SCIENCE COMMUNICATION IN THE CARIBBEAN

A Report of a Workshop

Edited by Victor Forsythe

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SCIENCE COMMUNICATION IN THE CARIBBEAN

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Caribbean Workshop on
Science Communication

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FOREWORD

An essential element of research management is communication, whether in science and technology or any other field of human endeavour. Transfer of information cannot be separated from research and development, and all those concerned with scientific activities must be involved in dissemination of knowledge to the same extent and with the same attitude as they have towards research and development itself. Research objectives are not only to find solutions to problems but also to communicate the results obtained to those who can benefit from their utilization, and to others who are responsible for ensuring that the national efforts in science and technology are appropriate, relevant and effective. The scientists must report to a public and its representatives who will judge whether scientific pursuit is worth the money spent on it and also whether the quality of man's life will be adversely affected by activities and innovations arising from such research.

Communication is not, however, a one-way system with one active communicator and a passive receptor. It is the whole process of the presentation, transmission and reception of information which constitutes the fundamental means by which the development and utilization of science and technology can take place.

The Commonwealth Science Council has recognized the imperative to promote cooperative activities directly relevant to the social, economic and environmental problems of its members, which could concurrently and integratively, assist in building up the national capabilities in science and technology, so vital for self-reliance.

One of the first of the urgent tasks tackled by the Council has been endeavours to improve managerial skills in scientific research. Too often we are confronted with the situation of highly-qualified researchers placed in positions demanding a wealth of knowledge and experience of leadership of people and materials without being adequately prepared for this role. An essential attribute of science leaders is the ability to communicate effectively whether it be with other scientists, with decision-makers in government, with the ultimate users of research findings, or with the public at large. Frequently, the sad situation is that research findings lie buried in files while the problems, for which research had supplied solutions, are still with us.

It was the main purpose of the Caribbean Workshop on Science Commission to correct this situation

1. to enable scientists to consider and compare techniques for assembling and using the available scientific information;

2. to participate in techniques for disseminating available scientific information to specialists, to administrators and to the general public; and

3. to encourage participants to organize similar workshops with the aim of developing science information systems within their respective countries, and to enable them to identify the kind of resource people for such an activity.

This workshop, organized and sponsored jointly by the Commonwealth Science Council, the Commonwealth Fund Technical Corporation and the National Science Research Council of Guyana, was held at the Cyril Potter College of Education, Turkeyen, Greater Georgetown, Guyana, through the courtesy of the Ministry of Education, Social Development and Culture, and the Principal of the College, April 12 - 20, 1977. It was the second such workshop organized under the auspices of the Commonwealth Science Council, the first for the African region being held in Arusha, Tanzania in April 1976.

The Caribbean Workshop was organized into different types of sessions, incorporating various meeting and learning techniques: seminars; lectures; formal presentation of background papers followed by discussion; case-study exercises; role-playing in simulated situation and practical demonstrations. The evaluation of the workshop at the final session by participants showed that the variety was appreciated, even though some forms would have been more suitable for a smaller number of participants. The workshop report and the resource material and papers presented are now published for a wider readership, as these could be useful material for similar workshops organized at a regional or national level.

The success of the workshop was to a large measure due to the excellent planning and organization by the coordinating committee and its various sub-committees, under the able chairmanship of Mr. Victor Forsythe, who acted as workshop Director. We were privileged to have had many resource personnel, from Guyana, Canada, Britain and Kenya, who gave so freely of their time and knowledge. The Cyril Potter College of Education was an excellent venue and the Principal and staff met our needs fully and cheerfully. The Honourable Minister of Education, Cde Shirley Field-Ridley, extended us the privilege of declaring the Workshop open and was active in her support throughout for which we are very grateful. To all who contributed to the success of the workshop, including the participants from the Bahamas, Barbados, Belize, Cyprus, Jamaica, and Trinidad and Tobago, we wish to extend our warmest thanks.

P.A. Munroe,
Secretary-General,
National Science Research
Council of Guyana,

and

Chairman, Commonwealth Science
Council

D.G. Thomas,
Deputy Secretary,
Commonwealth Science Council

September 1977
Marlborough House
Pall Mall
London SW1Y 5HX

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The formal opening of the Georgetown Science Communication Workshop by Guyana's Minister of Information CDE Shirley Field-Ridley. Others in picture are left to right, CDE Olive Lyken, Principal of the Cyril Potter College of Education (partly hidden); CDE Dr. Pat Munroe, Secretary, National Science Research Council of Guyana; CDE Victor Forsythe, Chief Information Officer of Guyana and Workshop Director; Mr. D.G. Thomas, Deputy Secretary, Commonwealth Science Council and Dr. M.N.G.A. Khan, Assistant Secretary of the CSC.

1 OPENING ADDRESS

Information Minister Cde Shirley Field-Ridley

Comrades, looking at this morning's paper, I am completely convinced that the importance of communication is not lost on the organisers at least of this seminar, because there was little room to see anything else but the Science Communication Workshop which was being held in Guyana.

But let me say that it is very good to have you here for the purpose of this workshop. We are a young country particularly in the field of Science and Science Research, and therefore it is a particular boon to us to have this kind of exercise being conducted in our country.

You have come, those of you who come from overseas, at a time when all of Guyana does something that I haven't really seen to the same extent in any other part of the world. That is, we all wake at about 4 o'clock on Easter Monday morning, those of us who have children use them as the excuse for doing this exercise, we acquire little things called kites and we move to any open space to fly those kites.

Now it is a time of the year when fathers particularly, sometimes for the first time in the year, remember their parental obligations; and one can see them in numbers trooping to the seawall and to various other places in the country, flying kites. The fathers, of course, pretend that this is an exercise for the children, helping them to raise the kites. But any of you who have been here long enough and have passed the sight of little children sitting looking longingly, while daddy has been putting up that kite for two hours, will know really the whole purpose of the exercise.

And that is part of the cultural tradition, I would say, of Guyana. It has been going on for a long time. Certainly I was born and met it; my parents tell me that they were born into that situation; but as the march of progress continued we find that science and technology interfered a little bit with this particular aspect of our cultural development, because with the advance of technology there appeared electric cables and high tension wires along the roads, seawalls and open spaces.

As a result, for years we have been having a problem telling parents and children to ensure that their kites do not get tangled in these high voltage wires, lest there be fatal consequences. Unfortunately we have had over the years some very serious situations, some fatal accidents. This year, the Electricity Corporation mounted a very effective communication exercise and I think it was to their credit

that we have passed this Easter weekend, for the first time in a long time, without any serious incidents.

To my mind this shows that there is a room, an important area for communication in the field of science, in terms of communicating with ordinary people, with the people who themselves are not scientists, with the people who have grown up doing things in a particular kind of way, but who have to adapt very frequently and modify their behavioural patterns because of the progress of science.

Here, in kite flying, is just one little example of the way that we have had to modify traditional behaviour patterns to accommodate something that we are all very happy about, the fact that we now have electricity in most parts of Guyana. But we have found, and this has been the experience throughout the world, that as scientific progress goes on its way, it has a serious impact on the cultural patterns of the country served by the scientist --- Guyana being no exception.

We have found however in Guyana, and I would imagine most of you in the Caribbean have shared this experience, that in terms of our own research, in terms of our own education in the sciences and in technology, we are in the stage of infancy.

Before we were Independent, and that happened just eleven years ago, our curriculum within the formal school structure and indeed within the informal school structure, was particularly innocent of any excursion into the field of science and technology.

This meant a lot of things, this meant that we looked outside of the country to try and share the results of the research in science that was being conducted in other countries. It meant that very frequently we did not have the personnel to adapt the technology that came into Guyana, and like most developing countries we were the victims of what has been described as technological imperialism.

We found that those few Guyanese who managed to acquire a nodding acquaintance with the field of science and technology found themselves unable to function effectively in their own country. The facilities were not there, the atmosphere and climate did not exist, and so for them it was an easier job to leave the developing Guyana, to go overseas to practise in the particular area of science and technology that they had identified as their particular area of interest.

Now what does all this mean in terms of science and science communication? Somebody said to me a few days ago, imagine after we have been communicating with each other for all these years we suddenly recognise and realise that it is important. And one remembers incidents throughout the history of movements in the world caused by the lack of communication of what was happening in terms of improved technology and improved scientific advancement. There were serious problems.

Looking to England a long time ago one remembers the Luddite riots, when workers saw the invention of machinery as being solely achieved for the purpose of putting them out of employment, and there was a wave of activity which ended in the destruction of machinery.

Much nearer home , I remember over the years the kind of out-cry one got from the unions in the sugar industry when there were the first attempts to introduce serious mechanisation within that industry; and even now there is very very serious debate and a lot of fear about any kind of improvement in that kind of area because the workman sees it as taking from him the opportunity to earn a livelihood.

This does not mean however, that one wants to hold back the kind of experimentation that has been going on in the field of science, it just means that one needs to explain in language that the laymen can understand, what exactly is taking place. Here we come to the crux of the matter.

There are two levels, to my mind, and I speak as a layman, at which this communication in the world of science needs to be effectively pursued. First of all scientists must talk to one another; and this has not yet started effectively. As a decision maker myself, I know the trauma that we experienced in attempting within our own environment, to cope with problems that other people have been looking at for many many years; to start afresh in research that deals with stock feeds or fertilisers, when one is aware that there has been some research somewhere else that could be of help.

But we have not yet evolved an effective system that makes the results of that kind of research available to us all. So that while Surinam has done a lot of work in the production of charcoal, Guyana, interested in this field, is now trying to tap some of the techniques to make our production efficient. We are all in the same business, we are neighbours, there is just a river that divides us, but we need to learn to have that dialogue.

Then,of course,there is the other problem (even if the scientists talk to one another) of the need to talk to the public to make us understand.

I know that there is a very serious temptation among any professional group, to establish a jargon which can be understood by no other group at all. I myself have been a professional and I am aware that in my particular profession we went back to the Latin language and have used over periods, and still do use, many phrases that nobody other than a lawyer would even try to understand. But the lawyers use it because it creates a sort of closed shop; and when we communicate with one another, we preserve our status and we preserve the esoteric nature of our particular profession.

Now I am not at all qualified to say whether in fact scientists do this, but I do not think it is just a gap in my own intellectual ability that makes it impossible for me to understand a

lot of the communication that emanates from the sciences. We find it impossible to understand not just what the exercise is about, but the purpose and the reason for the exercise.

To my mind, this spans the area of not just natural sciences but applied sciences as well. This is true of almost any area of the sciences that I can think of. There is this built-in process of identifying and devising a jargon that makes it impossible for anyone else to communicate or to understand the communication.

But the fact that this workshop is being held, to my mind, says that there is recognition that something has to be done in this area, so that you have called in aid, the science of communication to assist in this task; but if one is not careful, that science itself can have built into it particular hang-ups, which again form a barrier to communication.

It seems to me that, in Guyana, in the Caribbean and perhaps in the developing world as a whole, we live in a situation where because of our newness to this field, most of the research has been done in the developed world. Because we have not had the expertise to develop and adapt that research to our own needs or because we are not aware of the efforts of others to adapt that research to our own needs, we find ourselves over-dependent on the outside world for all the things that have come with the science, with the technology.

I know that in Guyana we have gone through periods when many many researchers have come here to Guyana, have got particular assistance and help in the interest of furthering the cause of learning and science, have been given access to all kinds of phenomena in Guyana that they regarded as unique, have been studying what has been described as the peculiarities of the peoples in Guyana, have done research on the fish, on the fauna, on the flora. We have not at all had a chance to really share effectively in the results of that research.

Other people have got PhDs as a result of this, or perhaps have been able to make a little bit of money because they have published work based on research done here in Guyana, sometimes by themselves, more frequently by Guyanese who were not able to draw the conclusions from the work they had been doing and we ourselves have been, as I said, not really the beneficiaries of the work that has been going on.

Now that we are independent, now that science is a subject o on the curriculum, now that we have become, I think, a little more aware of the importance of technological innovation in terms of coping with the problems of our environment, I would like to think that our own researchers and those researchers who come in, in this situation will be far more willing to share with us the results of the work they do.

I am not even suggesting that people were motivated by selfish instincts, but perhaps they simply did not see there was a need to so communicate. I am not even talking about people

who had a vested interest in not communicating, because they do exist, but people who because of ignorance of the importance of communication did not share with us the fruit of their work.

Living in a country like Guyana has other difficulties, again because we are not masters of our own research or research into conditions that are relevant to us we stand by or receive the results of inventions of discoveries that have made an impact overseas. Sometimes they have made an impact for particular reasons, because there are vested interests that demand that an impact be made. Sometimes these are counter-productive to the interest of little developing countries like Guyana, sometimes they're just plain unsuitable.

For example, there was time when Georgetown was a peculiarly beautiful city. The buildings were white, they were built on stilts, they were made of wood and they gave a very pleasing look. Now going around Georgetown, one sees that we have become masters of the art of using concrete to put up our structures, we use pastel shades, (that is fine) we build big edifices like for example the Pegasus Hotel, which have a beauty of their own. But these do not use the light that I think we have been blessed with; they do not use the breeze that the trade winds bring to us, but they are very sturdy buildings cutting out light and air, modelled on something from some other country.

Having completed the building we find that we really do need the light and air, that we have excluded the cool of the breeze, so we put in air-conditioners which are imported from overseas and we turn on the lights and have to keep them on all day because we ourselves have not had the confidence to do our own experimentation in the area of architecture, to find the buildings that are suitable for Guyana. But there are even more heart-rending examples of this kind of experience.

Guyana like many other developing countries, has from time to time, but more especially in the past, looked to aid donors for assistance to solve some of the problems of living in our environment and since malnutrition has been a problem for every developing country that I can think of, we have ourselves been in the position of receiving assistance in the form of powdered milk for our mothers and young babies.

Along with that there have been the commercial manufacturers of powdered milk, who were very conscious and are very conscious of the importance of communication, and who have subjected the residents of Guyana like all developing countries to the bombardment of every means of communication you can think of, which tells us of what a wonderful thing it is to use this particular brand of powdered milk or that particular brand of powdered milk.

Added to that, the communication net-work goes into play and tells us at a different level what our women should look like, what kind of figures they should have and how to preserve those figures. They give us statistics and in our struggle

to keep the standards that we have been told are the best, too many of our mothers refuse to breast feed their children. We believe it will interfere with the figure and men tell us that they would like to see us looking a particular kind of way, and we, silly clots, believe that that is what is really important in life, so we preserve our figures at the expense of the child.

But we do not think it is at the expense of the child because the manufacturers of the powdered milk have said it is the best thing that you can give your baby. And so the cycle continues, while the poor mother on the East Coast, who can't really afford the powdered milk in the quantity that she should puts in a little more water ... when there is such a ready means of taking care of our children.

But this is what I mean by the fact that we really need to call in aid, our science research, our techniques in dealing with these problems, to assist in our own struggle to live in the environment which is ours; and we need to have the communication link, the communication consciousness of science, working for us and not against our interest.

I am not sure how soon we will arrive at that situation, but it is indeed very heartening that our own Science Research Council with help from the Commonwealth, with help from resource personnel, are very conscious of the need to link these two sciences, the science of communication and the other sciences which are represented by the disciplines here today, in an attempt to produce the kind of linkages in the society without which, we can be lost.

It is impossible in 1977 to turn our backs on what is happening in the rest of the world. Indeed, the aspirations of our people in Guyana, in most of the developing world have all been fashioned in the developed countries. For about 300 years in Guyana we have been taught that the way the housewife in the United States or in Europe or in Britain lives is the way the housewife in Guyana should live, and that something is wrong with us if we don't have the modern conveniences that science has brought in the aid of house-keeping.

Perhaps that is true, but one needs an in-depth examination to try and work out which of those conveniences are the ones that are really important for a country like Guyana, for a country that is developing, which has 800,000 people, and 83,000 sq. miles with very little money to develop it.

In Guyana we have, since Independence, been attempting to combat the individualistic tendencies that have been part of our life style before independence, by emphasizing co-operativism, working together, the sharing together. In Guyana right now travelling around the country you would be aware of schools put up by what we call self-help; - you will see also community centres, drainage and irrigation schemes; and we have done it by sharing experience which we take very seriously.

In fact, it is recognised when we talk about co-operativism or co-operative socialism as the life style of the people of Guyana. We believe and we have to understand that knowledge is not a private preserve of any individual but something to be shared one with the other, that the result of the work of each one of us, is something that has to be shared with those who are not able or have not had the time or the interest to work in our particular area of expertise. That sharing of experience is one that to me, has been part of the life-style for a long time in Guyana.

The original inhabitants of Guyana, the Amerindians, lived in a co-operative way. After slavery, the Africans built villages having bought them by pooling their resources, and ran them in a co-operative way. Those labourers who came from India farmed and planted rice with the same kind of philosophy motivating their activity.

Therefore, I would like to say that you are doubly welcome when I see, in the way that you have come together, the same attitude to sharing knowledge, sharing experience, sharing the results of your research, perhaps the methodology of your research, sharing your experience of systems that can build into the whole net-work of science, the opportunity of sharing and helping each other and in that way helping the communities at large.

I do not believe that in the struggle to harness the resources of the world to help man become a happier being, that one should see oneself as being in competition with each other, because the end purpose of all this activity is the man himself. And in Guyana when we talk about socialism the most important aspect of that philosophy is the importance of the man, his value as a person, his value as a social being, his importance in terms of providing for him the opportunities to improve himself and develop himself.

And that after all, is the end activity of all the sciences no matter which is the particular area that you have chosen. It is the reason why you indulge in the activity, so that ultimately man will be able to live a better life, will be able, because of what you have been doing, to find himself more in harmony with the universe, more in harmony with himself, more in harmony with his fellow man.

Perhaps in a country like this it is understandable that we place so much emphasis on that kind of research that immediately helps us to tackle the basic problems that we feel man should not have, the problem that so many mothers in our country face of waking in the morning and not knowing what goes into that pot at midday, the problem of finding adequate housing, the problem of clothing oneself.

We believe that these are problems that should not occupy a hundred percent of the time of any individual or even half the time of any individual. Theseare things that should be provided for, so that a man's energy can be released to deal with other areas of improvement in life, in his personal

development, in the development of his society. Now, to do this one has to take into account that man in this society is not a peculiar being, but he needs to have assistance to use the resources around him.

Just a few months ago the people of Guyana faced a very difficult situation and we are still facing it. One of the reasons for this situation is the increasing cost of petroleum products and oil itself, because we depend so very heavily on this source of power for many of the activities that are carried out in Guyana.

Our electricity rates had to go up, because Government could not subsidise, as they had been doing for some time, the rates to the private consumer of electricity. But yet in Guyana, as everyone knows, we are blessed or otherwise with very large rivers, and numerous water-falls, potential for power and energy we have identified as needing to be tapped and we have started the work to do this.

But of course in a developing country, the technology to do this is very expensive; the inputs call for capital expenditure that certainly Guyanese do not have at hand and certainly very few developing countries really have readily to hand, but these are the areas to which we need to turn out attention. These are some of the areas that need urgent attention in countries like ours, and these are the areas where one would find that it is possible to interpret the work of the scientist to the ordinary man because he can share in an experience, which benefits him in a tangible way.

The whole area of food technology is one that we need to talk more about, and to talk in positive ways too. We have a whole tradition that we have been told is wrong, where mothers believe that the way to strengthen your child is to give it something called plantain flour, a flour we make from plantains. And certainly if you got anybody my mother's age or older than that, she would swear to you that any robust, healthy child she produced was the direct result of plantain flour.

Nutritionists, however, have told us, and I am sure they are right, that really and truly plantain flour has little that helps in the growth and development of the child; it has carbohydrates and very little else. So that we need either to stop using it, or to enrich it in some way with milk or something.

Now this is fine, it's important to know this; but at the same time, those of you who are involved in this particular field need to tell us with the same kind of dynamism that the producers of powdered milk have been using, what are things we should use. We know the things we should not use, now tell us a little more about the things that poor mothers can use.

Sell it as you would sell soap powder, if you want that analogy, because I gather that is something that is sold very

effectively; but sell it with everything, use the communication channels, the technology of communication that we have taken from the developed world, sometimes a little too uncritically. Use the traditional means of communication that our parents, our grandparents the villagers all know about, across the fence, perhaps in the barber shop, in the rum shops ; try and make it attractive so that you popularise the result of your scientific activity.

But nutrition is not the only area, architecture is not the only area, there are so many areas where the work you are doing is vital but can only really produce the results that you want if people like myself who are laymen understand what it is you are doing, understand the relationship of what you are doing to our life-style.

It is true, that based on the research you do and the results of that research the message might change very very frequently. And I remember the story of a man who went to a doctor complaining that he couldn't sleep and the doctor after asking him some questions said, "but the thing you have to do is have a really solid meal before you go to bed, that solves your problem." The patient objected, he said, "but doctor the last time I came, you told me just the opposite that I should not eat at all before I went to bed." The doctor said, "cha! that was last January, science moves very very quickly and three months is nothing at all for science."

But I think the public can be helped to cope with problems of change like that. The important thing is that we, the public, understand what it is you are doing, that you build into your work a system, nationally and internationally, that ensures that the process of communicating will continue even when you yourselves who, by your presence here indicate that you understand the importance of communication and you are committed to it, even when you are not there, and that you leave behind you a system that can function, that can work.

The importance of communication is something that subconsciously, I think, we all are aware of; but I think sometimes in pursuit of our own discipline we forget those who are, for one reason or another, outside of that particular area and too late we attempt to communicate with the people who should have been part of the investigation from the very start.

I am not at all suggesting that there are areas with which you are not the only people competent to deal, but I would like to think that every subject can be explained in terms of its relationship, in terms of the end purpose of it, in terms of what is involved, in a way that wins you the sympathy, the understanding of the people at large.

In some countries, that involvement is in your own interest and is important because you will need the funding to carry on the research; and if people don't know what the research is about and have not been involved you don't get it.

In a country like Guyana where we are trying a very difficult

job of funding things like this in different ways, of centralising the resources of the country and then allocating them to areas of importance; it is, nevertheless, important, perhaps just as important, to share with our people the results of your work because, after all, they are the people who provide the money for the research, either by taxes direct or indirect or in other ways.

Apart from that, if we respect each other as human beings, if we mean anything by the value of the individual, then we treat him in a way that shows that respect, we treat him in a way that makes him a partner in the sharing experience which is the experience of living.

We must say to him, "you are part and parcel of this exercise, you have a role in this just as I have a role; you are providing one function, I am providing another function; but together putting all our work together we will find a way of making life a better place, a happier place, a place where people can walk tall and feel proud of themselves."

In this area perhaps more than others you can de-mystify a science that has come down to us with all the cultural imbalance that has been part of the lot of the developing world. It has been part of the reason for so many of us who live in the developing world, feeling that those in the developed world are somehow way above us because they are in control of areas that we don't understand.

If you de-mystify this particularly important area then you help us, in ways perhaps you don't even think of, to restore the self respect which we should have, to have confidence in ourselves to understand that those of us who live in the developing world, are human beings on par, with valid cultural bases, with the ability to perform as effectively as those other kinds of societies. It is in that spirit that it is my pleasure to declare open this workshop.

2 COMMUNICATION TO MEET DIFFERENT USER NEEDS

D G Thomas

Introduction

People in different situations require information on a subject in different forms and with different emphasis and different depths of explanation. Even the same person seeks information in different ways and in different forms on various occasions, depending on his knowledge of the subject and the reasons for wanting the information.

There is no one means of communication that will ensure a ready flow of information for every situation. To be effective, more than one approach is required. One of the temptations in the communication process, as in other spheres of activity, is to be content with ad hoc remedies in different circumstances. The situation is far more fundamental than this.

Before we can communicate effectively, we must be quite clear in our own minds who we wish to communicate with, what information we want to convey to them, and what reaction we want from those being addressed. And we do, of course, want to know first of all, what is the best mechanism of communicating to a particular user.

Where do people get their information?

To ascertain which avenues to use for the transfer of information to a particular potential user, we must know from where the potential user usually obtains his information.

The results of the few surveys that have been made in different countries of the source of scientific and technical information by scientists, technologists and operators show that the more specialized the user, the more dependent he is on the written word.

In a sample of 606 scientists and engineers engaged in research at the John Hopkins University, it was found that 75% of 'pure' scientists, but only 50% of applied scientists, regarded the scientific literature, as opposed to oral sources, to be the most useful sources of research information. Somewhat similar response was obtained in another survey of 50 American scientists representing a wide range of disciplines: 60% first became aware of work crucial to

their own from some form of written communication, but there was a heavy reliance on verbal communication between scientists working in the same area.

Moving to lower levels of academic and technical qualifications, a survey of 1,082 industrial technologists in the British electrical and electronics industry revealed that 60 percent of respondents mentioned the technical literature as one of the most important sources of their ideas. It was evident from the results of other questions, however, that the technologist reads for general interest and to keep up to date; rarely does he use the literature for reference. Half of them claimed to make use of their company's library but only 22 percent would go to the library to seek information on a technical problem. A considerable majority said that they knew of no abstracting service relevant to their work, although in fact, abstracts were in existence.

Farmers are users of technological knowledge, who generally have received less formal education than the technologists. It is therefore not surprising that the results of a survey of 45 farmers in New South Wales show that interpersonal contacts were more important as sources of information than were the mass media and technical journals. It is important, however, not to underestimate the influence of mass media, as farmers often attribute information gained through the mass media to interpersonal contact.

Different types of users

The information system is composed of several distinct processes; these processes are different in different circumstances, being determined by the use for which the information is intended. Scientific information must be communicated, at many levels of explanation, to diverse groups of users:

1. to scientists within a specialized field;
2. to scientists of different disciplines;
3. to technologists and scientists in applied fields;
4. to non-scientists at managerial level, politicians etc;
5. to operators, including farmers;
6. to the general public.

All these groups of users view the extent and nature of the scientific communication problem differently.

Scientists, when seeking information within their strict research interest, will want the presentation in such a form that will allow them to judge the validity and significance of the research findings being reported. They will therefore want to know what has already been discovered and how the current research findings add to the store of knowledge. They will want to be assured that the findings are valid by the soundness of the techniques used and the validity of the interpretation of the results.

Scientists also seek information outside their specialized areas of research. They may wish to maintain a general

knowledge of other scientific fields, or they may want to know something about scientific activities in disciplines impinging on their own area of interest. In these circumstances, they would listen to or read reviews, at least in the first place, before searching the research literature..

Applied scientists and technologists will read a greater range of literature and go to many types of conferences and meetings in order to glean information of relevance to their applied problem. There is greater scanning of the literature and more general listening, but their attention is only caught on matters of immediate interest to them. They talk to more people across the range from research scientists to practitioners or operators because they form the essential link - the innovative link - between research and practice.

The non-scientist at managerial level, the technical administrator, and the political leader require information in different forms. They also need information over different fields of science and technology; not only do they require to know broad details of research findings, but they also need to know why the investigations were undertaken and whether or not the objectives were reached, what resources (both of manpower and equipment) were used, whether any results of practical significance emerged or what further work and resources are required before the findings can be used in an applied situation. They cannot judge the value of research without being supplied with information in a form that supplies answers to these questions.

The information needs of an operator, e.g. farmer, factory manager, are akin to those of the technologist, but are of a more practical nature. He will be more concerned with the application of research findings to existing or potential processes. The research findings must be interpreted for him.

The general public, to which all the above belong when outside their own business or speciality, as well as all others, is society at large. The scientist must report to a public who will judge both whether scientific pursuit is worth the money expended on it and whether the quality of man's life will be adversely affected by activities and innovations arising from such research.

The written word

One of the main faults of the scientific publication is its style: its circumlocution, its ambiguity and its clumsiness. It is often hard to read, not always because of its profundity. The form of reporting is an attempt to impart an apparently modest and disinterested tone in order to enhance the acceptability of the utterances. Maddox, the former editor of 'Nature' considers that the characteristics of scientific prose are symptomatic of an underlying failure of an author to engage himself fully in the task of communication as much as possible to as many as possible.

A more charitable view, and probably nearer the truth, is that the reporting of research results has been divorced from the research itself, instead of being regarded as part of it. The young scientist sets his standard on the existing literature, and thus the style and form is perpetuated. A concerted effort must be made to effect improvement. The time may now be opportune to do so, for it is now a buyers' market in that there are now more research papers on every subject for any one person to read, and authors should aim to 'sell' their papers to readers by improvement in style and grammar.

A conscious effort on the part of authors would achieve much; an even more effective means of improvement would be to provide a more systematic form of advice to authors than the present system of criticism and comments from colleagues. There is a strong case for an occasional refresher course to practising scientsts.

A recent refreshing attitude is to suggest improvements other than in grammatical style and syntax. There is a questioning of the dullness of the literature, its lack-lustre, its sobriety. There is a suggestion of the judicious use of such journalistic techniques in scientific journals as different type fonts, display boxes, and different colours in charts and graphs. If these are acceptable in technical journals such as "Scientific American", is there any reason why such methods would not be acceptable in research and review journals? There is need for experimentation in this field.

Publication of research findings in a scientific journal, although the end-point in one part of the communication system, is just the beginning in another part. Once research has been completed and the findings reported, the information should be issued in different forms that can be understood as far as is necessary by all the different types of persons concerned with the usage of the results - the applied scientists, the technologists, and the managerial sections of the organizations being addressed. To this list of users should be added the general public, which is concerned with the wider implications - the possible social consequences of the use of new developments in science and technology.

There are two kinds of publications that cover this wide range of readership, the technical article and the scientific article. The technical article is an organized presentation of facts and

data to inform, educate, and assist the reader in the performance of his job e.g. plant or process description, operating procedures, management techniques. Its purpose is to increase the reader's specific knowledge. Scientific articles are directed at readers who are seeking to increase their general knowledge about a subject, whether this be things, theories, or persons e.g. Scientific American, New Scientist, Science Journal.

Cudlipp, then editor of New Scientist, stated that one of the functions of his journal is to help stimulate cross-fertilization of ideas between the different scientific disciplines, between pure science and applied, between academic research and industry.

Readers of technical articles are generally more interested in results than in the means by which they are obtained; the primary aim of such articles is to proffer advice on action necessary and the effect that will follow. This advice must be presented without the distraction of lengthy reasoning, and with the aid of powerful graphic presentation of quantitative data.

Technical articles can be written at two levels, one for the technologist and the other for the intelligent lay reader. Too frequently, lack of technical knowledge is regarded as being lack of intelligence, and many an administrator or politician or shareholder has been antagonised by this attitude. A high standard of writing for a non-technical reader is often more difficult to attain than for the specialist or technically trained, and it is for this reason that a skilled science writer is generally more successful than research scientists and engineers.

One of the difficulties in writing for the popular press is not knowing how far one can use scientific terminology and how much detail to include. This is a specialized job, demanding training and experience. The science writer for a popular newspaper has a difficult job to do. Apart from being able to understand the significance of the scientific information, he must be able to impart that information in terms understandable to the readers and in a style appropriate to any particular newspaper.

It is this failure to understand the science reporter's difficult task that has caused so much antagonism and suspicion among working scientists, and has led to charges of mis-reporting and distortion of the facts.

Directors of research establishments have also failed to appreciate these difficulties, and have often reacted by shunning any contact with the press instead of appointing a staff member to liaise with the press, and to write press articles on occasions.

The form of the news item is quite different from that of the feature article or a contribution to a technical periodical. The lead paragraph contains the major message and the rest of the story progressively gives greater detail or explanation. This allows the deletion of the final paragraphs if space is limited without upsetting the rest of the article.

A staff member of a research establishment well-versed in the ways of the press, the general style of the publication, and how to present the material, can often have his article printed verbatim. This approach will avoid the oft-repeated wailings of the scientist that press articles are wrong in fact or misleading. Such a person is acquainted with the different free-lance writers who have shown an interest in the work of the organization, and will know the lines of scientific policy pursued by the main dailies and the relevant trade and technical press.

The spoken word

The most fundamental form of communication is personal contact. In an examination of the interaction among scientists at a laboratory, high research performance was associated with frequent contacts between colleagues, which provided not only intellectual stimulation and new ideas, but output comparison, error-spotting and coordination. The setting up of teams, committees, and evaluation groups increased contact but it was found essential that such arrangements are informal and uncomplicated. Unlooked-for information is often obtained in this way.

The more formal symposia, conferences and congresses are valuable for the closely-knit group of people attending them. They provide an avenue for the rapid dissemination of new information which is submitted to immediate, informed criticism. They do not however provide a perfect system, and the success of a conference depends largely on its organization and the performance of the participants, chairmen, and discussion leaders. Scientists often assume that they have a natural ability to communicate orally. This is a dangerous assumption.

In a different category are those conferences convened to bring together scientists and others - economists, government administrators, industrialists, medical practitioners etc. These may fail because of insufficient planning to ensure effective contact. Communicators either supply the wrong information or in such general terms that others are unable to relate it to their own situations. Unless there is a careful selection and briefing of speakers and discussions are competently led, such conferences fail to achieve their purpose.

Yet another form of oral and visual communication is the exhibition and display. As with other kinds of communication methods, the actual form of the exhibit will be governed by the purpose and audience to which the information is directed.

Oral and visual communication is also used in the media of radio, television and film. Apart from the special use made of film to show the research process, these media's role in science and technology is to interest as well as to inform the general public. All three media are also used to convey scientific information and advice to special groups e.g. farmers' groups, students.

Too much emphasis is often placed on the need to present an exhaustive discourse on a subject instead of using the broadcasting media to convey ideas and concepts. But to be able to do this, an awareness of the questions being asked on the subject by the public and an ability to answer them effectively, are equally as important as a thorough knowledge of the information to be put across. In this context, the scientist as communicator is only one of a team of specialists, each contributing equally to the task in hand.

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Like television, we have in film a means for the wide dissemination, not only of scientific knowledge, but of popular understanding of the very nature of science, of its problems and of its achievements. Like television programme production, successful film-making demands as high a degree of professionalism in its communication objective as the pursuit of scientific research.

3 ORAL PRESENTATION AT MEETINGS AND CONFERENCES

D G Thomas

Every scientist is called upon now and again to speak to others. The range of topics can be very wide, from a specialized subject matter e.g. an account of recent research findings to his peers, to a discourse on a wider scientific plane to a general audience.

Not all of us are endowed with oratorical skills and few enjoy this role of delivering an oral address. But there are certain guide-lines that, if followed, will make a presentation vastly better, and will make the task of the speaker easier. Some of these procedures may appear very elementary and obvious, but so often the presentation is marred by the oversight of some detail that could so easily have been avoided if this was considered during preparation or delivery.

To start at a very early stage, when a request is received to present a paper or talk - it may only be to a small committee - or a decision has been made to present a paper at a professional conference or symposium.

It is important, even at this early stage, to obtain certain information:

1. Date, time, and place of presentation
2. Time allowed for the delivery
3. Subject matter
4. Names and subjects of other speakers
5. Size and general description of audience
6. Effort required in time and money e.g. are proceedings to be published ?
7. Visual aids equipment available
8. Deadlines for receipt of paper or abstract by organizers

The next step is to consider in more detail the subject matter - its scope and limitations. This must be done in relation to:

1. Composition of the audience. This will affect:

   terminology; with a specialized audience, it saves time and avoids irritation to make use of scientific terms with specific meanings, but these terms should not be used or only after defining them when the audience is general.

   depth of explanation;

   examples and anecdotes used to emphasise or explain important points; and

   complexity or simplicity of graphics.

2. Specific purpose of the presentation. This will be clear if answers can be supplied to the following questions:

   What does the listener want to know?

   Is the listener expected to take action? If so, what action?

   How is the listener expected to react - confident, aroused, encouraged, frightened, relieved, inspired?

   Is a solution being offered to a problem?

   Are questions, suggestions, or replies expected from the audience?

   Will the audience be persuaded to accept a course of action?

   Will an attempt be made to inform the audience?

With this background information, ideas can be assembled by pursuing in sequence the following steps:

Jotting down ideas as may come

Eliminating - repetitions
- vague ideas
- unrelated ideas

Discriminating - make rough outline of key ideas

Classifying - search out subordinate ideas

Placing ideas in sequence, arranging them in a logical order

Fortifying and amplifying ideas with graphics
- determine what to chart
- decide on how to chart

Including homely examples to explain abstruse points.

The next step is to prepare ideas for oral delivery, and to consider how to make ideas attractive, forceful, and easy to comprehend. The time-proven form consists of an introduction, a body, and a conclusion.

Introduction. The audience has come prepared to listen. It will be attentive at first - contact must be made at the outset and maintained throughout.

Transition between introduction and body. The audience must be motivated by giving good reasons why each listener should heed and weigh each message as meant for him.

Body of the talk. The main points can now be made and elaborated and this can be achieved by making them clear and palatable for the audience, and by illustrating verbally and graphically by examples, case histories, the typical incident, the representative sample.

Conclusion. The end should have a purpose. It may be:

to activate audience to take a course of action

to summarize the main message - repetition aids retention

to stimulate questions and discussion

The visual aid, properly used, can greatly enhance the effectiveness of an oral presentation. It has been proved time and again that visual aids substantially increase retention of information by an audience.

To communicate facts, figures and ideas most effectively, a visual presentation should be employed. But the graphic must have something that is worth saying to someone worthy of hearing it to warrant the time and effort required to prepare it.

An oral presentation has got to march along. Graphics must be changed frequently, and must not be visible if no longer relevant. Only information to be conveyed at that moment should be included on the same graphic, as otherwise the audience's attention will be diverted from the immediate issue being discussed. Visual communication is dealt in greater detail in Chapter 4.

Finally, the text must be reduced to an outline form. A text should not be read to an audience except in very exceptional circumstances, and certainly not memorized. It is better to work in ideas and explain them in your own words of the minute.

The outlined text or notes should be typed or printed in triple space. The notes should be neat, with no cross-outs, wandering arrows or complicated marginal notes. Where it is advisable to pause for effect or to make a break between one idea and another, a mark in the notes would help to remind the speaker. Mnemonic devices (e.g. colour coding) are also useful as aids to indicate the sequence of ideas to be presented and to keep tag of timing.

Both the graphics and notes should be studied beforehand for hidden implications that may have been missed when planning.

Most importantly, presentation should be practised as an integrated whole; the audio and visual will be presented together and must be learned together.

It is not uncommon these days to be expected to make use of a public address system. Speakers often regard microphones

with considerable passion - they either fight with them, or regard them as objects to be caressed. Others ignore them entirely, regarding them as unnecessary gadgets. Public address systems are there for a purpose - to make the speaker heard by all the audience, without undue strain on the part of the speaker or the audience.

Microphones are very sensitive and heavy breathing, sniffing, coughing, sneezing, and handling should be avoided. Care should also be taken with notes as the crackling of paper is picked up and amplified.

The speaker should talk quite normally about fifteen inches from the microphone, which should be adjusted to the level of the mouth (and switched off during adjustment).

It is now becoming common to use microphones slung around the neck or clamped to the speaker's clothing. The microphone is installed and adjusted when switched off, and before beginning to speak. Otherwise the audience can be distracted and lose concentration.

Sometimes, a paper must be read e.g. presidential address, at professional meetings, to avoid omissions, errors, discrepancies or undue emotionalism. There is a difference between a report meant for silent reading and a report meant to be read aloud.

The silent reader can reread a sentence several times for clarity and comprehension and stop to analyse complex sentence structure. In oral delivery, however, a report or paper must be heard and understood by listeners the first time. Sentences must be constructed to be followed easily and comprehended by listeners.

When reading a paper, the speaker should bear in mind to:

1. keep the purpose in mind so as to be aware of the logic of the material,
2. analyse the meaning of the sentence by dividing it into thought groups,
3. emphasise key words by vocal stress,
4. be sure of word meanings and to avoid words with several meanings,
5. avoid verbal booby traps - tongue twisters, and to
6. vary pitch, quality and volume of the voice.

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4 ORAL PRESENTATION TO THE PUBLIC: THE PRESS CONFERENCE

C A Nascimento

The Press Conference is a familiar exercise used by any public relations practitioner to obtain exposure in the mass media for whatever subject, idea or product is being promoted for public acceptance or consumption.

This workshop is particularly concerned, we know, with the problem of the scientist disseminating information "to specialists, to administrators and to the general public". The Press Conference is a tool for reaching the general public, and, whether it is concerned with the dissemination of scientific information, promoting a political cause, or selling the image of an industrial complex, the techniques employed and the methodology to be pursued vary very little, if at all.

Walter Lippman once observed that "we do not first see and then define, we define first and then see". Lippman's observation points to a very fundamental problem in public communications and is germane to the successful planning of a press conference, simply that we must seek to put ourselves in the shoes of our audience before we seek to communicate and having done that then attempt to prepare what we wish to communicate.

Put another way by another renowned communicator, "the greatest problem of communications is the illusion that it has been achieved".

The Press Conference generally obtains for us exposure in the mass media, providing we have something worthwhile to say, because it conveniently assembles journalists and broadcasters in a single place and arranges for them to be placed on a face to face basis with whoever is communicating the message. It is, probably, therefore, the best way to obtain direct contact with the media. But guaranteeing exposure in the media is not guaranteeing communication with the public.

Lest there be any doubt what is meant by communication, I think we can settle here for a one-word definition: "understanding".

In essence, we are seeking to share what we have to say with our audience in a manner that is likely to attract their attention and hopefully win their assent. If we succeed in having our audience understand us and through understanding establish a common bond with them, we will have communicated.

It is important, therefore, to define our audience, and the reporters attending the press conference are not our audience, our audience is the variety of publics we wish to reach.

Our approach to a press conference, therefore, ought to be exactly the same as an approach to a total public relations exercise.

When we plan a press conference the following steps are recommended:-

1. We must define our objectives. But in order to avoid defining first and seeing afterwards, our objective must relate, not merely to the message we have in mind, but to the publics involved and the attitude changes expected.

2. Following from (1) we must validate our objectives by researching, as best we can, attitudes held and opinions expressed by the publics we wish to reach on the subjects or issues we intend to raise at the press conference. From this research, we ought to be able to arrive at the questions which are going to require answers.

3. Having done our research and interpreted it, we may wish to re-orient or modify our preliminary objectives.

4. A full-fledged, indepth discussion must then take place on the strategies to be employed at the press conference, and this must take into account such variables as the nature of the media we are dealing with, the credibility of the central figure at the press conference and the organisation which he or she represents, the nature of the original message, possible group interaction amongst journalists and broadcasters in attendance and, if appropriate, the identification of a theme or symbol for the press conference.

Even a successfully organised press conference and an accurately reported one, obtaining maximum exposure in the media is likely only to result in bringing about public awareness of the subject of the press conference, and at best, public interest and possibly public evaluation.

Trial of the idea or product and adoption or acceptance is seldom if ever achieved through the medium of a press conference. Other forms of communication utilisation and other channels will have to be organised to complete the communications process.

There are some relevant communication fundamentals that we might bear in mind when planning a press conference, and they are often forgotten by the very best public relations

practitioners.

1. First, we must beware of "media seduction". The public word printed or broadcast or filmed is not necessarily evidence of either audience exposure or acceptance, as I have already implied.

2. We need to be aware of a phenomenon in communication described as "selective perception". People will do certain things in accordance with their psychological or structural set:-

(a) People will avoid exposure to material which is in direct conflict with entrenched attitudes.

(b) People will distort messages they receive to adjust them to their own attitudes.

(c) People will accept and retain only that part of the message which is readily compatible with their held attitude or a major decision which they have already taken.

3. When researching attitudes, we should know that "opinions" expressed by people are often "reflections", not necessarily "expressions" of a held attitude.

4. Rational appeals or presentations (to which the scientists in particular is attracted) do not always guarantee successful communication. False perceptions are not always rectified by straightforward exposure to facts, though communications sociologist generally hold the view that the more "intelligent" the audience, the greater the likelihood of a rational presentation or appeal succeeding.

5. In certain circumstances, presentation of the "truth" can result in outright rejection.

6. The scientist as indeed the politician, may seek to communicate matters which arouse fear. Communications which arouse fear and which provide no adequate relief or some reassurance, rather than resulting in maximum response, invariably motivates an audience to minimise the importance of the threat. Scientists dealing with impending public disasters please note.

I have mentioned credibility of the speaker at a press conference, in passing, but let us never forget that the message which seeks to persuade will be successful only to the degree that the audience is convinced that its source is reliable and trustworthy and that the persuader is generally committed to the welfare of the audience.

It is my understanding of the purpose of this workshop, that in discussing with you the press conference under the general heading of oral presentation to the public, I should not involve myself in the techniques of public speaking. However, for the scientist who finds himself in a position of

having to communicate through the medium of a press conference it is important that he attempts to master the art of public speaking.

There are many books on public speaking, but perhaps one of the best I have read is called "Selected Readings in Public Speaking" by Jane Blakenship and Robert Wilhoit.

In their book, Blankenship and Wilhoit make, I think, a basic and very valuable observation which ought to encourage those whose profession is science to mount the public platform without too great a degree of trepidation. Their contention is, that there is not too great a difference between conversation and public speech, since "there is practically nothing true of public speaking that may not be true, at times, of conversation, and nothing true of conversation that might not be true of public speaking."

At a press conference, the closer the speaker comes to conversational delivery, the closer he is likely to come to achieving rapport with his immediate audience.

Perhaps a few observations are in order in respect to actual preparation of a press conference as opposed to planning the press conference.

Generally, people who hold press conferences often make the mistake of annoying the journalists present by making too long an opening statement. No more than five minutes is recommended.

The speaker at the press conference, unless he is exceptionally brilliant and possesses a magnificent memory, must prepare himself by rehearsing the press conference with his advisers, technical officers, etc., preferably the day before the press conference.

The rehearsal session should result in the speaker being able to anticipate every question that is likely to be asked at the press conference so that an agreed, prepared answer is available.

The best way to deal with the rehearsal is to have it minuted in detail so that the speaker can brief himself appropriately prior to the holding of the press conference.

Journalists are generally sensitive people, given to standing on their pride and the more widespread their reputation, the more "prima donna" their behaviour. Since that is the case, with few exceptions, the press conference must be scheduled, timed and programmed down to the last minute so as not to waste the time of the journalist or in any way make him or her feel used.

Invite the media representatives to be present and seated (comfortably) no more than ten minutes before the conference is due to begin, but insist on discipline. Late journalists should not be permitted to enter once the conference has begun.

A senior person, close to the speaker, should welcome the journalists, show them to their seats and seek to establish as informal an atmosphere as possible.

If the speaker is to be accompanied by advisers, they should be seated at least five minutes before the speaker himself enters the conference room.

It is advisable for the speaker to arrive about two minutes before the press conference is scheduled to start, obtain voice levels promptly, if necesary, perhaps exchange a few pleasantries with the journalists present, submit to photographs and begin the opening statement on time.

In inviting questions at the conference, the speaker should be positive about the reporter whose turn it is to ask the question and should make sure that as many reporters as possible are afforded the opportunity to ask questions within the time limit available.

If the press conference is being filmed or broadcast it is useful if each reporter identifies himself by name and his organisation prior to asking his question.

It is advisable not to allow a press conference to last longer than 45 minutes. It is traditional that journalists be informed of the intended length of the press conference and that the senior reporter present bring the press conference to an end at the appropriate time by thanking the speaker.

5 EFFECTIVE RADIO SPEAKING

Rafia Khan

In my experience, radio broadcasting is practised most effectively by those who understand and appreciate the characteristics of the audience and their own peculiar (and unnatural) position in relation to that audience. This understanding unlocks the door to the commonsense techniques of broadcasting, for effective radio broadcasting is not an esoteric art but is available to anyone who will take the trouble to understand the medium he intends to use.

First - and you will forgive me for saying the obvious - radio is not a visual medium. Allow me to make clear just what the lack of a visible speaker means to the radio audience and what the lack of a visible audience means to the speaker. When you are speaking in the lecture room or in the auditorium your audience is present in person and, through visual aids - like the way you are dressed, like shaking your head or extending your arms, or pounding the table or smiling or moving about - you try to keep your audience interested in what you have to say. They not only hear you; they see you. The radio audience on the other hand can only hear you, and you have to rely on your voice alone to hold their attention. Effective radio speaking is therefore not just a matter of uttering words. In the way you put across your message you have to make up for the absence of visual aids. More about this later.

And what effect does the lack of a visible audience have on the speaker? As you know, public speaking is usually a type of circular social behaviour. The speaker first stimulates his visible audience but, just as important, the audience in turn stimulates the speaker. Those of you who have done some form of public speaking will realise the subtle but potent influences the audience has upon you. The best speaker is inclined to be the one most sensitive and responsive to these influences, one who has the "feel" of the audience. Radio, however, has entirely broken the chain of this circular process for the speaker. In radio, your audience may react to you, but you cannot react to them. And at the time of your broadcast, you can't even tell for sure that they <u>are</u> reacting to you.

Another important psychological factor in broadcast speech lies in the distribution of a radio audience. In total, thousands of people might be tuned to your broadcast, but in reality those thousands are split up into small groups and individuals located in their own homes, or offices or cake-shops. An audience divided up such as this deprives a speaker of all the advantages to be gained from inter- stimu-

lation so commonly noted in crowd psychology. Those infectious waves of emotion that sway a large mass of people seated or standing elbow to elbow at a public rally are lost in radio for in this medium we are dealing with a large collection of people each completely uninfluenced by all the others.

Furthermore, radio listeners are entirely free of those social inhibitions, compulsions and conventions which dull speakers often rely upon to keep a visible audience in their seats. People who would be embarrassed to walk out of an auditorium while some would-be spell-binder is speaking do not hesitate to switch off the radio speaker who bores or irritates them.

These factors should force the radio speaker to be more painstaking in the preparation and presentation of his talk. Few of us realise until put to the task, the extent to which the eye and the ear, when working together, are influenced by impressions that come through the eye. When you pluck out the eye, as in radio, when the sense of hearing alone is involved, we have a very different and much more difficult problem on our hands.

So then, the radio speaker has only one set of stimuli to work with instead of two. He can use only the audible speech symbols and he has no appeal for the eye. Effective radio speaking is, therefore, not just a matter of uttering words. In the way you put across the message, you have to make up for the absence of visual aids. Your voice is the sole instrument for projecting your whole personality through the air to your audience. It seems, in fact, that broadcasters are sharply divided into those who are unable to feel the unseen presence of their audience and those who are acutely conscious of it as if it were visible before them. Both sides are, of course, equally aware that their audience exists, but the first type cannot take the imaginative steps which will enable them to act on their knowledge, or else they lack either the urge to communicate or the childish delight in make-believe which actuates the good broadcaster.

The cardinal principle of good broadcasters is the use of a direct conversational tone. The whole emphasis should be upon a sincere direct contact with the members of an audience that will achieve the effect of face-to-face conversation. No speaker at the National Park or elsewhere, even when amplifiers are provided, addresses a crowd in the terms and tone he would use when talking quietly and colloquially to an individual, and the larger the crowd the wider the divergence in his style of address and the more general and less intimate his contact. On the other hand, the broadcaster who feels the presence of his audience must keep his pitch down so that he can express himself with the immediacy of a private conversation. He is not impressed by the fact that his audience may run into thousands. He sees with his mind's eye an individual or a small family group relaxing in the living room or engaged in domestic tasks. People thus situated resent an oratorical or pedagogical tone of voice in a guest, seen or unseen. They expect the radio voice to talk to them, not talk down to them.

Proceeding on this understanding, we have only to ask ourselves what are the most effective means of speech in an ordinary conversation? What is the winning and attractive tone to use: The situation calls for an intimate and informal tone. The radio listener is quick to detect insincerity in our speech, so we must not put on airs, or try to be precious, coy or pompous, unless we naturally are, in which case we have no right being on the radio anyway. I appreciate that the effort to carry on an imaginary conversation can result in the loss of forcefulness somewhere between the microphone and the listener. Something I do when I am broadcasting is to imagine the listener sitting about four feet from me, and he is blind. Thus, in order to convey to him my thoughts and emotions, I must try to express everything in my voice by variations in pitch, in emphasis, in intensity and by pausing here and there. Inflections of the voice are vital to the good radio speaker, for they give colour and life to what he has to say. I may be reading a script but I don't have to sound as if I am reading. If the use of quiet gestures will help your delivery when speaking on the radio, by all means use them. Psychological experiment has shown that the muscles of the body respond in perfect accord with speech efforts. If one were to record in waves, on a strip of paper, the voice of a speaker and also the subconscious movements of any part of his body, for instance the arm, one would find that these two curves agree. A close correlation exists between body movements and thought processes. So point your finger at the imaginary listener. Shake your fist. Smile. One of the first bits of advice I give to a new broadcaster is: Before you open the microphone, put a smile on your face. A smile is heard over the radio because it changes the quality of your voice. Do not neglect these aids to speech. At the sametime - a word of caution - make no gesture or movement that would cause extraneous sound. A bang on the table sounds like thunder through the microphone, the rubbing of an unshaven chin like a motorbike revving up.

Above all else do not be dull. Indeed, it is difficult to exaggerate the deleterious effects of dullness. Not long ago, I listened to a talk, or part of a talk, on a subject in which I was much interested. But, alas the drawling monotony of the delivery was such that I switched off under the impression that I was listening to an outpouring of half-baked commonplaces. A week later I read the same talk in print and was amazed to discover an interesting and well-written article. A proof, you will say, of my stupidity! Undoubtedly, but what was it that stupefied me?

There is no better training for radio speaking than the reading aloud of all types of material. If you are going on the air for the first time, you should sit down with a friend and tell him what you intend to say, and then read him a part of your talk. The person listening can tell you exactly how your conversation differs from your reading style and tone. It would be a better test if your friend would close his eyes and turn away from you while listening. Simple words are the best for radio. Excessive use of sibilants, alliteration and tongue twisters should be avoided on the radio. (That

very phrase "Excessive use of sibilants" has so much hiss in it that I would never attempt it on radio). More than this, it is a good general rule to keep sentences short. Subject must not be too far separated from verb. In this connection, you must remember that the eye can take in a whole sentence at a time; it can see the beginning and the end at once, and get an idea of the general shape of the sentence. The ear takes in a sentence word by word, it must wait until the end of a sentence to discover its shape; it cannot flash back, as the eye can.

I come now to the question of audibility, of clarity. When the listener has to make a great effort to catch the broadcaster's words or his meaning his concentration on what is being said is seriously impaired. Consider for example what happens when by a sudden dropping of the voice or vagueness of articulation the speaker blurs a word or two. The very first time this happens the listener becomes involved in a nerve-racking process. He stops listening and tries to guess at the missing words. Whether he succeeds or fails hardly matters because, by the time he is listening again, the talk is a whole sentence ahead of him. The best he can do now is to cut his loss and listen for all he is worth in the hope of picking up and holding the remaining length of thread. But once again the speaker garbles his words and the thread this time is irretrievably lost. The effect of this on the listener is to induce in him a nervous deafness and he begins to miss what he actually could have caught. Here it is no question of mood: even the most persevering and sweet tempered listener is hopelessly lost and had better curtail his agony by switching off.

A contributing factor to lack of clarity in speech is speed of delivery. You should never talk too fast on the radio, because it is hard for the listener to follow you when he cannot see your lips moving. On the other hand, too slow a delivery may make an audience restive. The best advice I can give on this point is that the would-be broadcaster should vary his rate of utterance depending upon the weightiness of the material. The tougher the stuff, the slower the pace. And be careful how you breathe. Do not rely on ordinary punctuation but go through your script and mark off groups of words which bring out your thoughts. None of these groups should be too long that you run out of breath. When speaking off the air, you can afford to take a deep breathe through your mouth without distracting anybody, but you dare not do this on the radio for it would be clearly heard. On the radio you must inhale more quietly and deliberately through the nostrils, and never exhaust your breath entirely before taking another one. Also you do not breathe directly into the microphone unless you want to sound like a windstorm.

So to sum up: Radio speaking is a one-way conversation with a vast audience of individuals. The radio speaker must have something interesting to say and must say it attractively. He will use the rising and falling inflection of ordinary conversation. He will be emphatic, soothing or inviting through his flow of words, and at all times will endeavour to project his personality pleasantly to the distant listener.

6 WRITTEN COMMUNICATION - PLANNING AND PRODUCTION

C A Nascimento

Abraham Lincoln has been quoted almost ad nauseum in so many different circumstances in order to illustrate such a vast variety of points of view that I hesitate to quote him once again, nevertheless, one observation the late American President made in regard to the value of effective public communication is so much to the point that I consider it worth repeating here:-

> "With public sentiment, nothing can fail. Without it, nothing can succeed. Consequently, he who moulds public opinion goes deeper than he who enacts statutes or pronounces decisions. He makes statutes and decisions possible or impossible to be executed."

If we translate Lincoln's observation in terms of the scientist, rather than the politician, we might paraphrase to read:

> "He who moulds public opinion goes deeper than he who hypothesizes or pronounces scientific law. He makes hypotheses and scientific law possible or impossible to be executed."

Today we have been asked to look at one communication channel: literal communication in its written, or if you like, in its printed form as opposed to person to person, or the channels of sound or sight and sound, though all three of those channels are dependent at some stage or other on the preparation of the written script.

There are others on the panel today eminently more qualified than I am to deal with the actual techniques of writing for public communication. I thought, therefore, that I would deal with what some communicators describe as those variables in communication which create "barriers to effective communication," and which I think we might more usefully refer to as aids to effective communication.

Again, as with the medium of the press conference, with the written communication, which is aimed at persuading public understanding and acceptance of the message we seek to communicate, we are concerned with the problem of exposure before we can achieve awareness, interest, evaluation, trial and adoption.

Newspapers, pamphlets, posters, booklets and books need not be read. Radio and television sets need not be turned on and

are easily switched off. Exposure is not guaranteed through these media.

And even when exposure is achieved, as communicators, we are still faced with the problems of predisposed attitudes which derive from the structural set which individuals hold.

The message you wish to convey may be simple enough, clear enough, nevertheless, when that message is received, it may not result in the behaviour you intended or expected.

Some sociologists describe these communication variables, such as the individuals' structural set, the actual channel chosen for communication, the credibility factor of the communicator, the influence of opinion leaders and small groups, the symbol system we use, as "extra communication factors and conditions."

It is important, therefore, that in the preparation of written communications we are all aware and understand the pitfalls along the way to reaching the audience we aim at.

If there is a tendency to be secure in the knowledge that what is sought for the community to accept is best for the community, as may well be the case with the scientist, there is even greater need to be conscious of the conditions for communication.

What we are talking about is the need to get into the minds, the habits, the mores, of the audience we seek to reach; the need to identify and understand the sources of influence to which our audience are subject before we ever put pen to paper.

The problem of course, with effective communication, is that it is almost a science in itself, and it intimately relates to a number of other scientific disciplines. We are concerned with human values, attitudes and opinions; we are concerned with human behaviour, human environment, the meaning of language, sociology, psychology , anthropology, philosophy, linguistics and semantics are all involved.

Earlier, I mentioned the symbol system we use or the language we use. It is this language that contains the message in an act of communication, yet the language we use is a very imprecise tool and we need to guard against this fact.

One communication specialist has observed that "language is a product of life rather than the result of an exact science, it is a means people utilise to convey their needs, to express their emotions, to control their environment. Language often fails as a means to accurate communication because it very frequently fails to relate to reality."

Individuals who use the same language but who do not have a common experience or environment, for instance can often understand different things from the same phrases and even words.

This is why a universal language would not necessarily improve understanding or communication between different people, that is why our efforts to communicate through the written word and indeed the spoken word so often go astray.

Imagine, for instance, as those of us in Georgetown can, seeking directions in the middle of Rupununi Savannahs from an Amerindian. He may say to you that the place where you want to go is "just around the corner". If you are from Georgetown, you may set off walking, assuming that it is but a block away only to discover, five miles later and at the expense of weary feet and an exhausted temper, that you have not yet arrived, and that when an Amerindian talks about "just around the corner" his experience is very different from those of the city person.

Let us remember that the languages that we human beings use to convey meaning to one another, are simply a symbolic presentation of our experience.

To identify the weaknesses and strengths of our audience, we must know the sources of influences, whether they be political, religious, educational, etc., within the community; we must learn about the pervading likes and dislikes, the the superstitions which are held.

Then there is the phenomenon of opinion leaders. Those persons in almost every community who exert a special influence on other members in the community on almost every subject and who frequently are turned to for an explanation of an involved subject or a new idea communicated through the print media, or, for that matter, any other channel of mass communications.

To complete the communications process or at least make it more effective, it is useful to know who the opinion leaders are and sometimes structure our appeals directly to them.

Sociologists, Berelson and Steiner, have done considerable work on the influence the "small group" can bring to bear on communications directed at persuading behavioural change: "small group is where a great deal of human behaviour, including the 'right way' to behave is learned and enforced."

Berelson and Steiner define the small group as being not more than 25 persons, who frequently associate together in face to face relations over an extended period of time, who distinguish themselves in some way from other persons around them, who are mutually aware of their membership in the group and who are conscious that their present relationship within the group is an end in itself.

Berelson and Steiner take the position, on the basis of extensive research, that the individual attached to a small group, be it his family, a membership group such as a trade union, a political party, a club, a cultural group or a church group, places one of the major limitations on the mass media as a means of persuading people.

In fact, a number of communication sociologists have argued that anti-social attitudes are invariably entrenched in small groups rather than being held by individuals themselves and that these attitudes can only be effectively dealt with through the group and by penetration of the group rather than by external direction to the group.

Of course individuals belong to more than one group, but when there are conflicting pressures between groups, it has been reasonably established that the individual always tends to resolve the conflict in the direction of the group to which he is more strongly tied.

There is a great deal more that can be said and discussed on the intriguing communication factor of small group influences and the behaviour they generate, but once as an educator or a scientist seeking to communicate with a large community, you are aware of these group influences, you can make an active effort to prepare what you write accordingly and use your knowledge as an aid to effective communication.

I hope you will forgive me for having dealt in generalities rather than particulars, but I have done this only because I tend to be overly conscious, perhaps, that there is no more complicated an organism on earth than the human being and that the act of one human being communicating with another is a thoroughly complicated process and for that reason often the least understood, though we do it every day and take it so much for granted.

7 SCIENTISTS WRITING FOR SCIENTISTS

M Vahrman

Writing papers is an integral part of normal scientific practice. Improvement of form and content is achieved by continual writing throughout a career. The more important problem for Guyana, however, is for a greater scientific output, particularly devoted to the development of indigenous resources. "Paper writing settles itself if there is something to write about".

In this Session, we shall be concerned with the writings that scientists do for fellow-scientists - not for the general public, or even, mainly, for scientists working outside the general fields of activity of the authors.

I think it should be said at the outset, however, so as to maintain a perspective, that the problems connected with such writing are dwarfed by the main central problem for science in Guyana, which is to develop an embryo into a thriving individual, having a decisive effect on the use of the country's own resources, animate and inanimate. Paper-writing settles itself if there is something to write about.

1. Various Sorts of Scientific Publication

I shall deal mainly with the scientific paper, the essential step in the communication of new knowledge. There are other scientific publications which are widely used, however:-

(a) reviews, which may appear in scientific journals, technical encyclopaedias, or even in general encyclopaedias like the Britannica. These, to varying degrees, give an overall view of the state of a particular subject;

(b) books or monographs which emerge when a particular subject has so grown in theory and practice as to justify such an extended review: both reviews and monographs may also contain original, previously unpublished work; and

(c) patents which are monopoly claims to new methods for making mechanical devices or useful chemicals. These are now mainly not in the hands of individuals but owned by companies and government departments.

Their object is to get a lead in production and keep competitors off; thus patents sometimes present a minimum of information consistent with the patent laws. The utility of a patent as scientific literature is very variable, therefore, but it should by no means be ignored by the scientific worker. Books summarising patent literature in specific fields are now published regularly.

II. The Paper as Part of the Scientific Process

It is essential for an understanding of the writing of scientific papers to consider this activity as an integral part of the entire process of accumulation of scientific knowledge - in other words, of the way in which science works and grows (see Ref. 1).

The flow diagram (Fig 1) summarises this; the notes below refer to the numbers of the blocks in this diagram.

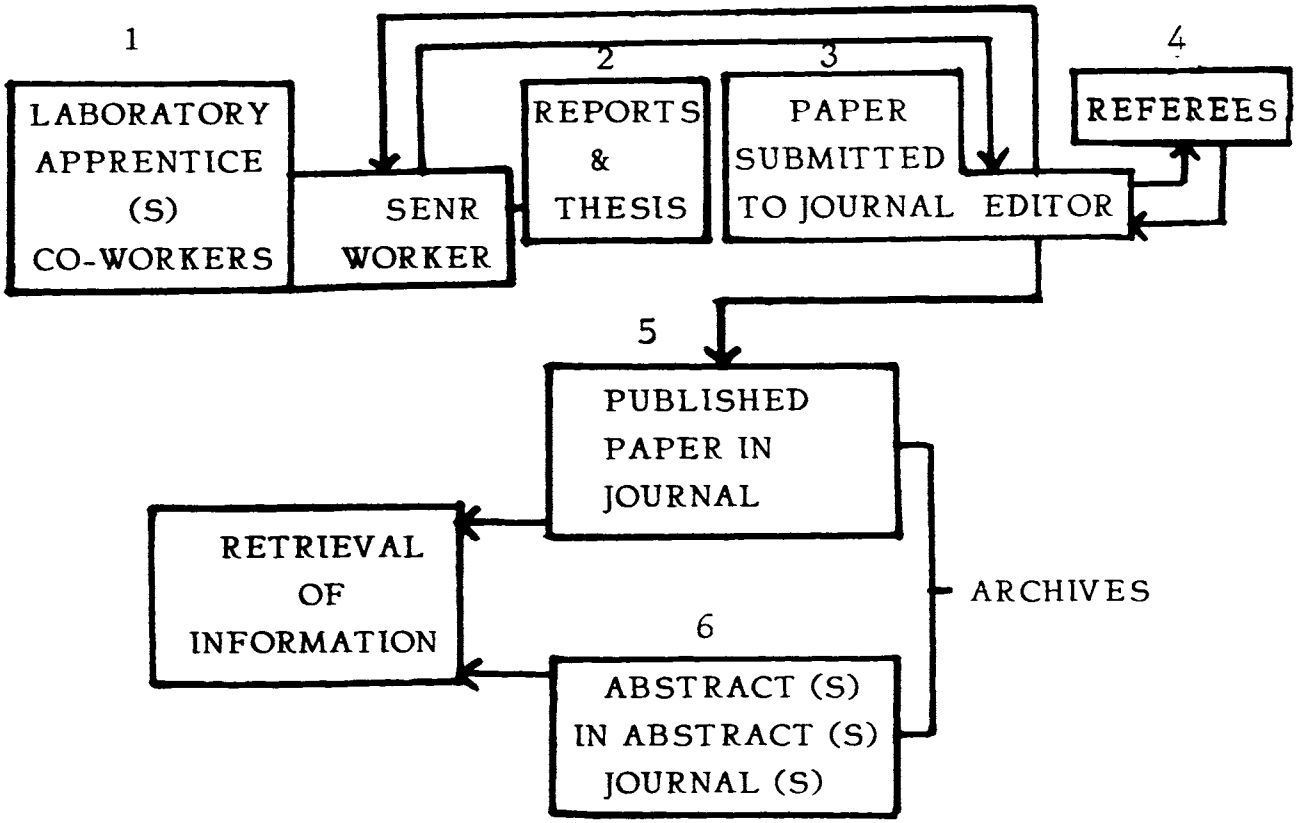


FIG. 1.

WRITING AS PART OF THE SCIENTIFIC PROCESS

1. The "apprentice" can be a post-graduate or sometimes an under-graduate student in a university or other teaching institution, or can be an employee working in the laboratory of a government parastatal, or private organisation.

2. Writing reports, not necessarily intended for publication, is an essential part of the scientific process. It is good practice because it

    (a) enables a continual, critical assessment to be made of the work in progress so that one does not "press on regardless", like a donkey;

    (b) gives practice in writing relative to this; and

    (c) provides sifted raw material for any future published work.

    A thesis is no more than an extended report and has a status not much higher than such. In some countries, they are indexed, but the work in them of any value will normally appear in published papers.

    Laboratory records and reports may attain the status of scientific publication if edited and published later (delay or non-publication of worthwhile work is usually due to a secrecy or security policy on the part of the employing organisation). A classic case of this is the publication of the B.I.O.S. and F.I.A.T. reports after World War II disclosing valuable information on German technology and science used during the war.

3. (a) The paper, the outcome of a creative piece of scientific work, is submitted when the senior worker thinks it right (but subject, sometimes, to the over-riding publication policy of government or industry if he is so employed).

    (b) Writing of the paper itself, or of part of it, is part of the training process, particularly of the junior author(s). Quite commonly, he (they) does a first draft, which is knocked about, or often completely rewritten by the senior author who has the final responsibility for the finished product.

    (c) The best guide to the preparation, organisation and arrangement of the material is obtained from a study of other papers, particularly those in the journal to which the paper is submitted, and of its editor's requirements. The form of presentation may, however, have to be adapted to suit the particular piece of work being presented.

The journal selected for the submission of the paper normally decides itself; it will be from among a small number of specialised journals in one's field. But an author who thinks he has "hit the jackpot", because the paper is of wide interest, and he wants to establish priority claim (for there may be others working in the same field) may submit a shortened version to a quick-publishing journal, such as "Nature". There is also a growing tendency to send short papers to other quick-publishing journals which have arisen in increasing numbers.

(d) In the actual writing, a distinction should be be borne in mind between technical terms and jargon. The former are a form of recognised shorthand for processes, procedures, phenomena, chemical formulas, and so on, and save an enormous amount of space and time in writing. As they are intended for scientists in one's own field, and not for the public, or even, primarily, for scientists outside this field, they are absolutely legitimate. By jargon, I mean those clumsy, circumlocutary, or obscure modes of expression which often hide the author's confusion of thought. Poetic utterances or "high prose" seldom emerge from scientific laboratories, or if they do, may be axed by editors or referees, not because they are against poetry, but because the sort of emotional meaning is not that sought by the readers. Such writing may, however, appear in scientific books. Ref. 2, gives brief examples of various sorts of science writing with my comments.

There are a number of books on writing scientific papers which may be useful to the scientist lacking other guidance. I must admit that I have not read a single one, nor do I intend to. What I do recommend to my co-workers are:-

(a) a book like "Plain Words" by Gowers, originally written to improve the standards of civil service writing, but of great value to anyone interested in the straightforward expression of ideas which is the essence of science writing; and

(b) "Roget's Thesaurus" which is of great help in the selection of appropriate words and phrases, and thus, at the very least, is an aid to relieving monotony in writing (Ref. 3).

(c) The general practice is for the names of all the participants in the research to appear in the paper as joint authors. (Thus, in coopera-

tive reseachers as senior author, my own name has appeared first only once: the co-author's name was Watts). Drawbacks to this procedure are sometimes seen when correspondence on the paper goes to the first-named junior author, who has often gone elsewhere, instead of to the senior who is maintaining the continuity of the research and has usually instituted it. He may also be mildly irritated to find a later reference to the authors of the paper as the junior author et alia instead of to himself et alia.

4. The editor normally sends the paper to referee(s) who is (are) usually engaged in research in the same field as the author, or in a closely allied one. They comment on it and advise whether it be accepted, rejected or accepted after amendment. Occasionally, the editor may referee it himself if he thinks he is competent to do so. Referees' comments are passed on, through the editor, to the senior author who has to decide whether to accept them, in whole, in part, or not at all. If "not at all ", it is the editor's responsibility to accept or reject.

5. & 6. An accepted paper is set up in type and the galley proof sent to the submitting author for correction. The paper is then published in the journal. An abstract of the published paper, not necessarily the same as that written by the author as an integral part of the paper, is done by the staff, full or part-time, of an appropriate abstracts journal. Different abstracts may appear in various journals.

7. Scientific journals and abstracts journals are indexed and all of those form part of the archives of science, open knowledge available to anyone interested. Because of the exponential growth of science, however, retrieval of information has become more and more difficult (Ref. 4a). Added to the difficulties are the increasing delays in and expense of publication (Ref. 4b). Various means are being devised to render the process more efficient (Ref. 4c). The status of scientific paper is decided in time by the acceptance or otherwise of the knowledge it discloses and by the effect it has on the course of the work in that field (Ref. 5).

REFERENCES AND NOTES

1. Science as public knowledge

An illuminating writing on this aspect of the workings of science is: "Public Knowledge; an essay concerning the social dimension of science, by J.M. Ziman, Cambridge University Press, 1968. There are also later (and longer) books on this subject by the same author (e.g. The social dimension of science", Oxford University Press).

2. Examples of science writing

The following three excerpts all deal with the same geological subject - the formation of sedimentary rocks.

(a) Straightforward English

"At the beginning, only igneous rocks were present in the crust but no sooner had they cooled, then they began being attacked by rain and gases in the atmosphere. The debris resulting from this destruction was washed into low places and sorted itself into beds of clay, sand or gravel, depending on how fine the particles had become. In time, such deposits reached such great thicknesses that the bottom layers began to press together into solid masses creating the class of rocks known as sedimentary rocks". Adapted from "Prospecting for gem stones and minerals", by John Sinkankas, page 83.

In the above, there are only one or two technical terms, and these are only comprehensible from the context. The passage can be understood by any scientist, and most laymen. But geology, by the very nature of the subject, lends itself to "popularisation".

(b) Scientific gobble-de-gook

"The provenance of sedimentary rocks is rendered comprehensible by a consideration of the various factors exercising an impact on the primary magma-derived igneous rocks. The principal disintegratory causal agency was primarily a concatenation of atmospheric effects, the cumulative attritive effect of which resulted in a particle-size classification. Subsequently, the action of the various impactive and compressive forces exercised caused consolidation of these sediments into sedimentary rocks".

This passage is neither a pleasure to read, nor is its meaning as clear as the one above. It abounds in clumsy expressions, jargon and stilted English.

(c) "Poetical prose"

".....the entire thickness of the sedimentary crust accessible to our observation seems to us only a residue accidentally spared by the two causes of destruction which act on the two faces of the solid crust; destruction by atmospheric agents above, remelting and metamorphism below. Thus suspended between those two infinities of destruction, infinite because they have endless time, the long series of decipherable geological stages is in reality only a final episode, the final spared witness of a very long history forever effaced".

From "Stratigraphical geology", by Maurice Gignoux.

This is the author's summary of rock formation, after a more detailed scientific description. It conveys imaginatively to the reader the immensities of time and of forces involved.

Legitimate chemical shorthand

The following short passage is full of technical terms, but is perfectly comprehensible to anyone with little more than an elementary knowledge of chemistry. To express the same meaning in any other way would result in a long treatise. It is virtually impossible to popularise the detailed content of chemistry.

"The small amount of unsaturation in butyl rubber, made by copolymerizing isobutylene with isoprene, permits vulcanisation by sulphur, and it may also be cross-linked in the presence of oxidising agents by nitrogen-containing derivations of quinone".

3. (a) The complete Plain Words, Sir Ernest Gowers. Penguin Books, 1954.

(b) Roget's Thesaurus of English words and phrases, P.M. Roget. Penguin Books, 1966.

4. (a) Problems created (and solutions sought) by the exponential growth of science

An interesting account, based on original research, of the exponential growth of science is given by D. de Solla Price in his book, "Science since Babylon". Yale University Press, 1975.

In 1750, when there were only ten (10) scientific journals in the world, a scientist could keep himself informed on all published scientific work. By 1800, there were one hundred (100) journals; by 1850, one thousand (1,000) journals; by 1900, ten thousand (10,000); by 1950, one hundred thousand

(100,000). This represents a tenfold increase every fifty (50) years. By extrapolation, there would be one million journals by 2000; however, there are distinct signs that this rate is flattening off.

In 1830, when there were three hundred (300) journals, it was already impossible for scientists to keep track of information of interest to them, and so the first abstracts journal was published. These, too, have multiplied by a factor of ten every half century, and so the same problem has arisen in relation to them.

(b) Economic problems of publishing

The economics of publishing (referring here particularly to the English - speaking world, which is of relevance here) have been changing for the worse in recent years, and particularly since 1973. Paper costs and book prices have soared to such an extent that it is the general opinion of those concerned that the hey-day of cheap scholarly publishing is over. Inflation has also led to a cutting, sometimes severe, of the money available to universities and libraries for the purchase of publications.

The monograph, in particular, always a highpriced publication, read by relatively few people, is thought by many to be moving towards extinction.

(c) Solutions sought

(i) The formation of "invisible colleges"

To keep himself abreast of development in his own field, the scientist now keeps in direct touch with his confreres in his own and other countries by correspondence, visits, exchange of papers and of samples, information on work in progress, and participation in international conferences. The last-named activity, in particular, has been made possible by vastly improved means of communication. Proceedings of such conferences are often published.

In this way, what have been called "invisible colleges" have been formed, a new and striking modern development in science.

Many scientists today are thus among the most travelled people; the cynical remarks made about this - especially by those who have to provide the money - are only partly justified. Certainly, though, some discrimination must be exercised in this activity.

(ii) Organisational and technical means

Co-operative publishing is a developing trend, with the aim of cutting down costs. The trouble in the U.K., for example, is the large number of learned societies relative to their output of publications : 228 of them publish only one journal yearly, and only 15% of the smaller societies publish more than one quarterly.

The Aslib group, for example, suggests the establishment of co-operative publishing offices (CPO's), which in the U.K. would become viable if more than 11,000 pages were published yearly.

In the U.S.A., editorial processing centres (EPC's) have existed for some time, increasingly using computer reproduction and other facilities to carry out many routine publishing functions; these are, of course, greater than in the U.K.

A typical example of the new approach to publishing scientific papers is the new Journal of Chemical Research, published in London by the Chemical Society, jointly sponsored by the French and German chemical societies and supported by other European chemical societies.

This separates "browsing" (which gives current awareness of what is going on) from the archival roles of primary science journals.

Part S contains conventionally printed synopses of papers.

Part M has full texts, reproduced from authors' own typescripts, either as microfiche, a 24:1 photographic reduction which can be read with a hand lens, or as a miniprint 3:1 reduction printed on ordinary paper which can be read with the aid of reading equipment.

Chemists need buy only Part S, browse over synopses, many built round formulae or graphs. If the full version is wanted, Part M is obtainable from an institutional library or photocopies from the Chemical Society's library.

The concept of "camera-ready" copy is now widely accepted, that is, a carefully done typescript which can be edited "on-line" by computer, and then reproduced cheaply, thus avoiding the more costly, multi-stage, older method or producing papers. It does not, however, avoid the necessity of refereeing, which would still have to be concerned with

content. If no refereeing on it is done, such a paper would necessarily have a lower status than one published conventionally. Its main virtue would be in the quick availability of work in progress.

A useful recent reference is: Trends in scholarly publishing. British Library Research and Development No. 5299 MC, 1976,.

5. Status of the published paper

Trivial papers are still published, but there is now more resistance to these by editors because of increasing pressure on space. Editors will also do their best to cut down what they consider to be unnecessarily lengthy papers. The number of papers published by a scientist is not a good criterion of the worth of his contribution to his science. Over-anxiety to appear in prin', regardless of content, is fairly characteristic of beginner scientists; an added incentive is the thought that their promotion prospects depend on such production. A greater regard for content, and a consequent reluctance to publish prematurely, often comes with maturity associated also with a greater concern for one's scientific reputation.

8 WRITING FOR SCIENTIFIC JOURNALS

G M Carman

There are now, and have been, a tremendous number of scientific journals coming into being in the world over the past three or four decades. It would seem that they have plateaued recently, and that some primary selection is being made on papers submitted to such journals, and in my opinion the reason for the slow-down, and the failure of journals to continue is simply money. We cannot continue to publish the number of journals in this exponential manner and survive because we simply do not have the money, nor the where-with-all to handle the journals, and the papers they produce. However, at the present time there are some 10,000 journals and I would see that number continuing into the foreseeable future. But, there are alterations coming in the way that we use these journals, in the light of the massive amount of information coming out and the financial restrictions present, and I think these are going to come to the fore in the future and I will attempt to present these alternatives to you now.

The Abstract

The first is already apparent - we are going to use the abstract of the paper rather than the paper in most cases. It would be cheaper to publish, and cheaper to distribute, and the person that wants the full paper can then write to the author himself. At the present time, a good abstract must be attached to each paper, and most journals are demanding that this abstract be thorough, concise, with a maximum of three hundred words, and that these words must be within a certain vocabulary that is suitable to machine translation. When you walk into the agriculture information office in Moscow, where the world's journals come in, you will find the abstracts taken and put through the machine translation unit. They are then checked by scientists themselves, and then these abstracts only go to the scientists working in the field. If he is interested he can write in, and get the full text of the paper that has been abstracted. Until fairly recently, if you examine the record, the scientists got a title only translation and anything that looked at all attractive was requested and they then had to translate the whole paper. And the paper blizzard in the Soviet Union is no different from that of our own (in Canada). You can simply translate it to your own country and find the same problems, although probably in much smaller volume.

So, they have gone to this system and I think you are going to see more and more of us go to this system in the future, both as machine translation becomes more viable, and the volume of literature has to be surveyed. This is never going to take the place - and may I repeat the word "never" - of reading the technical paper that the scientist has to have that fits in with his own work. The abstract simply gives him more identification than the title of what is in the paper, and whether he needs it or not.

Board of Referees

We have been looking at our own costs in Canada, and when I was in the United States recently I found that they were considering the costs of certain journals with the same problems in mind. The costs are going up, mailing costs are going up, and due to lack of suitable postal services a great number are not reaching their destination so they have to be remailed and the costs then become unbearable, and will continue to become more so as money becomes tighter, and the number of journals stabilizes. There has been a suggestion made, of which Professor Vahrman will not approve, and of which I do not necessarily approve but I personally believe is going to be the rule of the future, and this is the way that the journals themselves will have to function to survive. There will be a board of referees for a journal that will survey the articles that come in, that will act as more than our present board of referees, because they will recommend as to whether the article is going to be published in its entirety, as a short summary, or simply as a title. In the first short time I would feel that these boards of referees will perhaps place the outstanding four or five papers in their entirety in the journals, and put all other submissions in merely as summaries. For those referees there will be no quicker way to lose friends in the scientific field than to do that, but it may very well be that this is the only way that the scientific journal, as a working tool for the scientists, can survive. When the papers that are going to be published in their entirety are selected, they will be given the full treatment - the referees, the editing, and a clean presentation. The rough rule of thumb that has been set up in this planning is that only about one paper in seven is going to be published in full, and in some of the biological journals the demand is so high that this will go to ten at the very most.

Before this policy, or plan is the more appropriate word for it, was suggested to some of the journals, they went to a dry run. A group of referees was asked to do this with a journal in chemistry in one month copy and another group a journal of biological science for the next month, and so on. They classified the papers, and it was amazing how close the referees came in all cases. In one particular example of which I am aware, they said that they would put in only one of the papers printed in the journal in its entirety, they would have put seven in by summary and a rather large number of others by title only.

In another journal of economics, the editors examined one monthly issue and said that there was no paper there worthy of more than a summary. Conversely, in the next issue they had seven, and in the third they had ten. What this is going to do is throw a tremendous amount of responsibility on the referees, and make it mandatory that their identity be kept secret, because there is nobody half as angry as a scientist scorned by another scientist. I have personally experience in this field, since as a referee I have on more than on occasion turned down a paper from an old school chum, and he has later ignored me completely.

I think this is going to have to come, because we cannot afford the continuing publication blizzard that we have. You are going to see more and more use of the abstract in the journal for the scientist himself, and you're going to see more and more use of the personalized abstracting service which now can be done by the computer.

The Selecting Abstracting Practice

There is a rather rude expression that says "garbage in gives garbage out." So this means that as the competition for papers goes up, only the top quality ones are going to make the journals, and the mediocre material will be weaned out. The practice of abstracting has been going on for twenty-five or thirty years, in very great detail and it has become an art and a science in recent years. The good abstracter gives top rating to the good paper, and small mention of the mediocre one, and this in turn helps the reader. In most abstracting journals today, they do not abstract everything - they have what they call a selecting abstracting practice where the abstracter himself weans out those papers that do not warrant repetition.

In some journals it has been the practice for some years now to put in papers of lesser merit by title only, but since it now costs about seven dollars to handle that title on the computer I think you will see that this practice will decrease as well. Be that as it may, these are some of the changes that I think you can see coming, for the simple reason that mankind has published himself into a corner, he still must get scientific knowledge circulated in all languages, and the very volume that is at present being published makes this practically impossible.

This does not mean that you're going to see only one abstracting journal; it does not mean that you are going to see a journal of titles only ; but what it does mean is that professional journals will become more professional in each science, the quality of the writing will have to improve, and the selection by the scientist himself will have to improve.

The Quality of Writing

This brings up another problem - the quality of writing. It is acknowledged that the average graduate today with a Bachelors Degree in North America has been going down hill in his knowledge of the language over the past twenty-five years, and from what I can read the European Universities are not far behind. The best English that I know of today that's being written is being written by colleges and universities where English is taken as a second language, and where they have had to learn their grammer well. This is a problem that you will have to face in your school system, and particularly in your college training. To leave it until the student is in post-graduate work, or out in the field as a scientist simply puts off the day when it must be done, and the whole world is finding this out in all languages.

But the reason that people like myself are in the work of communication is because the work of the Professor Vahrmans in this world wasn't getting out, and isn't getting out to the person in the field behind the tractor, or to the manufacturer, the industrialist, the farmer, or whoever else is interested. This goes across all levels of science and is not restricted to agriculture, forestry or fisheries, but is even more critical in other areas.

There are more and more people today that are scientists that are becoming increasingly sensitive about this, and I hope that the people that are administering science, and the politicians are listening because you can't invest money in research and then get it out if you do not get the information out to the end user to justify that research, either morally or ethically without having to assume the final responsibility. And, as governments are having to cut back on their finances year by year they are taking quick looks at where the easiest cuts can be made, and in research it probably is in the dissemination of research itself. This is an ever-present danger, so the scientific community had better wake up to the fact that there has to be an intermediary link between themselves, to justify their existence in the scientific field. It has been said that technology is twenty to thirty years ahead of what we are at present using, and I have seen nothing in the literature for the past five years that would argue against that statement. If that is not an indictment of our present scientific communication system then nothing ever is. Here in your own country yesterday I was asking why you didn't use the water out of the river rather than drill your wells and I was told it was easier to go down thirteen to fourteen hundred feet where you're getting real top quality water and put it in the system than to use that from the river. I don't believe that. I think the present state of the engineering art here may make it so, but when I take a look at the systems throughout the rest of the world that I have seen, I am positive that it is not so.

Take a look at the systems that are being used now and I'm equally sure that more than the Israelis are using salt water to irrigate orange groves, and it was known back in 1921 to 1923 when the system was perfected that the osmotic differential of straws was sufficient to remove most of the salt and permit the use of brackish water. We have had that skill for all this time and still there are areas of the world alongside the oceans that are not able to use that water. There is no way that science can continue to take a back seat in this regard and mankind will survive.

A Responsibility

The scientific community, in brief summary, has a responsibility to make the information of their research available to the end users, and you people as communicators have to fill that intermediary link. Most governments have not yet realised it, and most scientists are not bothering, but you had better make yourselves heard, because otherwise you as communicators, and the scientist as a scientist, will not survive as the ever-increasing demands for funds are required to justify your common existence.

9 WRITING FOR TECHNICAL AND NON-TECHNICAL READERSHIP

D G Thomas

Introduction

From the communicator's standpoint, information and knowledge that he wishes to convey must be promulgated in a form and style that will be read and absorbed by the desired readership. He must therefore give careful thought to the attitudes, interests, reading habits, even the life-style of his potential audience.

Scientists often wish to be informed on developments in other branches of science; technologists want clear, concise information about their own work interests; managers and decision-makers must sometimes be provided with details of research activities but not of research methods; operators want ready answers to operational problems and information on increasing productivity; and the general public like to know "what's happening" in research, science and technology.

Types of publications

Various types of technical publications exist to meet different situations:

Annual reports are for the purpose of reviewing progress on activities at a research institute or Department. It is an account of stewardship during the previous year to Parliament or the Minister or to a Board of Directors. Too often these are detailed, overbulky, dull and remain on shelves unread. They need not be so if there is careful selection of stories worth telling, attractively designed and produced, and published as soon as possible after the end of the review period. Some organizations issue two forms of the Annual Report, one demanded by statute with statistical information, and an abridged, well-illustrated form for public consumption.

Guides to Research Institutes and Experimental Farms are frequently produced at the time of open days. An essential element is a plan of the site, a general background account of the purpose of the institute, an organizational chart, and short descriptions of sectoral research and even individual experiments. A new edition must be published for each occasion, whether open-day or season. Some Experimental

Farms overcome the difficulty of annual publication by placing information of an unchanging nature (lay-out, soil and climatic data, etc.) in an attractive brochure, with a pocket at the back for information of transient interest on individual projects.

Advisory bulletins are prepared when recent research findings may have a bearing on production or productivity of an enterprise. These publications are usually directed to the extension advisory or industrial liaison officer, but they could well be directly useful to the operator. These bulletins should be so written that the necessary background is given to convey the significance of the research findings, and that the potential benefit is high-lighted. Equally important is to indicate any undesirable side-effects that may arise through varying a recommended method or materials. Advisory bulletins are also issued when it is desirable to bring together scattered information and to relate this information to an applied problem or situation. Whatever form is prepared, it is important that the reader is not distracted by over-detailed description of how the information was obtained.

General review articles are written for different types of readership. They can range from the form of advisory bulletins mentioned above, to a general discourse on the most recently acquired knowledge in an abstruse field of science. But there is at least one feature in common - they are directed at those outside the field of speciality of the subject matter. The articles therefore contain a considerable amount of background information to enable someone of average intelligence to appreciate the significance and import of the main message.

There are also Guides to processes and equipment. These are specialized technical publications for those with technical knowledge. The principles of simplicity, clarity and conciseness equally apply to this type of literature.

Although not usually regarded as publications, written submissions to committees and commissions, require as much attention as more usual forms of technical literature. Again, there is need for much background information, clarity of expression and due emphasis on the main arguments. Here, any generalizations must be supported by cogent reasoning. A submission to a committee, although an 'official' document, is not a licence for dull, lifeless prose. Submissions would be more eye-catching and thought-concentrating if the techniques of graphics, sharp prose-form and attractive lay-outs were adopted.

Promotional literature is associated with commercial companies in efforts to stimulate sales and foster good-will. Similar procedures can be successfully adopted in a possibly less forceful manner by scientific and technological institutes. This can be done very effectively by making good use of typographical and graphic aids, and conveying in a persuasive but not a strident manner, to the reader that he, as the taxpayer and therefore financial supporter, is getting

good value for the money expended. There is need here again to indicate why the work is being done, and how the work is helping, for example, to improve a factory process, increase crop yields, or to control diseases.

Educational publications have a place in technical literature not only as advisory bulletins, but also as a means of bringing together new knowledge on a subject of economic or social importance. This can be the duty of a scientific institute as its staff has access to and the special ability to collate isolated items of information and to show how these meld to further knowledge in a specific area.

Principles of writing technical articles

Before any action is taken, the writer must ask:

Who is expected to read it?
Why do we want it read
- to educate or instruct?
- to motivate action?
- to influence opinion?
- to gain good will?

How much will the reader know already?
What will the readers' level of education be?
Will it be a mixed readership?

The answers to these questions will decide the purpose, the depth of explanation required, the form of the publication, and the eventual distribution.

Whatever the form of the publication, there should be an indication on the first page what it is all about, and in one sentence. This could be entered in a box, or in bold print.

The graphics and the text should complement one another and be married together in such a way that there is no separation of the components of the message. If an idea or piece of information can be conveyed entirely in an uncomplicated graphic, all the better. The juxtaposition of text and graphics must be such that there is an easy, flowing sequence, not one jarring the other. Build up the story easily and clearly, without leaving unanswered questions.

The language should be simple and direct, avoiding tortuous sentences and ambiguous statements. Rely as far as possible on short sentences, with no more than 15 words and 32 syllables. The purpose of written communication is to convey knowledge and information and opinions with ease and interest. There is no place for false exhibitions of erudition.

For some types of publications, it is useful to add a note to indicate where further information can be obtained.

Organization of work

You may be solely responsible for the preparation of a publication or you may be part of a team. Ideally, the team should consist of an interpretive writer, graphic designer, a research scientist, and possibly a photographer. The team should work together right from the initial planning stage. The sequence of work should be as follows:

Phase 1	Obtain background information from the research people (This is not meant to be a first draft!) Decide on readership, budget, print order
Phase 2	Select the theme (what is to be told) Decide on sequence of story Prepare rough draft (text and graphics)
Phase 3	Graphic designer to prepare first working plan Writer to prepare draft of accompanying text Photographer to assemble appropriate prints
Phase 4	Modification to working plan Assembling
Phase 5	Final art work and setting up Checking and proof-reading
Phase 6	Printing

10 WRITING THE NON-TECHNICAL ARTICLE

M Hamaludin

Introduction

At the risk of boring you with a story which is probably familiar, I would like to draw your attention to the proud mother whose son had just started to do maths. One day when the neighbour was visiting, she could not prevent herself from displaying her motherly pride. So she called Joey from the sitting room to the kitchen and asked him to say good morning to Mrs. Jones in algebra.

I mention her because I think she typifies the extent to which the average person understands science. It is important that you keep this in mind because you must write in such a way that your reader will understand what you are saying.

For example, what is a calorie? Is it "the quantity of heat necessary to effect a rise in temperature of one degree Centigrade of a cube of water each dimension of which is one-tenth of a part of the length of a bar of platinum and irridium alloy lying in the observatory of St. Cloud?". Perhaps, it is. But if you tell that to the average person, he will either think you have flipped your lid or that you are protecting one of those new-fangled languages that the spacemen are said to be learning just in case they meet the Martians. It may not be the most exact scientific definition, but the average person will have a better idea if you explain that 100 calories of energy can be had from three lumps of sugar or a dab of butter.

The central point which you must bear in mind when writing the non-technical article is that your readers will be non-technical people who will have neither the time nor the inclination to go back to school to understand what you are trying to say. Write simply.

Types of readers

As a rule, your readers will fall into four categories:-

(i) the scholarly readers with advanced science education and with highly specialised interest;

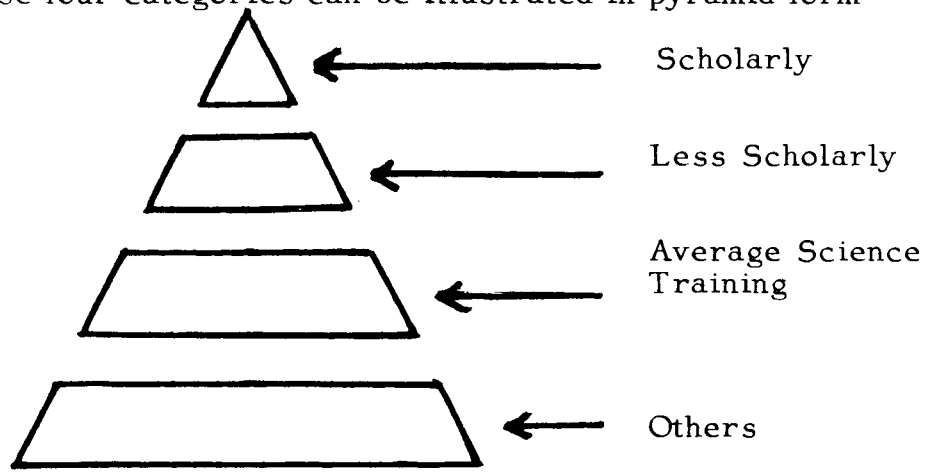
(ii) the rather less scholarly readers with a somewhat broader interest base but with a high level of education;

(iii) the average reader without much science education and not as

easily able to understand technical stuff as the other two groups; and

(iv) the man, woman and child whose interest is purely that of entertainment.

These four categories can be illustrated in pyramid form



Writers use a style and language to suit the category to which they are aiming, and this can be judged by the kinds of publications for which they write. For our purposes, your writing should be directed at the mass circulation publications, such as general interest magazines and newspapers. Unlike readers of specialised-interest publications, your average reader and those with no interest in science will not be in a captive readership, and your story will compete with a lot of other stories for his limited time. Unless you are a big name in the mass media, there is no guarantee that your story will be read, or that it will be accepted for publication.

I have not conducted a survey, but I suspect that the average West Indian reader will be more inclined towards science for entertainment rather than for education: that in reading a science article, he will be arrested more if it is in an entertaining rather than an educative style.

The West Indian society is not as yet a highly technological one. Someparts of it are more technologically advanced than others, but there is no indigenous technology powerful enough to have created either a regional or a territorial technological ethic on what, I believe, is essentially an agricultural people. Most of the technology is imported along with the aura of mystery that is supposed to surround technology.

At the same time, the West Indian is highly literate, with some level of education, and a well-developed native intelligence. So, on the one hand, a science writer finds himself aiming at a readership that if generally not scientifically-minded or trained, while, on the other hand, this readership

is at least adequately and intelligent. Your writing should not be technical, and it should not be condescending to the point where it makes the reader feel angry that he did not have the privilege of going to a science school. You can perhaps remember the advice of journalist Neale Copple: "The difference between a list of facts and a story is style".

Writing Assets

I do not know if it is true, but I understand, as a layman, that a sound science education is not necessarily indicative of a sound grasp of language. However, if you are to write for non-technical readers, you need a good command of language in order to communicate effectively. You need a good grasp and command of English.

Secondly, you need a good knowledge of the subject on which you are writing. This should not be too difficult if you are writing on a subject in the field in which you specialise. If not, research properly.

Thirdly, you may want to convey a particular viewpoint or have some definite purpose in writing the article. You need to have it clear in your mind before you begin to write. If you do not have it clear, it is unlikely that the reader will.

Writing the Article

It would be good if you pay attention to the following hints:-

(a) Before you start writing, think out a suitable title for your story. This will help you keep the central point in mind. Your title can be in one of several forms: a statement that will create interest, a statement that will arouse curiosity, a label, a declaration, telling how, why, what, a question, a quotation, an exclamation, and so on.

(b) Think out a good opening. Chances are that whether or not your story will be published, much less read, depends on the extent to which you capture the interest of your reader from the beginning - and hold it. Here again, you can choose one of several ways in which to start. Take, as an example, the opening for a story attempting to explain the relationship between the non-technical nature of the Guyanese society and the high road fatality rate:-

(i) make a striking statement: "Guyana's road fatality per capita is the world's highest";

(ii) give a summary: "With a better under-

standing of how a car functions, motorists will be more aware of the dangers involved in driving and be more careful";

(iii) address the reader directly: "If you drive a car, then you can improve your chances of living to an old age by learning how a car works";

(iv) ask a question: "Should people be licensed to drive a car without first knowing how it works?";

(v) begin by a narrative: "A young couple, newly-wed, was driving to their honeymoon hotel when it happened";

(vi) describe something: "The automobile can be a most lethal weapon in the hands of the uninformed";

(vii) give a quotation: "You don't know how dangerous driving is until you begin to understand just what you are driving", the man said.

(c) At the time, you are thinking out your opening, think out suitable ending as well. This will give you two definite points to connect in the article;

(d) Use illustrations or photographs to liven up the story. This should be noted particularly by science writers because they can thus help the average reader to understand some difficult points. Illustrations can also take the form of tables;

(e) Try to humanise your story as much as possible. To humanise it means to bring it down to the level of human beings, giving it a human appeal and make it easy for them to identify with it. You can humanise your article in several ways:

(i) making it clear to the reader how he is affected or will be, by what you are saying;

(ii) linking the story with a news item which the reader has already seen and for which he will probably expect a follow-up story;

(iii) use photos and illustrations;

(vi) use a narrative (story telling) style;

(v) use humour; and

(vi) give typical examples of what you are saying.

Bear These in Mind

Because you are science people and are writing for non-technical readers, you need to keep in mind the demands of non-technical writing. Some of the points you need to remember at all times are:

(i) your readers have not had a high level of science education, but they are intelligent people;

(ii) you should select facts you want to write in your 500-800 words article (average length) and not try to write everything that you know in it;

(iii) your readers do not necessarily know about something just because it was around for some time. You need to explain it;

(iv) your reader is not obliged to read your article. you must make him want to;

(v) humanise your article;

(vi) your reader will be curious about points which you raise. Don't leave this curiosity unsatisfied;

(vii) your reader will appreciate a style which helps them to follow your story easily;

(viii) remember who your readers are;

(ix) your reader will not appreciate it if you define a hard word by a harder one. (Remember the calorie).

11 GUIDELINES ON PREPARING THE PRESS RELEASE

V Forsythe

Introduction

The press release, as non-technical medium in science communication, has among other advantages the potential of creating public awareness of and stimulating interest in new advances in the scientific field. Operators, for example, would like to know how certain operational problems are being tackled; what increased productivity methods have been successful; and what events, exhibitions or demonstrations, are being staged to illustrate such successes. Among laymen, too, there is an urge to know about 'what's going on' in research, science and technology.

As with other communication techniques, the good press release is based on astudied decision of what you want to say and a working knowledge of the audience or readership for whom the message is intended.

The Basic Shape of a Press Release

Against that background, when you, as scientists and science communicators, have information you want to get into the newspapers, it is your responsibility to ensure that it is in a form the news editors will use. It is a mistake to say that you have given the editor the facts and he must put them into some shape.

There is a certain basic shape of the Press Release (common to most newspapers) which editors are happy to see you follow:

1. A heading at the top should attract attention and be explanatory. For example: "Demerara Bridge will push Development" rather than "Bridge Across Demerara River";

2. The main point of the news should be given in as few words as possible in the first sentence; and

3. The main or key point of the news should be followed by explanatory and background information in descending order of importance.

This approach will follow the 'inverted pyramid' method with your main idea standing boldy on the upturned base of the imaginary pyramid'. This is a good guide-line to follow as it is quite possible that because of limited newspaper space, the later paragraphs of your release may get cut out before the story goes into print. In extreme cases, the first paragraph of your release might be the only paragraph left to tell your story.

The Style of the Press Release

The Press Release should be written in a simple and streamlined style, practical for the purpose it is to serve. Avoid a formal pompous style.

Each sentence should be short, definitely not more than twenty (20) words. Paragraphs should also be brief and not exceed forty (40) words at a time.

Words should be chosen for their brevity and directness. For example, avoid writing 'request' when for brevity 'ask' would do. Avoid such cliches as 'disclosed' when 'announced' is so direct.

Always write in plain and simple language and watch the length of your press release which should normally be not more than three hundred (300) words at a time.

Wherever possible, it is helpful to include in your press release a simple quote from a well-known scientist concerned with the topic. Do this, however, only when the quote adds facts to the story and not some platitude.

If your press release is intended for overseas publication, you should remember that certain terms and words used in one country may be unfamiliar in another area. This consideration may also apply to regional dissimilarities within one country. For the same reason, the indiscriminate use of abbreviations should be avoided. In any case, when you use words and terms that may be new, explain them.

Emphasising Local Angles

Look for the local interest in the news item; note for example, how a certain scientific innovation can affect people's lives and write your releases in that context in the first place.

Notes to Editors

It is accepted that the Press Release should contain the immediate relevant details and background explanation. However, 'Notes to Editor' at the end of the release (and not as part of the story) can be a useful device to give to editors additional information which they may wish to follow up on their own.

Dealing with Trade Items and Names of Firms

Whenever you are preparing a Press Release on trade items, watch how you use brand names of products or the names of firms. Wherever the names of firms are included in the body of your press release, editors sometimes suspect that this has been done for free advertising, and they may reject your story on those grounds.

Accordingly, it is normal practice to avoid mentioning the names of firms in the body of your release. Instead, the name and address of the firm concerned with the particular product are mentioned at the bottom of the release away from the text of the release proper.

Editors are then free to print it if it is their policy to do so. On the other hand, it may be used as reference information for follow-up enquiries.

Photographs or Other Illustrations

Editors tend to accept your news releases more readily when, in addition to following the basic shape of the press release, you include photographs or other illustrations such as diagrams and graphs. (Please note that some communities are happier with bar graphs than with line graphs)

Wherever photographic prints are not ready, a separate note on their future availability will still be helpful to the appropriate department whose staff can follow up the matter.

Target Audience

Of course, in setting out to write a Press Release, you would have to decide on what you want to say (your message) and why (the purpose of your message).

That elementary consideration apart, you would certainly have to determine the people for whom this release is intended (the target audience). And in that regard, you would have to figure out how you would reach them, that is, through the morning or evening newspaper, at peak radio listening times or through a periodical publication.

Timing of the Release and Distribution

When you are aiming for publicity in the evening paper, then, obviously, the newspaper should receive your Press Release early on the morning of that day's issue. Similarly, if you are thinking in terms of the morning newspaper publicity, then your release should reach the press immediately after noon on the day preceding the proposed publication.

If you want to get your information in the weekly papers, then you will time your release so that it reaches the editor early during the week of publication when he is searching for topical material.

In any case, it would be helpful to your timing and distribution for you to study the printing times, deadlines and printing problems of the newspaper and periodicals in your particular area.

Radio and TV Considerations

You should, at this stage, also assess the specific needs of Radio and T.V. Thus, you would take into account that there are scheduled Radio and T.V. newscasts at peak and other hours which you may wish to catch.

Advance Press Warning (Early Warning)

When there is a press release of special importance, let the press know in good time, if it is at all possible, that an announcement will be issued at a particular time. You may sometimes do this through a central news agency.

This advance warning is most helpful to busy editors, especially if the announcement is to be ready or to be made shortly before press time.

Embargoes

A Press Release is normally intended for immediate use. However, there are times when, for such reasons as simultaneous release in different papers or different countries or early notice to the media, you may issue it under 'embargo'.

When a Press Release is issued under 'embargo', the release time and date should be boldly stated at the top of the headed paper or first sheet. You should, however, use the embargo system very sparingly. If it is overdone, it may not be taken seriously by editors.

Format of the Press Release

The format that is most helpful to the editorial and printing staff requires that:-

1. the release should be typed on quarto or foolscap paper (whichever is locally acceptable);

2. it should be typed on one side only of headed paper (i.e. paper marked "Press Release") with wide margins at top, sides and bottom;

3. the typing must be double-spaced to allow for any additions and changes by the sub-editor; and

4. the headed paper should carry, at the top or bottom, the name and address of the issuing office, a reference number and date

of the release and the telephone number of the person able to answer questions connected with the release.

Follow-Up Work

Follow-up work may fall into two categories.

In the first place, although you may have provided good background information in your press release, there is always the news editor (from newspaper or radio) who will call up for some extra fact or further detail in his search for more interest and variety.

In such a case, you and your staff should be up-to-date on the facts so that you can answer any likely enquiries. And so you should have the relevant reference file on your desk if you are not in a position to memorise all the facts.

Then again, you should also be aware of the opportunities to follow up your initial press release with further items, especially when you are dealing with a situation which does not remain the same all the time.

Remember that readership itself tends to fluctuate; and so in subsequent press releases, you do not only give additional facts, but you also briefly recapitulate the background information before moving on to new ground or exploring new communication fields in science and technology.

Summary

In the meantime, always remember that the basic shape of the press release requires that:-

1. a heading at the top should attract attention and be explanatory;

2. the main points of the news should be given in as few words as possible in the first sentence; and

3. the main points of the news should be followed by explanatory and background information in descending order of importance.

12 A BRIEF CASE EXAMPLE OF WRITTEN COMMUNICATION (PLANNING AND PRODUCTION) IN GUYANA'S LARGEST SCIENCE AND ENGINEERING PROJECT

O Hunter

In Guyana's largest science and engineering project - The Upper Mazaruni Hydroelectric Project - written communication is an integral and essentially vital part of the overall single continuum of purposive multi-media communication intervention Strategy of the Project's D.S.C. Unit.

Within this context, the D.S.C. Unit is found dealing with written communication relating to specific problems, issues and publics as part of an overall strategy.

At one end of this strategy is the mediated communication intervention material of which the written communication is a part and is aimed mainly at affecting awareness. In the centre of this continuum are various kinds of small media, of which the Slide Sound Programme is a part, acting as a leaven. At the other end of the spectrum we have the interpersonal non-mediated aspect of the communication intervention strategy which is aimed at reinforcing the various segments of the communication effort.

All three of these intervention actions interact and results in interesting changes in the human communication cosmos. Most of the multi-media messages, actions, strategies are geared to reach specific publics for specific purposes. Some of them are geared to reach general audiences.

In this brief case example we will only look at two bits of written communication material produced by the DSC Unit; a) Hydro Focus b) Hydro Progress.

Hydro Progress

This publication is monthly and is aimed at reaching National decision makers, Senior Hydro officials. Senior Officers of the Hydro Project supporting agencies and scientific technical and engineering operatives generally who have an interest in the Project. It is aimed at creating awareness and understanding on the part of these very important people without whom we cannot build the Hydroelectric Project. The language is relatively simple with the style flowing just like the waters of the Mazaruni. Some 1,500 copies are printed.

Hydro Focus a Tabloid Newspaper

This publication is fortnightly with size varying from 4 - 16 pages depending on the specific purposes. What is significant about Hydro Focus is the fact that it is a people's paper

produced by the people.

Just imagine our DSC staff darting in and out villages of the Mazaruni, Kako, Kukui, Kamarang and Kurupung rivers, along escarpments of the Pakaraimas, up and down the mountains and valleys of the Roraima formation among people of varying cultures and within an interesting socio-psychological and environmental mosaic which sometimes really make nonsense of scientific communication methodology.

Of course all of this interaction between the DSC and the various socio-psychological, cultural and environmental entities is simply to get the feel of the people, the opinion leaders, to establish a rapport, a oneness - some compatibility - all of which are elements which make up the mortar we communications' masons use to close the communication gap and effect understanding - changes - involvement.

In a nutshell what we are trying to do in DSC is to involve the people directly and indirectly in the planning, pre-testing, production and field evaluation of this written communication material taking all of the communication parameters and variables - inter-personal, extra-personal and environmental - into consideration.

With editorial representatives chosen from among the workers, residents of the Region, Akawaio, Arecuna, Islander, Coastlander —— the people for whom the material is mainly produced —— we are sure that our communication goals are being largely achieved.

We strive to keep this publication simple, entertaining, educational, interesting, but more importantly we keep it honest and ensure that the people see themselves as being the ones that are important.

We try to achieve presentation, comprehension and legibility. We ensure that each Issue achieves something. We go to the scientists, engineers and adminstrators and discuss technical matters with them all the time placing ourselves in the position of our specific publics, empathizing with them and the scientists and then interpreting the relevant information accordingly.

Sometimes there are difficulties in this area especially since we are using one written communication material in a major cross-cultural setting. How do we put over the scientific assurance that the 140-ft. high Sand Landing Hydroelectric Dam will not be broken by the pressure and force of the Chidago Reservoir water.

The fact is that the indigenous Amerindians in addition to the Porkknockers and others have been living their lives in the Upper Mazaruni —— they are true children of that environment. They know the power of water during "wash de bush".

They have seen whole plasseys, small settlements, landings, rest benabs washed away by angry waters foaming, rushing from the top of the mountains. They have seen the huge valleys, large villages, 'savans' turn into large lakes and flood plains; waterways turned into rivers within hours. Can a single dam hold back this kind of water?

How do we explain an important scientific fact that the electrical power passing through the high voltage transmission lines placed in the jungle, is to such magnitude and power that it is possible for an individual to receive an electric shock from those lines without even coming into contact with them.

And finally, how do we cater for the lowest common denominator of intelligence when we are using one written communication to reach many publics, some of which are specialised while others are either illiterate/semi-illiterate or have language problems. The answer of course was mentioned earlier and that is we will need to reinforce the written communication with other multi-media actions.

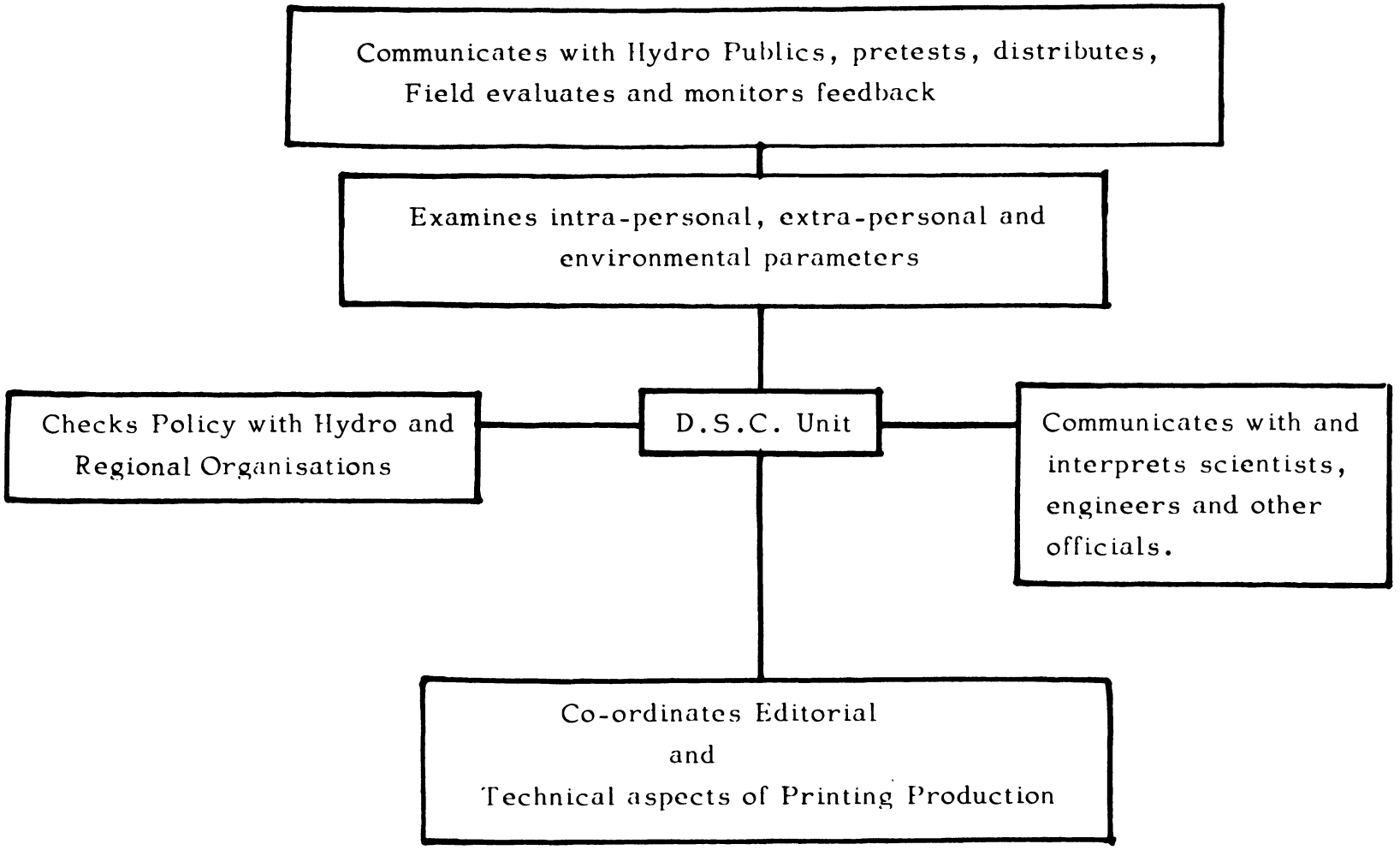
On the production side the DSC Staff, which is a micro-cosm of the Project area as a rule, comes together to do the rough layout and final dummy for the newspaper. Articles and photographs finally produced in keeping with space all allocated in the layout.

Photographs must qualify in terms of context, composition, quality etc. The staff has to ensure that type size and style, artwork including line illustrations are relevant to the particular issue.

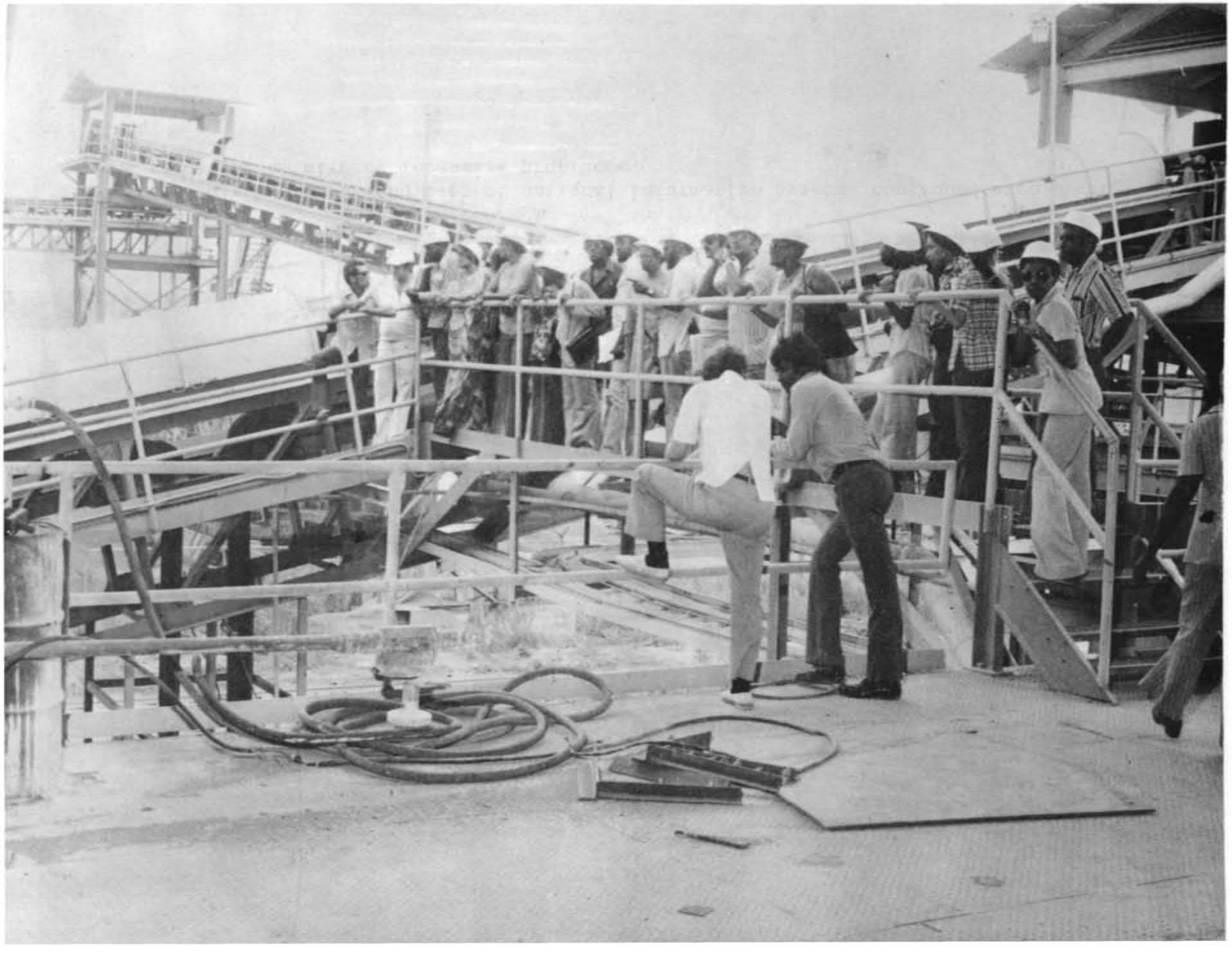
In the final analysis the material is taken to the Printers where it is type-set, proof-read and laid out. It is then taken through the various stages of photo lithography and web offset printing production. (At the end of my lecture I will demonstrate with various types of material which I have brought e.g. computer tapes and codes, films, paste-ups, layouts, flats, type sizes and styles, printing plates etc., the various stages of planning and production).

Throughout the exercise we try to avoid criminal acts against communication theory and the principle of planning, pretesting, producing, distributing, field evaluation and feedback in order to ensure that the particular written communication material creates awareness, understanding, effect change and greater involvement of the people for the benefit of the people.

D.S.C. WRITTEN COMMUNICATION (PLANNING AND PRODUCTION) MODEL



Informal discussion on the uses of national information systems continued even during the recess of an already intensive programme.



Workshop participants tour the Bauxite Plant of Guyana, Bauxite Mining Enterprise Limited at Linden, 65 miles up the Demerara River, during one day sessions held out of Georgetown.

13 SUBMISSIONS TO COMMITTEES

J Kimemiah

Introduction

At some time or other most of us find ourselves faced with the task of making a submission even if it is only at an interview or a meeting attended. Submissions of these kinds will usually be a short and straightforward account calling for no more than an orderly arrangement of relevant facts which should be clearly presented. These submissions like those at meetings of clubs and societies and in business, generally on matters of routine, are often made orally.

But in business, whether of government or the private sector, the submission may involve lengthy investigation and research and then assume the proportions of a small book. But whatever the nature of the submission, the object is always the same: to present in adequate form relevant factual information, and sometimes conclusions and recommendations, as a guide to action to be taken. The form taken by the submission will vary with its length and subject-matter, but there are certain general principles common in this form of communication.

Types of submissions

Written reports fall into two classes; routine and special. Many submissions for day-to-day business are routine and deal with matters that periodically occur e.g. reports of a departmental head on the work of his department over a period of time. Presentation of these submissions creates no special problem. Many routine submissions are in fact made on pre-designed forms which simplify the work of preparing and presenting them.

Special Submissions are different. They are not submitted as a matter of general practice but are once only ad hoc reports called for to provide information on matters of particular interest and concern. They cover every conceivable situation in which those asking for the submission are interested and on which information is sought. They range from reports that are no more than replies to requests for information needed to bring a manager up-to-date with development to those which involve prolonged investigation undertaken for the purpose of helping to shape policy.

They may arise from routine submission, where a situation revealed by that submission calls for special action. They may be in summary form and consist of a single sheet or they may be detailed and extend over many pages. They may be made by individual members of staff or by a group or by specialists. They may be made by committees specially appointed to investigate issues of wide-ranging significance. Many government reports are of the last named type and sometimes extend to hundreds of pages but even so, the general principles underlying their compilation are the same as those of other special reports.

Note For submissions by committees the style of presentation will usually call for the replacement of the first person 'I' or 'We' by the personal third - "the Council" or "the Committee" They should be signed by all the members. The Chairman signing first, the Secretary last and the remaining members in alphabetical order of names.

Preparation

The first step in preparing a submission of any kind is to make sure you know exactly what is wanted - in other words you must be clear about your Terms of Reference.

A breakdown on the following lines is helpful at the preparatory stage:

1. What are your terms of reference? Why is the submission necessary?
2. Who are the potential readers?
3. What is their background?
4. What do they know of the subject?
5. What are your sources of information?
6. Identify those sources which you propose to use.
7. How will the submission affect readers?
8. Is it confidential or restricted in circulation?
9. What consequences may the report have?
10. What financial aspects are involved?

Sources of Information

Collecting and assembling relevant information is the foundation of all good report-writing. Information upon which one can draw when writing a report is of 3 kinds:

1. that which is recorded e.g. books, articles, journals documents, files of correspondence and so on.
2. that which is investigated e.g. through questionnaires interviews and conversations with persons who have expert knowledge or first-hand experience. These would include managers, employees, specialists, and any others whose experience and opinions have relevance to the report.
3. that which is direct i.e. through personal observation, tests and experiments.

Some submissions may be so short that the processes of collecting and organizing the data and writing the report can be performed as a single operation but at the other extreme there is the lengthy report extending to many pages that may involve spending a long time in collecting facts, grouping and interpreting them before the writer can sit down to write.

Organizing the Material

Once the material is collected, the next step is to collate it. Two procedures are involved:

1. to bring together related facts and ideas and group them into sections under definite headings.
2. to arrange the section in the order in which it is supposed to be presented.

Once collation is completed it is easy to view the situation as a whole and assess the value of its component elements. This may reveal that some of the information included is unnecessary and that other information is inadequate and needs to be reinforced.

Forms of Presentation

Letter form Short submissions may be in the form of a letter addressed to the person(s) at whose request or on whose instructions the report is made. The mechanical structure will not differ from that of the ordinary business letter but the subject heading must be included above the body of letter.

Subject matter will be arranged in the following order:

1. a reference to the request from the report
2. the methods of investigation used
3. the writer's findings
4. the conclusions drawn
5. the recommendations made, if these had been requested

In the opening paragraph brief mention will be made of the terms of reference, followed by the formal statement that the submission is being made. Then will come a statement of the sources consulted the enquiries made and any other methods used to ascertain the facts. These will be arranged in order followed by a statement of the conclusions drawn. Should the terms of reference call for recommendations, these will conclude the report.

Tabular form If a submission is lengthy a schematic arrangement in which material is classified and grouped under headings and sub-headings simplifies the readers' task who can see at a glance what the different sections are about, pass quickly over those that do not concern him and concentrate on those which do. Capitals, numerals, lettering, underscoring are all employed as devices for presenting different items with varying degrees of emphasis.

Paragraph form For very long submissions, it is sometimes better to follow the simple arrangement of paragraphs grouped under section headings.

Writing the submission

Skill in writing means ability to present subject matter clearly and in an interesting manner. In writing of submissions accuracy is paramount.

A well written submission must have the following qualities:

1. Completeness It must be complete. Everything must be investigated which falls under the terms of reference. Facts must be carefully collected, interpreted honestly and the writer must distinguish between facts and opinions. Whether the findings are favourable or otherwise the evidence of which conclusions are made must be both adequate and reliable.
2. Clarity Clear writing is the product of clear thinking. A submission will have clarity only if facts and ideas are presented in an orderly manner. The language in which it is written must be grammatically flawless but easily understood. If it is being written for a specialized field there should be no objection to using that register of language.
3. Conciseness consists in using as few words as possible to express what has to be said. The essential point is economy in the use of words. In other words bombast hackneyed expressions and circumlocation should be avoided.
4. Readability It must be readable. Nothing written will get altered if it is pedestrian. It is not enough for presentation to be clear, it must be attractive - in a form and in terms that capture attention. No written submission is of any use unless it is at least attractive enough to get a reading.

Checking the submission

Having written the submission, it should be checked carefully. The writer(s) must make sure that the information is factually unassailable, appropriately grouped and logically arranged. Spelling, grammar, and punctuation are areas for consideration. In the process of checking the writer(s) should empathize with the reader to visualize the impact of the submission.

The components of a formal submission

1. The cover. Where submission will be handled a number of times a distinctive and protective cover is needed.

2. Title page. This shows the title, the name of the person preparing the submission, the name and nearly always the position of the person to whom it is addressed, a reference number or code, and the date of completion.

3. A summary of the contents, itemizing the sections of the submission, with the page references to the right. Any appendices will be identified in a similar way.

4. An introduction, presenting the topic dealt with or the problem investigated.

5. The main body of the submission, presenting data and discussing it, with illustrative material.

6. Conclusions, evaluating the data.

7. Recommendations.

8. Appendices, supplying supplementary material, tables and charts. The page sequence in which items occur in the main report should be maintained throughout all appendices and charts.

Submission Check List

Purpose

Is the purpose of the submission made clear, more particularly as shown in the title, introduction and summary?

Information

Does the submission give all the information required by the terms of reference?
Does it meet the needs of the reader?
What questions are likely to arise in his mind?
Which of these has the report anticipated?
Has any irrelevant information been included?
Is the technical level of the information appropriate?

Introduction

Does the introduction explain the scope of the submission?
Does it define its limits?

Accuracy

Are all the statements accurate? To what degree?
Have sources and authentication been provided?
Are there any possible ambiguities?

Structure

Is the subject arranged in the appropriate logical sequence?
Is the sentence structure clear?
Are the paragraphs of reasonable length in relation to the length of the report?

Does the paragraphing reflect the development of the information and ideas?
Has the right balance been struck between the various parts of the report?
How appropriate are they?
What reference to them is made in the body of the report?
Are all the main points clearly made?

Style

Is the report free from pompous phrases and cliches?
Is the approach positive rather than negative?
Does it hold the interest of the writer himself throughout his re-reading of it?

Display

Is there reasonable economy of paper and expression?
Are conclusions and recommendations arranged neatly and clearly?
Are the various sections summarized sufficiently for the reader?
Are the headings and sub-headings right?
Have visual aids been introduced where appropriate?

Language

Is the report free from grammatical errors?
Is the vocabulary too abstract?
Are any meaningless phrases introduced?
Is the pace the right one? Too fast? Too slow?
Is the report trying to accomplish too much?
Is the tone adopted towards the reader the right one?

Illustrative matter

Does each diagram convey its meaning clearly?
How well is the association between text and illustration established?
Do the illustrations give the essential minimum of explanatory wording?
Are the tables used mentioned in the text of the report?

The effect

Is the survey of the subject matter concise?
Has the purpose been achieved?
Can one describe in some detail how it has been achieved?
Has the draft been thoroughly edited?
Is the writer reasonably satisfied with the report?

14 POOLING EXPERIENCE IN MEETINGS

J Kimemiah

Introduction

Experience of a group of people can profitably be pooled together, with a common objective in view, in a meeting. Meetings constitute a very important form of communication.

Meeting

A meeting may be defined as a gathering together of a number of persons for any purpose. All meetings may be classified as either public or private.

A public meeting is open to the public.

A private meeting, however, is attended by members of the body holding the meeting or people with some other right or special capacity for the discussion of matters not of public concern. Private meetings include staff meetings, company meetings, meetings of clubs, trade unions, societies, aldermen, etc.

Why meetings? No organization can get along without meetings. They are work-sessions and a place for taking decisions. Some of the principal reasons for calling a meeting are:

1. To explain a new policy decision as it affects a Ministry, a department or a section of a department;
2. To review the operations of a department when things are not working to schedule;
3. To reach agreement on non-official activities necessary for the operation of official work;
4. To explore new and more effective ways of accomplishing official business within the broad official policy;
5. To set the tone of the department at the beginning of the year (or any agreed period), and to review the work of the department at the end of the year.

Causes of unsuccessful meetings. Some of the causes of ineffective, frustrating or boring meetings are:

1. Preparation - inadequate advance information, faulty composition of subject, Chairman vague about subject or purpose, bad handling of time factor.

2. Introduction - too long winded, incomplete or too short, muddled or confusing, key issues not defined, main issues not clarified.

3. Chairman/Leaders attitude - too autocratic, easy going, bored, uninterested, insincere, inattentive, overserious, pompous, flippant, tactless and prejudiced.

4. Control and guidance - irrelevant, rambling, latitude to overtalkative, diffident members ignored, discouraged or snubbed, private discussions, random allocation of time to major and minor issues, contributions ignored, disagreements or misunderstandings not clarified, intermediate phases of progress not summarized.

5. Conclusions - not summarized, minority views ignored, inaccurate quotations of contributions, unsettled points left in the air, action required not formulated.

6. Participation - many of the above causes arise because the leader did not develop a sense of participation in the members of the group. The sense of participation is not only a matter of the amount of talking done by members of the group but it is also their attitude of mind.

Not all meetings are expected to arrive at decisions or make recommendations. Therefore the amount of participation will depend on the kind of meeting, which can range for no group participation (which is rare) to the fullest possible participation.

Types of meeting Meetings vary between the following two extremes:

1. Highly formal - with Chairman, Secretary, agenda, minutes and formal rules of procedure.

2. Very informal - ad-hoc meetings about current business - probably colleagues on first name terms.

Between these two extremes, meetings vary also, depending on the amount of participation.

Some of the meetings which do not aim at full participation are:

1. Meeting called to hear a statement of policy

2. Meeting called to hear definition of responsibilities

3. Meeting called to receive instructions

4. Meeting called to receive explanation of new system or procedure

The problem solving meeting (Action Meeting) is possibly the most important. In this type of meeting one tries to transform a situation in which doubt, conflict or disturbance is experienced, into a situation which is clear and coherent.

A common example of a problem solving meeting is the post-mortem meeting. Because something has gone wrong or some mistake has been made the meeting is called to find out

precisely what went wrong, where it went wrong, why it went wrong, how can it be prevented from happening again.

At these meetings, if there is to be intelligent talking we must:

1. Know exactly what we are talking about
2. Keep our talks relevant
3. Know exactly where there is disagreement and why
4. Know exactly where there is agreement

In all meetings our activity - encouraged/inspired by the Chairman/Leader - should be a thinking activity and not random or emotional. Thinking means we want to know as much as we can about the causes, results of events and policies, the advantages of proposed courses of action, the reasons for people's views and the significances and results of our own views and actions.

Thought must be REFLECTIVE.

Discussion is more than a matter of free talk or conversation. Discussion is both thinking and talking and the talking is intended to aid the thinking. Good discussion

1. Stresses reflective thinking
2. Aims to understand a situation or difficulty
3. Aims to appreciate meanings and significance
4. Aims to analyse and solve a problem
5. Occurs in a group situation

Discussion is not debate. In a debate a person has made up his mind about something and wishes to convince everyone that he is right. We attend discussion meetings to learn in order that we may be in a position to make up our minds.

Functions of a Chairman

A Chairman/Leader must know:

1. How to plan and prepare for a meeting
2. How to start a meeting
3. How to stimulate and guide discussion
4. How to get everyone to take part
5. How to prevent irrelevancies
6. How to give intermediate summaries
7. How to bring a meeting to a conclusion and to give a final summary so that everyone knows exactly what the meeting accomplished
8. The kinds of action that delay, handicap or wreck a meeting

If there has been thoughtful and constructive participation at a meeting the decisions that are made will lead to cooperation in action because there has been cooperation in thought. Matters should not be put to the vote. The interest should be in weighing judgements, not in counting hands.

A good Chairman/Leader should be able to lead a discussion. To do this he must:

Outline the subject clearly. State topic, problem or difficulty with which the meeting is to deal, outline situation giving rise to topic, problem or difficulty, state purpose of meeting so that everyone knows what is appropriate for discussion and what is not, define technical terms used, outline procedure to be followed. The vague statement of subject is the cause of the most futile discussions.

Guide the discussion Assemble all the necessary facts, draw out information, view-points and experiences, make sure all contributions are understood. Keep discussion on subject, avoid purely personal arguments, develop group participation.

Crystallize the discussion. Summarize the development of the discussion, refer to any changes of opinion, state points of agreements or disagreement, state intermediate conclusions as reached, make sure of understanding and acceptance of summaries.

Establish final conclusions reached Give final summary of course of discussion, state conclusion clearly, main points contributed, disagreement if any and the reasons for them. A final summary is necessary to make clear what the meeting has accomplished. Ask members whether the summary has been fair and complete and invite any comments.

Get agreement on action Show that a decision is a group decision arising from discussion, that the decision is based on conviction, assent or reconciliation of views. It is Chairman's/Leader's responsibility to summarize the reasons for the action and show how it is in the organizations interest.

To lead a discussion meeting a Chairman should:

1. Determine purpose of meeting i.e. know the objective e.g. to consider unsolved problems
2. Examine the subject - get facts and information on subject, determine points that need discussion, anticipate differences in viewpoint
3. Anticipate causes of delay - and obstruction i.e. prepare for difficult members and embarrassing subjects
4. Outline the discussion i.e. know final objective, intermediate objectives, frame appropriate questions, outline clear introduction, prepare a time-table

5. Be ready i.e. agenda, reading matter, announcements, arrange accommodation, prepare visual aids and other necessary material. Preparation does not merely involve collating documentary information but includes a verbal map - in other words there must be time to think. (Chairman/leader should have a preparation sheet)

Chairman's/Leader's authority Although a Chairman must guide, he must also exercise control and discipline, without necessarily relying on the weight of authority of formal rules of order. Collective thinking is wanted.

Questions can be used by the chair not only to ensure that everybody takes part and to make best use of member's knowledge and experience but also to open up discussion, to amplify and explain a member's contribution, to introduce a point which is being over-looked, to move discussion ahead from one point to another, to bring out the distinctions and similarities between various ideas, to encourage intelligent judgement on the ideas presented and not least, to exercise discipline.

The use of questions as a means of directing and stimulating discussion is one of the most effective techniques used by a Chairman/Leader. Questions can be general or specific depending on the nature of response required. Whatever the type of response or question the most effective are those which cannot be answered by a "Yes" or "No". The "why", "when" "where" and "show" questions are preferred; to be successful a Chairman/Leader must develop skill in asking questions - intelligent and purposeful - which is an art.

Personality traits of successful Chairman/Leader

1. Mental alertness
2. Sensitivity and perception
3. Concise and clear expression
4. Impartiality
5. Tact
6. Poise and self-restraint
7. Friendliness and good will
8. A sense of humour
9. Interest
10. Fairness

The Secretary and his/her duties

Every meeting must have a Secretary to maintain a record of decisions and agreements.

Minutes of meetings Such things as memoranda and shortened-layout letters are sometimes called minutes, and the term is also applied to short comments written in the margin of some document or attached to it on a separate slip of paper ('loose minutes'). When used in connection with meetings, the word means a record of what was done at the meeting, and this is what we are discussing here.

If the minutes are to be precise and not merely depend on the whims and fancies of a particular individual then they should be uttered by the Chairman in the process of his intermediate summaries. This means that in fact he dictates the minutes when he checks acceptance of the summaries. If the meeting agrees with the summaries, then it has for all practical purposes prepared the minutes. It is then hardly likely that a meeting will waste time at a subsequent session by contesting the minutes of the previous meeting. When a Chairman in effect dictates the minutes, the Secretary has merely to note the summaries accepted by the meeting and following the right practice, re-write them in the minutes.

Layout There is no universally accepted form for the layout of minutes, and many variations in detail are possible, but the following is an acceptable standard layout for any kind of minutes:

MINUTES OF THE MEETING OF .....HELD ON (DATE), AT/IN (PLACE), AT TIME		Action by
PRESENT:	Mr X Y, Chairman) (Regular members of the body) (List of Names))	
Apologies for absence were received from: (List of Names)		
IN ATTENDANCE:	(List of names and posts) (Non-members specially invited or present to advise, etc.)	
Min. (No.)	HEADING (Brief summary of background and/or discussion) RESOLVED: That...(verbatim text of the resolution)	
Min. (No.)	(HEADING) The meeting closed at (TIME)	
Confirmed: ---------- Chairman		
Date: ----------		

Minutes of meetings are intended to be an accurate and concise record of what was done; they should definitely NOT be a complete record of all that was said. They record transactions, not debates, and THE SHORTER THEY ARE THE BETTER. Good minutes call for summarizing in its most concise form.

Facts and figures considered should be given in an Appendix, not in the body of the minutes. Reports from officials, sub-committees, and so on that have been received and discussed should also be treated in the same way. Minutes, especially those of company meetings, may under certain circumstances be accepted as evidence in courts of law, and it is essential that whatever is included in the way of facts, figures, and resolutions should be absolutely accurate. This is especially important in the the case of contracts, staff appointments, and other such matters where specific sums of money or details of salaries, incremental scales, conditions of service and so on are involved.

Here is an abbreviated specimen of the minutes of a meeting of a local authority:

MINUTES OF THE MEETING OF BANDANI COUNTY COUNCIL HELD IN THE COUNCIL CHAMBER ON 23RD NOVEMBER 1970, AT 10.45 AM

PRESENT: Councillor A B - Chairman
Councillor C D - Vice-Chairman
Councillor E F
Councillor G H
Councillor I J
etc.

Apologies for absence were received from:

Councillor R S
Councillor Mrs T U

IN ATTENDANCE: Mr B C - Clerk to the Council
Mr D E - Treasurer
Mr F G - Executive Officer
Mr H I - District Health Inspector
Mr J K - Committee Clerk

Min.67/70: PRAYERS
A short period of silent prayer was observed before the beginning of business.

Min.68/70: CONFIRMATION OF MINUTES
It was proposed by Councillor E F, seconded by Councillor G H, and

RESOLVED:
That the word forthwith in Min.54/70, line 2, be deleted and replaced by the words as soon as practicable.

Min.69/70: CHAIRMAN'S ADDRESS

The Chairman reported to the Council that during his visit to the Nairobi Show September he had approached a certain firm for assistance to Harambee groups operating cattle dips.

The company had offered to provide 120 gallons of 'Toxaphone' dip free of charge, and fifteen 5-gallon drums had already been received.

Referring to the Council's financial affairs, the Chairman drew attention to the care which its financial officers had exercised in controlling and supervising funds. Two cases of misappropriation had been reported to the police, and he wished to thank the officers for their alertness and vigilance.

The Council noted the Chairman's remarks, and endorsed his thanks to the Council's financial officers.

Min.70/70: REPORT OF THE HEALTH COMMITTEE

In the course of discussion of this report, Councillor K L pointed out that the Kalima Dispensary required extra staff and requested that this be noted by the Health Committee, and especially the sub-committee which was due to make a visit to all dispensaries in the County in the near future.

Proposed by Councillor K L, seconded by Councillor M N, and

RESOLVED:
That the report of the Health Committee as set forth in the minutes of that Committee's meeting held on 25th October 1970 be adopted, and further that the special needs of the Kalima Dispensary, as mentioned in the note heading this minute, should be recommended to the Health Committee's particular attention.

(During the discussion of this report Councillor Mrs S T entered the meeting)

(OTHER REPORTS OF STANDING COMMITTEES WOULD BE DEALT WITH HERE, EACH IN A SEPARATE MINUTE).

Min.75/70 MARANI AFRICAN PENTACOSTAL CHURCH

The Clerk informed the Council that he had received a letter from the elders of the Marani Pentecostal Church, expressing their gratitude to the Council for agreeing to their application for a church site at Marani Village.

The Council noted the Clerk's report with appreciation.

(At this point Councillor F G left the meeting).

Min.76/70: SEREMUNI HARAMBEE CATTLE DIP SITE

The Council received and considered an application from the Seremuni Harambee Group for the use of a piece of Council land situated at Seremuni Boma, which had in the past been used by the Department of Agriculture as a pig-breeding site but had now been abandoned, for the construction of a cattle dip on a self-help basis. After some discussion, in which it was pointed out that this land had no potential for any other kind of development, it was

Proposed by Councillor F G, seconded by Councillor Q R, and

RESOLVED:
That permission be granted to the Seremuni Harambee Group to use 1 acre at the extreme western end of the former pig-breeding site at Seremuni Boma for the construction of a cattle dip, subject to the approval of the site by the Veterinary Department, and to the pegging out of the area by the Council Surveyor.

(Councillor Mrs S T asked that her opposition to this resolution be recorded, on the ground that the site was too near to the Seremuni Secondary School.)

Min.77/70: APPOINTMENT OF ASSISTANT MARKETS SUPERVISOR

Proposed by Councillor G H, seconded by Councillor E F, and

RESOLVED:
That the recommendation of the Staff Committee be adopted that the vacant post of Assistant Markets Supervisor be offered to Mr K E at a starting salary of £855 in the salary scale 7(b), £855-36 - £1,035x42 - £1,245 per annum on local pensionable terms and conditions of services.

The meeting closed at 12.15 pm

Confirmed: _____
Chairman

Date: _____

EXERCISE

1. The following minute is badly set out and also contains a good deal that should have been omitted. Rewrite it.

   Min.38/70: LAND FOR SELF-HELP SCHEME. An application was received from the Wandiri Self-Help Group for permission to erect a nursery school on Plot No.39, adjacent to Wandiri Market. Councillor N O expressed concern that the sanitary facilities provided might not be adequate, but accepted the Chairman's assurance that this would be closely supervised. Councillor D E said that in his view another nursery school was not required at Wandiri. Councillor J K, however pointed out that there was not, in fact, any nursery school within five miles. Councillor D E then agreed that there was a good case for the proposed school. Councillor V W asked whether the self-help group was in a position to put up a building of the required standard, adding that he doubted it; he was assured by the CDO that it was. Several Councillors then expressed their opinion that the group should be encouraged; Councillor D E remarked that development through self-help was very important in modern Kenya, and said that it deserved the whole-hearted support of all Councillors. He asked why it was that Councillor V W always opposed everything progressive. Councillor V W heatedly replied that this was a libellous accusation. The Chairman called for order, and Councillor O P then proposed that the request should be granted. When this was put to the vote it was agreed to unanimously.

2. Determine the five most essential qualities required of a successful R & D Project leader, and arrange them in order of importance.

   Drive and enthusiasm
   Self control
   Imperturbability
   Balanced judgement
   Technical competence
   Courage
   Discipline
   Impartiality
   Approachability
   Balanced humour
   Sincerity
   Sensitivity and perception
   Creativity
   Mental alertness
   Tact

Procedure: Participants will be divided into three groups. Each group will elect a chairman. By group discussion each group will decide the qualities required and arrange these in order of importance. All the participants will finally meet at plenary to present their group decision.

15 PLANNING AND ORGANISATION OF CONFERENCES

G Parris

There are many aspects in planning and organising Conferences. I shall deal specifically with the administration of conference Secretariat - the setting up and maintenance.

When Does Preparation for a Conference Begin

(1) After the last conference;
(2) Immediately after the decision to have a conference is given;
(3) A stated period, say three months before the proposed date of the conference.

What is clear is that preparation for the organisation of a conference are done weeks or months before the date of the conference.

Planning Committee of Conference

The Chief Supervisor of the Secretariat is always a member of the Committee responsible for planning and organising the Conference. While the Chief Supervisor is interested in all aspects of the Conference, he/she is particularly interested in the following:

(i) Size of the Conference — the number of delegates and observers attending the conference.

(ii) Type of Conference —

(a) Conference of Prime Ministers
(b) Conference of Foreign Ministers
(c) Conference of Officials

The Supervisor of the Secretariat must liaise especially with the Conference Secretary and the Documents Officer.

Now, when the size of the Conference is known, the Supervisor will form a sub-committee to assist in the organisation and operation of the Secretariat.

Preparations for a 'large' Conference say for 500 persons or representatives from about 45/50 countries —

Conference Site:

(a) Main Conference Hall

(b) Discussion Rooms
(c) Rooms for Conference Officials
(d) Secretariat
(e) Canteen Facilities
(f) Rest Facilities, etc.

Let us suppose that at the Conference 4 languages are to be used —

English	Spanish
French	Arabic

Let us further suppose that the country where the Conference is to be held is English-speaking and there is little or no personnel to service the French, Spanish and Arabic units of the Secretariat. Personnel capable of typing and reading Spanish, French and Arabic must be obtained from outside the host country.

A decision as to the numerical strength of the Secretariat must now be determined:

e.g. French typing pool — 9 type (12) for rotation
Spanish typing pool — 6 type (8) for rotation
English typing pool — 10 type (12) for rotation
Arabic typing pool — 6 type and 2 typists for English typing.

Added: Conference Organiser/Chief Supervisor

Conference Supervisors - one supervisor for each category of typing pool; one for Office supplies.

Chief Messenger
Messenger

Now the Committee has settled the question of the typing personnel for the four units of the Secretariat. The layout of the entire Conference Secretariat and Hall must now be looked into. The following facilities must be located near to the typing services, i.e.

The Chief Translators and the Translators;
The Office Supplies;
The Printery/Duplicating Section;
The Interpreters' Rooms;
Documentation Registry or Store-Room; and
The Documentation Officer's Room.

Attached are two specimen layouts:

(i) of a typing and interpreters section, etc., and
(ii) the printing room of the secretariat

The Chief Supervisor and the committee should be acquainted with the entire layout of all the various halls and rooms which will be used during the Conference.

Let us recap on the facts that are now known to the Chief Supervisor and the committee:

(a) Time and duration of conference;
(b) Size;
(c) The number of languages to be used at the conference;
(d) The location and layout of the Secretariat, other departments, conference halls, etc.

The office equipment, stationery, etc., must now be ordered. The following must be taken into consideration —

(a) The countries or firms from which supplies could be obtained, and

(b) the time taken for the delivery of the equipment

I have attached an estimate for office supplies based on the following:

600 delegates
100 secretariat (interpreters/translators, et al)

This list is by no means final and it will be found that certain additional items must be obtained during the conference.

As stated before it was accepted that the Conference will take place in an English-speaking country. The competency of the stenographers and typists must now be ascertained. Typewriters for the various typing units must be obtained (e.g. Typewriter with French characters face, Spanish, Arabic).

As the date for opening of the Conference approaches, furniture and office equipment must be moved into the Secretariat and the offices laid out according to the plan. The Chief Supervisor must ascertain that all the rooms are adequately furnished and all his/her supplies are adequate. The entire Secretariat must take on the appearance of a well ordered and properly laid out office, which should ensure an easy flow of work with the operation fashioned to produce work accurately and quickly.

Although the Printing room and the Documentary Registry are not the direct responsibility of the supervisor, during a large conference, in a 'small' conference, he/she will be responsible for all the departments of the Secretariat. Therefore in a 'large' conference the Chief Supervisor must ensure that the facilities of the printing room are adequate and that it is also geared for accurate and quick production.

The Secretariat should be in operation at least a week before the opening of the Conference. There are several reasons for this, the more important being:

(i) the staff must be acquainted and become accustomed to working with each other;

(ii) there is always preparatory typing to be done - documents etc.;

(iii) the staff getting themselves acquainted with the layout etc., of the Conference site, buildings, etc.;

(iv) there is sometimes a meeting of officials before the conference proper, when Conference Documents are prepared;

(v) registration documents, cards, files, have to be typed and prepared;

(vi) conference packets for delegates must be prepared.

On the notice board in the Secretariat there should be a copy of the Time-Table of the entire conference meetings and the location of the meeting of the various Committees and Work-shops; Plan of the Secretariat and other important notices.

Each office or department must be boldly labelled, in a prominent place (with name of the supervisor and/or the section, e.g. Chief Supervisor Cde. X, Typing Pool, French Unit).

Operation of Secretariat During Conference

Chief Supervisor or an appointee must record or must receive a detailed description of every document given for typing. The Supervisor of each section should make a record of all documents submitted for typing and allocate work to each typist.

The Chief Supervisor must ensure that each document bears a number in numerical sequence according to code number/ symbol decided on by the organising committee.

Attached is a specimen of a Document Control Card, the type of record keeping device that is essential to the different operation of a secretariat.

Typing staff should ensure that each conference document bears a specific number.

Display and presentation are most important. It is appreciated that accuracy is the most important element in all the documents presented.

We have been looking mostly at preparation for a 'large' conference, say like the Conference for Foreign Ministers of Non-Aligned Countries - but the conferences we are most

likely to be involved in are the small conferences with between 30 and 50 persons and under 100, where the Secretariat handles the entire operation from the prior preparation, order of equipment and furniture to the production and issue of the last or final communique.

Miscellaneous Points

(i) Typing and printing sections must always be well arranged and tidy.

(ii) Supervisors ensure that staff are happy and contented.

(iii) Facilities: canteen, toilet, etc., are adequate.

(iv) Security is well maintained

(v) Adequate transportation

(vi) Supplies constantly checked, sources of replacement available.

(vii) The personnel available in the printing room may not be able to distinguish between French/ Spanish or other foreign languages so it could be decided to allocate different colours for each language used:

Blue — French
Green — Spanish
Pink — Arabic
Buff — English

In the printing room, printing of each language document should be restricted to particular machines which are properly labelled.

There are several other areas that could be elaborated upon, but which I hope would be discussed in the workshops.

Estimates for Office Supplies
Based on the following figures

---

600 Delegates - 100 Secretariat (Interpreters/Translators, etc.) and 60 documents of five pages each. These quantities should be increased in accordance with total anticipated number of documents.

800	pencils with eraser (for delegates and secretariat)
800	writing pads half-size (legal) (delegates and secretariat
100	thousand sheets for printing on both sides (double this quantity for printing on one side only)
50	tins of printing ink
1,000	stencil sheets
30	bottles of stencil correcting fluid
200	folders to keep stencils
200	plastic sheets to be used with stencils
15	two-hole perforators
5	staplers (heavy duty able to staple more than 100 sheets)
24	regular staplers
24	staple removers
15	scissors
20	rolls of gummed paper
1,000	sheets copy paper, legal size
1,000	sheets copy paper letter size
1,000	envelopes legal size
2,000	sheets bond paper, letter size
2,000	sheets bond paper, legal size
10	folders with lever
100	manila envelopes, legal size
100	manila envelopes, letter size
100	manila folders, legal size (Oxford type)
150	labels for manila folders
10	thick felt pen
30	fine felt pen (various colours)
12	boxes of carbon paper, legal size
40	shorthand pads (Gregg and Pitman ruled)
6	ruled paper pads (100 sheets each)
6	boxes of tacks
50	boxes of clips
30	typewriter erasers
12	typewriter cleaner rubber knead
12	blotting paper pads (for desks)
1	box of rubber bands (40 mm.)
1	box of rubber bands (80 mm.)
1	box of rubber bands (100 mm.)
200	ball-point pens
12	rulers (12 inch)
2	ink pads for seals
2	ink bottles for seals
30	waste paper baskets
30	boxes of staples (standard 26/6)

5	boxes of Acco-fasteners
10	desk pencil-sharpeners
12	in and out trays
1	dozen of bi-coloured pencils
2	blackboards for information
2	blackboard erasers
1	box of white chalk
5	dozens of 1" binders
1	ball of string

DOCUMENT CONTROL CARD

SYMBOL:		SHORT TITLE:	
AGENDA ITEM:	ORIGINAL:		No. of Pages:
Consulting Officer:			Tele:
TRANSLATION		Rec'd. on:	Hour:
Into:		Due on:	Hour:
TYPING POOL		Rec'd on:	Hour:
		Due on:	Hour:
PRINTING		Rec'd on:	Hour:
No. of Copies:		Due on:	Hour:
DISTRIBUTION:		Delegates:	Others:
Due on:	Hour:	Interpreters:	Registry:
CONFERENCE ROOM:		Rec'd by:	
		Date:	Hour:
DOCUMENTS CONTROL		Rec'd on:	Hour:
Job Number:		OUT:	Hour:
Special Instructions:		Reference:	

EXTREMELY IMPORTANT: A card is to be established for each document and each langauge, although it bears the same symbol.

This card should be printed in five copies, each one of a different colour, and bear a special mention:

ORIGINAL: White on heavy bond paper with mention botton right Documents Control

1st copy : Yellow on thick copy paper with mention bottom right Translation

2nd copy : Light Green on thick copy paper with mention bottom right Typing Pool

3rd copy : Pink on thick copy paper with mention bottom right Printing

4th copy : Light Blue on thick copy paper with mention bottom right Documents Control

The manner in which these cards are to be used is indicated below:

(1) DOCUMENT CONTROL establishes the card with all indications available at the time the document arrives for registration:

(i) Keeps the light blue copy;
(ii) Sends document with WHITE ORIGINAL and YELLOW copy to TRANSLATION;
(iii) At the same time, sends LIGHT GREEN copy alone to TYPING POOL, and PINK copy alone to PRINTING, to advise them of the coming of the document ahead of time in order to enable them to plan the work.

(2) TRANSLATION keeps YELLOW copy after entering respective indication on both the WHITE ORIGINAL and the YELLOW copy and sends document with WHITE ORIGINAL to the Typing Pool.

(3) TYPING POOL receives document and fills out WHITE ORIGINAL together with LIGHT GREEN copy and sends document and WHITE ORIGINAL back to DOCUMENT CONTROL.

(4) DOCUMENT CONTROL, after entering information appearing on WHITE ORIGINAL onto its LIGHT BLUE copy, sends document with WHITE ORIGINAL to PRINTING.

(5) PRINTING, after filling out its PINK Copy with information appearing on WHITE ORIGINAL and entering its own information on both, sends document in the number required to DOCUMENT CONTROL with WHITE ORIGINAL.

(6) DOCUMENT CONTROL remits documents for distribution to Documentation Officer, enters respective information on both WHITE ORIGINAL and LIGHT BLUE copy and clips them together and file into Kardex system.

16 GUIDELINES FOR THE ORGANIZATION OF TRAINING COURSES, SEMINARS AND WORKSHOPS

M N G A Khan

Introduction

Training courses, seminars, and workshops can serve several purposes. Courses can indicate different ways of solving problems, and provide new information, new methods, new ideas, new insight, different points of view and better understanding of the problem itself. Meeting together, people with common goals can decide on joint programmes of action.

A course or workshop must be planned if it is to be successful - both to the planners and to the participants.

A successful course can be likened to an iceberg - three-fourths of it below the surface. The one-fourth that does show is often taken for the whole iceberg. The unseen three-fourths (planning, organization and evaluation) are generally more important in the long run.

Critical Tasks

Before stating the guidelines it will be useful to list the critical tasks in the organization and conduct of training courses, seminars, and workshops.

Critical task 1: A course "style" must be chosen: full or part-time, timing, duration etc.

Critical task 2: The instructional method must be appropriate to the course style.

Critical task 3: The course must be planned with an agency responsible for manpower planning to insure that it will fulfil an identified need.

Critical task 4: The course prospectus must attract participants and be a clear description of the course.

Critical task 5: Selection of participants is as important as choice of instructional method.

Critical task 6: The successful conduct of the course depends on the instructor and the types of material and assignments chosen.

Critical task 7: Meeting room arrangements must be optimum.

Critical task 8: Coordination and follow-up with government agencies and supervisors of participants are essential in the planning stage, during the course, and after it has been evaluated.

Critical task 9: Evaluation of participants should be made during, at the end, and several months after completion of the course.

Guidelines

There are four main stages in the organization of a training course or workshop.

1. Planning and Preliminaries
2. Organizing for the course
3. Implementing the course
4. Evaluating the course and other post-course activities.

Planning and Preliminaries: Planning is a process in which the present situation is carefully examined and preparation is made for changing the situation. The success of any course depends to a large extent on the soundness of planning for the course.

Guideline 1: Information about needs for course must be gathered and analyzed. "Needs" can be defined as the gap between present level and desired (or required) level of ability of individuals or the organization (i.e. library, information centre, agency etc.) in meeting its responsibilities. All possible sources of information should be considered in determining what the problem and needs are. Classification of the gathered information will aid interpretation and evaluation.

Guideline 2: Course objective must be formulated. Sound objectives provide a firm basis for the decisions that will be necessary at each stage of the course. Objectives should be clear, concise, and stated explicitly with no possible misunderstanding of intent. Usual statements such as "to improve performance" are vague and do not provide an adequate base on which to develop a course.

Guideline 3: Resource needs must be assessed. The kinds of resources usually needed for a course include physical facilities, equipment, supplies, materials, funds and most important of all, people. Those resources already available can be an important factor in planning the programme, and should be taken into consideration.

Guideline 4: The Organizing Committee must be appointed. Persons on such a committee will normally have some special abilities or experience in the details of course management (such as registration, publicity, evaluation). The Committee should also include respresentatives of group which is to benefit from the course.

Guideline 5: Sponsorship must be attained. Appropriate national and international agencies should be approached to obtain sponsorship. This will ensure a better course plan and a more coordinated approach to the needs for education in a country.

Guideline 6: An action plan for the course must be designed. An action plan will include a list of several decisions needing action. For example:

1. Language of instruction
2. Scope and level of course content
3. Length of course
4. Time of year for course
5. Place for course sessions
6. Place for lodging and meals
7. Pre-course distribution of learning materials
8. Selection of groupings for course sessions
9. Choice of instructor(s)and other resource persons
10. Equipment and other facilities required
11. Plan for monitoring course's progress and participant satisfaction
12. Time sequence for publicity, course prospectus (with application), choice of participants, collection of registration information, post course publicity
13. Budget and accounts for funds to be raised by grant, subsidy, or fees
14. Maximum number of participants: their specific qualifications, if any.

The following checklist should be helpful to review the complex process involved in designing an action plan.

Checklist for the initial planning stage

1. ☐ Have you written a preliminary statement of objectives?

2. ☐ Have you set preliminary dates for the Courses?

3. ☐ Have you determined what type of course and how many people will attend?

4. ☐ Have you estimated budget?

5. ☐ Have you attained sponsorship?

6. ☐ Have you tentatively decided on a course venue?

7. ☐ Have you assessed appropriateness of facilities and availability of equipment at the venue?

8. ☐ Have you listed the sequence and the subjects to be covered in the course?

9. ☐ Have you chosen instructor/s? Other resource personnel, such as discussion leaders, recorders?

10. ☐ Have you determined qualifications of participants?

11. ☐ Have you decided on language of instruction and length of course?

12. ☐ Do you have an overall action plan and schedule of events from this point onwards?

Organization for the course: Decisions concerning the who, what and how of the implementation of the course should largely be determined on the basis of what is best in terms of fulfilling the objectives. The Organizing Committee and especially the Course Coordinator, a single individual, will have to make several decisions before the instructors and participants appear on the scene.

Guideline 7: Administrative responsibilities must be assigned and a secretariat formed. The management and coordination of the course should be an assigned responsibility of an individual or a group forming a secretariat, from within the agency for which the course has been designed.

Guideline 8: Course announcement must be drafted and and distributed. A clear and attractive advance announcement must be drafted and circulated to draw the attention of prospective participants.

Guideline 9: Training staff must be selected and organized. Training staff should be two different categories of competence:

content resource - persons with competency in specialized areas of knowledge or technical skills

methods resource - persons with ability to design a wide range of educational activities which promote learning in accord with established objectives.

Guideline 10: Participants must be screened and accepted. The participants should be selected for the course on the basis of the identified needs from which the course objectives were developed. An application form would be extremely helpful for screening applications. A formal committee could be established to do the screening.

Guideline 11: Availability of adequate facilities and the required equipment must be determined. It is important that supportive elements (facilities and equipment, comfortable seating, learning materials, etc.) be carefully coordinated and creatively used by the teaching staff to enhance the learning opportunities being developed in the course.

Guideline 12: Pre-course material, if any, must be prepared early and distributed to participants.

Checklist for organizing the course

13. ☐ Have you established a schedule for administrative tasks to be performed?

14. ☐ Have you sent out preliminary course announcement? final course brochure?

15. ☐ Have you reached agreement with training staff on course outline, learning activities, facilities and arrangements?

16. ☐ Have you screened applications and sent acceptance letters with follow-up instructions?

17. ☐ Have you distributed pre-course material, if any, to participants?

18. ☐ Have you confirmed facilities and equipment availability for course? and living accommodation (if any)?

19. ☐ Have you arranged for transportation? special dietary menus? living quarters?

20. ☐ Have you arranged for registration/hospitality on first day of course?

21. ☐ Have you sent out press release?

Implementing the course: Implementation of the course does not mean that all planning is concluded. Although the bulk of the planning may be done before implementation begins, each of the phases overlaps the other.

Guideline 13: Scheduled rooms for course must be checked out for satisfactory size, ventilation, electrical outlets, furniture, seating arrangements.

Guideline 14: Final time schedule for course activities must be determined and distributed to all participants. The daily schedule, with assignments for staff and participants should be part of the materials prepared for the course. This is a critical task as the time schedule.

The time table presented to the teaching staff, especially if they are outside resource personnel, would include such additional information as the following;

1. the actual attendance and composition of the participants
2. how the course is planned in toto
3. anything that has happened which might affect presentation such as questions or problems which have already been raised
4. who will introduce the resource personnel
5. information about the aids which has been requested, such as chalk-board, easel, overhead projector, etc.

Guideline 15: Educational activities must be stimulating for intended audience and promote discussion and exchange of view. Participants although having the necessary educational background and experience are not usually ready to plunge into discussion early in the course. Before the typical participant starts to take part in the question-and-answer discussion, he needs to become involved and identified with the group so that he will feel at ease. Participants will have some questions which should be answered.

1. Who is who? Who are the other participants? How do the participants compare in terms of background, on-the-job skills, and experience?
2. Where do I fit in? What's expected of me? How am I supposed to participate? How much am I expected to contribute? Do I just sit and listen or am I expected to talk?
3. What is the purpose of this course? What are the goals and objectives? Who designed the course? What are we expected to accomplish?

There are three basic problems which account for the failure of most question-and-answer periods and should be overcome.

1. The problem of communication
2. The problem of putting information to work
3. The problem of collecting information to use in planning future meetings.

Guideline 16: Materials prepared and distributed must be appropriate to illustrate concepts and principles which apply in actual situations. Inappropriate materials can jeopardize the educational objectives of the course. Materials should be clear and understandable to the learner, directly relating to his needs.

Guideline 17: Sequence and pace of instruction should match the variety of capabilities of the participants. Most often the sequence should proceed from simple to complex, with general remarks made for orientation, but for a gradual building to generalization after a number of specific aspects have been covered.

Guideline 18: Learning aids (audio visuals and others as needed) must be in good working order and available when needed.

Checklist for implementing the course

22. ☐ Have you checked the rooms for the course to determine satisfactory ventilation, size, furniture, seating arrangements, etc.?

23. ☐ Is the required equipment at the meeting site and in good working order?

24. ☐ Have you assigned specific persons to the various supportive tasks?

25. ☐ Have the arrangements for meals, refreshment breaks been confirmed?

26. ☐ Have the instructors been briefed? Are there any changes in the time schedule of activities?

27. ☐ Will the pace of instruction and sequence of learning activities be monitored for effectiveness?

28. ☐ Are the handout materials pre-assembled and available on time and in sufficient quantities?

29. ☐ Have welcoming and departure arrangements been made final?

Evaluating the course and other post course activities

Evaluating methods can provide information about the extent to which a course's impact is what was intended and to discover the means by which that impact was achieved. Two kinds of evaluations are possible. Both may be necessary. The first is course evaluation which is used to provide feedback about the course in process so that it might be adjusted as necessary. The second is results or outcome evaluation, which is used to measure the degree to which objectives have been met. Each of these kinds of evaluation must be planned from the beginning of the course in order to determine what information will be needed, how to acquire that information, and how to use it. Some useful guidelines are given below:

Guideline 19: The purposes for evaluation must be determined.

Guideline 20: The evaluation process (during and after the course) must be planned.

Guideline 21: Reliable and valid evaluation information must be collected, organized and analyzed.

Guideline 22: Evaluation data must be reported and utilized.

Guideline 23: Summary reports must be distributed to participants and other interested parties.

Guideline 24: Follow-up reports could be received from participants at fixed intervals after the course.

Guideline 26: Final contact with training staff should be a cordial affair.

Checklist for post course activities

30. ☐ Have you decided on the proper form for evaluation of the course? of the instructor? of the participants?

31. ☐ Have you collected and analyzed evaluation data?

32. ☐ Have you written and used the evaluation report?

33. ☐ Have you prepared post course reports to sponsor? to participants? Have participants produced reports?

34. ☐ Have you distributed post course materials?

35. ☐ Have you sent a letter of appreciation to instructors and others who contributed to the conduct of the course?

Reference: UNISIST Guidelines for the organization of training courses, workshops and seminars in scientific and technical information and documentation, UNESCO SC/75/WS/29, Paris April 1975.

17 EXHIBITIONS, OPEN DAYS AND DISPLAYS

Presented by

D G Thomas and
V Forsythe
(with acknowledgement to D J Plumb)

Introduction

People of every walk of life usually like looking at exhibits. They are intrigued to know what other people do, particularly if the information is supplied in an attractive style and in comfortable surroundings. There is, in effect, a captive audience that will come along, but it will not stay long if the organization is poor, the exhibits do not convey information clearly and interestingly. The aim of the exhibition or open day will also be lost if the audience goes away with incomplete information or with a misunderstood conception.

From the start, it must be quite clear in the organizers' mind what is the purpose of the exhibition:

a. To enlighten the general public about the Organization's activities i.e. to break down barriers of ignorance?

b. To facilitate the exchange of information between scientists?

c. To promote a product, a process, or the Organization itself?

The purpose will in the main govern the type to be presented. There are broadly four main types:

1. Exhibition for the public in general

   This has the advantage that this type can be geared towards a specific geographical area, there is more scope for graphic design, and less detail to be conveyed.

2. Scientific exhibition of a specialised kind, but covering a variety of subjects

   Conversazione by professional associations fall into this type. It has the advantage that experts come to it who are quick to appreciate the finer points of what is being shown.

3. Exhibition at a high technical level but concerned with one particular field e.g. measurement instrumentation, insect pest control in coffee.

The advantage here is that the visitors are already generally conversant with the subject matter and therefore likely to be receptive of new ideas directed to them.

4. Exhibition concerned with one particular trade or sector e.g. textiles, glass, coffee processing, range management. The advantage of this type is that the visitors have come to learn something of advantage to them.

In the early planning phase, therefore, we need to ask ourselves:

- What do we have to say?
- To whom are we saying it?
- What is the best way of saying it?

In visual terms, the purpose of any exhibition, open day or display is to convey information in a three dimensional plane. The incorporation of the third dimension, supported by two-dimensional methods of graphic and visual imagery and the printed word, demands that not only must the last two methods be modified for the purpose, but that also a method be devised of presenting static, semi-static and sometimes mobile exhibits to a mobile audience.

With the introduction of this third dimension together with mobile and static elements, there is added the factors of space, in which the exhibits are contained and in which they can be observed (which also have easy access), and time in which the exhibits can be comfortably viewed.

The success of communication is dependent upon the manner in which these elements are conceived, designed and implemented within the accommodation, scope of audience and financial limitations.

The human factor

In the planning stage, it must be borne in mind that a display structure needs to possess two essential properties. It must have the capacity of transmitting information quickly and efficiently, and it be so constructed that there is easy access and little interference to the free flow of visitors, avoiding congestion and confusion.

For the physical movement of people, several factors must be taken into consideration:

1. The various physical characteristics and intellectual level of the visitors. These will determine the degree and form of explanation required, the amount of space and time necessary to understand the message being conveyed before moving on to the next display.
2. The individualistic nature of people in their response to different forms of displays and their subject matter.
3. General inquisitiveness of human beings which affects both the provision of supporting information, either verbal or visual, and the security of the exhibits.

A guide to the physical area requirements can be gained from work done in the United States by Henry Dreyfuss in his check list of human dimensions for the working person. Although this was primarily researched for use in the design of control panels and ergonomic principles behind the type of movement required for the successful operation of such panels, certain of the dimensions given will be useful in the design of displays, exhibition stands etc.

Standard display height (stand): 36"

Standard minimum width of corridors: 21"-24" for 1 man
48"-54" for 2 men
108"-120" for 3 men

Ramps: 10° slope is optimum

Headroom: Allow 10% over the average height of ethnic groups using facilities.

Visual angle: Allow 50° above and 70° below the average eye level for visual angle without head movement.

Allow 30° either side of the central sight line for horizontal vision without head movement.

Reach radius: Allow 4'0" from security barrier to exhibit, even more if the exhibit is considered a target for theft or damage.

This information is not complete but should act as a guide to the type of information that is required in regard to human dimensions in the routing of people in limited spaces, the building of structures to be used for particular functions and the provision of security.

The presentation of exhibits within the display area(s) has to take into account not only these physical factors, but also the natural inquisitiveness of human being in either the quest for information or the novelty of seeing or using a piece of equipment. Any item that is of a manipulative nature or that has manipulative parts such as keyboards, control or activating buttons, switches or levers or those which are noise or light making are all liable to either cause congestion around their display area(s) or present problems by their liability to theft, breakage, or cause of accidents to the user, all of which destroy the effectiveness of communication. Congestion also must be expected in any area in which films, demonstrations either visual or physical,are taking place or at which film, TV or Radio interviews are being held. Knowledge as to the type of visitor is useful in planning both access and display areas and taking the necessary steps in providing certain special display or security features.

Movement

Initially, the manner in which the flow of visitors takes place is determined by the exhibition/exhibit planner, and the success at which it is implemented in practice is dependent upon his or her ability to estimate (1) the number

of visitors at any one display area at any one time, (2) their physical and time requirements, (3) the rational sequence of presented information and (4) the manner in which it is actually presented.

To help in the planning of an exhibition, it is first necessary to obtain a ground plan of the total area in which the exhibition is to take place and the individual display areas allocated. If the exhibition is to be contained in the normal working environment (research or training establishment) it is more important to make sure that both the display areas and the flow of visitors are planned in greater detail than if working in a completely open area or if one is designing these areas for the specific purpose of the exhibition. The reason for this is in the fact that there is a greater chance of having to adapt an existing area, usually used for more sedentary uses than for allowing a large number of people to move, stop, observe and move on with the minimum of effort and confusion. Irregular shaped rooms at the end of narrow, dark corridors and containing fixed laboratory benches are not the best venues for displays or exhibits, but nevertheless present the type of problem that has to be solved by the planner.

An exhibition planned for out-of-doors can be a disaster if during the middle of the day torrential rain sets in, and there is no provision made for alternative facilities. Careful planning can avoid this and also provide for the safe, satisfactory movement of people either at their leisure or hastened by an unexpected event.

The question of movement is not necessarily confined to the exhibition areas only. Visitors have to arrive and depart the site. Some will come by foot, others by public transport and others by private car, so details of general access for all these must be planned.

Display

The prime consideration in display is to present the facts as they appear and in the best possible manner. These facts may be represented as the complete object, as part of the object, as a collection of whole objects or a collection of parts of objects. They may involve movement or a series of movements or have to be exposed from positions normally hidden from view in either a static or mobile situation. The facts could also be seen as graphic interpretations of functions in the form of film, slide, diagram or photograph supported by spoken or visual commentary.

In planning the display aspect, several matters must be considered

1. Does the object present all the facts in itself? If it does, what is the best way to show the complete object? If it doesn't, what must be done in order that these facts may be presented?

2. Does any object require additional support material in order that the facts may be presented fully? For example, a computer could be seen as a working object but the facts or functionary process still remains hidden i.e. electronics. In this case, supporting material in the form of diagrams or working models may be required in order that the function can be explained.

3. Does the object rely upon a sequence in its function? If it does then this sequence may have to be worked out and displayed accordingly.

4. What sort of appeal does the object have? The fact that a television camera may have a greater crowd appeal than a cement mixer, especially if it is in operation, dictates that special display facilities, as well as display area will have to be provided.

5. Might the object have too much crowd appeal which might require extra or more rigid security measures?

6. What space and lighting, natural or artificial, is available? and

7. The amount of time allowed for the preparation of display items, which might include object modification, model making, supporting material preparation and display assembly.

The normal physical requirements of distance and height of viewing must also be taken into account together with the previously mentioned object size, appeal, function available display area(s) and lighting conditions, either natural or artificial.

In outdoor situations there is a danger that the object of display is seen against conflicting or confusing backgrounds. This can be avoided by the construction and use of screens.

Captions used in conjunction with the display must be visible, legible and comprehensible, and only contain enough information to be of value to the viewer.

Colour

The use of colour in the display must be controlled by the object. If the object itself is highly coloured, or contains a single, strong colour, then its surrounding display colour must be neutral or white. If on the other hand, the object contains little or no colour, then a strong colour as a background would project the object as a focal point.

Be careful of using two strong colours together. Red, when used with green or blue tends to give a 'jazz' effect around the edges, and unless this were planned, could have a detrimental effect on the display as a whole. For the reverse reasons, avoid using weak colours. White and yellow merge as one, and the lighter shades of other colours, when used with white present a neutral effect, satisfactory if a background is required, but should not be considered for the presentation of graphic images.

Certain colours, unless they have been specially formulated, have the tendency to fade, especially in strong sunlight. The ability of colour to withstand this is called 'Light Fastness' and most paint and printing ink manufacturers can give the information as to the degree of Light Fastness of any of their products.

Lighting

The effectiveness of display can, when the situation allows, be increased by the manner in which the displayed objects are lit. The use of spotlights can place emphasis on certain areas of the display, especially if the areas illuminated present the only lighting and are seen against a black or dark background.

Flood lighting can be very effective in presenting a total area of light.

With most lighting systems the facility to introduce colour is offered in the form of gelatines.

The light transmission properties of certain material i.e. acrylic (Perspex) can be used to great effect especially in the more adventurous displays where time, planned inventiveness and finance allow.

The properties of ultra-violet lighting in totally darkened situations allow for the more dramatic use of display techniques, especially if the object displayed lends itself by either its material of manufacture, its use or construction.

The back projection of visual material could be the only form of lighting in any one particular area of the display, and by so, places a higher degree of emphasis on the information displayed.

Any lighting manufacturer or contractor can give information regarding the properties of any particular lighting system to be used for display, provided that you have considered the functional requirements in lighting as an integral part of the communication process.

Construction

Most display situations require some sort of construction either to act as a screen to separate the displayed objects or areas from possible distractions, as a complete exhibition or display area which contains not only the display but also reception and rest facilities or as single display units to be used within the total area.

The complexity of construction is governed by the type of display required, the type of objects to be displayed, the financial limitations always encountered and the ability of the planners, who might have to build it.

The site in which construction is to take place, or be a part of, is important in deciding its form, for often the improvisation of existing facilities, materials and space is the governing factor.

Any construction, whether it be designed and produced professionally or non-professionally must be capable of (1) allowing easy access by the visitor, (2) being strong enough to withstand constant use, (3) providing the necessary security, (4) conforming to the necessary safety and fire regulations that may be in force, (5) ease of manufacture and erection and (6) being within the budget of the organising body.

If an exhibition is a regular event, it may be an economy to purchase ready-made display screens or modular units that are easy to erect and store and flexible enough to suit most needs, and would also avoid the necessity of re-thinking and making for each event.

If the display is to be transported, it must be capable of being assembled and dis-assembled easily and be contained in strong crates for travel. In this case, the lightness of construction is an advantage if the strength factor can be worked out.

Signing and captioning

An as aid to the smooth flow of visitors, it is essential that both the signing and the captioning of displays is clear, concise and easy to understand.

People must know the way in, the way round and the way out, and be encouraged by the exhibition layout to conform to the instructions displayed as signs.

Captions should be of a size that does not interrupt vision of the displayed object and contain enough information to suit the requirements of the viewer and be of a type-size that is legible from a distance of about five feet.

Ready-made lettering can be bought in the form of cut-out letters made of cork, polystyrene or one of the dry transfer systems that require little practice in applying. The advantage of three dimensional lettering is that it can be coloured to suit the display colour scheme and has possibilities with respect to light and shade when used in display lighting.

If circumstances dictate that you must produce your own lettering, try and choose a simple style that is easy and quick to draw and possibly cut-out. If a proportionate grid is drawn up on graph paper, then it is easy to scale-up lettering of a size that you require. The finished drawings can then either be cut-out from cardboard or hardboard or painted directly onto the facia or display panel.

Any colours chosen must be done so with a view to legibility, especially in the case of directional or warning signs, and must be displayed in a prominent position, above head height, but not too high.

Research done in the design of motorway signs in the United Kingdom proved that, contrary to popular belief, all capital letters are more difficult to read than if words start with a capital and use lower-case for the rest of the letters. It might be borne in mind when designing your signs.

Planning

Exhibitions and Open Days do not just happen, and are not merely pretty displays and gimmicky gadgets. If exhibitions and open days are to achieve their purpose, a great deal of thought must also be directed at an early stage to the planning. For this purpose, a planning committee should be convened with various Task Forces delegated to deal with specific aspects of the planning.

Fixing the date and venue must be the first decision:

- Will the desired audience be less busy at that time?
- Is the weather at the time suitable?
- Is there a clash with other events?
- Can it be fitted in with other events to save on travelling?
- Will it be convenient for a dignitary to open or attend?

Planning Task Forces should be formed to cover the following aspects:

Finance

- to ensure sufficient funds
- to budget for the various items of expenditure
- to decide on disbursement of funds
- to account for expenditure

Exhibits

- to decide on theme and format
- to decide on exhibitors
- to engage graphic designers and photographers
- to approve plans
- to arrange manning of exhibits

Publications and Publicity

- to decide on advance publicity
- to arrange publications and support literature
- to liaise with press, radio and television
- to arrange special viewing for publicity people
- lapel badges for officials and visitors

Site Planning

- to allocate space for exhibits, bearing in mind the traffic flow required
- to ensure provision of different kinds of facilities
  - Workshop for quick repairs
  - Catering
  - Toilets
  - Car parking
  - Film showing
  - Lectures
  - First aid and rest rooms
  - Public address systems
  - Press arrangements
  - Services - Water
    - Electricity
    - Gas
    - Telephone
    - Security

Staffing

- Guides at strategic points
- Manning of exhibits and demonstrations
- Attendants at car park
- Catering arrangements
- Central Enquiries and Information desk

The Planning Committee should also give consideration to separate showings for special audiences, such as school-children, as well as for the press and other publicity agents.

Farm Walks, Factory Inspections, and Demonstrations

Special problems arise with on-site and outside demonstrations and exhibits:

Transport

- straw bales or grain sacks on lorries and tractor trailers
- bicycles
- coaches

Displays

- sturdy and weather-proof
- size of lettering and graphics

Size of Visitors' Groups

Public address systems

- portable types
- hand-free microphones
- questions or comments from visitors

Alternative or supplementary indoor programmes

Press and publicity arrangements

The first decision is whether to try to interest the general public in your event. If the answer is yes, you must work with the media. Nominate a press officer and spokesman, and keep him fully informed of all plans. He will contact the editors and reporters, both to attract their interest in advance and to ascertain their requirements.

Journalists are busy people: give them plenty of notice. Journalists are not specialists in your field of work: help them to understand it, and to sympathise with it.

Treat them as valuable partners in a process of public education. Provide as much information as possible in advance, if possible in written form: if necessary, ask the press not to publish information until an agreed date.

Give them a chance to ask questions, to meet the people who take the decisions.

Remember, news means new things: stale news is useless.

Ensure that, if newspapermen need telephones, there are telephones: if cameramen need lights, that there are lights: if radio people need a quiet room, a quiet room is available.

Always ask the media people what they need, and do your best for them. They will repay you with a fair and accurate story. Your interests and the interests of the media are the same: to tell the truth clearly.

Work with the media, not against them. They will pay you back.

Working Check List

Type of event:	Exhibition Open Day Display within a conference, exhibition etc.
Theme of event:	Industrial Scientific Domestic General Interest
Space available:	Indoors Outdoors Both
Venue:	'In-House' (At training or research centre etc.) Travelling (Nationally) Travelling (Internationally) Other

Type of Exhibit:	Large Small Demonstrative (Static) Demonstrative (Mobile) Audience operated Mechanical Electrical General including all of the above
Type of Audience:	Professional (in subject of exhibition) Professional (general) Educated Non-educated Rural Urban General
Feedback:	Is there any professional/public feedback from the exhibition required in the form of general research regarding the use or reaction to the exhibits, sales information, census etc?
Services	Water Electricity Gas Telephone Security
Information:	Is there any information regarding various or all of the exhibits required to be made available to the public?
Facilities:	Is it intended to use part of the exhibit for entertaining purpose or as a Press Room? If so what facilities are being offered?
Budget:	What is the extent of the financial resources available?
Publicity:	Posters Handbills Press, Radio or TV coverage or advertising
Anticipated number s:	Large Small Unknown (This information is required for the production of catalogues or other informative items)

Any special requirement not included in the above list must be considered in order that the fullest possible use is made of planning time, finance and general effectiveness of the exhibition.

Bibliography: Dreyfuss, Henry (1960) The measure of man. Whitney Library of Design, New York.

18 INFORMATION SYSTEMS IN SCIENCE AND TECHNOLOGY

C D Knee

Scientific knowledge has grown to such an extent that personnel must specialise in order to be competent. To gain access to the knowledge of others, specialist information stores, that is, libraries, documentation centres, archives and data banks, have been developed. The function and role of such stores are examined, and the cost and time savings involved in the use of secondary information sources and services outlined. Dependence on exogenous sources should be avoided by the development of indigenous information systems and technological capability.

We can probably trace the growth of the information component in science and technology, which has become so evident in recent years, to the economist Adam Smith writing his book "The Wealth of Nations" in 1776. It is said that Smith, observing practices in a pin making factory, found that if manufacturing operations were split between workers so that each developed skills in a specific area, the output of the unit as a whole increased. And so developed the concept of division of labour, until today we find that not only have the majority of people, including scientists, become highly specialised, but that the volume of total scientific knowledge has grown to such an extent that no one person could possibly be competent in more than one or two fields anyway.

However, it is rare that a development project is so specialised. Guyana is developing its hydropower potential in the Upper Mazaruni area, and the project calls on skills in geology, engineering, forestry, fisheries, anthropology, etc. Thus the need for communication among scientists, and between scientists and administrators, decision-makers and the public is vitally important.

Even for the scientist to keep himself abreast of advances in his own field, unless it is excessively specialised, is a time consuming and inefficient business. Because of this there has arisen a demand for specialised information services and specialised information personnel.

The traditional store of information is the library. Here reference material and the results of past work are stored. It is in the library that the research worker will discover the state of his art, a necessary starting point for any further work. An enquirer with a particular bibliographic reference approaching a well organised library, will soon know, through the catalogue, whether or not that particular book is held, and in some cases, if not, where he will be able to find it. However, the library will rarely approach the user to encourage him to use information sources, it is more frequently left to the potential user to take the initiative and seek information. Unfortunately, it is often found that the potential user and beneficiary of scientific information is not always aware of its value, and may well take decisions or start a research project based on insufficient information. After all, is it not more attractive to many to carry out research on, for example, the use of mangrove bark for tanning, than to read somebody else's work on the same subject. This is not to say that further work on the same topic in the light of changed environmental conditions should not take place, but that the worker should be as far as possible aware of work done in the same field and take cognizance of it.

A second characteristic of the library information system is that there is very little, if any, processing of the information contained in the store. That is, a particular book or article will be classified and catalogued, and any enquirer in that field will be referred to the book, but no attempt is made to abstract the information contained therein, or to provide more than two or three access points in the system. Because of this fact, I wish to temporarily rename the library a "bibliographic storage and retrieval system" in an attempt to clarify some of the confusion that often surrounds the terms "library", "documentation centre", "data bank", etc. That is, the library system is geared primarily to the retrieval of specific documents, and to comparatively broad subject areas, rather than to the retrieval of specific information in response to a specific request.

It is the documentation centre which aims to carry out this latter function. Therefore, I wish again temporarily to rename the documentation centre an "information storage and retrieval system". Clearly, the average university or public library could not attempt to provide eight or ten access points to each document it holds, nor to abstract the information contained in these. Because a documentation centre aims to do just this, in an attempt to give specific answers to specific requests, it follows that its coverage must be curtailed and more specialised. Because of this specialised nature, the documentation centre, or information storage and retrieval system, will not serve a wide cross section of users. Its role is less the development of cultural and educational standards, as is generally the case in libraries, but more the support of professional work. A documentation centre may serve an industry or even one large organisation. As an example, the National Science Research Council of Guyana is currently creating a Documentation Centre for local agricultural research to draw together and make available information produced by various agencies in this field.

An even more specialised service is provided by the data bank, or following our nomenclature, a "data storage and retrieval system". In both a library and a documentation centre, the user is provided with access to information, although at different levels, whereas in the data bank the enquirer is presented with information for direct use. The information is broken down so that no further processing is generally required Again, such a service is a support to professional workers, and its cultural and educational contribution, which figured so prominently in the library, is negligible.

As an example, the Ministry of Agriculture in Jamaica has established a Data Bank and Evaluation Division. The object of this unit, as I understand it, is to evaluate the various agricultural projects and programmes of this island. One of its four branches is the Data Collection and Statistics Branch, responsible for carrying out sample surveys, collecting data from the island's various Parishes, analysing data and producing indices and tables. Such information is vital to the evaluation of projects and programmes. The need for primary data for planning purposes is undeniable, but unfortunately this need is not always given full attention. A unit such as the one outlined above should go a long way to satisfy the need.

A word finally about archives. The archives may be defined as a collection of documents which because of their economical, historical, administrative, legal or cultural importance have been selected for permanent preservation. Here the emphasis is on a preservation. Although the archives have a function as a provider of information, which will be enhanced in the absence of more specialised services, the function of preservation should come first. The archives role, therefore, is not so much as a support to professional work, as in the case of documentation centres and data banks, but more in the cultural field. The national archives are, or should be, the collective memory of the nation - the unit which traces the nation's progress, its failures and its achievements.

To summarise the functions and roles of the types of information services, we may consult the following diagram, where a cross indicates primary importance, and a circle denotes secondary importance.

	Archives	Library	Documentation Centre	Data Bank
FUNCTION				
Preservation	x	0	0	0
Access	0	x	x	0
Communication	0	0	0	0
Use	0	0	0	x
ROLE				
Culture	x	x	0	-
Education	0	x	0	0
Support of professional work	0	0	x	x

The above four types of specialist units will comprise the components of a science and technology information system. Just how these components are linked to create the National System is problematic and will be considered at a later stage by other speakers.

The volume of world literature has grown to such an extent that even a specific request will generate more information than is generally required to solve the problem at hand. To scan this information and select that which is most relevant and important is time consuming. To overcome this problem, there have been created various secondary information sources and services. By secondary is meant the transformation of the primary or original documents, into a form more easily and quickly assimilated. Such secondary forms are indexes, abstracts and bibliographies.

An index of publications will list documents and provide a number of access points to each reference, through an alphabetical list of descriptors and authors. Such references, although giving full bibliographic descriptions, may or may not be accompanied by abstracts. An abstract is essentially a condensation of a primary document. An informative abstract attempts to summarise the information contained in the original and is commonly used in connection with relatively short articles, such as are found in scientific journals. An indicative abstract, on the other hand, is commonly used for more voluminous works where a factual abstract is not practical, and aims to give an indication of the content only. In the first case the abstract may provide the user information required, whilst in both cases the reader will know whether or not the original is relevant.

The third secondary form which was mentioned is the bibliography. This is a list of documents on a particular topic, by a particular author, from a particular country, etc., giving sufficient details for retrieval from a library. A bibliography will give the user an idea of the volume of literature available, plus an idea of coverage from the titles. However, the information contained within the article cannot be assessed as it can with an abstract.

Secondary services, that is the dissemination of information in above forms, are provided by several specialist documentation centres. Abstract journals and indexes are generally current awareness services. That is, they summarise information that is currently being generated in a particular field, from which the user may be informed and may select particular articles of interest. The same agencies will also provide retrospective searches on a particular topic from past current awareness publications, create specialist bibliographies and may possibly supply copies of the original. A second service which we may identify is SDI or Selective Dissemination of Information. Such a service will have what are known as user profiles for its clients which describe the field of interest of the user, and the exact type and form of information which that client requires. Any information which fulfills the requirements of the profile are then sent to the client in either a primary or secondary form.

The advantages of secondary sources and services are those of time and expense. Time is saved because the user is saved the time of scanning journals and monographs to inform himself of work that has gone on in the past and work that is currently being undertaken, as well as, in some cases, the time of extracting information from the primary document. Expense is saved, not only by time saving, but also by the fact that the secondary services are relatively inexpensive in relation to the documents they represent. It is also cheaper to translate an abstract rather than the full article, which may not be actually required. A library can no longer hope to cover world literature in a particular subject. The optimal strategy for library development, therefore, would seem to be a collection of basic texts on the subject concerned, backed up by abstract journals and other current awareness services, and a vigorous follow-up action in order to best satisfy user requirements.

Implicit in the above recommendation that libraries and individual users of information should utilise secondary sources and services, is the assumption that no nation can be self-sufficient in scientific and technological information. We realise, of course that the information generated in a particular country has, or ought to have, greater relevance to development than information generated outside the country. Indeed, no amount of information on management techniques and on technology from abroad can make up for the lack of local data: population figures, agricultural production, directories of organisations, etc.

The National Science Council of Canada estimates that 98% of the worlds scientific and technological activity is carried on outside that country. With a 1975-76 budget of C$193,201,000 it requires little thought to conclude that the contribution of Caribbean territories individually, and possibly collectively, to world scientific activity is less than 2%.

Therefore, although local information is of paramount importance and efforts should be made to organise, make available and exploit this, we cannot depend on it alone. We have already seen that to cover world literature in primary form in just one sector of the economy is virtually a financial impossibility. Only nations with a vast demand for the literature could possibly afford it. Such a situation is not the case in most countries. The only solution would seem to be to combine the many scattered users in order to create sufficient demand to reduce the per bit cost of information to an economical level; that is, to create an international system.

However, care should be taken in creating such systems that the current technological dependence of the majority of the worlds nations is not merely transformed into an information dependence. With the advent of ERTS - the Earth Resource Technology Statellite, such a possibility is not too remote. At the same time as creating a mechanism for problem solving through the experience of industrialised countries, the capacity for indigenous problem solving must be developed.

It is not the function of this presentation to deal with international information systems but a few comments are in order. Firstly, the internal organisation of the nations information production is necessary before participation in an international system is possible. One agency must be responsible for making the national input, and must be aware of all local publications in the field in question. For Guyana to make an input into AGRIS - the international information system for the agricultural sciences and technology - all agencies involved in research in agriculture, forestry and fisheries must notify the national input centre of all its publications. Of course, such an input centre would serve the dual function of serving local workers with local information.

Secondly, an international system depends for its effectiveness on the quantity and quality of the local input. Although training courses are available for technicians, the scope for miscataloguing or for differing interpretation of subject matter is great, thereby lessening the accuracy and effectiveness of the final product.

Therefore, unless the information available in international systems is to be predominantly from the wealthy nations, with the resultant dangers of dependency, the Third World must improve their internal information channels so that individual countries will become aware of technological alternatives. One nation which has realised this fact is India, and there is currently no difficulty in acquiring information on Indian technology.

To round off this introduction to information systems, I would stress the need for information as a factor of production, to rank alongside the traditional factors of land, labour and capital. Once one moves out of subsistence agriculture, for example, one requires information on the sources, price and cost-effectiveness of inputs; on optimal production techniques and information on marketing of the produce. I would make a plea for scientists to realise the value of this production factor and create a demand for it. I would encourage those responsible for the dissemination of information to actively market their commodity and ask the powers that be to give us the resources and tools to create national information systems to further national development and independence.

19 INTERNATIONAL INFORMATION SYSTEMS

M N G A Khan

Introduction

A major development in the field of scientific information in recent years has been the emergence of a new kind of services - the International Information Systems. In the past, most information systems have been organized nationally by scientific societies or government agencies. Chemical Abstract is produced by the American Chemical Society, Bulletin Signaletique by the Centre National de Recherche Scientifique. These operations are either heavily subsidized or they must cover their cost by charging high subscription rates. Also with the advent of the information explosion, most such centralized services are experiencing increasing difficulty in acquiring the relevant material from all over the world and announcing it soon after publication.

International Information Systems

To obviate the difficulties mentioned above, the idea of international information systems have been conceived. The key features of an UN international information system include:-

1. decentralization of the task of identifying and recording information as it is produced, each nation (or region) being responsible for reporting what is produced in its own territory;

2. centralized merging of material reported by the different input centres, the task being performed in an international agency through international financing;

3. output products tailored to the needs of advanced institutions with computer facilities, as well as printed indexes that can be used by institutions without such facilities and by individual scientists;

4. back-up service of microfiches to ensure availability of texts;

5. provision to purchase products in local currency; and

6. international management.

Several such systems are at present in their different stages

of development.

UNISIST: World Scientific and Technical Information Systems, UNESCO, Paris

UNISIST is considered to belong to the macro-category of information systems in that it does not directly provide information. It does, however, provide necessary tools and a conceptual framework within which the operational micro-model could be developed. As conceived by UNESCO, UNISIST is not a system but "a continuing flexible programme based on a joint UNESCO - International Council of Scientific Unions (ICSU) Study 1, 2 whose aims are to coordinate existing trends towards cooperation and to act as a catalyst for the necessary developments in scientific and technical information. The ultimate goal is the establishment of a flexible and loosely connected network of information services based on voluntary cooperation". UNISIST is to be concerned initially with basic sciences, applied sciences, engineering and technology, but it will later be extended to other fields of knowledge.

UNISIST current activities include production of guidelines and manuals for data handling, organizing national information systems, training courses, seminars and workshops, and coordination of international assistance programmes in training and education. UNISIST operates through National Focal Points and UNISIST National Committees.

NATIS: National Information System

This again is a programme developed by UNESCO to include "all services which contribute to supplying information to all sectors of the community and to all category of users. It is the task of NATIS to ensure that all who are engaged in practical, economic, educational, social or cultural activities receive the necessary information which will enable them to make their maximum contribution to the community as a whole"[3]. There is a strong overlap between the activities of UNISIST and NATIS.

SPINES: Science Policy Information Exchange System, UNESCO, Paris

This is a classical bibliographical information system; thesauri in several languages have been prepared. It has received international approval to proceed on a pilot basis.

INIS: International Nuclear Information System, International Atomic Energy Agency, Vienna

This is now an operational international information system. This system makes use of modern technological aids, particularly the computer and micro-photography. Each participating nation is responsible for identifying its own nuclear literature and reporting it in accordance with the standards that have been established. These standards, the methodology

and management of INIS, are defined by agreements between participants. The primary products of the system are:-

(a) a magnetic tape service (the magnetic tapes can be used for computer-based searching operations and the generation of specialized lists and indexes);

(b) a printed index of the literature - Atomindex;

(c) a microfiche service of abstracts; and

(d) a microfiche service of full texts for that literature which is not otherwise easily obtained.

In total, about 65,000 items a year are being added to the INIS data base. Each member state bears the cost of providing its own input to INIS. The cost of central operation is shared jointly by member countries of the IAEA.

AGRIS: International Information System for the Agricultural Sciences and Technology, FAO, Rome

Based at least in part on the INIS experience, the Food and Agricultural Organization of the United Nations drew up plans for a similar system to handle literature of agriculture, food sciences, forestry and fisheries. This is planned to operate at two levels: AGRIS I will be a comprehensive index to the world literature in the field, available as the printed AGRINDEX or on computer tapes. The system started providing outputs in 1975. AGRIS II is intended to be a series of networks of information centres providing deeper analyses and bibliographies in the specialized fields; tropical agriculture and forestry are chosen for pilot AGRIS II networks.

AGRINET: A Worldwide Network of Agricultural Libraries

This is intended to ensure the availability of original material demanded because of AGRIS through a few big regional libraries.

CARIS: Computerized Agricultural Research Information Systems

CARIS aims to collect, organize and disseminate data on agricultural research institutions, programmes and activities carried out on behalf of developing countries.

DEVSIS: Development Sciences Information Systems, IDRC, Canada

This system under development is jointly sponsored by IDRC, OECD and UNESCO. The final report on DEVSIS has recently been issued, and the system is likely to become operational shortly on a pilot basis following the

the general line of INIS.

CAB: Commonwealth Agricultural Bureau, Slough, UK

CAB is an international body composed of members from Commonwealth countries. CAB produces Abstracts bulletins by computer and the tapes are computer searchable. Other publications include the list of research workers in the Agricultural Sciences, distribution maps of plant diseases, and of pests, and technical reports, monographs and bibliographies. The relation between CAB Abstracts and AGRIS is the subject of much interest at present - developments in either is bound to affect the other.

FID: International Federation for Documentation

The Institut International de Bibliographie was established in Brussels in 1895 to promote the international exchange of bibliographical information. In support of this work, the institute compiled a comprehensive world bibliography on cards. Although the bibliography was discontinued in 1914, the modification of the Dewey Decimal Classification scheme which the compilers had developed became widely employed and has since become known as the Universal Decimal Classification (UDC). In 1924, the institute was recognized as the International Federation for Documentation. FID consists of:-

(1) National Members (organizations representative of documentation activities in their countries);

(2) Associate Members (international organizations active in the field of documentation);

(3) National Associates (representing information organizations in developing countries, not yet able to join as National Members);

(4) Affiliates (organizations and individuals interested in the objectives of the federation).

The activities of FID are based on the guidelines outlined in the FID programme adopted in 1965, and cover the following areas:-

(1) Research on the theoretical basis of information;

(2) Universal Decimal Classification;

(3) Classification research;

(4) Theory of machine techniques and systems;

(5) Linguistics in documentation;

(6) Technical information for industry;

(7) Training of documentalists;

(8) Needs of developing countries.

The major work of the Federation is done through its many committees which issue reports and through the holding of its annual conference.

ICSU: International Council of Scientific Unions

The ICSU was founded in 1931 as a direct successor to the International Research Council. The objectives of ICSU are:-

(1) To facilitate and co-ordinate the activities of international scientific unions in the field of the exact and natural sciences; and

(2) To act as the co-ordinating centre for the national organizations adhering to the council.

There are two categories of membership : National Members and Scientific Members. A country is represented either by its principal scientific academy or its national research council or any other institution or association of institutions or, failing these, by its government. Scientific members are international scientific unions, i.e., unions interested in one or more branches of the exact or natural sciences, that have been in existence for at least six years and have held or sponsored at least two international meetings.

ICSU activities relating to information are:-

(a) ICSU Abstracting Board;

(b) Committee on Data for Science and Technology; and

(c) ICSU-UNESCO Study on the Communication of Scientific Information and the Feasibility of a World-Wide Science Information System (UNISIST).

A Committee on Data for Science and Technology (CODATA) was established in 1966 with the general purpose of promoting and encouraging on a world-wide basis the production and distribution of compendia and other forms of collections of critically selected numerical and other quantitatively expressed values of the properties of substances of importance and interest to science and technology.

Conclusion

In the preceding section, an attempt has been made to briefly mention only some of the existing international information systems. Full participation in the operation of these systems is so far limited to countries with developed national information infrastructures. There are considerable duplication between these systems. For effective participation in these

systems, it is necessary to develop the national infrastructure and to ensure full national coordination. Most developing countries will not be for a long time in a position to make use of the magnetic tape and on-line services that are available through these systems due to lack of existing facilities and the high cost of installation of required facilities. To obviate this difficulty somewhat, AGRIS and INIS produces printed versions of their tapes - AGRINDEX and ATOMINDEX. Operation of training courses is part of their programme of many of these systems which should be taken advantage of, particularly by developing countries.

International Information Systems are new experiments in the field of international cooperation. Full participation can be achieved only when the differences in technological developments between participating nations can be minimized.

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20 THE NATIONAL INFORMATION SYSTEMS AND THEIR USES

A J Seymour

In Guyana we lack the tradition of handling, disseminating and using information especially information relating to Science and Technology, yet there are elaborate systems of information generated within the country and necessary for the national life. These are the information systems relating to the major industries - sugar, bauxite, rice, agriculture and timber. For the successful operation of these industries, the management structures have amassed for their own use and decision-making central reservoirs of data and statistics which are being constantly up-graded, styled and analysed against a changing global market situation.

Apart from these there are other growing centres of industrial development - e.g. the textile industry. Guyana has made a name for herself with her shirt-jacs. Because of a keen rivalry between shirt manufacturers, there has emerged over the past ten years an inexpensive but attractive series of designs modelled upon the Latin American Guaya Gera which are distinctively Guyanese. There will be the completion of the textile mills, one from China one from India, which will make use of the cotton plantations being created, and a whole new system of technology will be based upon this aspect of our national policy of cloths ourselves.

The point being made is that for Guyana to become part of the modern world and to improve the quality of her life, she will have to create a national awareness of these growing points of technological and scientific information. Guyanese must become familiar with these tools of decision-making at all levels. The senior pupil of a secondary school must have a familiarity with this type of information - there must be no mystery about it as at present. Take an example, we should be able to appreciate the transition of a textile from a shirt cloth to a jacket cloth by the denier involved, the amount of weight of the texture and the number of strands used. We need to bring Guyana out of the fore-industrial era into the modern world of Science and Technology.

Because Guyana has chosen the road of Socialism, the country will not be an area showing the free-play of the forces of supply and demand on the classical capitalist model and therefore it will be for the State Corporations to supply all the information necessary.

There is an allied point. Guyana has a policy by which she believes ultimately in an emergent Anglo-Caribbean Federation and there has to be an accommodation between Guyana

as a self-sufficient entity and as a part of a larger political association. But whether on the smaller or larger grouping, we must envisage a self sufficiency in the field of Science and Technology and we will have to plan accordingly.

There are dangers to be guarded against - first that the sense of national and cultural identity is not undermined by the action of external transnational organisations and corporations while the technology is being transferred from outside or that mass media do not frustrate national policies and create alienation and exploitation, since there is a strong link between independence and cultural identity.

The importance of inculcating a general scientific outlook in the national education system is very marked and may I give at this point one example of system of statistics that we need to introduce in Guyana and in the Caribbean. Cultural development is becoming a focal end-product of many developing countries since it is universally recognised that all our communal activity is designed ultimately to improve the quality of life for the individual. Already in Europe, Asia and Africa, governments have agreed to introduce instruments of analyses to measure cultural statistics and to see how objectives are being realised and the methods that are most satisfactory. In October of this year, an inter-governmental conference is planned for Latin America and the Caribbean and in the near future, for the governments of the Arab world. The governments of the Caribbean will be invited to establish inter-locking systems of cultural indicators in common with those already in use elsewhere.

I will merely list some of the areas of our use of leisure time which will demonstrate the need for this means of measurement. Other areas are more difficult to measure.

For example, the questions asked will include: In every 1,000 people in the population, how many possess radio receiving sets? How many transistor radios are sold every year? What is the annual sale of gramophone records - how are these broken down into pops, classical? How many newspapers are sold per 1,000 people in the city and rural areas - in the morning and in the afternoon? How many people go to the cinema per year, what movies are the most popular? In the field of dramatic presentations, how many plays are put on in any year? How many people pay to see these plays? What is the rate at which people read books borrowed from the National Library? How many books are sold in Georgetown over a year and of what type? What is the total of book production in Guyana and how do these break down to literary text books, party promotional literature? How many children visited the National Museum? What is the number of adults to do so? How many art exhibitions were staged in Georgetown and what was the attendance? How many paintings and other works of arts were sold? When the Calypsonian Sparrow came to Guyana how many people heard him perform and at what forces? What is the number of concert recitals presented last year?

It is fairly easy to get the answers to these question once we set them out. In the teaching of the arts it is more difficult to evaluate the degree of stimulation and promotion of creativity. In a series of lectures to teachers on creativity and the products of the creative process, it may be impossible to say what happens and to measure.

Guyana possesses a National Trust for the preservation of its Cultural Heritage. It is difficult to assess the work being done to arrest the deterioration of Fort Island. Finally, what is the impact upon the people of Georgetown by the erection of the 1763 Monument; how have the minds and attitudes of viewers been shaped away from a two-centred appreciation of aesthetic values towards an appreciation of the Afro centred values embodied in the Monument.

I must stop here before I bore you utterly, but I hope you will appreciate the depth and the range of these aspects of our national cultural identity and the complexity of the system that will be eventually elaborated to measure this aspect of our national life. It will mean a re-orientation of approaches by the national agencies for development; and will involve: financing, widespread training of census takers, the enhancement of the cultural content in education, the training and involvement of artists and administrations, a series of research studies, a massive campaign for popular awareness and participation.

We must move from the needs to the functions and then proceed to the structure within the framework of a national information policy. After I had drafted my presentation, I saw in today's newspaper three articles which have a bearing on our subject. One was an appeal by Sir Lionel Luckhoo, for a vibrant Research section at the University to test out the old wives' remedies that enrich our folk lore. The second was an examination by Hamaludin of the approaches by the Guyana Manufacturers Association for government assistance and support through foreign exchange permits. In this we learn of the formulation of a policy on Science and Technology by the Guyana Government and the third is a back page article on the possible boosts in tool making, the Manufacturers can make upon the Guyana economy. These three prices may add up to the fact that the Guyana public is not getting the service it deserves from its press, but certainly underlines the fact that public awareness is abysmally small of the part that Science and Technology can play in our national life.

We need to have this type of information mediated to our school children in the classroom situation so that they may become familiar with these concepts.

21 PLANNING NATIONAL DOCUMENTATION AND INFORMATION SERVICES

A McMurdoch

Introduction

If you have ever experienced difficulty in discovering recorded information relative to your work or other activities you will be interested in a system which provides easier access to information. For the next ten minutes I shall attempt to tell you something about a national information system and of the way in which one part of the network - the documentation and information services - could be planned.

In every country there are several types of libraries - national, government, university, public, special, school or college - each serving a different clientele. There are also documentation centres and archives services. For some time the need has been felt for an interrelated network of libraries, documentation centres and archives services to ensure that all those engaged in political, economic, scientific, educational, social or cultural activities have access to relevant information to enable them to make their optimum contribution the community. More recently governments have recognized the importance of access to information by all sectors of the community, especially those responsible for making decisions and formulating policy at the national level.

UNESCO is playing a significant role in the development of national information systems by initiating and supporting several regional and international conferences on this theme. Guyana participated in two of these - the Intergovernmental Conference on the Planning of National Documentation, Library and Archives Infrastructures held in Paris in September 1974 and the Workshop on the Planning of National Information Services (NATIS), Library and Documentation Networks for the Caribbean Area held in Jamaica in November 1975.

From the recommendations of the regional meetings guidelines have been established for planning national information systems:-

1. A central co-ordinating body should be set up to advise the Government on the formulation and implementation of a national information plan. This co-ordinating body should be composed of representatives of all appropriate government departments, various state bodies and semi-official institutions and of representative specialists from the information field.

2. A national plan should be formulated in accordance with an established information policy, taking into account the priorities of national and sectoral planning. The plan should describe the present situation based on comprehensive surveys of libraries, archives and documentation services.

3. Legislation should be enacted to provide a secure legal foundation for the system.

4. Adequate financial provision should be made to ensure the effective implementation of the system.

5. Provision should be made for the training of manpower to perform at all levels - information specialists, librarians, archivists, technical personnel.

6. Adequate provision should be made for the application of information technology in the various components of the system with the aim of achieving maximum utilization of existing resources and of reaching compatibility and standardization.

In Guyana a central co-ordinating body has not yet been set up, nor, as far as I am aware, has a plan for a national information system been formulated, but recommendations have been made by professional staff for the coordination of resources within a subject area, for example in Economics, Law and Medicine. A union catalogue of the various collections in each subject area, with locations, would provide easy access to the material and avoid unnecessary duplication of titles.

About two years ago the National Library received a request for document on Agriculture in the Rupununi. We did not have a copy nor could one be traced in the Central Agricultural Research Station Library or the University Library. A senior member of staff had occasion to visit one of the libraries with a collection on Economic Development and by chance saw a copy of the required document on a shelf. It was a research paper published by McGill University. In a well-organized network of libraries we would not have had to rely on chance.

Many difficulties will have to be overcome before well-organized networks could become a reality, not least among these is the human problem - resistance to change. In some libraries the staff know their stock and are able to retrieve material instantly without the aid of any record and are not yet convinced of the usefulness of an index for the user.

Documentation and Information Services

While libraries and archives services have existed in Guyana for many years documentation centres are comparatively new. As mentioned before documentation centres are one of the components of a national information system. Some people are uncertain about the difference in function between a

library and a documentation centre. In a documentation centre publications are "received, processed, preserved, summarized and indexed; bulletins relating to such material are prepared for distribution to those interested; research is undertaken, bibliographies prepared and copies or translations made." A documentalist or information officer is concerned with the collection and dissemination of knowledge, with assembling information contained within documents together with data from other sources to form a new compilation, whereas a librarian is concerned with the techniques of handling records of knowledge, making them available and possibly exploiting them.

Accommodated adjacent to the research institution it is designed to serve, each documentation unit should aim to build up a library which can meet the needs of research workers.

These units should be co-ordinated through a national documentation centre covering all fields of knowledge - the Humanities, Social Sciences, and Science and Technology. This centralized organization would house the union catalogues, the computer terminals, act as a referral centre, arrange for the training of personnel. The setting up of national documentation and information services within the national system will be a gradual process; priority in establishing them will be determined by the priority programmes of the government.

One of the first tasks of the documentalist is to assemble a significant collection of research material in the area of specialization covered by the service -

- material published in the country or which deals with the country. An examination of existing collections in the country should reveal items; a perusal of catalogues of institutions in the region would also be helpful;

- establish links and conclude exchange agreements with regional institutions, e.g. the research centres of the University of the West Indies, the Caribbean Industrial Research Institute (CARIRI) in Trinidad;

- establish links with international agencies set up within the framework of the World Science Information System (UNISIST), e.g. the International Information System in Agriculture (AGRIS);

- provide a representative collection of current periodicals, indexes and abstracts;

- extend the resources through computer links with data banks;

In organizing the stock the use of international standards for cataloguing, classifying and indexing will allow the national

system to key into and take advantage of valuable information in other national and international systems. These standards are already in use in Guyana in some libraries and in the preparation of the Guyanese National Bibliography and are applicable to both manual and mechanical systems.

Experience has proved that it is necessary to insist on the provision of adequate premises equipped with shelving, furniture and fittings, reprographic and other equipment.

One of the most acute problems to be overcome would be the recruitment and retention of the services of qualified personnel - documentalists, librarians and technical staff - able to accept the responsibility of making the fullest contribution to national development.

Although financial resources are limited Government could formulate plans for a national information system and integrate these plans in the national plans for economic and social development. UNESCO is willing to assist Member States in carrying out their national programmes in planning and implementation of the system, the application of the new technology and the professional education and training of manpower.

Conclusion

Each of us has a contribution to make towards the goal of making information available. In our private/official collections, are important research documents that would be useful to researchers available to any of the major libraries or documentation centres in the country? If there is no record of its existence and location, access to the information contained therein is impossible. Your cooperation in the building of a national information system is vital.

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22 FUNCTIONS OF A NATIONAL DOCUMENTATION CENTRE

V Kallicharran

Introduction

As a Social Scientist, I realise the importance of establishing what one can call - working definition of a concept, before any discussion in relation to the concept is attempted. So, before I talk about the functions of National Documentation Centres, I will explain what is meant by 'documentation'.

S.C. Bradford who is looked upon as the father of documentation in the English speaking world after his 'Documentation' appeared in 1948, conceptualises 'documentation' as 'the art of collecting, clarifying and making readily accessible the records of all kinds of intellectual activity ... the process by which ... is ... put before the creative specialist the existing literature, bearing on the subject of his investigation in order that he may be made fully aware of previous achievements in his subjects and thus be saved from the dissipation of his genius upon work already done'.[1]

Documentation is further seen as that aspect of bibliographic control of bibliographic organization which is concerned with the scholarly characteristics of bibliographies, indexes and abstracting services.

On this side of the Atlantic, Jesse H. Shera sees the essential task of documentation as the matching of two patterns:-

(a) the pattern of all scholarly activities in which the use of primary graphic records play a part; and

(b) the pattern of inter-mediary services which transmit primary recorded materials from the scholar - as - producer to the scholar - as - user.[2]

Shera concludes that documentation is that portion of bibliographic organization that is involved with the indirect communication of primary materials within and among groups of specialists, to the end that they will receive, in a manner as efficient as possible, the data which they require for the effective execution of their work. (Bibliographic organization being in contrast to the chanelling of graphic records to all users, for all purposes and at all levels).

Documentation then should be regarded as an essential part of our modern system of graphic communication within the world of scholarship, an instrumental device to expedite the

the flow of recorded information within a group of specialists or between various groups of specialists.

In considering the functions of a National Documentation Centre or of Information Centres, one must look at the needs of the users and the types of materials which are needed to meet those needs.

Cde. Seymour outlined the needs of the users, and so without wanting to bore you with repetition, I will just briefly consider the types of material needed by the scientists and technologists.

The pure scientists (e.g. physicists, chemists, etc.) are primarily interested in literature - comprehensive and primary materials - which records the establishments of new facts, a new relationship among facts previously known or a new method for the manipulation of techniques or data already known. He needs not only single isolated facts but all facts of a given class for basis of a comparison, relationship and information on activities in related areas of research.

In addition, the scientist requires easy access to all established descriptive facts about one particular element, compound or substance - e.g. such as needing information on the physical and chemical properties of aluminium, and he needs access to the literature of all problems that have been approached through the application of a particular method or through a particular principle, hypothesis or law.

Because the research materials that the pure scientist needs are primary and unique and do not permit of substitution, his bibliographic requirements call for a comprehensive index of the entirety of the primary literature of research that falls within the boundaries of his subject field.

The other major group of users of documentation are the technicians, a group made up of engineers, mechanics, inventors and manufacturers. The needs of this group are quite a contrast to those of a pure scientist in that the technicians are primarily concerned with the results of research rather than the materials, methods or verifications of the experimental process.[4]

A National Documentation Centre should fundamentally be concerned with:-

(a) the acquisition of appropriate materials; and
(b) their organisation and interpretation for effective use.

And the social function of the documentalist being to provide maximum effective use of information with the task of supplying:-

(a) physical accessibility to information needed; and
(b) ensuring content accessibility.

Functions of a National Documentation Centre

The functional responsibilities of such a centre should include, as P.J. Boyle in his paper on 'Planning and Designing National Information Systems', presented at the Arusha Conference - outlines. (p 15.7 - 15.8)

(1) Implementation of policy decisions on national information services;

(2) Coordinating and strengthening links among components of the national information system and monitoring system performance;

(3) Acting as a referral point and coordinating link between the national system and regional and international systems;

(4) Acting as the main national centre for information and consultation on the theory and practice of documentation and information. This would include responsibility for monitoring developments in methods and techniques of handling information on behalf of all units in the national system;

(5) Standardising procedures and methods for handling information within the national systems and for developing maximum compatibility with international systems;

(6) Acting as a clearing house for enquiries relating to the scientific and technological literature from within and outside the country;

(7) Provision of information output of various types, e.g. the national bibliography, information digests, guides to information sources, abstracts, etc;

(8) Coordination of input to such international information systems as AGRIS;

(9) Training of personnel information work including organization of training courses for students and practicing scientists.

Besides those functional responsibilities, a National Documentation Centre - say for Science and Technology:-

(1) Must become thoroughly familiar with the current situation in science and technology so that it can select the information most pertinent to local needs and supply it

through the most appropriate communication medium (i.e. the printed work, audio-visual media and personal contacts);

(2) The Centre must be able to ascertain what information is available locally and what foreign sources can supplement the stock of the Centre to the degree required in the country;

(3) The Centre before supplying information to the requester should screen the material, collate, summarise and translate where necessary;

(4) The System must be prepared to educate the users in how to use information to its best advantage;

It is important for such a Centre to be able to communicate to the users and the public that because of the central position of the Centre, more sources of information can be tapped, especially know-how, and expert advice at the national and international levels.

(5) As a National Centre, it should function in close cooperation with other 'information institutions' in the country (e.g. libraries and information units). It should play a catalytic role and stimulate the demand for and utilisation of information on Science and Technology;

(6) The National Centre should aim to compile an inventory of national research and development projects;

(7) The Service of a National Documentation Centre should aim to provide a continuing flow of information to meet the needs of a particular user through:-

(a) a SDI Service (Selective Dissemination of Information) based on a careful identification of clients, their requirements and their individual profiles;

(b) a competent reference enquiry or advisory service; and

(c) some minor publication at regular intervals supplying information on local and international developments in Science and Technology.

As I see it, whether it is a National Documentation Centre representing the broad spectrum of subjects or specialised for only Science and Technology, the functions of such a Centre lie in its aims, its users and in the concept, 'Documentation' itself.

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23 PROBLEMS OF INFORMATION SYSTEMS

A BRIEF REVIEW OF THE GUYANA POSITION

Y V Stephenson

Faced with the challenge of preparing this paper for this workshop I was determined to do something rather impressive, but to be frank it just has not turned out to be that way. I encountered problems in determining what the specific aim of my contribution should be and thereafter my thoughts on the subject changed several times during its preparation. However, the experience gained in its preparation brought me face to face with new ideas about aspects of our information problems in Guyana. As a result I think what you are about to hear is not so much a conference paper but a review of some of the problems - perhaps what emerges here may be more a position paper rather than a case study.

So much has been published on designing and planning information systems and on aims and objectives and functions - there are several volumes available right here in Guyana. One treats them with respect and awe because these are the works of eminent people in the field many of whom are consultants, they are well written scholarly works which carry flow charts, diagrams and many illustrative techniques, but after carefully pondering a number of these, I wondered to what extent they could help when it comes to designing a real life system for our situation. And here you have the starting point for the thoughts which follow - the gap between the theoretical presentations and the actual problems we faced in organising the flow of information in a developing country.

I guess that I have a very definite view on the problems of information systems and their designs because of my firm belief that librarianship, documentation and information work are basically very practical activities in which things are done systematically for producing certain results. I know that what I am going to say may be considered by some as being an absurd comparison, but I have often thought of designing an information system as a meccano set where if one puts the correct parts together, the thing gets moving. Why can't we just do the same for an information system? I think that it is true to say that an information system comprises an input sub-system, a retrieval sub-system and the users who should provide a feed back which should influence the input. Obviously the system cannot function without a document supply system. These are the recognisable components, but yet they are not as readily put together as our meccano set.

This paper will attempt to review the problems which must

be faced in Guyana when contemplating the design of our information and documentation system. There are hosts of problems - social, cultural, linguistic, - attached to this undertaking which will not be considered in this paper. I will try to consider the more technical problems, the first of which is the fact that we have to establish this service almost in vacuum. There is no library of the stature of BLL, no network of specialist information services, there is one relatively small University Library, a National Library of similar standing, a small Medical Science Library, a few Special Libraries, most of which are unorganised collections in the various Government Departments and no information scientists in the library sense. To quote Peter Vickery of ASLIB "This is rather like trying to design and build an aircraft for a place where there are no airfields, no trained pilots and limited fuel supplies. Also we are not sure just how many passengers might want to use the aircraft and what their travelling habits will be".

To start, let us assume that we have done a survey to determine our user needs in Guyana, it will be seen that there is the potential demand for information in the field of science and technology, in many sectors of our community - in education, teaching and research, in government, industry and commerce. It might not be practical to attempt to meet all these demands at once, so it may be necessary to make a decision as to the priorities to be recognised. In this situation even making the decision might be a problem.

It should be said at the outset that even though designing a system implies pretty detailed planning, in our circumstances there are a number of details which our system will have to overlook, for instance, performance specifications cannot be estimated with any amount of accuracy, because it is not easy to tell how long it will take to obtain certain documents many of which may have to obtained from abroad.

Of material importance is the information which will be fed into our system. Information from the traditional sources, that is - published information poses only minor problems which are identified as lack of finances or inadequate machinery for the acquisition of material. The major problem is locating and acquiring the material produced at a country or national level. The whole concept of a successful system could only materialise if sufficient of the required information is pumped into the system.

But before discussing the thorny problem of locally generated information, I must make it clear that I am not attempting to minimise the importance of published material. Access to such information is just as vital, and it is important that the system provides adequate means of access. We know that in the field of science and technology there are approximately 30,000 periodical titles published annually and that there is an exponential growth rate of information in the field of science and technology. In Guyana, the same as any developing country, it is expected that our science information

systems would be equipped with some of the essential catalogues, indexes and abstracts through which users would locate information from the vast resources. Perhaps the crux of the problem in considering published information is how best to select from the world's store, the information that has particular relevance to the needs of the country as a whole, how to acquire it and how to ensure that it is made readily available to users.

Now we come to the second and most difficult problem to be solved, and that is the access to scientific and technical information generated within the country. There are four aspects of this problem:

1. Ignorance of work being currently pursued. A common complaint by researchers is that they have no certain means of knowing what research is in progress in the country. The danger here is unwitting duplication of efforts which would result.

2. Difficulty of access to reports of completed work. Much basic information in unpublished form is available, but as is well known are located or shall I say hidden in files marked confidential and are therefore not available to certain agencies or individuals. A corollary to this specific aspect of the problem is the lack of machinery for declassifying confidential documents. It has been our experience to trace and discover documents which have been classified as confidential and later slated for destruction by the shreading machine or incinerator or more commonly the refuse dump without having been released. In fact but for the word "CONFIDENTIAL" the document may have been allowed a longer life.

3. Absence of any comprehensive and up-to-date listing of scientific and technical papers which have been issued locally.

4. The legal deposit law does not require the deposit of unpublished items such as reports etc. emanating from Ministries, Institutes, or such Organisations. This situation has contributed to serious gaps in our efforts at collecting local material comprehensively.

Without these bibliographical control, much valuable original work which has been completed and distributed in a limited sense fail to reach the attention of those information users who would most benefit by it.

In the Guyana situation one has recognised the problems of the "input" into an information and documentation, some thought must be given to the logical sequence of the system.

How does the user get his information? We turn to the traditional methods - our users must be trained to accept all the indexes, abstracts, annotated bibliographies, our card catalogues and all the documents we throw at our users.

However, the problem now encountered may be one of adequate training to provide the service, which is acceptable to the users of information. Most of us in information must ask ourselves how much do we know or understand about the psychology of information use. Most of us providing the service tend to view the user as a distinctly different person from "us". The truth is that as librarians and information officers we are information users too with the same natural aversion to many of the characteristics of the service we offer to others. We should perhaps pause and ask ourselves, in what terms would we define the kind of information services that we would like to receive to help us on our own jobs.

But let us get back to the practical realm of the science information and documentation service. Three important characteristics that I believe users look for in an information system are simplicity, reliability, and speed - reliability being the most important characteristic of the three. The resources and service offered in the system will largely determine the extent of reliability. Yet in a sense the effective use of information is more difficult to achieve than the adequate resources of information and competent handling of it by librarians or information officers. Even developed countries are still trying by various means to improve what is essentially a human problem. It is said that to a large extent low use of information and documentation services correlates directly with inadequate and badly organised collections. Where a system provides a useful range of material on which is based a good service it is rewarded by regular and efficient use. But in Guyana and doubtlessly other developing countries inadequate use of information services may also be related to another totally unrelated problem. The view has been expressed that some of our scientists, and researchers in many fields have been educated in an environment in which there was very little literature. The habit of reading then has not been well formed at the crucial stages in education, and like so many other habits it is difficult to acquire it at a later stage.

There are a number of techniques which might be adopted in our information system for promoting its use. Recent research on patterns of information flow suggests that there are in many research organisations one or more specialist scientists who have become widely known as "gatekeepers" who have a natural interest in, and aptitude for transferring information from one place or individual to another. It would seem useful to identify such people in organisations such as NSRC, our local scientific societies, or any of the faculties of the University, and to solicit their interest in assembling resources which will eventually flow into the system. These very "gatekeepers" may be useful in helping to stimulate greater use of information and help to provide constructive ideas for the improvement of the system generally.

The concept of an information and documentation system throughout this paper may have evolved as the usual centralised system which will be supported by the now traditional network pattern which has been accepted as the most sensible plan for societies such as ours. The details of the network system would have been dealt with in a substantial way by other speakers. I would, however, like to touch on certain aspects of these component libraries which will be part of the network.

We have accepted the view that a national information and documentation system would be supported by the total resources of a number of existing libraries, but to activate such a system one must rely on three important factors - recognition by the appropriate authorities, a sound legal base, and adequate funding - none of which this paper will discuss. I would however like to look briefly at the position of government and the concept of information before closing.

In Guyana there is a great concern among librarians about the inadequacy of many of our libraries to cope with the demands which must arise from our Development Programme. This Programme has made it clear that active and direct participation in industry, and agriculture is to be a major weapon in the attack on the problems of eradicating poverty and restructuring Guyanese Society. The key role of science and technology in such a plan is self-evident. Examples that come to mind are modern agriculture projects - the fishing and shrimping industry, forestry products, improved health and medical services, rural drainage and irrigation schemes, new industrial enterprises away from the city - (leather manufacturing and the production of leather goods in New Amsterdam), the generation of hydro-electric power - all designed to maximise our natural resources - both human and physical with which Guyana is blessed.

Comparison with the national development plans for other developing countries, even here in the Caribbean, however, does reveal one national resource that is being neglected - the wealth of information available in libraries in Guyana.

It has been noticeable that the planning and co-ordination of information systems has engaged the attention of policy makers in other developing countries, where previously it was the concern only of Librarians. As explained by UNESCO "The reason for this is clear, policy makers in these countries have learned to consider information as a national resource to be incorporated in their formulation of national policies in the same context as man-power and natural resources".

No one would dispute the value of libraries in a developing country where it is doubly important to ensure an adequate flow of information, not only because we are labouring under the handicap of starting later than the developed industrial countries, but also because we lack the accumulated experience that only time will bring. It is perfectly possible, however, in many instances to bypass the long road of experience by drawing on the published and freely available

accumulated data furnished by the more developed and experienced countries. Experience in other developing countries has demonstrated that with access to reliable information, the manufacturer for instance can sometimes leap over technological periods and adapt systems without going through painful and costly development periods.

We in Guyana are faced with a situation in which libraries do not appear to be given more than a token recognition, despite the fact that Government is actively pursuing a programme of accelerated development. How then would the planners of information systems cater for the support of authorities? These therefore are aspects of the general problem of information which planners, systems designers, administrators and users of information must take into consideration when considering the Guyana position.

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24 A NATIONAL INFORMATION SYSTEM

J B Craigwell

Librarians and other interested individuals have long recognised the need for a National Information System in any country, particularly in developing countries where there are limited financial resources and the "need-to-know" is greatest. In this paper I have tried to show how library personnel, under very trying conditions, have tried and are still trying to implement a National Information System in present day Guyana. There are some omissions as there are information sources, still to be tapped and those which are tapped have their own problems of satisfying their own community before serving the wider community. They have to consider their own resources and manpower available to perform the functions for which they were created primarily. But in spite of this, efforts have been, and are continuing to be made, to implement an efficient and effective National Information System.

A system is designed to serve a purpose, to meet certain user needs - this is its function. So the purpose of an information system is to provide information that users need.

A National Information System is such a system but on a national scale. There is quite a lot of documentation on National Information Systems and this is available to all who are interested. UNESCO has organised conferences, one in Paris in 1974 and another in Jamaica in 1975 and these have produced even more documentation, so much so that theoretically organising a National Information System seems very simple (and unfortunately too many decision-makers believe this). All that one has to do is to get Government's support, get the manpower and information, and hey presto! - an Information System worthy of any nation.

However, when one gets down to the practical tasks involved one sees so many difficulties looming imminently overhead, that one must logically and methodically plan, reconsider those plans and then implement them, before one is overwhelmed by all the problems. But in developing countries like Guyana, the problem is even more serious.

The NATIS concept implies that Government should maximise all relevant information through documentation, library and archives services.

If this concept is accepted it would be that Government would be provided with a set of guidelines to enable them to "give a unified sense of direction and common aim" to the diverse

information activities being carried out in specific subject fields. To expect a Government of our developing country to put this as one of its priorities (as this involves a lot of financing) regardless of the importance of the information, is being most idealistic. So one has to look at the existing conditions and design a system along those lines.

In Guyana we have very few libraries e.g., National Library, Public Service Ministry Library, Caricom Library, and the University of Guyana Library. In the majority of cases where one is told that there are libraries, there are just unorganised collections of documents supervised part-time by someone who has no interest in library work. But nevertheless, these documents contain information which must be made available to the National Information Service.

Assessment of existing information sources

1. List of Libraries.

First of all a listing must be made of all the libraries and organisations, which possess these unorganised collections of books, called "libraries". Such a directory is in the process of being revised by the Librarian of the University of Guyana Library.

2. Subject areas covered

In the questionnaire prepared by the University of Guyana Librarian, the question of subject areas is asked of all library personnel filling the forms. This gives some idea of where one can obtain information on a particular subject from. Unfortunately the returned questionnaires were not complete on this point.

3. List of holdings

This is necessary as one must not only know what subject areas are covered but what documents are available for use by any section of the community, and the National Information Service would be failing in its tasks, if it failed to provide such a service. In Guyana there is the problem of lack of personnel to record the documents in these "Libraries". This is a very time-consuming task and the recording of the bibliographical data must be standardised.

4. Services provided

In the questionnaire prepared by the University of Guyana Librarian and distributed to all information sources, there was the question regarding the services provided by the "library".

5. Personnel employed

A question regarding the number of persons employed gives a very useful information about the number of persons involved in information work, whether they are qualified or

not, thus informing those interested in the training requirements in this particular field.

6. Co-operation with other libraries

This is the basis for our national information network. For some "libraries" are involved in inter-library lending, thus making their documents available to a wider section of the community. There are exchange programmes between libraries e.g., University of Guyana Library produces a list of documents, they have for exchange and sends it to other libraries. Then there are also donations, and this not only from one library to another but from individuals.

The Guyana Library Association, which has a membership of librarians, library personnel, institutions in which there are libraries, and individuals interested in library development, has tried to overcome some of the problems connected with libraries in Guyana. The GLA recognises the necessity of an up-to-date Union catalogue of all the holdings of the various libraries, if correct information is to be disseminated at a national, and later international level. The recording of the various holdings must be done according to some recognised bibliographical standard so the library personnel must be trained. The Guyana Library Association has undertaken several training workshops over the years with not too much success, as the staff who attend these workshops are moved from one post to another very frequently and not usually to a similar post. So there must be follow-up work at least once a year.

Individual libraries e.g., University of Guyana Library and National Library have their own training programmes.

At present the information picture looks like the one in the diagram on p. 5. One is able to offer information not available in one's own library by contacting another who is a member of the Guyana Library Association. There is no centralised agency to which one could go. However, the Guyana Library Association recognises that it cannot accept the responsibility of co-ordinating the national dissemination of information so it has set up an Ad Hoc Committee. The terms of reference of this Ad Hoc Committee are:-

1. to evaluate the existing information system and services within the context of the development of Guyana;

2. to make recommendations to the highest government authority on:-

   (a) the co-ordination, improvement and development of information services;

   (b) manpower and financial requirements; and

(c) the implementation of proposals;

This Ad Hoc Committee has undertaken to visit these "libraries" subdivided by subject areas to discover exactly what subjects are covered and in what depth. This is all that is possible at the present time. No one yet has undertaken to record the individual documents.

A user-questionnaire is in the process of being prepared so that any information service which evolves will be designed with the users needs in mind. For example, some of the information required from the users are:-

1. What is your main area of professional interest?
2. Do you keep any personal information files? What is their content? How and when do you use them?
3. The last time you needed job-related information what was the first source you approached?
4. What did you get from this source?
5. How long did it take to get?
6. Why did you use this source?
7. How was the information used?
8. What type of information did you find difficult to obtain?

When these questions and others have been answered, the output of the information system will be decided on. At this point the input and the processes of storage and dissemination can then be catered for.

In a national information system in Guyana there must be a co-ordinating source. This means having to depend on one of our larger libraries e.g., National Library. At this point the onerous task of actually organising the information for dissemination occurs and the finding and financing of the necessary manpower expertise and the financing of the necessary equipment must be considered.

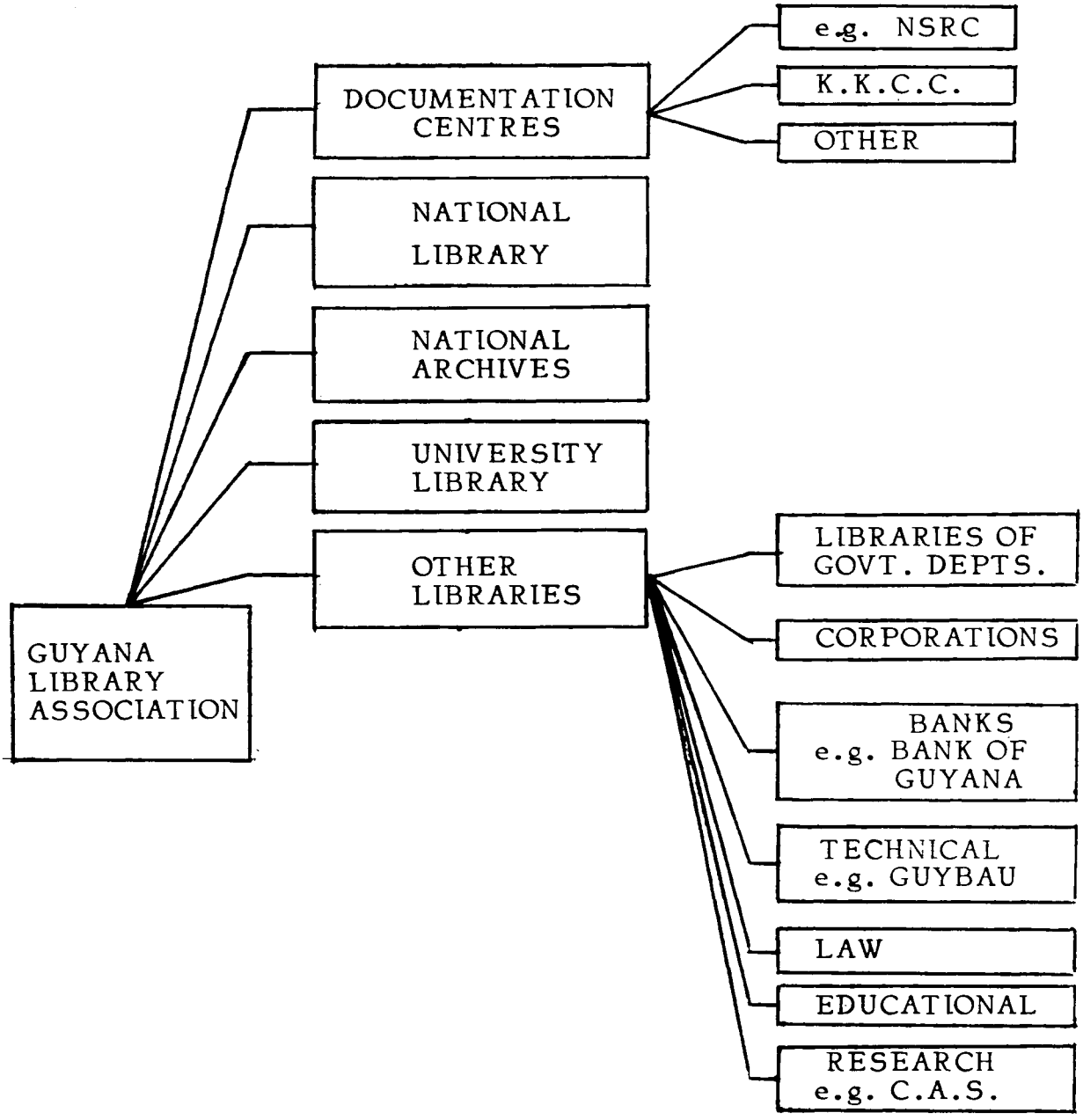
Does the parent body of the co-ordinating organisation finance the National Information System, or do all the parent bodies of the various information services contribute to the financing of the system? As this cannot be decided on at this stage in Guyana's information development the various information services will continue to contribute in their usual way.

All that happens at the present time is a referral service. For example, a reader wants information on the problems of malnutrition in the first three years of the child, and he goes to the National Library. He must be referred to another library e.g., Medical Science Library if the information is not available in the National Library. There is no way in which a reader can receive a copy of the documents unless the particular information source to which he/she has been directed has such services.

Generally the interested staff in the "libraries" provide a reasonable service which can be greatly improved by an

increase in their financial allocations from their parent bodies.

It has always been shown how important it is to get information when it is required, yet less and less is being allocated to the information services. It is to be hoped that there will be our increase in financing, so that a National Information System can devolve, improve and blossom into an International Information System.



The Existing Information Network

25 THE STATE OF SCIENTIFIC INFORMATION SYSTEMS IN THE BAHAMAS

B J T Taylor

Communication systems in the Bahamas, both written and oral, are moving in a positive stream - especially in education.

The conditions imposed by the geography of the country are quite different from most other Caribbean countries, in that the Bahamas is an archipelagic country composed of 700 islands covering an area of over 160,000 square miles. Transportation routes for materials and the organizational structure of the Ministry of Education and Culture often times cause problems with communications.

Innovative programs, 90% of the time originate in New Providence, the Capital of the country, and spread out to the other twenty-three inhabited islands and cays.

Scientific information in the Bahamas is presently being disseminated via the Ministry of Education and Culture, the College of the Bahamas, the Ministry of Agriculture and Fisheries, the Ministry of Health, the Bahamas National Trust and several scientific industries.

This paper will focus the means through which materials are disseminated in the Ministry of Education and Culture. This is the major system through which most scientific materials are disseminated in the Bahamas.

Meetings

1. General meetings with all Science Teachers from both Government and Independent schools on the island of New Providence are held during each school term - a total of three per year. At the initial meeting held in August which is an Orientation Workshop, teacher review curriculum guidelines and current information related to the field are presented.

Teachers are encouraged to join and activity participate in Curriculum Development and/or Renewal Committees. Each school has at least one representative on each of the subject committees.

2. Heads of Science Department meetings are held each month with the Education Officer. The purposes of these meetings being:-

(a) to discuss progress of Curriculum Development Committees;

(b) to present current professional literature;

(c) to review textbooks;

(d) to discuss problems that might exist within the various departments;

(e) to plan In-service Teacher Training Workshops; and

(f) to devise New Approaches to teaching

Heads of department are encouraged to meet with science staff members at least twice per month in order to inform them of recent developments as well as to plan, organise and implement matters related to the school science program.

3. Family Island Staff meetings are held with Family Island Science Teachers throughout the country during the visitations of the Education Officer (Science). Each island is encouraged to establish Curriculum Committees so that developments in Curriculum may be continuous throughout the school year.

4. Assistant Director of Education meetings are held weekly, each Thursday morning. The Education Officers are often-times invited to these meetings in an attempt to inform the Assistant Directors and the Director of Education with current occurrences in their area and to solicit their aid and support in carrying out proposals that are approved.

Communication of Materials to Science Teachers Throughout the Family Islands

Residing on each of the major Family Islands are District Education Officers. These persons serve as the Ministry of Education and Culture's representatives on the particular island to which they are assigned. They are responsible for conveying the Ministry's policies and seeing to it that they are carried out.

Good communication involves input as well as output by each individual involved.

It is through the District Education Officer that developments in Science are distributed to Science staff members living on the Family Islands. These officers carry or send the materials to the Principals and Science teachers. Any input that teachers have to contribute toward materials sent from Ministry's Headquarters are submitted to the Science Officer through the District Education Officer.

The Science Officer then presents the materials to relevant committees on the island of New Providence.

On several of the Family Islands, the District Education Officers serve as the chair agent between the Ministry and scientific institutions located on the islands for which they are responsible.

Circulars related to different activities in science education are sent to the District Education Officer. Also student textbooks, teacher resource materials and supplies lists and catalogues.

Only in cases of urgency are materials sent directly to the teacher in which case, it has to be sent through the Principal. Telephone calls and telegrams are also made and/or sent.

Family Island Science teachers, when in New Providence during a holiday, visit the Office of the Education Officer (Science) in order to receive needed information. New materials and developments are presented and discussed during these meetings.

Official minutes of all communications made are sent up the line of command to the Senior Officers for information purposes or for actions to be taken.

Writing Workshops

Since 1975, Principals of both Government and Independent schools have cooperated well in releasing science teachers from their normal teaching duties when requested by the Ministry of Education and Culture to participate in Writing Workshops.

These are Workshops that are needed primarily for producing Curriculum materials. They are normally of three to five days duration and are held in the Science Resource Centre. Teachers have easy access to resource information in the subject disciplines for which there are developing materials. The Resource Library has over 300 volumes of resource books.

In-Service Teacher Training Workshops

The location of science teachers throughout the country on twenty-three (23) different islands causes duplication of some of the activities related to the communications of scientific developments. This causes the process of communication to be long and tedious. Materials are sent from the Ministry to the District Education Officer who issues such to the teacher via the Principal. The teacher then submits comments, evaluation or recommendations to the Principal who then submits such to the District Education Officer who then forwards materials to the Education Officer (Science) through the Permanent Secretary. This, often times, takes from 3 weeks up to 6 weeks. Therefore, in 1973, In-Service Teacher Training Workshops for Family Island teachers were initiated.

The first type being the Primary In-Service Teacher Train-

ing Workshops which were initiated as a means of:-

1. Presenting to the teachers, especially on the Family Islands, sample materials that might be selected for use in a Primary Science Program in the Bahamas;

2. Providing a situation in which teachers might develop teaching skills that would enable them to test and evaluate these sample materials that might be selected to be incorporated in a Primary Science Program;

3. Acquainting teachers with background information on specific scientific topics that are to be developed into teaching units for the Primary Science Program; and

4. Encouraging teachers, especially those with little or no science background, to incorporate their scientific knowledge gained with other class subjects.

The Workshops were conducted by members of the Primary Science Committee and the Education Officer for Science. Local arrangements on the Family Islands for In-Service Teacher Training Workshops in Science are made by the District Education Officer. They include release of teachers, location of Workshop site, providing transportation and living accommodation for the visiting Officer. All materials to be used in the Workshop are transported to the island by the Officer, except for materials that may be found locally.

Summer In-Service Workshops in Agricultural Science were started in 1975 in an attempt to acquaint teachers who were interested in starting programs in Agriculture with enough knowledge and skills to do so. Specialist Officers from the Ministry of Agriculture and Fisheries as well as the Education Officer for Science and local crop and livestock farmers taught the sessions of this one month course. Both lecture and practical laboratory work sessions were held in the Science Laboratory and in the fields. Members of the Bahamas Agricultural Research and Training for Agricultural Development (BARTAD) Staff located on the island of Andros also gave valuable input. Another was held in 1976 and participants included Agriculture Science Specialists teachers who were not familiar with tropical Agriculture as well as interested teachers and farmers.

The In-Service Course on the Bahamian Marine Environment was held in 1976. This, being necessary, was to equip teachers to improve their teaching skills with a unit entitled the same that is a part of the General Science Syllabus. Fisheries Officers shared their knowledge in teaching these sessions as well as experts from the Ministry of External Affairs who acquainted teachers with "The Laws of the Sea".

Science Radio Broadcasts

In an effort to enlighten and broaden scientific knowledge in general, a Science Radio Broadcast Committee was formed in 1973. Ten scripts were developed and presented centering around the Unit topics found in the Bahamas Junior Certificate Syllabus.

These scripts were broadcast throughout the country but have been discontinued because of more pressing developments in the field of Science. Hopefully, by 1978, the Committee will be reactivated and more scripts produced and broadcasted.

Through the services of the Broadcasting Division of the Learning Resources Unit, half-hour radio programs related to current occurrences in Science Education are made once each term. Last term, the Low Cost Science Production Seminar/Workshop and the Agricultural Science Centre in New Providence were featured and this term, the Third Bahamas Science Exhibition will be featured twice within one week - once on Thursday and again on Sunday, both being done during prime radio time.

Bahamas Information Services

It is now a policy of my Government that any materials that are to be placed in the Press media, with the exception of educational radio broadcasts from the Ministry of Education and Culture, must be issued by the Bahamas Information Services. Therefore, any educational scientific news releases must come into Ministry Headquarters and be forwarded through the Public Relations Officer of the Ministry to Bahamas Information Services, the official publicity agent of Government. Only when programs are covered by an official member of Bahamas Information Services is this procedure unnecessary.

Science Exhibition

In 1972 and in 1974, very successful Science Exhibitions were held that served not only to develop an increased public awareness of the place and need for Science and things scientific in today's world, but these exhibitions also served as a meeting ground for young scientific minds from all over the Commonwealth.

The participation of private enterprise not only exposed students to the possibilities and the need for scientists in the future, but it served to reassure industry that the Ministry of Education and Culture was cognizant of their needs in these areas and was training our young people to be qualified to fill some of these needs.

Both served as a stimulating educational experience for all in that they:-

(a) provided students at all levels with an

opportunity and incentive to pursue their own scientific interests;

(b) increased the awareness of students about the many topics of Science and its teaching potential in the Bahamian environment;

(c) served as a meeting point for an exchange of ideas about Science education;

(d) provided an opportunity for the general public to gain an insight into the role of Science and its relevance to the Bahamian way of life; and

(e) provided everyone with an opportunity to witness that learning and enjoyment of life are compatible.

These Exhibitions were sponsored under the auspices of the Ministry of Education and Culture in cooperation with the Ministries of Health, Agriculture and Fisheries and private scientific firms and Organizations. Scientists from the public as well were invited to present lectures, seminars and demonstrations. The Third Bahamas Science Exhibitions is to be opened officially on April 25, 1977.

These Exhibitions were organized by the Science Exhibition Committee that is composed of one representative from each participating school, Ministry, firm and organisation.

The Exhibition is at present non-competitive. Schools throughout the country, also, stage individual Science Exhibitions throughout the year.

Science Resource Centre

In May 1975, it was found necessary to have a Central Supply Depot to store and distribute kits, booklets and other scientific apparatus to schools throughout the Commonwealth. Therefore, the Science Resource Centre was established. The services of the Centre are:-

(a) to serve as a site for In-Service Teacher Training Workshops for teachers of Science;

(b) to serve as a Science Service Centre (Repair of broken equipment);

(c) to serve as a Central Supply Centre for the loaning of Science materials (kits, audiovisual aids equipment, chemicals, professional literature and resource textbooks, etc.);

(d) to serve as a meeting place for Science teachers and other scientists and science educators in the community for discussions related to problems encountered in the

teaching of the subject; and

(e) to serve as a site for demonstrations of new or unfamiliar apparatus in science.

Presently, the Centre is not opened full time, but persons desirous of using the services of the Centre are able to do so when requests are made. It is hoped that once the services of a full-time technician are available, it will be opened full-time.

Donor Agencies

There are located in the Bahamas, scientific firms and organizations that published educational materials - Bahamas Oil Refining Company (BORCO), Syntex, Mortons Salt, The Bahamas National Trust, BARTAD, Shell and, etc.

Publications are sent to schools from these institutions via the Education Officer (Science). Of particular mention is The Bahamas National Trust which invited the Ministry of Education and Culture to cooperate with its Educational Committee in developing a Conservation Guide and slide shows related to Units in the General Science Syllabus.

Scientific films, filmstrips and slides are loaned to schools through the institutions stated above as well as the American, Jamaican and Canadian Embassies. Scientific materials received in the Ministry of Education and Culture from the British Council, the Caribbean Regional Organization of Associations for Science Education (CROASE) other Ministries and colleges and universities abroad are duplicated when received and if necessary, distributed to science staff members throughout the country. These are accompanied by a circular which is the official covering medium for materials being issued to all schools. Materials are forwarded to both Government and Independent schools.

Conclusion

Some of the major problems that are encountered in attempting to disseminate scientific materials to science teachers throughout the Bahamas are:-

(a) the slowness of the bureaucratic structure in having circulars approved;

(b) the inefficiency of materials arriving to the responsible officer immediately after their arrival in the office;

(c) the slowness of the mail service throughout the country; and

(d) the lack of efficiency in passing the materials on to the concerned teacher once it arrives at the school rather than waiting until the due date or filing the materials and forgetting that they exist.

It is hoped that with the formation of an Association for Science Education in the Bahamas, swifter communication among science staff members throughout the country and also among the territories will come into existence. More direct communication among such persons without having to go through the bureaucratic structure should improve the existing situation.

A typical small group discussion in progress during the workshop preparatory to reporting to plenary session.

Participants in plenary session.

26 THE STATE OF SCIENTIFIC INFORMATION SYSTEMS IN BELIZE

G Ellis

Belize has a population of 130,000 with a population density of 14.5 persons to the square mile. The high man-land ratio makes agricultural development the greatest economic potential for Belize. English is the official language, but Spanish is widely spoken. Languages of minor significance are Carib, Maya and Ketchi.

Belize has a literacy rate that has been quoted as high as 95 percent. Primary school education is free and the highest learning institutions are Sixth Form Studies and the Belize Teachers' College.

There is one Radio Station in the country and this is Government controlled. Radio Belize gives satisfactory reception in all parts of the country and it is undoubtedly the most widely used information medium. Government Ministries run regular programmes of a scientific nature in agriculture, health and meteorology. The Government Information Service operates a mobile cinema unit which takes pictures regularly to the rural areas. Many schools and Government Departments also have movie projectors.

The three weekly newspapers in Belize will carry from time to time scientific articles which has relevance in the country. Periodicals published containing scientific material are:

Extension Bulletin, by the Ministry of Agriculture;
Agricultural Information Bulletin, by Prosser Fertilizer and Agrotec Company;
Project Bulletin, by C.A.R.E. Inc.;
Belizean Farmers by the Belize Agricultural Society;
Asuntos Caneros by Belize Sugar Industries; and
Journal of Belizean Studies, by the Belize Institute of Social Research and Action (BIRSA).

Central Farm, the Government Agricultural Research Station has the only science library as such. However, all public libraries carry a science section to which foreign and local material are sent. Schools and colleges also carry science publications. The American Consulate in Belize City has a wide collection of science publications and movie films.

In Belize, scientific research is sponsored by the Government, regional agencies such as Caribbean Agricultural Research and Development Institute (CARDI), Universities and Foundations. Basically, Government research programme is geared toward the application of principles in the

maximisation of the natural resources of the country. As one would expect, the greatest thrust is in agriculture. In many cases the local researchers work jointly with outside agencies on a specific problem. A limited research is done in fisheries and this is carried out mainly by outside research workers with Government collaboration. The Forestry Department also has a research section, which, like Agriculture, concentrates on applied research.

The Belize Audobon Society, dedicated to the conservation of wild life, carries out field studies on wild life population, movements and habits. In the social sciences, BIRSA in its journal produce articles on local archaeology, history and anthropology. Extensive research has been done on the Mayas of Belize with funds from universities and Foundations. The Department of Archaeology monitors these studies and is supplied with all information and findings from such studies. Other research studies carried out from time to time are in the field of anthropology, particularly on the Black Caribs and the Mayas. The publications arising from these are usually lodged at the public library.

Scientific information gathered as outlined above must be disseminated and made available to the proper audience such as farmers, students and the general public. As far as reaching farmers is concerned, the Ministry of Agriculture Extension Services is set up for this function. The staff consist of 34 officers spread over six administrative districts and a clientele of 12,000. There is a special officer for radio programmes and one for publications. Two farm programmes are done by this specialist weekly, one is in Spanish. Radio Belize has recently started a daily programme, Tillers of the Soil, to which the Ministry of Agriculture and other agricultural agencies make contribution. The main agriculture programme is heard on Sundays and runs for 45 minutes. The items usually consist of a talk by one of the agricultural specialists, an interview with a farmer or a discussion; advice on current agricultural problems; announcements; and a very popular feature is a serial "From Polly to Polly", a radio drama with a rural setting and used as a vehicle for disseminating new technological practices in agriculture. The publications specialist officer gets most of his material from research workers. These he edits and prepares for farmers level.

None of these specialist officers have had any training in the work they perform. One was nominated last year to a workshop on agricultural broadcasting which was to be held in Guyana. The workshop has been postponed indefinitely we are informed. The need for training in this area should be very helpful, since the radio is the most widely used medium of communication in Belize.

Similarly, the specialist officer in publications has had to rely mainly on his initiative for presentation of publication material. He has no support staff and so must await his turn for typing and the use of the cyclostyling machine.

Recently one of the Ministries acquired a scanner and this has improved the appearance of our publications. The Government Printers may accept requests for off-set work if one is prepared to wait indefinitely. Limited finances precludes the wide use of commercial printers.

The need for training in communication techniques is even more obvious among the field staff. As a result they function more as field advisers and less as demonstrators and teachers. There can be more use made of visual aids and communication equipment such as projectors, tape recorders, etc. It is recognised that not every officer is an artist, but training in such areas as mass media, conceptualisation, propaganda techniques and so on, will enable him to tell the artist what he wants. Last month CARDI held its regional workshop/seminar "The Problems of Agricultural Research and Development" in Belize. Arising out of the discussion was a strong recommendation to Government for streamlining the flow of information from Research to Extension and vice versa.

In the main, scientific knowledge in Belize schools is taught in a classroom situation. Then, the material is broken down into subjects - chemistry, biology, agricultural science, etc. Too often the knowledge gained is not related to the students day-to-day experiences. It may be good only for school examinations and classroom purposes. Belizean educators are now becoming aware of this situation and last year they took steps to remedy it. Nine rural schools have been selected to participate in a pilot project which will be following the "integrated curriculum approach" to education. At the "out-door laboratory", students acquire scientific knowledge relevant to their environment and learn to see clearly the man-land relationship around them. The project will run for three years.

In conclusion, there is no doubt that Belize has a far way to go in developing her scientific information systems. If it is accepted that one of the preconditions for a receptive audience is a high general level of education, Belize has an advantage. What is needed parallel to this development is more research with local material under local conditions, so the kind of scientific material disseminated will be relevant.

27 THE STATE OF SCIENCE AND TECHNOLOGY INFORMATION SYSTEMS IN JAMAICA

O Lewis

There should be no doubt in anyone's mind that there is an information explosion in Science and Technology. It is becoming increasingly difficult for developing countries to purchase all the information they need - A system of resource sharing seems to be the answer.

In this report Science and Technology Information (STI) is taken to mean, information on the status, progress and results of research development and other activity, and on the application of such results, together with any other information of potential use in any scientific or technological activity. By system we mean any place where there is a collection of science and technology information whether this is organized or not.

Based on the above definition we have been able to identify 84 STI collections distributed as follows: Government 24; Private 31; University of the West Indies19.

Private Sector

In the private sector many of the 31 collections are small, often not organized, but highly specialized. These collections are not open to the public and so there is a wealth of information which is not accessible to the rest of the science and technology community.

University

The Main Library at the University of the West Indies has two branches, the Science Library and the Medical Library. There are also 17 departmental collections, which are not organized, dealing with science and technology information. These departmental collections are only accessible to the staff of the departments.

The following services are offered by the Science Library and Medical Library:-

(a) Inter-library lending
(b) Photocopying
(c) Distribution of Accessions lists
(d) Extension of reading and reference facilities
(e) Telephone enquiries

Government (including Statutory Bodies)

There are a total of 24 collections in this section. Six of these, namely Ministry of Agriculture, Bureau of Standards, Jamaica Industrial Development Corporation, Jamaica Bauxite Institute, Ministry of Mining and Natural Resources and Scientific Research Council are large organized libraries. The Ministry of Agriculture and the Scientific Research Council are open to the public as reference libraries.

The Technical Information Section (TIS) is a section of the Scientific Research Council (SRC), Jamaica. Scientific Research Council is a Government Research Organization which investigates the feasibility of producing new products from local raw materials which will boost the economy of the Island.

The objectives of the Technical Information Service are:

1. Developing and maintaining a technical library which primarily meets the information needs of the research staff;

2. To be a reference centre for Scientists, Industrialists, Businessmen and Teachers of Science;

3. The dissemination of scientific and technical information by preparing and publishing:

   (a) An abstracting journal;
   (b) The Journal of the Scientific Research Council, a primary journal reporting local research;
   (c) The Council's Annual Report
   (d) Technical Paper
   (e) Occasional paper
   (f) Also acts as publisher for any local science and technology information.

The functions of the TIS are:

1. Acquisition
2. Cataloguing and Classification
3. Reference
4. Referral
5. Dissemination
6. Archival

There is a wealth of STI in Jamaica but it is inaccessible to the Science and Technology Community because either its access is restricted or it is not organized. Either of these problems is without a solution.

Collections can be exposed to a wider number of users by either a switching system:

procuring material located in another Unit of the network for the user;

or a referral system:-

informing the user where the information can be located.

The Scientific Research Council proposes that a network of Science and Technology information systems be established, each unit maintaining autonomous administration of its collection, but cooperating its individual resource to the total wealth of the island.

A network has been proposed rather than a monolithic structure - because

1. Institutions already exist;
2. New ones can develop as the need arises;
3. Information will now be accessible to the total user community rather than a select few.

By forming such a network it is hoped that the following benefits will be realized:

1. Union Catalogue;
2. Wider Coverage for all;
3. Reciprocal borrowing;
4. Avoidance of excessive duplication.

Related Services to Science and Technology Automation

There are a few automation systems.

The Institute of Jamaica West Indies Reference Library has a KWIC indexing programme which is being used to index the Daily Gleaner, oldest and our major Newspaper.

Alcan Information Centre has a periodical routing system in operation.

Several libraries in the S and T discipline also have access to computer services. Plans are being made for other computer services such as Agris, Devsis and UNIDA.

Recently in Jamaica there was a demonstration of On-line service via Telex-TWX to the Lockheed Dialog System.

In Jamaica there is a National Council on Libraries, Archives and Documentation Services which has the following terms of reference:

1. To study in detail and make recommendations direct to Government for one integrated National Plan for the systematic development of all types of Libraries, Archives and Documentation Services;

2. To study in detail and make recommendations to stimulate and expand the development of the Libraries of private organizations and develop official channels for using their resources (unclassified material) in the National pool, following the NATIS (National Information System, concept as recommended by UNESCO;

3. To study and advise Government on legislation required to establish national library with provision for legal deposit;

4. To review continuously the Nation's library needs and advise Government on national priorities in the budgetary provisions;

5. To examine recommended standards for these services and advise Government on any necessary modification and legislation for the implementation of NATIONAL STANDARDS as guidelines for upgrading these services in Jamaica.

The Government considers it a matter of urgency to establish a national information system which would coordinate and/or integrate all the relevant services thus obtaining greater effectiveness and the economical use of limited resources without detriment to the traditions and specialised functions of individual services.

It is with this in mind that Dr. Dorothy Collings was asked by the National Council to advise them on library development.

Dr. Collings approached this assignment by setting up ten (10) working parties namely:-

1. National Priorities, Legislation and Financial Support;
2. Libraries of the University of the West Indies;
3. National Library of Jamaica;
4. Public and School Libraries;
5. Archives and Records Management;
6. Information Services in Science and Technology;
7. Government and Special Libraries (exclusive of Science and Technology);
8. Manpower Resources;
9. Data Banks and Automation in Libraries;
10. Publishing and Production: Books and Audio Visual.

Reports of these Working parties have been sent to Dr.

Collings for incorporation in her report to the National Council. It is on this report that Government will act.

The following is a list of the organized STI collections:

LIST OF ORGANISED STI COLLECTION

Library	Discipline	Address
Banana	Banana	10 South Avenue, Kingston 4, Jamaica, W.I.
Jamaica Bauxite Institute	Bauxite and related fields	P.O. Box 359, Kingston 5, Jamaica, W.I.
Scientific Research Council	Agro-Industry Nutrition Mineralogy and other related fields.	P.O. Box 350 Kingston 6, Jamaica, W.I.
Jamaica Industrial Development Corporation	Industrial Development including Agro-Industrial and Building	4 Winchester Road, Kingston 10, Jamaica, W.I.
Ministry of Agriculture	Agriculture	P.O. Box 480, Kingston 6, Jamaica W.I.
Ministry of Mining and Natural Resources	Geology, Water Resources the environment	P.O. Box 495, Kingston 5, Jamaica W.I.
Science Library	Natural Science	P.O. Box 104, U.W.I., Mona, Kingston 7, Jamaica
Medical Library	Medicine	U.W.I., Mona, Kingston 7, Jamaica, W.I.
Alcan Information Center	Bauxite production	Kirkvine Works Kirkvine P.O. Jamaica W.I.
Seprod	Soap Technology	6 Producer's Road, P.O. Box 271, Kingston, Jamaica W.I.

28 THE STATE OF SCIENTIFIC INFORMATION SYSTEMS IN BARBADOS

G Davis-Isaacs

It is necessary first of all to examine in depth the functions and role of the various Scientific Institutions existing in a country, before one can first determine the size, and scope of design of a system of the receipt and dissemination of scientific information.

It would appear that Barbados, like most developing countries, has inherited from its colonial days systems of one kind or another, which were originally designed to feed information into the receptacles of the metropolitan power which was at the time dominating the activities of the particular country.

On the other hand, developing and especially newly independent countries, such as Barbados, have found it necessary to institute new systems, set up new departments of Government, encourage and assist with establishment of institutions of varying kinds; all in an effort to determine for the country's own good, what is available to it and what maximum use they can be put to.

In this connection, the establishment of an institution like the Barbados National Standards Institute comes readily to mind. This Institution has emerged out of the necessity for some standard measure of control over the various products that were not being produced and manufactured in the country.

It is at this point that I will examine the scientific information system that is available in the country. If we take a first look at the manufacture of pepper-sauce as part of the overall operation of an agroindustrial plant, the efficiency or inefficiencies of the existing information systems should become apparent.

The need might or rather will arise for information regarding the present and potential output of peppers by farmers; information will also be required as to what are present yields per hectare, as well as an indication as to if these present yields could be improved, and if so to what extent and in what length of time. This latter being most important as the industrialist, planning his operation, or for an expansion of his operation, will of necessity require reliable answers to these questions, which are only a few of myriads that would need to be answered.

These few should suffice for the purpose of this exercise.

Let us examine first of all, the availability of the information. The first approach will be made to the Ministry of Agriculture - a rather large institution, comprising several departments and divisions each employing several scores of people. Where or to whom should the request for this information be directed?

Several courses of action are available to the receptionist. They may refer enquirer to any one of the following sections or persons:

The Chief Agricultural Officer
One of the Deputy Chief Agricultural Officers
The Library
The Agricultural Information Unit
The Economic Planning Unit
One of the Research Agronomists.

It should be noted here that only those that are most likely to have the answers required have been included in this list. There is the other side to this problem, and that is the difficulty the receptionist may have in determining where to send the request and might end up referring the enquirer to an administrative office.

This latter statement is not made lightly, but rather emphasises the lack of a central information collecting centre for scientific operation even within a small institution such as the Ministry of Agriculture, one segment of the government operations. The other point that could be made here, is that it is more than likely that the enquirer would not be able to obtain an answer from any, or a combination of the persons or sections listed above.

This last statement does not imply that the information is not available. As a matter of fact, with reference to the particular case - peppers, and the possibilities therefore - there is abundant documented material in the form of research reports which have been made over the years.

But the major question still arises - where are they? What is the system used for collecting, collating, storing, distributing, etc. of such data? The answer is not a simple one.

Let us first have a look at the agencies which have activities of a scientific nature. They are:

The University of the West Indies
The Caribbean Development Bank
The Ministry of Agriculture
The Public Library
The Caribbean Agricultural Research and Development Institute

Now time and space does not permit a detailed examination of functions of these various institutions, or their contributions to scientific knowledge; suffice it to say that either individually or collectively, there is and I emphasise there

is, the information required by the entrepreneur who made the request concerning the peppers.

What may be of more than passing interest is the methods used by these various institutions for the processing, this word used in its widest sense, of the scientific information acquired by them either by their own research or from reports of other agencies fed into them for analysis, their own use or to supplement other work being done by other agencies.

It may be appropriate at this time to have a look at the organisation with which I am more familiar - The Ministry of Agriculture. Scientific information may be supplied either by research or extension staff. This would normally be done by way of the report system, either periodically, annually, or as the occasion necessitates. Usually, these reports would be directed to the Chief Agricultural Officer through the appropriate deputy. Dependent on the nature of the information contained in the report, copies may be channelled to some or all of the following agencies:

1. The "File"
2. The Ministry's Library
3. The Public Library
4. Farmers' Organisations
5. The Institutions referred to in a previous paragraph

What does not happen is the opposite to this out-flow of information that is, there is no steady or sustained inflow of scientific information into the Ministry, and further, even where there is an inflow there is no charted course for the analysis and storage of this information as it becomes available. I would venture to say that this applies similarly to several other agencies for scientific knowledge.

This leads to the conclusion therefore that there is a dire need for the examination of the scientific information systems as they now exist, with a view to making them effective and possibly productive. To summarize:

1. There is a wealth of scientific information on a variety of subjects available in Barbados;
2. There are several agencies which obtain, produce, collect and channel scientific information to other agencies or the public:
3. There is no co-ordinated effort between the various institutions to centralise and codify the available information;
4. There is a need for the establishment of a unified system of report:
5. On failing (4), an established system of inter-change reports: and
6. There is need for a central pool to which all scientific information should be directed.

29 TOWARDS THE DEVELOPMENT OF SCIENCE COMMUNICATION IN THE CARIBBEAN

J J Niles

For the past week we have been occupied with the study of the means and tools of communication, and the techniques and relative advantages of the use of each individual medium, with the how and what of arranging conferences, seminars, meetings, exhibitions and tours for efficient communication.

It is somewhat unfortunate however, that we have such limited time in which to survey such important issues as the extent to which these media have been used in the Caribbean specifically for the dissemination of scientific information; the political, economic and attitudinal constraints which tend to reduce efficiency of communication; the attitudes of scientists themselves of decision makers and the varied motivations for scientific and technological research within the region. The constraints as typified will not be treated under separate headings, but should be sufficiently appreciated by implication.

While absorbing the atmosphere of the workshop and engaging in conversation here and there, I was struck by one particular statement: "In order to have science communication we must have scientists." This can be taken in different senses, each pertinent to the development of our thoughts on Science Communication in the Caribbean.

It might have been evoked by the conspicuous shortage of Scientists at the Workshop. This could be either through a flaw in the organisation or the negative attitude of our local scientists towards Science Communication.

It may mean that we have so few scientists in the region that we have little to communicate. This led me to fear that perhaps we were addressing our minds to the communication only of science emanating in the region, which would have been a tragedy. Nevertheless, it may be useful to state here that a large number of trained Caribbean Scientists are working in Metropolitian countries on projects of slight or no relevance to our immediate needs. This could explain the limited number of scientists in the region.

The statement may also serve to emphasise that perhaps not only the communication of scientific information, but also of information about scientific activity in the region has not been as efficient as it should be.

The historical paper by Benjamin and Cox summarised by

Joel Benjamin, substantiates my own conclusion that the region has not been sterile in scientific productivity.

A very cursory research reveals that there are fifty (50) or more institutions in the Caribbean concerned with scientific research in one field or another. Nearly eighty (80) different journals and bulletins have appeared during the present century, a large number directed to the farmer as end user.

Work has been done by individual scientists - indigenous and foreign; by scientific officers working for Governments and industrial concerns, e.g. the Sugar, Bauxite and Marine Engineering industries in Guyana; by research teams on private expeditions, financed by Metropolitan Universities, mainly in the environmental and ecological fields and for the benefit of their doctoral students or to expand their museums; and recently by the Universities of the West Indies and Guyana, the Caribbean Research Institute (CARIRI), the Caribbean Food and Nutrition Institute (CFNI), the Caribbean Conservation Association (CCA), the College of the Virgin Islands and the Island Resources Foundation of the US Virgin Islands, the Marine Research Institute in Cyracou of the Dutch Netherlands Antilles (CARAMI), and many others on the surrounding mainland and the islands of Puerto Rico and Cuba.

Hundreds of scientific papers have been published in the region based on the work of these institutions and individuals, but alas for one reason or another a large quantity of these are unknown to local scientists. The doctoral theses and findings of Tropical Research Stations are in Universities and museums abroad.

At the moment scientists in the region keep in touch by letters, and phone calls, and by more frequent trips from place to place for confabs, than would be necessary if they were provided with proper documentation and abstracting services. The question here is: In a region which is not unified politically, in which publications are coming out in English, French, Spanish and Dutch - who will undertake the setting up of a suitable Caribbean Centre? What can the scientists do about it?

The only reaction to this situation at the moment is unilateral procedure at high level on the plan of (CARIRI), the Caribbean Research Institute established by the Government of Trinidad and Tobago, with the help of UNDP and with UNIDO as the Executive Agency. Here I stress with the help of UNDP in order to emphasise the economic constraints. This institution staffed mainly by indigenous scientists has an arm which provides Technical Information Services to Industry, from which I am sure that the whole region could benefit -

1. It collects and holds available a core of important and useful technical information;

2. It presents such information in a form acceptable and useful to industrial personnel;

3. It offers necessary advice;

4. It maintains liaison with international agencies, equipment manufacturing firms, the University of the West Indies and the Trinidad and Tobago Development Corporation Libraries;

5. It advises on the organisation of Library/ documentation services for small industrial concerns;

6. It undertakes translation of technical papers from foreign languages into English; and

7. An information retrieval service provides information required for the compilation of bibliographies and the preparation of literature surveys.

The Technical Information arm is staffed by one Information Scientist, one Information Specialist, one Assistant Documentalist, and a Clerical Assistant. Some of the publications which I have seen are :

1. A select list of documents on Science Policy held by certain institutions in Trinidad and Tobago - A similar document would help the NSRC in enunciating our Science Policy;

2. A number of technical news sheets; and

3. A series of Food Processing data.

Except for the Caribbean Conservation Association which has a holistic concept of the region and which is building up regional documentation on environmental matters, I am unable to mention any other established institutions parallel to CARIRI, dealing with other scientific disciplines in any of the English, French, Dutch or Spanish speaking territories, but the time available to me was too short for indepth research on this topic.

In Guyana however, we can lay the foundation for such an institution by the combined efforts of NSRC, GAPE, UG Library, National Library, and the Guyana Ecological Society, not only in the preparation of local bibliographies, but also in the acquisition of bibliographies and other material from the region.

As far as I know we have a Bibliography on Soil Science Research in Guyana; a local Bibliography on Forestry is now with the printers; a Bibliography on Ecological work done in Guyana is in preparation; and the documentation of agricultural publications is also in progress. The importance of

bibliographies should be appreciated as a first step to be followed by acquisition of the publications before abstracting can be done.

In addition to the farmer, the industrialist and the research worker as end users of scientific information, one has to keep in mind the social purpose of science, (which however is not really to be found in science itself) and it should be the duty of someone to effect the integration of science into general culture.

Is this someone to be the scientist himself/herself? - Perhaps by the means of learned societies? The problem here is the prestige system of scientific disciplines. "This is the fundamental social phenomenon which currently inhibits all well-meaning attempts to infuse general culture with Science", an undertaking which if successful, would increase general understanding of science, increase the number of future scientists, and certainly clear the vision of decision makers.

The professional scientists sees his/her activity as earning "international visibility", recognition as an expert puzzle-solver within his/her own discipline and promotion within a faculty or department, which latter often halts productivity in research.

If we recognise that the economic health of a nation or region depends on science and technology, on adequate science education and a wide scientific literacy, "there seems to be a strong case for fabricating a prestige system which recognises achievement in the popularisation of science to the same extent as brilliance of scientific discovery".

The Scientist then, who is not of real research class, and who often realises it, may be diverted from chasing shadows and induced to turn his attention to communication of science either by good teaching or effective writing.

I will close by posing a few questions for which I do not have the answers:

1. Which newspaper in the Caribbean has a Science Correspondent?

2. Which radio station in the Caribbean, government or commercial, has a regular science feature as a public service involving a scientists on its staff working in collaboration with the communication experts?

3. How many science graduates in the Caribbean have taken up professional librarianship?

4. When and in what way will our Universities approach the exposure to science of its non-science under-graduates, many of whom are destined to become administrators and decision-makers on important issues involving an appreciation of scientific principles?

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30 THE DEVELOPMENT OF SCIENCE COMMUNICATION IN THE CARIBBEAN - A BRIEF SURVEY

J P Benjamin and M A Cox

In this paper we intend to examine, in outline, the growth of traditions of science within the Caribbean and the ways in which they allowed of a wider dissemination of ideas and research findings. This survey is not intended, given the limited time in its preparation, to deal with the Spanish speaking Caribbean, although it is most likely that many of the generalisations could be extended to this area.

1. Systematic scientific activity is not something new to the Caribbean. This activity has, in essence, taken five major forms, viz. that of the individual, private indigenous institutions, private metropolitan institutions, and official metropolitan and local agencies.

a. Individual research needs no major attention. From its very early history, the Caribbean has been a stimulus and a challenge to the individual researcher, to the curious traveller and naturalist. It offered an abundance of raw material for the anthropologist, the linguist and the zoologist. From Pelleprat in the 17th century to Schumann in the 18th, Brinton in the 19th and Goeje in the 20th century we see merely the glimpses of a massive and vigorous tradition of scientific linguistic observation and theory; from the writings of D'Aublet, Descourtilz, Richard Schomburgk and Charles Chubb we see only a few indications of the massive work in natural history. Anthropology carries no less important names. Yet, in a sense, this tradition does not need much said about it. It was largely the work of interested travellers, explorers, resident missionaries and the occasional resident learned researcher. Occasionally some of the findings were widely published, but a great deal of this work, particularly in linguistics and anthropology, would end up in obscure journals, or in unpublished archives of some learned society. In recent years the private researcher has depended usually on the financial backing of a university or related institution - and frequently he is a doctoral student using the Caribbean as the raw data for some academic scientific research.

b. The work of indigenous institutions has to be seen as emerging at two levels, viz. out of the curiosity of individuals who live in a new territory, and out of the major economic interests of those territories. In the British Caribbean one sees the growing phenomenon in the early 19th century of the growth of a number of local

societies, some for entertainment, some for cultural research, some for natural history studies, and others for agricultural research. The classic example of a society with the latter three functions is the Royal Agricultural and Commercial Society of Guyana. It was initially controlled by the planter interests and was fundamentally designed to stimulate discussion and research into the problems of drainage, improved sugar technology, and needed agricultural diversification. In the late 19th century this society sponsored a regular journal which produced some of the most systematic agricultural and related research of the period. The other example is the growth in the latter 19th century of British West Indies medical associations as branches of the British Medical Associations. Here we have largely expatriate doctors presented with a challenge of varied tropical diseases and finding it personally necessary to adapt their training to the new circumstances. This burst of medical activity can be seen in the context of an even longer tradition of vigorous medical research generated in the West Indies, including the work of Rotscheid, Landre, Blair, Beauperthuy and Hillis covering the broad field of epidemiology. Yet the point about curiosity needs to be modified. Medical research is of the oldest order in the Caribbean, going back in origins substantially to the 17th century. At one level it was necessary for the survival of European planters, and, perhaps not surprisingly even more so for the survival of slaves who represented, per person, major economic investments. K.O. Laurence, in referring to Guyana and Trinidad, shows the connexion between the development of medical services and the demands of organised East Indian immigration. It is worth noting that the membership of both the Royal Agricultural and Commercial Society and the British Guiana Medical Association, was taken almost totally from the economic and political elite of the society.

c. The third level of activity (i.e. by private metropolitan agencies) is a wide and varied field. At one simple level, planter interests, as represented in the 'mother countries', found it necessary to encourage research, usually in agriculture, in the Caribbean. An early example of this is the late 18th century effort to sponsor the transfer of food plants, particularly the breadfruit, to the West Indies. The visiting expert, as representative of the 'company' or 'corporation' is still a visible part of the scene today in the 20th century, and with the diversification of economic interests in the Caribbean (the discovery of bauxite is a good example) his research takes on dimensions other than in agriculture. Even in the 19th century the United States consuls were sending back systematic data on the economic resources of the Caribbean territories. Private research institutions abroad, some out of a need for pure research, and others out of philanthropic motives have played their role, but this level of research is a relatively recent one. In the first category one could place the Smithsonian Institute; and in the second, the Rockefeller Foundation activities in malaria and filaria research early this century, and recently the activities of various branches of UNESCO.

d. The fourth level of research sponsored by colonial governments themselves has a long history, and the intensity and emphasis correlates largely with the state of industrial development and the dominant concepts of colonialism in the metropolitan areas. In essence this research has been practical, covering largely the fields of cartography, hydrology, meteorology, forestry, geology, and civil engineering. It is not difficult to see why these emphases should exist. The French in the 18th century were particularly interested in the potential of tropical woods in Guyana for improving their naval power, and the British saw forestry reserves in Guyana as of immense value to themselves. Scientific cartography was essential for a naval role and for realising the potential of colonies. The Dutch and the British became aware in the 19th century of the immense potential of the Guianas, and more particularly of their gold resources. The Caribbean as a source for raw material has never disappeared as a stimulus for scientific research, but in the 19th century new types of colonial relationships started to emerge. This development is a complex one in its own right, involving, in the case of the British Government, new attitudes to slaves and later to an emancipated population, - attitudes which themselves help to explain the growth of Crown Colony government in the Caribbean. By the end of the 19th century we find this concept of colonialism informing the types of apparently disinterested research into problems of health, nutrition, and agriculture. We see it in the development of the Imperial College of Tropical Agriculture, and in the substantial research of J.B. Harrison in Guyana early in the 20th century. In the case of the Dutch the research is earlier and even more systematic. Like that of France it is more centrally organised. Latterly, both France and Holland had closer political relationships with their Caribbean territories and this closeness of relationship partly explains the detailed manner in which scientific data was and is gathered in these territories. Martinique and Guadeloupe, for example, have largely outstripped the Caribbean in the organisation of their agricultural documentation and research programmes.

e. It is easy to see how this concern of metropolitan countries should inform the scientific activities undertaken by the various government departments of colonial territories. In the post-war era with the movements toward various forms of internal self-government we see a major transfer of this activity. Nevertheless even though the control of research is in the hands of the particular territories, the activity is not indigenous. In most cases the visiting expert or team does the research and makes the recommendations.

f. The final stage comes with a relative state of independence, when these Caribbean territories are now forced to come to terms with their own problems of economic development, and the particular need to transfer technology and research methods to their own circumstances.

They are faced with a problem of, essentially, starting a new tradition. To some extent the growth of an indigenous tradition begins with the founding of the U.W.I., and its development into a serious centre for research. Yet, with the partial exception of its medical faculty, this institution does not fully come into the area of contribution to science and technology, as distinct from the humanities and social sciences, until recent years.

Problems of Communication

2. The last point about the need for starting a tradition is significant. If we are correct in pointing out the existence of a relatively rich set of scientific traditions in the Caribbean, why does it seem that each newly independent territory presently appears as if it is discovering the idea of science and its relevance? Why is it that even now our schools cannot produce a sufficient number of science-based workers? Why is it that the Caribbean researcher frequently has to seek so much information relevant to his work in foreign institutions? Or, conversely, why do so many present-day researchers seem to be unaware of the information, relevant to their research, in foreign institutions, or even nearby in the Spanish-speaking territories and Brazil? Why does one frequently find the only copy of an important research paper on, say Guyana, in Britain? The questions are many and complex, and answering them would involve reference to attitudes that emerge with colonialism, to the major Caribbean debate in the 19th and 20th centuries on education, etc. Yet, many of these questions have their answer in the ways in which communication processes operated in relation to the various traditions of scientific activity we have identified.

a. At a general level one cannot separate both the technology of communication and the levels of communication from the political and economic context in which these have an existence. In relation to the first it is easy to understand that countrieswhich have recently emerged from a colonial past will not have the sophisticated techniques of communication. Yet, communication does not depend on complicated technologies, and it is this belief, part of the mental detritus of the colonial experience which, historically, explains many of the failures in the dissemination of scientific and other data at the Caribbean level. One only has to think of the number of books written in the Caribbean which are published in America or Britain not because local publishers are not available, or because they could get greater sales, but because there is the belief that greater prestige accrues to the user of the more sophisticated printing technology.

b. Levels of communication for our purposes can be either horizontal (i.e. from territory to territory, or from researcher to researcher within a particular territory) and vertical(i.e. from researcher to user). That there

should be very little communication of research within the various language speaking areas should not be difficult to understand granted the exclusive nature of the 'mother-country' - colony relationship and the very fact of language difference. It is interesting that the one grouping within the Caribbean which has managed to overcome this has been the Dutch one - and that is simply the consequence of a transplanted metropolitan Dutch concept of education which, because of the limited international use of Dutch as a language emphasised the thorough learning of other languages. Equally understandable is the failure of inter-regional communication within the British Caribbean, if one realises, by comparison, that at one time the very mail from some of these territories had to pass through London before reaching an adjacent territory. The first major attempt to develop an inter-Caribbean scientific transfer of information is probably in the establishment of the Imperial College of Tropical Agriculture, and later, in the 40's, of the Caribbean Research Council as an arm of the Caribbean Commission. That the latter failed is no more surprising than that the political federation collapsed in 1962.

c. In very recent years several attempts have been made to encourage the establishment of inter-Caribbean documentation centres, and to connect the Caribbean with the invaluable data banks of North America and Europe. As yet, with the possible exception of agriculture, no system has evolved which makes relevant scientific research in Brazil, Venezuela and Colombia easily accessible to the territories of the Caribbean. These attempts have not been largely successful because the fact is that the creation of inter-Caribbean mechanisms for information transfer depends on the creation of intra-territorial information policies and systems. Only some Caribbean territories have started to take this step - Jamaica being a good example. This, naturally, leads us to ask why it was that library and information services were and are being neglected in the British Caribbean. Only now are we beginning to see that libraries have more than the amorphous 'cultural' or entertainment' functions of the public libraries, and that such organisation of information cannot be left to Carnegie's charity.

d. There are many historical reasons which might be offered to explain this. The first is the very nature of the colonial experience which led the colonial administrations to be concerned with the 'dispensing' of information rather than the 'communication' of it, and in due course, bred an attitude of mind which disposes us to believe that scientific information is something that one always gets, like motorcars and the definitions of words, from 'abroad'. It is the attitude of mind that allows us to pay little attention, in financial terms, to our archives because 'the originals would be preserved abroad' - or makes our researchers inclined to deposit the first copies of their research in foreign libraries before considering making a copy available in the country of the research.

e. The other historical reasons relating to the failure in wider communication of scientific information have to do with the very nature of the type of research undertaken by the agencies we have identified in the first half of this paper. The older private researcher has never, as a rule, been concerned with the dissemination of his work at a local level. It usually was sent to a foreign academic journal and, to a large extent, lost in its pages. And, in recent years, if one looks at the number of doctoral theses developed on and in the Caribbean and the attendant difficulties for local institutions to acquire these, then one sees that the principle has not been varied. More acutely disconcerting is the fact that the researchers are not always too anxious to communicate the nature of their research whilst it is ongoing, presumably for fear of being cut out by academic bandits. What this means is that quite a bit of duplication takes place. Still, even this is understandable if one sees it in the context of a series of values which stress the value of research (publish or perish etc.) for the individual's advancement as distinct from its social role.

f. Much can be said about the inhibiting communication factors in relation to the research stemming from private indigenous institutions in the Caribbean. Yet, these institutions did manage in many cases to establish broader bases of communication of their research. The journal Timehri of the Royal Agricultural and Commercial Society (if we may use this example again) was easily obtainable and widely distributed in the 19th century, and, quite amazingly, when one considers the relevant social interests of its members, this body did attempt seriously after 1890 to promote the public dissemination of knowledge by a series of well-organised public lectures. Added to this, much of the scientific work was promoted through a series of participations in international exhibitions. The first major European studies on the medicinal barks of Guyana were promoted by the preliminary surveys and samples forwarded to the various international exhibitions of the 19th century. The medical associations of the British Caribbean managed to generate a public forum for the discussion of new dimensions in tropical research, through journals and lectures.

g. In respect of the work of private metropolitan agencies it is difficult to generalise about approaches to communication of research when these institutions are of the philanthropic variety. Much of the failure in communication here is more a consequence of accident than design. A good example of this is the immense work recently done by the United Nations of relevance to the Caribbean. The lack of access to this is not a failure on the part of the United Nations, but a failure within the Caribbean to exploit the vast data available. Private economic institutions, however, are a different matter. Next to official government agencies, this grouping has been responsible for the largest output, but almost all of the research in this category has had special economic

motives - and, given the nature of the economic competition, it is perfectly intelligible why, say, the important hydro-electric survey organised by Alcan in Guyana should not be readily accessible, or subsequently even known to the persons responsible for the present hydro-electric planning in the Mazaruni. Understanding failures in communication in relation to the activities of both metropolitan and local official agencies is crucial to the answering of many of the questions generated earlier. It is important here to realise that very little of this research is theoretical in outlook and function. It is invariably given an impetus by a need or problem which, in turn, inevitably has political import. At an early stage we can easily see why the Dutch would not be prepared to make their discoveries or innovations in relation to drainage or fortification readily accessible, or why the massive French research in the 18th and 19th centuries into forestry potential should be restricted. Even with modifications in an exploitative and competitive concept of colonialism which takes place in the later 19th century and this century, this restriction on material still applies, partly because the colonial administration cannot separate the political sensitivity of policies from the types of scientific research which relates to those policies. Here we are perhaps also pointing to the major inhibiting factor in the dissemination of scientific research in the non-Spanish speaking Caribbean and largely in the British Caribbean. The politically autonomous Caribbean territories of the late fifties and sixties inherited this legacy of concealment and official classification. A new drainage system of agricultural project was (and still is) seen as a project which made or broke the image of the administration of the day - a feasibility study which is not implemented is the subject of criticism on the grounds that the very research represents a waste of money and time. When one considers that the major part of scientific research in these territories is sponsored by such indigenous official agencies, that government departments have overlapping interests and varying portfolios, and that no proper methods for classification or declassification have, in most cases, been worked out, then one understands that these territories have no effective way of ensuring that research is not duplicated.

h. The university libraries of the Caribbean are still frantically seeking to acquire much of this important material, (some of it no longer possibly sensitive) usually locked away in the worm-eaten cupboards of some administrator. In the extreme situation, when one is referring to the type of research which emerged in only ten numbered copies, it frequently is the case that one is confronted with the total disapperance of the research. What this means is that the Caribbean territories, in no way unique in this respect, have inherited and developed a tradition of secrecy, and it needs no elaboration to show that such a tradition conflicts with the very basic canon of scientific activity viz. the need for publicity, criticism and discussion.

i. Much of what has been said above about communication relates to the question of publishing. From the development in the Caribbean of vibrant publishing traditions in the 19th century to the emergence of the present day mimeograph tradition we see one constant strand (with the exception indicated earlier), i.e. that the audiences were intended to be limited. Perhaps it could be argued that this is so because of the very complex nature of scientific work, but the explanation probably lies more in the social function of information and in the power, social or political, that comes from the control of knowledge. The sociology of publishing should not detain us, except for throwing some quick light on the question of the vertical aspect of communication of scientific data. With some notable exceptions, it is only recently that the Caribbean territories have seen it necessary to be concerned with the transmission of ideas from the research paper to the level of understanding which the practical farmer or technician will have. In all of this the immediate potential of wireless (to give only one example) in a tradition which has been largely oral has still to be realised.

In this paper we have been attempting a brief survey of both the historical development of scientific activities and the attendant problems of communication without attempting a definition of the science. There is a sense in which science, if it is seen as a systematic and organised, publicly accessible and testable set of views about the world, is more than statistics and test-tubes. What this means is that within the oral West Indian tradition to which we have referred, people have accumulated a body of knowledge which they have tested over the years. Such a body of knowledge covers, as examples, both the ecological understandings of the Amerindian peoples, and the vast ethno-medical data of the 'ordinary' people. In this sense if communication at the vertical level were a two-way process, then quite a bit of orthodox research might have been unnecessary, short-circuited as fruitless, or redirected into feasible areas. This two-way understanding has never fully emerged in the Caribbean.

In summary, the Caribbean has not been the scientifically sterile place that it has been pictured to be. Various traditions of research have developed in the past; but in most cases they all developed patterns for the dissemination of ideas and data which served the purposes and needs of groups outside of the territory. Ours, today, is a task, not necessarily of recapturing those traditions as they functioned, but of learning how to structure our new scientific work to escape the limitations of them. It is also one of recovering some of the invaluable data, to which we referred earlier, generated within those traditions. Did the planners, during the feasibility studies for the clay works along the Demerara river, know that maps exist which locate the claybrick sites found to be most useful to the Dutch? Are the geologists aware of the 1796 map that locates the area of a pitch deposit in the Pomeroon area and silver mines along the Essequibo, or are we presently aware of the technology involved in modifying

Dutch wind-mills and water-mills to the New World situation? The historical information might not be useful, but we cannot afford to ignore it.

Sample list of Serial Publications in Science published in the Caribbean

Pre 1900

Agricultural record. vol. 1-4, 1889-1891. Port-of-Spain. Central Agricultural Board.

Agricultural journal of British Guiana. vol. 1-10, 1928-1939. Georgetown. Dept. of Agriculture.
Supersedes Journal of the Board of Agriculture of British Guiana.

Agricultural journal of the Leeward Islands. 1894-1895. St. Johns. Agricultural & Commercial Society of the Leeward Islands.

Barbados agricultural gazette & planters journal. vol. 7-20, 1885-1896. Bridgetown. Barbados General Agricultural Society.

Bulletin of miscellaneous information, Trinidad. 1888; 1897 -1908. Trinidad. Department of Agriculture. Botanical Dept.

Bulletin of the Botanical Dept. Jamaica. nos. 1-50. 1887-1894. Jamaica. Department of Agriculture.

Journal of the Agricultural Society of Trinidad and Tobago. vol. 51, 1951. Port-of-Spain. Agricultural Society of Trinidad and Tobago.
Formerly Proceedings of the Agricultural Society of Trinidad and Tobago.

Journal of the Institute of Jamaica. vol. 2, 1899. Kingston. Institute of Jamaica.

Journal of the Jamaica Agricultural Society. vol. 1, 1897. Kingston, Jamaica Agricultural Society.

Proceedings of the Agricultural Society of Trinidad and Tobago. vol. 1-50, 1894-1950. Port-of-Spain. Agricultural Society of Trinidad and Tobago.

Timehri: the Journal of the Royal Agricultural and Commercial Society of British Guiana. vol 1, 1882. Georgetown. Royal Agricultural and Commercial Society of British Guiana.

West Indian bulletin. vol 1-19, 1899-1922. Barbados and London. Imperial Dept of Agriculture for the West Indies.

Pre 1945

Agricultural experimental. vol 3, No. 3, 1943. Rio Piedras. Universidad de Puerto Rico. Estacion Experimental Agricola.

Agricultural bulletin (Bermuda). vol. 2, 1922. Bermuda. Department of Agriculture.

Agricultural journal of Barbados. vol 1, 1932. Barbados Department of Science and Agriculture

Agricultural news. vol. 1, 1902-1922. Barbados. Imperial Department of Agriculture for the West Indies.

Bulletin of the Department of Agriculture. Jamaica. vol 1, 1903-1915. Kingston. Department of Agriculture.
Formerly Bulletin of the Botanical Department. Jamaica.

Agricultural notes (Trinidad and Tobago). vol. 1-4, 1930-1933. Port-of-Spain. Department of Agriculture.

Bulletin Agricole. New series. vol.1, 1930. Fort de France. Service de l'Agriculture.
Formerly Bulletin Agricole de la Martinique.

Bulletin of the Department of Agriculture. Trinidad and Tobago. vol. 9-21, 1909-1927.
Trinidad. Department of Agriculture. Bulletin.

Rio Piedras. US Forest Service Tropical Forest Experiment Studies. 1939. Becoming USDA Forest Service (in 1944) Tropical Forest Experiment Studies.

Caribbean medical journal. vol 1- , 1939. Port-of-Spain. Trinidad and Tobago Medical Association.

Farm journal of British Guiana. vol. 1, 1936. Georgetown. Department of Agriculture.
Superseded by the Farm Journal of Guyana.

Horticultural journal. vol. 1, No. 2, 1940. Trinidad. Horticultural Club of Trinidad and Tobago.

JAST quarterly. vol. 1-10. 1937-1947. Jamaica Association of Sugar Technologists.
Superseded by JAST Journal.

Journal of Agriculture of the University of Puerto Rico. vol. 18, 1934. Puerto Rico. Agricultural Experiment Station.
Formerly Journal of the Department of Agriculture. P.R.

Journal of the Barbados Museum and Historical Society. vol. 1, 1933. Bridgetown. The Society.

Journal of the British Guiana Board of Agriculture. vol 1, 1908. Georgetown. Board of Agriculture.

Journal of the British Honduras Agricultural Society. Vol. 1,

1935. Belize. British Honduras Agricultural Society.

Natural history notes. vol. 1, 1941. Kingston. Natural History Society.

Revue agricole: organe du service de l'Agriculture de la Guadeloupe et dependances. Annees 1-3, 1926-1928. Basse-Terre. Service de l'Agriculture.

Ste Madeleine quarterly review. no. 1, 1921. Trinidad Ste Madeleine Sugar Co. Ltd.

Tropical agriculture. vol. 1, 1924. Trinidad. ICTA.

West Indies fruit and vegetable bulletin. vol. 1, 1935. Trinidad. Imperial College of Tropical Agriculture.

Pre 1960

The Advocate - incorporating the Agricultural Advocate. col. 1, No. 1, 1951. Kingston.

Bulletin. Fisheries Division. B.G. Department of Agriculture. 1958.

Bulletin de la societe Francaise d'histoire naturelle des Antilles. no. 1, 1952. Fort de France. Societe Francaise d'Histoire Naturelle de Antilles.

CEIBA. vol 1, 1950. Honduras. Escuela Agricola Panamerica.

Geonotes. vol 1, 1958. Kingston. Jamaica Group of the Geologists Assn.

J.A.S.T. Journal. Kingston. Jamaican Association of Sugar Technologists. vol. 11, 1948. Contains Proceedings of the Association. Formerly JAST quarterly.

Journal of the Geological Society of Jamaica. vol 10, 1969. Jamaica. The Society.

Journal of the Trinidad field naturalists club. vol 1, 1956 Trinidad. Field Naturalists Club.

The Peasant. vol. 1, 1957. Trinidad. Federation of Agriculture. Cooperative Societies Ltd., becomes Federation of Agricultural Fishing and other Coop Socs. of Trinidad and Tobago, Ltd.

Revue agricole sucriere et rhumiere des Antilles Francaises. vol. 1, 1956. Guadeloupe. Centres techniques de la Canne et du sucre de la Guadeloupe et de la Martinique.

Rice review. vol. 3, 1961. Georgetown, B.G. British Guiana Rice Producers Association.

Science notes and news. No. 17, 1960. Mona. Jamaica. UCWI. Assn of Science Teachers of Jamaica.

Shell agricultural newsletter. No. 7, 1958. P.O.S. Shell Trinidad Ltd.

De Surinaamse Landbouw. vol. 1, No. 2, 1953. Paramaribo. Department van Landbouw.

West Indian Medical Journal. vol. 1, 1952. Jamaica. U.W.I.

Vox Guyanae. 1954-1959. Paramaribo.
Superseded by Nieuwe West Indies Gids.

Post 1960

Cajanus. vol. 1, 1968. Jamaica. Caribbean Food & Nutrition Institute.

Cane farmer. vol. 11-14, 1970-73. Trinidad. Islandwide Cane Farmers Association, Inc.

Caribbean agriculture. vol. 1, circa 1963. Puerto Rico. Caribbean Organization.

Caribbean conservation news. vol 1, 1976. Barbados. Caribbean Conversation Association.

Caribbean Conservation Association. Environmental newsletter. vol. 1, 1973. Caribbean Research Institute, College of the Virgin Islands, U.S.

Caribbean journal of medical technology. vol. 2, 1971-2. Society of Medical Lab technologists. Pathology Department U.W.I. Mona. Jamaica.

Caribbean journal of science. vol. 1, 1960. P.R. University of Puerto Rico. Mayaguez.

Caribbean Meteorological Ins. Monthly weather summary. 1970-76. Caribbean Met Institute. Husbands, St. James Barbados.

Car. Monthly bulletin. 1966. Puerto Rico. Institute of Caribbean Studies. University of Puerto Rico.

Guyana journal of science. vol. 1, 1972. University of Guyana. Department of Biology.

Journal of the Association of Professional Engineers of Trinidad and Tobago. vol. 1, 1960. Port-of-Spain. The Association.

Journal of the Geological Society of Jamaica. vol. 1, circa 1960. Jamaica. The Society.

Journal of the Scientific Research Council of Jamaica. vol.

1, 1970. Jamaica. The Scientific Research Council.

Medi-news. vol. 1, 1974. Trinidad. Trinidad and Tobago. Medical Association.

Les nouvelles maraicheres et vivrieres de l'inra aux Antilles. vol, 1, 1971. Guadeloupe. Institut National de la Recherche Agronomique.

West Indian journal of engineering. vol. 1, 1968. Trinidad. U.W.I. Faculty of Engineering.

Winban news. vol. 1, 1965. Windward Islands. Banana Growers Association Ltd.

31 CARIBBEAN WORKSHOP ON SCIENCE COMMUNICATION

Tuesday, 19th April, 1977

CLOSING SESSION

Cde Hetram Maraj, Permanent Secretary,
Ministry of Economic Development and Cooperatives
(Economic Development)

Cde. Chairman, distinguished guests, your Excellencies and Comrades; I am very much impressed with the papers which emerged from this workshop. The contents of these documents amply illustrate the dedication with which participants approached the various topics assigned them. I am sure, you have all enjoyed your deliberations even though exacting and I am certain our foreign guests will return to their homes with happy impressions of what is known in these parts as "Guyanese hospitality".

As you may observe, I have made no scientific statement, but it does not seem as if I can avoid doing so for too long. If per chance I do, please feel free to apply the necessary scientific elimination process. It is well known that technological progress is the key to prosperity and scientific research lies at its roots. We need research to prevent spoilage of our crops after reaping, to devise new methods of reaping and cultivation, where necessary, as well as to ensure that these crops are not destroyed by pests during growth. In short we must by communicating relevant scientific knowledge and technological information enable the farmer to produce without fear of loss, by pests and spoilage after reaping. We should, with the aid of scientific expertise devise the best means to preserve our locally grown crops and fruits in order to give the farmer the incentive to produce. In this way science can help to stimulate economic growth and improve the lot of our society. The challenge is great and the way you accept it will determine the extent of our future prosperity.

I would like to refer to certain features of the ninth biennial meeting of the Commonwealth Science Council which was held last year in Sri Lanka. The Council recognised that there was considerable responsibility on research scientists to make the right choice of projects and unless forethought was given, considerable expenditure could be wasted. The Council, therefore, advised that research leaders should be involved in the decision making at the national level.

Much interest was evinced at this Conference on the utilisation of natural products and follow-up action was suggested.

It was stated that for centuries a variety of plants have been used in folk medicines throughout the world and in recent years, many have found their way into scientific medical practice. One example of this is the Rauwolfia. which was used for centuries in India and is now proved to have medicinal value. Another such tree is the Neem tree which we have in Guyana. This tree has been found to have commercial, exploitable properties. We are also carrying out experiments on some of our trees and I feel exchange of information of this kind can be of tremendous benefit among Commonwealth countries.

In order to achieve scientific and technological progress, the structure which a country sets up is of great importance. The Government of Guyana saw the wisdom of this and enacted the National Science Research Council Act No. 26 of 1974. This legislation, established the National Science Research Council, which has wide functions in scientific research. In order to give practical effect to the use of science and technology, Government obtained the services of Dr. Ponnamperuma, an expert from the Commonwealth Secretariat. He compiled a report entitled "the organisation of technological research and development." In this report he referred to the need for supporting Scientific and Technical Services and Research and Development to support various operative sectors of the economy.

Overall manpower development, he said, is an important aspect of national economic planning and development and scientific and technological manpower is one of its critical components. These are to a greater extent absent in Guyana and the task that lies ahead is to fulfil this need. The responsibility of the National Science Research Council to suggest ways and means to overcome this shortage is a great one. However, with cooperation and interchange of ideas among Commonwealth Countries this task could be made easier.

We have great hopes in the functioning of the Institute of Applied Science and Technology and look forward to it as the chief centre for promoting and conducting research. It will be the working laboratory of the National Science Research Council where scientific knowledge would be transformed into reality. We all look forward with great anxiety to the completion of this building.

In the process of advancing science and technology in different fields, information and communication play an essential part. Not only must this information be properly classified and categorised but it must also be made easily available to potential users. The theme of this workshop is on communication and from what I have read in the submissions, this is no easy matter. It depends so much on the vagaries of human behaviour that the communicator must have a multi-disciplinary knowledge to approach it with success. The papers presented have shown the pitfalls and ways of avoiding them and I am certain if our communicators follow the guidelines set out, a great deal could be achieved.

But while communication of scientists information to the user is important another form of communication in my view should not be overlooked and that is the communication process of science education in schools from the lowest level onwards. This would have tremendous benefit and may in time provide an adequate amount of science teachers which is now very much needed. There is only 10% science graduates of the graduating students from the University of Guyana each year. Stimulation of the interest of children in science education from an early age would allow us to discover many a genius and may increase the necessary manpower resource so essential for higher scientific and technological education.

Information centres are very important in providing the necessary data which is required for research and development. Such information may not be easily accessible but is scattered in different departments and industrial enterprises. This, I would imagine is a great handicap to scientific research. Here again there are two schools of thought - some favour a coordinated central information centre while others prefer separate specialised sources of information. This is a matter for the specialists. I understand that UNESCO has also established information systems which could be useful to a developing country. Government has established a National Data Management Authority which is at present studying the computer needs of Governments Departments and the Public Sector. The time may very well come when we will have a great deal of our data both administrative and operational, computerised. We shall soon study a report on the setting up of a Documentation Centre in Guyana.

Conclusion

I am hopeful that with the establishment of our Institute of Applied Science and Technology, we shall proceed from documentation to implementation. Science plays a great part in our lives and there are few activities which do not require a scientific approach. No country can afford to lag behind in pursuit of scientific knowledge and technology and to rely on external assistance without at the same time developing its own indigenous base, may be detrimental.

The paradox of our age is that men seek peace while preparing for war and make full use of the scientific and technological knowledge at their disposal to achieve the latter. In the developing world there is a great need for scientific knowledge to aid development rather than to pursue the exploits of war. The exchange of ideas and sharing of technological information in seminars and workshops can go a far way. It is how we pursue the various decisions taken at these meetings which can be of advantage to our people. I look forward to see the Commonwealth Science Council grow into a dynamic scientifc source of information which with proper communication may be able to meet some of our scientific needs.

I thank you all for participating in this workshop and it has indeed been a great pleasure for me to join you at this closing session. I may have the privilege of seeing some of you again when the Commonwealth Science Council meets in Guyana next year under the Chairmanship of the Secretary General NSRC, Dr. Pat Munroe, that is, provided as a non-scientist I am invited. Thank you.

APPENDICES

WORKSHOP PROGRAMME

Tuesday April 12

All Day	Arrival of Participants
2000 - 2130 hrs.	RECEPTION by the Commonwealth Science Council and the National Science Research Council of Guyana at the UMANA YANA.

Wednesday April 13

0830 - 0900 hrs.	Registration of Participants and GROUP PHOTOGRAPH
0900 - 0930 hrs.	Official Opening by Cde. Shirley Field-Ridley Minister of Information, in the Multi-purpose Hall, Cyril Potter College of Education. Remarks by Mr. D. G. Thomas (CSC) Chairman Cde Victor Forsythe (Guyana)
0930 - 1000 hrs.	Introduction of Participants and Resource Personnel Cde. Dr. Pat Munroe
1030 - 1200 hrs.	Self introductions Mrs. J. Kimemiah (K.I.A., Kenya) Element of Communication Dr. Grant Carman (Agriculture Canada)
1330 - 1700 hrs.	Oral Presentation at Meetings, Conferences etc; and Presentation Practice Mr. D. G. Thomas (CSC) Mrs. J. Kimemiah (K.I.A., Kenya) Cde Compton Rodrigues (Guyana) Visuals Cde A. J. Seymour (Guyana)

Thursday April 14

0830 - 0900 hrs.	Review
0900 - 1730	Oral presentation to the public (Press Conference, radio & TV interviews) Cde C. A. Nascimento (Guyana) Cde Rafiq Khan (Guyana) Mr. Jones Madeira (Caribbean Community Secretariat)

Friday April 15

0830 - 0900 hrs.	Review
0900 - 1030 hrs.	Written Communication 1 - Planning and Production Mr. D. G. Thomas (CSC) Cde C. A. Nascimento (Guyana) Cde Oliver Hunter (Guyana)
1100 - 1230 hrs.	Written Communication 11 - Scientific Writing & Editing Prof. Mark Vahrman (University of Guyana) Dr. Grant Carman (Agriculture Canada)
1400 - 1500 hrs.	Writing for Technical Journals Dr. Grant Carman (Agriculture Canada) Cde Arlington Chesney (Guyana)
1500 - 1600 hrs.	Non-technical Publications - Press Releases, Feature articles Cde Victor Forsythe (Guyana) Cde Mohamed Hamaludin (Guyana) Cde Pat Brandon (Guyana)
1630 - 1730 hrs.	Pooling Experiences in Meetings and Practical Sessions Mrs. J. Kimemiah (K.I.A., Kenya) Cde Dr. Pat Munroe (Guyana)
1730 - 1800 hrs.	Film: "Leadership Dynamics"

Saturday April 16

0830 - 0930 hrs.	The Use of Audio-Visual Materials Mr. D. G. Thomas (CSC)
0930 - 1730 hrs.	Submissions to Committees - and Practical Sessions Mrs. J. Kimemiah (K.I.A., Kenya) Mr. D. G. Thomas (CSC) Dr. M. N. G. A. Khan (CSC) Cde Victor Forsythe (Guyana) Cde C. A. Nascimento (Guyana)
1900 - 2330 hrs.	BAR-B-Q and Dance at Thirsk Park, East Bank Demerara, through the kind courtesy of Banks D.I.H. Limited.

Sunday April 17

0830 - 0900 hrs.	Review
0900 - 1030 hrs.	Information Systems and Services in Science and Technology - An Overview Cde Chris Knee (NSRC; Guyana)

	Dr. Grant Carman (Agriculture Canada)
1100 - 1230 hrs.	International Information Systems Dr. M. N. G. A. Khan (CSC) Dr. Grant Carman (Agriculture Canada) VTR Shows: "An International Information Systems"
1400 - 1545 hrs.	Organising National Information Systems (Brief Presentations of background papers) Cde A. J. Seymour (Guyana) Cde A. McMurdoch (National Library, Guyana) Cde V. Kallicharran (University of Guyana Library) Cde Y. Stephenson (U.G. Library) Cde J. Craigwell (Guyana Archives) Mrs. Beverly Taylor (Bahamas) Mr. Godsman Ellis (Belize) Mrs. O. Lewis (Jamaica) Mr. G. O. Davis-Isaacs (Barbados)
1600 - 1730 hrs.	Organising National Information Systems: A Case Study
Monday April 18	
	Linden Programme arranged through the kind courtesy of the Guyana Bauxite Company Ltd
0700 hrs.	Leave Turkeyen for Linden
0900 hrs.	Arrive Linden
0900 - 1030 hrs.	Workshop session at Lichas hall: Planning and organisation of Conference, Workshops, Exhibitions, Open Days and Tours. Mr. D. G. Thomas (CSC) Mrs. J. Kememiah (K.I.A., Kenya) Cde Gwen Parris (Guyana) Cde Victor Forsythe (Guyana)
1030 - 1215 hrs.	TOUR OF GUYBAU MINES
1600 - 1730 hrs.	AND PLANT
1800 - 2000 hrs.	DINNER and Panel Discussion " Development of Science Communication in the Caribbean". - Guest Speakers (7 minutes survey each) Prof. J. J. Niles (Guyana) Cde Joel Benjamin (University of Guyana)

	Chairman: Cde Claude Saul Deputy Chief Executive, Guyana Bauxite Co., Limited
2015 hrs.	Leave Linden
2215 hrs.	Arrive Turkeyen
Tuesday April 19	
0830 - 1230 hrs.	Open
1400 - 1530 hrs.	Evaluation of the Workshop Dr. M. N. G. A. Khan (CSC) Mr. D. G. Thomas (CSC) Cde Dr. Pat Munroe (Guyana)
1600 - 1630 hrs.	Closing Session by Cde Hetram Haraj Permanent Secretary Ministry of Economic Development and Co-operatives
1930 hrs.	FAREWELL DRINKS offered by the Acting High Commissioner for Jamaica in Guyana and Mrs. A. H. Thompson, in the Multipurpose Hall, Cyril Potter College of Education.
Wednesday April 20	Departure of Participants

SOME WORKSHOP HIGHLIGHTS

Among the highlights of the workshop was the daily issue of Workshop Press Release prepared by different teams of participants who were able to see their work published in the national newspapers.

Oral Presentation to the Public

On April 14, the eighty participants, resource personnel and observers attending the Caribbean Workshop on Science Communication broke up into three (3) workshop groups and looked at the practical ways in which science communication can benefit people.

The Workshop groups took up the challenge thrown out the previous day to communicators and scientists at the opening of the Workshop by Information Minister, Cde Shirley Field-Ridley when she asked them to lift the veil of mystery surrounding science in the Region, and thereby help restore the people's self respect and confidence.

Leaders of the day's group were Cde C.A. Nascimento, an Institute of International Communication Trustee and Minister of State in the Office of the Prime Minister Cde Rafiq Khan, Director/General Manager of Radio Demerara; Cde Jones Madeira, Communications Officer of the Caribbean Community Secretariat; and Dr. Grant Carman, Director of Information, Agriculture Canada.

The Workshop on radio, handled by Cdes Madeira and Khan, saw Caribbean Broadcasters accepting that there is need for them to read more material related to science with the hope of improving their background knowledge on sciences related to Caribbean development.

The Workshop felt that there is need for scientists to break-down their 'language' so that communicators would find less difficulty in relaying to the public what is required of them for technological changes, improvements and development. The Workshop felt that the scientists and communicators should meet more often with a view to solving communication difficulties and misunderstanding which arise from time to time.

Describing communication as "understanding" in his major presentation on press conferences, Minister Nascimento pointed out:

> "In essence, we use a press conference to share what we have to say with our audience in a manner that is likely to attract their attention and hopefully win their assent. If we succeed in having our audience understand us and through understanding establish a common bond with them, we will have communicated".

After outlining steps for planning a successful press conference, the Minister stressed the essential need for credibility: "Let us never forget that the message which seeks to persuade will be successful only to the degree that the audience is convinced that its source is reliable and trustworthy and that the persuader is generally committed to the welfare of the audience".

Dr. Grant Carman in his presentation said that television can be highly supportive in science communication but was falling into third place in the scheme of things because of its high costs and the need for its high selective usage.

The day's session began with the participants viewing with keen interest a film on public speaking entitled, "The Floor is Yours". Later, the participants were all exposed to, and participated in discussions on, the techniques of the press conference, conducting radio and television interviews which were all filmed or recorded and played back for self-criticism.

The evening's session involved films on science and communication in addition to a slide sound programme by the Upper Mazaruni Development Authority DSC Unit and the Ministry of Health on Guyana's hydro-project entitled, "The Beginning of the Challenge".

WRITTEN COMMUNICATION

During the sessions on Friday April 15, University of Guyana Professor, Mark Vahrman, stated that Guyanese and the Caribbean scientists could be more effective by doing more scientific writing.

In presenting a paper on "Scientists Writing for Scientists" during the third day's sessions of the Caribbean Workshop on Science Communication, he also stressed:

> "The more important problem for Guyana, however, is for a greater scientific output particularly devoted to the development of indigenous resources".

He added that only in the last 50 years in the West did scientific opinion come to the forefront. Using this analogy for the Caribbean, he stated that it would probably take another 50 years for scientific opinion to have an impact on Caribbean people. In the Caribbean, Professor Vahrman added, scientists regrettably were not involved in policy-making at every level. This could be due to their small numbers, he said.

He was supported on this last point by Dr. Grant Carman of Canada, who expressed the hope that politicians would take note.

Earlier in the day's session on "Written Communication", Minister of State, Cde Kit Nascimento had outlined the main variables to be considered when producing written scientific communication.

Cde Oliver Hunter, Chief DSC Specialist, U.M.D.A., outlined, with examples, the planning and production of Written Communication for a difficult cross-cultural audience involving Akawai and Arecuna Amerindians, Porkknockers and Islanders in the Mazaruni Hydro Project Region.

Other speakers in the day's sessions were Workshop Director, Cde Victor Forsythe, on Press Releases; Mohamed Hamaludin, Chief Reporter, on Non-Technical Feature Articles; Cde Pat Brandon, Senior Health Education Officer, giving examples of non technical publications; Mrs. Joy Kimemiah (K.I.A. Kenya) and Dr. Pat Munroe, NSRC Secretary General on "Pooling Experiences in Meetings".

Commonwealth Science Council
Commonwealth Fund for Technical Cooperation
National Science Research Council, Guyana

CARIBBEAN WORKSHOP ON SCIENCE COMMUNICATION

Greater Georgetown, Guyana
April 1977

ASSESSMENT FORM

A critical assessment of the Workshop was made with the view of improving the quality and relevance of future National and Regional endeavours. Participants were requested to rank their respective evaluation of aspects of the Workshop by selecting a number, on a scale of 1 to 5, which most closely agreed with their assessment.

The number of participants who selected each number is shown in parenthesis following each ranking number.

WORKSHOP AIMS

	Completely			Not at all	
Did the Workshop achieve its stated objectives?	5(2)	4(16)	3(8)	2	1
To what extent were your specific aims met?	5(5)	4(13)	3(9)	2(1)	1

COURSE CONTENT

	Too advanced			Too elementary	
Course subject level	5(1)	4(9)		3(20)	2(1) 1

COURSE LENGTH (7 days)

	Too long			Too short	
Was the Course	5	4(8)	3(16)	2(5)	1

TEACHING AIDS

	Very satisfied			Not satisfied	
How satisfied were you with the Equipment (visual aids etc)?	5(3)	4(6)	3(11)	2(7)	1(3)
Literature (lecture notes etc)?	5(8)	4(10)	3(10)	2(1)	1

WORKSHOP ADMINISTRATION

	Very satisfied			Not satisfied	
How satisfied were you with the Planning and organization of the Workshop?	5(7)	4(14)	3(11)	2(4)	1
Teaching accommodation (seating, audibility etc)?	5(12)	4(13)	3(3)	2	1
Living accommodation (rooms and meals)?	5(14)	4(8)	3(2)	2(1)	1

SUBJECT MATTER

	Extremely relevant				Irrelevant
Which are the subject matters you consider Elements of communication	5(18)	4(9)	3(4)	2	1
Oral Presentation.....					
- Meetings etc	5(16)	4(9)	3(5)	2	1
- Radio, TV, Press	5(15)	4(11)	3(4)	2	1
Written Communication.....					
- Planning and Production	5(17)	4(10)	3(3)	2	1
- Scientific Writing and Editing	5(13)	4(7)	3(5)	2(4)	1
- Writing for Technical Journals	5(15)	4(9)	3(4)	2(2)	1
-Writing for Non-Technical Publications	5(17)	4(11)	3(8)	2	1
- Submissions to Committees	5(12)	4(8)	3(1)	2	1
- Pooling Experience in Meetings	5(15)	4(8)	3(3)	2	1
Information Systems and Services in Science and Technology.....					
- Overview	5(7)	4(16)	3(6)	2	1
- International Information Systems	5(9)	4(13)	3(7)	2(1)	1
- Organization National Information Systems	5(14)	4(7)	3(6)	2(2)	1
- Planning and Organization of Conferences etc	5(14)	4(10)	3(3)	2(2)	1
-Panel Discussion - Development of Science Communication in the Caribbean	5(10)	4(9)	3(7)	2(2)	1
- Evaluation of the Workshop	5(15)	4(5)	3(1)	2	1

GENERAL COMMENTS

(Including suitability and effectiveness of programme)

A summary of the general comments is given on pages **A.10** to **A.12**

ASSESSMENT.

GENERAL COMMENTS

1. Program was indeed suitable to situation with respect to Science Communication in the Caribbean. Its effect was reduced by the absence, from the workshop, of many practising scientists.

2. Extremely suitable and effective; a few more natural and applied scientists should have been present. (Gained a great deal).

3. Participation would have been better if accommodation was provided for all or those participants living more than six miles from Cyril Potter College of Education.

4. The workshop was extremely suitable and well-timed. There were minor slips - e.g. in audio-visual preparation. Participation was high and rapport among participants very good. Too few Scientists. Too many floating participants and observers.

5. There should have been more Caribbean participants apart from Guyanese.

6. (1) Workshop was composed of too many local participants. It appeared to be a Guyanese instead of Caribbean.

   (2) Too many participants were involved therefore sessions were not as practical as they were obviously planned to have been.

   (3) Schedule was too tight - organisers attempted to cover too much material in such a short time.

   (4) Case studies related to organisation of conferences, workshops, field trips, and exhibitions should have been presented as practical work for the participants.

   (5) Open morning for participants should have been allowed before the last day of the Workshop.

   (6) Topics presented were most suitable but some presentations contained material that was only related to local situations.

7. TEACHING AIDS

   Not all literature of lecture notes received - in some cases there seemed to be an insufficiency.

NOTE

Staff member responsible for preparing and setting up visual aids did not even make a note for assisting herself at future conferences.

8. COURSE CONTENT

Too much repetition or emphasis on objectives. This would have been appropriate in a course on communication "per se".

COURSE LENGTH

Bearing in mind comments in section two, however participant found that the course was crammed into too short a time.

TEACHING AIDS

Literature - (Adequate and Informative)

Participant thinks that the course was suitable for the wider cross section of interests represented by the participants (previous comments notwithstanding). To him/her, the immediate effect of the programme has been to crystallise one's intuitive awareness of the problems of communication or to inform one of these problems. The long term effect will be seen by the effectiveness of the participants in bringing about a greater awareness of all their organisations or departments of the need for effective communication.

9. (1) Participant found the packed programme a bit tiresome. Feels a Monday-Friday conference would have been ideal.

(2) Learned much from the workshop and simulated situations and found them quite interesting. Thinks it is safe to say that the few days exposure have forcibly brought to mind:

(a) the TARGET audience
(b) the "extension" (intermediary between the technical and the (target) man
(c) the MESSAGE

(3) It was difficult after a tiring day to return to the film shows in the evening. So participants missed most of those.

10. Could suggest that time should be given for really thinking in practical terms of application of the training received and be prepared to expand on this statement if requested.

11. As a Communicator who is at present on a Public Communication Course, participant found there were some areas which personally had not been exposed to. Participant has learnt immensely. More such seminars should be held.

12. Overall good but weak points existed e.g. Pooling experiences in meetings. No one (participant felt) realised that the workshop was intended to utilise a Meeting form in the true sense until told so after the exercise. Also, so very often some of participant's lectures gave real examples of

Not to do e.g. in presentations to the Committees (the second day). Some of the Commissioners (one in particular) just did not listen to the answers really. May be it was just a question of role playing.

In spite of the comments participant feels that this workshop met a serious need. However, he also feels that the NSRC MUST soon organise a National Workshop involving Scientists only. It should be suitably tailored.

13. Participant feels this workshop has achieved its goal. It has given him a working knowledge of what is expected on the various areas of scientific communication.

14. A great job done. Workshop experiences on the whole were very good only that at times it caused physical fatigue during the long and late sessions. Duration could have been extended.

15. Methodology followed in workshop very effective. Daily attendance should be taken.

16. In general the conference probably came close to meeting the needs of the host country in particular.

17. As a contributor, or resource person, participant was dissatisfied with his own input, and particularly its quality. Another time, participant would have his material organised. This is however, a personal disappointment.

    We really did not stick to the topic on "scientific" information - there were no scientists; we did, however, carry on a far more constructive program for this venue and area by not doing so.

    Also, there was one very big hole that participant is sorry and distressed that we missed i.e. press relationships. Another time if he is around he would like to cover this - no matter who the attending personnel are.

18. Participant thinks the course content was of a very high standard. He learnt quite a lot, but keeping sessions from Wednesday to Tuesday without a day's break was unfair. This aspect should be considered.

19. Not sufficient scientists. Too much emphasis on written course - too little on information systems for scientists.

20. (1) The topics were extremely relevant: the subject matter in some (very few) areas was satisfactory.

    (2) Unfortunately very little information reached local delegates as to their participant in the workshop. For example, were they required all the time? Or only at some sessions?.

PARTICIPANTS (OTHER THAN RESOURCE PERSONS) ATTENDING THE WORKSHOP

(a) Overseas

Mrs. Beverly Taylor	Senior Education Officer, Bahamas
Mr. G.O. Davis-Isaacs	Ministry of Agriculture, Barbados
Miss Melzina Branch	Barbados attached to Ministry of Health, Guyana
Mr. Godsman E. Ellis	Principal Agricultural Officer, Belize
Mr. Soterios Afrodisis	Cyprus
Mrs. O. Lewis	Technical Information Officer and Librarian, Scientific Research Council, Jamaica
Miss Sandra John	Librarian, Caribbean Epidemiological Centre, Trinidad and Tobago
Cde Hubert Williams	Guyana-based Correspondent, Caribbean News Agency, Headquartered in Barbados

(b) Guyana

Cde Cynthia Willis	Communications Officer Ministry of Agriculture
Cde Irma Lewis	Agricultural Field Officer, Ministry of Agriculture
Cde Rosemond Underwood	- do -
Cde Alec Farley	Co-ordinator, Integrated Science, Ministry of Education
Cde Olive Lyken	Principal Cyril Potter College of Education

Cde E. Chalmers	Curriculum Worker, Curriculum Development Unit
Cde D. Sharma	Lecturer, In-service Teacher Training Programme
Cde B.N. Kumar	President Science Teachers' Association
Cde Dyhraj Ramphir	Chemist and Geologist, Forestry Department
Cde James Alexander	Geologist, Geological Survey and Mines
Cde Balgobin Persaud	Assistant Librarian, University of Guyana
Cde Shirley Alonzo	Senior Assistant Librarian, University of Guyana
Cde Oscar Edwards	Public Relations Officer, University of Guyana
Cde Keith Richards	Chief Planning and Construction Engineer, Guyana Electricity Corporation
Cde Ngozi Onvoha-Moses	Scientific Officer National Science Research Council of Guyana
Cde June Henry	- do -
Cde Sandra Plummer	Research Assistant, National Science Research Council of Guyana
Cde Leslie Chin	Factory Manager/ Director Guyana Pharmaceutical Corporation
Cde Alfred B. Ramrattan	Public Relations and Education Officer, Guyana Rice Board

Cde M.G. McIntosh	Secretary, Small Industries Corporation
Cde Clarence E. Daniels	Electro-Mechanical Engineer, Upper Mazaruni Development Authority, (UMDA)
Cde Maurice Veecock	Co-Project Manager (ag), UMDA
Cde Michael Granger	Agricultural Co-ordinator, UMDA
Cde M. Haniff	Project Director, UMDA
Cde Chander Persaud	Engineer, Hydronet Division Ministry of Works and Transport
Cde Nelroy Jackson	Bio-Chemist Guyana Sugar Corporation
Cde Clarence Mahadeo	Chief Analyst, Guyana Sugar Corporation
Cde Eric Humphrey	Manager, Bauxite Process and New Products, Guyana Bauxite Company, Limited.
Cde Nathaniel S. Pagnauth	Communications Manager, Guyana Bauxite Company, Limited.
Cde A.M.B. Sankies	President, Guyana Association of Professional Engineers
Cde Maureen Wren	Librarian, Medical Science Library, Ministry of Health
Cde Joy Duncan	Senior Librarian National Library
Cde Joan Christiani	Deputy Chief Librarian, National Library
Cde Tommy Payne	Government Archivist, National Archives

Cde Henry Skerrett	Assistant Editor, New Nation (Newspaper)
Cde Grace Deebrah	Guyana National Service
Cde Florence Thompson	- do -
Cde Clinton Williams	Engineer (Training) Guyana National Engineering Corporation
Cde Fitzroy Collins	Executive Officer National Science Research Council of Guyana (NSRC)
Cde B.A. Gibbs	Senior Scientific Officer (NSRC)
Cde R. Persaud	Scientific Officer (NSRC)
Cde Oscar Pollard	Upper Mazaruni Development Authority
Cde Henry Josiah	Public Relations Officer Guyana Water Authority
Cde Barbara Osman	Guyana Bauxite Company Limited

RESOURCE PERSONS, as they appeared on the Programme, were

Mr. D.G. Thomas, B.Sc. (Hons) M.Sc.	Deputy Secretary Commonwealth Science Council
Cde Victor Forsythe, B.Sc. (Hons), M.Sc. (Director of Workshop)	Chief Information Officer Ministry of Information, Guyana
Dr. M.N.G.A. Khan, Ph.D. (Co-director of Workshop)	Assistant Secretary Commonwealth Science Council
Cde Dr. Pat Munroe, Ph.D. (Administrative Arrangements)	Secretary General National Science Research Council of Guyana
Mrs. J. Kimemiah	Kenya Institute of Administration
Dr. G.M. Carman, Ph.D.	Director Information Division Agriculture Canada

Cde Compton Rodrigues	Art Director Design of Graphics, Guyana
Cde A.J. Seymour, A.A., F.R.S.A.	Chairman, National Commission for Research Material on Guyana
Cde C.A. Nascimento, B.Sc.	Minister of State, Office of the Prime Minister, Guyana
Cde Rafiq Khan, M.S.	Director/General Manager, Radio Demerara, Guyana
Mr. Jones Madeira	Communications Officer Caribbean Community Secretariat
Cde Oliver Hunter	Chief D.S.C. Specialist, Upper Mazaruni Development Authority, Guyana
Prof. Mark Vahrman, D.Sc., Ph.D.	Professor of Chemistry, University of Guyana
Cde Arlington Chesney, M.Sc.	Chief Agricultural Officer (ag), Guyana
Cde Mohamed Hamaludin	Chief Reporter Guyana National Newspaper, Limited.
Cde Pat Brandon, M.P.H.	Senior Health Education Officer, Ministry of Health, Guyana
Cde Chris Knee, M.Sc.	Technical Co-operation Officer National Science. Research Council, Guyana
Cde A. McMurdoch, A.L.A.	Chief Librarian National Library, Guyana
Cde V. Kallicharran, B.Soc. Sc.,Dip.Lib.	Assistant Librarian, University of Guyana
Cde Yvonne Stephenson, A.L.A., M.L.S.	Librarian University of Guyana
Cde J. Craigwell, A.L.A.	Assistant Archivist Guyana Archives

Cde Gwen Parris, B.Soc.Sc.	Permanent Secretary, Ministry of Information, Guyana
Prof J.J. Niles, B.A., B.Sc.	Vice President, Caribbean Conservation Association
Cde M. Cox, A.L.A.	Assistant Librarian, University of Guyana
Cde J.P. Benjamin, M.A., M. Litt.	Assistant Librarian University of Guyana

ELEMENTS OF SCIENTIFIC COMMUNICATION

P J Boyle

Introduction

The theme of this Workshop is effective communication in the context of science and technology. By communication is meant the whole process of producing, transferring and receiving information by means of the written or spoken word or by pictorial illustration.

The importance of scientific information as a major resource essential to progress at all levels of science and technology is now universally acknowledged. But just as scientists and technologists need access to information from their colleagues and elsewhere, both within and outside their subject specialities, so also do they need to be able to communicate the results of their own work to other scientists generally and to contribute to the flow and exchange of information within their own group or organization.

In most countries scientific and technological activities operate on various interrelated levels and in some developed countries may present an extremely complex picture. Basically, however, the communities involved may include scientists in academic institutions for whom the emphasis is on the search for fundamental knowledge with no particular end use in view. Many other scientists work in governmental and industrial research organizations and for them the emphasis may be on applied research aimed at obtaining knowledge of direct or indirect practical value. Technologists, who are mainly concerned with processes, techniques, development and similar work, will usually have strictly practical and tangible objectives in view.

In addition to those actually conducting research and development work are research managers and administrators, information personnel and many others with scientific or administrative support roles or who may be involved in interpreting and disseminating information, whether on a crop variety, a laboratory technique or industrial process, among end users. Each of these groups within the total scientific community has its own particular information needs and patterns, depending on its functions and interests. Among scientists proper, the chief need is to communicate the results of their research and be informed about the results of work done by other scientists. In addition scientists, technologists, research managers and administrators, information officers and others may all from time

to time be called on to write reports of various kinds, policy documents, present and argue cases at meetings, organize work demonstrations and communicate with the general public.

Communication among the scientific community therefore goes on at many levels, involves exchange between many different types of information, uses various formal and informal media and may have limited or wide circulation.

Every type of information to be communicated has to be presented in terms the audience or recipients can understand. For example, there is little point in presenting non-scientists with the full details of a scientific paper or with material that assumes background knowledge they do not possess - it must be interpreted into language and terms they can grasp.

All modes of communication, whether oral or written, whether among scientists or non-scientists, to live audiences or not, have their own potentialities and limitations, advantages and disadvantages. They also have their own principles, techniques and rules that must be taken into account if communication is to be effective.

Formal and informal modes of communication

Within the overall communication process, a primary distinction can be made between formal and informal modes.

1. Formal modes. Being formal, these modes employ forms prescribed by custom and practice and follow established rules set by the community to which they apply. In the scientific community the most important communication need is to report the results of research done. This is usually done in formal scientific papers written for publication in established scientific journals, books or other publications. When published, such reports become permanent records that can be examined at any time. Similarly, many forms of internal reports, memoranda, extension literature, etc. also constitute formal publication in prescribed forms. Elements of formal communication in science and technology are set out in Figure 1.

   In common with most people, scientists often have difficulty in communicating effectively by means of the formal written or spoken word. To organize and prepare material for publication is often an arduous, time-consuming business and many scientists have problems in expressing themselves clearly. Some scientists, of course, achieve proficiency with experience and others are fortunate enough to have an innate ability to write or speak well. For others, however, the problem remains. It needs to be stressed, however, that much of the art of effective communication can be defined and can be learned.

2. Informal modes. As in any human community, much communication and information exchange goes on by

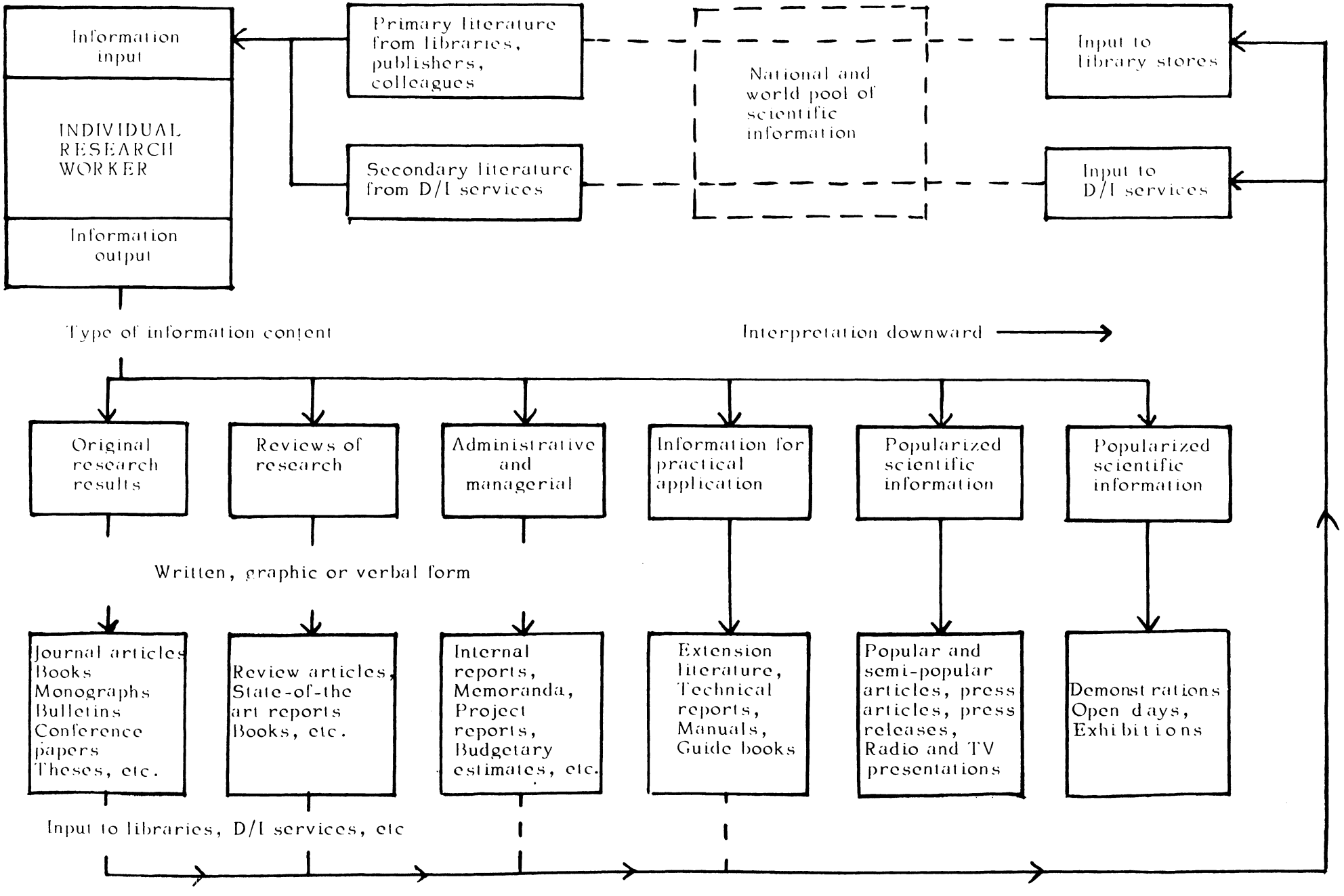


Fig. 1 Formal elements of the communications cycle in science and technology

informal person-to-person contact in the course of daily work, but because it is informal and of necessity unregulated, its significance is hard to quantify. However, all studies of the information gathering habits of scientists have stressed the importance of this mode. Much research and development work is carried on as a group activity, as indeed is the work of any research organization as a whole, and as in any group activity, its efficiency depends greatly on free, effective and positive informal communication among the personnel concerned. At one level, such communication can be regarded as belonging to the realm of sociology, but where inter-personal relationships between individuals or groups are poor or where there are other personal or organizational obstacles to free transfer of information, then both morale and research efficiency will certainly suffer.

Meetings, seminars, conferences and symposia

These have been included at this point because they share elements of both formal and informal modes of communication. Within organizations, meetings and seminars are variants of one another, seminars being meetings held specifically to discuss or review given topics and at which participants may present formal or semi-formal written or spoken material. Meetings proper are generally less formal than seminars and their content of informal communication among participants is correspondingly greater. Meetings can take up much valuable staff time to little purpose unless they are well organized and conducted, but at best are extremely important means of information exchange within organizations and groups.

In contrast to meetings and seminars, conferences and symposia are more formal affairs which bring together individuals from a much wider area to discuss or review a specific scientific subject or subjects. It is usual for formal written or spoken material to be presented on these occasions, often in the form of progress reports or short research papers which may subsequently be published in book form for wider circulation. Often as important as the formal side of conferences is the informal communication among professional colleagues that is such a prominent and essential feature of such occasions and which makes possible the exchange of views and information among individuals who may otherwise meet only infrequently.

Communication of information - the outward flow

It is useful first to consider in more detail the audiences with which scientists and others will communicate and the forms which that communication may take. It must also of course be remembered that transfer of information by informal person-to-person contact can take place with any of the audiences encountered.

1. Practising scientists will expect to write up the results of their work for publication and circulation outside their

group or organization. This will normally take the form of journal articles, bulletins, monographs, scientific conference papers, books, etc. They may also write reviews of research. Their audience here will mainly be other scientists and information services.

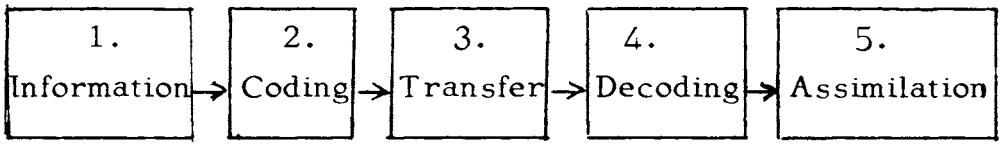
2. Within their own organization scientists will participate in the communication flow among scientific colleagues, research managers, policy makers, etc. Communication may take the form of internal reports, memoranda, policy documents, etc. They may also have to present and argue cases involving policy and decision making, budgets, etc. Most of this flow will be internal, but may at times extend outside the organization.

3. Scientists must communicate their research results and experience to technologists in industry or public services or to extension personnel responsible for advising farmers and others. They may at times have to communicate directly with end users in talks, lectures, literature, etc. without benefit of such intermediaries.

4. Finally, scientists, research managers and information officers may have to communicate with the general public and other lay audiences such as non-professional groups, schools, societies, the press, etc.

Scientists writing original research articles are usually writing for other scientists and their presentation will reflect their scientific training and analytical approach. As scientific information is progressively interpreted downwards to audiences with less and less scientific background, so must the presentation change accordingly.

The basic sequence common to all visual and auditory communication, whether scientific or not, can be summarized as follows:



1. Start of sequence. Information present in the mind of the person wishing to impart it.

2. Coding the information in terms of words or pictorial illustrations.

3. Transfer by means of the printed or spoken word, or by pictorial illustrations or audiovisual means.

4. Reception and decoding of the printed or spoken word to extract the meaning.

5. End of sequence. Analysis of the information and committal to memory or other record, i.e. written notes, etc.

Because this sequence is a human process, faults that hinder communication or distort the message can be introduced at any stage. The following are examples:

Stage 1. The originator may have given insufficient thought to matching his material to the target audience. He may lack the time or ability to organize his material to best advantage.

Stage 2. The originator may make a poor choice of words, grammar or other modes of expression to convey his information. The graphics used may be inadequate.

Stage 3. The medium used to transfer the message may be inadequate, defective or inappropriate. Printed material may be difficult or uncongenial to read. With verbal delivery, sound quality, acoustics, voice projection, intonation, etc. may be unsatisfactory. A stuffy auditorium and a dull speaker may send the audience to sleep or at least make them inattentive.

Stage 4. The recipient may misunderstand words or lack the scientific background to understand concepts, assumptions, scientific jargon, etc. if these are not properly explained. In some cases there may be language difficulties.

Stage 5. Where the presentation has been uninteresting and the information content not clear or readily understandable, recall of the information content may be poor and short-lived.

These examples of obstacles to communication differ with the medium used. For effective communication it is necessary not only to know what faults to avoid but what positive methods there are to aid reception and comprehension for each medium and how to use them.

The sequence of communication starts in the producer's mind and, obviously, he or she should have something worthwhile to express. But once the decision to communicate has been made and with it the decision of how best to match message, medium and audience, then all possible art and artifice must be employed to give maximum impact and comprehension.

For the communication of original research results, the medium of communication may be more or less self-evident and other questions, such as which journal to place it in, may be more important. For communication to administrators, technologists and non-scientists, the best choice of medium and style of presentation may be less obvious, since the communicator may have to simplify and interpret his information to a greater extent and keep his audience much more actively in mind.

Communicators need to know the potentialities and limitations of the different media and thus need guidance on how to present their material to different audiences and what aids

and techniques, graphic or historic, they can use.

In some contexts, particularly commerce and politics, the term "public relations" has dubious overtones. Nevertheless, communication with the public and with persons in public and political life can be highly important. Scientists, research managers, administrators and information officers may all at times become involved in the public relations aspect of communication. They therefore need to know how best to present the case for their group or organization and to ensure that when opportunities arise to describe work or achievements, this is done to maximum effect. They need to know, for example, how the same statement made in print in a newspaper can differ in impact and interpretation from that made orally over the radio. Also, what points in a public statement may be liable to be picked out for emphasis in a newspaper report and possibly misinterpreted or distorted. Understanding of techniques and approaches for dealing with the press, press releases, radio and television interviews and talks and also the use of graphics and the various methods or presenting visual material are all important and will be singled out for further attention in this Workshop.

Communication of information - the inward flow

Scientists and technologists are both producers and consumers of information. They must communicate the results of their work if it is to add to the total sum of world knowledge or make its contribution to scientific and technological progress in their own national community. In publishing their work, therefore, scientists contribute to the world pool of information; at the same time, they need access to this same pool of information if they are to keep abreast of progress made elsewhere in their own or related subject fields.

In this sense scientists are part of a circular flow of information among the scientific community generally. For those engaged in fundamental research with no particular applied objective in mind, this circular flow of scientific information is the major concern. For those involved in applied science this same circular flow is also of major importance, but so also is the largely one-way flow of information to technologists, extension workers and others who need to apply it to practical use. In this case there may also be feedback of other levels of information on such aspects as the usefulness of the scientific knowledge originally provided, the need for new or further research, modifications to existing programmes, etc. Figure 2.

Without access to the results of other scientists' work as published in scientific journals, to textbooks and other reference sources, etc. no scientist can do effective research for long. The problem for scientists is to find out what information they need and where and how to get it. As has been said, scientists receive a great deal of their information input from informal personal contact at work, at meetings, conferences, etc.

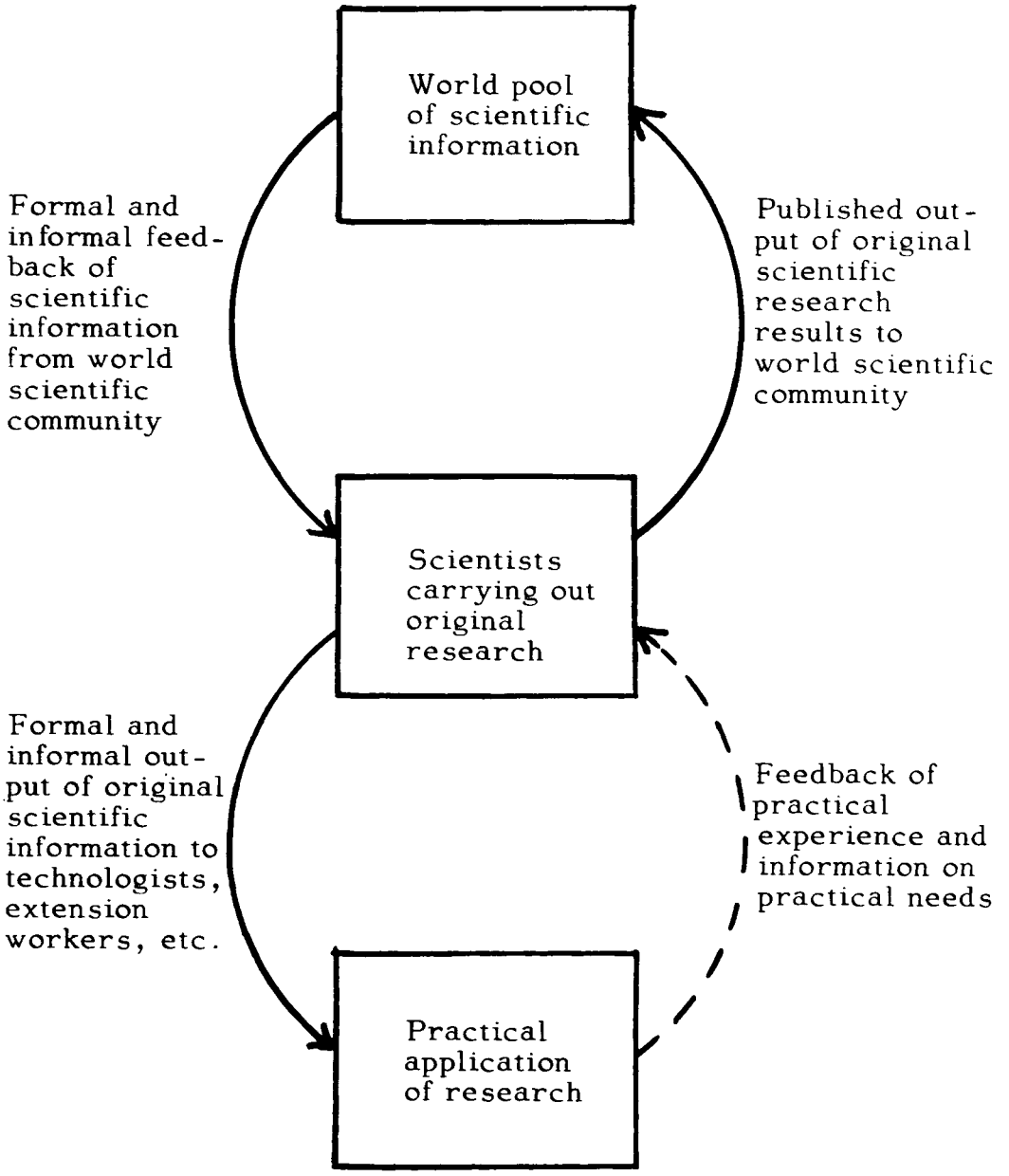


Fig. 2 Flow and feedback within scientific information

Most research or academic organizations will have libraries containing the more important publications relevant to their subject area. However, most scientists generally have only limited amounts of time to devote to scanning the literature.

To keep abreast of developments reported in the literature they do not normally see or which their library may not receive the library may take one or more of the so-called secondary documentation services in which abstracts or other notices of research articles are presented in a form in which they, or someone on their behalf, can scan and extract items of interest. The library resources can then be used to obtain the original article or a copy of it.

These secondary services thus enable libraries to increase greatly their effective literature coverage and they are now a prominent and established feature of the documentation scene in all scientific disciplines and technologies.

At one time, scientists did most of their own literature scanning and searching and generally maintained their own private card or other index files to the literature. Many still do so, but there is now an increasing trend towards the appointment of information officers to carry out part of this function on their behalf and generally to act as a middleman between the information source and the scientist.

In many developed countries there exist large national libraries and library networks covering virtually all areas of science and technology. Similarly, there has been a tremendous growth of documentation and information services, some using sophisticated computerized processing and publishing methods, designed to meet the information needs of particular scientific communities. These developments have been paralleled in recent years by initiatives towards the establishment of international information systems, such as AGRIS to cover agriculture, UNIDO industrial development, etc. These services have been designed with the needs of developing countries especially in mind. In addition, there are various international agencies, such as UNESCO, that actively promote and aid the development of scientific information services in these countries. Many developing countries are actively seeking to develop and improve their own national information and documentation services and to provide their scientific communities with better access to the common world pool of scientific information. The development and organization of national information systems will therefore also be dealt with in this Workshop.

A glossary of a few terms commonly used in the field of scientific information is appended.

GLOSSARY OF TERMS

Annotated bibliography. A list of titles of documents relevant to a specific, usually narrow subject area, with each title supplemented by annotations in the form of abstracts or other brief notes giving details of the contents of the documents.

Bibliographic information. Information about documents, typically details of their titles, authors' names, year volume and page numbers and other relevant information enabling the documents to be identified and retrieved.

Data base. In the information and documentation context, the whole store of bibliographic material, typically titles plus abstracts plus index entries, or other referral data, assembled by a documentation and information service.

Document. Any permanent record carrying information, usually in written form, but which may be on film, magnetic tape or other medium.

Documentation. That which has to do with documents, especially their arrangement for retrieval and presentation and the process of handling them for this purpose.

Documentation centre. An organization that (a) selects, acquires, stores and retrieves documents, (b) announces, abstracts, extracts and indexes the contents of documents, (c) disseminates documents or information about documents or their contents, (d) organizes and coordinates information services and facilities.

Documentation and information (D/I). A compound term denoting the whole process of recording documents and condensing, indexing and processing of their information content for presentation.

Extension service. Body of professional people who, working under or in cooperation with the government, provides technical advice to specific groups of users on a non-remunerative basis (government officials, technical experts from universities, etc.) Extension officers may also be called liaison/advisory officers, or information officers.

Information. The factual, numerical or other content of knowledge convened, typically by a document, but which may also be conveyed verbally, visually, etc.

Liaison/advisory service. See Extension Service.

Library. An organization which collects, stores and makes available for use books, periodicals and similar materials.

National information system. A system in which the various national documentation and information and referral services and resources of a country are linked and coordinated so as to maximize their value and availability to users.

Primary publication or document. The original publication or document in which new information or new interpretations of existing information is published in full.

Referral centre. A centre or unit providing hard data or other factual information on specific subjects rather than abstracts or other bibliographic information, or indicating sources (persons, institutions, publications, etc.) where such information can be obtained.

Repackaging. The rearrangement of bibliographic material (usually titles plus abstracts) that has already been published as a main output by a secondary information service into new, generally narrow, subject profiles or arrangements to meet the needs of special user groups.

Secondary publications. Publications in which secondary information, typically in the form of titles plus abstracts, derived from primary documents are published in order to inform users about the existence and contents of the documents; they may also include similarly derived catalogues, reviews, surveys, etc.

SDI (Selective Dissemination of Information). Type of regularly issued, repackaged secondary output consisting of regularly updated sets of references (usually documents titles, with or without abstracts) on a specific, narrow subject profile.

Retrospective retrieval. Type of one-off repackaged secondary output consisting of a single set of references (usually document titles with or without abstracts) on a specific, narrow subject profile and derived from literature published over a greater or lesser time span.

Thesaurus. A keyword list or index in which only controlled keywords are used. Such a list may specify which are permitted keywords and which are non-permitted keyword synonyms or related terms, with cross-references from non-permitted to permitted keywords. The keywords may also be arranged in a logical structure of main and subordinate or broader and narrower terms.

VISUAL COMMUNICATION

D J Plumb

Introduction

Graphic communication has been used for centuries under a variety of names, using a visual language as a means of practical communication rather than as a means of personal expression as found in other areas of graphic art.

The earliest cave paintings could be viewed as being not only decorative additions to the environment of the man of those times but also as a practical statement of fact regarding information necessary to the well-being of the community as a whole.

The advantage of a graphic/visual means of communication is in the maximum effective spread of information that can be made at any one time - irrespective of the language, culture, educational status or age of the recipient. It is however important that the choice of graphic image and its use in conjunction with other images is suitable, not only for its intended purpose, but also that it is capable of being understood in its purposeful role.

It could be assumed that if one group is attempting to communicate with another, using common visual images, success should be achieved. In practical terms this is proved not to be the case. Research conducted by Bernard Shaw of the African Medical and Research Foundation in the form of a visual symbol survey among Kenyans, shows up this misconception. Although all the drawings and symbols used in this survey were graphically accurate and common to all participants, some misunderstandings occurred due to the manner in which the illustration was viewed. A tortoise, for example, was identified as being (a) an elephant, because of its feet, (b) a crocodile, because of the pattern on its shell and (c) a snake, because of its head. These responses were due to the fact that not everyone sees the complete image but rather a series of details, and on any one of these details bases the answer. In a similar manner a goat was described as being a cow by 53% of a certain group of participants due to their seeing a head, horns, legs and a turned down tail. The fact that all details shown on the drawing were of a goat was missed by these participants who based their answer on the single fact that all local goats have tails that turn up so it must be a cow. The theoretical capability of visual communication can be near to achievement if the various methods of perception employed by the social or ethnic groups taking part in the communication process are investigated before work is started.

Any person whose work demands explanation, must attempt to see their own specialist activity through the eyes of those whose understanding of it is limited or non-existent.

One of the first objectives in any communication process is finding a common denominator. If there is no such thing readily available in the natural context of the communication then one has to be contribed in order that the difficult path to complete understanding is navigated. An unknown subject is similar to finding oneself in a foreign city with no knowledge of the language or street plan, no money and surrounded by a people displaying strange and threatening attitudes. If you move, it would be easy to lose yourself and get further from your destination of say, your national embassy or consulate. You are wary of trusting the local taxi service or guide and long for a familiar face to appear around the corner. If one did, you would be quite happy to place your trust in him irrespective of the devious route taken in reaching your destination.

As communicators, it is our duty to provide this familiar, identifiable figure as a means by which we can lead people through unfamiliar, unidentifiable surroundings.

Figuratively speaking

Whilst text speaks with words, the graphic figure speaks with form, and just as words are the flexible units, or vocabulary, of spoken or written language, so the point, line, shape, value and texture are the equally flexible units of vocabulary of form. The use of this vocabulary is essential in the preparation of a visual, graphic language.

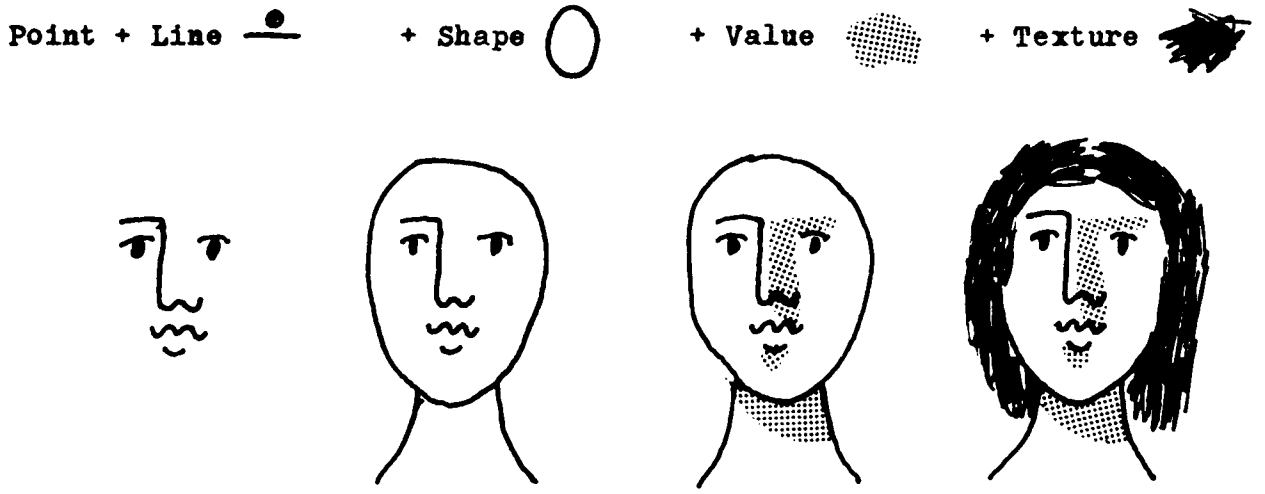
The Point Theoretically non-dimensional showing location, position or focus. In practice, a point can vary with respect to its size, shape and value, and can also act as a symbol representing a specific subject or idea.

The Line One-dimensional in character and shows direction, extension or movement. Linear form can vary in weight, length, structure, character, value and course. A major quality of the line is in its directional capability. In this role it can also indicate motion. Lines can be complete or broken, and, varying in width, can also indicate changes in magnitude.

Shape Two-dimensional in form, it shows contour, area, outline, enclosure or edge. Shape quality derives from the structure of its edge, and varies with respect to size, distribution of weight, position, regularity (or irregularity) of its edge. Shape can be constructed in solid or outline form.

Value A quality of colour which refers to the degree of darkness or light and in practical use could reflect the quantitative aspect, distance etc. Made up of a concentration of dots which at a distance appear to blend with the intervening white spaces, graduations of tone are dependent upon the relative size and density of the dots.

Texture The quality of surface structure or pattern. In practical terms, the use of texture as an aid to differentiation of individual aspects is invaluable and should be considered in conjunction with other form elements, especially colour value.



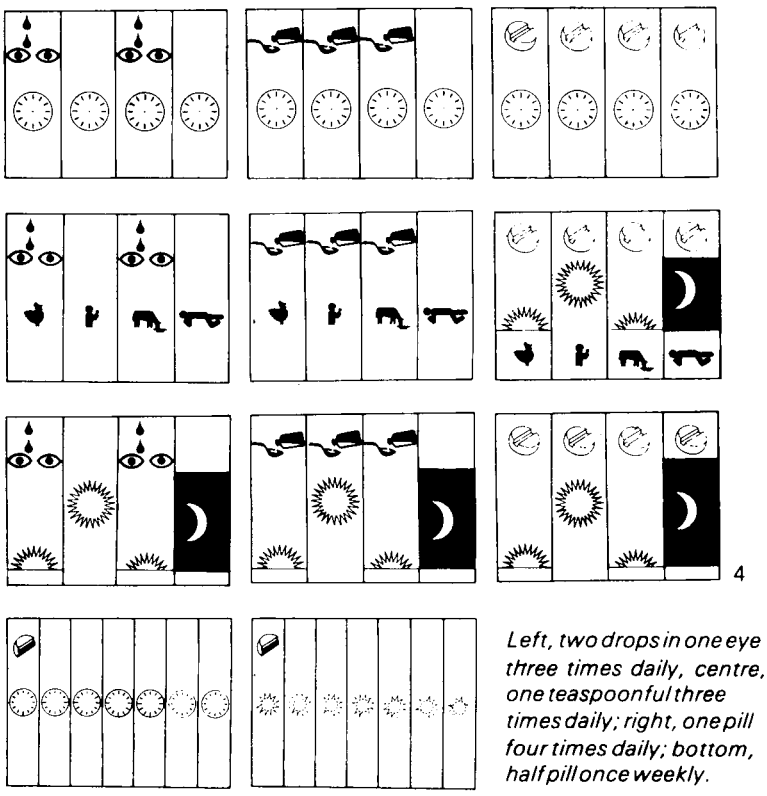
The Graphic statement

Visual language is not an end in itself, but simply a means by which to visualise ideas and have those ideas understood. The visualization of ideas begins with the definition of purpose.

Relevant subject matter is applied to this purpose and translated into logical visual concepts.

In everyday life the meaning of a thing can vary in relation to the way in which it is seen and understood. The farmer for instance sees the wheel of his wagon as a physical object, the engineer who designed it sees it as a mechanical problem and the merchant who sold it sees it as a financial profit or loss. Thus while the farmer's view is objective, the engineer's is symbolized into a plan and the merchant's into an abstract of monetary terms. Similarly, the subject of the graphic figure can be seen and represented in different ways, depending upon its communicative aim-subjective, symbolic or abstract.

Pictorial Diagram



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Left, two drops in one eye three times daily, centre, one teaspoonful three times daily; right, one pill four times daily; bottom, half pill once weekly.

Objective translation shows the idea in terms of visual reality. The photograph is possibly the purest example of objectivity, although often requiring visual modification in order to simplify or exaggerate the character of the object.

Symbolic translation removes the idea from the context of natural reality, retaining only the visual features which are essential to its identity.

Abstract translation presents the idea in terms of pure visual logic, independent of any associations with specific objects in the real world. It also lends itself to problems in which the technical content, or its interpretation, is itself abstract. Abstract form can also act as an organizing device without special meaning.

Designing the statement

The visual communication of information takes three distinct forms, Statistical, Explanatory, Locational (maps), and is represented graphically in the form of diagrams.

Statistical information can be shown visually in various ways. One of the most common is the use of the graph, whether it be in the form of line, divided line (which shows the value of the total and its constituent parts on the same frame), bar graph (which shows quantitative values more clearly than line), block diagram, divided rectangles, circular graphs, divided circles and pictorial graphs.

Explanatory diagrams explain stages in a manufacturing process, the structure of an organization or events related to each other in time. They do not usually make quantitative statements although adaptations could make this possible. The main design problem in explanatory diagrams is in reducing information to the essential without distortion. This can be done in many ways from the objective to the abstract or near abstract viewing.

Locational diagrams and maps also make full use of form vocabulary as well as the objective, symbolic and abstract method of presentation. Certain characteristics found in graphs are also to be found in the presentation of maps, especially when statistics regarding geographic areas are required to be shown.

The important difference between the statistical diagram and the locational diagram is that the map provides the framework on which information can be shown. In giving statistics in diagrammatic form there may be several ways open to the designer or communicator to use or modify shape to suit the requirements of the information. The one main problem in map design is that of getting inflexible information into inflexible shapes, a problem increased when labelling of the information is required. To superimpose population pyramids for various countries on a map of Africa may be easy for Zaire, Nigeria and the Sudan but impossible for Togo, Lesotho or Sierra Leone on a map of the same scale and if the map lines and superimposed information are to be kept readable. Maps can be in the form of explanatory, route, statistical, non-quantitative (political, physical, racial etc.)

Various factors will have a bearing upon the method of presentation used: type of information, type of audience, sources of reference, the type of media used (slide, overhead projector etc.) and the skill of the presenter.

Production of visual aid material is a highly specialized field, but the communicator should be in a position to discuss effectively with the designer as to what and how to express information graphically. In other words, the communicator must have sufficient background knowledge of graphic design to be able to assess the communication requirements and to issue a comprehensive brief regarding the visual aspects of these aids in order that he can fully exploit the potential of the information being presented. The communicator should therefore have some knowledge of the physical requirements of organizing and presenting information in a graphic form.

Organization

The same type of questions must be asked when preparing visual material as when organizing a meeting. (1) What is the purpose of the meeting? (2) What type of information is to be presented? (3) Who is the audience? (4) How many expected in the audience? (5) Where is the meeting to be held? (6) What facilities does the venue offer? (7) What is to be the method of presentation? and (8) What costs are likely to be involved? All of these questions must be answered in the early planning stages in order to get the best results from the time, effort and expenses involved.

In establishing the purpose of the meeting, it is necessary to consider the type and size of audience, subject of presentation and finance available for the production of visual material. For example, if the meeting is aimed at a specialist audience then the visual presentation and its spoken commentary can be more technical than if the audience is for the non-specialist, even on the same subject. By establishing the expected composition of the audience at an early stage, the depth of detail and explanation of the subject matter to be presented, including the degree of complexity of the graphics, can be decided upon. The size of the audience will have a bearing on the type of visual equipment to be used. The amount of effort to be expended on the preparation of graphic material will not only be determined by finance available, but will be influenced by the type of equipment to be used and whether or not a permanent record is required for future presentation.

Audio-visual systems

There are several aids suitable for the presentation of visual material:

Slides

In 5cm x 5cm mounts
Colour or Black and White
Picture size: 36mm x 24mm

Advantages include:
Easy to use
Readily available
Easy to make

Advantages include: (contd)
Can be presented in any sequence
Storage and transportation easy
Can be combined with sound
Automatic and remote control is easily arranged

Disadvantages include:
The need for electric power
The need for blacked-out room
Once projector is switched-off the image has disappeared and no longer available for study

Filmstrips — 35mm single frame (18mm x 24mm picture)
35mm double frame (24mm x 36mm picture)

Advantages include:
Correctly threaded into the projector the pictures will be presented correctly and in sequence
Very transportable
Easy to use
Copies are cheap

Disadvantages include:
The need for electric power
Projection Equipment is required
A blacked-out or dimmed room
Inflexible in so far as the sequence of presentation is fixed and it is impractical to insert local or alternative material
Material disappears when equipment is switched-off

Overhead Projectors — $9\frac{3}{4}$ x $7\frac{3}{4}$" (25cm x 20cm)
$9\frac{3}{4}$ x $9\frac{1}{4}$" (25cm x 25cm) Standard sizes

Advantages include:
Easy to use after a few minutes basic Instruction
Flexible in that transparencies can be varied in sequence, added or omitted
Can be used in normal lighting
Colour can be easily introduced
Presenter faces audiences (Good eye contact)

Disadvantages include:
Need for electric power
Large size of transparencies compared to 35mm slides

Episcope — An instrument for projecting flat copy (book pages etc. straight onto a screen without having to make transparencies)

Advantages include:
Cheapness. Because the image is projected from the original there is no expenditure of time

and money in making slides i.e. there is an instant projection

Disadvantages include:
Need for power
The machines are not easily available
Light output is very poor and use dictates a completely blacked-out room

Cinefilm — 8mm, 16mm or 35mm with or without sound
Colour or Black and White

Advantages include:
Movement
Sound
Great impact

Disadvantages include:
Need for power
Need for equipment
Need for specialist operator
Films may have to be booked well in advance
Expensive

Flannel Board (Felt Board) — Usually a piece of dark felt cloth stretched over a board such as hardboard or an existing blackboard
Size can vary, but 3' x 4' will be suitable for most purposes
The images can be produced on coloured flock paper, which can be used piece by piece at whatever speed the presenter considers best

Advantages include:
Materials easy to obtain and make-up
Easily transported

Disadvantages include:
Need to be kept clean and dust free to maintain smart appearance
The presenter cannot introduce new facts or ideas on the spot as he could with a blackboard

Flip Charts — Loose sheets (clipped, pinned or taped up)
Sheets mounted on hardboard with easels
3' x 4' approx.

Advantages include:
Can be economical (hand lettered or drawn on cheap newsprint)
Can be produced very quickly
Can be tailormade and topical
Needs no power
Full daylight use

Disadvantages include:
Needs special display arrangements e.g. board, easel, pins etc.
In some cases, charts may have to be large and unwieldy, numerous, heavy to handle and transport

Blackboard Whiteboard, chalkboard with chalks or liquid markers
Immediate production of images in the presence of an audience

Advantages include:
Cheap
Familiar to majority of audiences
Colour easily introduced
Visuals created the moment they are required

Disadvantages include:
Temptation to include too much information
Is liable to be badly used and present illegible information
Cleaning does not necessarily remove the last set of information and 'ghosting' can occur
The use of chalk and the cleaning covers the presenters hands and clothes with dust

The following information will assist in arranging the positions of audience members and projectors in relation to the screen

Slide projection

With a lens of 5cm focal length:

Screen distance of	10'	will give a picture size of 7'6" x 5'0"
	13'	9'6" x 6'4"
	16'	12'0" x 8'0"
	20'	14'4" x 9'6"

With a lens of 8cm focal length:

Screen distance of	10'	will give a picture size of 4'6" x 3'0"
	13'	6'0" x 4'0"
	16'	7'6" x 5'0"
	20'	9'0" x 6'0"

Overhead projection (10" x 10" transparencies)

Lens to screen distance	5'6"	Picture size 39" x 39"
	6'0"	46" x 46"
	10'0"	78" x 78"
	20'0"	156" x 156"

Audience numbers in relation to screen size and seating

Screen width	Seating Area	Practical Seating
5'0"	20' x 17' (340 sq ft)	50
5'10"	24' x 20' (482 sq ft)	75
7'0"	30' x 22' (654 sq ft)	100

General guide for seating positioning in relation to screen

No person to be nearer than twice the screen width.
No person further from screen than six times its width.
No person on either side more than 30° from axis of projection.
General guidelines as to the size of image in relation to projection distance for maximum legibility could be taken as being a symbol (either drawing or lettering) of 1" high for each 30' of projected distance (from the lens to the screen).
This would mean that at a distance of 60' the eight of a projected symbol or letter would have to be 2".
This size could be reduced to $\frac{7}{8}$" if the image is clear and well defined.

When preparing transparencies in the form of lines of lettering, the distance between the lines should be equal to 1/36 of the overall height of the transparency.

Sequential steps in the preparation of material

1. Determine the main and subsidiary purposes of the presentation
2. Prepare rough ideas of the visual aspect in association with the spoken commentary
3. Prepare visual images
4. Arrange sequence - decide on changes
5. Rehearsal for both time and continuity with the script
6. Modify, if necessary, to conform to the time limit or parts of the commentary that are found to require greater emphasis.

Important facts in presentation

1. All visual material should be of the same, good quality
2. Spoken commentary should be clear and concise
3. Visual and spoken commentary should be in synchronization
4. The overall presentation should be professional, to the point, and have a beginning, a middle and an end
5. Time should be allowed for questions. The speaker must decide beforehand whether questions can be asked during as well as the end of the presentation. Questions interposed in the course of a delivery requiring sequential presentation of ideas in building up a reasoned case could be distracting. On the other hand, the speaker may wish to have active audience participation, and comments and questions would then be encouraged. The audience should be aware of the speaker's wish before the oral delivery is started.

Remember that pictures or visual images are static. An approximate guide as to the length of time a single image is in view should be no longer than 15 seconds, unless it is the subject of prolonged discussion.

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