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NATIONAL INFORMATION AND INFORMATICS POLICIES IN AFRICA

REPORT AND PROCEEDINGS
OF A REGIONAL SEMINAR
HELD IN ADDIS ABABA, ETHIOPIA
28 NOVEMBER – 1 DECEMBER 1988

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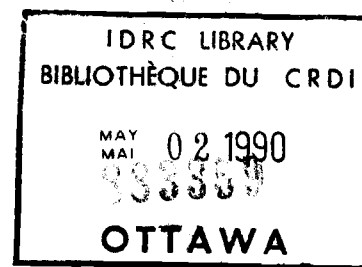
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NATIONAL INFORMATION AND INFORMATICS POLICIES IN AFRICA
Report and Proceedings of a Regional Seminar

Addis Ababa, Ethiopia
28 November - 1 December 1988

International Development Research Centre (IDRC)
&
Pan African Documentation and Information System (PADIS)

Shahid Akhtar
Editor



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**NATIONAL INFORMATION AND INFORMATICS
POLICIES IN AFRICA:
REPORT AND PROCEEDINGS OF A REGIONAL SEMINAR**

**Addis Ababa, Ethiopia
28 November - 1 December 1988**

SECTION I

**A TECHNICAL, ANALYTIC REPORT OF
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C. Kisiedu

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A. INTRODUCTION

a) Substantive Background

Development policies are necessary instruments by which Governments define national problems and set goals and direction for the development of national economies. Policies are declarations of intent by Governments to undertake action in given sectors of an economy. They establish rules and regulations, as well as methodologies for action, and at the same time indicate the natural and other resources required for their execution.

Although for the past several years, the economies of developing countries, and practically all African countries, have been experiencing acute recession, there have been successes in such areas of development as population, the environment, nutrition and housing, to name the most prominent. The successes in these and other problem areas have been attributed largely to sound policies, and international co-operative efforts and assistance. These have increased public awareness, co-ordination among participant groups and countries, ensured Government commitment and increased financial flows.

Information policy should benefit from the experiences gained in the above endeavours. Indeed, the case for national information policies (NIPs) for all countries of the United Nations system has been on the international agenda for over two decades now. The initial focus was the UNISIST programme (see SECTION B.d below). Other UNESCO activities in the area of information in the 1960s which culminated in the concept of National Information Systems (NATIS), and the convergence of all these activities and programmes in the General Information Programme (PGI) in the mid 1970s, has kept the issue alive and has also resulted in increased effort on the part of UNESCO and other donor agencies to assist in the process of developing integrated information infrastructures in Member Countries.

The context of this international concern and activity was the critical situation of the information scene in developing countries, especially those of Africa. Weak or non existent information infrastructures had created an acute information shortage which chronic lack of funds and other important inputs had turned into a vicious circle that has played havoc with all aspects of development in these countries. On the other hand, the introduction of new technologies into African countries has brought in its train new dimensions to the information crisis. While African countries have been made aware of

the various advantages for development which the application of the new technologies to information processing can bring about, the dangers of improper understanding of their already considerable impact, and the absence of know-how for their sustained operation have also been brought home to them. In the meantime, the rate of acquisition of these technologies has been on the increase. The problem clearly needs an informatics policy in order for the grave issues to be addressed and infrastructural requirements met.

b) Historical Background

Though enthusiastic at first, African responses to the international initiatives slowed down to near-inactivity towards the end of the 1970s. Despite continuing attempts by UNESCO and donor organizations to stimulate and sustain their interest in the development of NIPs, not many countries in Africa gave serious consideration to the idea. In the past decade, however, there have been visible signs on the continent of resurgent interest and activity in the development of information infrastructures at the national and regional levels. Emphasis has been on creating endogenous systems on the basis of local initiatives with external assistance.

The establishment in 1980 of the Pan African Documentation and Information System (PADIS) through international and African action seemed to have triggered these activities. PADIS, the first all-African information system, was designed, among others, to assist in strengthening the information capabilities of African countries, including the formulation of national information policies, so that those countries can contribute to and benefit from PADIS' computer-based files and programmes. Co-operation and sharing at sub-regional level was an aspect of this development. The attempt at establishing the Southern African Documentation and Information System (SADIS) gave impetus to the process of information institution-building in the countries of the Southern African sub-region, ensuring their readiness to participate in that co-operative but abortive endeavour. Thus were born the various adhoc liaison committees which have developed into the present day national co-ordinating committees and councils, focal points for information policy and other information related activities of those countries.

This new spate of activity on the information scene is the result of the combined effects of the widening of the gap between the "information rich" North and the "information poor" South, and the need to bridge this gap.

The above has goaded African information professionals, planners, researchers and other information user groups into accepting the fact that a rational and systematic approach to Africa's information problems need to be found urgently and, that the magnitude of the problem requires the framework of a Government policy for solution. Thus, since 1985, and in the wake of the failed SADIS scheme, seminars, workshops and meetings have been convened, with the sustained assistance and encouragement of UNESCO, the International Development Research Centre (IDRC), the German Foundation for International Development (DSE), the Commonwealth Secretariat, other external donors and Africa's own PADIS. The meetings have brought together various actors on the information scene to countries of the sub-region to deliberate on the problem of access to information in all its manifestations, and the need for policy to provide direction and authority.

Co-ordination of efforts at both the national and regional levels has been a central theme in the new desire to co-operate and share resources [21,30]. Many of these seminars were actually convened to prepare the ground for information policy formulation with the latest UNESCO Guidelines [35] and model national information plans such as the Jamaican attempt, for direction and inspiration. Where actual plans have not yet been formulated, there are serious discussions towards defining the problems and establishing the modalities for NIP formulation.

Concrete policies are also needed in information technology (IT) for the development of infrastructure so that African countries can benefit from the immense possibilities for development that it offers. This need is recognized by all developing countries. It has been addressed (until its recent demise) by the International Bureau of Informatics (IBI), which was created in 1974 by UNESCO to replace the International Computer Council (ICC).

IBI's mandate was, among others, to disseminate knowledge of informatics, promote its use and recommend national and international actions in order to adopt informatics policies and improve administrative methods through its use of "international peace and the common welfare of mankind" [41]. Like its predecessor, IBI was created with a Third World focus and thus had the needs of Third World countries as its guidelines for action. Such guidelines were spelt out in what has become known as the SPIN I Conference - the First World Conference on Strategic Policies for Informatics, which was jointly organized in 1978 by IBI and UNESCO in Torremolinos, Spain [42]. These guidelines, the result of agreements and recommendations adopted at this conference, are regarded as de-facto the first world informatics charter, and have provided direction for many countries and charter organizations, including IBI itself, in subsequent programmes.

Several conferences at governmental level have been held with the objective of promoting policy development, among other concerns, in member countries. One such on standards in areas of potential conflict was the World Conference on Transborder Data Flows Policies of 1980 and 1984. In Africa, IBI's co-ordinating presence has been felt through cooperative activities with the Organization of African Unity (OAU), in the form of conference reports, state-of-the-art and position papers.

In spite of the above, there is an apparent lack of drive towards the formulation of informatics policies in Sub-Saharan African countries in general, but more so in the English-speaking nations of which the countries of the Eastern and Southern African sub-region form a significant part. This may be explained partly by the fact that IBI never really had as strong a hold in these countries as it had in French-speaking Africa. It is worthy of note that out of the governments of 40 countries that represented the membership of IBI, only 3 or 4 were from English-speaking Africa (and of this small total, only one, Swaziland, was from the East and Southern African sub-region). On the other hand, all the French-speaking countries of the continent were members.

A survey of IT development in English speaking Africa undertaken in 1988 by the Commonwealth Secretariat [16] confirms this picture of a generally low level of development in this field in the sub-region as a whole. The review of literature on informatics policies in the sub-region [39] also presents a similar picture. It points out that Zimbabwe is the only country in the area which provides definite evidence of direction and development in informatics and hence the likelihood of coming up with a national informatics policy in the foreseeable future. This view is endorsed by the Zimbabwe presentation on informatics [40]. Thus, it was not by accident that the only IBI sponsored conference in the sub-region - the Southern African Regional Workshop on Informatics - was held in Zimbabwe, in Victoria Falls from 12-16 May 1986 [43].

The above observations provide the context for the regional seminar in Addis Ababa. An increasing number of African countries have attempted to formulate national information policies, which are now at varying stages of implementation. Others have yet to formulate such policies. To move such initiatives forward, it was thought that an exchange of experiences would be useful.

c) The Regional Seminar [4]

The purpose of the Addis Ababa seminar was to provide a forum for experts closely associated with the articulation, formulation and implementation of national information and informatics policies in a select number of countries in the East and Southern African sub-region to exchange views and share experiences. The sponsors also felt that by providing this forum, and by distributing widely the inputs to and the results of the seminar, valuable contributions would have been

made towards advancing the formulation and implementation of sound information and informatics policies in the African region.

The seminar was organized jointly by PADIS and IDRC and funded by the latter. Participants comprised experts drawn from the community of information, documentation, library, computing and related professions, as well as from development policy-makers and planners principally from the countries of the East and Southern African sub-region including Botswana, Ethiopia, Kenya, Malawi, Tanzania, Zambia and Zimbabwe. Two or three participants were selected from each country and were expected to present an integrated country paper. A co-ordinator was identified for this purpose in each country by the seminars sponsors.

In addition to the country papers the following were also presented: (a) a paper on the experiences of African countries in formulating and implementing development policies in general, titled: "Planning, Information and Informatics", by the Socio-Economic Planning and Research Division of the Economic Commission for Africa (ECA); (b) a paper on Informatics and UNESCO presented by the Inter-Governmental Informatics Programme (UNESCO IIP); (c) a paper on Issues Pertaining to National Information Policies in Africa delivered by PADIS; (d) findings of the study on informatics policies in Commonwealth African countries titled "Information Technology in Government: The African Experiences", delivered on behalf of the Commonwealth Secretariat; (e) a paper on the experiences of the Arab North African countries in the formulation and implementation of information and informatics policies; and (f) literature surveys on information and informatics policies in some sub-Saharan African countries.

The present report provides an analytical summary of these varied experiences in seven broad, substantive sections:

- B Information and Public Policy;
- C Rationale and Need for National Information and Informatics Policies;
- D Scope of National Policies;
- E Instruments of Policy;
- F The Policy Process and its Key Actors;
- G Policy Issues
- H Conclusions and Recommendations.

B. INFORMATION AND PUBLIC POLICY: DEFINITIONS AND SCOPE

a) Public Policy

Information policy is an aspect of public policy in most countries, whether articulated or not, because information permeates and fuels every aspect of national activity. It can also derail or itself be derailed by national policy if the proper relationships are not established between the two areas at the initial stages of policy

formulation. (This issue is discussed in depth under SECTION D.b). It was therefore considered necessary, for the purposes of the seminar, to establish the domain of information in order to provide a framework for the deliberations on national information policies in the wider context of public policy. In the same way, public policy establishes the contextual framework for the necessary linkages between sectoral policies on the one hand, and between the latter and overall national policy on the other. Therefore, the need was also felt to define or establish this framework of relationships, goals and procedures into which a national information policy should fit in order to succeed.

A small number of the contributory papers offer varied definitions of public policy, but they all emphasize some basic, common characteristics. These include, among others, the fact that public or national policies are planning tools; that they set national goals in the context of national needs and objectives, and establish coherent and systematic modalities for achieving these objectives; that policies could be of a general, integrated nature affecting the entire national economy or, as is often the case, that policies may also be sectoral and operate within the context of the overall national objectives.

One of the presentations by Tanzania [21] briefly defines public policy as:

"a deliberate course of action carefully selected to meet certain clearly defined objectives within a specified time frame."

This source recognizes national policies as planning tools which take cognizance of national needs and objectives and set a course of action to achieve them. Such policies can be general and may affect the entire national economy while others deal with particular sectors but within the context of the overall national objectives. It also emphasizes the linkages and cohesiveness that are necessary for goal achievement in a time frame.

The UNISIST Guidelines [35] define policy as "basic principles or assumptions on which a programme of action is based". In his review of the literature on national informatics policies in African countries, Zwangobani [39] endorses this definition and agrees further with the UNISIST Guidelines that policy can also refer to a general plan of action or plans and strategies. In addition, he sees national or public policy in the "integrated", holistic sense, recognizing the interconnections between sectoral policies that are essential to successful implementation and goal achievement in any given sector.

By far the most comprehensive definition of policy is offered by ABATE [10] who examines definitions and analyses from various sources. Beginning with the Oxford Dictionary's general definition, the paper progresses to more specific and precise statements called from such authors as SPENGLER, KIVINIEMI, ADEDEJI, to name some of them. [Please refer to Section II for the full text of this paper].

SPENGLER, for example, cautions against dictionary definitions for their lack of specificity for most purposes of analysis, while KIVINIEMI notes, in addition, the role of policy as a means by which Government controls the actions of policy executors and of the citizenry at large away from the usual. ADEDEJI emphasizes the importance of a systematized approach to goal achievement or problem solving that is inherent in public policy. This point of view is shared by the Seychelles Roundtable's definition of 1980 dedicated to "Public Policy in Africa" and endorsed by the African Association for Public Administration and Management (AAPAM).

In addition, these sources also stress the relevance of harmonization of sectoral policies with total policy which BAGUMA regards as a sine qua non for goal achievement. KIVINIEMI bases his support of this view on what he refers to as the "little effect phenomenon", the repeated or partial failure of intended policy programmes that one finds in case studies on public policy, which he attributes to lack of coherence or interaction between sectoral policies operating at any given moment.

b) Information

The seminar noted the often cited absence of a common definition for information as reflected in the attempts made in some of the presentations at providing such a definition. Definitions are sector-oriented in some cases, comprehensive in others, depending on the background and interest of the person(s) presenting the definition or making the case, as the information policy drive in Australia has found out at some cost [14].

Another problem related to definition is the close interlinking with scope, especially where a functional definition is required, as in the present exercise. Invariably, definition broadens into a description of the scope and/or functions of the many sectors of the information industry. However, as noted at the beginning of this section of the report, it was deemed necessary to provide a domain for information (in the widest sense) in order to provide a context for the deliberations of the seminar.

As with public policy, a number of the papers presented at the seminar attempted to provide a definition of some sort for information. BASSIT [6] identifies sectoral views, beginning with the concept of national communication policy, "a product of earlier educational planning efforts" as exemplified in the 1975 UNESCO report: National

Communications Systems: Some Policy Issues and Options. He also refers to the science and technology focus on which basis information policy OECD/UNISIST style (initially) developed. Thirdly, he mentions the approach that emphasizes traditional library, documentation and archives, and finally, the informatics and information technology dimensions which derive much of their impact from computer technology. Bassit observes that a heavy emphasis on the importance of information is a common denominator among these approaches, but that by virtue of their narrow, sectoral orientation, they fall short of an acceptable global conception of the total information system. He describes the characteristics and properties and defines the global view of information as:

"a resource, a production factor which has its place in every system of creation, an element to be taken into account in all decision-making process[es]..., a commodity which, unlike most others, is not exhausted with use."

The literature review on national information policies [18] refers to the standard definition of information provided by PGI/UNISIST (1979) [34]. This is considered a rather technical and abstract definition with no practical context for information. It is observed further that this definition imposes a two-sided narrowing effect on the limits of information largely in terms of scientific and technological information. Secondly, the definition places greater emphasis on print-based information and fails to give sufficient attention to information in non-print format, an omission that cannot be ignored in an age of electronic documentation. It also excludes such organizations and functions as mapping agencies, statistics, remote sensing, etc, that have recently been identified with the information sector.

The Ethiopian paper [33] presents a paraphrase of the UNISIST definition, broadened to bring out the multi-faceted dimensions of information in the development context. This defines scientific and technological information (STI) for development as embracing:

"the natural sciences and their technologies ... the social sciences and humanities as well as the "soft" technologies related to them ... all of these being covered by the name of specialized information involving a wide variety of institutions such as research [and] educational institutions, statistical agencies, archives, printers, publishers, booksellers, libraries, documentation centres, extension and advisory services, science popularization and literacy programmes, etc."

As can be seen, the above attempt does not escape the print-based nature of the original definition from which it is derived. For the purposes of the seminar, however, the more enriched definition provided by ABATE's paper [10] (see Section II) which sees information in the context of development, was adopted.

With regard to the scope of information, the general consensus is that it should be comprehensive and should embrace all the sectors, institutions and activities identified in the enriched definition cited above. However, traditional practices, experiences and interests as evidenced in practically all the papers on information policy, have a narrow conception of the scope of information based on libraries, archives and documentation centres and their activities [10].

The national information policy efforts manifested in draft policies [27,30,37], discussions and the general thinking reflected in the professional literature (published and unpublished) emphasize document-based information and the primacy of libraries and allied institutions as traditional sources of information in African countries. Thus, information workers in Malawi are described categorically as librarians, archivists and documentalists; the Malawi seminar [30] to articulate specific goals for a national information policy has only those institutions and professionals as target and identifies information institutions and instruments with only those in this sector. Botswana's report on co-ordination of information services [27] lays heavy stress on libraries and emphasizes the media of printed information. Zambia's draft information policy [37] excludes mention of information sources and services other than libraries, archives and documentation centres. The trend is similar in Tanzania where efforts at NIP formulation involve librarians as main actors because "libraries have historically been the major suppliers of information" [21].

One important reason for this narrowness of the scope of information in African countries is that practitioners in the library and other fields of documentary information have traditionally been more closely associated with the provision of information and have consequently played a leading role in the on-going attempts at information policy formulation. Another likely reason is that practitioners in other key sectors of information have excluded themselves and their pursuits from the mainstream of information activities because they did not (until recently in some cases) regard their functions as information functions [10]. This state of affairs was discussed at length at the seminar and countries represented urged to encourage linkages between various sectors of the information profession in order to ensure a stronger lobby for the NIP formulation exercise.

c) Informatics and Related Information Technologies

The development of informatics has been one of the major preoccupations of UNESCO since the 1950s, although the discipline was not introduced into its programmes until 1975. A few of the contributory papers on informatics attempt brief definitions of the term. BASSIT defines informatics as:

"a complex of scientific, engineering and other technological disciplines and management techniques which are helping to cope with data and information more systematically, without losing sight of their wider social, economic and cultural contexts ... increasingly referred to as informatics."

Reference is also made to the parallel development of associated equipment and procedures which enable the fast and economic handling of huge volumes of data required for development.

An even briefer definition, though a more technical one, is that of the French Academy in 1966 quoted by NDAMAGI, which defines informatics as;

"The science of the systematic and effective treatment, especially by automatic machines, of information seen as a medium for human knowledge and for communication in technical, economic and social contexts" [25].

This definition is considered still relevant, although it has undergone slight modifications over the years, but it is obviously narrow in expression and scope. A more expansive definition by SAMUELSON, BORKO and AMEY [29] explains that :

"Informatics stands for Information Science and Technology, defined as that field which includes: Structure and properties of information and communication as well as theory and methods of the transfer, organizing, storage, retrieval, and evaluation and distribution of information, and furthermore information systems, nets, processes and activities that mediate knowledge from source to user and are based on general systems, cybernetics, automation, and technology for human work environments in timely and current praxis."

The seminar expressed concern with this narrow scope of informatics. The general view is that the term is too computer-oriented and excludes other pertinent technologies like telecommunication and other aspects of the electronics industry. Therefore, for matters of policy, the term "information technologies" (ITs) should be preferred. "Information technology" (IT) is thus defined as:

"the application of modern, new tools and techniques to the acquisition, processing (including storage and repackaging) of and dissemination of information".

In scope, information and information technology have a natural affinity towards each other which is seen in the ever increasing integration of ITs in national life manifested in the telecommunications, publishing, computer industries, and in resources inventory, early warning systems and in the increasing application of electronics in traditional information systems and institutions.

d) UNISIST and NATIS: Their Contributions to Information Policy Concepts and Practices

As noted in the introductory section of this report, UNESCO, the lead agency of the United Nations system in the promotion of the development of information within and between Member States, has pursued this policy since its inception. In the process, it has established over the years various departments and programmes. The best known of these are the UNISIST and NATIS programmes, created respectively by the former Division of Science and Technology, in collaboration with the International Council of Scientific Unions (ICSU), and the Division of Documentation, Libraries and Archives, and both of which programmes were absorbed by the General Information Programme (PGI) in 1977.

Kenneth ROBERTS [28] has made a comprehensive and detailed analysis of the activities of PGI in which he traces its origins to the UNISIST and NATIS programmes, and provides a brief resume of the conceptual framework in which the two programmes operated, and the focus of their activities all of which became the guiding principles of PGI at its inception in 1977. These precepts and operational thrusts have been built upon and expanded since then. PGI has been made stronger conceptually and has a clearer operational vision because of the harmonization of the UNISIST and NATIS concepts and activities that the merger brought about. Ulrich GEHRKE [12] provides a more comprehensive, comparative and evaluative account of pre-PGI UNISIST and NATIS programmes in which their contributions to the development of information in general (including their weaknesses) have been highlighted.

The initial objective of UNISIST was to promote the co-ordination of existing trends towards cooperation and to act as a catalyst in the development of scientific and technological information (STI). It emphasized the sharing of information internationally, and its handling through co-operation and standardization among existing systems, so that the flow of information for the world community may be improved. UNISIST requirement that participant countries should already have in place developed information infrastructures, and its natural science orientation, led to a somewhat diminished developing countries focus. However, this gradually increased over the years as the programme's

scope expanded to embrace all areas of national activity and the principle of integrated information for development became central to the programme's activities after the UNISIST II Conference in 1979. The literature review [18] (see Section III) demonstrates the course of this evolution as represented in UNESCO documents themselves.

The main thrust of the UNISIST programme was in four main areas, namely, policy formulation; standards-setting; infrastructure-building and manpower-training. However, on the basis of on-going NIP formulation activities in the African region, one could safely state that policy formulation encompasses and provides the rationale for the three other areas of activity. This programme of activities has been pursued through PGI, to encourage many governments to develop information policies as cornerstone to the development of information at the national, regional and international levels.

Many African countries have benefited from the operations of these programmes. For example, between 1986 and 1988, Botswana, Malawi, Zambia and Zimbabwe were the focal points of information policy meetings. In fact policy and infrastructure building activities have often been inseparable. Efforts at promoting the development of information infrastructures are exemplified in the meetings cited above. Another such was the First UNISIST meeting held in Accra, Ghana. (FIRST UNISIST Meeting of Experts on Regional Information Policy and Planning in West Africa, Accra, Ghana, 4-7 December, 1978). UNESCO's involvement with the establishment of PADIS in 1980; its participation in the preparation of development plans for the establishment of SADIS, and in various feasibility studies and field research programmes commissioned by UNISIST for the development of both sectoral and integrated information services and institutions, cited in the literature review [18] are specific examples of infrastructure building initiatives towards eventual policy formulation.

UNISIST/PGI has made a very considerable contribution to the development and training of information manpower through short as well as full-term courses, and co-operative institutional ventures. ROBERTS records that between 1977 and 1980, several international and regional courses were held, three of which were in Africa.

In 1983 a UNESCO-IDRC mission visited six African countries to explore the need for an information science programme and the capacity of the countries visited to achieve this. The team recommended the establishment of two such programmes in Africa, one to be based in Addis Ababa University, the other at the University of Ibadan, Nigeria.

The standards setting activities of UNISIST/PGI are well known and well-documented. They have taken the form of the development of technical, normative tools for the design and operation of information systems and services. The objective has been to ensure the establishment and maintenance of common standards in information handling and the unimpeded flow of information at both the national and extra-national levels. Some key PGI documents on standards are listed

in ROBERT's article cited above. They provide for activities, institutions and functions across the entire spectrum of information, aimed at ensuring ease of information flow at the national and international levels.

Raymond AUBRAC [3] has identified three levels at which these ideas and activities have been expressed and pursued, the first of which is through an analytical and comprehensive study of the problem such as that which took place during UNISIST I and II conferences. UNISIST II's evaluation of the UNISIST programme led to a shift in the programme's orientation from the development of STI per se to specialized information in the context of national development. This shift is manifested in such recommendations as the promotion of endogenous information systems as important bases for information policy; the recognition of a two-way flow of information from developed to developing countries and vice versa, and even between developing countries; focusing attention on users to better identify their information needs and assist them to utilize available information more effectively. Thus, UNISIST is considered as the "locus of basic precepts on information transfer and use, and the source of national, regional and international operations".

Common standards are also articulated through guidelines - the application level of the basic precepts mentioned above - prepared by consultants in co-operation with international and non-governmental organizations such as the International Council of Scientific Unions (ICSU), the Federation for Information and Documentation (FID), the International Federation of Libraries, Archives and Information Institutions (IFLA) and the International Council on Archives (ICA). These guidelines have established norms and standards in information processing and handling for policy formulation, etc.

Two such Guidelines have been produced - respectively after UNISIST I in 1975 and UNISIST II in 1985 [35]. The latter which represents the latest PGI/UNISIST precepts, has been widely distributed in many developing countries, coinciding, as it does, with the period of heightened activity in national information policy formulation in many of those countries. Many of the draft policy recommendations in the literature review [18], discussed at length at the regional seminar, used the Guidelines as a model. This is because the 1985 Guidelines is much more reflective of current realities in most developing countries. Most of the recommendations centre around an analysis of the existing situation. Current initiatives in a number of the target countries have been taken along those lines by libraries, archives and even some resource centres.

The document points to the underutilization of existing information (as UNISIST II does) and urges the identification of the reasons, and promotion of information use. It also stresses the importance of and the need for co-ordination of information, which is now a permanent agenda item of the PGI/UNISIST programme. The third level also referred to as the "technology level" constitutes the implementation of the precepts established at the first two levels in individual countries and regions in the form of field research projects and reports [18].

The concept of NATIS, an acronym from National Information Systems, resulted from the general demand for a coherent infrastructure covering all information services, and was a reaction to UNISIST's initial, exclusive concern with information in the natural sciences. The programme which was launched at the International Conference on the planning of NATIS (UNESCO, 1974) provided a conceptual framework for the formulation of a national information policy in which objective for national action for the implementation of NATIS were embedded in five precepts: (a) policy, but one reflecting the needs of all sectors of the community, to guide a plan which should be fully incorporated in a country's national development plan; (b) co-ordination of the functions of all library, documentation and archives services through a central body to form the national information system (NATIS), to ensure the optimum use of resources; (c) professional education and training for information manpower as part of the national education system; (d) legislative backing to support the planning and implementation of NATIS; (e) the existence of a mechanism for national bibliographic control to foster the objectives of the concept of Universal Bibliographic Control (UBC), which seeks to ensure that a bibliographic record exists for every publication at the national and universal levels. All of these were aimed at strengthening the information capacities of Member countries, especially developing ones, in the context of national policies.

Through its integrated and comprehensive approach and its advocacy for centralization in the development of information, NATIS presented a framework that was more acceptable to developing countries than that of UNISIST. NATIS also had the vigorous support of all those elements in the information industry who believed that UNISIST, "with its concentration on science and technology, had created an imbalance in UNESCO's information programme" [1]. As originally conceived, UNISIST's concern with the information problems of developing countries was only minimal. It was this, and particularly its exclusion of the social sciences and other non-natural science subjects as a focus of development that prompted the establishment of the NATIS concept. It should be noted, however, that the validity of UNISIST's initial objectives is not in question. However, as BASSIT observes, "in the context of development issues and in the light of the new concept of international economic order, it seems understandable that its emphasis was shifted to recognize STI not for its own sake but for its social and economic value."

As can be seen from the precepts and operations of the two programmes as identified above, UNISIST and NATIS pursued basically different aims but employed largely identical means [12]. For example, the principle of national participation which forms the basis of NIP activities in African countries is a requirement that is common to both, and was based on common UNESCO experiences. In fact, practically all the NATIS precepts could also be identified with those of UNISIST. The often quoted rivalry between the two programmes emanated from the fact that although they were from the same source, they were offered separately and were unco-ordinated.

As noted above, the creation of PGI has brought to an end this duplication on the part of UNESCO, the rivalry between UNISIST and NATIS and, to some extent, restored equanimity to developing countries regarding which way the information policy and systems debate is heading.

However, more than a decade after the merger with PGI, some African professionals still cling to the term NATIS and have based on-going information policy formulation exercises on its precepts [9,30,37]. It is a measure of the great appeal that the concept had for African countries, as noted above. It also indicates that the confusion is not quite cleared. In spite of the merger, the term UNISIST continues to be used, and specific programmes and projects are attributed to it, although NATIS has gone out of UNESCO usage. Authoritative sources in UNESCO (ROBERTS, for example), state that "the retention of the name 'UNISIST' had been recommended by the General Conference for "appropriate use". Personal communication with PGI reads: "NATIS concept and UNISIST programme have been absorbed by General Information Programme (PGI). No use is made of the term NATIS. Only UNISIST appears on PGI documents". This means that the NATIS concept has no separate identity under PGI, and that NATIS as a term ceased to be used after 1977.

Despite the initial rivalry and confusion, the contributions of UNISIST and NATIS to the ideal of information for development have been considerable. Shorn of the problems, which were largely operational and managerial, the precepts they established; the tangible output, and the benefits to African and other developing countries as well as the international community in general, cannot be denied.

C. RATIONALE AND NEED FOR NATIONAL INFORMATION AND INFORMATICS POLICIES

a) Fundamental Information Problems

A recent editorial article on current thinking and progress on the issue of national information policies in Australia which appeared in the Journal of Information Science (cited already) [14] would seem to discourage, on the face of it, the whole issue of national information policy formulation in a profession riddled with competing interests, lacking a coherent and well defined identity and dominated by a sector whose operations and intentions are viewed with suspicion by other sectors. This may well be a valid line of argument in economies where, in spite of lack of policies, information development programmes proceed relatively satisfactorily because viable information infrastructures exist already, and the value of information is recognised and appreciated at policy level.

The situation described above is not an unknown phenomenon, nor are its unfavourable consequences. Expert opinion [35] agrees that even where the importance of information services are appreciated by high-level policy-makers, the need for a coherent and systematic national information policy and plan may not be appreciated; that in the absence of such information policies and plans incorporated or closely geared to development plans, relevant information may be utilized but in a haphazard manner; that decision-making based on such information tends to be ad-hoc because it is not backed by all the relevant information that could have been mustered. This strengthens the case for information policies, generally. African countries require to establish such policies to enable them to overcome fundamental information problems through adequate inputs of information, infrastructural and other relevant requirements that ensure improved performance.

The impact of the new technologies on information and on society as a whole, given the pace of their rapid advance and the prospect of cheap storage, handling and dissemination of information, needs to be given closer attention. The enormous capacity for handling information offered by some of these tools has increased the potential for meeting the needs of users. All this can be taken into account properly only in the context of national policies.

The situation in African countries calls for such an approach. Information infrastructures are weak or non-existent in some cases. There is an acute shortage of qualified personnel and skills at all levels of the information profession. Insufficient awareness by policy-makers in Africa of the relevance of information in national development is still a constraint on progress in that sector. And, chronic shortage of funds for, or indifferent funding of information programmes, and many other constraints have together created a crisis of access to information which can only be solved in the framework of

an articulated policy for the information profession. An awareness of these constraints and their effect on access to information now exists, and provides the impetus for the on-going talks and activities on information infrastructure building; it also provided a context for the deliberations of the regional seminar. Some of these constraints as identified at the seminar, and as raison d'être for formulating NIPs, are discussed in depth by ABATE's paper [10], although all the country presentations [5,8,9,15,19,20,21,23,24,25,32,33,40] and most of the other papers [6,18,39] treat them in varying detail. The policy drafts also present their case on the basis of these problems.

Inadequate financial and material resources for information pursuits are cited by all contributions as by far the greatest constraint on information and informatics infrastructure building. This situation is exacerbated by the widely held view that African bureaucrats do not appreciate the relevance of information in problem solving. Although there is reason to believe that individual attitudes are changing for the better in this regard [2], institutional responses to the needs of the information profession do not reflect this change. The situation is not helped by the general national financial stringencies, the foreign exchange dimension of which is recognized as an insurmountable problem in an import-dependent sector like information, particularly the informatics sub-sector.

Shortages of qualified personnel in all sectors and at all levels of the information industry are reported as a pressing problem that needs urgent attention. This issue is given detailed analysis in SECTION G.c (Human Resources Development).

Inadequate infrastructure in terms of physical facilities available to most information centres constitute another basic information problem. Libraries and other information institutions in Africa lack basic equipment, demonstration and reading room facilities. Documents are out of date and new ones are unaffordable [21]. At the same time, the existing resources are not utilized to full capacity because there is little or no sharing of the resources by means of co-operative efforts and marketing of information. These infrastructural problems have resulted in a crisis of accessibility of information which was discussed exhaustively at the seminar. There is general agreement that African countries have sufficient information lying around; that there is need to mobilize and use it. The problem is how to find and mobilize it for use. ABATE [10] traces the cause of underutilization of available information to the imbalance in the supply and demand of information and the fact that "too much emphasis has been placed on the supply of services and too little on mobilizing demand".

As regards its infrastructure, major computer centres in Malawi, Tanzania and indeed, in most sub-Saharan countries, have been set up as data processing departments (DPDs) within, for example, Ministry's of Finance and Department's of Statistics. These cater for government only. Private institutions and business organizations like banks and industry have installations which cater for their own requirements. These exclude the general public.

Underutilization of resources is also a problem here. Computers are not used at full capacity because applications are at an early stage, and are limited largely to the commercial sector. This situation can also be attributed to lack of sharing and co-ordination. The computer agencies are in competition and are not eager to consider the idea of sharing. Even Governments demonstrate an inherent problem because of the set up within which the administrative units related to informatics operate, scattered under as many different authorities as there are sectors. This causes administrative bottlenecks and slows down progress. It also results in waste of efforts, particularly in the area of software applications [25]. Agencies produce their own software, and there are a few firms that offer consultancies. It makes standardization also difficult if not impossible.

Awareness at the policy level of the importance of informatics in development is professed but, with the exception of Zimbabwe, the tendency to control rather than promote the development of this sector by means of restrictive rules and regulations governing the acquisition of informatics equipment and products reported in all countries [15,16,23, 25,32,39,40] certainly puts the brakes on development. Lack of understanding of the full potential and the impact of informatics on society creates a suspicious outlook which engenders doubts as to the relevance of informatics in development. Such a situation is reported to have existed in Tanzania in the 1970's and resulted in the return to manual systems and a complete ban on the importation of computers and related informatics equipment [25].

b) African Development and Information Priorities

A fundamental characteristic of African development in the last two decades is the ever worsening social and economic conditions. Several causes have been attributed to this state of affairs, including adverse climatic and environmental conditions, unfavourable international economic relations, and simple mismanagement of the economy on the part of Governments. This has resulted in changes in development priorities which have, in turn, called for corresponding changes in information services and the systems that would meet their new needs [10].

Agriculture in sub-Saharan Africa, with its complex and multi-dimensional nature, has become a developmental priority and "the cornerstone of domestic economic relations". Agriculture and agro-industries is an area that demands a changed focus in the service provided by the information sector. There are already in existence in many African countries agricultural libraries, information and statistical centres. The problem is how these largely traditional, document-oriented institutions could meet the needs of multidisciplinary, agricultural development concerns and the heterogeneous user environment. Only the recent technological advances in remote sensing, communication and data processing possess the potential that can meet the challenges of innovative information collection, processing and delivery methods, and continuous R & D and updating of those methods.

Trade, industrialization, transport and communication and natural resources exploitation form a second subject area of change. However, African Governments do not possess in-depth knowledge of the extent of their natural resource base [10]. This area is also a main domain of the private sector, but the information needs and information seeking behaviour of the African private sector is still very little known or understood. This is due partly to the fact that the private sector has been excluded from the on-going exercises in information infrastructure building and policy formulation, a situation which evinced concern and comment at the seminar. It is also seen as due to the fact that an indigenous private sector is only just emerging, and that the dominant foreign multinational concerns depend on their parent metropolitan companies for information.

For the above noted and other reasons, trade and industrial information services are still at an embryonic stage of development. However, as noted, current thinking and trends are in favour of a shift from the conventional approach to information handling that places emphasis on printed, textual sources in favour of information decision-support systems that embrace innovative activities and services identified in the seminar's enriched definition of information. Such systems will hopefully respond more adequately to the emerging developmental challenges.

c) Planning and Information

African countries adopted planning as an instrument for economic and social development after the attainment of political independence in the early 1960's. This was in response to models established after the First World War when the imperatives of reconstruction and socio-political changes made government intervention in development popular, set against the regression of free market economies of the 1920s. The approach, however, was not uniform in all African countries. While a few followed the Soviet system quite closely (e.g. Algeria and Egypt), most opted for the various forms of "indicative" planning, i.e. planning at the macro economic level, based on consensus

between government and the different economic agents of the country to ensure realism in plan objectives. Nevertheless, government intervention has been evident in the development process of most of these countries. This has been exemplified in government ownership of or participation in business, industry and agricultural concerns, Marketing Boards, the introduction of exchange control systems and reliance on such macro economic tools as the budget and fiscal policy in general [11].

One of the most common manifestations of planning at the macro level is the formal development plan by means of which goals are set on the basis of "informed" projections over a specified number of years. Zambia, for example, has had three five-year development plans and two interim national development plans [20]. Tanzania records a long history of centralized planning which dates back to the early colonial days, beginning with the Planning Agency of the Colonial Development act during the British Mandate period [23]. Although the emphasis and methodology of development planning have changed considerably since then, the actual process of central planning is thus not a recent feature in Tanzania's national economy.

By the mid 1970s, however, there was a movement away from planning towards a free market economy in many African countries. This was triggered by (i) the oil crisis of 1973 which created a huge debt in the foreign reserves of most of these countries as a result of huge oil bills; (ii) the failure to raise productivity in several areas of the economy and, more relevant to the purpose of the seminar, (iii) lack of information.

Planning at both the micro and macro levels require large inputs of information, especially in centralized planning. Starting with the disadvantage of embryonic or non-existent statistical institutions, the newly independent African countries lacked the most basic data on all variables and, in effect, made development plans with very little or no data. The situation has improved since then but not significantly, and African governments have earned the unenviable reputation of planning without information.

Zambia's experience points directly to "difficult access to information and data", "poor data and information flow among implementing units", "poor quality of data" unscientifically derived and therefore inappropriate for analysis, as some of the main reasons for the failure of the implementation of the various national development plans of the country [20]. The main lesson from the above is that information is vital at every stage of the planning process, but that there is a serious deterioration in the quality and availability of information in all sectors of African economies [11].

The new technology holds a lot of promise for the future, with particular regard to information collection, storage, processing analysis and dissemination, on a scale and at a speed which could not have been foreseen some twenty years ago. Possible areas of application in central administration include customs, tax administration and finance. A spinoff in the form of statistical byproduct can be utilized in other areas of administration. Some of these basic applications are already in force in most African government institutions, as noted elsewhere in this report. However, the capacities of the new technologies are underutilized, and the level of use is not yet of much benefit to government [25,32,39,40]. Besides, the existing systems are used largely to process historical data.

Apart from the above, other problems that prevent the effective use of information technology in government institutions were identified in the course of discussions at the seminar. (a) Data collection is still a problem in spite of the new improved data processing systems because "it depends on human action" in different areas of public administration where inefficiency and shortages of skilled manpower are well known. (b) Co-ordination of the disparate information systems in the central administration is cited as another problem [11]. For example, while trade statistics are compiled on a regular basis, data on household expenditure and consumption collected through household surveys, and general census data can only be obtained at intervals of five to ten years. (c) The possibility of information glut due to the limited capacity of planners and other development officials in African countries to effectively use the considerable information which can be generated by a computerized information system. While this last named problem is considered real, it is perceived not as a planning problem but as one of how to manage the information available. Integration of information with planning is certainly lacking. The result is that African countries are "data rich but information poor". Computers are a means to an end, the end being the integration of computer generated data into planning to provide the desired information. So far this has not been possible to any great extent in Africa [16], and information still remains as data in Africa, of little use for planning.

The shift in orientation in planning from centralized to free market economy does not mean that planning has failed. The phenomenon involves the dynamics of change, since planning is a dynamic, not a static process. Planning and information need to be integrated. The one cannot succeed without the other. As a corollary, the efficient use of the possibilities offered by IT to generate development information and ensure integrated information systems cannot be effected unless definite policies are set in place for information and information technology. This is the ultimate case for information/IT

policy formulation and the principal argument of all contributory papers. Development plans should include a national information/IT sector plan which should be supportive of the national development plan. This will ensure the relevance of information/IT systems and promote co-ordinated development of sectoral into national level systems or networks that can make information available to users.

D. SCOPE OF NATIONAL INFORMATION POLICIES

a) Broader versus Narrower: The Pros and Cons

The objective of national information policies, stated broadly, is to set the goals, provide the inputs and support mechanism that would make possible the achievement of optimum satisfaction for the information needs of all sectors of the national economy, and to promote effective use of information services. This requires the harnessing and harmonization of all existing national information institutions and functions into an integrated system. On the basis of the definition of information given in ABATE's paper [10] (see Section II), the scope of a national information policy covers the following information institutions and functions: libraries, archives, documentation centres, statistical agencies, the media and broadcasting, telecommunications, publishing, mapping, cartography, land use and geological surveys, remote sensing and meteorology, etc., that is, the different aspects of the provision of actual services to various user communities.

The above would ensure a more comprehensive scope for a NIP. However, the conventional approach and customary references to the formulation of NIPs in African countries demonstrate varying levels of comprehensiveness of content and coverage [18,27,30,37]. There is as yet no comprehensive policy in any of the target countries of the seminar. In those few that have made attempts at NIP formulation, the provisions are limited to libraries and similar institutions and their activities. References in the professional literature to national information policies are to the following areas: (1) discrete processes in the information transfer chain - generation, collection and dissemination; (2) objects of these processes with emphasis on the paper media; (3) the absence of uniformity on what constitute the confines of information (i.e., whether statistical, public administration and management, etc., fall within national information policies or not) [10].

Whatever the controversy or trend exhibited in the literature and current thinking on the subject, some contributory papers and the direction of seminar discussions point to advantages and disadvantages in adopting a narrower or broader scope of national information policies. On the credit side of a broader scope, there is general agreement that (a) the more sectors included in a NIP the greater would be the resources that would be brought to bear on the momentum of

policy formulation and implementation; (b) a broader scope would also ensure greater chance of satisfying the total national information needs more comprehensively.

On the debit side, a broad-based NIP will represent a large number of interests which are often competitive and at times conflicting. (a) A broad scope, particularly at the early stage of policy formulation, may jeopardize the chances of success since the process might degenerate into a forum for bureaucratic wrangles and in-fighting. (b) The inclusion of more sectors in a NIP could also create difficulties in the way of co-operative agreement due to suspicion among participant institutions of threat of loss of autonomy to their independence and individual identity. These factors were instrumental in Botswana's decision to opt for a narrowly-based NIP [27].

The general agreement, however is that a broad based NIP should be preferred. This does not necessarily mean a single, common policy, but a conglomerate of sectoral policies which would be well co-ordinated and harmonized. This would also take care of the much discussed problem of fragmentation that bedevils co-operative effort in the information profession. Such a sector oriented policy could also pay closer attention to strategic or priority sectors.

b) Linkages with Other Public Policy Areas

The rate of success of a NIP formulation and implementation depends, to a large extent, on the levels of harmonization and the situation that pertains in those other sectoral and general policy areas with which NIPs have to interface. As noted in Section B.a above, a national information policy, indeed any sectoral policy, should take serious account of the fact that there is interaction between policies operating at any given moment and that such policies may be at variance with and inimical to the success of its own objectives, and vice versa. An indication of the large number of departments, institutions and individuals who become involved in the policy exercise once it is set in motion is described in detail in some contributory papers [10,23,24,25,39].

Some of the most obvious public policy areas that interface with NIPs are one of the topics discussed in ABATE's paper [10]. They include education, science and technology, public and state security, labour and employment, overall economic policy, taxation, transport and communication. A few of these, and the nature of the "interfacing" process, are analysed below:

- a) **Education policy:** on the provision of material at all levels of the education system; inculcating in students the reading habit, and the habit of independent, compulsive search for information for problem solving; education and training at all levels for information workers. An example of a positive interfacing relationship is the reduction by the Kenyan Government of the duty on book imports.
- b) **Science and technology policy:** on the application of information technology, library, information and documentation services in science and technology research, popularization of science, scientific publishing, and so on.
- c) **Public and State security policy:** on confidentiality, individual and national security, individual privacy rights and protection.
- d) **National labour and employment policy** is related to education policy. The nature of the former has a direct bearing on the calibre of labour force available. Thus, manpower elements of NIP could be in congruity or at variance with the country's higher education and/or labour policies at large.
- e) **General legal system:** The laws of a country provide legitimacy for a NIP and support for its programmes. As demonstrated by several seminar papers [5,8,9,10,15,18,21,24,33]; there also exist various legal instruments such as copyright, deposit laws, laws on publishing, etc., which have a direct bearing on the operation and viability of information services.
- f) **Overall economic policy:** A NIP must show keen awareness of national development in its programmes. Hence, for example, the need for sequencing and prioritizing the development of information to coincide with declared national priority areas of development in the provision of information systems and services in the context of scarce resources [15,39].
- g) **Taxation policy:** The information/informatics industry is import-oriented. Imported materials and equipment including books, computers and other informatics products are liable to taxation just like any other imported commodities in any sector of the economy. The heavy import levies on such items in the information sector are well known constraints on the sector's development, and are discussed in practically all the country papers. A NIP should be aware of this and establish the necessary rapport with the particular authorities that might evince sympathy or special consideration, as in the Kenyan example cited above.

- h) **Communication policy:** Aspects of information transfer rely for success on a sound national communications system. National inter-library loans and associated document delivery systems require an efficient and comparatively cheap postal system to function efficiently, and book mobiles that provide reading material to outreach areas without libraries require good roads. The problem of high cost of communication services such as telecommunications, postal and computer systems that link up international data bases is one that managers of information systems have to contend with.

The above list of policy areas with which a national information policy is likely to interface is by no means exhaustive, but the point is clear: no NIP can succeed if it ignores the implications of other policies on it, and vice versa.

c) The African Experience

There is no full blown comprehensive national information policy in sub-Saharan Africa. The situation at present is a state of flux in which a number of countries have reached various stages in the policy formulation exercise, while others are still seriously discussing taking the plunge. They have all largely come up against the issues discussed under 'scope'. A major problem here is the conventional interpretation or conception of the scope of NIP which is determined by existing definitions of information. As noted already, the seminar participants were almost unanimous in their acceptance of the broader view of information, although, as noted earlier, conventional thinking, on-going NIP activities and references in the literature restrict information policy to institutions that deal with documentary information.

Draft policy efforts of Botswana, Malawi, Uganda, Zambia and Zimbabwe are all library oriented. And this manifests parameters such as the composition of Drafting Committees, information institutions and some policy instruments. For example, the objectives of the 1987 policy seminar in Malawi has been stated as directed towards libraries, documentation and information services [24,30]. Botswana made the deliberate choice of a narrower view in order to concentrate on the development of its library and allied services. Thus, the Report on co-ordinating information services argues:

a heavy stress on libraries thus implies attaching a preponderant importance to the media of printed information... it means, conversely neglecting or at least de-emphasizing non-print information and operation such as the generation and use of knowledge... The July seminar

opted in the short-term, for the narrower definition of information and wanted the proposed council to concentrate on the improvement of library and information services and... at a later stage... the council could expand its operation to include other fields of public knowledge and numerical data...[27].

The memorandum on National Information Policy for Zambia presented to Government by the Zambia Library Association (ZLA) "on behalf of the information profession" requests, among other things, the co-ordination and institutionalization of the various information centres in the country which consist only of libraries and related print-based institutions. This is illustrated by the following extract from the document in which the ZLA aims:

to institutionalise and co-ordinate various information services currently being provided by national institutions such as the University of Zambia Library (National reference activities), National Archives of Zambia (Legal deposit and production of a national bibliography), Zambia Library Service (National lending activities) and NCSR Information and Documentation Centre (Science and Technology focal point) [36].

The literature review [18] mentions Uganda's draft policy which is also unequivocal in its orientation towards libraries, archives and documentation services. Thus, although integrated information policies and systems are their stated objectives, the restricted view of information of the above initiatives robs integration of its implied wide scope. There obviously exist disparate views on the scope of information, and the situation is not helped by the uncertainty as to whether certain types of information identified in definitions of Section A should be covered by a NIP.

This state of affairs led to a long discussion on the limits of information, and possible reasons for the restricted view were advanced, as already noted. It is closely connected with the issue of linkages. Experientially, the problem is the result of insufficient linkages between the different sectors and disciplines of information, even among the library-oriented sectors. All NIP drafts mention co-ordination as a desired result of policy which should be provided through a co-ordinating agency. Its absence is considered as a major weakness in the maximization of resources.

The situation is no better at the institutional level. Linkages with other policy areas are crucial for the success at all levels of the policy process. This is discussed in detail in Section D.b above. The problem here is manifested in the near-total absence of contact between information professionals and policy-makers, researchers and other user groups who are all designated as actors in the policy process. The literature is full of references to lack of contact, especially between information workers and bureaucrats [18]. The former

complain of bureaucrats' lack of appreciation of the importance of information as a problem solving tool; bureaucrats are not convinced that their information providers know what they are about; and observers of the scene think that information workers lack sufficient educational attainments comparable to those of the administrators they serve to enable them to establish a viable relationship based on mutual respect [12].

This state of affairs accounts for the fact that the 1986 Resolution of the Ministers Council of the Organization of African Unity (OAU) on the African Informatics Plan for Africa was not known by professionals until it was announced at the seminar. The need to establish a dynamic two-way link with the executive level is stressed, otherwise the policy efforts would get nowhere. It is felt that special efforts should be made to establish viable relationships with all those involved in the policy process. Some participants expressed the view that the policy process itself should bring about contact and sensitivity between the actors involved on the basis of mutual understanding.

The need for a long term solution is undisputed and this should be achieved partly through the introduction of information awareness in the school curriculum in the near future, the same way that consideration of this is being given in certain countries with regard to informatics. Meanwhile, through-thinking is recommended in the policy process. This implies the adoption of processes and procedures that would ensure that communication could be maintained with every level of government.

E. INSTRUMENTS OF INFORMATION POLICY

a) Instruments of National Information Policy and the African Experience

For effective implementation a national information policy must have, at the formulation stage, backing rules and regulations both at the national and sectoral levels that serve as an aid to its enforcement. "It is a prime necessity to formulate and implement appropriate regulatory, legislative and administrative procedures and measures conducive to the sustained growth of the national information system" [6]. These "procedures and measures" are in the form of laws, decrees, executive orders, standards, etc. Some are applicable at certain stages of the policy process while others are essential at all stages.

They are also described as what constitutes policy, and the availability and success of policy is measured in terms of how many of these instruments are in force, how effectively they are applied and with what degree of coherence. As noted below (Section E.b), the target countries already have some of these instruments in force for

regulating their information activities, therefore, one cannot speak of lack of information policies in absolute terms. However, the situation is undermined by the absence of coherence and national-level co-ordination in the application of existing instruments. Besides, the instruments in force tend to be limited in scope, and considerable action and changes are required for them to effectively address the problems and developmental challenges that information policies are expected to address. Some of those instruments commonly available to the policy process are discussed below.

Examples of legislation relating to information work are deposit laws, copyright and other printing laws, Acts which set up and regulate the activities of information institutions like libraries, archives and documentation centres, Broadcasting services, statistical departments, etc. They all have major weaknesses including (a) lack of comprehensiveness seen in the exclusion of vital material and areas of activity; (b) absence of clarity in the rules which often leads to misinterpretation and non-compliance and (c) lack of enforcement, to mention only the most obvious. Recent legislative efforts in Malawi [24], Swaziland, Zambia and Zimbabwe may lead to significant amendments and improvements [10].

The impact of budgetary legislation on information work in most African countries is direct and often debilitating. Most African information institutions suffer from indifferent funding and, with the possible exception of some North African countries [5] (especially Algeria and Tunisia), they also suffer from chronic shortages of funds.

Administrative rules, Regulations and Procedures become *de facto* policies in the absence of formal ones. These include customs duty, import rules, rules on personnel recruitment and placement, and rules telecommunications, etc. They have not been compiled to meet information needs specifically, therefore, they often prove restrictive, even punitive and hence counterproductive. The acquisition of information and information technology materials and equipment suffers from such import regulations whose restrictive approach seems designed to control rather than promote the development of information. Foreign exchange constraints seem to be the main deciding factor in this matter [15,25,32,39].

In Africa, institutions and their terms of reference also tend to become instruments of policy formulation, implementation as well as review. Examples are to be found in such fields as science and technology in general, forestry, tourism, population and desertification. Such institutions play an important role in development because they have the power of policy framework. Their specific though limited mandates tend to amount to policy, in the absence of formal ones. Their areas of weakness are in the overlap of mandates, lack of co-ordination, shortage of qualified manpower, equipment, funds, etc.

On the other hand there are hardly any umbrella institutions with co-ordinating powers over a wide range of information activities or organizations in any African country [10]. The problem of fragmentation of the information discipline into more or less isolated, independent entities is admitted and lamented by all.

The Library Associations (LAs) of African countries have acted as vital instruments of policy in so far as they have been flag bearers of national policies. Evidence in all target countries testifies to this, and other sectors of information recognize, even though grudgingly, the lead role played by the LAs in current information policy exercises in a number of countries of the sub-region [15,24,32]. For example, it was argued in some quarters at the seminar that this lead role is purely accidental, and that the type of information represented by the LAs is narrow in scope; that how seriously the Governments in those countries take the LAs would emerge from their (the Governments') responses to current policy drafts presented to them.

The LAs have responded with the rejoinder that they have attempted to draw some sectors of the information profession into participation in the on-going exercise but have invariably received a lukewarm or indifferent response. Such exchanges during the discussion sessions were a reflection of the serious absence of contact and co-ordination between the various sectors of the profession [40].

Plans, Programmes and Projects are manifestations of policy in practice. They are regarded as instruments of policy in that they lead to a systematic resolution of problems with tangible action, and secure resources required for policy execution. The inclusion of information plans in national development plans has been repeatedly recommended because they are recognized as prerequisites for improving information infrastructures and services. The most basic level of planning will be the project level where the objectives, inputs, outputs and budgetary implications will be spelt out in detail, within a specified time-frame [10].

Like legislation and plans, the form in which information policies are packaged by government is in itself an instrument of policy. Depending on various factors such as a policy's comprehensiveness and length, and the traditional methods employed by a Government, an information policy could be declared through several mediums such as Presidential decrees, executive orders, standards, etc. [6] or, through a "white paper", a government position paper which clearly and exhaustively spells out the intentions of government.

b) No Information Policy in Africa?

A negative response to this question may seem natural, but will not be absolutely true. Bassit's statement with regard to the situation in Arab North Africa also is true to a large extent of sub-Saharan Africa:

"With the above mentioned concept of a national information policy, and reviewing the available literature; evaluating the relationship between such a policy and national development goals; examining its implications regarding the introduction and use of new technologies (computers, telecommunications); assessing the existing co-ordinating mechanisms in the field of information, one can hardly say that at present there is any national information policy as such in this region. At the same time this does not imply that the region is void from such activities. Actually, as mentioned in earlier stages of this paper there are information services, some of them are even better off than many of their counterparts in industrially developed countries. Others have partial policies covering informatics. Some have already taken the necessary steps moving along the way. Still, the formulation of such a policy is needed for some others and procedures should be set up immediately for this purpose."

Evidence from the literature [18,39] and discussions at the seminar point towards active information pursuits in most of the target countries, although the levels of development and intensity of activity vary from country to country. The inputs from Botswana, Ethiopia, Kenya, Tanzania, Zambia and Zimbabwe endorse this observation. And there are also in force a number of instruments for the implementation of existing sectoral activities despite their recognized shortcomings (see Section E.a immediately above).

In its introductory paragraphs to Section A on National Information Policies, the Kenyan paper [15] admits to the absence of a comprehensive NIP in Kenya but notes that the country "does have several legislations, regulations and guidelines that influence information acquisition, accessibility and dissemination." It goes on to describe the various sectoral services such as libraries, archives, the media services, etc., and the instruments regulating their operations. All the other country papers make similar assertions. Malawi admits that the answer is an ambivalent "Yes" and "No". On the positive side it discusses the various institutions, activities and instruments in place, including the draft policy [24]. On the debit side it points to the absence of a full-blown comprehensive NIP. Its conclusions, quoted below, are a true summary of the situation:

"To the extent that individual legislative frameworks, supported by funding and staffing, exist in Malawi one could argue that information policies exist. These pieces of legislation have made it possible for institutions such as the National Library Service, the University, the Ministry of Agriculture, the Malawi Bureau of Standards and others to offer meaningful information services to their patrons. Malawi's present policy is therefore the sum total of policies of the various institutions who try to do something on their own, within the limits of the available parental support."

Botswana states that the country is still without "an articulate and deliberately formulated national policy on information and informatics" but is currently examining the need for a comprehensive one. In another paper [8], the existing structures, activities, institutions and instruments in force are enumerated and briefly discussed. Ethiopia and Tanzania follow the same pattern.

As noted above, these countries are all at varying levels of development as regards existing structures, etc., and the stage of on-going policy arrangements. Malawi, Zambia and Botswana have actually presented drafts to government for consideration though it should be noted again that Botswana has opted for a different approach - the creation of a co-ordinating agency which would deal with policy as such. Ethiopia and Zimbabwe have held policy seminars with UNESCO's assistance and the former has established a national information centre (although with a different orientation) - something that those countries that have reached the draft policy/co-ordinating agency state have not done, and Ethiopia is particularly weak where legislation relating to information is concerned [33]. At the same time it can claim some of the most extensive surveys of its resources conducted in an African country. Tanzania can boast of a large number of information services in various sectors of the economy but they operate separate "policies" that are unco-ordinated except within the Tanzania Library Service (TLS) [22]. Other policy initiatives [21] are expected to bear fruit in the not too distant future.

The situation regarding informatics is a little more bleak. The discipline is new and therefore infrastructures are not so firmly established. However, as in the traditional information sector, there are different levels of achievement in different countries. The literature review [39] notes that practically none of the target countries has an integrated informatics policy in place. Of all the countries covered, Mauritius has the most systematically documented informatics goals and priorities and has made the most considerable progress towards policy. A special commission on informatics was created among other things, to prepare the 1980 census.

Tanzania has had an interesting experience regarding the development of informatics [23,25]. As noted earlier, a crisis of confidence and relevance in the discipline in the 1970s caused by shortage of qualified manpower and aging equipment led to the imposition of a complete ban on the importation and use of informatics equipment (at least in government) and the return to manual systems. A reversal of this policy occurred in 1987 with increased understanding of the potential of these tools in development. This led to accelerated reorientation and re-establishment of informatics institutions through high level conferences (1987). A high powered Task Force has been formed to consider what government action is required to ensure appropriate progress in the development of informatics.

Zimbabwe, which has been described as over-computerized, does claim a sophisticated level of computer awareness but has no informatics policy, though infrastructure development does not face the type of constraints that are evident in other countries. This is probably due to the fact that the local computer society is involved in a more disciplined manner, and has gone to the extent to provide a code of conduct for the profession with government approval [40].

The Arab countries of North Africa present extremes of development. At the bottom of the scale are countries like the Sudan and Mauritania with very basic infrastructures in the library- oriented sector, with prospects that offer scant hope of accelerated development in the future. At the other extreme are countries like Egypt and Algeria with existing prospects and high expectations of future development [6].

The most encouraging case is that of Algeria where a comprehensive programme of information/informatics policy has been established, based on five-year plans dovetailed into national development plans. An informatics authority - the Commissariat National de l'Informatique (CNI) - has been established since 1962 as a special body for promoting the formulation of information/informatics policy, and supervising its implementation and co-ordination. Areas of progress and development include the establishment of a multi-function medical informatics industry, the establishment of an assembly plant for minicomputers and training courses, all in the context of national five-year plans which ensure systematic (and generous) allocation of funds [6].

Egypt also has a sophisticated system and "has executed high level of preparedness." It has established a national information system - the Egyptian National Scientific and Technical Information Network (ENSTINET) for the promotion of the development of STI. The project, begun in 1980, is a co-operative effort between the Academy of Scientific Research and Technology (ASRT), the Egyptian lead organization on the one hand, and the Georgia Institute of Technology, its American counterpart on the other. It has also presented a draft information/informatics policy to government for consideration. There

are plans to establish a National Informatics Centre to provide technical assistance and consultancy, computer software and research facilities [6].

The above demonstrates that the answer to the question posed by this sub-section cannot be unequivocal. Perhaps the observation made by one of the participants is not cynical, all things considered. The absence of policy may well be considered the only consistent "policy".

F. THE INFORMATION POLICY PROCESS AND ITS KEY ACTORS

a) Policy Goals/Objectives

Steps involved in the policy process include:

- (a) goal setting,
- (b) problem identification,
- (c) policy development,
- (d) policy implementation, and
- (e) policy review.

The limited nature of the African experience in the policy process and the fact that the few attempts are yet to be ratified by the respective governments suggest that only the first three steps, i.e., goal- setting; problem identification and policy development have received attention in the existing literature and were discussed at the seminar. There is need, however, to also discuss the last two steps: implementation and review, in order to provide direction so that the known pitfalls may be avoided and guidelines followed when those stages are reached.

Information Policy formulation or development requires planning boards at every level of the process. The board provides NIP for the country in the same way as Research Councils provide national research policy. Membership should comprise all major users of information and those already involved in information work.

At the planning level, where policy proposals are formulated, the board should usually consist of high government authorities from the various ministries, universities, research establishments, the information industry and from the user sector. They set the goals, respond to suggestions, harmonize conflicting view-points and anticipate the effects of complex interactions.

With regard to these actors involved in the policy process, the general view is that their identities and roles are confused. We talk of professionals, policy-makers and users, but these definitions are interchangeable. Users can be policy-makers and vice versa. Professionals can also be policy-makers and users. Everybody is indeed an actor in the policy process in so far as we are all involved in

development. The issue is more one of levels of involvement rather than specific roles as such in the policy continuum. All the levels involve a mixture of these different categories of people, more of one at a particular level than others, depending on the nature of activities associated with that level.

The dimensions of policy objectives are closely associated with the scope of policies. In other words, the broader the scope of a policy the more comprehensive the policy goals get and vice versa. The advantages (and disadvantages) of a broad-based information policy have been discussed already in Section D.b above.

The few examples of African efforts at policy formulation - those of Malawi, Zambia and Botswana - define information policy goals to include:

- i. encouraging the generation, collection and utilization of published and unpublished materials;
- ii. ensuring support for infrastructure (e.g., telecommunications), facilities, technology and manpower;
- iii. encouraging access to and utilization of information in all forms (bibliographic, statistical, referral, etc.);
- iv. establishment of a national information and documentation system.

These goals are comprehensive enough to embrace all major information functions [10].

b) Policy Formulation and Key Actors

The formulation stage of the policy development process includes translating the goals and objectives into feasible plans, programmes and projects. Before this can be done, a great deal of information - factual, statistical and descriptive - needs to be assembled on such parameters as finance, manpower and other infrastructural inputs since effective planning cannot be done without the required data, despite the African propensity towards this phenomenon. In other words, there is the necessary first step of problem identification which ideally involves the preparation of detailed analytical surveys on national information needs, infrastructure and services, using systems analysis methodologies. This is described in the Egyptian experience as the

systems analysis phase [6]. A number of country papers give a detailed account of the policy formulation process in their respective countries in which the need for accurate and relevant data is emphasized [5,6,8,20,30,37] and hence the need to assemble such data.

Available information on the African experience in this respect suggests that this did not happen, at least not to the desired extent, in the cases of the above-mentioned efforts at policy formulation. Based on the narrow definition of information discussed already, papers of uneven coverage have examined the needs and availability of sectoral library and documentation services and have served as the basis for policy development. Yet professionals have made numerous recommendations for quantitative surveys to be undertaken. It is suggested that the reason why they did not use this methodology may have been due to shortage of time and resources available to them [10].

Surveys of the nature suggested above should indicate that every stage of the policy process requires the close co-operation of departments, institutions and individuals to bring it to a successful conclusion and realization. Information policy formulation or development should therefore involve all the major users of information and those who are already involved in information work. The former group includes bureaucrats, researchers, academics, industrialists, etc. Professionals/information workers comprise, on the basis of the seminar definition of information, statistical and computer personnel, librarians, documentalists, archivists, workers in the media, and in all other fields within the information discipline. Both groups form a broad, multi-disciplinary force whose experience should be harnessed into producing a relevant policy that addresses the needs of all.

In the countries where attempts have been made at policy formulation, however, the main actors have been the library community through the local library associations (LAs). In Kenya, the on-going discussions on policy were initiated by the Kenya Library Association (KLA) [15]. "The Zambia Library Association has been responsible for the elaboration of a NIP in Zambia since 1982" [19]. It is interesting to note, however, that, despite the emphasis on library-related activities and institutions in the policy exercise, membership of the Malawi "drafting seminar" comprised a multi-disciplinary group of experts [30].

As much as possible, attempts were made to include other professional groups, with mixed success. The Botswana group that produced the report on the co-ordination of information services was relatively diverse in composition, comprising librarians, researchers, academics, data processing experts and bureaucrats, and reflect the institutions that have been listed in the country paper as principal actors in the policy process [8,27]. In Zimbabwe, the local LA was the main force behind the promulgation of the National Library and Documentation Service (NLDS), although to a lesser degree, other professional groups participated [9].

c) Policy Implementation and Key Actors

The implementation stage of the policy process involves translating the policy objectives into more specific, problem-oriented, policy statements with an indication of the nature of actions to be taken and the policy instruments to be applied [10]. In simpler terms, this is the stage at which the sub-plans, projects and programmes articulated on the master plan are executed with the above-mentioned guidelines. These policy-statements or plans are based on the outcome of the analyses of data from feasibility studies that, as noted above, should be undertaken at the initial stages of the policy process.

A weakness of the few NIP drafting exercises is that, in spite of the broad policy objectives, the elements, instruments and strategies for implementation deal with library and documentation services only. It is stated categorically in the Zambian presentation that information workers "are the ones who will have the task of implementing the [national information] policy once it is eventually promulgated ..." [19]. However, the author of this document views information professionals in his country as a major obstacle to change and therefore a threat to the success of the implementation exercise.

That information professionals and institutions are the major actors at this stage has expert support. In agreeing with this however, J.P. Polinière's "professionals and institutions in charge of everyday action" are a broad-based group which is assisted in implementing projects by means of the instruments identified above. As has been demonstrated already, however, existing instruments for the implementation process are inadequate, restrictive or ineffectively applied.

External donors are another group of actors at the implementation stage. This stage requires considerable inputs of funds, equipment and qualified manpower. Some of these could be supplied in the form of technical assistance. All country presentations recognize this need but caution against the dependence syndrome which can jeopardize the bid for national self-reliance. External assistance agencies like UNESCO, IDRC, DSE, the Commonwealth Secretariat, to name a few, have been with us for a considerable time. There is a feeling that there has been too much hand-holding already even where this has not been necessary [32]. However, there also is agreement that in spite of this, the assistance and services of foreign donors will continue to be needed. Each country should be left to determine the areas of need and how much aid is required, while keeping a judicious balance between dependency and self sufficiency.

d) Policy Review and Key Actors

The policy process should make provision for the review of existing and newly created institutions and services and the instruments of policy implementation, both new and old, with the intention of revising, endorsing or expanding them. The review exercise is necessitated by the kaleidoscopic changes in the information sector brought about by the rapid advance and the resultant rapid obsolescence rate of IT, and its all-pervasive impact on society. These have created the need to look back and assess whether directions are right, and if they are not, whether change is necessary or whether methods of goal achievement should be improved. Information audits are considered necessary to identify gaps [8].

The key actors here include (a) policy-makers in Government through a co-ordinating board; (b) special interest groups such as subject specialists in STI or an agricultural information service, and (c) Information professionals. For the last-named group, this would also provide an opportunity for self criticism, to find out whether they are doing what they are supposed to do, and whether they are doing it well. In this connection professional associations, including LAs and computer societies, as agents of change and pressure groups, should be involved in increasing awareness and prioritizing the need for NIP, and expectations from it.

The role of user groups in the review exercise is important, because, as target of the services under review, they are in a better position than any other group of actors to contribute towards performance assessment. External assistance agencies may again provide expertise in areas where this is not available locally. The same type of caution as given under implementation is relevant.

G. INFORMATION POLICY ISSUES

a) Centralization and Co-ordination

Central to the crisis of access to development information in Africa by those who need it is fragmentation of existing information services and institutions. Responsibility for libraries, archives and documentation centres and services are spread among several authorities with little or no co-ordination at any level, authorities which tend to compete rather than cooperate with each other. This situation is known to exist in all target countries and was the subject of considerable debate at the seminar. The individual country papers highlight the problem and the literature is full of references to it.

This problem exists at all levels - national, sectoral, institutional and personal. Speaking of the Arab North African countries, BASSIT laments that "the majority [of those institutions] exist, and act completely independently, with no or very little co-operation, harmonization or coherence of action" [6]. Tanzania's experience suggests that the sectoral approach to the development of information has led to the tendency towards self sufficiency (though hardly attainable anywhere) at sectoral and institutional levels [21]. At the personal level, the empire building tendencies of information managers, another dimension of the same problem, is well known. As a result of the above, separate policies exist aimed at satisfying specific institutional and client interests, with little inclination to share available resources.

A similar situation exists in the informatics sector where the literature review notes that practically all countries studied have sectoral informatics policies dealing with one or more issues relating to the sector [39]. This observation is supported by the country presentations on informatics.

At the administrative level, information and informatics institutions are scattered under various authorities which seem to have little to do with one another. It has been noted already that in Tanzania, sectors related to information/informatics are under as many as six ministries and government departments [21,25]. The trend is similar in all the target countries. This absence of co-ordination results in wastage of resources, the presence of gaps in the provision of information and indeed the general inability to meet the demand for information of any named group of users.

Co-ordination cannot be achieved because there are no formal mechanisms for bringing this about, although its desirability is unquestioned. It is in fact considered by all countries (and aid organizations too) as the most effective means of maximizing existing meagre resources at all levels of operation. It is also recognized that a central authority is needed to do this; one established by government, with legal authority behind it to ensure its effectiveness. Such an authority is envisaged as an integral part of the NIP apparatus [35].

Although a central co-ordinating mechanism is considered crucial to the solution of the problems of information availability in Africa, centralized control of information activities does not seem to be acceptable to information practitioners. This view has been strongly expressed in relation to the powers envisaged for the proposed central co-ordinating agencies in the current information policy debate. Most countries prefer that such a body should not have any powers of control but that its role should be merely advisory and "facilitating" in relation to members of the national information networks that NIPs are expected to establish. Thus, Botswana has indicated preference for an agency with "facilitating" powers - a body that will largely advise on, encourage and co-ordinate information activities in the country [27].

The thinking in Tanzania is similar [21]. The Zambian and Malawian drafts also make recommendations along those lines [30,37]. It is interesting to note that although centralisation is rejected at the level of co-ordination, it is encouraged, in fact welcomed at the operational level. This view is supported by various recommendations to establish national documentation centres.

A certain degree of centralization is noted in government operations especially in the informatics sector [25,39]. But this relates mainly to the area of decision-making in the acquisition of IT equipment, largely dictated by foreign exchange constraints. Even this trend is seen as unhealthy because it is considered to be at variance with the development of information technology. The above opinion suggests that in view of the inefficiency of existing data processing (DP) departments, it is advisable that decision-making and authority are more decentralized but properly co-ordinated.

b) Critical Information Policy Success Factors

From goal setting to review, certain factors are recognized as crucial to the success of information policy. The following constitute some of the most critical:

i. A thorough appraisal of fundamental information problems.

One of the reasons why policies in general fail is lack of a clear definition of the problems and goals that are expected to be addressed. It is observed that policy attempts in the field of information have been haphazard and characterized by superficial definition and appraisal of problems, with very few empirical surveys of the problems involved, such as manpower shortages and inadequate training facilities available to meet these; identification of users and their information requirements; attitudes towards information, especially at the policy-making level, and so on. Such an in-depth enquiry provides information which assists policy-makers to decide on precise action.

The literature suggests very little of such activity, therefore, the national information needs that policies are supposed to address tend to be based on estimates and hunches. Botswana, Zambia and Malawi claim to have based their policy drafts on surveys, but their empirical bases cannot be vouchsafed. Two main surveys conducted in the region are associated with international organizations. They comprise (i) the UNESCO-led feasibility study in 1983 of the information infrastructures of the countries of the Southern African sub-region to determine their readiness or otherwise for the Southern African Documentation and Information System (SADIS); (ii) the PADIS Study Team of 1979 which made a similar survey with similar objectives as a prelude to the establishment of PADIS. Among the countries of the sub-region, Ethiopia is the only one which has conducted a comprehensive survey of the information facilities and sources in the country. These

activities are recorded in the literature review [18]. An important lesson from the Egyptian experience gained in the course of the establishment of the national information system - ENSTINET - derives from the very scientific manner in which the steps in the NIP formulation process were followed on the basis of systems analysis [6].

ii. Clearly defined objectives.

It is generally accepted that the clearer the objectives that policy is expected to achieve the easier it is to work towards those targets, and the more likely it is to achieve success. This issue is closely related to the scope of policy. Most policy attempts aim at comprehensive, multi-sectoral policy, on the basis of what they have defined as policy goals (see Section F.a above). The objective is to tackle all sectoral policies at the same time. It is suggested, however, that although a broad, comprehensive policy has its advantages, a focused sectoral orientation in support of the prevailing national development priorities stands a greater chance of success [10]. This view is endorsed by the Australian experience cited already, and expressed as "joining the bandwagon of development priorities". The author uses it not appositely, but to question the need for policy [14]. It has been observed, though, that even in the absence of a policy, the application of informatics will experience success if it coincides with priority areas. Examples are cited from Zimbabwe [39].

In Mauritius, informatics goals and priorities have been made to coincide with areas of government priority development such as Tourism and the Sugar industry. Kenya has also proposed the establishment as priority sectors agriculture, industry, health and planning on which to focus information development to ensure success [15].

iii. Awareness of the importance of information in socio-economic development.

Much has been written and said on this topic in relation to African bureaucrats. The criticism is mainly from information professionals. Thus, all the country papers at the seminar have reiterated it as a stumbling block to the development of information.

The need to sensitize this group of users is stressed and rests on the fact that as they promote policy formulation and provide funds, they can block the progress of policy if they are not convinced of its relevance. The onus lies on the information profession to change this state of affairs. Self criticism by the profession is advised as a healthy exercise but it has proved more difficult to engage in this, and easier to apportion blame.

iv. Coherence within subsectoral information policies and between information policies and other national policies.

Although there are no comprehensive information policies in any country in Sub-Saharan Africa, sectoral policies already exist in practically all these countries. What is lacking among them is coherence. The situation manifests itself as isolationism, lack of co-ordination, and lack of cooperation, all of which militate against performance. At the national level, information policy, like any other policy, has to interface with many other national policy areas. Recognition of the need for and the level of success of this interface determines policy success. These issues have been discussed under Section D.b above.

v. Efficient system of implementation and follow up.

This is important to policy success and depends on several factors among which is the need to have in place an efficient system of enforcement. Some of the various instruments available for enforcing policy have been described under Section E.a above. There are many in force for regulating the largely sectoral activities of individual information services. The problem is that they are either not enforced, or that enforcement is ineffective. Another relevant agent of enforcement is trained and qualified manpower which is keenly alive to its responsibilities generally, and which is particularly aware of the fact that it carries on its shoulders the responsibility of being the major implementor of policy. Severe manpower problems threaten the effectiveness of professionals as agents of enforcement. The manpower problem is analysed in detail immediately below (Section G.c).

vi. Continuous feedback and review.

These are necessary exercises during and after implementation, as has been observed above (Section F.d). Monitoring, or evaluating during implementation ensures consistency between the objectives and what is actually happening. It is important to check regularly to see whether targeted goals are being achieved. Assessment after implementation or ex post assessment determines, among others, what goals were actually realised in comparison with the set objectives. Though there are no full blown information policies yet in the region, existing sectoral and institutional services require such a spotlight. This should be done through proper evaluative mechanisms-definite systems of performance review and user surveys. There is insufficient evidence that these are being done, as noted already (Section F.b).

c) Human Resources Development

A critical constraint on various development efforts in African countries is the low level of development of their human resources. From the point of view of information, these include not only the workforce but also the user community. Not only are information workers deficient in most of the requisite information skills, but also the various groups of users they serve lack the training and habit to use purposefully the available information. This twin problem was brought into sharp focus at the seminar.

The lack of adequately trained and qualified information workforce is considered by one country paper as the greatest weakness within the information services [21]. This view is endorsed by the UNISIST Guidelines [35]. The weakness is related to the nature of existing training facilities and their responses to the manpower problems which manifest themselves in the following ways:

- i. Africa-based training opportunities are limited;
- ii. those available are oriented towards the traditional information services and institutions;
- iii. there are no retraining facilities for both professional and non-professional personnel [10].

The existing workforce is almost entirely trained to staff libraries, archives, and documentation services only. Even in this sector the ratio of professionals to non-professional staff is skewed badly in favour of the latter in most of the participant countries. This conclusion is supported by the findings of a recent survey of training institutions in the sub-region which points to a growing trend to over-produce non-graduate diploma holders many of whom fill professional positions and perform tasks which their training and skills do not equip them to perform efficiently [26].

In Tanzania, for example, holders of the two-year diploma in librarianship are considered "professional" in non-academic libraries [21]. Worse still, their conceptualization of their role as caretakers, and their junior status in the bureaucratic and decision-making hierarchy, give a poor image of the role of information in planning and development, and deprive the profession of the strong lobby of confident professionals that can argue its case.

There is concern that the information profession in Africa should not be limited to the training merely of librarians and archivists, but that it should also concern itself with equipping them with management skills and strengthening their leadership capacity so that they can play a political role in defence of policy [10]. To achieve this, their educational attainment should be made comparable to those of the administrative and technical, research and academic personnel for whom

they provide information services; and their status and remuneration should equally be elevated. This calls for a reorientation of existing training institutions or the establishment of new ones that can meet the urgent demands of the emerging information systems and technologies for specialist, "all purpose", information managers [13].

In the IT sector, the picture is equally, if not more dismal. Practically all the target countries of the literature review report acute shortages of trained manpower at all levels [39], with the single exception of Zimbabwe which is self-sufficient in computer maintenance engineers [40].

There are slight differences in the seriousness of the situation. Lower down the scale are countries like Malawi where qualified personnel is scarce both in government and the private sector, and which reports the shortage of people with the requisite computer knowledge to undertake simple computer installation and maintenance [24]. Tanzania, where some active effort has been made to address all aspects of the IT problem, also reports similar shortages in government and the private sector, adding that the proliferation of IT equipment is hardly matched by qualified manpower [25].

There is an acute shortage of training facilities for all levels of informatics professional in most of the countries. Tanzania reports proliferation of short and long-term courses in the private sector since 1985 [23], but all at the elementary level. These, however, are unco-ordinated and there is little government control over the curricula, examinations and certification in these institutions. The situation jeopardizes the employment prospects of students for whom no employment opportunities are assured. The long-term, disastrous consequences of this situation has been stressed. In Malawi, the University of Malawi is the only institution which provides "formal" but composite training in informatics vis-a-vis a growth rate of 10-12% per annum of informatics equipment, an obviously inadequate provision to meet this high growth rate. The government data processing department provides courses in computer awareness and in-service training for civil servants. The Computer Society of Malawi, described as "young, weak and not very effective", provides short courses and seminars [24].

In Botswana, the education and training of IT personnel is in the hands of a number of institutions including the University of Botswana, but no degree courses are offered [8]. The government obtains training for its personnel by means of a co-operative arrangement with South Africa which requires sending personnel to that country for training. The arrangement is considered unsatisfactory [16]. Educational institutions have had no significant impact in Zambia, although as far back as the early 1970's, an institute of technology offered courses at certificate level. This was discontinued. Of late, a college offers two to three years computer studies with the assistance of a donor agency. The country's computer professionals and computer society were actively involved in the curriculum design [32]. Zimbabwe again offers

a more attractive picture. Computer education is available at the university level, and the Government has plans to introduce computer studies in schools. Polytechnics also offer small, part-time courses. The lead position of the computer society here is seen in its provision of a professional code of conduct for training institutions [40].

Co-operation is considered necessary in the provision of training facilities for the information profession in the African region generally. PADIS is seen as representing the symbol of such co-operation. The assistance of external organizations in this regard will continue to be relevant, and the current arrangement to set up a School of Information Science for Africa (SISA) in Addis Ababa University with the assistance of IDRC and other donors has been noted with appreciation.

As observed above, human resources development does not relate only to the training of information personnel who provide information; it should also include the education of actual and potential users to enable them to make effective use of the information available [16]. That this is lacking is seen as a demand constraint the root causes of which may not be straight-forward illiteracy. They are also attributed to the fact that the reading habit and the impulse to use information are not developed, even in institutions of higher learning [10]. There is less training in individual problem-solving and in the use of various information resources. Increased user awareness through surveys and a user training drive is seen as the only solution. It seems that capacity utilization in Africa's information services has proved a more intractable problem than capacity building.

d) Role of Information Technologies in African Development

It is now widely accepted that ITs have an important role to play in the socio-economic development of African countries. For one, there is general recognition that effective information processing is a sine qua non for more cost effective management [39]. Practically all African countries have embraced the IT revolution because of its potential for development and as a powerful agent for technological and social change. This is already beginning to manifest itself in the ways in which governments and companies work in a number of African countries.

In spite of, or maybe because of this great potential, there is cause for concern that most countries of the region have not yet demonstrated the sound ability to effectively harness this technology for full integrated development (see Section C.c: Planning). There is an obvious absence of clear conception of how this integration should be affected. Thus, the advances in IT present both an opportunity and a threat to developing countries, especially, in Africa.

A two-fold threat is recognized. Firstly, as beginners or late-comers in the IT revolution, developing countries are in no position to compete with their technologically developed counterparts in the international market place. Secondly, participation in the IT revolution by developing countries represents a major technological leap and a force of major social change. Both processes need to be controlled so that they do not get out of hand [10]. The application of the new technology is characterized by a new information culture dominated by computers in all areas of human endeavour. This has given rise to new demands which African countries must meet, whether they like it or not, especially in order to relate to the developed world.

The main problems that inhibit effective application have been discussed in detail by ZWANGOBANI [38] in his contributory paper to the IDRC African Strategy Seminar of 1987. They are presented here only in main headings as lack of funds, especially foreign currency; shortage of skilled personnel; inadequate training facilities; inadequate and inefficient telecommunication services; lack of professional bodies or societies; inadequate industrial base; and lack of political direction. These problems need to be addressed urgently and quickly if African countries are to reap the full benefits of the new technologies.

The levels of IT applications in African countries are measured against a number of existing classifications. UNESCO, for example, recognizes four levels, categorized as initial, basic, operational, and advanced. These correspond roughly to the three-phase classification presented in the Zimbabwean and Tanzanian country papers on informatics policies respectively as Phases I, II and III [40]; and as Operational, Tactical and Strategic Planning [25] Levels. The Commonwealth Secretariat report also identifies five levels which include (a) data and transaction processing systems; (b) operational and management control systems; (c) sectoral information systems; (d) multi-sectoral information systems, and (e) planning and policy systems [16].

Most countries of the region hardly rise above the basic - the second of UNESCO's four levels. The average is estimated to fall somewhere between the basic and the operational [39] which would be close to Phase II or the Tactical Level, according to the Zimbabwe and Tanzania classifications. The largest level of applications is commercial data processing such as payroll, accounting, invoicing etc., described as "bread and butter applications" [39]. These graduate (but in inverse proportion) into management information applications such as, planning, project control, modelling, simulation, etc.

Experiences in the various country presentations on informatics also support the above observation. In Tanzania, for example, applications are largely commercial and generate a lot of information for operational staff. Management information applications such as census data, hydrological surveys, statistics, etc., which have significant influence on decision-making, are hardly touched. While

some information is achieved for the Tactical level, (Level II) there is almost no service at the top management or Strategic Planning Level of management (Level III) and therefore little impact on decision-making [25]. Mauritius is the only country in the sub-region which tries to apply computer technology in national development through judicious prioritization of sectors to computerize [39].

The pattern in Zambia is similar to that in Tanzania. Most installations are the usual commercial type, but notable tactical level applications include the mining corporations computerized vehicle movement control system at the large open pit division, the primary school examination, the electoral roll and the budget control systems in government [32]. In Zimbabwe where the Government is the largest user of informatics products, and where computerization has developed at a much faster pace, applications are reported to be at Phases I and II, especially at Phase II of the country's 3-phase categorization.

The Commonwealth Secretariat report also finds the commercial mode of application as the most predominant category of application in English-speaking African countries (which were the target of its survey), and as one of the first applications to be computerized [16]. This report provides a rather more comprehensive, in-depth survey of the status of IT in those countries. Thus, it also records an increasing variety of applications even up to management/policy levels, though the latter category is fewer.

The report provides information on a number of major areas of computer applications that are perceived to have a high national development impact, and which have been operational for some time. For countries of the East and Southern African sub-region, these include, beginning with data and transaction systems, the Malawi Foreign Trade Statistics Information System, Zambia's Grade VII Examinations System cited earlier, Botswana's system for marriages, births and deaths and Zimbabwe's Voters Registration system. Operational and management control systems include, among others, the Mauritius Sales Tax system, Botswana's Fuel Control System and the Kenya Wagon Control System.

A variety of impacts are shown as resulting from these and other IT applications in governments of the sub-region. A summary of these impacts is given in Table I. Data transaction processing systems have had significant impacts. Examples include the Tanzania Household Budget Survey System and Botswana's Continuous Household Income and Production Survey System which facilitate the production of more accurate statistics as well as generating information that government agencies can use to formulate sectoral policies. Malawi's Foreign Trade Statistics system permit interdepartmental co-ordination, in addition to the production of timely statistics and monitoring of the status of external trade. The Zambia Grade VII Examination System and the Botswana Primary School Leaving Examination System permit faster processing of examinations, centralisation of examination marking and streamlining the selection of secondary school candidates. More significantly, these systems enable examination marking and selection

of candidates to be done on fair and impartial basis. And the Zimbabwe Voters Registration System represents not only an efficient record keeping systems, it also reduces the incidence of multiple registration for voting.

National level Operational and Management control systems streamline operations and management activities, resulting in cost-savings, improved revenue generation and efficient resource utilization. Thus, the Mauritius Sales Tax System improves revenue collection to the tune of some US\$20 million per annum, and Botswana's Income Tax Collection system which centralizes the collection of income tax and payment of rebates for the whole country ensures an efficient process.

Organisational-level systems such as the Botswana Fuel Control System of the Central Transport Organisation (CTO) and the Kenya Wagon Control System of Kenya Railways streamline operations and enable management to reduce operating costs and increase capacity utilization.

The areas of impact relate also to types of infrastructure support, and to what extent these are operational in a given country. Besides computers, these include among others, telecommunications and electricity. IT in the mass media and telecommunications sector is dominated by developments in the last-named sector. Most countries have seen a high level of influence and innovative development in this sector, a fact that has led to its assumption of the role of a standard setting sub-sector in the informatics sector. Kenya [15] has experienced the most tremendous studies in the application of IT in this field. This is reflected in its advanced telephone and satellite communication systems. Yet most libraries and documentation centres are not computerized except those established by international/external organizations.

Tanzania [25] also has a reasonably comprehensive telecommunications network serving national, regional and international needs, but the facilities are underutilized and their development potential unrealized. Teleprocessing is only utilized by Air Tanzania Corporation (ATC) for passenger reservation and ticketing, although other institutions are said to be planning similar facilities. The telecommunications sector in Malawi also dominates the support sector, but available evidence suggests that innovation here tends to have a rather negative effect on existing services, even though the long-term advantageous effects are recognized [24]. The main reason is finance. The new facsimile service has adversely affected telex service sales: it is cheaper for the user but brings in less revenue to the Department than telex sales. Therefore the Department is hesitant in using it. Government intervention is recommended to ensure user orientation and less emphasis on company profits, so long as a new system is cost effective. The Department continues to monitor the country's needs, nonetheless, and imports new equipment. Data communication facilities have been installed but are weak at the moment and therefore not considered helpful in transmitting data in the

country. Satellite communication is also being developed: remote sensing facilities are available for weather forecasting in the Meteorology Department and the Land Husbandry Branch of the Ministry of Agriculture.

The trend in Zimbabwe also reflects the dominance of the telecommunications sector. The latter exercises control over its models, and has established a standard of excellence in innovative development. Permission is required before any communication devices can be installed onto their communication network, and these should conform strictly to their performance standards [40].

The above is ample evidence of the increase in the application and the beneficial impacts of ITs on countries of the East and Southern African sub-region. It has been noted above that certain problems inhibit the realization and utilization of the full potential of these technologies. There is no doubt, however, that their importance as the gateway to economic development in this information age is recognized.

A major conclusion is the need for national-level planning co-ordination in IT development [16]. Some forms of mechanism for co-ordination do exist already in most of these countries. For example, Botswana has a Computer Steering Committee in the Ministry of Finance; the Cabinet Office of Zambia houses the Computer Utilization Committee (CUC); Malawi's Data Processing Department (DPD) is located in the country's Ministry of Finance. However, their co-ordination functions are limited largely to decision-making regarding the acquisition of computer hardware. The need to relax the tendency towards control in the interest of promotion in the utilization of the potentials of existing equipment and systems has been expressed.

H. CONCLUSIONS AND RECOMMENDATIONS

Thorough discussions that followed the presentation of the various country and commissioned reports resulted in specific conclusions and recommendations on two main themes: (a) Information policy and the parametric factors and instruments necessary for its success in all stages of the formulation process, and (b) Major actors in the information policy process and their roles.

a) Information Policy

i. Definition for Information and Informatics

Information is a broad, inter-disciplinary sector. However, there is no common definition for it. This is confirmed by the disparate nature of existing definitions. They are lacking in comprehensiveness, being largely oriented towards documentary information. Besides, there

is lack of agreement among information professionals on the limits of information. However, in order to establish the domain of information in the context of the seminar, a practical, development-oriented definition was considered necessary. Such a definition and one which encompasses the various sectors, institutions and their activities has been adopted and is recommended as cited above (SECTION B.b in the text).

As regards informatics the term omits reference to certain pertinent technologies. In the context of policy, the term information technologies was considered preferable. The seminar opted to focus its discussions on all information technologies. It was recommended that information technologies should be defined as "the application of modern, new tools and techniques to the acquisition, processing (including storage, repackaging and dissemination) of information".

On the relationship between information and information technologies, the conclusion is that there is a natural unity between the two terms which is reflected in the ever-increasing integration of ITs in most areas of national life including telecommunications, computers, publishing, resources inventory, early warning systems, etc. One of the main reasons for an information policy is that information technology is advancing so fast that, as noted already, it has raised certain issues and problems that need urgent attention.

ii. Scope of Policies

National information policies could be broad or narrow in scope. However, Governments could derive major advantages from setting broad policy objectives that will accommodate the varied national information activities and institutions. This may be difficult to achieve in the short term due to the large number of interests and other issues involved. Another option for Governments is to develop partial policies for subsectors within the information sector. There is a third alternative for Governments which may choose the second approach, i.e., they can develop information policies for particular priority sectors of their economy, such as agriculture. Information priorities in African countries may vary but the establishment of national information systems and the development of information infrastructures are considered a priority. It is recommended that the particular combination of circumstances in a country should determine which type of policy to adopt. The policy and systems adopted should be in consonance with national development priorities. In order to ensure this, it is recommended that priority areas in the development plan should be identified and emphasized in the information plan, bearing in mind the sequencing or prioritizing of these areas.

iii. Policy Areas

On the basis of the discussions on the seminar papers, the following were identified as some of the major areas that a policy should address:

- (a) National Information Sector
- (b) Utility of Information
- (c) Information Technologies and Products
- (d) Management of Information Resources
- (e) Information Services Industry
- (f) Information Sector Manpower
- (g) International Information Activities
- (h) Rationalization of Purchase of Equipment
- (i) Standardization and Compatibility
- (j) Value System and National Interest

iv. Policy Instruments

A number of instruments were identified as some of those commonly available to information policy processes. These have been discussed in Section E.a above. Ideally all these instruments should be optimally utilized in a coherent manner to ensure the success of policy. It has been established that one or more of these policy instruments is in force for regulating information activities in most African countries. Therefore, one could not talk of lack of information policy in Africa in absolute terms. However, the inefficiency, inconsistency and lack of coherence in the application of these instruments can and do constitute lack of policy. In addition, the instruments are inadequate in the scope, degree and nature of changes and actions required to overcome the fundamental problems and developmental challenges that information policies should address.

It is therefore strongly recommended that at the time of policy formulation, Governments identify the appropriate instruments necessary for each policy objective. Where instruments for a particular policy objective are already in place, the policy being prepared should make provision for their review with a view to revising, endorsing and/or expanding them.

v. Critical Policy Success Factors

Certain factors were identified as critical to the success of the information policy process (from goal setting to review). They have been identified and discussed in Section G.b above.

vi. Co-ordination

The nature of co-ordination is determined by the scope of policy. In general, at the national level co-ordination of information work should take the form of facilitating the policy process; harmonization; standardization; and, interfacing. This could be usefully supplemented by a more structured co-ordination within the respective information subsectors and by applying judicious measures of centralization and decentralization.

With regard to information technologies, at present, Governments seem to favour a centralized approach to (a) the making of decisions regarding information technology acquisition; (b) the provision of information technology resources and services (i.e. through the Government computer centre or Data Processing Department (DPD).

In discussing the issue of centralization versus decentralization, it was noted that each approach has its own advantages and disadvantages. The nature of the advances in IT, with decreasing costs of acquisition, seems to favour decentralized application. However, it is felt strongly that each government concerned should be left to adopt any of the two approaches on the basis of the prevailing circumstances.

Discussions have demonstrated that it is not possible to talk about information policy without reference to other national policies. Two main levels of linkage have been identified: inter-sectoral and intra-sectoral. Linkages between the information sector and other sectors of the national economy could be brought about through an inter-ministerial council or such high-powered body. With reference to intra-sectoral linkages, the formulation of a cohesive national information programme should ensure this.

b) Main Actors in the Policy Process

Policy formulation is usually the domain of Government. However, with regard to information policy, professionals have taken the initiative and have demonstrated that they also have an important role to play in the exercise. User groups including researchers, academics, other professionals and the private sector also have a role to play since all are involved in the task of national development. The involvement of the private sector is particularly stressed because of its experience and vast but little known information needs. Co-operation between these groups is generally encouraged to ensure effective policy formulation, implementation and review. The assistance of external aid agencies will also continue to be required by African countries in information policy formulation, as in other sectors especially in the areas of funding and technical assistance. However, African countries should not lose sight of the need for self-reliance.

The role played by each of these groups will differ at various stages of the information policy process, but the role of government/policy makers and information professionals pervades all stages. Certain specific recommendations are therefore addressed to these two major actors in the policy process. Government in recognition of its role as source and prime-mover of policy, and professionals as main implementors of policy.

i. Government

The role of government in information policy formulation includes, among others (a) Providing the necessary legislative, institutional, financial and infrastructural mechanisms for the formulation, implementation, enforcement and review of policy; (b) establishing a body or using an already existing body charged with the responsibility for policy formulation; (c) Formulating a plan which should be included in the national development plan, and generally creating an environment that would promote the formulation and implementation of policy. For the above reasons, it is recommended that:

- (a) in view of the rapid advances in information technologies their societal impact and their impact on national development, the formulation of national information policies be speeded up so that these parameters can be properly assessed and controlled;
- (b) in view of the common level of development among countries of the sub-region and the similarity of problems encountered in harnessing information technology, regional co-operation be actively pursued in all areas of information development, including manpower development; standardization of training programmes in information technology; formulation of regional policies; development of telecommunication facilities (including satellites); standardization in appropriate areas of information technology, etc. In this connection, initiatives like the proposed School of Information Science for Africa (SISA) at Addis Ababa University as a regional education centre is highly commended;
- (c) steps be taken to ensure adequate and appropriate development of manpower for the information sector with particular attention to the managerial level. As a prelude to formulating strategies for the achievement of this objective, a survey should be conducted to gather data on trained/skilled manpower requirements of the information sector, and on training resources available in the country;

- (d) governments give sufficient attention to ensuring that the national education system, at all levels, is kept up-to-date in respect of advancement, through appropriate curricular changes/reviews, and the retraining of teachers to prepare the next generation of information practitioners and users;
- (e) in order to increase the awareness of information technology in the population and to sensitize it to the need for using accurate and up-to-date information in decision-making, the inclusion of information related activities, and information technology courses be considered throughout the national education system, as far as possible;
- (f) recognizing the need to have national information policies integrated with development policies and plans of the country, the active involvement and participation of special interest groups, for example, Non Governmental Organizations (NGOs), user groups, and professional associations in the process of policy formulation, be sought and encouraged;
- (g) in view of the important role played by the private sector in the generation, procurement, dissemination and utilization of information, government be invited to take into consideration the participation of this sector in the process of policy formulation, implementation and review;
- (h) recognizing the fact that external aid agencies will continue to play a relevant role in the policy formulation exercise, (a) African countries should determine the level and types of assistance, and when this should be given; (b) external aid agencies could provide technical assistance in the formulation and implementation of national plans in the form of the establishment of formats, norms, standards, guidelines, etc. This is with particular reference to the new area of the development of a Pan African Information System or data base pertaining to national policy, legislation and so on, whose primary objective would be to provide exposure for policy-makers as well as information professionals. Furthermore, (c) African countries should not lose sight of the need for self reliance, in spite of the above.
- (i) As a corollary to h) above, the policy formulation as such should be the responsibility of the nationals of a country. This principle should be strictly adhered to, to ensure that the ultimate policy objectives will be relevant to national needs.

ii. Information Professionals

The term "information professionals" was defined broadly to include librarians, archivists, documentalists, information scientists, extension workers, journalists, publishers, computer scientists, systems analysts, software engineers, programmers, data entry operators, statisticians, mapping specialists, film producers, etc; that is, those who are involved in the generation, processing and dissemination of information. The policy formulation process would be more effective if their involvement in it was enhanced. The integration of professionals and the government was necessary to ensure effective policy formulation, implementation and review. To ensure all of the above, it is recommended:

- (a) that information professionals, as agents of change, should strengthen their associations/societies and make them more effective representatives of the profession so that they would be enabled to engage in such professional roles as developing standards on training, software, etc., and developing codes of conduct for their membership; engage in aggressive marketing of their services; create awareness of new developments in information technologies among their members and user communities, and act as pressure and lobby groups for the profession;
- (b) professional bodies should co-operate with each other at the highest levels in order that they could adopt a uniform approach to national information policy issues, and thereby strengthen their relationship with Government;
- (c) professional associations should be formed where none exist. Those that exist already should mobilize their membership and be generally seen to be active representatives of their various professions at the local, national and international levels.

**TABLE 1 : THE IMPACT OF INFORMATION TECHNOLOGY APPLICATIONS
IN GOVERNMENT**

<u>APPLICATION (YEAR IMPLEMENTED)</u>	<u>IMPACT</u>
Botswana fuel control system (1982)	Tracking government vehicle movements and efficient resource reduction
Kenya Wagon Control System (1971)	Better fleet control and congestion reduction
Malawi Foreign Trade Statistics System (1966)	Monitoring status of external trade
Mauritius Sales Tax System (1983)	Fast processing of sales tax data and efficient revenue collection
Tanzania Government Household Budget Survey System (1975)	Fast processing of nation-wide survey data
Zambia Grade VII Examination System (1969)	Fast processing of secondary school examination results and streamlining candidate selection
Zimbabwe Voters Registration System	Clean voters roll and elimination of multiple registration

Adapted from: Mohan KAUL and Han Chung KWONG, eds. Information Technology in Government - African experiences, London: Commonwealth Secretariat. Preliminary edition, June 1988.

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Note: Most of these papers can be obtained by writing directly to

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