COMMUNICATION TO MEET DIFFERENT USER NEEDS

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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.