DEVELOPING INFORMATION FOR DEVELOPMENT INFORMATION

AN INAUGURAL LECTURE 1989

BY

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UNIVERSITY OF IBADAN

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Mr. Vice-Chancellor, Sir, The Deputy Vice-Chancellor, The Registrar, The Provost, College of Medicine, The Dean of Education, Deans of Other Faculties and the Postgraduate School, Learned Academic Colleagues and Friends, Fellow students, past and present, Distinguished Ladies and Gentlemen.

THIS is the fifteenth Inaugural Lecture from the Faculty of Education and the third from the Department of Library, Archival and Information Studies. Two previous Inaugural Lectures by Professor F. Adetowun Ogunsheye and Professor B. Olabimpe Aboyade were delivered in 1976 and 1981 respectively from my department. Both Lectures dealt with aspects of Librarianship. This Lecture is, therefore, the first in the area of Information Science, the youngest and fastest growing of the three related disciplines of Librarianship, Archival Studies and Information Science, and I consider it an honour and a privilege to be the one to deliver it.

There is an interesting parallel between my being the third Inaugural Lecturer from my department and the fact that I am the third child and only son of my mother's five children. My people's tradition has it that the third child is always difficult, especially if the first two are girls and the third is a boy. I am sure, however, that the two previous Inaugural Lecturers from my department, who happen to be ladies, can testify that I have brought them nothing but joy during my over twenty years in the department! I can also assure the distinguished audience gathered here today that there will be nothing difficult about my Lecture.

Two words: 'development' and information' feature prominently in the title of this Lecture. We shall now define them, starting with 'development'.

1.1 *Definition of 'Development'*

One of the clearest expositions on the subject of 'development' that I have read is the excellent book by Conyers and Hills: *An Introduction to Development Planning in the Third World* [14]. My definition of 'development' in this lecture derives almost entirely from the book, and especially from chapter two.

The concepts of 'development' -- and 'underdevelopment' -- have changed significantly over time. Today, there are a number of different schools of thought on the subject. For the purpose of this lecture, however, we intend, first, to consider the meaning of the word 'develop' before we attempt to define 'development'.

One dictionary definition of the verb 'to develop' suggests that it means to change gradually, progressing through a number of stages towards some sort of state of expansion, improvement, or completeness or a state in which the subject's true identity is revealed.

The dictionaries also point out that the verb 'to develop' can be transitive or intransitive. This means that when we use the word with reference to, say, countries, it is possible for a country either to develop by itself or to be developed by some outside agency. The application of the word 'develop' -- and the related words 'developed' and 'development' -- to countries was rapidly followed by the introduction of the terms 'underdeveloped' and 'underdevelopment' to describe a lack of development. Much more recently, the verb 'to underdevelop' has also come into use. This verb is normally used in the transitive form, in the sense of a nation or a group of people being underdeveloped by some outside force.

Furthermore, it is important to note that the terms 'development' and 'underdevelopment' may be used in two related but significantly different ways. On the one hand, they may be used to refer to a state of being. Thus, in this sense, 'development' is used to mean the state of being developed, while 'under-development' refers to a state of being underdeveloped or not developed. However, they may also be used to refer to the actual act or process of

changing. Thus 'development' is used to mean the process of developing or becoming developed – either because of the subject's actions or as a result of some sort of outside force – and 'underdevelopment' is used to refer to the process of becoming underdeveloped or less developed [14:22].

This distinction, as we shall attempt to demonstrate presently has important implications for information. When we talk about information 'to achieve development', we are using the word 'development' in the sense of a state of being and, consequently, thinking of information as a means of achieving this state. In other words, 'development' is identified as the goal of the information process. When, however, we talk about 'development information' we are using the term in the sense of the process of developing and we are concerned with the role of information in guiding or influencing this process.

This Lecture, then, is concerned with the two, that is, 'information to achieve development' as well as 'information in the development process'. However, it is still important to emphasize the distinction between the two because when planners or policy makers disagree about development information issues, it is necessary to know whether they are in disagreement about the type of development they wish to achieve (in other words, the goals of information) or about how to achieve those goals, with or without information. Finally, it should be obvious by now that we are more interested in this Lecture in the 'developing', 'less developed', 'low-income', 'Third World' countries of the 'South' than with the 'developed', 'industrialized', 'high-income', 'First and Second World' countries of the 'North'.

1.2 *Definition of 'Information'*

It is not necessary nor is it possible, in any case, to give a universally acceptable definition of 'information'. My definition is, therefore, and understandably, development-oriented and it should suffice for the purpose of this lecture. Here then it is:

> 'Information' is used to describe mankind's accumulated 'knowledge' derived from all subjects, in all forms and from all sources that could help its users to reduce their

levels of uncertainty. Specifically, 'information' is defined as 'data' of value in planning and decision-making, in the execution, monitoring and evaluation of the public- and private-sector programmes of any institution or community... [Adapted from 2:12].

It will be observed that the words 'data' and 'knowledge' have featured prominently in our definition of 'information'. Although there are important differences in the more or less sequential progression from 'data' to 'information' to 'knowledge', we shall be content in this Lecture to use the generic word 'information' for all manifestations of the three terms.

It is important, however, to note that the 'information' just defined is different from that information which is of primary interest to mass communication and media specialists. Generally, the official conceptualization, organization and functionalization of 'information' – our information – in most Third World countries are embodied in 'Ministries of Information' which propagate government plans and achievements. Such ministries place an overwhelming emphasis on output, rather than input, considerations in information matters [3]. And although the areas of convergence between Mass Communication and Information Science have been fairly well researched and reported in the literature [e.g., 4 and 24], the fundamental differences between the two disciplines remain, and will not be discussed further in this Lecture.

1.3 *Examples of 'Development Information' in Practice*

One of the tangible outcomes of the United Nations Development Decade (1971-1980) was the establishment of the Development Information System, a computerized database of references to unpublished material written by or for the United Nations in the field of economic and social development. It is managed by the Information Systems Unit in the U.N. Department of International Economic and Social Affairs. The System has published, from its files, first a quarterly, and then a bimonthly, *Development Information Abstracts* in English, French and Spanish since January 1981.

By far the best known international example of the fruitful application of information to development efforts is Canada's International Development Research Centre (IDRC) which was

established in 1970. The Centre was the first major international development agency to recognize and to effectualize, from the outset, an Information Sciences Division as one of its four programme areas. The three others are the Health Sciences Division, the Social Sciences Division and the Agriculture, Food and Nutrition Sciences Division. Thus, information is recognized by IDRC as a major vehicle for promoting the development of Third World countries where most of the Centre's activities have been concentrated. By pioneering the concept of a Development Sciences Information System (DEVSIS) – and promoting its application to development efforts in Africa, the Caribbean and Latin America in particular – IDRC has become synonymous with 'development information' throughout the world.

Mr. Vice-Chancellor, Sir, I had the privilege of working as Program Advisor at IDRC's Information Sciences Division during my sabbatical year in 1980/81 session, and I shall have more to say on IDRC's pivotal activities in development information later on in this Lecture.

At the continental level, and under the aegis of the regional United Nations Economic Commissions, the principles of DEVSIS are being applied with significant results. The Latin American Planning Information Network (INFOPLAN), the Caribbean Information System for Economic and Social Planning (CARISPLAN), and the Pan African Documentation and Information System (PADIS) have taken off and are making steady progress. Similar systems are being planned for the Economic Commission for Western Asia and the Economic and Social Commission for Asia and the Pacific.

Progress at the sub-regional and national levels has been relatively slow. In Africa, the efforts of the Southern Africa Documentation and Information System (SADIS) and the achievements of the Moroccan National Development Information Network are worthy of note. There are strong indications that we shall soon see more African sub-regions, such as ECOWAS, and more countries, such as Zaire and Zimbabwe, follow the examples of SADIS and Morocco respectively.

Having defined and illustrated the basic concepts in the title of the Lecture, we shall now examine the foundations of Information Science in general, and of development information in particular, in order to emphasize the relevance of the discipline to development goals.

2. FOUNDATIONS OF INFORMATION SCIENCE AND DEVELOPMENT INFORMATION

Both the subject matter and philosophy of Librarianship have been completely revolutionized since about 600 B.C. when libraries and the profession of Librarianship first emerged. The first generation librarians were scholars in every sense of the word as they were authorities on the content of the relatively few hand-written records in their libraries: readers had to consult such scholar-librarians in order to make meaningful use of the records in libraries.

After the invention of printing in the fifteen century and its rapid spread throughout the world, printed books replaced hand-written records, and their number in libraries increased by a magnitude of between 100 and 1000. The scholar-librarians could no longer cope with this sudden increase in the number of books they had to read and master in order to maintain their consultant relationship to their clients. To add to the librarian's burden, the first scientific journal appeared in the seventeenth century, and the number had increased to about 2,000 by 1800. Consequently, the functions of the librarian shifted more and more to book acquisition and organization for use, with the attendant diminution in his image and prestige as a scholar.

Libraries and Librarianship experienced a different orientation during the mass education and public enlightenment era in the pioneering years of American history. Public libraries in particular became vital agents of mass literacy campaigns, and the librarian assumed the role of librarian-educator in a more or less negative or censorial sense. The librarian's new role did very little to enhance his already diminished scholar-librarian image, especially as the number of books and journals continued to grow exponentially.

The Second World War dramatized the significant difference between knowledge about books and periodicals on the one hand,

and knowledge of the 'information' contained in them, on the other. It was during this War that some librarians and other subject specialists sought specific items of information and made them available as inputs to the construction of models designed to solve practical battle problems. 'Operations Research' and 'Documentation' were used to designate these emerging sub-disciplines immediately after the War, and their cause has been championed by a new breed of librarians or 'documentalists' since then until the late 1960s when 'information science' began to assert itself as a new discipline.

2.1 *Information Science as a Discipline*

The exponential growth of data, information and knowledge, especially in science and technology since 1945, has given great impetus to the emergence of Information Science as a discipline in its own right although, not surprisingly, perhaps, there is as yet no agreement about the scope, or even the definition, of Information Science. Indeed, there are respectable opinions within and outside the discipline which argue that it is not (yet) a discipline at all.

It seems to me, however, that the debate so far has produced more heat than light. Too much energy is regularly consumed in arguments about what Information Science should be, rather than in analysing what it is. For example, Information Science is strongly interdisciplinary – as we were powerfully reminded in the book coedited by an economist and an information scientist, and appropriately titled *The Study of Information: Interdisciplinary Messages* [20]. The forty-odd contributors from Information Science, Library Studies, Computer Science, Artificial Intelligence, Linguistics, Cybernetics, Systems Theory, Psychology, Economics, Sociology, Demography and Statistics demonstrate convincingly the richness, versatility and potential utility of the discipline from about every angle one chooses to approach it.

Information Science has benefitted, and continues to benefit, from the advent of the computer, especially the microcomputer. Quite frankly, we would not be able to conceptualize, analyze and interpret much of the exciting topics being reported in the literature of Information Science today without the almost magical computa-

tional power of the computer. And just in case anybody needs to be reminded: Professor Olu Longe's brilliantly stimulating Inaugural Lecture here in 1983: *Ifa Divination and Computer Science* showed us that the primary functions of *Ifa* divination are descriptive, analytical and prescriptive information.

Mr. Vice-Chancellor, Sir, before I proceed further, I like to confess my bias in describing my perception of the theory and practice of Information Science. During the past decade, I have had the privilege of serving on the Editorial Board of the *Journal of Information Science* (London), one of the two leading journals in my field. During those years, I have been actively involved in mapping the content and direction of the journal. It should come as no big surprise, therefore, that my theoretical orientations have been strongly influenced by the views expressed on the pages of the journal over the years.

A short, thought-provoking paper was written by Hollnagel, a psychologist/information scientist, with the catchy title: "Is Information Science an Anomalous State of Knowledge?" [17]. The paper examines some of the definitional problems of Information Science from the perspective of similar problems in the field of psychology. The apparent need for a set of rigorous definitions of the basic concepts of a discipline is discussed, and it is argued that although this is necessary for the physical and natural sciences it is not necessary for sciences, such as Information Science, which concern themselves with behavioural phenomena that have a prior description in natural language. It is further argued in the paper that Information Science should be more interested in *uncertainty* than in information, and it is shown how the distinction between information and uncertainty is nicely captured by a paradigm represented by the acronym "ASK".

An Anomalous State of Knowledge (ASK) is the state where 'the recipient recognizes that there is something wrong (missing) with his state of knowledge concerning, say, some topic or situation, and wishes to resolve this anomaly ... it concerns what the recipient does not know, rather than what he knows he needs to know' [13:9]. The ASK paradigm was suggested as an alternative to traditional

information retrieval paradigms, such, for example as the Best Match hypothesis, which requires a rather complete representation of what the user wants to know. The ASK paradigm is careful to point out that normally the user does not know what he wants, but rather feels the need for supplementary knowledge.

The virtue of the ASK paradigm lies in pointing out that incomplete knowledge is far from being an obstacle to communication: it may, in fact, be the stimulus for communication. It is important to note, however, that incomplete knowledge is one thing, lack of knowledge, another thing entirely. For example, two systems cannot communicate if they lack common knowledge, and need not communicate if their knowledge of each other is complete [11]. Only the intermediate state – of incomplete knowledge – is favourable for communication. Furthermore, the incompleteness must hold for both of the communicating systems: if either system had complete knowledge of the other, then, by definition, an ASK would not exist [17].

My case, Mr. Vice-Chancellor, Sir, is, therefore, that Information Science, despite the connotations which are evoked by the word 'information', should concern itself more with the states of incomplete knowledge or information or data than with definitions of information. Information Science is primarily interested in the meaningfulness of information, in the usefulness of information to the user, rather than in Information Theory in the classical Shannon/Weaver [28] or Farradane [15] sense.

3. THE CONCEPT OF A GLOBAL DEVELOPMENT INFORMATION SYSTEM

The literature on 'development information' has grown so rapidly in just over a decade that one must necessarily select a few topics in a Lecture such as the present one. Consequently, we shall examine only three aspects: (a) The Antecedents of a Development Sciences Information System; (b) The Evolution of DEVSIS and DEVSIS-type Systems; and (c) DEVSIS in Africa.

3.1 *Antecedents of a Development Sciences Information System*

A 'system', as used throughout this Lecture, refers to an organized set of related operations. If one is talking about artificial systems as

opposed to natural systems, then the organization of the set of operations implies a design, a design that can be modified as time goes on in the light of experience. But the organization did not just happen; it did not come into being spontaneously; it was designed. Systems have an input and an output. And, therefore, since they have an input and an output, their efficiency can be measured. How much work is needed to provide the input? How much useful work is achieved by the output? And the ratio of these, whether expressed quantitatively or in some more subjective way, is a measure of the efficiency of the system [31:13].

The first generation information systems were subject-oriented, such as *Chemical Abstracts,* started by the American Chemical Society, or *Bulletin signalétique*, developed by the Conseil National de la Recherche Scientifique (of France). During and after the Second World War, information systems whose scope was defined by economic activities rather than by scientific disciplines began to emerge. People began to realize that information had value and that it was worth investing public funds for the design of information systems. But the shift has gone even further; central agencies of government have been taking responsibility for building information systems and for providing the funds and the long-range investments that are needed. Sometimes the initiative has come from the presidency of a republic, as in the case of Morocco; sometimes from a ministry of planning or of coordination, as in the case of Mexico or Bolivia.

The shift in responsibility away from the scientific community and toward the central government agencies has been accompanied by a shift in the way information systems are defined. New systems are now seldom defined by discipline. The old systems – for Biology, for Chemistry, for Physics – continue to meet important needs; but the new systems are no longer discipline-oriented; they are mission-oriented. The mission is some economic purpose – to promote the peaceful uses of atomic energy (INIS) or to grow more food (AGRIS) – missions which can only be realized if the necessary information is collected from many different disciplines; so the mission-oriented systems are necessarily multidisciplinary.

Thus, by the time people began to talk seriously about the possibilities of designing a global development sciences information

system, information specialists had learned valuable lessons from two operational global information systems: the International Nuclear Information System (INIS) based in Vienna, Austria, and the International Information System for the Agricultural Sciences and Technology (AGRIS) based in the Italian capital, Rome.

3.2 *Evolution of DEVSIS and DEVSIS-Type Systems*

Earlier on in this Lecture, I promised to dilate on the pivotal activities of Canada's International Development Research Centre (IDRC) in promoting the cause of development information. It can, indeed, be asserted, without any fear of exaggeration, that IDRC is the originator, motivator and chief sustainer of the world's major development information systems, especially in developing countries.

But, how did it all begin? In summarizing the story, I shall quote extensively from the most comprehensive and authoritative publication on the topic: *DEVSIS: Preliminary Design of an International Information System* [18;9-13].

In the late 1960s, as people concerned with development began to review the results of the first development decade, 1951-1960, it became clear that there were still missing elements in the development equation. In an attempt to identify these elements, the United Nations Organisation undertook a review of its own capacity to meet the requirements of development [19], a review which, among other things, emphasized the need for stronger information support. At the same time, initiatives were begun elsewhere, within the United Nations, to build the first truly international cooperative information system to be directed towards the performance of a mission: the application of atomic energy to peaceful uses. The result was INIS, as we noted earlier on in this Lecture.

Most significantly, the feeling was growing stronger and stronger that 'Development' is also a mission, and it was increasingly thought of as the significant mission in today's world. There was a possibility that the same technologies which allowed for the evol-

ution of cooperative and potentially comprehensive information systems, such as INIS and AGRIS, could be applied for the provision of information to the development community as well. Information could, indeed, be one of the missing elements in the development equation ...

'Why has this interest in development information emerged so strongly in recent years? It probably reflects a realization that many development studies and projects represent a process by which people who need information go out into a market and buy it. They commission a survey, hire a consultant, start a research programme, but, physically, what they get is a document which presents the information they have purchased. This is information for which they were willing to spend $10,000, $50,000, often more than $100,000. They bought it because they believed that it would be useful in their policy-making, planning or operations. Potentially it could affect investments of millions of dollars and change the lives of whole communities. But the documents which represent the key link in this chain are not easy to find once they have been presented. Investments of time and money in generating information are duplicated by different agencies (sometimes even by the same agency) simply because they do not know that the information they want has already been put together. To record the existence of all these documents, and hence the information they contain, costs $20 to $50 per item depending on the methods employed. This is a very small increment on the original investment and, by placing the information in a system from which it can be retrieved when needed, one has the facility to avoid the loss of money and of time that would have been involved in conducting a new survey, hiring a new consultant or starting another research project. And even when the current need is somewhat different from the earlier one, to have the results of the earlier work can still cut the costs and shorten the duration of any new effort to generate information. In sum, the interest in information handling stems from a realisation that information is a resource for development and that, in the world as it is today, even otherwise highly developed countries have very inadequate means of gaining reliable access to this resource.' [18:9-10].

The concept of a Development Science Information System (DEVSIS) had its origins in an IDRC-circulated paper entitled

DEVSIS: a Development Science Information System [30]. The paper deplored the lack of information services available to development planners and policy-makers, and proposed that the principles of a mission-oriented, decentralized cooperative system, combined with technologies for providing input and producing comprehensive files, could be used to provide information services to the development community. Six months after the distribution of this paper, IDRC, OECD, and UNESCO sponsored a meeting in Ottawa, Canada, to consider whether there was a general need for a system like DEVSIS, and if so, to define in broad terms its subject scope, organisation and financing, and to recommend further action towards the detailed design of the system.

Mr. Vice-Chancellor, Sir, I obviously cannot narrate the full, exciting story of DEVSIS and DEVSIS-type systems in this Lecture. Suffice it to note that Nigeria's Chief S. Oluwole Awokoya was one of the two Vice-Chairmen of the DEVSIS Steering Committee. Moreover, DEVSIS had generated wide interest among the member states of the United Nations because countries had begun to think nationally about the problems that DEVSIS and its co-sponsoring organisations were attempting to tackle at the international level. Thus, countries such as Brazil, Canada, Hungary, India, Jamaica, Morocco, the Netherlands and the Philippines had a significant DEVSIS head-start over other countries because they had already established services that were mainly concerned with their nationally-produced information in the field of social and economic development, primarily as a support to national development planning and policy-making.

But DEVSIS has not materialized as a global information system and probably never will. In one of my books [5], I tried to show that this fact of life is not necessarily a setback to the cause of DEVSIS. On the contrary, the evolution of strong regional, sub-regional, national and institutional DEVSIS and DEVSIS-type systems in Africa, Asia, the Caribbean, Europe, North and South America, has powerfully demonstrated the futility, from the outset, of attempting a macro concept of development. The difficulties that inevitably characterized such earlier, futile efforts have now,

happily, become a thing of the past as success after success continues to be recorded in the design, management and evaluation of mini and micro DEVSIS and DEVSIS-type systems, especially at the national level. Against this background, we can now briefly review the contributions of Africa to DEVSIS.

3.3 *DEVSIS in Africa*

Morocco has had a considerable headstart over other African countries in recognizing the potential contributions of DEVSIS-type systems to its development activities. Indeed, some aspects of Morocco's national efforts predated Canada's global DEVSIS initiative of 1976 described earlier on. There are, however, encouraging signs that several other African countries, with considerable financial and technical assistance from IDRC and the United Nations Economic Commission for Africa, are beginning to appreciate the significance of information in development planning. Nigeria is one of such countries.

The foresight and commitment of the National Library of Nigeria were a major factor in the design and successful execution of a long-range research project to identify the parameters of Information Dissemination to, and its Utilization by, Policy-Makers in Nigeria (IDUPOM Research Project). I had the privilege of designing the project, of leading its Research Team, and of producing some dozen papers from its findings. In addition, a book: *The Perception and Utilization of Information by Nigerian Policy-Makers* [6] is just being published from the project by the National Library of Nigeria.

As might be expected, Nigeria's continuing efforts to put in place a DEVSIS-type system have been anchored on the findings of the IDUPOM Research Project. But even more significantly, the Pan African Documentation and Information System (PADIS) has relied rather heavily on the techniques developed in Nigeria in the implementation of a major aspect of its declared objectives.

The Pan African Documentation and Information System for socio-economic development was designed in 1979 to help improve the quality of public-sector development planning and decision-making in Africa. The system has gone through two implementation

phases. from 1981 to 1986, and an external evaluation in 1985. Although PADIS has recorded notable achievements, a major problem remains in ascertaining, first hand, the nature of development information actually used by African development researchers, planners and decision-makers. Consequently, definitive user surveys in key African countries were identified as an important component of PADIS Phase III, which commenced in April 1987, beginning with my commissioned study of development information utilization in Ethiopia, Nigeria and Zimbabwe [7].

Finally, plans have reached an advanced stage to launch another long-range and extensive research project, designed to identify, describe, codify and standardize all development information variables that should be considered in the design, monitoring, management and evaluation of planned or operational development information systems, using a variety of data-collection and analytical techniques[8]. Researchers from three Nigerian institutions, led by this speaker, will collaborate in carrying out an experimental study, using Nigerian data first, before attempts are made to cover other parts of Africa and the world.

Mr. Vice-Chancellor, Sir, Bibliometrics and Development Information have focussed my research, publication and public service activities in the past twenty years. However, every university teacher is expected to demonstrate more than a passing interest in the effectiveness of his teaching, and a definitive commitment to human resource development issues in his field. I shall now follow in the line of previous Inaugural Lecturers by highlighting certain manpower development concerns that are bound to have a direct bearing on the quality of future African leaders of Information Science. In doing so, I shall, once again, emphasize local developments in the context of global scenarios.

4. MANPOWER DEVELOPMENT IMPLICATIONS

Relatively few of the recognized leaders of the field of Information Science today took degrees in a field that was then called Information Science. We are almost all converts from the older, more established fields, such as Library Studies, Geography, Chemistry, Mathematics, Economics, Psychology, Linguistics, English and

almost all aspects of Communication [21]. Increasinly, converts are also coming over from the relatively younger field of Computer Science. A true test of our maturity will be when we find that our leaders are graduates of our own programmes. How are we squaring up to this challenge?

One of the recognized leaders of education for Information Science, Meadow, has observed, in a futuristic paper appropriately titled: *Information Science and Scientists in 2001*, that Information Science, or its synonyms, is today almost always found following the word 'and' in a departmental title: 'Library and Information Science'; 'Library, Archives and Information Studies'; 'Computer and Information Science'. By the year 2001, Meadow predicted, these Boolean expressions may be reversed [21].

I share Meadow's assessment and prediction.

Although we have, in our short history, largely been a profession that responded to, rather than led, the signals point inexorably in the direction of efforts to produce leaders who will establish a true and lasting identity for Information Science. Moreover, the same signals strongly suggest that the profession is looking up to the Third World to provide leadership in this exciting area, as we shall soon illustrate.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Federation for Information and Documentation (IFID) have traditionally assumed the leadership responsibility for continuing education and training programmes in Information Science. Typically, such ad hoc programmes are short, with many of them designed exclusively for participants drawn from the Third World. The limitations of such useful programmes are obvious enough, and vociferous voices soon began to clamour for a long-range educational strategy that will address the ubiquitous challenges of education for Information Science.

As we observed earlier on in this Lecture, the responses consisted essentially of merely tagging on 'Information Science', or its derivatives, to the names of existing library schools, with little or no change in curriculum content. Individual librarians or chemists or geographers who wanted to pursue a career in Information Science had to evolve their own 'Teach Yourself Information Science'

packages and follow them as best they could, with or without help from professional bodies, such as the Institute of Information Scientists. That was how I taught myself Information Science, and particularly development information. This situation persisted until the UNESCO/UNDP initiative in South-East Asia in the 1970s.

4.1 *The Philippines Experiment*

The story of the very successful postgraduate programme in Information Science at the University of the Philippines in Manila has been adequately told elsewhere[22]. Four aspects of the experiment are of interest to us in this Lecture:

(a) The programme was the first full-time training programme designed to produce information scientists, with a bias for scientific and technological information.

(b) Most of the funds were provided by the UNDP, with UNESCO serving as the executing agency.

(c) It was located in a developing country, with indigenous (Asian) staff playing a leading role in curriculum design and the production of appropriate teaching materials, especially computer software packages.

(d) It was an autonomous, regional programme in a university which already had a long-standing library school.

All of the comprehensive internal and external evaluations of the programme emphasize the urgent need to replicate the success story elsewhere, especially in Africa and Latin America. It is against this background that we examine the African situation.

4.2 *Training for Information Science at Ibadan*

As far back as 1973, the UNDP had proposed the University of Ibadan as the location for a regional postgraduate training programme in Information Science for English-speaking Africa, and UNESCO was to be the executing agency. Unfortunately, UNESCO was plunged into financial crisis during the 1974/75 period and the proposal was aborted.

The Team of Experts that designed the Pan African Documentation and Information System (PADIS) (on which I had the honour to serve) had called for a strong complementary training programme in Information Science. During my sabbatical year in the 1980/81 session at Canada's IDRC, I tried to get the authorities of the Centre's Information Sciences Division to be directly interested in the establishment of such a programme. This was done in the hope that IDRC, which had played a crucial role in the design and implementation of PADIS, would appreciate the need for additional investments in the formal education aspect of Africa's development information system, PADIS, in order to ensure desirable returns from its heavy resource investments in the design of the system.

The rest is now history [25] as IDRC, in collaboration with UNESCO, recommended and actively supported not just one but two regional training centres for Information Science in Africa: one at the University of Ibadan and the other at Addis Ababa University in Ethiopia. The National Universities Commission (NUC) had pledged substantial annual subventions during the first five years of the proposed training programme here ...

Regrettably, the positive signals from IDRC, UNESCO and NUC marked the beginning of bitter opposition from within the University of Ibadan. The efforts of two Vice-Chancellors, four Deputy Vice-Chancellors, three Deans of the Postgraduate School, and three Deans of Education, regrettably, failed to neutralize the most destructive elements of this opposition from within, with the result that the momentum to create an Africa Regional Centre for Information Science (ARCIS) was lost. By the time the proposed Centre's much delayed presentation of a revised structure and a new Master's degree programme in Information Science was approved by Senate, the Federal Government had slapped a moratorium on all new programmes at the University of Ibadan.

But all is not lost. There are positive signals, once again, indicating that ARCIS may be back on the rails and that it may, indeed, take off soon. The Nigerian National Commission on UNESCO, while expressing concern that delays in the implementation of the ARCIS programme had been caused by the University of Ibadan itself, has pledged support to ensure its take-off. In the interim, we

continue to teach and research whatever aspects of Information Science we have the resources to handle in my department. Our Master's in Library Studies (MLS) programme now contains a substantial dose of Information Science courses. Two doctoral theses in Information Science were successfully completed by colleagues in my department in 1986 - one under my sole supervision [1] and the other jointly supervised by Professor Longe of Computer Science and myself [10]. A Master of Philosophy (M.Phil.) degree in Information Science has also been successfully completed under my supervision [12].

In summary, it would be fair to say that our efforts here at Ibadan are, invariably, a reflection of African and global concerns in Education for Information Science, and that human resource development in Africa has engaged our attention in more recent years.

5. LOOKING AHEAD TO MORE EXCITING TIMES

Mr. Vice-Chancellor, Sir, ladies and gentlemen, I like to emphasize that I am still learning and searching, just as I learned librarianship after my honours degree in Geography; then I learned bibliometrics to gain a major foothold in the field of Information Science; and then again I learned development information to sharpen the public service relevance of my essentially theoretical research inclinations. Perhaps not unexpectedly, I like to end this Lecture by pointing briefly to three exciting areas in which the potentials of Information Science are only just beginning to emerge. These are:

(a) Transborder data flows and the development process;
(b) Bibliometrics in public policy; and
(c) Information management in development crises.

It should come as no surprise to anyone, therefore, if one or more of these areas were to focus my learning, research and publication activities in the coming years. For the purpose of this Lecture, however, we shall consider only the first area in some detail; the two remaining topics will be reserved for discussion at another forum.

5.1 *Transborder Data Flows and the Development Process*

Recent technological advances have led to the increased use and application, in developed countries, of automated information and

the emergence of an international data market. These developments stem from rapid advances in both computer and telecommunications technologies, which have led to their convergence in a new activity, telematics. Modern telecommunications facilities have overcome time and distance as major obstacles to access to sophisticated services for the processing, storage and retrieval of machine-readable data. The transnationalization of this process, in turn, has given rise to transborder data flows (TDFs), which means international data transmissions over transnational computer-communication systems. Telematics and TDFs have given a new importance to information because they have widened considerably the range and depth of the application of automated data. Consequently, they have initiated far-reaching changes in both developed and developing countries [27].

There is little indication that Nigeria and most developing countries are even aware of the serious implications of telematics and transborder data flows in their development efforts. And yet, the evidence is strong that TDFs affect the international economic exchanges of all countries, and that developing countries are not getting much from the value-added direct benefits resulting from the processing and distribution stages of the raw data which they produce. Trade in information goods and services, for instance, has increased exponentially over the past two decades, partly in the context of growing trade in services generally. Increasingly, it is being recognized that data flows are commodity flows (either in their own right or because they are closely related to trade flows in other areas, such as shipping) and that, therefore, the subject should be regarded as an economic issue. It is, therefore, not surprising that, in the light of increasing protectionist sentiments in this area, the industrialized countries are beginning to discuss the adoption of a 'data pledge' analogous to the 'trade pledge' that the Organisation for Economic Cooperation and Development (OECD) has already adopted. Furthermore, the United States of America has taken a strong position that trade in services (of which trade data and data services constitute a significant component) should be examined in the context of the General Agreement on Tariffs and Trade (GATT) [27].

It has also been established that transnational corporations are the major exporters of data and that their information flow activities must be closely monitored in the overall interests of both generator and recipient countries. The information advantage of transnational corporations may place domestic enterprise at a competitive disadvantage, thus hindering the emergence of indigenous capacities in host countries. This factor also bears directly on the bargaining positions of these corporations, *vis-à-vis* states and groups within states (e.g. trade unions).

Robinson [26] has demonstrated how uneven access to the international data market could result in the 'migration of key decision-making functions' to foreign locations and, consequently, a country's ability to influence the direction of changes within its borders. Gottlieb *et al.* [16] and O'Brien and Helleiner [23] also showed how the sovereignty of a country could be seriously compromised if information which is restricted about the full range of alternatives open to a given country in a given situation were made available to another country. The frequency of such an occurrence in international relations has already created a new kind of imbalance between developed and developing countries, or between the 'information rich' and 'information poor' countries.

Once the full implications are recognized, TDFs may acquire a political dimension that they hitherto have not possessed in developing countries. On the other hand, if developing countries' capabilities to use TDFs and their access to the international market can be improved sufficiently, these flows should become a powerful instrument for the advancement of their development objectives. In fact, TDFs may even contribute to the establishment of an international infrastructure for a more self-reliant development, in a framework of greater economic and technical cooperation among developing countries [27].

For a start, we suggest that Nigeria take the first decisive steps in playing a leadership role in the Africa Region by being more actively involved in the activities of the United Nations Centre on Transitional Corporation (UNCTC). Brazil in Latin America and Poland in Eastern Europe have shown the way for their respective regions by facilitating the study and publication of transborder data flows in respect of their countries [29].

6. CONCLUDING REMARKS

In October 1986, I was invited by the National Institute for Policy and Strategic Studies, Kuru, as a Guest Speaker at a 'Seminar on the Development of Effective Communications and Information Systems: 1986-2010' under the theme: *Nigeria's Strategic Interests: 1986-2010*. I presented a short paper entitled: 'Harnessing Nigeria's Resource Investments for an Effective Development Information System' [9] which appeared to have been well received. The main objective of the paper was to catalogue Nigeria's tremendous resource investments in development information, in the hope that Nigeria's policy-makers would welcome the challenge of harnessing these investments to evolve an effective development information system for Nigeria by the year 2010. More than two years after the seminar, nothing tangible appears to have been done, and I fear that the seminar may have been a mere academic exercise.

I like to re-emphasize, on this occasion, the theme of 'self-reliance' which featured prominently in my Kuru paper and which, incidentally, is at the heart of current national efforts to restructure the economy. One important lesson to learn from operational and near-operational DEVSIS-type systems is that 'self-reliance' is a cardinal principle of development information as it is, indeed, of economic development. You cannot organize and utilize the development information of other countries until you have learnt to organize and utilize the information produced in your country. To put the point in another way, no country can expect to derive the expected benefits from a regional or global development information system which does not first put its own national development information house in order.

Mr. Vice-Chancellor, Sir, I believe the challenge is clear.

6.1 *Acknowledgements*

Before I conclude my lecture, I should pay due tributes to people who have made priceless contributions to my academic career. But first, I thank God Almighty who, twenty seven years ago, gave me a clear vision of a career in Librarianship, and has sustained me physically, emotionally and intellectually ever since.

Margaret Kikelomo Omotayo (M.K.O.), my ever-young wife for 22 years, who married me while I was a student riding a second-hand bicycle, has stood lovingly and patiently by me through thick and thin. This lecture is dedicated to her. Our children, Olusola, Yetunde, Oluwagboyega and Eyitayo have been my source of perpetual joy and inspiration. My elder brother, Mr. T.F. Aiyepeku, Director-General in the Office of the Chief of General Staff, whose sacrifices and foresight ensured that I went to secondary school, can never be forgotten.

My geography teachers, especially Messrs Cooper, Soladoye and Pennington at Okene Secondary School, and Professors Simpson, Moretimore and Thorp at Ahmadu Bello University, Zaria, gave me a solid foundation for a successful career in Information Science. I am infinitely grateful to Professor John Dean who, as Director of the (then) Institute of Librarianship, took a chance on me in 1969 by appointing me as an Assistant Lecturer in the face of stiff opposition from some of his staff.

Two previous Vice-Chancellors of this great university, Professors Tamuno and Olayide, and the current one, Professor Banjo resolutely resisted persistent pressures to compromise fairness and equity in matters affecting my vital interests here since 1975. Canada's International Development Research Centre, and especially its current Director of Information Sciences, Mrs. Martha Stone, gave me a most valued working experience during the 1980/81 session.

And finally, my friends here in Ibadan, especially Dr. Ayo Lawani and Dr. Agboola Adesanoye and the others of Table 001 at the Staff Club, as well as those in Lagos: Bayode Mesaiyete and Biodun Ehindero, laboured, counselled and stood firmly by me, especially during the most difficult periods of my career so far.

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Ladies and gentlemen, I thank you for y our attention.

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