Commonwealth Science Council **Communication Techniques Workshop**

COMMUNICATION TECHNIQUES IN SCIENCE AND TECHNOLOGY

Resource material and Report
of a Regional Training Workshop
Arusha, Tanzania
21-28 April, 1976

Commonwealth Science Council
Commonwealth Secretariat
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FOREWORD

That science and technology play vital roles in economic and social development is generally accepted. Without knowledge of science and technology, there is little chance of improvement in human life and well-being. But knowledge in itself is not enough; information must be disseminated and used if benefits are to accrue from it. Transfer of information cannot be separated from research and development, and all those concerned with research and development must be involved in the transfer of information to the same extent and with the same attitude as they accept responsibility for research and development itself. Not only must information be conveyed to those who will directly use it, but also as background information to those who are responsible for ensuring that the national efforts in science and technology are appropriate and relevant. Equally important is to inform the general public how science and technology can be used for the common good and that with proper control, the application of science will not of necessity adversely affect the quality of man's life but that it has the potential of enhancing it.

The very real need for scientists and technologists to communicate effectively was emphasised at a regional workshop on Research Management and Administration held at Muguga, Kenya, in March 1974. The workshop recommended to the Commonwealth Science Council, that a further workshop be convened specifically to discuss means of overcoming the lack of knowledge of communication techniques by research scientists. It was recognized that one of the major constraints was the lack of knowledge of communication techniques by research scientists.

A 'Training Workshop on Communication Techniques' organized by the Commonwealth Science Council in cooperation with the Tanzania Scientific Research Council, was held at the East African Community Management Institute, Arusha, Tanzania during 21 to 28 April 1976. The aim was to present the various facets of information transfer and to demonstrate a model course programme which could be repeated at a national level with appropriate adjustment. The Workshop was sponsored by the Commonwealth Fund for Technical Cooperation.

Originally nine Commonwealth countries were to take part, but Nigeria and Uganda could not send their participants. In addition, there were observers from Guyana Science Research Council, East African Community, International Development Research Centre and the UNESCO Regional Office of Science and Technology for Africa.

The resource team was comprised of specialists from Britain, Kenya, Commonwealth Secretariat and the CSC secretariat. List of participants, observers and members of the resource team is given in Appendix I, which also includes further details about the Workshop and course programme.

The concluding session was devoted to assessment of the programme by participants. Assessment by participants is summarized in Appendix II while the Assessment Form used is reproduced in Appendix III. Participants considered that the Workshop achieved its objective to a large extent, and all the topics covered were relevant or very relevant to their needs and those of their respective countries. Subsequently several participants expressed their willingness to organize national workshops. The second regional workshop is being planned at the initiative of the Guyana Science Research Council for the Caribbean to be held in March/April 1977.

The resource material of the Arusha Workshop is now published for wider dissemination. It is hoped that this publication will provide useful resource material for organizing similar workshops at a regional or national level.

I wish to express my appreciation to all who contributed to the workshop: the various members of the resource team who gave freely of their expertise, and their parent bodies that very readily released them for this task; the Tanzania Scientific Research Council staff who assisted very ably with the organization of the workshop; the East African Community Management Institute Director and staff who made available the excellent meeting and accommodation facilities of the Institute and who cheerfully met our many needs; and, not least, the participants whose enthusiasm and willingness assured the success of the workshop.

February 1977
Marlborough House
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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 other 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

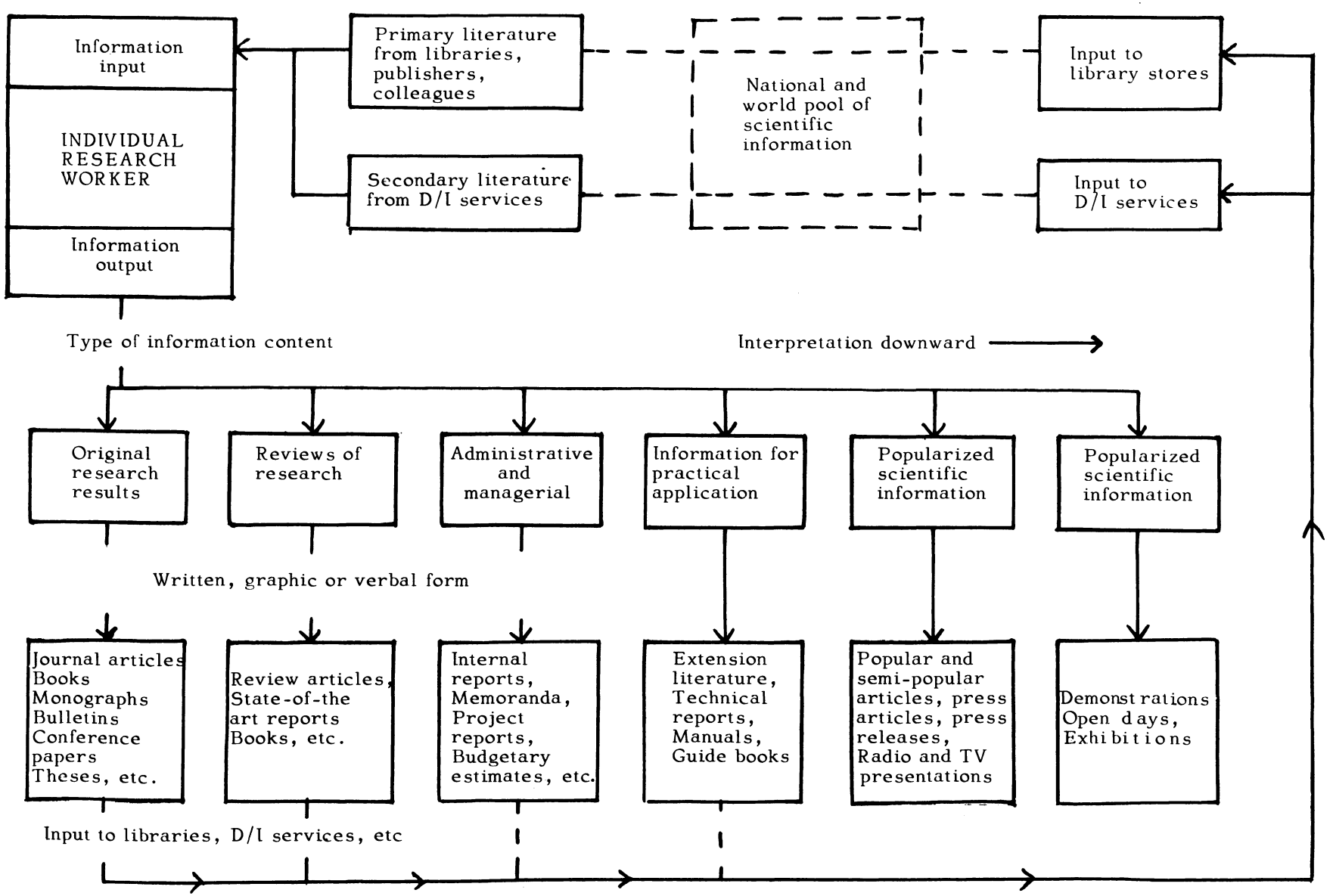


Fig. 1 Formal elements of the communications cycle in science and technology

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.

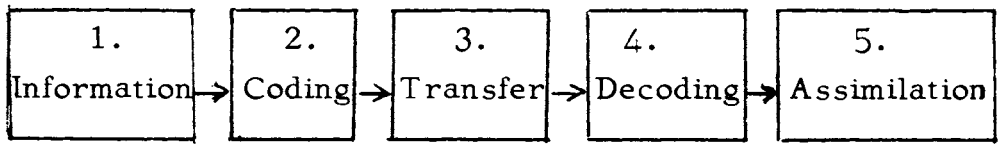
2. Within their own organization scientists will participate in the communication flow among scientific colleagues, research managers, policy makers, etc. Communication may take the form of internal reports, memoranda, policy documents, etc. They may also have to present and argue cases involving policy 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.

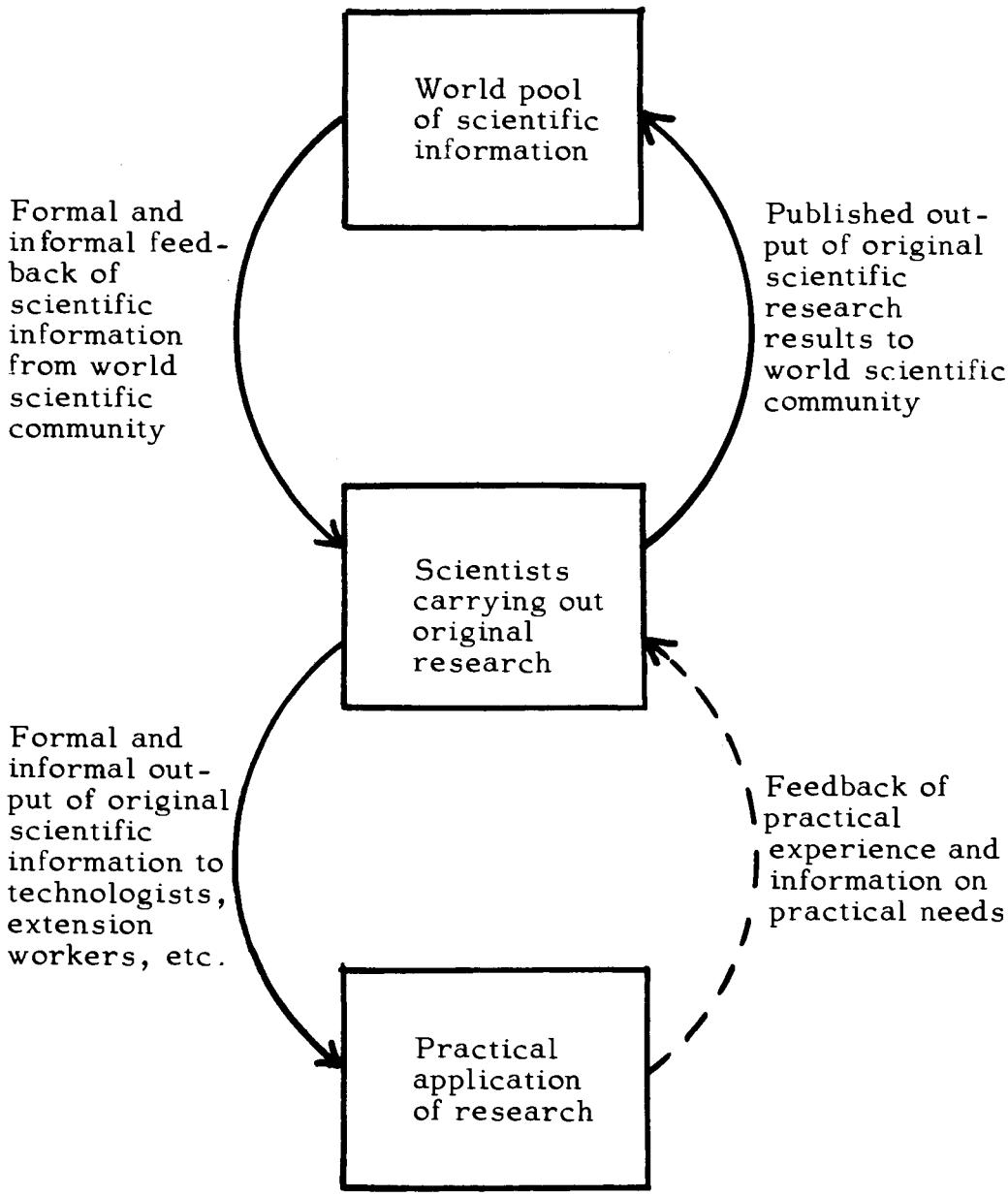


Fig. 2 Flow and feedback within scientific information

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.

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 tc 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 freelance 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.

ORAL PRESENTATION

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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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.

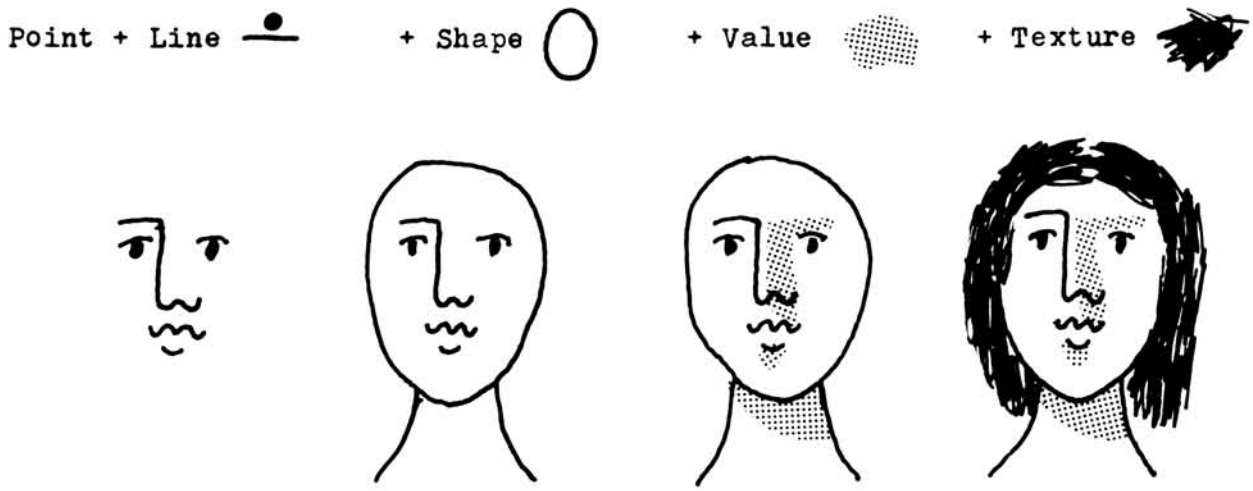
The Point Theoretically non-dimensional showing location, position or focus. In practice, a point can vary with respect to its size, shape and value, and can also act as a symbol representing a specific subject or idea.

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.



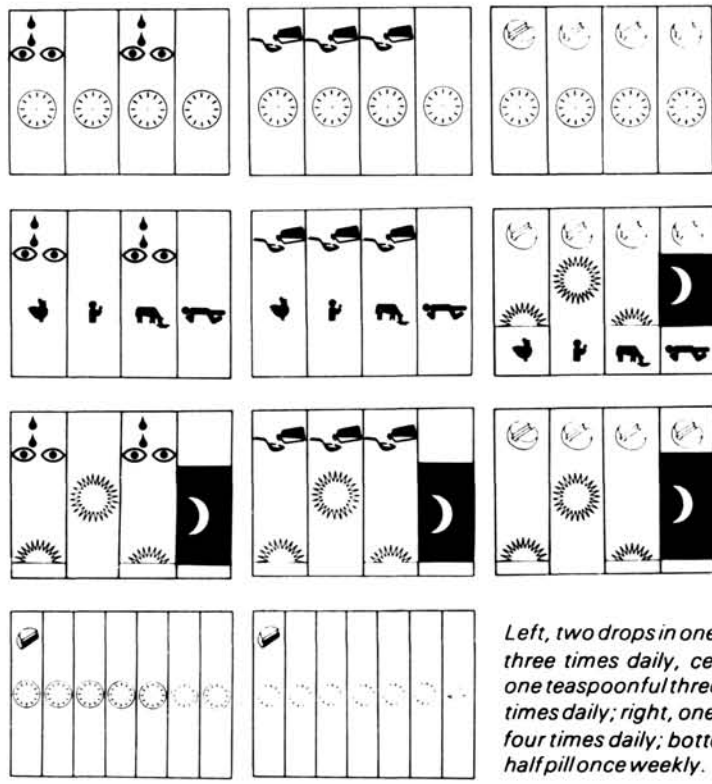
The Graphic statement

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



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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THE SCIENTIST AND THE GENERAL PUBLIC

N Harman

Introduction

All effective communication depends on a clear preliminary definition of three things:

First, and most important, the communicator must define what he wishes to communicate, master the subject, and eliminate the inessential. Nothing is as confusing, or as irritating, to an audience than the introduction of irrelevant matter.

Second, the communicator must define his audience. A similar message may need to be couched in very different terms for effective communication to, for example, a group of scientific researchers, a panel of civil service administrators, and a newspaper's general readers.

Third, the communicator must define the means at his disposal for conveying a message. A class-room or a radio may be equally useful, but the techniques to be used in each are necessarily different.

The mass media

Scientists and scientific administrators have an undoubted duty to explain their activities to the general public. Whether as taxpayers or as customers, it is the general public that pays for those activities. Science often seems difficult, obscure, even irrelevant to the daily lives of ordinary people. Scientists, if they wish to secure the necessary material and moral (and even political) backing for what they do, must try to break down the barriers of incomprehension. Willing, constructive and frank cooperation with the newspapers, radio and television are the only effective methods of achieving this.

The "mass media" must always be respected - if only because the "mass" that reads newspapers, listens to radio or watches television includes a large number of specialized audiences. Political leaders, civil servants and specialists in other disciplines get from the mass media most or all of their information about subjects outside their speciality. The mass media are truly democratic: they include in their various audiences everybody you need to speak to.

There are special difficulties for a scientist wishing to communicate with the general public. First, he must not assume that his audience understands or even sympathises with what he is trying to do. He must realise that his subject is strange and remote, and try to relate it to the interests of ordinary citizens within his society. Second, he will almost always have to work closely with a specialist in communications - a producer or reporter or interviewer - whose job it is to help convey a message which he probably does not himself understand (although he may, unfortunately, believe that he does).

Furthermore, the requirements of the press, radio and TV may impose an additional administrative burden on the organisers of scientific events. Advance information must be provided in such a way as to stimulate the interest of editors and programme planners. Press releases must be made available promptly at the conclusion of any meeting or briefing. And busy scientists and administrators must be prepared patiently to meet the sometimes unplanned and disorganised requirements of the press.

Contacts with the media

When planning scientific meetings, or announcing scientific schemes for developments, organisers and administrators should at an early stage consider whether the public may be interested. If it is thought they may be, advance notice should be given to the appropriate newspaper or broadcasting organizations, and a member of the organising team should be designated as spokesman. If editors or correspondents express an interest, it is often highly worthwhile inviting the relevant person beforehand for a background chat, at which some groundwork of information can be laid and friendly contacts established. News correspondents need news, not final reports and official documents. They will wish to announce the relevant event as or before it happens. They will wish to announce its conclusion as soon as it ends.

Journalists are often ignorant in specialist fields. If they are not helped, they will make mistakes. If helped, they will get it right, and getting it right is what they want to do.

Press releases

Good science press releases are written with the press in mind, and designed to provide non-expert journalists with the raw material for an informed story. Bad science press releases are written for the writer's fellow-scientists, and designed as administrative reports on his work.

Include in press releases an accurate, if simplified, account of the conclusions of the event or develcpment being described. Include the names of the main contributors to the new development; include the names of the governmental or public figures who have attended or spoken at the relevant

ceremonies (opening and closing ceremonies, laying of foundation stones, etc.)

Exclude from press releases long historical accounts of underlying developments. Exclude polite acknowledgements of services rendered: exclude lists of names of passive participants. Exclude, above all, anything that sounds like self-aggrandisement by the organisers.

Try to tell the truth, as simply as the truth can be told without distortion.

Press conferences

Journalists need to understand the significance of the event they are reporting on. They are often very good at finding out in general terms what has happened: they need to know its significance, and to find ways of making it interesting to their readers. Press conferences are most valuable to the press as an opportunity to put questions. The ideal press conference starts with a very brief statement from its chairman, and is then opened for questions as soon as possible. Journalists know what they need to know better than non-journalists. The press conference is their chance to find it out.

As much background material as possible should be provided in advance of a press conference, in written form. If radio and TV have special requirements in convering a press conference (for example, placing of microphones or recorders, lighting, arrangement of the background for pictures, etc.) they should be met in advance, in consultation with the relevant reporters. Reporters know what they need: scientists who wish to convey a message should consult them.

Press conferences should be planned for the convenience not of participants, but of journalists. Punctuality, reasonable comfort and audibility are essential. Journalists always face the problem of deadlines: a news broadcast set for 6 p.m. cannot take note of a press conference held at 5.45: a weekly journal published on Friday will need its copy on Wednesday. It is a press officer's job to ascertain these needs of the press, and to satisfy them as far as reasonably possible.

Newspaper interviews

Granting an interview to a newspaper journalist is a cooperative venture: the article will be good if the journalist and his subject agree on the final message, and bad if they disagree. Success demands the constructive participation of the interviewee as well as of the interviewer. If granting an interview, try to ascertain what the interviewer wants, and tactfully steer him into wanting the right thing. Interviewers are specialists too - specialist in communications. They can help you to get your message across, but only if you help them.

Newspapermen everywhere are used to the convention that some things may be said "off the record", and others for quotation. Some newspapermen everywhere do not observe, or misunderstand, the convention. Interviewees should clearly grasp the rules of this game, and make reasonable judgements about the extent to which journalists can be taken into their confidence.

It is often extremely useful to provide journalists with background material explaining the full context of a development, even if this is not to be printed. A journalist is likely to be favourably impressed by frankness, and needs all the help he can get if he is to give a full and fair account to his readers.

Newspaper features

In newspaper feature articles on scientific subjects, information is conveyed not directly by the informant but through the medium of a professional newspaper writer. The writer will need all possible help, including the provision of prepared graphic material where available. But he has his own job to do, and his own audience to address. The crucial consideration for a scientist hoping to communicate with the public by providing material for a feature is respect for the job that the feature-writer is tackling: a job essentially of popularisation.

It is vital for the person providing information for a feature-writer to know fairly clearly what audience is aimed at. A science writer, for instance, will need a different degree of information from a farming writer or a woman's page writer. It is worth the interviewee's time asking the writer to define his needs as clearly as possible: this can help to clear up misunderstandings.

Radio interviews

The essence of success on radio is clarity, brevity, and a respect for the audience. That audience, of course, cannot be assumed to have any pre-knowledge of the subject of the interview. So a special effort is needed to think clearly and simply about the purpose of the interivew, which is not to turn people into scientists but to tell them what the subject is and why it is interesting, important and relevant.

The best learning technique for scientists is for two or more of them to interview each other on tape, and to play back the result. This can help make clear that interviewing, as well as being interviewed, is a craft: that the direct and clear question, far from being abrupt or hostile to the interviewee, is often a valuable way of eliciting the necessary brief, clear answer.

The best defence against misquotation on radio, and the best method of speaking direct to the general public, is crisp and effective use of the radio interview. This is especially true in developing countries, where TV and newspapers are often available only in the urban centres.

Radio talks

If invited to give a formal, scripted talk on radio, scientists and administrators must not imagine they can simply rely on lecture notes that they use for addressing highly educated audiences. Plain, direct and colloquial speech is essential. Scripts must be read so as to sound as though the reader is talking, not reading. The craft of writing and of reading radio scripts can best be learnt by doing: writing your own script on a subject of your choice, read it to a tape recorder, play it back - and next time you will do better!

TV interviews

There are two likely formats for the sort of TV interviews participants may be asked to give. One is the quick interview - the "doorstepper", TV men call it - on the way in or out of a meeting. If this seems likely, the interviewee should prepare in his mind a quick two-sentence summing up of what he wants to say, and say it more or less regardless of the question put.

The studio interview is a slower and more laborious process. It is almost always possible to agree in advance with the interviewer the likely shape and sequence of his questions. But it is important to avoid too detailed rehearsal, for fear of seeming pat and glib. Never say - as TV interviewees so often do: "As I was just saying", referring to something that viewers have not seen. Always speak direct to the interviewer: never speak direct to a camera, unless by agreement with the studio director. Always respect the audience. If the studio lights are in your eyes, object before the interview starts.

It is important for interviewees to know in advance what technique will be used for the interview. Two methods of recording interviews are currently in common use: by electronic cameras, and by film cameras. The use of one or other will depend on the physical resources available to the relevant broadcasting organization.

Interviewees should always ask whether they are being interviewed on film, which means that what they say can be easily edited: or on videotape, which means electronically for later transmission: or live, which means by electronic cameras that transmit their electronic images direct over the air. Interviewees should invariably ask, in advance, how long they are allotted to say what they want to say: a one-minute interview for a news programme is very much sharper and more concentrated than a 15-minute interview for a magazine programme, and the interviewee should not be shy about finding out just what he is letting himself in for, and preparing his answers accordingly.

A successful interview is what the interviewer wants, as well as the interviewee: all interviewers want to cooperate with

their subjects, and are glad to give advice both on the form and on the content of the interview.

TV talks

In addition to the general considerations for radio talks (see above), TV talks require special techniques. Always talk to the camera as if it were a friend on the other side of the table. Never feel shy of consulting a script. Do not bob your head up and down between script and camera. Keep still: all gestures and grimaces are magnified by the camera.

TV studios may (if luxuriously equipped) offer the facility of a "prompter" machine. This can take the form of large cards containing leading ideas for a script, held up below the camera by a studio assistant. This device is unnecessary: if it is offered, refuse it and make no secret of reading from a script on a lectern.

Autocue or TelePrompter machines are devices whereby a prepared script is projected from a light source onto a clear glass screen directly between the speaker and the lens of the camera he is talking to. Using these devices, if offered, is tempting but delusive. Unless you have a lot of experience in their use, prefer a script on a lectern.

Graphics and visual aids can be helpful in the presentation on television of complex information. But most television receivers everywhere are improperly adjusted, and show a blurred image. Only very bright and clear images will be clearly received. In preparing visual aids for TV, it is essential to find out not only whether transmission is in colour, but whether most potential viewers have colour receivers. (In Britain, for example, research has shown that 90 percent of viewers of Open University programmes, transmitted in colour, are viewed on black-and-white receivers: most colour images are wasted). In preparing graphic material for TV, always work closely with a specialist TV producer who will know what material will "work" on TV.

THE PRINTED WORD

D J Plumb

Introduction

Irrespective of the value of the communication, all printed matter can be divided into two definite areas. The first requires little or no reader participation and is judged purely upon the needs of the reader - choice of newspaper, author, subject interest etc. The second in which the reader or user of the printed material has demands made upon him in the form of making a decision based upon the information, giving asked-for information or performing a function and acting on given instructions. In the second area legibility, comprehension and presentation are the main concern.

We are all subjected in one way or another to printed material that requires action on our part, from completing a tax return, taking an examination or attempting to construct a model from a kit of parts, and have found that the speed at which the job is completed, or the success or failure from acting upon written instructions, is dependent on the way that the chosen words or instructions were presented, either with or without illustrative aids.

There are applications where the visual display of words that demand positive action on the part of the reader fall outside the area of printed matter. Motorway signing systems, warning and informative notices etc. are such examples and have, in addition to the factors of legibility, comprehension and presentation the new factors of Time and Distance in achieving communication effectiveness.

These new factors, which are not critical in normal word presentation, dictate that presentation of the legible and comprehensive parts is critical in an application where there may be no allowance made for misunderstanding on the part of the reader.

Design Objectives

A resume of the chief attributes of printed material that is intended as the sole means of communication, not supported

by spoken commentary or illustrative prompting and instruction, would read as follows:

1. Its ability to give information accurately and concisely
2. Its ability to possibly seek information
3. Its ability to collect that information, and
4. Its ability to allow easy retrieval of the sought and collected information.

In other words, communication can sometimes be a two-way process.

The success of communication by the printed word could be placed upon three factors:

1. The use of common-sense when constructing the words of communication
2. The ability of the writer or communicator to view a specialist subject through the eyes of a non-specialist, illiterate or semi-illiterate reader, and
3. The ability of the writer or designer to present the written information in such a manner as to enhance and predict its effectiveness.

Together with these factors must be put the understanding of production techniques when applied to the financial resources available.

The choice of type-size, for example, can be determined by several factors including:

1. The amount of text to be set
2. The amount of space available on the page for the text
3. The normal lighting conditions in which the material is meant to be read. For instance, if it is to be read in natural lighting then a smaller type-size is used than if read as, say, an instruction or maintenance manual under a tractor or down a mine in poor lighting conditions
4. The distance at which the material is meant to be read. If it were a poster or explanatory wall diagram, then a larger type-size would be used than if it were a piece of hand-held material intended for use at normal eye level and distance
5. The age or educational status of the reader. Children, semi-illiterate or old people may find difficulty in reading so the easier it can be made the better, and one would use a larger type-size than that employed for the educated reader in full command of his or her sensory powers.

All production techniques can be chosen by determining the factors of use, together with the finance allotted for production and the availability of the technique.

It has been mentioned that common-sense is a prime factor in the construction of the written word. An extension of this common-sense could be in the form of defining one's own ability in the various areas of design and production, and a rational look at all the factors governing the presentation of information can be seen as being part of this. A check list of these factors enables you to structure both the design and production more effectively, and might read as follows:

Type of publication:	Book Booklet / Leaflet Poster Other
Type of information:	Statistical text Statistical diagram Explanatory text Explanatory diagram General information
Type of text:	Informative Technical (either statistical or explanatory) General
Type of illustration:	Objective Symbolic Abstract
Type of reader:	Illiterate (reader in this case means user) Semi-literate Literate General
Location of reader:	Rural Urban General
Age of reader:	5-15 15-60 60+ General
Supporting material:	Is other information to be used in conjunction with the publication (printed or verbal)?
Distribution:	How is the publication to be distributed? By mail By hand to the reader Collected by the reader Other
Retrieval:	Does the publication seek information from the reader, and how is this gathered information retrieved?
Resources:	What resources, creative, production or financial are available?

Each one of the above, or any other factor contained in a check list requires a selective decision which, when made, will provide the basis on which design and production can be implemented, either with or without professional assistance.

Production of the printed word

The first requirement in the production of the printed word is the means by which the individual characters or letters in the word are assembled ready for printing.

The techniques for letter-assembly or type-setting can be basically broken down into four areas:

Hand composition, which indicates the manual placing in position of these individual letters. The modern technique hardly varies in principle from the invention of moveable type in about 1440. Each letter is an individually cast piece of a lead alloy which bears the characteristics of the letter in reverse, so that when printed it appears correct and the right way round.

Mechanical composition in which the letters are assembled either in complete lines of type (Linotype) or as individual letters made up as lines (Monotype). Like hand composition, mechanical letter-assembly is based upon hot metal.

Photo-composition This method is used increasingly as an alternative to hot metal and is primarily a photographic technique. The individual letters are placed in position on a negative matrix and either by manual selection or by using a keyboard, are positioned between a light-source and photographic paper which is then exposed to give the images. A unique aspect of photo-composition is that it is not limited to the fixed sizes that are used in hot metal, and although using the same size ranges as that method, can complement these with intermediate sizes to suit certain applications. The ability to distort letters and spacing is also unique to this method.

Capable of very fast setting speeds, photo-composition can be used for a variety of applications.

Cold Setting Any method other than the above, especially those which depend upon the use of manual or electric typewriters or the IBM composing system are classified under this heading. The advantage of this method is in the fact that type-setting can be supplied by the ordinary office typewriter and typist without resorting to specialist and costly skills and equipment. The operating of the IBM units requires some training, and the resulting type-setting can be compared with that obtained by the more traditional methods. In the majority of applications where speed and economy are the main limitation, this method is ideal, provided that limitations regarding type-size, style and their use is worked to and the skill of the typist is not overestimated.

Tabular matter set by conventional typewriter

'KODAK' COLOUR FILM AND SIZES AVAILABLE		METER SETTINGS AND LIGHTING BALANCE
'Kodachrome' II for Daylight	135,828	Daylight ASA 25
'Kodachrome' II, Type A	135	Photoflood ASA 40
'Kodachrome-X'	126,135	Daylight ASA 64
'Ektachrome-X' (Process E-4)	126,135,127,120/620	Daylight ASA 64

The same copy set by an IBM composing unit

'KODAK' Colour Film and Sizes Available		Meter Settings and Lighting Balance
'Kodachrome' II for Daylight	135,828	Daylight ASA 25
'Kodachrome' II Type A	135	Photoflood ASA 40
'Kodachrome-X'	126,135	Daylight ASA 64
'Ektachrome-X' (Process E-4)	126,135,127,120/620	Daylight ASA 64

Hot metal typesetting showing headings and sub-headings

National Youth Orchestra of Great Britain

Rimsky-Korsakov

The Russian Easter Festival
Overture Op 36

Rimsky-Korsakov remained, for much of his life, unsatisfied by the dogma of the Russian Orthodox Church, and found himself more attracted by ancient Slav paganism and by mysticism. But in 1888 he attended Easter morning service in St Petersburg, and was so impressed by its colourful nature that he decided to write an Overture for orchestra

Elements of the printed word

About a quarter of the world's population has learned to make itself understood with the symbols, or letters, of the Latin alphabet. Some can decipher it easily, others find it more difficult. Letters are the individual parts of the alphabet, and the basic shapes of these letters cannot change and their function is fixed. Variations of these basic shapes have been made however, and are used as aids to comprehension and should be considered as just as much a part of the communication factor as the words that make up the message. These variations are available in the shape, size, weight, width and slope of the standard letter, each has its use and each can be misused.

Spaces that appear between each letter is automatically provided in all systems of composition, but in photo-setting, these can be varied to suit the text.

Type-faces are distinguished in two forms: those with end lines (serifs) and those without (sans serif) and there is a large selection of type-style in both forms. Usually books, leaflets and any printed material that is intended for continuous reading at normal eye level and distance are set in the serified form which is known as 'Roman'. This form is easier to read, especially in the large areas of text that are found in books, as the serifs act as leaders onto the next letter and word, and the eye tires less easily. Sans serif is more suitable for use in technical and tabular matter.

Both forms are available in all three systems of composition, although if an ordinary typewriter is used, the letter form will vary slightly from that used to type these notes.

Capital letters are known as 'caps' and small letters as 'lower case'.

Measurement The unit of measurement used in printing is the 'point' abbreviated to 'pt'. There are two point systems in use, the English/American (used in Great Britain and the United States and areas under British or American influence) and the Didot (abbreviated as 'D') which is used in all other areas.

The point (pt) itself is approximately 1/72", and type-sizes are arranged in single point increments from 6 to 12pt for bookwork and text setting, by two points from 12 to 18pt, by six points from 18 to 48pt and by 12 points from 48 to 72pt for display setting. As already mentioned, photo-composition, whilst basically using the same increments, can produce sizes outside this scale for special requirements.

Weights and widths Apart from size, letters of any one type-style also differ in the graduations of weight and width. Weight indicates the various thicknesses of strokes in relation to the height and spaces within the letter-form and is usually graded as light, medium, bold and extra bold. There is no standardization of this weight factor, and a bold in one type-style varies from that of another.

Widths are the vertical outer dimensions of the letters. They are in definite proportion to the weight of the letter. Many type-styles are available in only one width, but others offer several, including: extra condensed, condensed, expanded and extra expanded.

Slope In addition to upright letters, or those which are at right-angles to the base line, sloped, or italic, type is also available. Letters in italic slope in one direction only. All type-styles contain an italic version and like variations of weight and width can be used, in conjunction with standard, upright letters, to gain emphasis in text as well as being used where differentiation of certain areas is required.

The word Words are combinations of single letter, and are placed on the page in the order of speech, using spaces to separate individual words, one from another.

A line which contains words and spaces must have optical coherence, i.e. the words must be clearly recognizable and not run into one another. Care must be taken in that the space between words is not too great so as to disrupt the flow of reading. A normal space between words is of a fixed size and regularly repeated.

When word spacing for larger type-sizes (headings of display setting) the spaces may have to be modified as irregularities in letters at the end and beginning of words become apparent and require optical spacing.

The line and column Lines consist of words arranged one after the other, and are placed one on top of the other in a column, with either the natural, built-in space (set solid) or extra space (leading) inserted between the lines in order that a greater degree of legibility is achieved.

The width of a column is usually determined by the number of letters that have to be accommodated, and usual practice is that a column width that contains between 40-60 letters is satisfactory for most needs, and ensures a line that is not too tiring to read and allows the eye to find its way back to the start of the next line.

Lines in columns can be arranged in four ways:

(1) Justified or set full out with lines flush at both the left and right hand side of the column. Word breaks at the end of lines are hyphenated.

(2) Unjustified - ranged left with the lines flush at the left hand side of the column only. These notes are set in this manner which is the usual style for office typewriters.

(3) Unjustified - ranged right with the lines flush at the right hand side of the column. Rarely used except in certain tabular work because of difficulty in reading.

(4) Centred The symmetrical arrangement of the lines on each side of a vertical axis. This type of column is not suitable for text and should only be used in display work.

Examples of type sizes and weights

Light Medium Bold

Justified setting

Ten members of the staff of the Division of Forest Research have undergone a three-day course in public speaking.

It was requested by members of the staff who felt they could benefit from some tuition in the art of communicating with the public, talking to industry and special visitors, and speaking at seminars and lectures and to

Unjustified setting ranged left

By contrast the remainder of the book is far more successful. Backed by tables and appendices, this gives briefly explicit descriptions of nearly 700 species of trees and shrubs, with excellent colour photographs of many of these. Inevitably the coverage is selective, and one could quibble at some of the choices (e.g., no *Eucalyptus microcorys;* only *F. macrophylla* among the *Ficus*). However, in all, this part fully justifies the book's existence.

Printing

Methods of producing the printed image suitable for everyday needs can be defined in three distinct areas:

1. Letterpress The traditional method of printing from a raised (relief) surface from hot metal type-setting. Illustrations can be in the form of line blocks for work containing solid or pure line areas or half-tone for the reproduction of photographs or illustrations containing variations in tone.

2. Offset lithography Based on the principle of grease and water not mixing, a flat metal or paper plate holds the inked (grease) printing area and the non-printing area, which is kept wet, on the same surface.

   The printed image is transferred onto the paper via a rubber offset roller. Preparation for lithography is done in the form of 'artwork' which is the pasting-up of both type-setting and illustration in position ready for photographic transferring onto the place. Type-setting can be either hot metal, photo or cold composition. This method is increasingly used in the production of all manner of printed material from books and leaflets to newspapers.

3. Silk screen A very quick and cheap method of printing posters, display material and other publications not containing small size illustrations or type-setting. Fine nylon mesh is stretched over a frame and the non-printing areas masked off either by hand or photographically. Ink is squeezed through the open, printing areas onto the paper.

Calculations

The area required for type-setting original typescript can be calculated. Type-face manufacturers provide charts with which it is possible to make these calculations based upon the type-style, type-face used together with the number of letters in the original manuscript and the width of column to be used.

This procedure is known as 'casting-off' when counting the number of letters in the manuscript and 'copy fitting' when estimating the amount of space required to 'fit the copy'.

It is suggested that unless you have a working knowledge of these calculations it is left to the typographer or printer to work out the exact area which your copy will require, for not only will it be difficult to learn the system in the short time available at present, but there are other working terms such as 'ems' and 'ens' that could cause confusion.

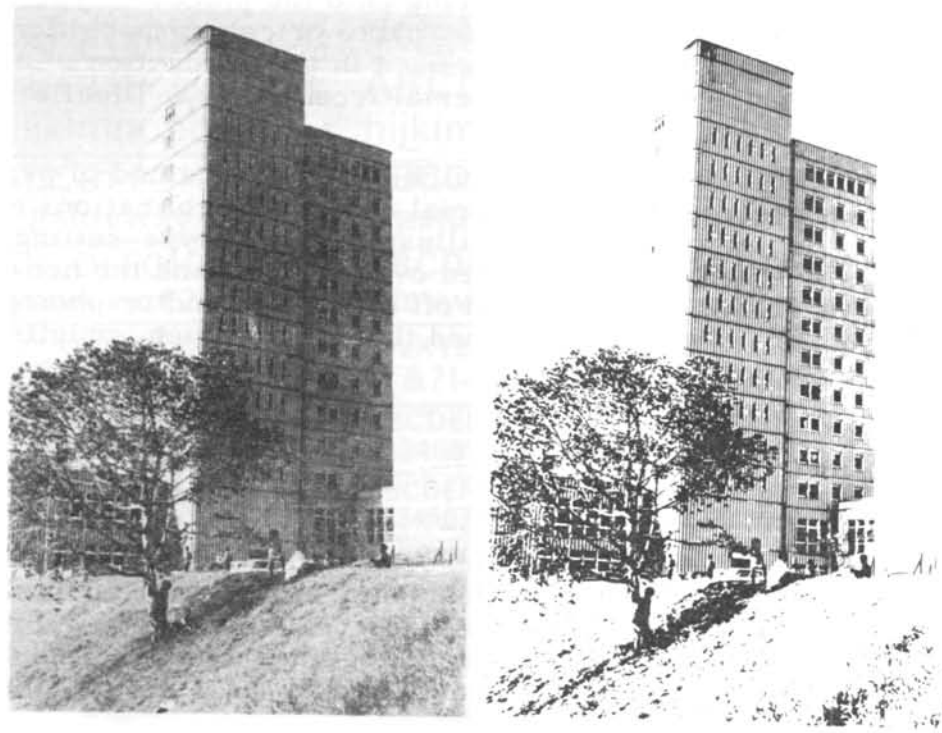
Illustrations

The choice of illustration and its reproduction are sometimes paramount in the effectiveness of communication in being able to explain or demonstrate one particular part of the information that would otherwise take time in writing and possibly understanding.

Reproduction of illustrations is in two forms - Line and Halftone.

Line illustrations are, as the name implies, made up of solid areas or lines without tonal areas. The preparation for these illustrations is in the form of black and white originals, and any tone that may be required is introduced at this stage as a pre-printed area of dots or other linear devices that gives the appearance of a tone of the solid colour.

Line illustration developed from a continuous-tone original



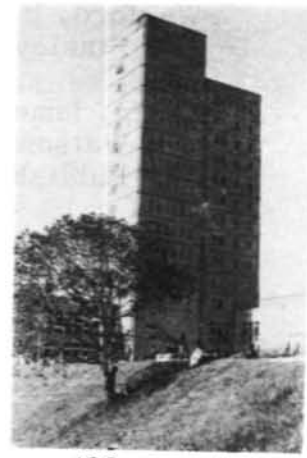
Half tones are prepared from continuous-tone photographic originals, and in order that they can be printed, must be rephotographed through a screen that breaks up the whole of the tonal areas into a series of dots that progressively increase from very small for the light areas to large for the dark tones.

The size of these screens is based upon the number of dots to the inch.

Course screen half-tone illustration

65 screen

85 screen



100 screen

It is important that the correct screen is used on paper for which it is suitable, and will avoid the loss of definition which might be critical in the illustration.

If finance allows only the cheapest method of production with the cheapest type of paper, it might be worth considering a simplification of the illustrative material in the form of line instead of halftone provided that the detail required to be shown is not lost.

Communicating with the printer

So far we have only dealt with outgoing communication or that which has an effect upon the reader in the giving of instructions, information etc. There is also communication that has to be made with the printer or whoever is producing the material.

As with outgoing communication, the information given to the printer must be clear, concise and to the point. In the situation where you are dealing direct with the printer and not relying on his design services he will need to know the following:

1. Size of publication (in either trimmed or folded Imperial sizes or the International 'A' sizes), and the approximate number of pages.
2. Number of colours to be used.
3. Type of paper (if a choice is allowed).
4. Amount of text.
5. Number of illustrations and whether line or halftone.
6. Binding or finishing requirements.
7. Quantity needed.

and the original manuscript must show clearly any alterations to text, words or passages to be set in bold, italic or any other variation of type-style.

Further reading list

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SCIENTIFIC WRITING AND EDITING

P J Boyle

Introduction

No scientific research is completed until it has been written up so that its results can be communicated to others. Much of this research will be written up for publication in scientific journals and will make its debut on the world scene in this form. Articles in scientific journals will also be given notice by one or more secondary documentation services and thus be brought to the notice of a wider audience than the readership of the journal in which the article was published.

Scientists may be called on to prepare many different types of scientific writing. These may include theses and dissertations, conventional scientific articles, monographs, books, reports, research proposal and applications for research grants, extension literature, practical manuals and technical specifications, popular and semi-popular articles. The range is wide, but the same basic principles of production and presentation apply to all.

The involvement of information officers and scientific administrators in scientific writing may take any of the following forms:

1. They may themselves have to write up scientific material for presentation in summaries, reports (e.g. departmental or annual reports), and for publication in popular or semi-popular form.

2. They may be called on to edit scientific writings and referee them for sense and grammar, advise on editorial matters and see articles, book, etc. through the press.

3. They may be asked to provide instruction in scientific writing and publication.

The principal and most representative type of scientific writing is the scientific article published in a primary journal. It is to this type of publication that what follows is mainly directed.

For many scientists almost the hardest part of a research project is to write up the results. It can be very difficult to make a beginning and some scientists may need a lot of tactful prodding and help to start them on their way.

Effective scientific writing calls for many qualities of logic and precision and depends on the ability of the writer to develop his arguments logically and express his results clearly.

Scientific content

The scientific paper should report significant theoretical, experimental or observational extensions to knowledge or significant advances in the practical application of known principles.

The temptation to rush into print prematurely should be resisted. Only when the writer has something important to say and has a substantial body of original research results to back his conclusions should he publish.

Organization of material

Various ways of presenting the contents of research papers can be adopted, but the following three basic structures are most common.

1. Introduction
   Materials and methods
   Results
   Discussion

2. Introduction
   Theoretical analysis
   Application
   Conclusions

3. (For description of new methods)
   Introduction
   Description of procedure
   Tests of the method
   Discussion

As a first step, it is useful to assemble all the material to be used in preparing the article and then devise a working title. This title should be as short as possible, but long enough to indicate the main purpose and scope of the research and should contain only one topic. In addition, a brief summary of the contents of the article and its conclusions should be written. These exercises help clarify and concentrate thought. At this stage the decision as to where to submit the article can also be taken.

Where to submit scientific papers

In many instances the answer to this question is relatively self-evident and rests with the research worker who will generally know the journals in his subject field and can also get the advice of colleagues. Wherever possible, research should be written up with a specific journal in mind, rather than being written up first in the hope that a journal that will take it can later be found.

Having selected a target journal, it is then extremely important to read any Instructions to Authors it may carry. Editorial practices and conventions differ among journals in such matters as the way they require illustrations, figures, bibliographic references, etc. to be given, length of articles, presentation and style, abbreviations, etc.

Many organizations similarly have their own editorial conventions for their staff which generally include instructions on such matters as page size, layout, abbreviations, units of measure and general in-house editorial procedures to be followed for the various types of publication prepared by the organization. Many of these conventions will also apply to material for publication outside the organization and, when used in conjunction with an effective in-house editorial board or panel to vet publications for scientific standards, etc., can be a very valuable means of ensuring a high standard of scientific publication.

Drafting and revising

O'Connor and Woodford (1976) recommended first drawing up an outline of the text to be written. This should be in the form of a topic outline defining the subject to be discussed in each paragraph, and a sentence outline setting out the main points it is wished to make about each topic. Having done this, the first draft should be written as rapidly as possible, preferably at a single sitting and without special regard to style or grammar. In this way the draft will read as a single unit and can then provide a basic draft that can be corrected and refined for structure and style.

Assuming that the structure follows the first example given on page 7.1, the various sections should be drawn up with the following contents in mind:

Introductory section This should be brief, indicate the purpose and scope of the paper and show how the research reported follows on from previous work.

Materials and methods section The experimental design and approach should be described and the choice of method (including statistical methods) justified if there are alternatives. The exposition should be logical and given enough details to enable others to repeat the experiments.

If commercial equipment, drugs or chemicals with registered trade names are used, suppliers, names and addresses should be given. Pesticides, pharmaceuticals, etc. with both trade and established common names should be referred to by their common names only. If pesticides, etc. have no known common names, then use the trade name followed in brackets by the chemical name, where known, on the first occasion the name is used. There are various reference books which can be consulted. Where plants or other organisms are used, the genus, specieis, race,

cultivar, variety, etc. should be given, with authority for nomenclature as required. Particulars of sources of supply of organisms may also be important. In experiments with humans or animals, it may be necessary to ensure that ethical considerations and safeguards have been taken into account and details have been given.

Results section Results should be presented in logical order, giving only those details that are most important and relevant and are not given elsewhere, e.g. in tables. Statistical operations and significance should be shown.

Discussion section This section is sometimes run together with the results section in shorter articles. Its purpose is to assess the significance of the results, compare them with previous work and assess their importance for future studies.

Acknowledgements Any substantial help or advice received from individuals or organizations should be briefly acknowledged. It is wise to ensure that all acknowledgements are beforehand agreed with the persons or organizations named. This section should normally go at the end of the text and before the references section.

The abstract The abstract, usually placed at the head of an article, is now a most invariable component of scientific articles. It informs readers rapidly of the main contents of the article and thus helps them decide whether they need to refer to the article itself. Also, it will almost certainly be used by one or other documentation and information service as a means of alerting users of the service to the existence and contents of the article. The abstract may also be used as a source of index entries by secondary services.

Where scientific articles report original research results they should be informative. Generally, they should state the aims of the research (though not if this is already clear from the title of the article), indicate the methods used, give the main results obtained (with more important factual or numerical data) and the conclusions reached. Abstracts should be kept as short as possible consistent with acceptable information content and should not generally exceed 250 words.

So-called indicative abstracts are generally used for research reviews and similar articles. They will be short and need contain only a general description of the subjects dealt with or other relevant comment.

Tables and illustrations

Good guidance on the presentation of tables and illustrations is given by O'Connor and Woodford (1976) and it is not proposed here to do more than bring together the main points to be borne in mind.

Tables These should follow the style used in the target journal. Titles, column headings and notes should be such as to make the table comprehensible without having to refer to the text. Titles should be kept as short as possible and no table that is not strictly essential should be left in.

Numbers should be arranged from small to large where possible. Units that keep numbers as small as possible should be chosen. Statistical information is important and the test of significance used should be stated, with P values, standard deviations or standard errors of means.

1. The number of observations on which the values given are based should always be stated.

2. Remove explanatory notes to the foot of tables in small type; in order to refer to them, use small superscript letters in the body of the table.

3. Tables should be designed to fit into the column or page width of the target journal.

4. Tables stretching over two or more pages are greatly disliked, and every effort should be made to split overlarge ones. Similarly, tables should not be overstuffed with numerical data.

Illustrations The two main kinds of illustrations are line drawings (e.g. diagrams, graphs, histograms) and photographs from which half-tone illustrations can be made. Photographs of line drawings are difficult to correct and will cause problems if changes are needed. Reprographed versions of illustrations are rarely accepted. In all cases, instructions given by the target journal should be followed implicitly. All illustrations should carry legends and any necessary explanation of symbols, lettering etc.; like tables, they should be comprehensible without reference to the text.

With line drawings, graphs or histograms can be used to show several relationships simultaneously, but too much should not be crowded into a single illustration. In representing numerical results, it is a common habit to show them in terms of a plotted curve, which implies that the line joining two sets of values is a continuum. In such cases a histogram may be a more accurate representation. Lines should never be extrapolated without indicating to the reader that it is an extrapolation.

It may be necessary to abandon some types of photograph, e.g. chromatograms, autoradiographs, etc., which may be better represented by line drawings; similarly a diagram may be better than a photograph for describing equipment

Illustrations should be prepared with the column or page size and shape in mind.

1. Block-making may entail reduction in size, which may make any lettering or symbols hard to read.

2. Lettering should not be in thick, bold type, which looks very dark when printed.

3. Lettering and symbols should be at least 1.5 mm high after reduction.

4. A scale bar should be included in all micrographs, maps, etc.

5. Graph lines should not be drawn too thin or they may be scaled down to hair thickness on reduction. To produce broken lines it is best to draw the line solid, then ink the breaks in with white ink.

6. Use of Letraset or other pre-printed lettering may be very useful for diagram work.

7. Zeros should be placed before decimal points.

8. The symbols and units used should be those specified by the target journal.

9. Graph axes should carry lower-case, not capital lettering.

10. Lettering should be horizontal, not vertical.

11. Never draw letters freehand if it can possibly be avoided and use the same style of lettering in all illustrations and figures.

Bibliographic references and copyright

Any tables, illustrations or prose passages (verbatim or paraphrased) taken from other persons' published or unpublished work should be acknowledged. Permission to use such material may be needed and it is the author's responsibility to get it. In principle, up to 10 percent of a copyright text can be quoted without violating the copyright, but exact definitions are unclear. It is safest, as well as professionally courteous, to ask for permission to use anything more than 2-3 lines of text.

It should be made clear in the text by use of quotation marks (single quotes) where passages have been taken verbatim from other authors' articles. Where passages have been altered in the interests of brevity or selection, they can be referred to as: "Based on Smith, 1962" or "Adapted from Smith, 1962", with full bibliographic details given in the References section. Permission should always be sought to use unpublished material or private communications.

In compiling the list of references, most journals require the name and date system. Some may ask for references to be given as footnotes and others, especially review publications, may ask for a numbered system. The name and date system will take the general form "Smith, 1974" or "Smith (1974) has reported that ..." (See also The Royal Society, 1974). Where more than one paper by the same author, published in the same year is quoted, this should take the form "Smith, 1974a" or "Smith (1974a,b) has stated that ..."

References to unpublished work or to private communications should appear only in the text, not the reference section.

References to journal articles will usually take the following form:

Names and initials of all authors
Year of publication
Title of article
Journal title (either abbreviated or not abbreviated as required)
Volume number
First and last page number

References to books or book chapters:

Names and initials of all authors
Year of publication
Title
Names and initials of Editors
First and last pages of chapter or section
Publisher's name
City or town of publication

These are the two most common types of references and include the full set of bibliographical components required for readers of articles to be able to identify and locate them should they wish to consult them themselves. Methods for arranging bibliographic components may be specified in the target journal. Other guidance is given in the British Standards Institution (1950).

Abbreviations for journals titles are now covered by two main systems. The first is the International List system based on British Standard Institution (1970) and American National Standard Z39.5-1969. A useful source for these abbreviations has been prepared by BIOSIS (1974). Another source is the UNISIST/ICSU-AB list (1970). The other authority is the World List of Scientific Periodicals, which has now perhaps rather less authority than the first.

Units of measure, acronyms, etc.

The Instructions to Authors should be checked for details of permitted units of measure and other editorial conventions. Generally speaking, abbreviations and acronyms should be

kept to a minimum; internationally established ones can stand by themselves, but others should be spelt out in full or defined the first time they are used.

With numbers, all measured amounts should be given as figures and not spelt out. Figures should be used for all numbers of 10 or over, except where they come at the beginning of a sentence.

When wishing to indicate use of Italics for species names, etc., underline the words in question, but otherwise avoid underlining except where necessary. Use marginal notes (in pencil) to draw attention to any similar points over which confusion could arise, such as letter 'L' for figure 1, capital 'O' for figure '0'. Use of proof correction symbols in the margin can often clarify such points. Symbols and units of measurement used should preferably follow international SI practice, as will be required by most journals (see British Standards Institution (1969)). Useful guides to editorial conventions, etc. are given by Collins (1956) and TheRoyal Society (1974).

Style

Within the limits of this Workshop it is not possible to deal in any comprehensive way with matters of style. The foundation of effective presentation is to have good research to report and logically arranged, well organized material to write up. Scientific writing differs from other writing in reflecting the intellectual discipline of science itself. Hypotheses have to be expressed clearly. Statements made must be coherent, unambiguous and be able to stand up to the critical scrutiny of other scientists. A good deal of scientific research is of interest only to other scientists and it is all too easy to drop into stereotyped turns of phrase and jargon understandable only to other initiates.

Guidance on style and writing is given in various texts, among which the following can be recommended: Tichy (1966), Strunk and White (1972), Council of Biology Editors (1972), Gowers (1973), O'Connor and Woodford (1976), Woodford (1968), Darbyshire (1970), Turner (1974).

It is worth stressing that scientific writing in English greatly benefits from the use of short sentences and short rather than long words. All too much scientific writing suffers from inflated language, especially where use of abstract nouns rather than verbs has become a habit (e.g. "The conclusion reached was ...." rather than "I conclude that ...."). Authors should be pressed to shorten, simplify and prune all wordage that cannot earn its keep.

Final drafting for press

In the final draft, the title should be written in terms as short, concise and informative as possible. The final

copy should preferably be typed up on A4 size paper, using ample margins on both sides and double line spacing, in as many copies as are required by the journal editor.

The copy will normally be arranged as follows:

1. Title, authors' names and addresses (with any changes of address as footnotes)
2. Abstract
3. Text
4. Appendices (if any)
5. Acknowledgements
6. References
7. Tables (each on a separate page)
8. Legends for illustrations

Before submitting a paper to a journal editor

1. check that all pages, tables and illustrations are numbered consecutively
2. see that the margin is marked to indicate where tables and illustrations should be placed
3. see that all bibliographic references, footnotes, tables and illustrations have their appropriate references in the text
4. make sure the final draft has met all the requirements of the target journal
5. make sure that copies of the final draft have been retained for authors' files
6. make out and keep a file record of all relevant dates and notes relating to publication (e.g. dates of draft typing, submission to referees and return, submission to journals, referees' comments, receipt and return of proofs, etc.)

Proof corrections

Assuming that an article has been accepted for publication, the next stage is the receipt of galley proofs (unpaginated long sheets) or page proofs (sheets carrying the pagination in which they will be published). Photo-offset proofs may take the form of text with a transparent overlay on which corrections can be made.

Proofs should be read at least twice. It is helpful to read through once for sense and grammar and then again to check numerical data, spellings, authors' names, etc.

Substantial additions or deletions to printed text are difficult to make and may involve rearrangement of whole blocks of print. If the printer has pied the text, the onus is on him to put it right.

However, if an author has second thoughts about what he has written journal editors are unlikely to agree to any but minor alterations, and certainly not merely for stylistic improvement. Any corrections that have to be made should result in the minimum change in spacing - this can often be done by removing, adding or altering words to offset the change.

Marking corrections

All corrections should be marked in ink both in the text and in the margins of proofs, using standard proof correction markings. Journals may also ask for different coloured inks to be used to distinguish between author's and printer's corrections.

Details of symbols for proof corrections are given in British Standards Institution (1958) and (1973). They are of most importance to editors, but authors should also know how to use them.

References

BIOSIS, Chemical Abstracts Service, Engineering Index, Inc. (1974).

Bibliographic guide for editors and authors. Biological Abstracts, Philadelphia; Chemical Abstracts, Columbus, Ohio; Engineering Index, Inc., New York, NY.

British Standards Institution (1958) Table of symbols for proof correction.

Extract of BS 1219: 1958. British Standards Institution, London.

British Standards Institution (1969) The use of SI units. PD 5686. British Standards Institution, London.

British Standards Institution (1970) The abbreviation of titles of periodicals.

BS 4148, Part 1. British Standards Institution, London.

British Standards Institution (1973) Draft british standard specification for copy preparation and proof correction. British Standards Institution, London. Revision of BS 1219.

Collins, F H (1955) Authors and printers' dictionary. 10th Edition. Oxford University Press, London.

Council of Biology Editors (1972) CBE style manual. 3rd Edition, American Institute of Biological Sciences, Washington, DC

Darbyshire, A E (1970) Report writing. The form and style of efficient communication. Edward Arnold (Publishers) Ltd.

Gowers, Sir E (Revised by Sir B Fraser) (1973) The complete plain words. 2nd Edition. Her Majesty's Stationery Office, London.

O'Connor, M, Woodford, F P (1976) Writing scientific papers in English. An ELSE-Ciba Foundation guide for authors. Elsevier, Excerpta Media, North Holland, Amsterdam.

Royal Society (1974) General notes on the preparation of scientific papers. The Royal Society, London.

Strunk, W and White, E B (1972) The elements of style. 2nd Edition. Macmillan, Riverside, N J; Collier-Macmillan, London.

Tichy, H J (1967) Effective writing for engineers, managers, scientists. Wiley, New York and London.

Turner, B (1974) Effective technical writing and speaking. Business Books Ltd., London.

UNISIST/ICSU-AB (1970) International list of periodical title word abbreviations. Prepared for the UNISIST/ICSU-AB Working Group on Bibliographic Descriptions. ICSU-AB Secretariat, Paris; Chemical Abstracts Service, Columbus, Ohio.

Woodford, F P (1968) Scientific writing for graduate students. A manual on the teaching of scientific writing. Rockefeller University Press, New York; Macmillan, London.

Table of Proof Correction Media

Marginal mark	Meaning	Corresponding mark in text
	Delete (take out)	
	Delete and close up	above and below letters to be taken out
	Delete and leave space	
stet	Leave as printed	... under letters or words to remain
caps	Change to capital letters	 under letters or words to be altered
s.c.	Change to small capitals	 under letters or words to be altered
caps. & s.c.	Use capital letters for initial letters and small capitals for the rest of words	 under initial letters and under the rest of the words
l.c.	Change to lower case	Encircle letters to be altered
bold.	Change to bold type	 under letters or words to be altered
ital.	Change to italics	— under letters or words to be altered
rom.	Change to roman type	Encircle words to be altered
w.f.	(wrong fount) Replace by letter of correct fount	Encircle letter to be altered
	Invert type	Encircle letter to be altered
x	Replace by similar but undamaged character	Encircle letter to be altered
	Close-up - delete space between letters	linking words or letters
	Insert space	
eq. #	Make spacing equal	L between words
less #	Reduce space	L between words
tr.	Transpose	 between letters or words, numbered when necessary
n.p.	Begin a new paragraph	[before first word of new paragraph
run on	No fresh paragraph here	 between paragraphs
(/)	Insert parentheses	
[/]	Insert (square) brackets	
	Insert hyphen	
	Insert apostrophe	
	Insert single quotation marks	
	Insert double quotation marks	

[Proof]

1. s.c.

Results

2,3. 9/c

Most of the experiments in the present investigation were carried out with

4.)/

cocaine; and the results to be described

5,6. below/wf.

~~bloew~~ were obtained with this unless

7. #

special mention is made.

8. ital.

Magnitude of action potential.

9,10. J/H

(1) Conduction along the distal ~~non~~ non-

11. ⊙

narcotised segment. In view of the

12. tom

finding of Woronzow that the size

13. tis

the of electric response suffers decrement

14. tis

along the distal region most beyond the

15. =

depressed area, it is interesting, first

16. see

of all, to ~~find~~ whether the same

17,18. the/lc.

would occur under present EXPERI-

19. run on

MENTAL conditions.

20. caps

For this purpose dd leads were first

21. less #

employed. Records of propagated

22. stet

disturbances were taken ~~both~~ before and

23. X

at varying intervals during narcosis and

24. n. p

recovery. [With ND leads diphasic re-

cords ...

25. ϕ

Smith (1940) stated, The following

general equation may be used

26,27,28. ô/ϕ

$$a = Ka\phi \left[\frac{p+q}{(r+s)}\right]$$

To printer
lc. sloping
Greek kappa

[The same corrected]

RESULTS

Most of the experiments in the present investigation were carried out with cocaine, and the results to be described below were obtained with this unless special mention is made.

Magnitude of action potential.

(1) *Conduction along the distal non-narcotised segment.* In view of the finding of Woronzow that the size of the electric response suffers most decrement along the distal region beyond the depressed area, it is interesting, first of all, to see whether the same would occur under the present experimental conditions. For this purpose DD leads were first employed. Records of propogaged propogaged disturbances were taken both before and at varying intervals during narcosis and recovery.

With ND leads diphasic records ...

Smith (194)) stated, 'The following general equation may be used

$$a = ka_o \left[\frac{p+q}{(r+s)^2}\right]$$

Meaning of marks

1. *Change to small capitals.*
2. *Invert letter.*
3. *Close up.*
4. *Substitute comma. (Similarly for semicolon.)*
5. *Replace by word in margin.*
6. *Wrong fount. Replace by letter of correct fount.*
7. *Insert space.*
8. *Change to italics.*
9. *Delete (take out).*
10. *Insert hyphen.*
11. *Insert full stop. (Similarly for colon.)*
12. *Change to roman type.*
13. 14. *Transpose. When several words are badly mixed up they may be numbered, the mark 'trs' being written in the margin.*
15. *Straighten lines.*
16. *Replace by word in margin.*
17. *Insert word or letters in margin.*
18. *Change to lower case.*
19. *No fresh paragraph here.*
20. *Change to capital letters.*
21. *Reduce space.*
22. *Leave as printed.*
23. *Replace by similar but undamaged character.*
24. *Begin a new paragraph.*
25. *Insert single quotation mark.*
26. *Symbols over which this sign is placed to be 'inferiors' (subscripts).*
27. *Symbols under which this sign is placed to be inserted as 'superiors' (superscripts, indices).*
28. *Note to printer to explain an unusual character or expression.*

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

ORGANIZATION OF CONFERENCES, SEMINARS AND MEETINGS

D G Thomas

Introduction

Scientific conferences, seminars, symposia, and colloquia are becoming more and more common, but there is rarely any continuity of organizational experience among those who become involved in their arrangement. More often than not, the job of organizing falls on a willing amateur - willing at the outset, at least. If he is fortunate, he may find a colleague who has handled a comparable event and who remembers enough about it to pass on useful information.

When a conference is over, the organizer is glad to forget all about it and will gladly return to his normal work as soon as possible. Consequently, this sort of experience is rarely written up and made more generally available.

No two conferences are the same, each having their special circumstances and problems. There are however several matters common to all meetings, and a check list and time schedule of preparatory events can be drawn up.

Fixing the date and venue must be the first decision:

- Will the desired audience be able to attend?
- Is there a clash with other events?
- Will it be convenient for dignitaries to open and attend?

Committees are essential if the conference is large, residential, extending over several days, and to which international delegates are expected to attend.

Sometimes it is appropriate to set up a prestige group, called 'Conference Council', 'Patrons' etc. of influential people. They should be invited to lend their names in good time for inclusion in any brochure announcing the conference.

Under the main Organizing Committee, there should be a series of Task Forces or sub-committees to be delegated with responsibility to deal with the detailed planning of aspects of the conference:

Finance

- to ensure sufficient funds either by donations, subventions or other subsidies, and by conference fees
- to budget for the various items of expenditure
    - printing and postage (stationery, advance documentation, proceedings)
    - hire of hall and conference accessories
    - accommodation for visitors
    - hospitality, social functions, refreshments
    - travel, visits, excursions
- to decide on disbursement of funds
- to account for expenditure

Accommodation and hospitality

- Conference accommodation
    - size of hall (number of delegates to be decided by Organizing Committee)
    - additional rooms for syndicate and group meetings
    - reception room and delegates lounge
    - secretariat offices
    - press and publicity office
    - catering facilities and bar
    - Chairman's office
- Delegates' accommodation and hospitality
    - proximity to conference hall (if close, may save on transport costs)
    - single and double accommodation
    - arrangement for meals, including dietary requirements
    - arrangements for settling bills
    - preparation of delegates lists indicating where accommodated and how to contact (Room number, telephone number)
    - arrangements for meeting delegates at airports etc.
    - transport arrangements for delegates
    - local private hospitality
    - special arrangements for accompanying spouses

      visits to local places of interest
    - programme of local events, local places of worship

Documentation - Administrative

- Headed notepaper
- Notices and brochures announcing the conference
- Invitations to contribute paper
- Tickets, lapel badges
- Detailed information on travel, accommodation, programme
- Conference folders or briefcases

In drawing up the timetable for pre-conference despatches, aim at spacing them to maintain continuing interest.

Notices and brochures should be truly informative, explaining why the conference is being convened, the background to the theme of the conference, expected outcome, expected attendance, and the benefit envisaged to delegates. It should be remembered that documents sent to potential contributors and visitors may have to be used by them in making a case to their organizations to justify their attendance.

When designing application or registration forms, careful consideration should be given to the information sought from those who will attend, by what date the completed forms are required, and how this information will be handled by the conference office. If different information is to be processed by more than one person (e.g. accommodation, transport, attendance at social functions) it may be advisable to have separate forms for each category, but provision must be made for delegates to enter their names on each form.

Documentation - Conference contributions

- Abstracts
- Full papers
- Proceedings

For a large conference, papers are usually pre-printed and distributed in advance. Amendments to papers after submission should not be encouraged, but reasonable requests should be considered sympathetically. In any case, amendments and updating can be done before submission of the proceedings to the printer.

It may sometimes be appropriate to request synopses or abstracts of proposed papers some time in advance of the papers themselves. This may help the convenors to tailor the programme either by persuading contributors to design their papers differently or by inviting further contributions to fill gaps.

Contributors should be sent notes for guidance in the preparation of papers. Sometimes it is possible for contributors to prepare sufficient copies along a defined format for distribution, but freight charges often preclude this course. The papers should however be in a form that would not require

editing, even to the extent of supplying 'camera-ready' copy for offset printing. Some provision should however be made for transcription, including re-drawing of illustrations.

Full particulars should be obtained of any demonstration, film or slides with which contributors propose to illustrate their presentation, to ensure that appropriate equipment can be made available at the conference hall.

Publishing of proceedings can be a problem. Careful thought should be given to the value of this course, as it may be sufficient to have more important papers published in appropriate journals after the conference. If the discussion is to be printed, it will save much time and trouble if contributions can be written down by those contributing them, or else can be typed quickly and shown to the speakers before they disperse at the end of the conference. Recorded tapes are not the answer; floor contributions are often indistinct and and the play-back takes as long as the original contribution !

Conference procedure

Most of the arrangements for looking after people and ensuring the smooth running of the conference may best be regarded as a continuation of all that has been done before the event. All those who have assisted with the preliminaries should be present in force: they will already be in the picture, familiar with names, and so on. More helpers than these will be needed, of course, and it is vital to hold a comprehensive and unhurried briefing session with all helpers present. Each should know his own job, and should also know who are responsible for other jobs. All stewards should wear badges indicating their function.

Amplification systems and other services should be tested before the proceedings commence. It is necessary to ensure that there is adequate liaison with contractors' staff and/or the maintenance staff of the premises. Provision should also be made to amplify contributions from the body of the hall.

Speakers who intend to show films or slides should meet their projectionists before the session, to go over the material and agree on signals. Ensure disciplined control over blackout and/or lights. Check the ventilation.

It is tiresome to have to hunt for small change for interval refreshments. They should be free (the cost can be included in the conference fee), and so arranged that nobody has to spend most of the interval queuing for them.

The stewards' briefing might include some reference to general security of property, especially if valuable equipment is in use or on display.

Conference office

A conference office should be established at or near the main meeting place. For a residential conference, it may be necessary to have this manned without break for 16 hours a day. Arrange reliefs, so that those manning it do not starve.

The office equipment should include a typewriter, and perhaps a duplicator, with stocks of appropriate stationery; also

Spares of pre-prints and other documents;
Receipt books;
Travel timetables;
Details of parking spaces and service garages;
Maps and location diagrams;
First-aid kit;
Telephones (perhaps provision for visitors as well as staff);
Information on places of worship, theatres, cinemas and other local facilities.

It is also as well to consider security for valuables, including portable equipment.

Ensure that all telephone numbers likely to be needed in an emergency are readily available.

Registration of delegates

The Registration desk should be in a central and prominent position, adjacent to the Conference office. Registration gives the opportunity not only to be informed of the delegates' arrival, but also to distribute the delegates kits which should contain:

- Additional information on the Conference arrangements
- Lapel badge
- Extra Conference papers
- Invitations to receptions
- Questionnaires on local visits, excursions, return journey

Receptions

It may be appropriate to hold some reception function on the eve of the main proceedings or on the first working day.

If the occasion warrants official hospitality, a Minister or senior government official may offer cocktails. If this kind of function seems appropriate, check up well in advance on protocol.

Otherwise, or in addition to this, one of the organizations sponsoring the conference may agree to put on a reception, with or without a meal. This will help to distribute the work, but it is important to ensure that liaison arrangements are adequate.

Chairman

If the chairman of the various sessions have to be selected according to status, rather than special knowledge of the business of the conference, it is all the more vital to ensure that they are adequately briefed. Each should be provided with appropriate notes, which may cover any of the following:

Welcoming remarks;
Background to subject-matter of the session;
Notes on speakers;
Suggestions for remarks to open discussion, to guide this in useful directions;
First few named contributors to discussion, if known;
Time limits, etc. (most important!)
Summing-up remarks.

It may be appropriate to have a secretary for each session, to sit with the chairman and help him run the meeting. This secretary might well be someone who will ultimately be responsible for getting the proceedings into shape for printing - or at least someone who will have that requirement in mind, and who will therefore see that speakers are identified and that an adequate record can be made.

If a lot of people wish to speak, and a selection has to be made, forms handed in before the session will help the chairman and secretary to arrange the appropriate order. Some degree of spontaneity has inevitably to be sacrificed in a large conference, but try not to exclude it altogether. It is always possible that someone present may be stimulated to original, valuable and articulate thought in the course of the session itself.

If the conference splits into smaller groups for part of the proceedings, the chairmen of these groups can perhaps be selected primarily for their ability to direct discussions, resolve conflict and so on. If so, they will need little guidance, but they should be provided with lists of group members, timetables, etc. and adequate briefing on any form of group report to the plenary session.

Announcements from the chair should be made, as far as possible, at the opening of a session. They should be kept to an absolute minimum.

Clearing up

It is advisable to appoint someone to look after the return of all equipment, etc., at the end of the conference; this includes the return of slides, etc., to speakers. Things do tend to 'disappear' when conferences break up.

After-conference staff meeting

A meeting of all helpers should be held after the conference has dispersed. This is useful partly as a means of collecting experience and views on how to do better next time, but it is far more important as an opportunity to thank explicitly all who have helped.

A conference is usually the occasion for a remarkable degree of enthusiasm on the part of all sorts of people. Members of the staff whose routine work may be quite unspectacular suddenly appear as models of social resourcefulness, work all hours, weigh in with hospitality and transport, and generally make a very big contribution to the 'image' of the organization. This should be acknowledged, handsomely.

These helpers often find themselves out of pocket in all sorts of little ways that are not normally covered by any of the official arrangements for meeting expenses, and it may not occur to them to claim for these expenses. The organizer should be alive to this matter and should do whatever is appropriate to arrange reimbursement.

Phasing of planning activities

Pre-12 months	Organizing Committee Funding and budget Banking arrangements
12 months	Draft outline of conference programme - theme, size, duration, invited contributions - attendance charges
11 months	Settle on date and venue - book conference centre - book delegates accommodation
10 months	Despatch of invitations and information on conference Conference Council Task Forces begin work in earnest
6 months	Receipt of abstracts Catering arrangements
4 months	Receipt of full papers Press announcements Arrangements for official receiption
2 months	Badges Signposts and location diagrams Notice boards Car parking arrangements

Check-list

Conference office

- Staff roster
- Telephone numbers
- Information sources
- First aid
- Lock-up arrangements

Registration

- Staff
- Tables
- Badges
- Receipts
- Other documents

Equipment

- Projectors and operators
- Demonstrations
- Amplification
- Black-out, ventilation, lighting control
- Platform furniture

EXHIBITIONS, OPEN DAYS AND DISPLAYS

D J Plumb

D G Thomas

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^{o} slope is optimum

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

Visual angle: Allow 50^{o} above and 70^{o} below the average eye level for visual angle without head movement.

Allow 30^{o} 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 de gning 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 conjuction 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 tele - phones: 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 numbers:	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.

SUBMISSIONS TO COMMITTEES

Mrs 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?

POOLING EXPERIENCE IN DISCUSSION

Mrs 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) (List of Names))	(Regular members of the body)
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.

COMMUNICATING IN RESEARCH MANAGEMENT - CASE STUDY

D G Thomas
M N G A Khan

Due to reduction in the national budget, the Government has formed a national committee to advise it on how economies will be effected in different sectors. The two national R & D institutes are required to submit proposals on the ways savings will be made, and to indicate how the programme will be affected by these cuts. The Research Directors will also be required to submit a case in support of retaining some positions now vacant, and of proceeding with defined capital expenditure.

A national Committee has been formed to recommend to the Government as regards the programme and budget proposals of the two national R & D institutes, one concerned with industry and the other agriculture, in view of the following situation.

Situation:

Transferring all vacant positions to central pool

All long-term projects to be suspended - projects with immediate prospect of return only considered

Budget on current expenditure reduced by 20%

New capital expenditure to be reduced by 50%

Capital works in progress to continue but no funds for new equipment and furniture

Travel outside country disallowed

Internal travel must be approved by Headquarters - 20% reduction in Travelling Vote.

Casual employment stopped

Temporary staff to be dismissed

No expenditure requiring convertible currency

Journal and book expenditure reduced 20%

Staff - no promotions to fill vacant senior positions

No increments

Procedure: The participants will be divided into two syndicates to represent the two institutions and each one will be given a role of divisional head according to the institutional charts. Proceed as follows:

Each department head prepares an annual programme for his division, indicating the projects (on-going and proposed, short and long term), manpower (available, required, existing vacant positions) and the budget required (salary, overhead, capital items of expenditure, consumables, etc.), and how his division is affected by the cuts.

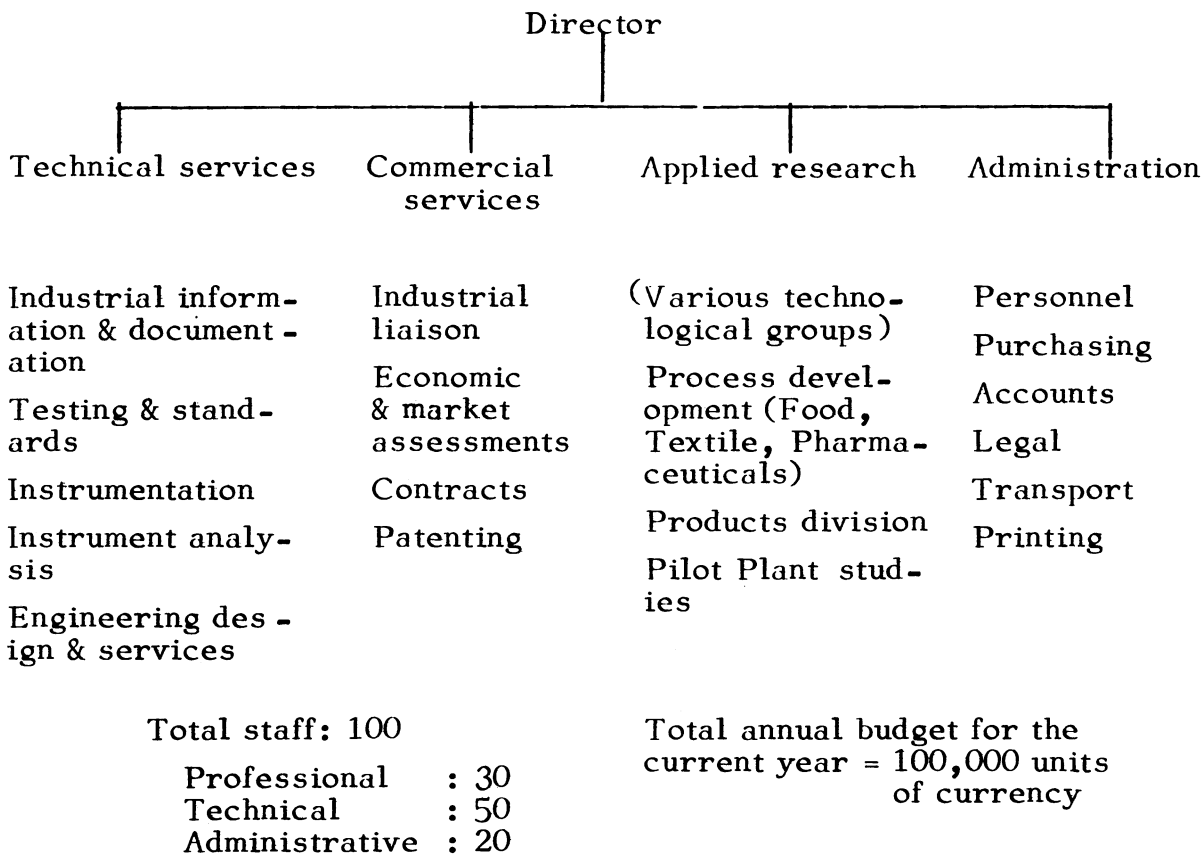
All divisional heads meet with Director in a joint session to work out an annual programme for the institute, suggesting ways savings will be made and indicating how the programme will be affected by these cuts.

Prepare a written submission to the national Committee in support of your programme.

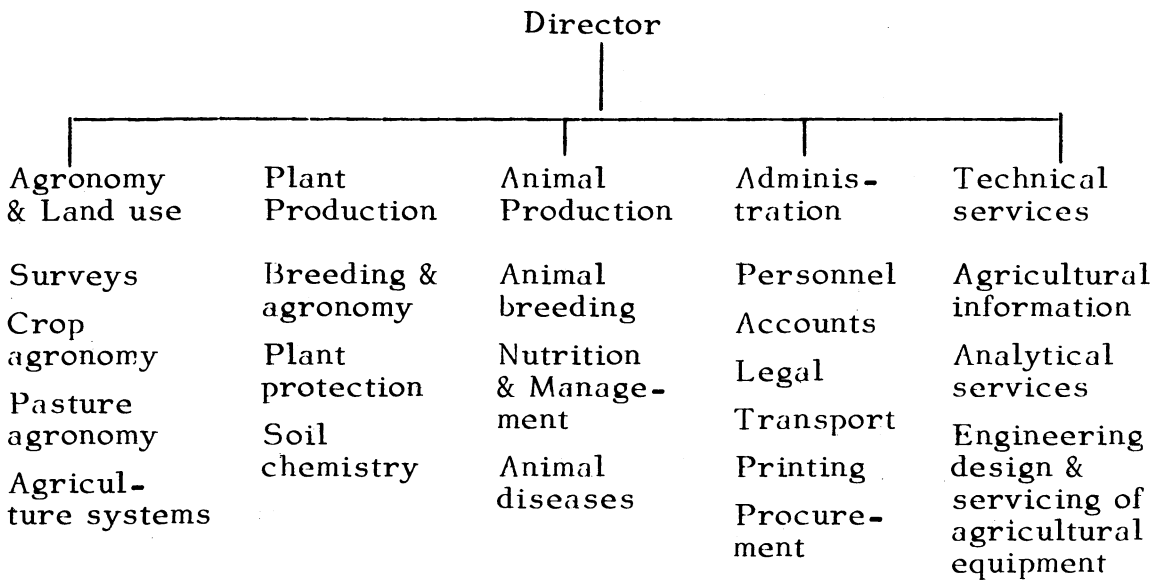
Prepare a Press Release

Oral presentation to the national Committee by Directors in plenary

Take part in Radio and TV interviews.



Organizational structure of the Industrial Research Institute



Organizational structure of the Agricultural Research Institute

INFORMATION SYSTEMS AND SERVICES IN SCIENCE AND TECHNOLOGY

P J Boyle

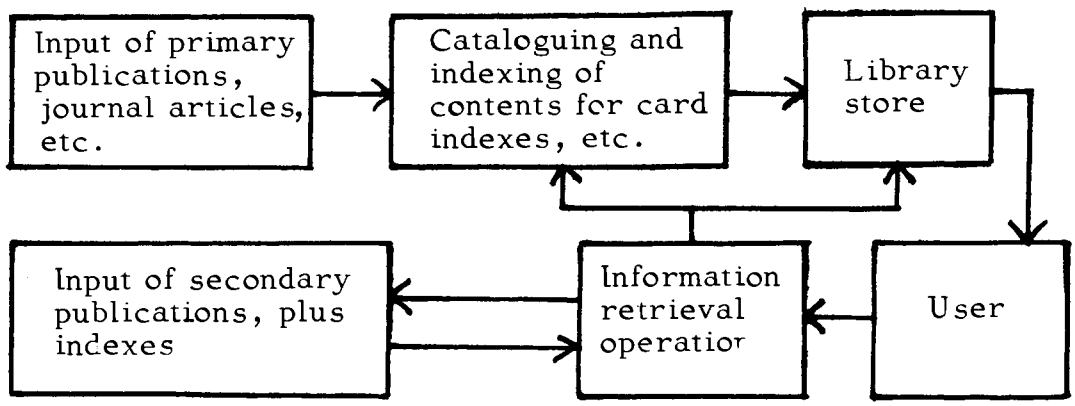
Introduction

The main information need of scientists is to know what research is going on, who is doing it and where and what results have been obtained. They also need much factual and numerical data and information about methods, materials, new products, information sources, etc. The world fund of formal published scientific information in all active disciplines and technologies is very large and growing continuously. Access to this information is mainly through various institutional facilities. Research managers, administrators and policy makers equally need access to information for research planning, the assessments of priorities and budgets and in policy making, but this is of a qualitatively different kind to that needed by practising scientists.

For scientists, to be well informed requires knowledge of what information exists and how to get it. This is mainly a matter of access to published literature taken by libraries attached to research institutes, universities, etc. where they work.

The Library information system

Functional components In all countries libraries are the principal first-line repositories of information for scientists. Their basic function is to obtain, catalogue and store documents and to make them accessible to users on demand. In addition, libraries will normally undertake to obtain loan copies or photocopies of documents held elsewhere. A generalized scheme for the library function is as follows:



In this scheme, the user can have either direct access to library stocks on the shelves or can use subject or author catalogues and top of indexes to identify items which can then be retrieved from stocks. The information retrieval operation may be done by the user himself or by information personnel working on his behalf. The secondary information literature may also be used to identify documents needed and which can be obtained from library stocks or outside sources.

Library contents The usual classes of literature held by a science library will include the following:

1. Journals, conference proceedings, bulletins, monographs, etc. containing original research reports.
2. Books, textbooks, research reviews and digests, scientific reference books, data files, etc.
3. Dictionaries, glossaries, guidebooks, etc. for general reference.
4. For some libraries, patents and/or standards literature.
5. Secondary information journals, reviews, digests.

Publications in classes 1 to 4 will generally be given notice in the library catalogue. Class 5 is the so-called secondary literature which typically consists of journals containing collected titles of articles or titles plus abstracts or other extracts from the primary literature. This can therefore be regarded as condensed information about the contents of primary publications and which at the same time gives sufficient details to enable the original documents to be identified and located. Such publications provide a key to literature not taken by the library and so greatly extend its literature coverage. The indexes in secondary publications perform the same role for the literature they cover as library catalogues do for the library contents.

Library catalogues The catalogue or index has a key role in enabling the library contents to be noted and retrieved. This is usually done by means of subject keywords and authors' names. In some very large libraries the cataloguing arrangements may be complex and computerized, but in most smaller libraries manual indexes are usual. At their simplest, these indexes may consist simply of individual cards. Each new document entering the system is indexed by subject and author and new cards carrying the bibliographic description or accession number are made out and added to the cards already in the system. Because each entry needs two or more new cards, such indexes rapidly become physically unwieldy. A measure of compression can be achieved by using various forms of edge- or centre-punched cards in which the same index card may carry a number of different document descriptions or accession numbers. Alternatively a card may be made out for each document or accessions number, which is then edge- or centre-punched for an index keyword or keywords.

A variant of the former is the so-called feature or optical coincidence card index. In this system every keyword in the index has its corresponding feature card. Each card which is edge notched carries a fixed number of positions (usually up to 10,000) which can be located by horizontal and vertical coordination and on which each coordinate position corresponds to a document accessions number. When a new document (book, research paper, memorandum, etc.) enters the library, it is first indexed and given an accessions number. If the keyword chosen has already been used in the system, its corresponding feature card is extracted and a hole punched at the coordinate position corresponding to the accession number of the new document. If the index keyword is new, then a new feature card is made out for the keyword, punched at the appropriate coordinate and added to the cards already in the system.

When using a single card for retrieval, the card corresponding to the chosen keyword can be taken from the index and placed over a light source. The coordinates at which light shines through the card can then be identified and their respective accession numbers found and used to retrieve the corresponding documents from store or file. Alternatively, more than one feature card can be aligned together in a stack and similarly placed over a light source. The coordinates at which light shines through the stack correspond to those documents carrying all the index terms chosen for retrieval. By this method index entries can be coordinated so that retrieval is achieved with chosen keyword combinations.

The choice of cataloguing system depends on the size of library or amount of material to be dealt with. The feature card system can be used to index the same number of documents as there are coordinate positions on the cards; when the number of documents exceeds this number, then a new set of index cards must be started. In time, this could involve the sequential searching of a number of feature card sets. In practice, it becomes difficult to use more than about five sets of a feature card index carrying 10,000 coordinates; however, where it is wished to retrieve material going back over a relatively limited period of time this may be less of a problem.

Where feature card systems involve substantial numbers of keywords, users may find it difficult to decide which is the correct keyword to use for retrieval. In this situation it will be necessary to provide both users and those responsible for document indexing with a list of the main operative keyword synonyms, related or alternative terms with cross-references linking them to the preferred operative keywords*.

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* A good account of a feature card system and its associated controlled index or thesaurus is given in the following reference: Posnett, N W The Land Resources Division and its feature card system. Quart. Bull. IAALD, 1975, 20, No.1, 23-33.

Photo- and microcopying Reprographic facilities are nowadays available in many libraries. Xerography is in common use for direct copying of documents for internal and external use and is a valuable means of providing document copies on request without the need to send the originals. Microcopying is also in use as a means of rapid, inexpensive document transfer through the mail and can offer a way of reducing the volume of library storage needed. Microfiche (commonly 90 pages per fiche) is more popular then microfilm, mainly because it is more convenient and file storage of microfiche is easier. However, the equipment needed to produce microfiche masters is expensive; copying masters is appreciably less costly and microfiche readers themselves are relatively inexpensive.

Microfiche is likely to become increasingly important as a medium for document transfer in international and multinational documentation and information systems. However, scientists themselves generally dislike having to use microfiche and its acceptability as an alternative to maintaining library stocks in hard copy form is likely to be limited, in practice.

In-house provision of scientific information

Information gathering habits of scientists There are variously reckoned to be 30-35,000 scientific journals in the world today, though in the face of this very large number (and ignoring the additional very large amount of non-conventional literature) it has also been said that 95% of the really important literature is published in only about 10% of them. Typically, scientists may read on average only 10-12 journals regularly, perhaps 8 or 9 specifically on their subject and the rest general science journals such as Nature or Science. Outside their own reading, many scientists rely heavily on informal contacts at work, conferences and symposia, on abstract journals, etc. So-called invisible colleges (e.g. groups of scientists within and outside their own country who share a professional research interest and who correspond, exchange reprints, etc.) are also considered important by some scientists, though such groupings tend to be rather haphazard and unsystematic as information sources.

Library information services Generally, libraries will take as much of the relevant primary literature as demand requires and budgets allow and take secondary literature to supplement their coverage. Outside scientists own literature scanning, therefore, efficient library services thus depend on effective ways of identifying wanted documents and effective means of getting documents that are not already taken by the library. This depends on a good inter-library loan system, backed up by knowledge of how and where to get documents outside the library network, e.g. in other countries.

A valuable and rapid method of alerting library users to new literature is to list it for, say, weekly circulation. Such lists will not necessarily include research articles in journals which the scientists concerned will see anyway, but will concentrate on incoming books, reviews, reference books, conference proceedings and other non-conventional literature, etc.

In-house information personnel There is an increasing trend in many organizations to appoint information officers specifically to process and prepare information for users. This can work very well where such personnel are in close touch with those they serve; in large organizations this can save much of the time many scientists spend searching the literature and maintaining their own card indexes.

Such personnel may compile lists of bibliographic references, find and assemble hard data and generally deal with specific enquiries for technical information. Clearly, good knowledge of information sources and of scientific information work generally is important; in many cases good subject knowledge will also be necessary.

Some research organizations in developed countries have large centralized information departments based on the library and which use computerized methods of processing information. Computers are expensive, but hardware and software costs are falling and equipment is improving all the time. Their use as information processing aids is likely to increase considerably over the next decade.

Where national documentation and information centres exist, these are likely to play an increasing role as intermediaries in abstracting primary literature and in searching secondary literature on behalf of users. Also, literature search services such as those specifically provided in agriculture by such services as the Commonwealth Agricultural Bureaux can provide useful back-up for national or local information sources.

Formulation of enquiries Where information personnel have to do scientific enquiry work, a common problem is to identify exactly what the enquirer wants. Within the same organization, this is not too difficult - the problems arise when enquiries come from outside. Proper formulation of enquiries involves both the seeker and the provider of information. It is useful to itemize some common difficulties, especially with complex enquiries invdving comparison and assessment of information. Here are some questions for those answering enquiries:

1. Does the enquirer want as much information as possible, or only an introduction for which a few key documents or a recent review will do?
2. How far back should the enquiry go? (In many subject areas, anything over 10 years old may be of little value).
3. How quickly is the information needed?

In answering enquiries, simple facts and figures can generally be found in textbooks. Enquiries of the kind "all information on ....." often turn out to be much less sweeping in scope on being referred back to the enquirer.

It can be very useful in dealing with enquiries to draw up a standard form to answer some of these points in advance.

Secondary information sources and services

Today no scientists can hope to keep up with the literature published in his subject by his own efforts. Fortunately, he has no need to be informed about more than a fraction of it and the problem is therefore one of selection. The so-called information explosion was first felt in the developed countries. In response to the need for a means of identifying and selecting wanted from unwanted literature, there have now grown up secondary documentation and information services in all disciplines and technologies of any significance. A new discipline of information science has itself recently evolved and the number of its practitioners grows. These services are mostly staffed by information specialists whose principal job it is to prepare notices (article titles, or titles plus abstracts) of the contents of journal articles or other primary publications, and to issue these, usually plus indexes, at intervals to users. The indexes make it possible to identify and retrieve particular primary documents and the information given in the abstracts enables users to decide whether or not they need to see the original document.

There are now hundreds of secondary information services in existence. Some are very large and sophisticated, others are small. Many are national, some are multinational and some are international. All the very large services now use computers to enable them to deal with the enormous amount of information they have to process. Nearly all these continue to issue printed journals and all produce their output on magnetic tape as well. This enables users with the necessary computer facilities to print out all or to select parts of the contents according to need.

Secondary information services

Examples of the more important among these services are the following:

Biological Abstracts, issued by the Biosis service (about 120,000 abstracts per year).

Chemical Abstracts, produced by Chemical Abstracts Service (over 160,000 abstracts per year).

These are major commercial services serving particular scientific disciplines.
Examples of large nationally based services covering a wide range of disciplines are the Referativnyi Zhurnal series of abstract journals produced in the USSR by VINITI (over 900,000 abstracts per year) and the Bulletin Signaletique journal series produced in France.
Examples of large recently created international services are the Agrindex and Atomindex title services.
An example of a large multinational service is the Commonwealth Agricultural Bureaux (CAB) which issues 130,000 abstracts per year in its journal series.

Up to several months or more may often elapse between the publication of a scientific article in a primary journal and the appearance of its corresponding abstract in a secondary publication. To meet the need for rapid notice of new literature, so-called current awareness services such as Current Contents and Chemical Condensates are available. These publications issue lists of article titles, Current Contents in the form of copied primary journal contents pages and Chemical Condensates as repackaged title lists. In both cases, the objective is to reduce to a minimum the interval between primary and secondary publication.

Special outputs Some secondary documentation and information services repackage the material in their data bases into so-called SDI (Selective Dissemination of Information) outputs covering small subject areas. The CAB for example, repackages its main abstract output into regularly issued outputs covering such narrow fields as plant growth regulating substances, irrigation and drainage, etc. The UK INSPEC service, which covers physics, electronics and computers, provides a similar service covering particular subsections of the main subject sections. The Chemical Abstracts Service, for example, also provides output covering, say, a single chemical to customers' requirements. Both the Excerpta Medica and CAB services provide retrospective retrieval services on demand, in the case of CAB in the form of one-off annotated bibliographies which cover the literature published over a longer or shorter time interval.

All the large services use highly sophisticated computer aided processing techniques and, unfortunately, many are very costly to use.

Data analysis and referral centres There are a number of document analysis centres in existence in which the data or factual information in primary journals is analyzed and made available in condensed form to users. These services are generally staffed by scientific specialists and their output is numerical or factual data, provided in response to direct enquiry. An example is the US National Oceanographic Research Centre. Initiatives are being made to set up an Environmental Referral Service. Other services, such as the National Referral Centre for Science and Technology in the USA, provide information about sources of information.

International and national agencies and systems concerned with scientific information

Of the following organizations, INIS and AGRIS also publish secondary information, but all are important as referral agencies for service and aid in scientific information matters.

AGLINET (Worldwide Network of Agricultural Libraries) Like AGRIS, this is based on FAO and consists of a network (at present) of 10 collaborating agricultural libraries. The system is seen as complementary to AGRIS and its aim is to coordinate library resources and exchange internationally.

International Nuclear Information Service (INIS) (International Atomic Energy Agency, INIS Section, PO Box 590, 4-1011, Vienna, Austria). This was the first fully international information system and deals with information on nuclear science and atomic energy. It produces Atomindex. Governments of 22 countries collaborate.

Information System for Development Science (DEVSIS) (Information Science Division, International Development Research Centre, Box 8500, Ottawa, Canada KIG 3H9). Modelled on the INIS and AGRIS Systems. This is a projected international information system for economic and social development, particularly for the Third World and is still in the planning stage. Its function will be to coordinate the collection and evaluation of published and unpublished information on development policy, planning, finance and trade, the social and economic effects of development programmes and related aspects.

International Council for Scientific Unions (ICSU) (17 Rue Mirabean, 75016 Paris). A non-governmental international organization consisting of a number of scientific unions, sections and committees coordinating various scientific activities on an international basis. An important component of ICSU is its Abstracting Board which exists to improve the quality of scientific information and its distribution among scientists. Represented on its Board are major secondary documentation services and publishers of scientific journals.

International Federation for Documentation (FID) (7 Hofweg, the Hague, Netherlands). The principal non-governmental international organization concerned with the study and coordination of documentation and information. FID collaborates with various other international bodies, convenes conferences and organizes study and research programmes. A special committee (FID/DC) exists to survey documentation needs in developing countries and promote documentation activities.

International Information System for the Agricultural Science and Technology (AGRIS) (AGRIS Coordinating Centre, FAO, Via delle Terme di Caracalla, 00100 Rome, Italy). Similar to INIS in being a system in which cooperating countries or regional centres (over 60 in all) collect and record information on the literature published within their geographical area. This information is sent to FAO, Rome, where it is coordinated and prepared for publication. The subject

coverage includes all aspects of agriculture and related subjects. The present output is Agrindex, a monthly title service, in printed form or magnetic tape. Parallel abstract outputs covering major subject areas in agriculture are planned for the future.

ISORID (Information System on Research in Documentation) Set up in 1972 by UNESCO to collect, organize, analyze and disseminate information on research activities in documentation, libraries and archives and to keep a register of research projects on information and documentation.

UNESCO (United Nations Education, Science and Culture Organization) (Place de Fontenoy, Paris 7, France). This is an agency of the United Nations with responsibility, among other things, for fostering and developing efficient information services in member countries. UNESCO organizes meetings, arranges for consultancy work and the training of information personnel and has been instrumental in setting up documentation centres in various countries.

UNIDO (United Nations Industrial Development Organization) (Felderhaus, 2 Rathausplatz, PO Box 707, Vienna 1010, Austria) Set up as a clearing house to provide help to developing countries in industrialization, with emphasis on medium and small industries unable to provide their own R&D. Includes help to providing industrial information facilities.

UNISIST (United Nations Information System in Science and Technology) This is a programme, not a service, established jointly by UNESCO and ICSU (International Council of Scientific Unions). Its aims are to coordinate and promote trends towards international cooperation in documentation and information. Research projects coordinated by UNISIST and funded by UNDP (United Nations Development Programme) are under way at regional and national level in a number of countries. Many study projects covering various areas of UNISIST interest are also in progress.

In addition to these international agencies, various developed countries also provide aid in documentation and information matters. Prominent among these countries is Canada, which funds the International Development Research Centre (IDRC) (PO Box 85)), Ottawa). This organization exists primarily to help developing countries acquire the knowledge they need to improve their social and economic conditions. This it does by awarding grants for appropriate research and for strengthening the information services within these countries. Other countries include the UK (via the British Council, 65 Davies St. London WIY 2AA), the Federal Republic of Germany (the German Foundation for International Development, 53 Bonn 1, Endenicher Strasse 41) and various others.

PLANNING AND DESIGNING NATIONAL INFORMATION SYSTEMS

P J Boyle

Introduction

In many developing countries of the world there have grown up substantial structures of scientific and technological research. These patterns include many disciplines and technologies and involve a wide variety of academic, governmental and industrial research organizations, all with their special information requirements. The major importance of effective documentation and information to support research and development work within these structures is universally recognized and, over the years, complex, often highly sophisticated services and facilities to meet these needs have come into existence in virtually all significant areas of science and technology. These facilities are supplemented by various secondary information services, some of which may cover various individual sectors of the national literature and others, such as BIOSIS, the Chemical Abstracts Service, etc. which cover the international literature.

Because the scale of scientific and technological activity is so great in many developed countries each subject area has tended to become largely self-sufficient for its documentation and information needs and, over time, in many countries a substantial degree of understanding and cooperation has grown up among the various components of the network of services, libraries, etc. serving particular subject areas. In some developed countries, therefore, there may be little overall planning or coordination of services or, indeed, little specific need for it. In other countries, however, notably the USSR, there is a high degree of overall central control dictated partly by language difficulties, the need for internal self-sufficiency and other political and social considerations.

In contrast to the situation in developed countries in developing countries scientific and technological information in developing countries is a resource equally indispensable for economic and social progress, but its availability is often spread much more thinly over various agencies acting more or less independently of each other, often on a very modest scale and with little overall director or coordination. Similarly, the high cost of many secondary information services effectively places them beyond the reach of many potential users in these countries. The scale of activity in particular areas of science and technology is frequently too small to permit internal self-sufficiency for information resources

and there is commonly a correspondingly greater dependence on a very small number of non-specific central facilities, especially academic libraries.

In most developing countries today, there is a general recognition of the necessity for central coordination and improvement of their internal information resources. Such coordination offers a means of better pooling and use of available budgetary resources and of extracting maximum benefit from scarce information resources for the greatest number of users. It can also enable maximum advantage to be derived from imported information, a relatively inexpensive way of obtaining knowledge derived from what may often be extremely expensive research done elsewhere.

Various agencies have been involved in providing assistance in setting up or improving information systems in developing countries. Principal among these has been UNESCO, under which the UNISIST system has been established to provide a conceptual framework and specific recommendations for the design and development of information systems. Within this system, the establishment of a state-controlled national documentation centre acting as the main body with responsibility for coordinating national information resources into a national information system is central to the AGRIS, UNIDO, DEVSIS and INIS concepts.

It is particularly in the context of the developing countries, that this concept of the national information system has developed. At present, there are rather less than 30 formalized national information systems. Some of these are in centrally organized developed countries, but most are in developing countries and most have been set up only within the last 10 years. The concept is likely to prevail in other developing countries in which information facilities have not yet been rationalized into a coordinated system and the number of such systems is likely to increase progressively in the future.

The overall aim of a national information system is to promote the availability and flow of information of all kinds to all sectors of the community that need it. It will utilize and build on the various existing documentation and information resources of a country as a foundation and will involve the following two basic aspects:

1. The establishment of an organizational structure for centralized overall control and direction of the system.
2. The coordination, improvement and systematic development and supplementation of existing facilities and services (e.g. libraries and special information services in academic, governmental and industrial research organizations).

Centralized direction involves the creation of a national information policy with specific short- and long-term objectives for the development of the system. This policy will need to take account, firstly, of the national interests

essentially as extensions of a wider community of world systems, with the associated need for maximum compatibility among systems and cooperation at all levels.

Results of a recent UNESCO study (UNESCO, 1973) in which the organization of information centres and services in various developed and developing countries were examined, underlined the marked differences that existed among them. In 11 out of 13 developed countries, there were various degrees of governmental responsibility for overall management and coordination of information services. In many developing countries, on the other hand, there were libraries, but no documentation centres, and the emphasis was more on supplying primary publications rather than other forms of processed information. An important exception, however, was India, which had a well organized and integrated national system.

In what follows, therefore, the basic pattern of a national information system proposed assumes the UNISIST concept as its model and its context developing countries.

Planning national documentation and information systems

Initially, the national information system will embody existing library and other information stores and facilities as its basis. The essential new feature that must be added to establish a national system is:

(a) A line of administrative and budgetary control of the system system extending through a national focus to ministry or government department level.

(b) A line of executive control of the system extending up to a national documentation centre with responsibility for activating and coordinating the components of the national system.

Such a system, which may initially operate on a very small scale if the infrastructure of the system is small, can provide the necessary on-going technical basis for developing the national system in accordance with needs over time, can provide a national forum for the consideration of documentation and information needs and problems, can provide a basis for enlisting international or other aid in systems development and, finally, can effectively promote better awareness of the importance of scientific and technical information and the facilities available at all levels.

The initial step in establishing a national information system is to set up appropriate planning machinery. This might take the form of a team (preferably small) of experts in information and documentation work or with other relevant background knowledge and experience, and including one or more experts seconded by arrangement with such agencies as UNESCO, IDRC, etc. This would constitute the planning group, which would work to terms of reference and timetable set by a state-appointed committee of representatives of government and principal user groups. The planning group would make recommendations to this committee for implementation.

1. Assessment of information needs and priorities

(a) Identification of documentation and information users and user groups, with data on personnel numbers and distribution, in:

Government ministries, departments and agencies
Public utilities (transport, sanitation, water supplies, etc.)
Socio-economic services (public health, education, housing, labour, etc.)
Government research and development organizations (including agriculture, use and management of natural resources, etc.)
Industry
Universities and academic institutions

(b) Assessment of short- and long-term trends in information needs among these classes of users in terms of primary and secondary information resources, equipment, premises, etc. as indicated by state investment policy in different areas of science and technology, forward projections of research projects and activities, anticipated changes in personnel numbers, etc.

(c) Assessment of budgetary priorities for expenditure on information services among these classes of users, including ratios of expenditure on documentation and information and information services in relation to overall departmental budgets.

2. Assessment of existing information facilities and services

Including:

(a) Itemization of information stores (libraries, documentation centres, archives, etc.) and their principal users.

(b) Itemization of information centres (including industrial information or other specialized centres, referral services, etc.) and their principal users.

(c) Data on stocks of books, journals, etc. held in information stores.

(d) Data on services provided (library loans, micro- or photocopies, enquiries received, secondary information outputs etc.).

(e) Data on numbers of personnel employed in information stores and centres, with details of functions, qualifications and experience.

(f) Data on premises and specialized equipment, reprographic facilities, etc. in libraries or information centres.

(g) Details of regional or international arrangements for obtaining, providing or exchanging information.

(h) Details of printing and publishing facilities and publishers.

(i) Details of budgets for the various information facilities and services in terms of absolute figures and as proportions of R&D budgets.

(j) Data on information flow among the various information units within and outside the country.

(k) Arrangements (if any) for obtaining feedback from users on service efficiency and on services required, and the views of representative samples of users.

(l) Details of existing planning or development policies.

3. Identification of avoidable duplication among existing services.

4. Identification of gaps in existing services that need to be eliminated.

National information system components

These will vary in scale with requirements, but the basic elements of the system will include:

1. A government ministry or department responsible for overall budgetary allocation and political control of the system.

2. A national Focus. The national committee comprised of representatives of government, academic and industrial organizations, administrators, information users and producers with administrative responsibility for overall planning and coordination of the national system.

3. National Documentation Centre. The main national organization with executive responsibility, under the national Focus, for control and coordination of the national system.

4. Network of specialized documentation units and sub-centres. These may already exist, or will be created progressively as need indicates and funds permit. They may be located in university libraries, research institute libraries, etc.

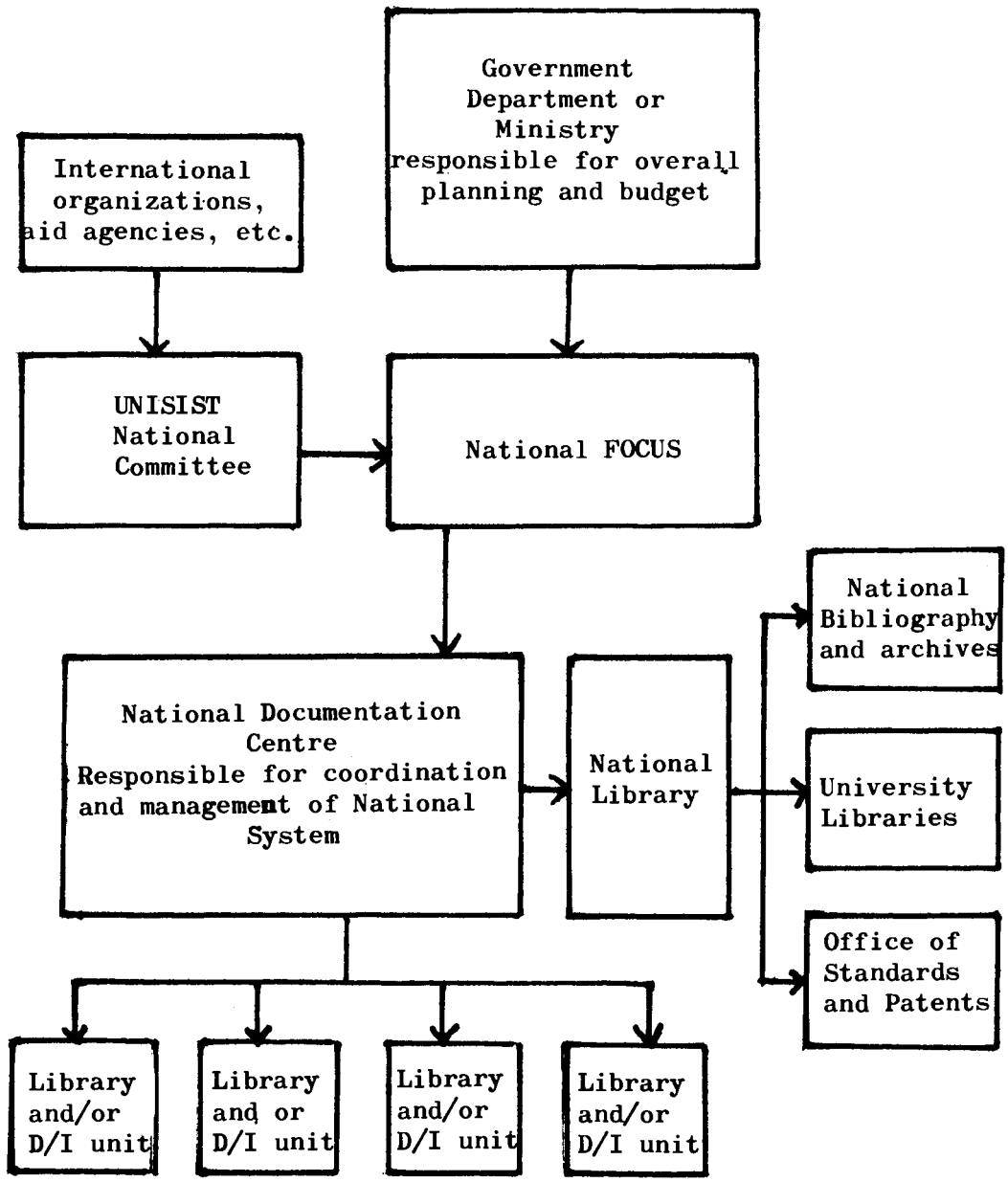
5 National copyright library

6. Network of specialized libraries. These will include libraries of research institutes, professional associations, patent and standards libraries, etc.

7. Specialized documentation centres. These may include referral or other centres engaged in document analysis.

This scheme is shown graphically overleaf.

ELEMENTS OF A NATIONAL INFORMATION SYSTEM



In this scheme, the national Focus may be associated with a UNISIST national committee, thus giving it a direct link with aid and advice from outside the country.

In planning a national system, the task of the planning group is to design a system within these components. The new elements initially to be added to what was there before will be (a) the Focus (b) the national documentation centre and (c) specific measures to coordinate the network of components. The information obtained on national information needs and facilities will provide the basis for short- and long-term design proposals, methods and systems projections and for assessing the changes in the present structure needed to achieve the agreed overall structuring, coordination links and central control in terms of finance, premises, equipment and personnel.

System design may take the form of stepwise phasing-in of different components and methods over time. The most important link in the system is the National Documentation Centre. This may be large or small, depending on the overall size of the infrastructure to be coordinated and the scope of its own information activities. Its personnel should include those with special training in information science and it will work in close association with the national Focus. The Centre may be associated with a large library, though this is not essential. If attached to a library it may itself provide information output in the form of abstracts, titles, etc., or may forward requests for information to appropriate information sub-centres.

Functions of a National Documentation Centre

Depending on its scale, the functional responsibilities of a national centre might include:

1. Implementation of policy decisions on national information services coming from the national Focus.

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. Standardizing 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, titles, etc.

8. Coordination of input to such international information systems as AGRIS and DEVSIS.

9. Training of personnel in information work, including organization of training courses for students and practising scientists.

Within a national system, necessary information resources for research managers, policy makers and planners and which may be embodied in the national system may include:

1. A national bibliography. A list of all significant non-classified government publications and documents, both conventional and non-conventional, and all copyright literature deposited in the national library.

2. A union catalogue. A list of all serial publications taken by the various libraries within the national information system, with the location of each item.

3. An inventory of national research and development projects. Data elements for such an inventory might include:

   Project title
   Personnel
   Institutional affiliation
   Type of research (e.g. fundamental, applied, developmental)
   Start and projected end date of project
   Keywords or other description of the project for index purposes

Sources of international aid for information systems

For many years now, various international bodies have been dedicated to providing aid to developing countries to help build up their information resources. At one time the emphasis was on the transfer of information by provision of services and output from elsewhere, but is now much more on developing national information infrastructures designed to achieve as much national or regional independence and self-sufficiency in information resources as possible.

For developing countries, aid and advice from various international agencies can be crucial to the successful development of national information systems. The most important international agency is UNESCO, supported by the UNISIST programme and the creation of UNISIST National Committees within member countries to work in collaboration with national focal points. In addition to UNESCO plus the support of UNDP funds, FAO coordinates aid for agricultural information systems within the AGRIS framework, and UNIDO for industrial information systems. Various national aid organizations also exist; these are set out in Chapter 14.

Regional information systems

National systems may be associated in one or more subject sectors with regional documentation and information centres controlled by countries with common geographic, linguistic or geopolitical ties. Such jointly operated centres can enable participants to have access to equipment, translation facilities, expensive primary publications, magnetic tape services and other benefits they could not enjoy independently. National documentation centres and national information systems will need to be integrated into joint systems of this kind.

Training in information science

A national information system will depend for efficient operation on trained personnel. Information science is now a recognized discipline and many developed countries now have well established training courses within their academic structure. Developing countries have great need for cadres of trained personnel. The easiest means of developing them is to make use of training facilities provided in and in many cases funded by the developed countries or with the aid of UNDP funds or such agencies as IDRC in Canada or the British Council in the UK.

The need to ensure that the scientific or other communities in countries are adequately informed about information resources and their use must also be considered. The organization of short training courses, lectures, etc. should fall within the responsibilities of National Documentation Centres.

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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.

Commonwealth Science Council **Communication Techniques Workshop**

ORGANIZATION OF THE WORKSHOP

i. Conference Arrangements

Aim of the Workshop:	To demonstrate to the participants a model of a course on Communication Techniques that could be conducted nationally for those responsible for the transfer of scientific information, whether at the laboratory, institutional or organizational level, to different recipients
Dates:	21 - 28 April 1976
Venue:	East African Community Management Institute, Arusha, Tanzania
Organizers:	The Commonwealth Science Council, Africa House, Kingsway, London WC2B 6BD Tanzania Scientific Research Council, PO Box 4302, Dar-es-Salaam, Tanzania
Sponsor:	Commonwealth Fund for Technical Cooperation, Marlborough House, Pall Mall, London SW1
Participating Countries and Organizations:	Botswana, Cyprus, Ghana, Guyana, Kenya Lesotho, Tanzania, Zambia, East African Community, International Development Research Centre
Contact for further information:	Course Programme - Dr M N G A Khan Administrative Arrangements - Mr I A N Munisi Press and Publicity - Mr N J Harman

ii. Participants

BOTSWANA	Mr A V Lionjanga Private Bag 0026 Gaborone
CYPRUS	Mr G P Petrides Geologist Ministry of Agriculture and Natural Resources Geological Survey Department Nicosia
GHANA	Mrs B M O Clerk Council for Scientific and Industrial Research PO Box M32 Accra
KENYA	Mr J K Gitau Ministry of Agriculture PO Box 30028 Nairobi
	Miss I N Kamau National Council for Science and Technology PO Box 30007 Nairobi
	Mr G O Ogola Ministry of Agriculture PO Box 30028 Nairobi
LESOTHO	Dr P E Khabele National University of Lesotho Roma

TANZANIA	Dr. K. Hirji, Department of Zoology, University of Dar-es-Salaam, P.O. Box 35064, Dar-es-Salaam
	Mr. A.M.K. Mtoi, Tanzania Information Services, P.O. Box 9142, Dar-es-Salaam
ZAMBIA	Mr. E.J. Zimba, National Council for Scientific Research, P.O. Box CH158, Chelston, Lusaka

iii. Observers

EAST AFRICAN COMMUNITY	Dr F Kamunvi East African Medical Research Council East African Community P O Box 1002 Arusha, Tanzania
GUYANA	Dr Patrick A Munroe Secretary-General National Science Research Council 44 Pere Street Kitty, Greater Georgetown
IDRC	Mr Robert LeBlond Programme Officer Information Science Division IDRC/EARO P O Box 30677 Nairobi, Kenya
UNESCO	Dr R H Maybury UNESCO Regional Office of Science & Technology for Africa P O Box 30592 Nairobi, Kenya

iv. Resource Team

MR P J BOYLE	Director Commonwealth Bureau of Pastures and Field Crops Hurley Maidenhead SL6 5LR UK
MR N J HARMAN	Director Information Division Commonwealth Secretariat Marlborough House Pall Mall London SW1 UK
DR M N G A KHAN (Course Director)	Assistant Secretary Commonwealth Science Council Africa House Kingsway London WC2B 6BD UK
MRS J KIMEMIAH	Kenya Institute of Administration PO Lower Kabete Kenya
MR I A N MUNISI (Administrative Arrangements)	Tanzania National Scientific Research Council PO Box 4302 Dar-es-Salaam Tanzania
MR D K OPARE-SEM	Council for Scientific and Industrial Research PO Box M32 Accra Ghana
MR D J PLUMB	Consultant Typographer and Chairman, Society of Typographic Designers 1 Cheyne Walk Croydon CRO 7HH UK
MR D G THOMAS	Secretary Commonwealth Science Council Africa House Kingsway London WC2B 6BD

v. Workshop Programme

DAY 1

Morning

Introduction to the Workshop	D G Thomas
Introduction of Participants	
Elements in Scientific Information Brief outline of the primary elements in scientific communication	P J Boyle
Communication to Meet Different User Needs The importance of varying the form and style of communication, oral and written, to meet the peculiar needs of different users	D G Thomas

Afternoon

Oral Presentation and Visual Communication How the skills of oral presentation can be acquired, given the right approach	D G Thomas D J Plumb
Presentation Practice	

Evening

Film and discussion

DAY 2

Morning

The Scientist and the General Public The important points to take into consideration while taking part in radio and television presentations and dealing with the Press	N J Harman
Radio and TV Presentation Practice	N J Harman

Afternoon

Radio and TV Presentation Practice (contd.)	N J Harman
Writing of Press Releases	N J Harman

DAY 3

Morning

The Printed Word Processes involved in producing printed material	D J Plumb
Scientific Writing and Editing The preparation and editing of articles to be published in scientific journals	P J Boyle
Writing for a Technical and Non-technical Readership The different approaches necessary to meet the needs and interests of different readerships on different subjects	D G Thomas

Afternoon

Organization of Conferences and Seminars	D G Thomas
How planning and organization can contribute to the success of conferences	J Kimemiah N J Harman
Exhibitions, Open Days and Displays Planning and organization required to ensure the success of open days and exhibitions	D G Thomas D J Plumb N J Harman

DAY 4

Morning

Submissions to Committees How to communicate effectively with Committees	J Kimemiah
Pooling Experiences in Discussion Benefits that could be gained from proper conduct of meetings	J Kimemiah

Afternoon

Pooling Experiences in Discussion Practical session	J Kimemiah N J Harman

DAY 5

Whole Day

Communicating in Research Management Case Study Group study of practical problems in R&D Management by involvement in a simulated situation	D G Thomas J Kimemiah P J Boyle N J Harman

Evening

Film

DAY 6

FREE

DAY 7

Morning

Information Systems and Services in Science and Technology Different components of a scientific and technical information system	P J Boyle

Afternoon

Organizing National Information Systems Basic outlines and functions of a national information system	P J Boyle D K Opare-Sem
National Information Systems A case study	P J Boyle D K Opare-Sem

DAY 8

Morning

Guidelines for Planning National Information Systems Systematic approach to planning national information systems	M N G A Khan D K Opare-Sem
Guidelines for Planning National Workshops	M N G A Khan D G Thomas

DAY 8 (contd)

Afternoon

Evaluation of the Present Workshop Critical assessment of present workshop with a view to improving the relevance and quality of future national or regional endeavours	D G Thomas M N G A Khan

Evening

Workshop Dinner

SPEECH ASSESSMENT FORM

Topic .....

Speaker ..... Date .....

Evaluator ..... Allotted Time .....

(Underline whichever is applicable)

1 MATERIAL				
Clarity	Very Good	Good	Fair	Poor
Sequence	Very Good	Good	Fair	Poor
Relevance	Relevant	OK	Irrelevant	
Technical Content	Very Good	Good	Fair	Poor
Accuracy	Very Good	Good	Fair	Poor
2 PRESENTATION				
Timing	Very Good	Good	Fair	Poor
Eye Contact	Very Good	Good	Fair	Poor
Voice				
Volume	Too Loud	OK	Too Soft	
Speed	Too Fast	OK	Too Slow	
Variation	Very Good	Good	Fair	Poor
3 VISUAL AIDS				
Quality	Very Good	Good	Fair	Poor
Information Content	Too Much	OK	Too Little	
Legibility	Very Good	Good	Fair	Poor
Use	Satisfactory		Unsatisfactory	
4 ANSWERING QUESTIONS	Very Good	Good	Fair	Poor
5 SUMMARY				
The talk as a whole	Very Good	Good	Fair	Poor

REMARKS .....

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APPENDIX C

Commonwealth Science Council **Communication Techniques Workshop**

East African Community Management Institute, Arusha, Tanzania April 1976

WORKSHOP ASSESSMENT FORM

A critical assessment of the present Workshop will help us to improve the quality and relevance of our future National and Regional endeavours. Please attempt to fill in the individual sections of the form while the Workshop is in progress and hand in the completed form at the concluding session.

Please answer all queries by circling the appropriate number on each graded scale

Name

Brief job description

Specific reasons for attending the Workshop

WORKSHOP AIMS

	Completely				Not at all
Did the Workshop achieve its stated objectives?	5	4	3	2	1
To what extent were your specific aims met?	5	4	3	2	1

COURSE CONTENT

	Too advanced			Too elementary	
Course subject level	5	4	3	2	1

COURSE LENGTH

	Too long			Too short	
Was the Course	5	4	3	2	1

TEACHING AIDS

	Very satisfied			Not satisfied	
How satisfied were you with the Equipment (visual aids etc)?	5	4	3	2	1
Literature (lecture notes etc)?	5	4	3	2	1

Over

WORKSHOP ADMINISTRATION

	Very satisfied				Not satisfied
How satisfied were you with the					
Planning and organization of the course?	5	4	3	2	1
Teaching accommodation (seating, audibility etc)?	5	4	3	2	1
Living accommodation (rooms and meals)?	5	4	3	2	1

SUBJECT MATTER

Which are the subject matters you consider	Extremely relevant				Irrelevant
Elements in Scientific Information	5	4	3	2	1
Communication to Meet Different User Needs	5	4	3	2	1
Oral Presentation	5	4	3	2	1
Visual Communication	5	4	3	2	1
The Scientist and the General Public	5	4	3	2	1
The Printed Word	5	4	3	2	1
Scientific Writing and Editing	5	4	3	2	1
Writing for Technical and Non-Technical Readership	5	4	3	2	1
Organization of Conferences, Seminars and Meetings	5	4	3	2	1
Exhibitions, Open Days and Displays	5	4	3	2	1
Submission to Committees	5	4	3	2	1
Pooling Experience in Discussion	5	4	3	2	1
Communicating in Research Management - A case Study	5	4	3	2	1
Information Systems and Services in Science and Technology	5	4	3	2	1
Organizing National Information Systems	5	4	3	2	1
Guidelines for Planning National Scientific and Technological Information Systems	5	4	3	2	1
Guidelines for the Organization of Training Courses, Seminars and Workshops	5	4	3	2	1

GENERAL COMMENTS

Including suitability and effectiveness of programme

Over

OVERALL ASSESSMENT OF THE WORKSHOP

Bearing in mind the effectiveness of the course programme and administrative arrangements, what is your overall assessment of the Workshop?

5 Excellent

4 Good

3 Fairly Good

2 Below Average

1 Unsatisfactory

POSSIBILITIES

What are the possibilities of you initiating a National Workshop?

5 Definite

4 Good

3 Fairly Good

2 Poor

1 Don't intend to

Date

Signature of Participant

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