society is essential. All are affected by the Information Community in differing ways and represent differing interests as stakeholders. Government must play a leading role in defining strategy, developing policy and in implementing adaptable regulatory frameworks. Developing effective mechanisms for this sectoral co-operation is a high priority for the Information Community.

Creating an Enabling Environment
The creation of an "enabling environment" for the Information Community is essential. This includes ensuring appropriate macro / micro-economic policies, investment incentives, research and development incentives, provisions for the transfer of technology including intellectual property rights and trademark protection.

1.5 Funding: National, Sub-Regional, Regional, Global

Building an Information Community requires investment. Ensuring such domestic and international investment depends upon clear and explicit national and global Information Community strategies designed to enhance service delivery and promote socio-economic development. The investment framework must encourage participation of the private sector, both domestically and internationally, while simultaneously ensuring a role for governmental investment strategies and frameworks. It is also crucial that the entry of global corporations into the markets of developing countries takes place on an equitable basis.

National Funding Government must set investment incentives for the private sector and create new frameworks for public, private and voluntary sectors to participate in the building of the Information Community. In South Africa public enterprises and parastatals must continue to play a major role in the development of information infrastructure. Government also has an important role in ensuring focused investment in areas of high national strategic priority, through setting national investment strategies and frameworks, including funding criteria and offset arrangements.

Sub-Regional Funding The sub-region for South Africa is clearly defined as the Southern African Development Community (SADC). Within SADC, South Africa should work to ensure that projects and funding opportunities are developed and co-ordinated for the benefit of the entire sub-regional Information Community.

Regional Funding Funding and Information Community development for Africa as a whole will be co-ordinated through the OAU and the United Nations Economic Commission for Africa. The "ECA Action Plan" outlines strategies for African infrastructural development. Global Funding In addition to financing from the global private sector, we should examine the international funding schemes currently being proposed by several international organisations. For example, the World Bank has proposed its Information and Development Initiative (InfoDev). The International Telecommunications Union (ITU) has developed a World Telecommunications Fund (WorldTel). In addition, the G-7 nations have initiated a series of eleven pilot projects. These will need to be augmented by the pilot projects proposed and discussed at this ISAD Conference.

2 USING THE GLOBAL INFORMATION SOCIETY TO MEET THE NEEDS OF THE DEVELOPING WORLD

2.1 Introduction

The objectives of this chapter are to:

Examine the role of an Information Community to promote economic growth and social development;

Suggest responses to the development challenges of the Information Community;

Raise awareness of the particular development needs of developing countries.

Two critical questions for South Africa and other developing countries are:

What are the country's social and economic development needs?

What is the potential of the Information Community to meet those needs?

This chapter addresses these questions and makes recommendations on how to realise the potential of the Information Community to meet local needs. These recommendations are grounded in the South African vision of an Information Community as defined in the previous chapter which seeks to ensure that the benefits of the information age serve society as a whole.

2.2 A Global Information Community: Issues for Development

South Africa's Reconstruction and Development Programme (RDP) presents a clear statement of the government's guidelines for national socio-economic development (Section 2.2.1). The aim of the RDP is to eliminate poverty and to create an open and just society in South Africa. South Africa must create a competitive, dynamic, resilient and sustainable economy which delivers improved living standards to all its people, and in particular to those communities disadvantaged under apartheid. The focus of policy-making will shift from our political "miracle" to enabling rapid and equitable economic development.

South Africa needs a development strategy that can deliver both rapid and sustained economic growth (approximately 6%) and employment growth (approximately 1/2 million new jobs per year). The Information Community can enable growth by helping to shift the economy towards higher value-added, more highly skilled and more knowledge and technology intensive activities. However, this has to be achieved without the job losses and de-skilling that so frequently accompany technological innovation. To prevent unacceptable social impacts the development of an Information Community needs to include massive investments in training, human resource development and research.

Innovation will lead to new products and opportunities, including innovative IT-based applications to provide for development needs. Innovation needs to occur within a framework of labour standards to address the concerns of organised labour that skills development and the introduction of high technology occur in a socially equitable fashion. An analysis of the real needs of the developing countries must determine the requirements for infrastructure, for information technologies and for applications. The value of IT depends upon its ability to address the real needs of communities in an appropriate and sustainable way.

2.2.1 South Africa's Development Needs

The RDP encompasses four programme areas to meet social and economic development needs:

Meeting basic needs of communities by providing effective, efficient delivery of basic services in a people-centred and people-driven way;

Developing South Africa's human resources;

Building the economy, upgrading social and economic infrastructure and creating employment;

Democratising the state and society, including ensuring popular governance and restructuring the public service.

A National Growth and Development Strategy, adopted in November 1995, sets targets for economic growth, a more equitable income distribution, reduced unemployment, provision of household and

economic infrastructure and services and improvements in literacy and life expectancy. This strategy focuses on six pillars:

- Investing in people through education and training;
- Creating employment in a competitive, rapidly growing economy;
- Investing in household, social and economic infrastructure;
- A national crime prevention strategy;
- Improving social security provision to eliminate absolute poverty;
- Ensuring an efficient and effective government and public service.

2.3 Using the Information Community to Meet Basic Needs

The RDP explicitly argues that IT can be an enabler for meeting basic needs and supporting economic growth and development. IT offers a major opportunity to provide for basic needs within an Information Community in innovative ways.

Opting out of the information revolution implies succumbing to permanent marginalisation and under-development. The only question is how successful developing countries will be in adopting the new technologies and adapting them to their specific needs. The combination of necessity and opportunity should spur us to take the lead in locally relevant areas of IT development and enable us to open a door to major export possibilities, both regionally and globally.

It is therefore important for South Africa and other developing countries to impact on "the rules of the game" through the formation of a co-operative Information Community to ensure that the potential of IT benefits all countries and communities equitably through tackling the barriers of education, poor health care, geographic isolation, and inadequate access to urban benefits. This is made possible by the interactive nature of IT: it is not the passive distribution of information but the interactive connection of people to one another. Computer supported co-operation will have major impacts on the nature of the workplace and community interaction. Older forms of information distribution (such as television and radio), when supplemented by IT, can allow open-ended democratic interchange. The concrete manifestation of the Information Community will depend on agreement and implementation of the ISAD pilot projects identified in this document.

The role of policy is to ensure that a nation has the capacity to develop a range of applications to meet its own needs, rather than to identify specific applications. Policies that opt for prescribing each application are exactly the policies that stifle IT progress.

Examples of possible areas for the development of applications to build the South African Information Community include:

- In education and human resource development, tools for distance learning can provide opportunities for students and learners in remote areas to get high quality teaching and training through interactive facilities, including in basic literacy and numeracy.
- Information tools in health care can make information resources available to all areas of the country. The Department of Health is developing a National Health Information System which will provide acceptable standards of health care to all citizens regardless of locality.
- Development planning information databases and Geographic Information Systems provide information to facilitate decision-making by development planners, and to allow a range of stakeholders to view the information and make inputs into decisions and their implementation.
- Information applications can provide mechanisms for speedy payment of social grants which create flexibility and security for individual beneficiaries. The Department of Welfare is investigating applications to identify and reduce fraud in the pensions payment system.
- IT based tools are already being used in South African cities and towns to monitor crime, improve police response times, identify perpetrators and improve safety, security and the quality of life of South African citizens.
- The South African Government and a number of provincial governments have taken steps to introduce transparency and accountability into governmental processes and decision- making in order to ensure people-focused and people-driven governance. For example, the drafting of the new constitution uses the Internet to facilitate access to and democratic input into the process.

Many further examples could be given. The fundamental point is that developing countries must build their own capacity for developing such solutions. They are best placed to solve their own problems. Developing new applications is labour intensive, something which is already working to the advantage of developing countries in terms of cost effectiveness, job creation and export potential.

2.4 Using the Information Community to Develop Human Resources

The Information Community needs to invest in its people in a wide variety of ways if it is to enrich and improve the quality of life for individuals and communities. Some of these ways include:

The use of IT to ensure widespread provision of educational facilitates and to develop and enrich a culture of life-long learning. Multi-purpose Community Centres (MPCCs) have an important role to play in this regard.

The use of IT to record and disseminate cultural artefacts and to promote an appreciation of the richness and diversity of our cultural heritage. The Contemporary African Music and Arts Archive (CAMAA) is an example of this.

The use of IT to promote and communicate sporting and recreational activities, including e-mail and the Internet. The sports information pilot project is important in this area.

The use of IT to encourage youth development programmes. MPCCs again have an important role to play here.

Many of the issues raised in this section are discussed more fully in Chapter 6 below.

Concrete affirmative action strategies in the IT arena are necessary to address the high levels of inequality created under apartheid and to redress the balance of skills, access and promotion in terms of race, gender, disability and social class. Reward mechanisms must include career path strategies for creating a growing cadre of specialists, innovators, practitioners, entrepreneurs and managers in a wide range of productive, technological and service areas. South Africa has a high rate of unemployment and low levels of skills amongst the unemployed. IT can be used to raise the skills level amongst young people and adult learners - both as a medium of education and by raising current levels of IT literacy. These tools must give school leavers and unemployed people the skills to take advantage of job opportunities they would otherwise be denied.

2.5 Using the Information Community to Build the Economy

In this age of the globalization of production and markets, the exchange of information on a world wide basis has become a sought-after commodity. Not only is information itself a commodity, but the technologies which provide access to information have become a major source of profit.

South Africa, like other developing countries, must concentrate on developing its own solutions to address its unique local needs in building up the Information Community. In filling these unique niche requirements, South Africa will not only stimulate economic growth through expanding domestic demand, but will also position itself for success in international markets. This is the best strategy for maximising the potential of the Information Community to support economic growth and development. Examples could apply to promoting local culture, management of scarce environmental resources, primary health services to remote areas, or promotion of SMMEs.

Supply-side measures to build the economy through IT include: training incentives, improvements to work organisation; a review of investment incentives; offset requirements; industrial development financing; productivity improvement; and SMME development. Such support measures will facilitate the rapid transition of South African industry from the factor- driven stage to the investment-driven stage of economic growth, thereby creating favourable conditions for further innovation-driven growth. National policy needs to include investment measures to support the establishment of infant and other high-risk industries, as well as measures to promote job creation.

Investing in a software industry and support for an information content industry would be a significant contribution to developing South Africa's capacity to produce higher value-added products and enable industry to move up the value chain. A key new activity could be software innovation itself. Novelty will act as a protection against competitors, and small scale will be turned into the advantage of flexibility and rapid response. These twin approaches have the potential significantly to enhance South

Africa's ability to deliver local solutions and thereby promote economic growth and international competitiveness.

One of the highest priorities for South Africa is to create employment. Key questions that require further investigation are:

What will be the effect of the Information Community on employment levels and skills?

Are jobs going to disappear? Where?

Where are the new jobs going to be? How can we gain jobs quickly?

How can we ensure job creation adheres to acceptable labour standards?

A key challenge to the participants to the ISAD Conference is to ensure that the developed world recognises the employment imperatives in developing countries with unemployment levels close to 50%. An agreed vision of the Information Community must begin to address these questions satisfactorily.

In all sectors, South Africa is facing major productivity challenges to meet the objectives of the RDP. New technologies must be used and new work techniques must be developed to enhance productivity. These changes will affect both labour and management in fundamental ways:

The democratisation of the workplace is a necessity so that all participants play their part. Several hierarchical layers of management are no longer appropriate. Labour and management must both have access to IT to ensure an equitable industrial relations environment.

There is a need for a flexible labour market to facilitate rapid adoption of new technologies.

The implementation of IT must be accompanied by widespread job creation programmes and by training and skills upgrading for the work force if unacceptable social effects are to be avoided.

There needs to be international agreement on the adoption of a social clause to ensure acceptable international labour standards, including freedom of association and collective bargaining, freedom from forced, child or prison labour and freedom from discrimination on the basis of race, religion or gender.

New work practices and ethics must be supported by the introduction of new technologies, not determined by them. Information and communication technologies can be used both for education and to enhance productivity in the workplace. Investing in people requires an enabling environment in the workplace, where the skills and competencies acquired through education and training can be optimally used to enhance productivity and to empower workers.

2.6 Using the Information Community to Democratise the State and Society

Public access to information, within the framework of legislation on privacy and freedom of information can be promoted through a range of applications. Careful consideration has to be given to government's role as a producer and provider of information.

Individuals and communities must also be able to influence the outcomes of processes. The interactive nature of IT promotes feedback on policies, documents and proposed legislation. Examples of successful participatory democratic mechanisms include the Telecommunications Green and White paper process.

The public sector approach to IT has been characterised by a lack of co-ordination and overall management. An all-encompassing vision of the role if IT in government has to be formulated and accepted. IT strategies should cover all tiers of government, central, provincial and metropolitan, as well as all departments.

Public sector institutions must be transformed from rigid, rule-bound monoliths to institutions with the capacity, expertise and flexibility to deliver services and meet basic needs. The introduction of sophisticated IT and applications can be a key tool in the transformation of public institutions. Success also requires major organisational transformations, a training and skills development programme, and a reorientation drive to ensure that public servants are comfortable with the new technologies and work ethics.

2.7 Creating an Information Community

Given the challenges for maintaining their positions in the value chain, many countries, including the United States, Canada, Malaysia, Singapore, Denmark and Switzerland, have developed strategic policy approaches to building an Information Society. Developing countries need to approach these issues from the perspective of their own needs and priorities. As the global rate of IT innovation and change is accelerated by the developed world, it is essential for developing countries to become significant players in the international arena, but not at the price of sacrificing their own development needs on the altar of international trade liberalisation.

The policy perspectives advanced by these countries meet their needs, which may not be appropriate to the environment of developing countries. South Africa can not afford a trade- off which sees large-scale layoffs and growing unemployment as a necessary evil for reaping greater efficiencies through the introduction of information technology. While the potential pay-off of greater international competitiveness for all South Africans is considerable - more jobs, higher incomes, greater savings, improved quality of life - these are not predestined. International competitiveness can also foster an erosion of labour and environmental standards. South Africa is not willing to pursue international competitiveness at the expense of increasing employment or maintaining labour standards. The Ministry of Labour, NEDLAC, and non-governmental institutions such as trade unions and the numerous environmental agencies will play an important role in monitoring and maintaining acceptable labour and environmental standards.

South Africa has a relatively high (although very skewed) level of basic infrastructure including telecommunications, electricity, access to financial markets, industrial and manufacturing infrastructure. Constraints include scarce financial resources, relatively low levels of human resource development in the IT arenas, duplication of information infrastructure, IT illiteracy, fragmentation of initiatives and lack of co-ordination of projects for building the South African Information Community.

2.8 Proposals and Recommendations

To achieve our vision of an Information Community, international co-operation agreements should be directed towards developing local centres for research and development of information applications and information content, as discussed in chapter 5. The following recommendations are designed to lay the foundation for creating a South African Information Community and a Developing World Information Society:

1. Establish a Task Team, drawing in all relevant stakeholders, to prepare a report on the "Vision, Principles and Strategy for the South African Information Community". Clear terms of reference will be outlined, as well as a time-frame for delivery and publication.
2. Establish specific "South African Information Community Pilot Projects", organised and managed locally, and funded through domestic and international resources. A number of such projects are proposed within each chapter of this document.
3. Establish an "Inventory Project for Economic Development" to review macro- economic policies for economic growth and social development in, say, six developing countries and present a comparative analysis and "best practice" .
4. Establish specific "Developing World Information Community Pilot Projects" which promote developing world priorities and focus and extend relevant G-7 Pilot Projects to the developing world. This initiative should be based on partnerships between developed and developing countries as well as on developing world collaboration in conjunction with regional bodies and funded through domestic and international resources. This document proposes a core set of such projects in the next chapter (see 3.6 below).

3 CREATING THE SOUTH AFRICAN INFORMATION SOCIETY: FORGING CO-OPERATION BETWEEN SOCIETAL SECTORS IN A GLOBAL WAY

3.1 Introduction

The key objectives of this chapter are to:

Demonstrate the creative power of an Information Community that draws on the knowledge and values of all sectors in our society;

Design a process that will ensure participation by all sectors of society in the planning and implementation of the Information Community;

Support sub-regional initiatives while ensuring linkages to regional and Global Information Society development.

There is much discussion of a Global Information Society. However, by virtually any objective measure, the Information Society and the infrastructure which supports it, are far from global. There are huge gaps of infrastructure, applications and human resources that must be filled if we are to begin to build a global Information Society which incorporates presently disadvantaged communities. Developing countries need to initiate a constructive dialogue with the developed world about a Global Information Community, and must play an active role in shaping its norms, standards, policies and regulatory frameworks. Equally important is debate and dialogue within the developing world itself. This dialogue needs to result in concrete projects and collaborations to build an international Information Community. These collaborative efforts should involve all social actors at the various levels: national, sub-regional, regional, and global. Despite great internal inequalities and the legacy of apartheid, South Africa is a relatively advanced developing nation, and has a key role to play.

3.2 Ensuring Sectoral Participation

All societies have a unique historically specific social structure. However, there are also many similarities in their composition. The South African Information Community includes the following five sectoral categories:

Public Sector (government at national, provincial and local levels; public utilities; parastatals and government-owned businesses);

Private Sector (private business, from SMMEs to multi-national corporations);

Organised Labour (trade unions and other bodies representing workers);

Civil Society (communities and voluntary association, including NGOs, INGOs, and CBOs);

Academia (research and educational institutions, including universities, technikons and schools).

Each of these five sectors has a vital role to play in the development of an Information Community. However, these sectors have differing interests that can be difficult to reconcile. It is therefore necessary to forge structures and frameworks for co-operation among them. The public sector has the political mandate and democratic authority to accomplish such tasks in the national interest. The private sector has significant resources to expand the economy through domestic and international markets. Organised labour represents the work force whose energy fuels the productive capacity of the nation and whose jobs and skills are affected by developments in the Information Community. Civil society provides direct contact with people in their communities who often are the end users within the Information Community. Finally, the academic and research sector of a country is crucial to foster innovation, education, the development of a vision and the strategic planning necessary to “surf the tidal wave of change”.

Effective frameworks for co-operation must encompass these sectors at national, sub-regional, regional and global levels in both developing and developed countries. We envisage collaboration between public, private, labour, civil society, and academic sectors in South Africa, within the developing world, and between the developing and developed world as an integral part of the development of the Information Community in Southern Africa. It is necessary to involve all five sectors in the development

of national policy and a resulting in the identification and prioritisation of achievable goals and targets for the short, medium and long term.

3.3 National Information Community Process

The state has begun to plays a leading role in setting national information policy frameworks in South Africa. An inter-departmental team has been created to oversee the development of a comprehensive information policy framework for the country. This project, co-ordinated by the Department of Arts, Culture, Science and Technology (DACST), is called "Networking 2000." The telecommunications sector has also been particularly active, with the Department of Posts, Telecommunications and Broadcasting (DPTB) having recently issued a White Paper on telecommunications restructuring. A national initiative to bring together stakeholders in the five sectors is at an advanced stage with the launch of the National Information Technology Forum (NITF) in mid-April. The NITF will be key to mobilising the various sectors to participate in the process of creating an Information Community and to ensure input into the formulation of a national information policy framework. Such national Information Community policy will need to address many areas, such as broadcasting, computers, telecommunications and, perhaps most importantly, guidelines for information content production.

3.4 South Africa's Information Society Process

The achievement of an Information Community depends on the building of a national consensus around its objectives, scope, strategies, policies and implementation. The various social sectors need to participate in the process so that they will endorse its benefits, work to minimise the pitfalls and support the outcomes. For this reason the process needs to be sponsored by the highest office in the country. The following steps are envisaged:

3.4.1 National Vision

A national vision for the Information Community should take cognisance of sub-regional, regional and global realities. It should be driven by a high-level inter-ministerial committee, and be publicised and promoted nationally.

3.4.2 Green Paper Process

A Green Paper process should involve all five stakeholder sectors in identifying opportunities and issues with regard to the national vision. Due to the diverse nature of the information industry, a number of separate streams should be considered, such as information architecture, information ethics, telecommunications infrastructure, computing infrastructure, information content, human resource and equity issues. A Green Paper task group will need to be formally constituted around this process, drawing upon international expertise where applicable.

3.4.3 White Paper Process

Following the publication of the Green Paper, an open and participatory process will be needed to resolve outstanding issues. Colloquiums, hearings, seminars and one-on-one sessions can ensure the widest possible consensus. This agreement would form the basis of a resultant White Paper. Legislation would then be drafted where necessary for information policy implementation.

3.4.4 Implementation

After completion of the parliamentary process responsibility for governmental aspects of the Information Community would pass to the normal strategic, planning and operational cycles. Monitoring would be ensured through the creation of an "Information Community Board", on which all stakeholders are represented.

3.5 International Co-operation towards an Information Community

The development of a national Information Community as envisaged above can assist equality of participation for South Africa within the Global Information Society and overcome its years of isolation and underdevelopment. Beneficial outcomes include:

Stimulating local content development and component manufacture;

Genuine development and transfer of knowledge, skills and abilities from outside South Africa and from within;

Ongoing integration and utilisation of all sectors of society, especially including previously disadvantaged communities;

Focus on employment creation and stimulating of the development of SMMEs;

Substantial contributions to black economic empowerment;

Close collaboration between South Africa and other developing countries, which can contribute significantly to social, political and economic development throughout the developing world; Close co-operation between developing and developed countries to minimise the negative effects of globalisation, to close gaps between developed and developing countries and to engender an international Information Community.

3.5.1 Sub-regional Co-operation and Collaboration

For South Africa, the sub-region is clearly defined by the Southern African Development Community (SADC), consisting of twelve member states from South Africa to as far north as Tanzania. SADC is already engaged in several information initiatives such as the Southern African Science and Technology Information Network (SASTIN) project. The SASTIN project will facilitate the transfer of scientific and technical data between scientists, academics and research institutes throughout the region. These and other initiatives in the region need co-ordination to avoid duplication and wastage of resources, and to ensure inter-operability and technical reliability. It is also essential that sub-regional co-operation takes place within a framework of equity to ensure that the differing levels of development within the region are not exacerbated.

3.5.2 Regional Co-operation and Collaboration

The primary regional effort currently under way for building information co-operation and collaboration within Africa is being led by the United Nations Economic Commission for Africa (ECA). In April 1995, the ECA and the Pan-African Development Information System (PADIS) held a "Regional Telematics for Development Symposium" in Addis Ababa, Ethiopia. This symposium was widely hailed as signalling to the rest of the world that Africa is determined to be a major player in the international Information Community. Following the April meeting, the ECA group of African Ministers for Economic Development and Planning adopted resolution 795 entitled "Building Africa's Information Highway" which established a high-level working group on Information and Communications Technologies (ICT) in Africa. There are several other regional initiatives under way, as well as active professional associations operating within regions, that are critical to an Information Community. South African involvement will help to strengthen them.

3.5.3 Global Co-operation and Collaboration

These national, sub-regional, and regional initiatives need to be supported by international co- operation. Internationally, there are a wide range of organisations working on information issues. Interaction with these bodies must be driven by the perspective of the specific needs and objectives of developing countries.

The International Telecommunications Union (ITU).
One of the themes of its recent world forum was "Breaking Down Barriers Towards the Global Information Infrastructure." The ITU is setting up a World Telecommunications Fund (WorldTel) to marshal private sector resources for funding information infrastructure projects in the developing world.

The International Bank for Reconstruction and Development (World Bank).
The World Bank has many information infrastructure and applications development projects. The World Bank has set up an "Information and Development Fund" (InfoDev).

World Trade Organisation (WTO).
The WTO, especially its Negotiation Group on Basic Telecommunications (NGBT) is working to promote greater liberalisation, privatisation, competition, and market access within the global telecommunications industry.

Group of Seven Industrialised Nations (G-7).
The G-7 nations have taken a leading roles in developing a GII. The G-7 have initiated a series of eleven "Information Society Pilot Projects" (ISPPs). These cover a number of concrete application areas such as: cross- cultural education and training, cultural preservation, environment and natural resources management, emergency management, health-care, government, and SMMEs .

Global Information Infrastructure Commission (GIIC).
The GIIC is a non-governmental initiative, sponsored by the G-7. The GIIC consists of 40 CEOs and senior executives of leading telecommunications, IT and broadcasting corporations. Its purpose is to promote the leadership of the private sector and the active participation of developing countries in the emerging GII. It has set up three task forces on policy, applications, and liaison.

Other international initiatives include the United Nations sponsored Copine project of OOSA (space applications), which will link Europe and Africa for the purpose of sharing scientific and technical information.

3.6 Developing World - Information Community Pilot Projects

One method of solidifying these national, sub-regional, regional and global collaborative relationships is through Information Society Pilot Projects. The G-7 has initiated eleven Information Community Pilot Projects[3]. South Africa should develop strategic partnerships and alliances with other African and developing world countries and organisations to strengthen the platform for entry into and participation in the global information society by identifying specific Developing World Pilot Projects.

South Africa has identified 5 areas for such developing world pilot projects:

- Multi-Purpose Community Centres: delivering the Information Community (Chapter 5);
- Centres of Excellence, Expertise and Resources: to empower our vision (Chapter 5);
- Information Technology National Qualifications Framework: skills for the information community (Chapter 6);
- Open and efficient government: transparency, information access and organisational reform in government (Chapter 3 below);
- Contemporary African Music and Arts Archive (CAMAA): combining and reflecting our traditions in the new information age (Chapter 6).

3.7 Proposals and Recommendations

1. The proposed comprehensive Green and White Paper process must be launched to co- ordinate all national information initiatives in order to create an Information Community that will achieve national goals in a creative and economic way.
2. As a product of the above process, a representative policy and control body must be created to oversee the achievement of the agreed national Information Community vision.
3. Pilot projects in "Government on-line" must be developed to enhance the transparency, accessibility and accountability of government. An example would be the One- Stop-Shop project of the North-West province of South Africa.
4. South Africa must continue to play a leading and constructive role within SADC to assist in the creation of an equitable Southern African Information Community. The South African process could serve as a catalyst for the development of such an Information Community within the region.
5. South Africa must support the efforts of the ECA initiative to develop a Vision and Action Plan for Africa in the Global Information Society.
6. South Africa must continue to co-operate with a wide range of international information initiatives. This should include support for mechanisms that will ensure meaningful developing country input into decisions on standards and regulatory frameworks and that will ensure an equitable international information order.

4 DEVELOPING A SOUTH AFRICAN INFORMATION INFRASTRUCTURE FOR THE INFORMATION COMMUNITY, IN A GLOBAL CONTEXT

4.1.1 Introduction

The objectives of this chapter are to:

Promote the provision of an information infrastructure in accordance with national needs and geared towards social development and economic growth within the Information Community;

Argue for the development and maintenance of an information infrastructure that will enable affordable universal service;.

Promote the vision of a national information architecture that will minimise duplication and maximise compatibility;

The foundation of the Information Community is its information infrastructure. Without infrastructure, it is impossible to ensure access to and utilisation of applications, which are the raison d'e\^tre of the Information Community. The primary prerequisite for the creation of such an Information Community, whether domestically or internationally, is the comprehensive development of an Information Infrastructure (II).

4.2 Infrastructure issues

4.2.1 Towards a Definition of Information Infrastructure

In developed countries electronic highways are being deployed at a very fast pace using broad-band optical-fibre lines and satellite channels, creating a pervasive Information Infrastructure to support the trend towards a global information-based economy and society. In South Africa information infrastructure, and its underlying telecommunications infrastructure, may have a different meaning.

A definition of II is to some extent influenced by one's position within the value-chain. For instance, many manufacturers of telecommunications equipment refer to II as a sophisticated enhancement and extension of the telecommunications network. Some participants define it as a coherent amalgamation of computers, television / media and telecommunications. Others see the information infrastructure as an "all encompassing, information storage and dissemination infrastructure."

The definition of II nevertheless remains heavily influenced by the needs of the industrialised world. Although some of the needs and priorities of developing countries accord with those of the developed world, others may differ completely. As a developing country, South Africa must define II in terms of its vision of the Information Community and of national needs and priorities, and seek to forge consensus on these issues with the rest of the developing world.

This document understands II to include the following: basic telecommunications networks; agreed standards and protocols for data interchange; and some aspects of basic software to ensure infrastructure operability.

4.2.2 Information Standards and Protocols

One key requirement for coherence in the emerging Information Infrastructure is an agreed set of standards. Without such agreement, incompatibility between systems can easily arise. Existing numbering plans, protocols, formats and standards must be adapted to accommodate the emerging new services, technologies and structures of the information society. New standards will have to be developed to ensure full inter-operability to create the "network of networks" that underlies the concept of Global Information Infrastructure (GII). This will be essential to interconnect the various networks and services which comprise the information highway. Developing countries such as South Africa need to be full and equal participants in the process of setting international standards.

4.3 Developing a South African Information Infrastructure

Any implementation of II that is not accompanied by the development of human resources and that fails to ensure the provision of information content for social development and economic growth will simply exacerbate dependence upon the developed world. In addition it will undermine the ability to provide for

national development needs in an appropriate, people- centred and community-driven way. The following areas related to II provision are identified for further discussion:

Basic telecommunications infrastructure and telematic services;

Developing an overall information architecture to support the Information Community;.

Management structures and regulatory frameworks;

Domestic exploitation of the economic opportunities offered by II.

4.3.1 Basic Telecommunications Infrastructure and Telematic Services

Some aspects of the telecommunications network infrastructure in South Africa are fairly modern and supported by a well-trained work force. Some 60% of the telephone exchanges and 95% of the transmission network are digital. Data communication is supported by well- developed X.25 and frame relay networks, and by digital high-speed point-to-point circuits. Optical fibre is used widely for the transmission infrastructure, and the same is being provided to large corporations. The country is well connected with overseas and African countries by means of satellites and undersea optical fibre cables. The connection to neighbouring countries is by means of land-based microwave systems and needs improvement. Although there has been a significant slowdown in network modernisation in the last few years, this infrastructure was adequate in the past to meet the needs of the business community and the emerging information society.

The legacy of apartheid again means that large sections of the population have limited or no access at all to basic telecommunication services. In fact the majority of South Africans have never made a simple telephone call! A plan of action is therefore needed to expand service provision rapidly to all sectors of the community in all geographical areas, while rapidly upgrading the network capabilities to meet the needs of the Information Community. The following factors should be considered:

existing and required penetration levels;

the current status of the network and the need to expand and enhance it to meet the broad needs of the Information Community;

the reality of the country's economic conditions and its projected development path;

the various financing options available.

Finally, the question of affordability must be considered, more specifically the question of who should pay for the information provided, for accessing it, and for the required infrastructure and terminal equipment. The situation is characterised by:

lack of basic telephone services for large numbers of people;

low income levels of a large part of the population;

lack of access to high-capacity services in many areas. Large corporations and governments located in the major metropolitan centres can already connect to high- capacity telecommunication networks, and can utilise high-quality digital interconnections. However, millions of homes, schools, libraries, hospitals and small to medium businesses do not yet have access to these services;

A pragmatic approach is thus required that will both recognise these constraints and optimise the use of available resources in a situation where:

existing national telecommunications infrastructure is capable of supporting both narrow- band (voice, text, data) and broad-band (file transfer, interactive video) information and applications, but the reach of this infrastructure is limited;

penetration of the telephone network must be expanded to provide accessibility to all people (universal service). A plan of action is in place in Telkom's Vision 2000 to provide 3 million additional lines;

capabilities of the infrastructure must be upgraded (through full digitalisation, bandwidth on demand, etc) to support economic growth and development needs;

large bandwidths may be needed for meeting basic needs, such as providing tele-education and tele-medicine.

Market forces alone cannot address the existing disparity in service provision, or resolve the conflicting demands on resources. The state needs to develop clear policies that will allow for a carefully balanced approach to the equitable provision of service to all sectors of society. These policies should also enable the telecommunications sector to evolve gradually towards the open models more prevalent in the developed world. They should have well defined and specific goals and objectives, and yet be adaptable to the country's evolving needs.

4.3.2 Developing an Overall Information Architecture to Support the Information Community

The Information Architecture guides the creation and utilisation of information resources within a framework that minimises duplication and preserves data integrity. It includes the following areas:

The creation of a South African data model
A data model is a reference dictionary describing the content, meaning and quality of data elements. The data model is derived from the information needs of the key national delivery processes which often share the same information in many subject areas. An integrated data model can be an effective management tool. If the gathering of statistics is not done according to agreed frameworks, analysis is hindered and the ability to generalise undermined.

Freedom of access to information
Access to information is a fundamental right which is being addressed in South Africa through the drafting of the Open Democracy Act, the effective implementation of which is facilitated by an overall information architecture.

Privacy of personal information
Personal information must be protected even in an open Information Community. However, this same information, in a collated form where no rights can be compromised, is important for national planning purposes and such usage must be legal.

Copyright and intellectual property
Within the Information Community it is important that property rights are protected, including rights to information. At the same time, effective technology transfer should not be limited by these rights.

Security and integrity of information
An integral part of the information infrastructure are guidelines to secure the integrity of information and prevention of theft, fraud and dishonest practices.

4.3.3 Management Structures and Regulatory Frameworks

South Africa's many apparently conflicting infrastructural priorities make it essential to create a management structure to ensure the timely provision of an appropriate national and global information infrastructure. All developing countries face the challenge of meeting basic telephony needs, as well as providing access to sophisticated information infrastructures. To do so will require a representative management body of all stakeholders involved in establishing or affected by the information infrastructure. This management body will also be required to co-ordinate the amendments needed to policies and regulation, and to ensure that inter-operability of the physical and information levels as well as constituent physical networks in the GII is achieved.

In addition, functional partnerships will be required to direct and manage Research and Development activities and to prioritise services requiring the support of the NII.

Telecommunications reform has been set in motion by the White Paper on Telecommunications Policy. This policy document advocates the establishment of a regulatory authority, the South African Telecommunications Regulatory Authority, with the necessary powers to supervise the achievement of the basic objective of universal service, and expansion and modernisation of the network. While a period of exclusivity will be granted to the national carrier to facilitate the rapid achievement of these

objectives, the regulator will also supervise the gradual transition to a liberalised telecommunications market and smooth the entry into global markets.

The White Paper on Telecommunications also provides for a Universal Service Agency (USA), which will work with the Regulatory Authority to promote universal service. Its objectives will be to maintain universal service at the heart of the national telecommunications debate and to ensure that telecommunications components are integrated into development projects whose own goals can be reinforced by information flows and communication. It will work closely with the RDP, Telkom, the Regulator and community organisations to build a national consensus on the meaning of affordable and accessible universal service, to establish goals, objectives and monitoring mechanisms in order to meet the different needs of regions and communities, to advise the Regulator on licensing obligations and to manage the Universal Service Fund. The USA is a unique South African response to the problem of balancing sophisticated business requirements with the imperative of network expansion to meet the needs of the historically disadvantaged communities that have minimal access to communications facilities. The USA is intended to ensure that the needs of the disadvantaged areas are not sacrificed in favour of the more powerful and lucrative business and urban markets.

The regulatory environment envisaged above will provide guidance and support in areas which affect South Africa's ability to achieve its vision of service availability, service affordability, development and growth.

South African telecommunications has no choice but to move decisively in the further development of its information infrastructure. South Africa will manage its approach to the Information Community in accordance with its needs and capabilities, while ensuring that it keeps abreast of international developments, exploiting the opportunities that may derive from these in the future. The new telecommunications legislation and regulatory environment that are being developed are aimed at achieving just that.

This element of the Information Infrastructure will be costly. Funding is a crucial question which can determine how it is controlled, what applications it will support and who has access to it. Various models have been proposed in different countries with a range of private sector, governmental and multi-national players.

The establishment of an effective strategic regulatory framework and structure is critically important to encourage investment in the telecommunication sector and hence in the Information Community.

4.3.4 Domestic Exploitation of the Economic Opportunities Offered by II

Information Community strategies must facilitate the establishment and maintenance of a cost-effective IT infrastructure on a national basis, which will create opportunities and eliminate wasteful duplication. Technology for international trading and technology for local infrastructure are closely linked and initiatives in either direction must be co-ordinated.

South Africa is largely an importer of information technology. No single company or institution in South Africa is likely to offer any real competition to the established giants of the information technology world. Pooling of our knowledge and other resources and establishing collaborative agreements with international bodies may lead to applied research and development that can, in terms of South Africa's unique circumstances and abilities, add value for our own benefit and create niche markets.

It is essential to ensure that the economic benefits of information infrastructural development are used to benefit and grow the domestic economy. Investment incentives and offset requirements are needed to ensure that SMMEs are developed through the provision of II.

4.4 Proposals and Recommendations

1. The White paper on telecommunications must produce a sound regulatory structure that will guide development in the sector towards universal access in the shortest possible timespan, utilising the latest enabling technologies and practices that will promote a sound telecommunication infrastructure for the Information Community.
2. Develop an II service industry based on the downstream benefits of infrastructural provision. An indigenous industry that can provide for and service information infrastructure requirements is important in allowing a developing country to avoid dependency on foreign suppliers. There are

many opportunities for SMME growth in infrastructural areas that should be exploited to boost internal economic growth.

3. Launch a national project to define an information architecture to ensure coherent development of applications in South Africa so that information output can be maximised in support of national development processes.

5 DESIGNING AND PROVIDING APPLICATIONS TO SERVE THE DIVERSE NEEDS OF THE DEVELOPING WORLD

5.1 Introduction

The objectives of this chapter are to:

Locate applications development within the needs of developing countries;

Examine the capacity required by developing countries to produce relevant applications;

Discuss the economic issues related to applications development within an Information Community.

Applications are the heart of the information society - they are the reason for having the infrastructure; they are what people use. Without suitable applications, the infrastructure remains under-utilised and the Information Community fails to deliver the services citizens and communities are led to expect. Applications can affect almost all aspects of life - work, leisure, governance, education, development, industry. However, we should always bear in mind how these systems would function in a township or a remote rural area; and not just how dazzling they look in air-conditioned offices.

The real role of IT is as a universal enabler acting in almost all fields of human endeavour. IT cuts across the traditional divisions of our communities and working lives. But software and computer systems are not in themselves the applications. The human aspects - how people use these systems, whether they find the information useful to their lives, whether they feel empowered to use it, whether it is comprehensible in terms of language and culture - are more crucial to the success or failure of systems than the hardware and software themselves.

This chapter considers applications at all levels - from a simple PC package such as a spreadsheet, to a whole national system, for example in health. This chapter also considers the politics of applications, at the levels of needs analysis and prioritisation, development and access to the applications. Then developing world resources and ways of sharing expertise are considered. Applications of benefit to the developing world, based on meeting real needs, are mentioned as is the impact of applications at many levels of the economy. The chapter concludes with a summary of the arguments, proposals and recommendations, and suggestions for methods of funding these proposals.

Three fundamental themes run though this chapter.

Applications must be needs-driven: The development of applications should be driven by the needs of developing countries, and not simply by what is offered by the global market.

Develop capacity to produce relevant applications: It is essential for developing countries to develop their own applications to meet their own particular needs. A country with a base for developing IT can expect to steer new developments to support whatever goals are set in public and private life.

Applications play a crucial role in the whole economy: Aspects of the Information Community have fundamental implications for all aspects of a country's economy. Developing countries must develop policies to strengthen their IT sectors.

5.2 Applications and Needs

5.2.1 The politics of applications

A key issue for developing countries is to have the effective power to determine their own IT futures. That power only derives from controlling the process of IT development. How IT is applied, and whose interests it serves, is central to whether this is an enabling technology, or a sophisticated way of keeping people and communities disempowered. At various stages in the development and use of applications, it is necessary to ensure that the needs of the end users are paramount, and not those of intermediaries. One aim must be to break down the barrier between IT professionals and “ignorant users”. All have a stake in IT.

5.2.2 Needs analysis and prioritisation

Whose needs should an application serve? Most people would agree that it should support the specific activities of end users. A central concern therefore needs to be the building of capacity so that the people with the needs have the skills to understand and shape the applications, rather than continually

depending on external experts. This is true both at the level of communities, and at the national level, where it is essential that developing countries build the necessary skills to address their own needs.

Currently, the majority of software applications originate from the developed world. Many of these are excellent, and it would be a waste of resources to duplicate them. However there are other areas where the needs of the developing world are so different that completely new applications should be developed. An example of the former would be word processing where the needs of document production are largely similar throughout the world; whereas health care would be an example of the latter, where the experience of developing countries differs greatly from that of the developed world.

These are strategic choices for each developing country: towards which applications areas should its IT capacity be targeted? Prioritisation directed by the overall developmental and economic needs of the country of needs, is central to a coherent IT policy. In South Africa, this is best spelled out by the Reconstruction and Development Programme (see Chapter 2).

5.2.3 Applications development

Applications development should be driven by needs, and not simply by the global IT market. While a free market is a very efficient mechanism in many instances, it will not always meet the needs of the majority of the population in the developing world. Thus the costs of applications development should not be borne solely by the private sector.

The field of applications development must be dramatically broadened beyond the traditional mathematical and engineering approach. Social and human aspects must also be taken into account. This is shown by the growth in fields such as Human-Computer Interaction, Visualisation, Participatory Design, Prototyping and Iterative Design, Open Architectures, Multimedia, Large Scale Computing, and similar practices. Each is an attempt to bridge various technical and social disciplines in order to create effective and humane systems.

The most useful applications are not necessarily the most sophisticated. Installing basic word-processing and electronic mail will greatly assist in many situations in the developing world. When considering pilot projects, attention should be paid to whether they are reproducible on a large scale. For example, broad-band tele-medicine is an application with enormous potential, but the cost currently makes it unrealistic as a means of addressing widespread health problems. Putting a basic PC with a dial-up connection in most rural health centres would make a bigger contribution to health-care

5.2.4 User service

The cost to the end-user is a central issue governing the accessibility of applications. The private sector must be encouraged to address this issue and to charge realistically. However, if the private sector does not produce appropriately priced products, public domain software and shareware can be used in many instances. The universal enabling potential of information technology will not be realised if developments only serve the needs of an elite. Universal service is also more than infrastructure and training: it includes having applications that people can use and content that is useful.

5.3 Capacity in the developing world

Many excellent examples of IT being applied to meet needs in developing countries demonstrate a growing level of capacity. Countries can pool their strengths and collaborate for mutual benefit, as well as in joint ventures with more developed countries. Co-operation between developing countries maximises their ability to meet their own needs. A few of the many available examples of successful IT applications and developments are given below.

India has a developed IT sector, and has developed many applications to meet its own needs. It has used its own satellites to develop information and communications systems reaching rural areas. This allows government to disseminate services and information to remote areas and to receive information from these areas that can influence government policy.

Egypt has developed many impressive IT applications. The CVs of unemployed people are held on a central database, maximising job opportunities. All statute law has been digitised and put on-line, as have most of the archives of the Egyptian museum. The Information and Decision Support Centre is an effective decision support tool for the national cabinet.

In Tunisia there is the Regional Information Technology Development Centre. Many excellent applications have been developed.

Gambia has developed strong telecommunications infrastructure and related applications.

Singapore harbour uses EDI (Electronic Data Interchange) technology for all its transactions, greatly improving its efficiency.

Chile has developed a successful software industry with the collaboration of business, academia and government. IT now makes their exports more internationally competitive [4].

5.3.1 Centres of Excellence, Expertise and Resources (CEERs)

Developing applications is a complex and labour-intensive task. Research is needed to establish what the IT requirements of the society are. Because of the very rapid rate of development, what is possible changes rapidly. Universities, together with local business and the public sector should establish Centres of Excellence, Expertise and Resources (CEERs) in key IT areas. CEERs would support small enterprises in IT and related fields. Such centres can be developed in conjunction with equivalent institutions in developed countries. However, it is important that policy focus be set by the developing countries, who know local needs. There should be co-ordination at national level to ensure there is no duplication by different CEERs. This initiative needs to include establishing Centres of Excellence at historically black and hence disadvantaged universities in South Africa.

These CEERs will directly link to the MPCCs mentioned below. The MPCCs will provide practical exposure to academics and students. Private and public sectors will benefit from high quality IT expertise and education. Applications developed in such centres will lead to appropriate development methodologies and specialised niche products and tools. All tiers of government and international bodies should be encouraged to fund such centres. A key issue is the need for financial support for small businesses that can be formed from the work of such centres, the “spin-off enterprises”.

CEERs could make an important contribution to developing applications and IT capacities within the developing world.

5.4 Potential Application Areas

The G-7 nations have identified eleven key information society pilot projects which include: global inter-operability for broadband networks, cross-cultural education and training, electronic libraries, environmental and natural resources management, government on-line, multi-media access to world cultural heritage, global emergency management, global health care applications, global marketplace for Small and Medium Enterprises, maritime information systems, and a global inventory project [3].

Application areas can be grouped by the range of needs they serve.

Meeting basic needs:

Remote health care (Tele-medicine) and computerisation of health-care administration with multimedia patient records.

Telecommunications itself is seen as a basic need. “The RDP aims to provide universal affordable access for all as rapidly as possible within a sustainable and viable telecommunications system; to develop a modern and integrated telecommunications and information technology system that is capable of enhancing, cheapening and facilitating education, health care, business information, public administration and rural development”.

Water and other natural resource management. Sustainable exploitation of our natural resources for the benefit of all citizens can be greatly assisted by the information gathering, processing, resource simulation and data visualisation capabilities of human-centred information technology.

Developing our human resources:

Distance learning (tele-education) can overcome limitations of concentration of resources in certain places.

Technology Enhanced Learning can make education more interesting and targeted on the individual needs of students.

Basic adult literacy and numeracy can themselves be taught by means of specially developed applications.

Building the economy:

Supporting local business and industry. A great benefit to sustained development is the contribution IT can make to the international competitiveness of local industry and commerce. IT development can benefit industries such as agriculture, manufacturing, and tourism; and these can lead to export opportunities.

Industry and SMME support. Standard benefits of IT to business and manufacturing can be expanded to a global level through use of new communications and media developments. Small businesses that are spin-offs from centres of excellence should be nurtured.

Democratising the state and society:

Improving the efficiency of government. Improving co-ordination of and co-operation between government departments. Decentralising government and empowering communities and citizens. "Government on-line" to use electronic messaging for communications within and between government and citizens; the provision of government services to the public. IT can help bring the government closer to the people (e g council minutes can be available on-line with laws, white and green papers available on request).

Support for and co-ordination of Community Based Organisation (CBOs), Labour organisations and Non-Governmental Organisations (NGOs).

Human Rights campaigns can be well served by rapid communications potential of modern IT, as Amnesty International has demonstrated.

IT has played a major role in the co-ordination of elections, including collecting the results. Electronic voting might be possible when there is universal access.

5.4.1 Multi-Purpose Community Centres (MPCCs)

An application that serves all four of the RDP programmes mentioned above is the development of Multi-Purpose Community Centres (MPCCs). MPCCs would use IT for networking, information provision, communication, administration and training. A range of community support facilities and government services can be offered, including support to small businesses. Existing buildings, including libraries, schools or churches, can be used. Alternative sources of power can be used in areas outside the electricity grid. Connectivity can be via dial-up telephone lines, leased lines, ISDN, satellite or packet radio as appropriate. This is currently a major initiative in South Africa, actively involving several ministries.

5.5 Economic impact of applications

IT is both an industry itself, and a tool that impacts on all economic sectors. It has a central role in promoting the efficiency of the whole economy, and in bringing out the comparative advantage that a particular country has. Software development is very labour-intensive and can be highly profitable - there is close to 100% value added. Thus a country with low wages and an educated population has a competitive advantage. This can therefore be an important sector for developing countries that invest in their people. IT can result in either job creation or displacement. Care should be taken to introduce applications that increase the skill of the workers, rather than simply de-skilling them. Where IT leads to fewer jobs in certain areas, training programmes are needed to support workers entering other higher skilled areas.

As it has such a major role in the economic life of a country, IT should be seen as a strategic asset for the country. Lessening dependency on external suppliers, particularly in application development, is crucial to the self-sufficiency and sustainability of an economy. If developing countries do not become involved in developing their own applications, they will become increasingly dependent on external suppliers. Developing countries must aim to be producers of IT applications and not simply markets for others.

To facilitate the creation of strong IT industries in developing countries, it is essential to promote the necessary enabling environment. In the words of J Braa et al, "Historical experience from the North

strongly suggests that learning about IT needs take place in sectors sheltered from international competition. This is what the North traditionally has done... This implies that the South can only catch up through a planned approach - and not by eliminating all possibilities of the required processes of technological learning. Only in this way is it conceivable for less developed countries to catch up technologically and, consequently, economically."[6]

There is vast scope and need for world-wide IT development and for the empowering effect IT has for sustained social and economic development. It is in the long-term interest of all countries for there to be global development, including development of international markets. The commitment of developing countries to the design and implementation of their own applications should not be perceived as a threat by the developed world, but as an opportunity to enhance levels of development. International co-operation remains the corner-stone of an equitable information order.

5.6 Proposals and Recommendations

1. Establish Centres of Excellence, Expertise and Resources (CEERs) in Information Technology. These will empower developing countries to develop their own vision of the Information Society and implement this effectively.
2. Multi-Purpose Community Centres (MPCCs) for universal access to a range of services meeting community needs, with IT as the backbone.
3. Co-ordinate and explore ways for developing countries to co-operate in IT applications. Provide ways of entering into mutually co-operative agreements with developed countries that serve to advance the information society for the benefit of all. The aim should be genuine partnership without discrimination.
4. Institute an in-depth study on resolving threats to co-operation in IT between developed and developing countries. The move to an Information Community should not serve to entrench the advantages of developed countries.
5. Address the financial weakness of developing countries to support the key enablers of applications development through:

   Assisting developing country strategies for IT development;

   Financial and managerial support to emerging SMMEs in IT;

   Companies entering into pre-competitive research consortia;

   Recognising and encouraging the key role R&D within the Information Community.

6 PEOPLE EMPOWERMENT: INVESTING IN HUMAN RESOURCES, EDUCATION AND TRAINING FOR THE GLOBAL INFORMATION SOCIETY

6.1 Introduction: Benefits of Investing in People

The objectives of this chapter are to:

Argue for a new Human Resource paradigm appropriate to an Information Community;

Describe necessary reforms in formal education and training;

Suggest qualifications standards and career path development for an emerging Information Community.

It is generally recognised that education and training form an important foundation through which individuals, organisations, communities and countries can grow and develop. This is outlined in the RDP document: "The challenge that we face at the dawning of a democratic society is to create an education and training system than ensures people are able to realise their full potential in our society, as a basis and a prerequisite for the successful achievement of all other goals in this Reconstruction and Development Programme."

Fundamental to the changes the Information Community will bring is the ability to function within a context of continual and rapid change. Such changes require skills: skills in adapting to change; skills in locating, evaluating and using information; skills in creative thinking, entrepreneurship, social and cultural awareness; specialist and general skills.

At the root of this process of change is education. In recognition of this principle, the RDP recommends the development of an integrated system of education and training which unites the broad range of disciplines in any education and training system into a single system based on the principles of personal growth and development, life-long learning and the building of a learning nation.

It must, however, be recognised that investing in people embraces a wide range of broader areas, including cultural development, the provision of sports, leisure and recreational facilities - all of which need to form part of an integrated approach to the development and enrichment of human resources within a learning nation.

This section provides an overview of the conceptualised integrated education and training framework proposed for South Africa and makes several recommendations which will assist in making this framework available to all South Africans.

6.2 A New Human Resource Development Paradigm

The human resource paradigm of the emerging Information Community must take into account the broadest range of social, political and economic activities where information and IT are used, and must provide a framework sufficiently comprehensive to allow for human development of across a wide range. This new paradigm must create an environment in which people, in the workplace and in wider society, use information and IT to enable them to work (and play) more fully and effectively. Information can be used to make decisions, to solve problems and to chart directions for social and economic progress. Therefore, skills which promote personal information manipulation and creativity must be linked to skills needed for decision-making, problem-solving, operational and administrative management in institutions, and strategic analysis and evaluation.

The foundations of a national education and training framework leading for the Information Community include:

the principles of personal growth and development, life-long learning and the development of a learning nation;

the introduction of a "basket of IT skills";

advanced education and training programmes for IT specialisation;

appropriate mechanisms for recognition and accreditation of skills acquisition, including recognition of prior learning;

access to a framework for appropriate accreditation at all levels of education including adequate mechanisms for accreditation of institutions;

universal access to learning opportunities which will lead to personal growth and formal accreditation;

an affirmative action framework which will redress past education and training inequalities with regard to race, gender, disability, social class and locality to ensure that social equity is a key feature of the Information Community.

6.2.1 A National Qualifications Framework (NQF)

The NQF currently being set up addresses the issues outlined above, by establishing a set of principles for education and training. These include:

Integration. The framework is based on the integration of education and training which concentrates on the facilitation of "skills outcomes"[7].

Relevance. The skills outcomes are based on national development needs required for the improvement of the quality of life, of culture and of employment.

Credibility. The skills outcomes need to have both national and international credibility.

Standards. The framework must be based on nationally negotiated and accepted outcomes.

Legitimacy. Legitimacy of the framework must be ensured by the open participation of all stakeholders to ensure a transparent process.

Portability. Credits for skill outcomes achieved need to be "portable" between learning institutions, employers and career streams.

Progress. Individuals must be able to progress through the levels at their own pace and via a variety of delivery systems.

Prior Learning. The framework must give credits for prior learning, either from on-the-job learning, or learning from other systems.

Access. The framework must be accessible to all prospective learners, irrespective of location, language or current abilities.

A comprehensive project plan has been proposed for researching, analysing, evaluating and implementing a process leading to an IT qualifications and human resource framework. Four key areas of focus have been identified:

6.2.2 Formal Educational Institutions (Primary, Secondary and Tertiary levels)

A root problem in primary and secondary education is the lack of strategic vision for information skills and competencies in school syllabi. As a result, there is a lack of funding for IT infrastructural provision within the school environment. The only schools which may have an IT infrastructure are private schools where this infrastructure was introduced and funded by the school board. Even in these cases, there is frequently a lack of vision and effort to ensure integration IT and information skills within the school syllabus.

A related problem within the school system is the lack of exposure of teachers to IT, either as a possible curriculum, or for use in the administration and presentation of classes, or as a vehicle for learning. Until IT becomes a strategic subject in teacher training and education, introducing IT competencies into the syllabus will remain problematic.

The result of these problems is that school-leavers have little notion of what a career in IT may entail and have little exposure to the environment of an Information Community. Further, they have had little access to the possibilities of personal growth and enrichment that are possible within an Information Community.

At the tertiary level, there is far from sufficient recognition of importance of the IT, a situation worsened by the brain-drain of skilled teachers and students into the private sector. Currently information systems and computer science departments at tertiary institutions suffer from a number of problems: under-

staffing, low salaries, rapid staff turnover, high teaching loads, outdated research equipment, and a lack of recognition due to consequent low research output.

World-wide, vast quantities of information, from dictionaries and encyclopaedias to fully- fledged models, simulations, lesson plans and so on, are now available electronically on computers and over networks. This affords opportunities for radically different and more effective methods of teaching and training. Especially in South Africa, where the national budget cannot hope to overcome the backlog in education needed to make up for past deficiencies, it is imperative that we conduct research, develop and implement new methods of teaching and learning that exploit the abilities of IT to facilitate rapid learning. Distance learning, collaborative learning between schools, co-operative learning within schools, and learning by doing are just some of the opportunities enabled by information and communications technologies.

6.2.3 Availability of IT Education and Training

The availability of education and training depends upon provision of basic educational infrastructure. This includes the buildings themselves as well as educators and trainers, training materials, and easy and safe access for learners. In South Africa there are very few education and training establishments, especially for adult training, whether they be work place or residential learning establishments, within disadvantaged communities. This is especially true with regard to IT within training and education.

The problems at the root of this category are:

The strategic value of IT has generally not been recognised by government;

Business, in general, has little real human resource development focus;

There is no common method or standard for assessing IT trainers;

There is little appreciation of IT as a delivery method for education and training.

Private sector management is generally not involved in the definition of skills required for specific tasks in their area of responsibility. This is left to the HR and Training departments. As a result, training is generally viewed more as a “perk” than as a developmental tool. Furthermore, because management has little knowledge or experience themselves of the strategic value of IT, it seldom features amongst the skills required for job functions. Finally, businesses do not really see themselves as a vehicle for HR development, and therefore South African investment in this area is well below the world average.

A growing proportion of workers in organisations of all types work with information and are increasingly classed as “knowledge workers.” Organisations need to be sensitised to this phenomenon and be encouraged to offer paid time and facilities to their workers to gain basic computer and information skills while on the job.

Because of the lack of standard and qualifications for IS teacher training, the resulting training is reliant almost solely on the quality and integrity of individual trainers. Students from primary, secondary and tertiary levels as well as adult learners need to develop understanding and skills in both computer use and information processing. Teaching curricula must take this need into account and incorporate the necessary material at all levels of the formal and informal education system.

Despite a number of efforts over the past few years, the lack of appreciation of the role of IT within education, training and development remains. Unless IT is a required subject on the teacher training curriculum, this problem will persist, with its domino effect on human resource development in general.

6.2.4 Common Standards for an Information Community

There is a general lack of common standard in most areas of IT education and training in South Africa. This is due to the absence of a single national body responsible for the setting and maintenance of standards for job performance and for education and training practitioners. Because there has been no overall governmental responsibility for IT, the various areas of IT have become fragmented throughout a number of government departments.

The need for formal standards and acknowledgement of skills levels that has widespread acceptance by employers in the public and private sectors has been widely expressed. Specifically, the new education and training framework offers an important opportunity to formalise and standardise computer and information skills training and acquisition.

A body is therefore needed, which is fully representative of all stakeholders with regard to IT in South Africa, and which enjoys authoritative access to government to ensure support for policies and practices in the best interests of the development of the country as a whole. There is also a need to establish a National Standards Body to set the standards for skills, as well as to establish an Education and Training Quality Authority to monitor and maintain standards of training and accreditation. These bodies also need to be fully representative of all stakeholders of within the Information Community in South Africa.

6.2.5 IT Career Development

The current entry level for a career in IT is: matriculation with English, Mathematics and Science, and a further diploma in information technology or similar discipline. This precludes the majority of South Africans from a career in IT, particularly because of the huge educational disparities enforced under the apartheid years. These problems need to be addressed within the formulation and implementation of a clear, integrated strategic vision for an Information Community.

Information career paths have largely been created in isolation by individual business concerns, with no agreed formal recognition of skills and competencies achieved - which has created difficulties for the portability of skills both from one organisation to another and from one career cluster to another. Furthermore, although there has been fairly widespread implementation of IT in business, workers in general have not been given the skills to understand and use the technology effectively.

There is also a lack of general business training in IT. This has led to “islands” of specialist knowledge within businesses and the implementation of IT systems which do not cater for the broader strategic requirements of business. This has contributed to the outflow of experienced personnel from South Africa.

There is therefore a need for clearly defined skills and job functions on a career development basis, which will facilitate the concept of life-long learning within a learning culture throughout all jobs and levels and throughout society as a whole.

6.3 Recommendations

6.3.1 Promotion of Awareness of the Information Community

Effective use of IT by a society will only happen if decision makers appreciate its potential. This is particularly relevant in developing countries, which are well behind the industrialised nations in the integration of IT into political, community and business life. Active steps need to be taken to raise levels of awareness of the potential of IT in all sectors of South African society, from political and government leaders to the private sector and people in the communities themselves. Mass media can be used to give widespread exposure to the emerging role of IT. “IT Awareness” tapes and videos can be created and deployed on a wide basis to schools, community centres and businesses of all sizes.

The Internet and the World Wide Web in particular offer an immediate and inexpensive opportunity for schools, technology centres and training establishments in all parts of the country, both urban and rural, to collaborate and benefit from the knowledge and expertise of countless teachers and trainers throughout the country and the world. At national, provincial and local authority levels, urgent action is needed to implement inexpensive, but robust facilities to connect schools, tertiary institutions, MPCCs and training establishments to the Internet and to each other. Projects can be as small as one PC and a modem located at a community centre, to extensive networks of computers in laboratories or classrooms. There needs to be a full investigation of applications needed for education, training and development purposes. These applications may be skill, service or recreationally based.

Nation-wide “fast track” inculcation of computer and information skills in the population is an major task requiring large-scale organisational commitment and funding. Co-operation with developed countries and groupings, and other developing countries with similar needs, can help to mobilise sufficient resources and enable South Africa to share skills, experiences and expertise. On a world-wide basis, large amounts of money go towards research and development projects in the IT arena. South Africa must ensure that our research and development is of sufficient standard to ensure the benefit of these funds.

6.3.2 Development of an IT Approach to the National Qualifications Framework

Under apartheid the majority of the people of South Africa had such poor education in the past that there presently an understandable scepticism with regard to education, training and certification. Therefore agreed standards of certification, which enjoy both national and international approval, as well as the approval of business, must be high on the agenda.

The rapid development of IT means that knowledge (like the systems themselves) rapidly becomes outdated. This implies the necessity of expertise that appreciates the fundamental trends and directs these in ways appropriate for local requirements. Hence research and tertiary education programs which combine the innovative skills of academics together with the knowledge of applied skills in the workplace, have an important role to play. Therefore the creation of research teams is needed as proposed in the Project Plan for the Information Technology Qualifications Framework (IT-NQF) for applied research and development of IT outputs as they relate to work, social and recreational environments.

Teachers have to be trained in the use of IT, both as an administrative tool and a delivery method for classes, as well as in specific IT skills from introductory to advanced levels. IT should therefore form part of teacher training curricula and in-service training of teachers in applications of IT should be provided.

IT skills should be included within school and ABET curricula. Students may not choose to pursue a career in the IT, but they will invariably encounter IT in both working and private lives. IT skills are becoming as basic as literacy and numeracy and need to be treated as such.

Schools career guidance at schools also needs to include IT in a more thorough way.

Special projects such as the Soweto Technology Project (STP) need to introduced on a national basis. The STP identifies students with arithmetical aptitudes at primary school level. These student are then "streamed" to specialise in English, Mathematics and Science to produce "university ready" students for Engineering or Computer Science careers.

6.3.3 Ensuring Equality of Access to Education, Training and Development

A system of education, training and development accreditation is useless without the infrastructure which provides access to this accreditation to all South Africans, irrespective of race, gender, class, language, age or geographic location. This is crucial in view of the gross levels of inequality inherited from the apartheid years. Affirmative action strategies to redress these imbalances therefore need to be an explicit part of the formulation of IT-NQF frameworks, as well as concretely forming part of the work of the proposed Centres of Excellence, Expertise and Resources (CEERs) and Multi-Purpose Community Centres (MPCCs) (see Chapter 5).

6.4 Project Proposals

1. Information Technology National Qualifications Framework (IT-NQF) Project. This will not only establish graded levels of information technology literacy but also skills of self- learning, co-operation and innovation. It needs to be part of a larger programme to ensure widespread growth in skills, including a programme of basic literacy training. It is also part of a lifelong learning programme, vital in an Information Community characterised by high degrees of innovation. Without such an effective IT education and training system, the effects of the information age on employment levels and skills may well be disastrous.
2. Contemporary African Music and Arts Archive (CAMAA). The CAMAA archive project combines documentation of indigenous art materials with digital storage and distribution, and directly supports the broadest objectives of human enrichment advanced at the start of this chapter. It creates a local cultural content for the Information Community based on the artistic heritage so badly neglected under apartheid. This documentation will preserve the richness of African culture for our own people as well as for world cultural enrichment. the back to the people of the continent and other continents. The advanced technology of MPCCs can be used to promote popular access to this rich legacy. Other countries of the sub-region should be invited to participate in and contribute to the project.

Appendix A: Acronyms and Abbreviations Used in this Report

ABET Adult Basic Education and Training
CBO Community Based Organisation
CEER Centres of Excellence, Expertise and Resources
CEO Chief Executive Officer
DACST Department of Arts, Culture, Science and Technology
DPTB Department of Posts, Telecommunications and Broadcasting
EDI Electronic Data Interchange
G-7 Group of seven highly industrialised nations
GDP Gross Domestic Product
GII Global Information Infrastructure
GIIC Global Information Infrastructure Commission
HR Human Resources IC Information Community
ICT Information and Telecommunications Technologies
II Information Infrastructure
INGO International Non-Governmental Organisation
ISDN Integrated Services Digital Network
InfoDev Information and Development Fund
ISAD Information Society and Development
ISPP Information Society Pilot Project
IT Information Technology
IT-NQF Information Technology National Qualifications Framework
ITU International Telecommunications Union
MPCC Multi Purpose Community Centre
NEDLAC National Economic Development and Labour Council
NGBT Negotiation Group on Basic Telecommunications
NGO Non Governmental Organisation
NII National Information Infrastructure
NITF National Information Technology Forum
NTPP National Telecommunications Policy Project
OAU Organisation of African Unity
OECD Organisation for Economic Co-operation and Development
PADIS Pan-African Development Information System
PC Personal Computer
R&D Research and Development
RDP Reconstruction and Development Programme
SADC Southern African Development Community
SASTIN Southern African Science and Technology Information Network
SMME Small, Medium and Micro Enterprise Telkom
Telkom, S A Ltd
USA Universal Service Agency

WorldTel World Telecommunications Fund

WTO World Trade Organisation

X.25 Packet switching protocol standard

References

[1] Mbeki Thabo, South African Deputy President, Opening Address to the G-7 Ministerial Secretariat on the "Information Society", February 1995, Brussels, Belgium.

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[3] G-7 Ministerial Conference on the Information Society, G-7 Information Society Pilot Projects Progress Report, released on the Occasion of the G-7 Summit, Halifax, Nova Scotia, Canada, 15-17 June 1995.

[4] R.A. Baeza-Yates et al, Information Technology Landmarks in Chile, Information Technology for Development, IOS Press, March 1995, Volume 6.

[5] Ibid, p34.

[6] J Braa et al, Technology transfer Vs. technological learning, Information Technology for Development, IOS Press, March 1995, Volume 6.

[7] The concept of a "skills outcome" is a recent innovation in education and training and is becoming widely accepted in countries around the world. Countries especially well developed along this line are Australia and New Zealand. This concept concentrates on the expected outcomes from the development of skills rather than the input required to obtain those skills.