User studies: an introductory guide and select bibliography
Edited by Geoffrey Ford

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User Studies: a Review and Bibliography

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PREFACE

"User Studies" is a difficult area of knowledge to define. It can include conventional surveys of library borrowers and this may be the main form of activity which comes to mind when the term "user studies" is mentioned.

But borrowing from a library should raise a host of other questions about user behaviour. What do people do with books and journals when they have borrowed them? How much use is made of library material within libraries without borrowing taking place? What books and journals do people buy so that they do not need to borrow at all? When questions such as these are asked across a whole range of activities, from the general layman wanting to find out how to build a fireplace for himself to the experienced scholar in the university seeking the latest developments in chemical microscopy, the potential range of user studies immediately becomes apparent.

When the Centre for Research on User Studies at Sheffield University was set up in 1976 with funds from the British Library Research and Development Department it was clear that the first task was to find out what had been done already so as to be able to produce a "state of play" report. With user studies as yet only loosely defined it was agreed amongst the staff at the Centre that the net should be cast fairly wide. The Research Officers spent a considerable period of time working through bibliographies, indexes and research reports to find out what had been done, to get some idea of the results so far available and to consider the various methods used in the researches.

The work proved to be much more onerous and time-consuming than had been anticipated, but it did produce a large research index which has become the information base from which the Centre will be able to advise enquirers, and it also helped to identify areas of user studies in which work may be said to be developing well and areas in which, as yet, too little is known.
The report which follows is both an evaluation of current knowledge in user studies and a very selective bibliography of literature which the research workers feel is worth having at this preliminary general stage. The first overview of user studies could not hope to deal in detail with every aspect of so wide a subject. The Centre plans to issue research reports and bibliographical guides to work in specialised aspects of user studies as its own knowledge and expertise develops. We hope that this first report, to which all members of the staff of the Centre have contributed, will be of help and interest to those readers who wish to increase their understanding of the general field of user studies.

Peter H. Mann,
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Section 1

THE OBJECTIVES OF THE REVIEW AND THE SCOPE OF USER STUDIES.

The objectives of this review of the state-of-the-art of User Studies are:
1. to summarise what is known about the consumers in the information industry
2. to indicate gaps in our knowledge
3. to suggest fruitful lines of research
4. to outline techniques which might usefully be employed in future research.

This is not an exhaustive bibliography, but rather a guide to the literature which is useful:
1. in defining the scope of User Studies
2. in suggesting hypotheses about the behaviour of information consumers
3. in the illustration of techniques of study
4. in presenting findings about information consumers.

There have been many bibliographies and guides to the literature of User Studies (27, 47, 48, 59, 215, 232): the chapter on information needs and uses which appeared in each of the first nine volumes of the Annual Review of Information Science and Technology (8) was a valuable feature, the variety of viewpoints adopted by the authors affording useful insights.

We have scanned many such bibliographies, review articles and library catalogues in identifying items of potential interest and we make reference to these where appropriate. We have also had access to personal files maintained by other research workers, for which we are grateful.

We have concentrated on the recent literature in the preparation of this review, together with what we consider to be the most useful of previous studies.

The information industry has recently (115) been defined as comprising several overlapping categories of -
1. discovery, creation and collection
2. storing, retrieving, processing, duplicating
3. distribution
4. supply of equipment and materials
5. markets and other user groups.
Each of these categories in turn comprises a further set of overlapping elements. Libraries belong to both the storing and distribution categories; our viewpoint is that of the user groups which form the market sector of this industry. It is now nearly twenty years since it was estimated that the production and distribution of information represented between 75 and 90% of the USA gross national product (139) so that the importance of the information industry is clear. A recent description of the information industry in the U.S.A. suggests that by 1980, 42% of the total U.S. workforce will be engaged in information activity (177).

Before proceeding with the main body of the review, we should define both information and user; the definitions we use here are formal statements which express the meanings which we in the Centre for Research on User Studies attach to these concepts.

Following a recent definition (15) we may state that

1. **Information** is the structure (or order) of any text which is capable of changing the image-structure of a recipient;

2. A **Text** is a collection of signs or sounds purposefully structured by a sender with the intention of changing the image-structure of a recipient.

These definitions are as applicable to imaginative literature as to tables of statistics and reports of research.

In this domain, the user is a recipient who has perceived an anomaly in his knowledge of the world and is trying to find messages which are aimed at correcting that anomaly. By implication, he not only recognizes the anomaly but also desires to correct it. The above definition of information applies to other situations such as education and persuasion, in which the recipient may not recognize an anomaly, or may not consent to attempts to change his image-structure. These categories of human communication are excluded from this review.

Given the above definitions of information and user, it seems unlikely that there are many non-users in the world. There are non-users of particular information systems, but as these systems are merely individual components of the industry, their non-users are not necessarily non-users of information. Our definition of user studies, then, comprises the study of people's need for, and use of, information. Many such studies have been carried out, most of them by the providers of information. Surveys of library use on a particular day tell us how many people used
what service, and perhaps that the amount of such use varied according to some external characteristic such as sex or status within an organisation. These facts do not illuminate such matters as need, nor do they give much assistance in planning future systems and services. Of more use are the studies of people's information needs and information seeking behaviour, particularly where these are based on what actually happens rather than on people's opinions of what might happen. Of primary interest are those studies which contribute to our understanding of the user. Such understanding demands the broad approach rather than the narrow, so we have included within our purview bookshops, publishers, consumer advice centres and similar organisations, as well as the libraries, information analysis centres and bibliographic services traditionally associated with research on users of information. We have looked for data on the ways in which people's work and leisure activities give rise to needs for information and the ways in which these needs are met.
Section 2

THE OBJECTIVES OF RESEARCH ON USERS OF INFORMATION

The general objective of research on users is to further understanding of the processes of information transfer. The research may be expected to lead to the improvement of information transfer systems of all types and to have implications for the organisation of communication, the distribution of resources and the relationships between systems.

In more concrete terms, research should enable us
1. to explain observed phenomena
2. to understand behaviour
3. to predict behaviour
4. to control phenomena and improve information use by manipulating essential conditions

The essential preliminaries to the attainment of these objectives are
1. the description of users' behaviour
2. the definition of concepts
3. theorising on relationships between the processes of information transfer and related factors.

There are many examples of description of users' behaviour in the literature, but the field is weak in concept definition and theorizing. In this and other respects, user studies resembles the closely related field of mass communication research in which theory has not kept pace with techniques of research, and much research is undertaken within administrative or commercial constraints which militate against the proper understanding of research findings (82).

Successful research depends on the adequate definition of concepts. Given a sound theoretical base, research on user studies should make a greater contribution to the development of information transfer systems than has hitherto been apparent. There are three corollaries to this.

First, a study based on a consistent theoretical framework should yield results which are generalizable to other situations.

Second, the data obtained from such studies can be expected to accumulate with that from other studies, and not to conflict with it or be impossible to compare with it through lack of a consistent basis for definition.

Third, and most important, the results should be applicable in practical situations with some degree of confidence.
Within the general objectives of research already stated there are many subsidiary objectives, and there is a variety of types of research to deal with these objectives. There is in fact a spectrum, ranging from development work through to enabling research. In a second dimension, the range is from hard to soft. In the field of user studies, development work might involve modifications to a booklending procedure; enabling research would include studies of print readability. Hard research includes studies of users' performance with various styles of catalogue, and soft research, participant observation of students' work habits.

The objectives of any piece of research must be closely linked with the objectives of the person or organization undertaking it. Many studies of user behaviour are concerned with the users of individual information systems, partly because the operators of systems are naturally interested in their own activities, and often because there are political, commercial or administrative barriers to investigating aspects of human behaviour which cross system barriers. For example, the investigation of the contribution of a library in the educational process could not be carried out without reference to educational objectives, curriculum content and teaching methods. If the researcher is unaware of the wider context of his study, or ignores it because he cannot examine it in depth, his research may well turn out to be nothing more than a description of a cross-section of the users of one information system. If the system neglects external changes it may easily become obsolescent or direct its services and products to the wrong client group. Since many information systems form part of a larger organization this is a trend which could lead to a shift in resources to other parts of the organization. This is particularly the case with libraries and information services in publicly-funded organizations - public libraries, educational libraries, etc - since their organizational objectives are often only vaguely stated and criteria for success are not easily established. In this situation it is easy for the library to accept a set of received doctrines which do not relate to present-day reality. As has been pointed out recently (106) the library must be seen to be serving all sectors of the community which supports it, and librarians may have to undertake political activity to secure funds for this purpose. This may require a change in attitude by librarians - it is easy for the traditional value-free approach to degenerate into a
conservative acceptance of the adjustment/achievement/advancement cycle which leads to libraries serving only small sectors of the population (109). In commercial situations, where criteria for success are more readily available, it is easier for system managers to assess performance and to attempt to adjust to market forces.

Much of the previous research on users has been carried out by system managers interested in defining their clientele and establishing levels of demand for various services, and we must expect this activity to continue. For this research to be useful in a wider context, we must look to independent research workers and research units to provide the general theoretical basis for relating these studies one with another.

The system undertaking research into its users or potential users will be interested primarily in staying in business, and hence in demonstrating its own utility to the policy makers in its own organisation. We must therefore be able to apply the results of user studies to problems of system management; Brittain, in a thoughtful and stimulating paper (26), has pointed out that this requires research into future requirements as well as current requirements and that this may require the development of new approaches to research.

The application of research results may take one of two forms. The first of these is to use the results to provide general guidelines within which a system operates, the second makes use of numerical data to specify exactly the parameters of the system. Brittain gives as examples of these types of application papers by Back and Katter. In the first of these, the results of dissemination studies are examined, and general recommendations for the design of on-line reference retrieval systems are given (11). In a different field the results of a survey of students' book use (151) led to recommendations for the setting up of a system for communicating information about students' needs between a university and local bookshops. Brittain's second example describes the data a system designer might require from a set of user studies (8e). Such data would be required at several stages in the cycle of system development, and might need to be updated and re-evaluated.

We must turn now to the examination of the findings of previous user studies and establish whether the conceptual bases of these studies have yielded any fruitful insights on which we can build.
A major problem in the study of information transfer lies in the definition of concepts. We have already used the word information in a very broad sense; there are many alternative definitions. At the risk of mixing our metaphors, and with no claims to originality, it may be worth pursuing this topic a little further. We can imagine a vast sea of information — ideas, data, opinions, interpretations — and a wide variety of ways of packaging this information. Each package will have a physical form — printed book, article, microfilm or whatever — and an intellectual form — poem, musical composition, factual description, critical review, and so on. The packages are of course not mutually exclusive in either content or form. We have also a vast array of persons with "needs". Need is a difficult concept to handle, but it can be regarded as being derived from the existence of problems requiring solution. So ultimately we have people with problems. These include problems relating to work and to leisure. A typical leisure problem is "how to fill leisure time?" One solution is to read a book, and the problem then becomes one of delivering suitable books to the person involved. At one or more points in problem solving the person will encounter a variety of information packages; these encounters are often called "uses" when they occur in libraries. A different definition of use takes the process a step further, i.e. use is said to occur when part or all of the contents of the package are inserted by the problem solver. If the information assists in the solution of a problem it can be said to be useful. It should be noted that "relevance" is a different concept, usually applied to documents. In many studies of information transfer systems, "users" are defined as people who use document delivery systems (e.g. libraries) or document referral systems (e.g. abstracting services). Inevitably these activities are only a small part of the total process, which explains why the so-called "formal" information sources seem to be so unimportant in studies of information-seeking behaviour.
When examining writing on information transfer, a distinction has to be made between information that points to other information (a bibliographic reference, for example), and substantive information; it is hardly necessary to point out that many information retrieval systems deal only with the first type of information.

The arrangement of this review of the literature has inevitably been influenced by previous reviews. The *Annual Review of Information Science & Technology* (8), in its regular chapter on "Information needs and uses" has provided a variety of leading researchers with the opportunity to put forward their views of the information transfer process; there have been several other reviews made for specific purposes, notably by Slater (198) and by Wood for the period 1966-70 (232), by Barnett for 1971-75 (13), by Febrisoff & Ely (59), by Totterdell (210), by Ward (218) and a major review oriented towards the social sciences by Brittain (27). The structure we adopt is based on that used by Ford (63) in a more restricted context, which has similarities with the structure developed independently by Lin & Garvey (8h).

This structure has three main components:
1. factors affecting information needs
2. the interaction between users and information systems
3. the use of information

The principal concept requiring resolution in this model is that of need. There has been much discussion of this concept in the literature (28, 10, 122, 161, 183) and we do not propose to add to it here. We do not accept the view that demand expressed within the formal information system is necessarily indicative of need, nor that recorded use of documents is necessarily indicative of value. The looseness of terminology in this field must be borne in mind when evaluating any study of users.

**FACTORS AFFECTING INFORMATION NEEDS**

Paisley (8c) has listed the groups of factors relevant in this area:
1. the full array of information sources available
2. the uses to which information will be put
3. the background, motivation, professional orientation and other individual characteristics of the user
4. the social, political, economic and other systems that powerfully affect the user and his work
5. the consequences of information use - e.g. productivity.

It is immediately apparent that a study of the loan records of an individual library is merely scratching the surface of users' behaviour.

Sources of information

There have been many studies which examine the relative frequency of use of different information sources. The results are not easy to compare since some sources (such as indexes) provide pointer information, while others (such as one's professional colleagues) may provide substantive information. Differences in population studied, methods of analysis, sampling procedure, response rate and others all help to compound the difficulties of drawing general conclusions about the practices of individuals. Table 3.1 compares results of four studies of sources of substantive information, and table 3.2, eight studies of sources of pointer information. These comparisons were made from the best available data, but the comparisons were very difficult to make.

Table 3.1* - Most Important Information Source
(Percentage of respondents)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monograph</td>
<td>-</td>
<td>12</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Journal</td>
<td>38</td>
<td>11</td>
<td>73</td>
<td>17</td>
</tr>
<tr>
<td>Trade publication</td>
<td>22</td>
<td>16</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Thesis</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Research report</td>
<td>1</td>
<td>15</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>Patent</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Informal contact</td>
<td>31</td>
<td>-</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>Formal contact (conferences/meetings)</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>-</td>
<td>41</td>
<td>23</td>
<td>45</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

* Adapted from Skelton (194)
** Advisory Council on Scientific Policy (2)
*** From Brtain (28)
Table 3.2 - Most Effective Retrieval Methods
(Percentage of respondents)

<table>
<thead>
<tr>
<th>Source</th>
<th>Study Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scott (192)</td>
</tr>
<tr>
<td>Citation in current reading matter</td>
<td>5</td>
</tr>
<tr>
<td>Abstract/index</td>
<td>4</td>
</tr>
<tr>
<td>Bibliography</td>
<td>-</td>
</tr>
<tr>
<td>Library Catalogue</td>
<td>18</td>
</tr>
<tr>
<td>Reviews</td>
<td>-</td>
</tr>
<tr>
<td>Personal</td>
<td>30</td>
</tr>
<tr>
<td>Chance</td>
<td>41</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

* Adapted from Skelton (194)

# Advisory Council on Scientific Policy (2)
In some surveys, respondents have been asked to rank their sources of substantive information in order of importance (Table 3.3):

**Table 3.1** - Importance of Information Sources

<table>
<thead>
<tr>
<th>Sources</th>
<th>Arts D</th>
<th>Arts N</th>
<th>Social Science D</th>
<th>Social Science N</th>
<th>Science D</th>
<th>Science N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal collection of books</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>University Library</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Other libraries involving travel</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Other libraries through T.I.L.</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Fieldwork, lab work, etc.</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Conference Seminars</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Press, T.V., Radio</td>
<td>7</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>No. of respondents</td>
<td>65</td>
<td>69</td>
<td>32</td>
<td>26</td>
<td>113</td>
<td>89</td>
</tr>
</tbody>
</table>

* After PKVL (196)*

A different approach is to rank sources of information in order of preference. Table 3.4 gives the rankings obtained in one such study (185).

**Table 3.4** - Preferred Information Sources

1. Search personal library
2. Search material in building where you work
3. Visit a knowledgeable person nearby
4. Telephone a knowledgeable person
5. Use a library that is not within your organization
6. Consult a reference librarian
7. Write a letter
8. Visit a knowledgeable person twenty miles away or more

It should be noted that these rankings are the preferences for information-gathering methods expressed by a sample of workers in
industry, and that the same workers rated the anticipated values of these sources very differently. This finding confirms that of several other studies (74, 84, 108) that accessibility and ease of use are primary criteria for selection of an information source, even when the anticipated value is low. The obvious implication for system designers is to make highly valued sources more accessible and easy to use.

One possible indicator of the sources of information used by people lies in the evidence of citation. Differences are found in the frequency with which types of document are cited by people in different environments (Table 3.5).

The field of citation studies has been reviewed recently (155); the reliability of citations as indicators of use is questionable, particularly in the light of recent research (189) which showed that the frequency of use of journals at the British Library Lending Division is not correlated with the frequency of citation as recorded by Journal Citation Reports. This article gives rise to some controversy (12, 128, 168, 188). Further research in this area is clearly needed.

The findings reported above are taken from surveys of people involved in work which requires information for its successful prosecution - people such as research scientists and engineers. In the very different field of leisure, it seems likely that the same criteria of accessibility and quality are applied, although their relative importance is less certain. The readers of romantic fiction are known to have a high level of publisher, author and even title loyalty (149, 150) and this is probably an expression of the users' own assessments of quality. In a recent survey of information needs in rural areas (85), the public library was cited most often as a source of information on leisure interests, with friends and relatives second and personally owned books third. Again, variations in question wording make generalization difficult, and it is significant that a study (slightly earlier in time) using the same data collection instrument as the one just referred to obtained rather different results - the public library still led the field as a source, but the other sources were hardly mentioned (118). The incidence of citation of sources was far lower in the second of these two studies: it is possible that the differences are due to the differences in the populations surveyed. However, the general trend is clear - here the most accessible source did not rank highest.
Table 3.5 - Rank Order of Frequency of Document Forms Cited for Science and Technology Author Affiliation

<table>
<thead>
<tr>
<th>Document Form</th>
<th>Academic (N=183)</th>
<th>Nonacademic (N=176)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Science</td>
<td>Technology</td>
</tr>
<tr>
<td>Society Proceedings, Transactions</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Research and Development Journals</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Trade Journals</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Monographs</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Handbooks and other reference works</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Conference Proceedings, symposia</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

*From Haraldrart (216).*

There is evidence to suggest that the use of information is influenced by its provision - an expression of the accessibility factor perhaps. The Barnes & Noble book supermarket in New York uses modern merchandising methods so that books compete with other media on their terms in the consumer society (67); and the customers are flocking in. In a recent nationwide survey of children's leisure reading (225, 226) it was noted that modern children's books were largely neglected; it was also found that these modern books were often not provided in the school libraries available to these children. The purpose of the school bookshop movement in the U.K. is to introduce children to books outside the learning process, and to make books available to them at a convenient place. This increased accessibility may lead to a reinforcement of the perceived value of books, and a permanent emplacement of the reading habit. The tendency for children to stop reading in their adolescence may be due to this lack of reinforcement; alternatively the availability of works suitable for this age group may be low, and a recent experiment in which books were given to teenage children was an
attempt to assess this factor (132). A survey of the effects of provision of an SDI service showed that its users were convinced that the service improved their awareness of developments in their subject (90); here the provision of the service had increased the confidence of the users. These pieces of evidence combine in favour of the view that the supply of services affect the use made of information. On the other hand, we must not ignore the fact that services also react to meet users' demands; Reader's Digest produce books in response to ideas generated from surveys of the readers of that magazine (66).

The uses of information

As we have already discussed, information is used to assist problem solving - this being defined broadly to include topics such as the occupation of leisure time. Key factors in studies of information transfer are thus the purpose for which information is sought, and the use which is made of it. These factors are often neglected, or treated only superficially in many user studies. The many surveys of book borrowing from libraries tell us how many books are borrowed, by persons of varying status and with varying subject interests. Data collected from a number of university libraries showed the lengths of time for which students read books (116); it is interesting that comparing one university with another, the amount of time devoted to reading a single book varied much less than did the number of books borrowed. Thus while the mean number of books borrowed per annum varied between 25 and 90 per student, the mean time spent reading them varied from 2.75 to 3.83 hours per book. While this measure of document exposure may be more useful than simple figures of number of loans, we are still no wiser as to the effectiveness of the use.

There are difficulties inherent in post-mortem studies of the effects of particular actions; it seems to us that a real-time investigation of the ways in which information needs arise and are met is more likely to give useful results. One investigation of part of the process was carried out at Lancaster University Library a few years ago (116), and more recently the techniques for this kind of study have been explored at Cranfield (172). We shall return to this point in section 5.
Characterisation of the user

It is easy to list many characteristics of an individual which may or may not relate to his information-seeking behaviour. Evidence is often conflicting or difficult to interpret. Age is one such variable and in one study of information needs (219) the under 25s were found to be more likely to cite information needs than the over 60s. Whether this was because they had more needs or were just more articulate in the interview is not apparent. In one survey of university students, it was found that women were more likely to use catalogues than men (130), but in another study no difference in this respect was found between the sexes (190).

As so much information exists in printed form, clearly reading ability is an important variable (41). It had been estimated that as much as 20% of the U.K. population has a reading age of 12 or less (102) and a recent study of 15 year old school leavers found that 5% had a reading age of 10 or less (140); the results of this last study were affected by absenteeism and other factors, and the figure of 5% may well be on the low side.

Differences in personality may be relevant; it has been found that science students place higher values on independence and learning for its own sake than do engineering students, who are more concerned with personal success and vocational training (114). "Bizzle" (141) identified relationships between the information-gathering habits and creativity of chemists; and such factors as motivation, extraversion/introversion and emotional stability have all been postulated as possibly related to information seeking. It is not immediately clear whether clarification of the relationships with these factors is likely to lead to improvement of systems. All we can ask for is tolerance, so that designers of systems recognize that these variations do occur and act accordingly (e.g. introverts do not like asking for assistance, so systems should be self-obvious or encouraging).

The systems to which users belong

Paisley (96) outlined a classification picturing the individual at the centre of many systems touching every aspect of his work. Within each system many variables can be identified which bear on the process of information transfer. The systems can be listed as:
1. the cultural system
2. the political system
3. the membership group
4. the reference group
5. the invisible college
6. the formal organization
7. the project team
8. the individual
9. the legal/economic system
10. the information marketplace

It seems likely that any study of information flow contributes to our knowledge of at least one of the above systems; most published studies are concentrated within a few only of these systems.

The analysis of research findings which throw light on these systems is presented in section 4.

The interaction between users and systems

Many information systems over the years have undertaken studies of their users, principally by means of surveys and analyses of records. Many of these studies are published, but rarely do we find descriptions of the use made of the data collected. The recent spread of automation in libraries has encouraged discussion on the uses of management information in libraries (9, 35, 52, 77, 93, 95, 140, 189, 205), and there are rather more reports of the use of records of circulation than of other user data.

A survey of student attitudes to the university library at Southampton (130) revealed several problems and deficiencies, and a number of changes in library policy and practice were instituted, partly as a result of the survey. A follow-up study (129) revealed some changes in student attitudes, some of which can fairly be attributed to the new policies. The large number of uncontrolled variables and the differences in population make it impossible to draw hard and fast conclusions as to the precise effects of individual activities, but the two surveys are an excellent illustration of the concept of survey, policy evaluation, policy implementation and re-survey - a sequence which is rare in this field.

The Southampton surveys are illustrative of one technique - the survey - used in the rather "soft" area of attitudes and behaviour. At Lancaster University a combination of techniques was applied to investigate and improve the availability of books to users (34). An
initial survey of the extent of unavailability (as perceived by users) and the actual causes of this led to a study of loan records and the borrowing histories of items in library stock. A computer simulation model was used to predict the likely effects of changes in loan and duplication policy, and implementation of changes was followed by a close monitoring of effects. For reasons of economy the research concentrated on records of user behaviour, rather than on the reasons for it, and the effects of the policy change exceeded those predicted. The search for refinement has led to exploratory studies of user behaviour within the library and a number of hypotheses about users (116). There has been a strong tendency in all user studies to equate use with value. There are a number of objections to this (see Ollman (112) for a fuller discussion). Primarily of course, a system manager is able to study records of use more easily than anything else, and to the controllers of finance, profit and turnover are the performance measures most easily understood; whereas the concept of profit is difficult to operationalize (as in libraries) turnover is the only measure available. Some attempts have been made to investigate value at Lancaster (116), and more recently at Cranfield and Longman (117); a major difficulty in all such investigations is that the purpose underlyng behaviour in universities is either teaching, research or learning, and evaluation of any of these activities is fraught with political difficulties.

One possible line of research is to monitor the use of on-line referral systems such as Walling. The relevance judgements of the users may help to indicate the value of items. The application of such monitoring has been reported (91) and this seems a fruitful line of research. It is interesting to note that bibliographical citations reported as relevant do not necessarily coincide with items actually examined (51).
Section 4

THE SYSTEMS TO WHICH USERS BELONG

In this section we treat in more detail Paisley's systems (80) and the research findings relevant to them.

THE CULTURAL AND POLITICAL SYSTEMS

The cultural system is all-pervasive and outside our control, but its traditions and ambience do have effects on our information transfer system. Most user studies have been undertaken within what may be called the Western cultural system, with its emphasis on priority of discovery, a system in which in all branches of endeavour it seems necessary to have stars; in some branches of learning it is these stars who effectively control aspects of the information system. It is a matter for discussion whether the countries of eastern Europe form a separate culture or a sub-culture; Japan appears to be at the intersection of two cultures. It is likely that studies of information transfer systems in other cultures will be found in the literatures of anthropology, cultural change and technological innovation rather than in the literature of information science.

THE MEMBERSHIP GROUP

Each person is a member of one or more groups which may have much influence on his information transfer behaviour. In relation to his work the dominant group may be a professional organization, a trade union or an employers' association. An over-riding group which may have considerable effect is the socio-economic class; this is difficult to define in any discrete classification, but home background, education and residential area are all important variables. Many user studies have been undertaken of membership groups and it seems best to group these according to a few major classificatory variables.

The general public: urban and rural residents

The major study in this field was carried out in the city of Baltimore, "Maryland, U.S.A. (219)." This work has been followed by other studies in the U.S. (73) and more recently in the U.K. by a number of smaller scale investigations (70, 95, 101, 133, 138, 235).
The Baltimore study is of great interest, not only from the methodological point of view, but also because of the detail with which the population sample is categorised and related to information problems. In essence, the sample population was interviewed and asked to cite recent examples of their own problems requiring information. Certain sub-groups were found more likely to cite problems than others - this may indicate a higher level of awareness.

Table 4.1 shows the sub-groups ranking above the median in terms of the percentages of that group who cited problems, while table 4.2 shows the sub-groups ranking below the median. The number of problems cited by each individual tended to correlate with the same groups. An interesting sub-group is composed of those belonging to 3 or more organizations.

Table 4.1 - Sub-groups Ranking above the Median in Problem Citation

<table>
<thead>
<tr>
<th>Percentage of sub-group citing problems/questions</th>
<th>Demographic and Social Network Sub-groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>Age = 25 years</td>
</tr>
<tr>
<td>97</td>
<td>Occupation - professional or managerial</td>
</tr>
<tr>
<td>95</td>
<td>Education = 16 years completed</td>
</tr>
<tr>
<td>94</td>
<td>Union leadership - high</td>
</tr>
<tr>
<td>94</td>
<td>Median tract income = $15,000+</td>
</tr>
<tr>
<td>94</td>
<td>Education = 16-17 years completed</td>
</tr>
<tr>
<td>93</td>
<td>Membership in organizations - high</td>
</tr>
<tr>
<td>91</td>
<td>Median tract income = under 30,000</td>
</tr>
<tr>
<td>90</td>
<td>Intragenerations - high</td>
</tr>
<tr>
<td>90</td>
<td>Intragenerations - moderate</td>
</tr>
<tr>
<td>90</td>
<td>Occupation - clerical or sales</td>
</tr>
</tbody>
</table>

Table 4.2 - Sub-groups Ranking below the Median in Problem Citation

<table>
<thead>
<tr>
<th>Percentage of sub-group citing problems/questions</th>
<th>Demographic and Social Network Sub-groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>Age = 25-64 years</td>
</tr>
<tr>
<td>88</td>
<td>Education = 12 years completed</td>
</tr>
<tr>
<td>87</td>
<td>Occupation - low</td>
</tr>
<tr>
<td>87</td>
<td>Union leadership - low</td>
</tr>
<tr>
<td>87</td>
<td>Membership in organizations - low</td>
</tr>
<tr>
<td>87</td>
<td>Education = 12-13 years completed</td>
</tr>
<tr>
<td>87</td>
<td>Occupation - blue collar</td>
</tr>
<tr>
<td>87</td>
<td>Occupation - housewife</td>
</tr>
<tr>
<td>86</td>
<td>Median tract income = 30,000-37,000</td>
</tr>
<tr>
<td>85</td>
<td>Occupation - not working</td>
</tr>
<tr>
<td>83</td>
<td>Intragenerations - low</td>
</tr>
<tr>
<td>83</td>
<td>Education = 0-4 years</td>
</tr>
<tr>
<td>82</td>
<td>Age = 65+ years</td>
</tr>
</tbody>
</table>
Members of political, civic, educational and recreational organizations were more likely to cite information needs than members of social services and religious organizations. In summary, the subgroups of individuals who are the most disadvantaged were least likely to articulate information requirements. It is possible that unmet needs of long duration and an inability to solve problems are no longer consciously regarded as problems; also that the disadvantaged are less articulate or less willing to articulate their needs.

The topics of most interest to the people of Baltimore are listed in table 4.3. Some topics were more likely to be cited spontaneously than others, as indicated in table 4.4 by the columns headed $\text{unaided}$ and $\text{aided}$. Again there were variations as between subgroups and full details will be found in the report cited (219). An example we may quote that consumer problems were more likely to be cited by those with high incomes, or by people with clerical or sales jobs; education problems were least likely to be cited by people with less than 7 years of education.

The strategies which were successful in problem-solving differed as between sub-groups. Thus contacting one's personal acquaintances is an effective strategy for professionals and managers; for non-professionals it is best to use as many sources (other than one's friends or relatives) as possible. It is particularly interesting that use of machines was a factor related to success, while the use of TV, radio, books, newspapers and libraries was not related to success at this level of analysis.

A particularly useful part of the Baltimore study was the exploratory testing of the ability of information agencies in the city to provide solutions to residents' problems. The problems selected for testing were drawn from those cited by the residents themselves. While 79% of the problems could be handled by at least one of the agencies tested, further testing would be needed before any degree of competency is assumed. The purpose of the exercise was to establish a method and to illustrate the problems involved, and is a model of this type of exercise.
Table 4.3 - Frequency of Citation of topics as Problems

<table>
<thead>
<tr>
<th>Topic Area</th>
<th>Number Cited</th>
<th>Percent of All Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>8,932</td>
<td>100</td>
</tr>
<tr>
<td>Neighbourhood</td>
<td>1,440</td>
<td>16</td>
</tr>
<tr>
<td>Consumer</td>
<td>1,199</td>
<td>13</td>
</tr>
<tr>
<td>Housing and Household Maintenance</td>
<td>1,145</td>
<td>13</td>
</tr>
<tr>
<td>Crime and Safety</td>
<td>878</td>
<td>10</td>
</tr>
<tr>
<td>Education</td>
<td>583</td>
<td>7</td>
</tr>
<tr>
<td>Employment</td>
<td>568</td>
<td>6</td>
</tr>
<tr>
<td>Transportation</td>
<td>545</td>
<td>6</td>
</tr>
<tr>
<td>Health</td>
<td>513</td>
<td>6</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>487</td>
<td>5</td>
</tr>
<tr>
<td>Recreation</td>
<td>470</td>
<td>5</td>
</tr>
<tr>
<td>Discrimination</td>
<td>368</td>
<td>4</td>
</tr>
<tr>
<td>Financial Matters</td>
<td>316</td>
<td>4</td>
</tr>
<tr>
<td>Legal Problems</td>
<td>214</td>
<td>2</td>
</tr>
<tr>
<td>Public Assistance</td>
<td>207</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4.4 - Spontaneity of Problem Citation

<table>
<thead>
<tr>
<th>Topic Area</th>
<th>Total Percent</th>
<th>Percent Unaided</th>
<th>Percent Aided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100</td>
<td>19</td>
<td>81</td>
</tr>
<tr>
<td>Neighbourhood</td>
<td>100</td>
<td>18</td>
<td>82</td>
</tr>
<tr>
<td>Consumer</td>
<td>100</td>
<td>23</td>
<td>77</td>
</tr>
<tr>
<td>Housing and Household Maintenance</td>
<td>100</td>
<td>29</td>
<td>71</td>
</tr>
<tr>
<td>Crime and Safety</td>
<td>100</td>
<td>8</td>
<td>92</td>
</tr>
<tr>
<td>Education</td>
<td>100</td>
<td>9</td>
<td>91</td>
</tr>
<tr>
<td>Employment</td>
<td>100</td>
<td>12</td>
<td>88</td>
</tr>
<tr>
<td>Transportation</td>
<td>100</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>Health</td>
<td>100</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>100</td>
<td>36</td>
<td>64</td>
</tr>
<tr>
<td>Recreation</td>
<td>100</td>
<td>9</td>
<td>91</td>
</tr>
<tr>
<td>Discrimination</td>
<td>100</td>
<td>7</td>
<td>93</td>
</tr>
<tr>
<td>Financial Matters</td>
<td>100</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>Legal Problems</td>
<td>100</td>
<td>31</td>
<td>69</td>
</tr>
<tr>
<td>Public Assistance</td>
<td>100</td>
<td>45</td>
<td>55</td>
</tr>
</tbody>
</table>
The U.K.

The British studies cited above are on a smaller scale, but interestingly enough are illustrative of 3 different techniques. Irving (101) used the structured questionnaire schedule distributed and collected by hand (response: 50%); McLaughlin (138) and Hawgood & Morris (85) used structured interviews (response: 70% and 87% respectively); and Yorke (255) used a panel of diarists. The two interview studies in fact used the same schedule of questions and comparative findings are to be found in Hawgood & Morris. The percentage of respondents identifying problems ranged from 59% (McLaughlin) to 71% (Hawgood & Morris); differences in questioning and analysis make it difficult to compare other findings directly.

Too much should not be read into the findings of these studies, since the samples involved were small, and the interviewers were untrained in this field at the commencement of the field work (one investigator commented that he got more response on information needs at the end of the project than at the beginning).

Another recent British study (70) attempted to investigate information needs of the general public in relation to leisure interests. A postal questionnaire was used, and a sample of non-respondents were visited to attempt to increase the respondents. It is not surprising to find that the most popular information sources for leisure interests are informal - friends, acquaintances, etc.; books and magazines were perceived to be the most satisfactory source. A general conclusion of this study was that the questionnaires produced only limited data, and that interviews with members of the public would be necessary at a later stage.

There have been many studies of the leisure-time activities of urban residents; and one leisure-time activity which leads to an immense amount of expenditure of public funds is reading. In one study, 10% of the sample population listed reading as one of their favourite leisure time pursuits (221). One conclusion of this study was that the lower socio-economic classes spent less time on leisure activities, and had a more restricted range of activity than the higher groups; reading was a fairly universal activity however. Another recent study suggests that the average U.K. resident spends approximately 2 hours each week reading books, 5 hours reading newspapers, and 17 hours watching television (157).
Studies of individual activities have also been published. Reading habits have been extensively surveyed, and a variety of these studies are summarised elsewhere (145, 146). A number of variables are associated with reading and non-reading (table 4.5).

Table 4.5* - Readers and Non-Readers

<table>
<thead>
<tr>
<th>Variables associated with Non-readers</th>
<th>Frequent readers</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Rarely or never read)</td>
<td>(at least once a week)</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
</tr>
<tr>
<td>Age (25-64)</td>
<td>&gt; 64</td>
</tr>
<tr>
<td>Education terminal age</td>
<td>15 or less</td>
</tr>
<tr>
<td>Socio-economic group</td>
<td>Manual working class</td>
</tr>
</tbody>
</table>

* After Vasiu & others (157)

Analyses of particular reading matter revealed that crime and thrillers were the most popular type of light reading during the winter months; during the same period history and religion were the most popular subjects for serious reading (we have no similar analysis for other times of year). According to the same survey (Vasiu & others), 45% of the books read were borrowed from a library; this is a significant increase over the figure of 37% borrowed from libraries found in a survey nearly 10 years earlier (99). A selective bibliography on adult reading habits has been published recently (143).

Taking book reading as an leisure activity, we may go on to assess the sources of books, and the characteristics of people who select one source rather than another. It is likely that those who read most heavily will obtain their books from the widest variety of sources, but this is difficult to prove; a number of surveys show that book buyers tend to be library borrowers also (79, 146, 199). Some variables associated with buyers and non-buyers of books are shown in table 4.6.
Table 4.6* - Book Buyers and Non-Buyers

<table>
<thead>
<tr>
<th>Variables associated with Book buyers</th>
<th>Non-buyers</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Bought 10 or more books in 4 month period)</td>
<td>(Bought no books in 4 months)</td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
</tr>
<tr>
<td>Age</td>
<td>under 45</td>
</tr>
<tr>
<td>Education terminal age</td>
<td>16 or over</td>
</tr>
<tr>
<td>Socio-economic group</td>
<td>non-manual</td>
</tr>
</tbody>
</table>

w After Masius & others (157)

The major source of books in the U.S. at least, is the public library.

There are many descriptions of studies of public library borrowing and the place of the public library in people's lives (79, 13, 146, 209).

There is also a useful review and summary of U.S. public library studies (137). Variables associated with typical users and non-users of public libraries in the U.S.A. are shown in table 4.7, with some comparable data on the British library user.

Table 4.7* - Public Library Users and Non-Users

<table>
<thead>
<tr>
<th>Variables associated with Library</th>
<th>U.S.</th>
<th>U.S.</th>
<th>U.K.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Users</td>
<td>Users</td>
<td>Users</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>50 and over</td>
<td>21-34</td>
<td>21-44</td>
</tr>
<tr>
<td>Education</td>
<td>College</td>
<td>Secondary</td>
<td></td>
</tr>
<tr>
<td>Socio-economic group</td>
<td>Professional, non-manual</td>
<td>non-manual</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Separated, divorced, widowed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Childless</td>
<td>White, urban residents</td>
<td></td>
</tr>
</tbody>
</table>

w U.S. Data after Wendelschn & Jingerd (160)
U.K. Data after Mann (146)
More recently, the Euromonitor surveys of bookbuying and borrowing have been published in 1975 and 1976 (55, 56) but these cannot be relied upon since the nature of their sampling frame is not indicated within the published reports.

The interaction of various information sources are treated in a number of studies. It has been suggested that a decline in public library issues correlated with an increase in the number of colour television sets in use, but it seems more likely that there is a correlation between book issues and television hours (120); and that sales of books are also related to television hours (28). Both of these findings are consistent with the principle of least effort: given a certain amount of leisure time, TV is the first choice, being closest to hand, and reading (of purchased and borrowed material) takes up some of the slack. The information consumption of school-age children is treated in the next section.

The educational sector: teachers and students

Within the educational sector, teachers are a major source of information (researchers are considered later). Location is itself a process of information transfer which is clarified from this review.

Staff

Most members of the academic staff at institutions of higher education have a dual role - they are both teachers and researchers. This is true certainly in universities, and is almost axiomatic in polytechnics. Most user studies in those institutions indicate that information is used and acquired in the same role. Indeed it is axiomatic that the two are indivisible. In other institutions, such as colleges of education, for example, there is less emphasis on research, and studies of information transfer behaviour in these institutions are more likely to reflect the needs of the academic staff. Unfortunately there are few studies on this topic. One study that several university, polytechnic and college staff are asked respondents to indicate their principal activity and to describe their information-seeking activity in terms of the role designated (208). In this study, over 70% of college staff and over 73% of polytechnic staff cited teaching as their main activity, but only 58% of university staff did so. It is interesting that teachers received more hours than researchers; also that in the colleges of education library staff were cited far more often as sources of information than in the university and polytechnic (there may of course be organizational or personality variables at work here).
Other studies of teachers in academic institutions indicate that teachers' greatest problem is physical access (90b, 211). The need for an information service, providing evaluated information, was also apparent in the two studies cited. Another study, part of the comprehensive programme of research undertaken by The American Psychological Association (7), found that there were several areas in which information sources did not match up to the tasks of teachers (7a). Teachers of psychology were found to use a great variety of sources of information, to draw on their own experiences of research and practice, and (again) to suffer a lack of suitably evaluated material.

A specialised group of teachers - tutors in the I.4. Adult Literacy Scheme - were surveyed in a recent study (7b). The implications of this study are that these tutors require access to a reference collection of a full range of suitable teaching materials, backed up by adequate loan facilities.

Students in institutes of higher education

This membership group has been very much researched in one way or another. In almost all surveys of academic library users, students naturally form the largest group, but much of this research is limited to actual users of the library in recent use. Of more value is our context are the surveys of students of an institute, in whom live the Library and other information services can or cannot intervene. Among such surveys in the 70's, we can mention Van Jan (193), library use and book buying; Tucker (211), library use, book buying and work habits; Line and Hirsch (199), library use and book buying; P31 (198), library use and work habits; Mann (11), library use and book buying; Olsen (197), information use and behaviour.

Table 1.4 summarises a typical finding.

<table>
<thead>
<tr>
<th>Survey</th>
<th>Mar-Jan</th>
<th>Tucher</th>
<th>Line</th>
<th>P31</th>
<th>Mann</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent in lib. (hrg/week)</td>
<td>5</td>
<td>10</td>
<td>11</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>No books on loan at time of survey (%)</td>
<td>&gt;23</td>
<td>&lt;32</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Books bought during yr.</td>
<td>11</td>
<td>10</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>'No difficulty getting books' (%)</td>
<td>&gt;31</td>
<td>3</td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reluctant to ask library staff (%)</td>
<td>21</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library instruction not useful (%)</td>
<td>39</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Care should be taken with the interpretation and comparison of these figures. Differences in wording of questions, grouping of answers for analysis, timing of surveys and environments are confounded in any such comparison. The PAUL report discusses the amount of time spent by students in libraries in the context of the students' total working week, and discusses the phenomenon of over-estimation of the amount of time spent in libraries.

In the U.S.A. Lubans carried out a survey (135) of library use in which he identified a number of non-users. In a follow-up study (134), he interviewed those non-users and discovered that they differed little if at all in respect of all other characteristics from library users. Most recently, in a more longitudinal study, Ohman (172) discovered that the drop-outs from the study differed from those who completed the study only in their degree of willingness to fill in diaries. The role of books in higher education has been the subject of a recent bibliography (144).

Schoolchildren

Studies of children as information processors are usually confined to the activities of reading and televiewing (92). One study of this type concentrated on the public library borrowing habits of children in a Welsh town (118); factors such as home background, level of intelligence, age and sex were related to the nature of the books read in terms of content and reading difficulty. More recently, a nationwide survey has investigated the leisure-time reading of nearly 8000 children aged 10-15 (225, 226).

It has been suggested that the habit of independent reading has great influence on the child's mastery of written language (41) and the importance of reading in the transmission of cultural tradition and achievement has been ably argued by Mann (146). In this context the findings of the Whitehead study (225, 226) are quite important.

This research has detected a tendency for children to read less as they grow older, and some evidence to show that the amount of reading is complementary to the amount of televiewing. However, there appears to be a spectrum of activity - at one end, children who read, view and participate a lot, at the other end children who do little that is at all structured in their leisure time. While it might have been expected that children in grammar schools read more than those in
secondary modern schools, it might seem surprising that children in ability-
streamed primary schools read less than those in non-streamed schools. It
seems likely that differences between schools in methods and organization
also affect the amount of reading, but at the time of writing these results
have not been published. Some of the points from the survey have important
implications for education. For example, the wide range of children’s
preferences and choices supports the widespread practice of individualized
reading schemes. The teachers’ knowledge of books is stressed as an
important factor in developing reading skills; and it appears that the
provision of books by the primary school plays an extremely important part
in determining what children read.

There are still some unanswered questions which point the need for further
research: for example, what are the factors which lead children to raise
the quality and maturity of their reading, or to give up altogether? Research
currently being undertaken by Professor Mead in Bradford (23) in which some
schools are flooded with books, may help to establish some of the missing answers.

Professional groups

There have been many studies of the information-seeking behaviour of
members of professional groups – that is, people with common backgrounds of
education and training or field of endeavour. The level of analysis at
which such studies are undertaken varies: the first level distinguishes
between scientists, social scientists and humanists, the second between
physicists, chemists, and biologists, and so on. In these studies it is taken
as axiomatic that information is a professional requirement, and
investigators typically seek similarities or differences between disciplines.
It has been suggested that there is a spectrum of science ranging from hard
to soft (178), and that the degree of hardness can be measured by the citation
pattern within journal articles: specifically, the percentage of references
dated within the past five years in Price’s index of hardness – hard science
has an index of not less than 40.

Line (126) has suggested that there is a similar spectrum of the social
sciences, and that in the harder social sciences, books are used in a
consecutive mode, while in the softer disciplines several items are used in
conjunction.

A major study of information-seeking practices in Ireland revealed
considerable differences in the use of different sources of information by
<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Scientist</th>
<th>Social Scientist</th>
<th>Hypothetical about Humanist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sources</td>
<td>Most useful sources are journals, plus books. Uses personal contacts.</td>
<td>Using literature and journals, with a great emphasis on personal contact.</td>
<td>Uses monographs and journals to a great extent.</td>
</tr>
<tr>
<td>Methods for locating references</td>
<td>In person: personal, reference sources, abstracts, indexes. Library use is not important.</td>
<td>In person: personal, library. The use of the library is not important.</td>
<td>In person: personal, library. No use of the library.</td>
</tr>
<tr>
<td>Use and function of abstract journals</td>
<td>Scientists use abstract journals slightly less than social scientists. Both use them, to a similar extent for current awareness.</td>
<td>Attends conferences to a similar extent.</td>
<td>Attends conferences to a similar extent.</td>
</tr>
<tr>
<td>Delegation of literature searching</td>
<td>Tends to delegate searching.</td>
<td>Tends to conduct own research.</td>
<td>Tends to conduct own research.</td>
</tr>
<tr>
<td>Behaviour</td>
<td>Scientist</td>
<td>Social Scientist</td>
<td>Hypotheses about Humanist</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Late detection of information</td>
<td>Both experience instances of late detection to a similar extent.</td>
<td></td>
<td>Experiences instances of late detection.</td>
</tr>
<tr>
<td>Linguistic ability</td>
<td>Linguistic ability of scientists and awareness of the language is greater than that of social scientists.</td>
<td></td>
<td>Linguistic ability is greater than that of scientists and social scientists.</td>
</tr>
<tr>
<td>Stimulus for research/ideas</td>
<td>Written material, own work, and informal personal contact are important for both scientists and social scientists.</td>
<td></td>
<td>Same.</td>
</tr>
</tbody>
</table>

* From Bobutt & others (14).
different sectors of industry (206). Some sectors are low users of information, some are low users of particular services.

It seems likely that understanding of differences or similarities between disciplines will be found by considering the knowledge structures of the different disciplines (171) in concert with the purposes for which information is sought. For the moment however, we will consider the generalized findings on the behaviour of professional groups without reference to the knowledge structure.

Table 4.9 is a recent survey of information-seeking behaviour patterns of scientists and social scientists, with some hypotheses about humanists. One of the earliest major surveys of scientists was carried out by Bernal (172), and there have been many others of varying size and respectability. Comparisons of findings of these many surveys is tedious and difficult, but some attempts have been made, notably by the Bureau of Applied Social Research (1/2) by Barber (173) and by Slocum (194).

For the social sciences, the major source of data lies in the reports of the Episcopes and Disclos projects (40, 96), and in Brittain's review of earlier studies (27).

As implied by Table 4.9, it is only possible to hypothesize about humanists at present, but the articles from which it is taken review a number of studies within the field (11).

There have been a number of studies of scientists in which groups from different disciplines were studied in parallel (11, 105, 121, 157). The data base at Johns Hopkins University on the communication behaviour of scientists and technologists (71) must be one of the most complete in existence, representing as it does an accumulation of the results of several years' research. The best of these comparative studies provide information about the interactions between users and systems, as well as data on the information-seeking behaviour within individual disciplines to which we must now turn. A few disciplines have been singled out here as examples; readers interested in other groups should consult Saldnart and Saldnart's bibliography (215).
Physicists

Some of the detailed studies of behaviour of this group are of considerable interest. A well-conceived study (196) of physicists' methods of current awareness reported behaviour patterns prior to and subsequent to the introduction of *Current Papers in Physics* (197); it is disappointing that the response rate in this study was so low that the conclusions must be treated with caution. There are some important methodological aspects of this study which will be referred to later. A similarly conceived study concentrated on electronics research workers before and after the introduction of an SDI service (80). This latter study was particularly interesting in that it revealed a general devaluation of information by research scientists in this field who did not receive the SDI service; unfortunately no explanation of this phenomenon is forthcoming. The typical researcher was found to scan about eight periodicals regularly, and to spend three to four hours a week reading and assimilating. These tendencies are both age-dependent - older scientists scan more and spend more time reading. The receipt of an SDI service tends to reduce these figures, which indicates one benefit, and also to reduce the incidence of use of the general abstracting and current awareness publications such as *Physics Abstracts* and *Current Papers in Physics*. As might be expected from our earlier discussion, differences were noted between scientists in universities and in industry. It is necessary to add the caveat that these results are based on rather poor response rates to a postal questionnaire survey.

A simpler approach to studying the behaviour of this group was taken by Chen (18) in examining the use made of physics journals in the library of MIT. It was noteworthy that the incidence of use of the heavily used English language journals was related to the availability of abstracts and citations, while this relation was not apparent for foreign language journals. This may indicate that physicists will follow up references found in secondary publications, if the original is in their own language, but will only use foreign language items when they are specially recommended by colleagues or by other sources. In the latter case the availability of an abstract or citation is irrelevant.

An extremely useful survey of dissemination and use of physics information was published recently (56). The graphic presentations are particularly good in this report, which neatly summarizes the information structure and communication behaviour in physics.
Chemists

Chemists are reputed to be the most literature-conscious of all scientists - indeed, the first guide to the use of the chemical literature appeared more than fifty years ago (202). Consequently it is not surprising that chemists’ use of information has been the subject of many studies over the years. One of the best of recent studies (162) explored both formal and informal methods of satisfying information requirements. This study provides supporting evidence that the relative frequency of use of different channels is task-dependent. Thus, for deliberate searches, journal articles were cited more often as the main final channel providing the information sought, while for brushing-up, the main channel was the book (see table 4.10).

Table 4.10- Three ‘Most Important Channels of Satisfying Information Requirements’

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Deliberate Search</th>
<th>Brushing-Up</th>
<th>Accidental</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Main final channel’</td>
<td>(percentage of respondents)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Articles, reprints</td>
<td>25</td>
<td>27</td>
<td>45</td>
</tr>
<tr>
<td>Books</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Colleagues</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Ex-colleagues</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Other persons, excluding suppliers’ representatives</td>
<td>17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* After Venzel (162)

This study by Venzel was limited to polymer chemists, but it is a useful generalization of the type of result that has become common over the years: it emphasizes the importance of articles and of “other persons” in the accidental acquisition of information, and the general importance of interpersonal communication.

More specifically, the articles used by chemists for current awareness have been studied (53). Scanning of a number of current journals is the preferred method; the author index of tools such as Chemical Abstracts is also favoured with access via Science Citation
index coming third. The existence and continued growth of a machine-readable data base has allowed a considerable expansion of the range of services available to chemists and other scientists. CA Condensation is one such service, but in the survey just referred to it was noteworthy that the items in this service reported as relevant by the receivers did not match with the items examined by the same people in Chemical Abstracts or in hard copy.

A detailed examination of the use of new journals by chemists showed that this type of periodical was an important source of information, maintaining awareness of developments and stimulating research (23).

Biologists

A useful study in this field concentrated on scientists working at three research institutes (21). Since these scientists had no commitment to education, their communications behavior can be regarded as dependent on their research role and their individual contributions as members of a discipline. Based on an 80% response to a postal questionnaire the results report on factors affecting the biologists' choice of publication vehicles (reputation and subject context of the journal were very important, circulation and publication delay important), methods of current awareness (50% scanned current journals, 25% used abstracting services), personal retrieval methods (54% maintain card indexes, 31 files of photocopies and of prints, 15% rely on memory), and methods of tracing references to previously published research (working back from references in primary journals was the preferred method, information retrieval systems coming a bad fourth). This study also explored beliefs about scientific communication held by these biologists; there were differences between age groups, but overall (60% feel an obligation to keep up with developments in their discipline, 35% to keep up with key journals, and 32% to inform their fellow scientists of their work. A large minority (40%) considered that when they wrote papers their audience was made up of all other biologists, whereas 56% felt that their audience was contained within a sub-discipline. Only 4% regarded publication as a ritual activity, and 18% felt that they were writing for a few people only, most of whom they could name. The significant factors affecting acceptance of items for publication were considered to be scientific reputation of the author (by 54% of the respondents), reputation of the organization (36%), and merit alone (27).
In a study of informal communication among biologists, Mullins (170) reported that organizational and status constraints were absent, but that description and orientation towards research were important.

Other groups

The groups described above are typical of many that have been investigated in varying degrees of detail over many years. Wadhart & Wadhart's bibliography (215) is a good, well-indexed, recent guide to studies of other groups, and we can recommend it to readers with special interests.

THE REFERENCE GROUP

Paisley's definition of a reference group covers groups of people with similar training, specializations and other characteristics. Specifically, a research worker might attempt to maintain files of papers and offprints produced by other members of the reference group.

English Civil War historians are one such group; another is made up of persons interested in railway operation. The so-called invisible college concept is subsumed within the reference group. This concept has been explored most thoroughly in the fields of academic scientific research (43, 44, 67, 78, 179). It seems likely that an invisible college can only be defined by one member of it; another member would have a slightly different series of contacts and correspondents. However, it would be possible to define a reference group by reference to its most productive scholars who have received in that field (43),

This nuclear process, the force holding the group together and giving it a structure that differentiates it from other reference areas, still this concept is supported by other research (78, 179) it should be noted that some research areas do not seem to form invisible colleges. In areas less ruffled than those of scientific research it seems likely that the reference group/visible college concept is still valid, but we lack evidence. Possibly the major community in a Durban village is a reference group (167); it would be interesting to obtain a sociometric analysis of the community's communication behaviour.
THE FORMAL ORGANIZATION

Organizational factors can be important for information flow. Within any one organization there are several status levels, and varying roles, responsibilities and products. The facilities and policies of an organization obviously affect the channels of information open to any one member of it. If a local authority provides an information service to its officers, they will make use of it (22%). The study of organizational influences on information flow has featured in much of the work undertaken by Allen and various associates (4, 5), and there has been a considerable amount of work done in the USA in this field. It seems likely that organizational constraints can be important in commercial organizations; in academic institutions the effects are less clear, possibly because of the academic staff members' traditional freedom to arrange their own work schedules. As an example of this last, we may cite the propensity of academic staff in the humanities to travel to use large libraries during their vacations; it is noteworthy that in one study it was found that 93% of the staff who did travel had graduated from universities with comprehensive library facilities, but were currently working at a university whose facilities could be described as typical of the smaller civic universities in Britain (180).

THE PROJECT TEAM

Several projects in the USA have elucidated the role of the work team in information flow (4, 175, 184). In the technological field it is the work team that forms the most significant information source for an individual, and many scientists find this also. Preliminary results from Project T133 confirm this finding for social workers (23%). One recent British study examined communication practices of work teams in a variety of disciplines (19); and in a rare longitudinal study, Bethell (18) reports on a survey in which the information researcher formed part of the work team. The key concept that has emerged from this body of research is that of the technological 'gatekeeper' (5). These persons are to be found in many situations, and their importance has been recognized in some organizations by attempts to institutionalize the role - for example, subject specialists and information officers in university libraries (1, 4, 56, 81, 180). A recent British review of this field discusses the issues involved in some detail (194).
THE LEGAL/ECONOMIC SYSTEM

There is not much that need be said here about the influence of this system. The system of copyright, patents and retail price maintenance variously restricts or enhances the flow of information. Many publishers feel that the invention of Xerox has harmed their profitability, but the British Library Lending Division have firmly stated that their own photocopying activities could not affect journal sales (123, 127, 213).
Section 5

ROLES AND GOALS: THE PURPOSES FOR WHICH INFORMATION IS SOUGHT

We have already discussed (in sections 3 and 4) the factors which affect information behaviour, and we have suggested that a key factor is the purpose for which information is sought. It is now time to examine this aspect a little more closely.

It has been stated that the key to understanding the information transfer system lies in the identification of population segments (11). Previous attempts at identifying population segments have relied largely on classificatory criteria such as sex, age, social class, educational status and vocation. These criteria may well be important, but it cannot be denied that their use in isolation can give rise to confusion, if not conflicting, data. It seems to us that a better approach is to look at information-seeking behaviour in terms of the role of the seeker.

In an early discussion of the purposes of reading, a sociological model of the work-leisure spectrum was described (11.5), which can usefully form the basis for developing an understanding of other aspects of information transfer. This model can be modified in the light of empirical evidence, and extended to form a basis for discussion (Fig. 5.1 and 5.2).

This idea of work-leisure spectrum, and the identification of roles, is presented as a basis for discussion of information-seeking behaviour.

It is important to recognise that we are now faced with many roles and thus will seek information for very different purposes. By applying different criteria when acting in this different roles (such as in the leisure role, it is the availability that is paramount, while in the research role it is worth waiting for a particular, novel item. The amount of information systems and services reflects these differences to a certain extent; problems tend to occur at the margins. For example, an information department in an industrial organization may set up an information retrieval system which is geared to serve the research personnel, and which serves them very well; if, however, the nonresearch staff asks for service and are dissatisfied, the information department's budget may be in jeopardy.
### A Model for the Analysis of Information Seeking

<table>
<thead>
<tr>
<th>Purpose:</th>
<th>'Work'</th>
<th>'Utilitarian'</th>
<th>'Social'</th>
<th>'Personal'</th>
<th>'Leisure'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>+ Intrinsic</td>
<td>Books reviewed and recommended by opinion leaders</td>
<td>Intrinsic→</td>
</tr>
<tr>
<td></td>
<td>sentence</td>
<td></td>
<td>← Self-Improve→</td>
<td>←</td>
<td>Distraction</td>
</tr>
<tr>
<td></td>
<td>man</td>
<td>non-fiction</td>
<td>Fiction</td>
<td>TV</td>
<td>Soap opera</td>
</tr>
<tr>
<td></td>
<td>manuals</td>
<td>fiction</td>
<td>'how'</td>
<td>novels</td>
<td>Detract</td>
</tr>
<tr>
<td></td>
<td>and</td>
<td>history</td>
<td>'classic'</td>
<td>thrillers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reference</td>
<td>biography</td>
<td></td>
<td>TV documentaries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>manuals</td>
<td>books</td>
<td>for manuals</td>
<td>books</td>
<td>for manuals</td>
</tr>
<tr>
<td></td>
<td>and</td>
<td>and</td>
<td>travel</td>
<td>travel</td>
<td>TV documentaries</td>
</tr>
<tr>
<td></td>
<td>reference</td>
<td>reference</td>
<td>serials</td>
<td>serials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>books</td>
<td>books</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>car manuals</td>
<td>car manuals</td>
<td></td>
<td>TV documentaries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and</td>
<td>and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>leisure</td>
<td>leisure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>hobbies</td>
<td>hobbies</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>For reference only</th>
<th>May be read and re-read</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy to have at hand</td>
<td>Buy as present for self.</td>
</tr>
<tr>
<td>Borrow to extend knowledge</td>
<td>Perhaps buy after reading borrowed copy.</td>
</tr>
<tr>
<td>Buy what has previously been borrowed</td>
<td>Buy as present if recipient's tastes known, but status very well.</td>
</tr>
<tr>
<td>Buy as gifts</td>
<td>Buy as present if recipient's tastes known, but status very well.</td>
</tr>
<tr>
<td></td>
<td>Challenge the reader's attitudes and beliefs.</td>
</tr>
<tr>
<td><code>Buy experiences</code></td>
<td>Borrow from library or friend.</td>
</tr>
<tr>
<td><code>Fiction</code></td>
<td><code>TV shows</code></td>
</tr>
<tr>
<td><code>Novels</code></td>
<td><code>Serials</code></td>
</tr>
</tbody>
</table>
Fig. 5.2: Subdivisions of work category in the Information Seeking Model

<table>
<thead>
<tr>
<th>Purpose:</th>
<th>Policy Making</th>
<th>Administration</th>
<th>Research</th>
<th>Teaching</th>
<th>Learning</th>
<th>Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need:</td>
<td>Evaluative</td>
<td>Prescriptive</td>
<td>Innovative</td>
<td>Comparative</td>
<td>Instructive</td>
<td>Practical</td>
</tr>
<tr>
<td>Documents:</td>
<td>Digests</td>
<td>Rulebooks</td>
<td>Research reports</td>
<td>Reviews</td>
<td>Texts</td>
<td>Manuals</td>
</tr>
</tbody>
</table>
Tauke (208) has suggested that a distinction should be made between professional services and consumer services; and that the organization and dissemination of scientific information is a professional activity in which the value of the service cannot be measured by consumer responses. We may extend this by saying that where information dissemination activity is a consumer service (as in the leisure end of the spectrum), then consumer responses can be used to measure at least some aspects of the value of the service.

The evidence for role-differentiation in information transfer patterns is scattered throughout the literature. Bernal identified seven sub-groups of scientists (17): the differences in communication patterns of scientists and engineers were also described by Bernal (16), and a strong element in this difference may well be that scientists are usually employed in research and teaching and engineers in development work. This is not a complete explanation, because some engineers are engaged in research, and a recent study has isolated some of the factors affecting communication patterns of engineers in different environments (table 3.1). One of the factors will be seen to be functional role (216).

A study nearly 25 years earlier yields data relating to this question of roles. Table 4.1 was constructed from data given in the text of a report in which the original author did not consider the point in detail (209).

For the selection of information channels has revealed that this choice is dependent on the task performed (4, 147), and there have been some studies of the way in which communication behaviour is a factor in the stage of research at which it is initiated (7L, 97, 234).

The DHEW study revealed differences between research workers, teachers and practitioners in the social sciences; interestingly enough the teachers can no need to keep up with research, while the practitioners, despite their shortage of time, were very aware of the need to do so (124). The way in which scientists use information news journals was found to be partly dependent on the nature of their work role (233).
<table>
<thead>
<tr>
<th>Table 5.5 - Some Factors Influencing Communication Patterns of Engineers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motivation to publish</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Organizational barriers to communication</strong></td>
</tr>
<tr>
<td><strong>Orientation of organization</strong></td>
</tr>
<tr>
<td><strong>Functional Roles</strong></td>
</tr>
<tr>
<td><strong>Educational background</strong></td>
</tr>
<tr>
<td><strong>End Product of Work</strong></td>
</tr>
<tr>
<td><strong>Reward system</strong></td>
</tr>
</tbody>
</table>

* After McHart (14).*
Table 5.4 - Engineers in Different Environments

<table>
<thead>
<tr>
<th>School of Engineering (graduate and undergraduate teaching)</th>
<th>Applied Physics Laboratory (non-teaching; engineers: replies only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median estimate of information obtained from literature</td>
<td>80% &quot;indicating that type of institution is probably a factor influencing degree of dependence on literature&quot;</td>
</tr>
<tr>
<td>Direct sources (in order of preference)</td>
<td>Direct sources (in order of preference)</td>
</tr>
<tr>
<td>Advanced texts</td>
<td>Handbooks</td>
</tr>
<tr>
<td>Research journals</td>
<td>Classified reports</td>
</tr>
<tr>
<td>Tables</td>
<td>Advanced tests</td>
</tr>
<tr>
<td>Unclassified reports</td>
<td>Research journals</td>
</tr>
<tr>
<td>These</td>
<td>Trade publications</td>
</tr>
<tr>
<td>Indirect sources (in order of preference)</td>
<td>Indirect sources (in order of preference)</td>
</tr>
<tr>
<td>Cited references</td>
<td>Cited references</td>
</tr>
<tr>
<td>Regularly used</td>
<td>Regularly used</td>
</tr>
<tr>
<td>Abstracts and indexes</td>
<td>Abstracts and indexes</td>
</tr>
<tr>
<td>Bibliographies</td>
<td>Bibliographies</td>
</tr>
<tr>
<td>Personal records</td>
<td>Library card</td>
</tr>
<tr>
<td>Book reviews</td>
<td>Catalogue</td>
</tr>
<tr>
<td>Library card</td>
<td>Book reviews</td>
</tr>
<tr>
<td>Catalogue</td>
<td>Bibliographies</td>
</tr>
<tr>
<td>Reference services (in order of preference)</td>
<td>Reference services (in order of preference)</td>
</tr>
<tr>
<td>Translating</td>
<td>Accession and reading list</td>
</tr>
<tr>
<td>Guidance by library staff</td>
<td>Bibliographies</td>
</tr>
<tr>
<td>Accession and reading list</td>
<td>Guidance by library staff</td>
</tr>
<tr>
<td>Bibliographies</td>
<td>(Use services below)</td>
</tr>
</tbody>
</table>


A major study of urban residents (219) identified a large number of topics about which information was needed for problem-solving. These topics extend the degree of detail of the work-leisure purpose model and are listed in table 4.4. The topics were elicited during interviews with a stratified sample of the population; the extent to which these topics were cited spontaneously (i.e., without prompting) perhaps indicates their relative importance to the respondents. From table 4.4, we infer that public assistance, legal problems and financial matters are of greater importance than education and recreation. On the other hand, the relative frequency of citation indicates the size of the market segment for that topic.
The foregoing selection of evidence is enough to demonstrate the possibilities; there is more to be found. Paraphrasing a recent survey of children's reading (225, 226), we can say that we need to study information-seeking behaviour in the context of people's temperaments, interests, attitudes and total life-situations. The insights and understanding to be gained from such studies would be of great practical value to the planners and providers of information services.
**Section 6**

**PROBLEM AREAS IN THE INFORMATION INDUSTRY**

If the aim of user studies is, as indeed it must be, to assist in the design and improvement of information systems, it is pertinent to enquire what problems the information industry has, and how user studies can assist with their solution. The problems can be stated at a fairly general level for each of the actors in the knowledge transfer drama. For example,

1. **The author:** how can I write what I want and get it published?

2. **The publisher:** how can I stay in business/maximise profit/escape prosecution/remain respected? How do I spot what books the public will buy if I produce them?

3. **The bookseller:** how do I match the publishers' output to the demands and needs of my clientele, existing and potential?

4. **The acquisition librarian:** how do I allocate resources to meet my objectives? How do I detect which books are needed in quantity for immediate demand, and which will be used in the future?

5. **The indexer:** how do I index this item so that knowledge will be retrieved by the future users of this item?

6. **The database manager:** how do I organise the database so that future users shall have minimal barriers between them and the knowledge they require?

7. **The information librarian:** how do I detect users' needs so that I can best assist them in their problem solving?

8. **The "user":** how do I acquire the knowledge that will assist in solving my problems?

These problems can be seen within a framework of activity which can be applied to all information systems (table 6.1).
The problem of resource allocation is a large one, but user studies inevitably contributes to its solution. One approach is to base allocations on the amount of use made by various groups (169) or by reference to the number and level of potential users (39), making assumptions as to the ultimate aims of the organization involved. A more sophisticated approach is to adopt a system based on the users' valuation of the service; this is comparatively easy in commercial operations such as publishing and bookselling, but is more difficult in the field of libraries, where no satisfactory method of valuing the benefits of knowledge transfer exists. A multi-dimensional approach in which the aims of the organization are examined in concert with the expectations and perceptions of the users seems fruitful; and the recent study by Oldman (172) provides a useful clarification of the issues involved. A number of research studies
have used techniques whereby users are invited to suggest the allocation of resources to various information activities. Two of these (180, 181) were largely confined to library-based activity, but a recent study at the University of Southampton adopted a gaming technique in which the university library was only one of a number of support services considered (174).

**Staffing**

The contribution of user studies in this field is to indicate the kinds of problem which users have, their perceptions of the functions of systems and of the ability of the staff to assist in the solving of their problems. Surveys of university libraries (129, 153), of scientists (214), of public libraries (209) and of the general public’s information needs (219) testify to the reluctance of people to approach librarians for assistance, and there is evidence in Mann & Burgoyne (143) of the degree of unhelpfulness apparent in some bookshops. This evidence can be used to formulate recruitment policies and staff training programmes in the relevant organizations.

**Layout planning**

Sufficient studies have probably now been undertaken to demonstrate the need for providing a variety of seating in libraries (60, 75, 200, 201). As far as bookshops are concerned, relevant research will be found in the literature of marketing; and display; the comments in two items cited are relevant here (67, 145).

**Research and Development**

In a sense the purpose of the whole of this review is to assist the design and development of information systems. It may be relevant here to indicate some of the main factors which user-oriented system managers should take into account. The dimensions of these factors may have to be determined according to local circumstance.

1. Information must be accessible
2. Information must be timely
3. Information must be task specific
4. Information must be in the form suited to its use
5. Users belong to identifiable groups with needs in common
6. Information providers must interact with their users
7. Systems must allow the user to browse
8. Systems must adapt to users' behaviour patterns
9. Informal communication is important

A programme of research might begin with identifying a sub-group of users; the next step would be to establish the tasks for which information is required, and the amounts, urgency and preferred packaging of such information.

PROBLEMS IN STOCK CONTROL

Acquisition

The manager needs to know what to acquire to satisfy his consumers. As far as existing services and products are concerned, he can observe use and ask the customers; and this is a common approach in libraries, rarer in other fields, although there are exceptions (149, 150). The usual response is of course, "more of the same", but there is the problem in the information industry that "the same" is always different in fact from its predecessor. Acquisition decisions are also often overlaid with managers' own beliefs and prejudices - witness Macmillan's dismay at the content of H.G.Wells' novel "The New Machiavelli" which he had contracted to publish (171), and the opinions of librarians at different times about the provision of light fiction and multiple copies of student texts.

In the past, large academic libraries (and indeed, some public libraries) have not always selected their stock on the basis of its likelihood of being used. Comprehensiveness, exhaustiveness, preservation for posterity, and a balanced stock are phrases often used in statements of acquisition policy, and these are all valid statements. Where a library has to be more selective, the criterion that a book will be used if acquired is desirable; the problem remains of predicting future use. For books that are already in stock, past use seems to be the best single predictor of future use - at Lancaster University, for example, a rule based on this criterion predicts levels of use correctly in 75% of cases for popular books, and in 90% of cases for less popular books. However, this does not help us in respect of acquiring new books. In public libraries and bookshops, selection can be based partly on categories -
biography, travel, western, romances and so on - in the expectation that most of their decisions will be correct. We have not so far found any published evidence of the degree of success of these predictions, but in bookshops at least, the annual turnover gives the manager some idea.

In academic libraries, it is more difficult to think in terms of categories of material when selecting, and very little systematic research has so far been undertaken. The Library Research Unit at Lancaster University (116) is currently investigating some aspects of the problem. In a study of four academic libraries in the U.S.A., it was found that books selected by library staff had significantly higher rates of usage than books selected by teaching staff or by blanket order programmes (57); but we have no indication of the criteria for selection employed by the various parties involved. A useful longitudinal study of usage rates of recently acquired stock has appeared recently (35). The Delphi technique was used by the publishers Hutchinson to forecast the sales of a new book; the value of the technique was demonstrated by the fact that the Delphi forecast of sales was much closer to reality than the publishers' original forecast (which was 50% too low) (72).

Discarding

The main criterion for discarding from stock is lack of use. Remaining of stock by publishers and out-price sales by booksellers are the commercial remedies; public and special libraries are geared to discarding older materials, and recently some public libraries in the U.K. have adopted the policy of selling surplus stock. Academic libraries are most reluctant to discard, however. There has been a considerable amount of research on obsolescence of periodicals and a recent review suggests a number of research topics in the field of obsolescence in general (126). It has been suggested that discarding of monographs can be undertaken on an arbitrary basis (142), since much of a library's stock after an initial "honeymoon" period of popularity will sink into a pool of material with a low apparently random probability of use. This apparent randomness may be due to our lack of understanding underlying the reasons for which books are used. The problem is compounded by the fact that very little is known about the relationship between borrowing and in-library use. Until more is known about the nature of in-library use by
various sectors of the user population, it would be dangerous to make
long-term decisions about discarding stock wholesale, particularly as
this would imply a major restatement of objectives by academic libraries.
The recent report on capital provision for university libraries in the
U.K. (212) suggests that libraries can discard books at a rate equivalent
to their rate of acquisition. This kind of policy is a reaction to events,
and a rational policy is likely to emerge only after adequate research in
the areas of uncertainty. These include the problems of substitutability
and the circumstances under which a user’s need will be satisfied by a
book differing from that which he originally requested; if large
quantities of little-used material are relegated to a central store (such
as the British Library Lending Division), what facilities will be provided
to take the scholar’s to the books and will the central store actually be
able to house and organize the collections; in what circumstances is
interlibrary loan an acceptable substitute for an on-the-spot collection?
A considerable programme of research can be easily envisaged, of which
user studies are only a part. Investigations of the user as an information
processor are more likely to yield useful data for planning for the future
than are simple studies of present and past use as recorded on the date
labels of library books.

Pricing

All knowledge transfer systems have pricing policies. The pricing
policies of publishers are now fairly well known: it seems that the retail
selling price of a monograph is between four and five times the
production cost (22, 147). Computerised reference retrieval systems have
a variety of pricing structures, and the associated costs of terminal
hire charges, telephone line usage etc. make it desirable for a trained
intermediary to carry out bibliographic searches rather than the eventual
user.

While public and academic libraries usually make no charges for
their services, they do have pricing policies. These are expressed
largely in terms of loan policies and internal arrangements. Thus a
short loan period - say 4 hours - can be regarded as a high price, and a
long loan period as a low price. A well arranged library in which it is
easy for the user to find what he wants has a low price, a library with
few signposts and much of its stock located in basements inaccessible to
users has a high price. The best analysis of the variation of loan policy
in relation to use is Buckland's seminal work (34), although he does not cover all aspects of the problem. In one respect libraries do make explicit their pricing policy by fines for overdue books. It seems that the imposition of fines does reduce the percentage of books overdue and on loan at any one time, so that availability is increased; however, the actual level of fines seems to have little effect (63, 117).

PROBLEMS OF EXPLOITATION

Consumer education

Many of the systems which make up the knowledge transfer industry do not have specific programmes for training their consumers (we exclude advertising here). It is true to say that this aspect is limited in the main to libraries in educational establishments and to computerised on-line reference retrieval systems. There have been several reviews of the literature in this field (e.g. 29, 165), and of methods of instruction (37). Dyson has identified four common patterns of instruction in U.S. and U.K. university libraries:

1. "underground" instruction, with little support from the library
2. designated library instruction officer, with little involvement from other library staff
3. broad library staff involvement with no designated instruction officer
4. broad library staff involvement coordinated by designated instruction officer

He suggests that the fourth of these patterns seems most successful. The basic programme of instruction in the U.K. still conforms to that recommended by the Library Association in 1948:

1. introduction for new students
2. introduction to bibliography after 1st year of study
3. advanced bibliographical method for postgraduates.

This is similar in essentials to the U.S. pattern (29).

It has been generally recognised for some time that library instruction to be effective has to be closely involved with the educational curriculum; as Knapp discovered several years ago, the success of such an integrated programme depends on the social structure of the institution and the relationships between academic and library staff (113). It is apparent that successful programmes do operate in many institutions in a variety of disciplines where relationships are good (26); but general application will depend on the academic
staff recognizing that students need to be taught about the information structure of their subject (66). User studies which reveal this information structure are thus of considerable value in planning user education (182).

Advertising and promotion

In the area of exploitation of the stock of knowledge, consumer education, advertising, promotion and packaging merge into one another. In the commercial arena, ABC, JICAs, JICAs and doubtless others are continuously monitoring the consumption of various products - studying magazine circulation, newspaper readership, television audiences and so on. The impact of various forms of advertising is also measured. Direct mail promotion of books is one activity which has burgeoned in recent years. According to a recent survey (97) 22% of all academics in Britain and Ireland regard direct mailing as the most important way of finding out about new books; on the other hand 56% regard articles and reviews as the most important. Since most academics have an important voice in library purchase decisions the comparative effectiveness of various forms of advertising and promotion is important.

Among libraries, the monitoring of effectiveness of specific forms of advertising is rare. Libraries are either publicity-minded or not; they may be design-conscious or not; in academic institutions they may display posters twice a term announcing general recalls of all library books and then be surprised at the number of users who fail to see the posters. This is not to deny that many libraries do produce well-designed publicity material, but user studies to determine their effectiveness have been lacking up till now.

Packaging

What makes a producer package his product in the ways that he does? Commercially, again, salability is the criterion: the packaging of sail-makers' needles remained unchanged over a century because there was no need to change it (119). The three-volume novel held sway in Britain for many years while the main market for "quality" fiction consisted of libraries and gentlefolk, but it vanished almost overnight in the 1930s when a mass reading public emerged.

Within libraries and information centres the question of "packaging" has achieved more importance of recent years and there is a respectable
body of literature reporting surveys of such innovations as information officers in university libraries and neighbourhood information centres. One innovation adopted by a public library in the U.S.A. was a "books by mail" service for inhabitants of rural areas (110); since 85% of the users were already public library users and the average rate of borrowing by this new service was two items per year, the service cannot really be regarded as a success in terms of increasing use of the library. A greater degree of success was achieved by a library which operated mobile libraries stocking paperbacks only (132); here usage increased by 66.4%, but we are not told whether increased borrowing had any effects on bookbuying habits. According to one survey, one-third of the books bought by the general public had previously been borrowed from the library (145), so that increased availability of loan copies of paperbacks need not have deleterious effects.

The provision of information services by public libraries, as distinct from reference services, is a matter of considerable interest. The emergence of information and advice centres provided by social service and welfare organizations, often supported by volunteer workers, is due in part to the failure of libraries and other organizations to gear themselves to the public needs (31), partly to the public's perception of the library as a source of reading matter only. Given that some people regard reading itself as unhealthy escapism or a pastime for the educated elite (96), it is not surprising that libraries are ignored by the many. The public library is faced with a choice of several policies: to expand its information services, to take over services operated by other bodies, to limit their activities to referral services, or to limit themselves to a backup service to the other organizations (101). All of these require cooperation between services, and the common problem of lack of awareness of each other's existence, distrust, and the tendency to denigrate other agencies' work do not help. One reason for the success of neighbourhod information centres is that they are geared to coping with barriers which people encounter in seeking to learn their rights, and with dealing with everyday problems (129). The range of problems which came to light during the survey of public information needs in Baltimore provided a test bed for the problem-solving potential of existing agencies in the area (219); but the information service set up in the Enoch Pratt Free Library in Baltimore
failed (51). The reasons for failure included lack of publicity, the lack of a full-time professional with authority, the location of the service in the city centre, and the lack of a telephone enquiry service - this last despite the Canadian experience which showed that over 90% of the enquiries to a similar service came by telephone (107). Incidentally, this last survey, of the enquiries received by the service, helped to reveal gaps in the community provision of services. A good review and bibliography of this field has been published recently (217).

**PROCESSING PROBLEMS**

In the processing of materials within knowledge transfer systems, the user orientation is clear: the objective is to reduce delay to the consumer. Therefore, while studies of time delays in themselves (25) provide valuable information to the system manager, it is the study of the impact of those delays on the consumer that will tell us whether we are right to be concerned with delay. Within libraries, one source of delay is the recall procedure, whereby books on loan may be recalled for the use of other users, and there has been a recent survey of the impact of delay in this respect (204). The interlibrary loan system is another source of delay which has been studied recently in relation to research needs (94, 204). In the case of both internal and external delays it appears that delays are not crucial - there is usually plenty to get on with while awaiting documentary material. It could be of course that really urgent needs are satisfied by other means, and the users of these delay-prone services are "residual" users. A particular category of users to whom delays are critical are home based students (228).

Organizing stock for ready access by the consumer is another concern here. Simply changing the location of material helps to increase (or decrease) use (84); the retail stationers W.H.Smith locate their record departments (and formerly their lending libraries) at the rear of their stores so that the users of these services (who tend to be purposive) will have to pass other displayed goods on the way in - the main browsing collection, of magazines, being located near the entrance.

Library catalogues are one way of providing access to bookstocks, and there have been a number of studies of users' requirements. It seems that users recall titles more accurately than they do authors (10, 207), but not many libraries provide comprehensive title catalogues.
Finally, at the point of sale, what about procedures for saving the consumers' time? In libraries, in particular, what is the value of users' time, and should an issue system which saves 60 seconds on each transaction be preferred to another which is less costly to install? The opportunity costs involved can be calculated (65) but decisions are usually made by management on the basis of what they expect users to prefer, rather than on any hard facts.
METHODS AND TECHNIQUES OF RESEARCH ON USER STUDIES

As Britain (27) states "from a methodological point of view the field of user studies is weak". This comment tends to be repeated year by year in the *Annual Review of Information Science & Technology* and one of the main causes is, as Herner and Herner (8a) pointed out, the failure to build on past gains and the failure to profit from past mistakes. Wensel (8a) stated that "our judgement ... parallels that of Paisley who, reviewing the research literature on the flow of scientific literature from the beginning of time until December 1975 found only 33 items (the APA being counted as 1 item) worthy of specific mentions ... other than citation count studies and studies of the flow of scientific information to the public". Even in 1975 we find Burns and Hasty (36) writing that "most user studies have emphasised the descriptive rather than the analytical in their reporting and were conducted by practising librarians or information scientists with little or no attention to the adoption of rigorous methodology".

"Nearly all methods that are found in user-studies have been lifted, without much modification, from other disciplines and areas - especially from the field of social survey" (27).

The subject matter of user-studies and social science are concerned with the same units of enquiry - people, groupings and social institutions and the demographic, social environment, the activities and attitudes of groups of people. Yet why is social science methodologically rich while user studies poverty-stricken? It is submit that there are two causes.

One is that there tends to be a uniform background of training and research experience of people in the social sciences; at some point in their courses, many social scientists are given a quantitative methods course so that even if they are not expert methodologists, they have an appreciation of the subject, the pitfalls involved and the relative advantages and disadvantages of the various research approaches. But such is the disparate background of people in the information field that this basic research knowledge is often lacking so that we all too frequently have librarians and researchers conducting research projects with no formal research training and using the wrong methods for a given situation or else using them inappropriately.
Hennar and Hennar (8b) make this point of the heterogeneity of information workers when they say that "the failure to profit from past work is due, to a significant extent, to the variety of disciplines and viewpoints in the field and to the vast breadth of frequently unfamiliar literatures they represent".

The second reason is the one pointed out by Ford (64): the "general lack of theory and an equal lack of an adequate definition" of concepts and until this is remedied, it is unlikely that a fully-fledged methodology will exist. The field of user studies is in the pre-theory stage, one in which it is extremely difficult to deal with conflicting results (234).

This lack of a common corpus of research experience and training in this field has led to a few methods being used indiscriminately and inadequately while others are ignored; and when the term method is used, it all too often is used in the sense of data-collection without realising that there are other vitally important research stages and methods such as sample design, questionnaire design and methods of data-analysis. Selzmann (20) in his authoritative work "Theory and Methods of Social Research" devotes only 50 out of 900 pages to data collection methods; the rest is concerned with the theoretical problems of variables, indexes, parameters and analysis.

To this end it is instructive to detail all the steps in the research process (fig.7.1). It must be pointed out that although the stages are numbered sequentially, the process of planning, implementing and writing up a piece of research is a multi-dimensional one in that many of the stages, although different and beginning at different points, overlap in time so that several are being carried on at the same time. Nevertheless, each stage does have primary importance at some point in the research process and, more importantly, the form and content of subsequent stages is shaped (or should be) by decisions taken in prior stages.

We are concerned here principally with stages 8 and 9 but it is necessary to mention some of the prior stages because of their implications upon methodology. Stage 3 answers the question "Exactly what questions will the research try to answer?" and stage 4 poses a subsequent but equally important question and one that is all too frequently not asked of themselves by researchers: "is the research likely to answer the questions and is it worth doing?"

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Fig. 7.1: - The Research Process

Part One: Designing the Research Plan

1. The initiating idea or need and problem area
2. The initial review of the literature
3. Defining the specific research problem
4. Estimating the research success potential
5. The second literature review
6. Selecting the research approach
7. Stating the hypothesis of the research
8. Selecting the data-collection method(s)
9. Selecting and developing the data-collection instruments
10. Designing the data analysis plan
11. Designing the data-collection plan
12. Identifying the population and invited sample
13. Pilot studies of methods, instruments and analysis plans

Part Two: Implementing the Research Plan

14. Implementing the data-collection
15. Implementing the data-analysis
16. Preparing the research reports

Part Three: Implementing the Results

17. Dissemination of findings and agitation for action.

* After Fox (65).

It is only when the prior stages have been settled that we can choose the data-collection method most appropriate to our research problem, having consideration to many constraints of the alternative methods such as their differential cost functions, response rates, type and quality of data yielded and their different demands in the way of numbers and experience of staff needed to administer them. Criticisms have been levelled at past user studies in that only a few methods have been used frequently, that too few methods have been introduced to meet the special problems of user enquiry, and that this is an unsatisfactory state of affairs. This is somewhat harsh as there are basically only three main methods of collecting data about a group of people:

1. documentary sources
2. observation
3. questioning

It is possible to give new titles to old techniques - i.e. to call a recurrent self-administered questionnaire a "longitudinal communications
questionnaires" or refer to a "solution development record" which, basically, is a diary.

While the above grouping is a useful classification for discussion, it should not be thought that a particular method has to be used on its own. Indeed, a combination of methods is often more appropriate in order to make use of their different advantages and to counter the individual weaknesses and biases of a method used in isolation. The multi-method approach has tended to be ignored in user studies; but the degree of enhancement of our knowledge of behaviour which has been achieved by this approach (e.g. 7) demonstrates its advantages.

The techniques of data collection available are summarized in fig. 7.2, and we will deal with the three broad groups in turn.

**Table 7.2 - Data Collection Methods**

<table>
<thead>
<tr>
<th>Documents</th>
<th>Observation</th>
<th>Questioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library records, loans</td>
<td>Participant - known</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Requests, etc.</td>
<td>Participant - unknown</td>
<td>Interview schedule</td>
</tr>
<tr>
<td>Citation analysis</td>
<td>Indirect - known</td>
<td>Interview guide</td>
</tr>
<tr>
<td>Solution records</td>
<td>Indirect - unknown</td>
<td></td>
</tr>
<tr>
<td>Collection of social and demographic statistics</td>
<td></td>
<td>Structured questions</td>
</tr>
<tr>
<td>Reports of past research, books, biographies, etc.</td>
<td></td>
<td>Semistructured questions</td>
</tr>
<tr>
<td>Diaries</td>
<td></td>
<td>Unstructured questions</td>
</tr>
<tr>
<td>Content analysis</td>
<td></td>
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</tr>
</tbody>
</table>

**DOCUMENTS**

Documentary sources are of the greatest value at the planning stage of a research project, particularly if it is to use the survey technique. There is no substitute for thought and desk research but all too often people rush out into the field with their questionnaire without having had a long, cool, session with the documentary material. A mass of information about the population studied is available in historical documents, statistical reports, records of institutions and many other sources. In using it, the researcher must consider its suitability for his purposes - for example, does it cover the same population as the research project, are the same definitions used, how accurate is it, is it sufficiently up to date. One of the main
problems with official statistics is comparability; government departments are notorious for changing the definition of an item, witness the term "social class".

Much material is collected by people in the course of their work, for instance, the case records of social workers and probation officers, or the files maintained by most people in an office environment. Much of this refers to the information process, and as such can provide valuable background material. But it has limitations; records written without thought for subsequent analysis are unlikely to lend themselves to this purpose; some information may not be written down but starts and ends as verbal messages, and the terms used in the records are likely to be vague. For these reasons the records must be regarded as subjective statements, useful as background material but not always suitable for aggregation. In the same way, biographies provide insights into the way people solve problems but here the element of subjectivity and distortion arises, as for example in Watson's account of the DNA research (220).

Statistical records, as opposed to case records, are often suitable for aggregation and statistical analysis - bookshop orders, library checkout slips, request slips, etc. - but apart from giving a picture of the demand made upon a particular system with perhaps, some cross-classification by subject, sex and age of the consumer, little else can be learned from these records in themselves. They throw little light upon users' attitudes and information needs as opposed to demand.

Diaries

Diaries, written or dictated, were used by Jahoda, Werner and Shaw (104, 191, 223). Werner discarded the method because of poor response and Jahoda pointed to the lack of representativeness of use patterns it produces. Shaw found that his sample did not cooperate and concluded that "the diary method, even with better than average cooperation and supervision, is not reliable enough to justify further studies over extended periods of time". But with short periods, there is the problem of representativeness. Even if there is not an increase in the non-response rate, the quality of the data may diminish over time as entries become shorter.

Another approach to the use of diary methods is epitomised by the Random Alarm Mechanism (RAM). (37) A device, akin to a hospital doctor's "blimp", is given to each participant who is asked to record the activity
he is performing when the RAM is activated. In this way the research worker who controls the 'mirrors' knows how many entries there should be in each diary, so that the cooperation rate can be precisely determined.

There is also the problem of the conditioning of the respondents which is a problem common to all research where the respondents are approached more than once - they become skilled at answering and framing answers in an "expected" manner and they may alter their information-seeking pattern and lump it into one session so that they can then fill in their diary and be finished with it for the day.

It seems better to use the diary technique to sample behaviour generally and to extract information behaviour from it. This is basically the technique used recently in the Cranfield research (172).

The other main problem is the analysis of the data since the material is difficult to quantify and time consuming to analyse. A few tape-recorded diaries were collected by the Aslib Research Department from scientists and as Martyan (156) says "the data collected were rich in variety but have so far defied all attempts at analysis". This problem may be solved by having regular interviews with diary keepers to clarify and expound on any obscure points emerging from the analysis.

Solution Development Records

Allen (3) used as one component in his study of selected R & D departments, a solution development record; this is a form of a diary, being a progress report on how the solution of a particular problem is getting on, showing alternative methods considered, the feasibility of each and the reasons for discarding some. McAlpine (137) used this method plus a longitudinal communications questionnaire in an attempt to link information sources with various categories of information received by researchers in the physics department of two British universities. In one reported project the information researcher formed part of the research group being surveyed (18).

This solution development record might prove useful particularly if linked with the critical incident technique whereby respondents tell how they go about solving a problem or need as it arises. However if the designated incident is trivial, the results will be trivial, while the more complex the incident the more complex will be the data and the
problems of analysing it. This technique suffers from the many problems of
diaries - faulty recall, inventive, etc. but if combined with task simulation,
it might prove to be a valuable method. In this method, hypothetical problems
are set to respondents and they write, tell or otherwise detail how they
would solve it - a solution development + task simulation + critical
incident diary or questionnaire. Suitably controlled, there is no
reason why this combination should not be used on selected members of
the general public, asking them for instance what they would do, if a
newly bought appliance is faulty, or they are threatened with eviction,
what rights do they have, where would they go for information and advice
and so on.

OBSERVATION

Observation in fact underlies all methods of data collection - for
example, diaries constitute self-observation, questionnaires are based on
post facto observation. Direct observation can fairly be called the
classic method of scientific enquiry.

Looked on as a means of general orientation, observation plays as
much a part in the social as in any of the sciences but observation as a
systematic method of collecting data, however, is quite another matter.
It is not sufficient that the subject matter is there to be observed; the
method must be suitable for investigating the problem in question, it must
be appropriate to the populations and samples under study and it should be
reasonably reliable and objective.

The observer must have a prior designed plan of the data required as
the potential events which could be observed are so vast and often so
amorphous that a structured observation guide is necessary.

One disadvantage whether it is direct or indirect observation is
that the observer can only be in one place at a time; if he is observing
behaviour in one section of the book stack, he cannot physically be in
another. In some situations then, more than one observer may be needed.
Another disadvantage is that unless it is coupled with other methods such
as questioning, events can be observed but the motivations behind those
events cannot be ascertained - we see a person consult the catalogue but
why we do not know nor whether the consultation had a successful outcome.
Again it may be difficult to distinguish between browsing and searching.
Observation can be valuable in a highly structured situation where one is observing a particular person rather than people in a system, i.e. the case-history rather than the general population approach. In the Project DNSH observers sit in with selected social welfare officers and observe them in their information-seeking and using role and they record each information event upon a card. It is really more than observation as observation strictly means using the eyes only whereas this structured observation approach of Mintsberg (164) involves the ears and also utilises the explanatory comments of the observed.

In this manner, the method can give valuable information on what is currently happening and combined with questioning, can yield information on why. It has problems of inter-observer bias, and the reliability and validity of the data, problems shared with the questioning method, but some measures can be taken to overcome or measure them "provided that the data instrument is a structured one. In order to structure the data instrument it may be necessary to carry out some prior observation to establish major categories of activity. The observational methods used in work study are a model for this technique; and there are some applications of these techniques in librarianship (63).

Another disadvantage as pointed out by Herner and Herner (8b) is that "the very act of examining an individual's information gathering patterns, with his knowledge, has the effect of altering them. The longer the examination lasts, the higher the probability of change ... and it is dangerous to extrapolate from or generalise upon the results". The use of a time lapse camera will eliminate this variable in some situations (227) but here again we lose the ability to question motives.

Active participant observation has been used only seldom (159) in user studies as they have tended to concentrate on specialist groups or the use of specific systems. In an investigation of the general public and their information requirements in relation to their life styles, this approach might be used, though the situation to be investigated would have to be highly structured or specific given the multi-role aspect of people's lives. A variant of it, beloved of psychologists, might profitably be used to examine certain highly defined sectors of people's existence - that of role-playing. Posing as a member of a disadvantaged group might provide insight into the problems faced by people obtaining information on, say, social welfare benefits, consumer information, legal advice, medical problems and the like. One could also employ members of these dissadvant-
aged groups to undertake the observation.

Regardless of the name given it, outside psychological experiments observation is unstructured; any structure that is imposed in the situation is via the observation guide which tells us which actions and events are to be recorded and which ignored as being outside our sphere of interest.

**QUESTIONING**

As Hawthorne says "If you want to know why people do what they do, why not first ask them" (86). Most user studies have taken this view but with varying degrees of success due to inadequacies in the research design rather than the method.

There are three types of question schedule. In the structured type, there is a list of specific questions with pre-defined answer categories or codes. The semi-structured type has a list of specific questions, but the respondent has a considerable degree of freedom of reply. The unstructured schedule consists of a list of topics on which data is required.

A questionnaire is a form that is filled in by the respondent and these self-administered schedules can be handed out, or posted. This is the method most widely used in past user studies, probably because of the advantages it is said to possess of cheapness (no large band of expensive interviewers needed), speed in obtaining results and ease of administration. It can be used for populations that are thinly scattered.

It does possess major disadvantages. It should only be used where the questions are sufficiently simple to be understood with the help of the printed instructions and definitions; these cannot be over-elaborate (not too many of the 'if yes go to Qx, if no go to Qy, otherwise answer Qz' type). It should also only be used where the questions require straightforward and brief answers and where the respondent can be defined clearly beforehand.

The questions to be answered have to be taken as final; there is no opportunity to probe beyond the given answer or to clarify ambiguous ones. The questionnaire is inappropriate where spontaneous answers are required; the answers to it cannot be regarded as independent of each other; one cannot be sure that the required person fills in the questionnaire; and there is no information about the manner in which the questions were answered, whether seriously or flippantly.

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Another disadvantage is that it assumes literacy in the respondent whether in absolute or relative terms. It is with self-administered questionnaires that non-response looms large as a problem. Non-response is a problem with any method as there is always the possibility that the non-respondents differ significantly from the respondents so that estimates based on the latter are biased. The larger the non-response rate, the larger the possible biasing effect and, conversely, the less we can safely generalise from our sample results to the population. Yet this statistical fact has not stopped researchers generalising from totally inadequate results.

There are statistical methods for following up non-respondents in order to ascertain their characteristics (a good explanation is given in Kish (112) yet very few of past user studies seem to have used them. One notable exception was a survey of astronomers and their information needs (158); here a correct application of the follow-up procedure yielded a response rate of 86%.

Scott (191) has written a good review of mail surveys and attempted to classify them by factors which may have a bearing on non-response. Some research has been done in trying to determine the important factors or variables but much of it is ad hoc or too many factors were varied at once to allow us to quantify individual discriminatory variables. There is a need for experimentation here which should be undertaken as the method is an important one and one which will continue to be used extensively.

There are some general rules of thumb which it is considered should be adhered to to achieve a good response rate. One is to keep the questionnaire as short as possible - any form is competing with the many other demands on a person's time (including doing nothing) and, therefore, should be short. The important factor is not physical length but completion time.

General points are to include stamped not franked envelopes, personalise the letter, use good quality paper and so on. Basically, it is an inflexible method but used in conjunction with other methods, it can be a useful one.

**Interviewing**

Administration of the questionnaire by interviewers is common in social surveys though little used in user studies.
One of its main advantages is that response rates tend to be high—in the 90% range (40)—as interviewers can persuade and cajole people to respond, and achieve what is termed 'rapport' with the respondents. Other advantages are that it is possible to use highly complicated questionnaires with complex questions, to use a structure where some sections refer to certain respondents only, and to use semi-structured questions where the interviewer probes for the reasons behind a specific reply. The interviewer can clarify ambiguous answers and ensure that the respondent understands a question by restating it if necessary, and it is possible to get behind the surface replies into the attitudes, reasons and motivations of the respondent.

The interviewer can also administer other data instruments as well as the schedule, for example, an IQ. test or a psychological projective technique.

Interviewers have to be used where the schedule contains a large number of semi-structured questions or has a complex structure. The focused interview using an interview guide instead of a schedule cannot be undertaken any other way than by interviewers.

It is important to realise that there is a spectrum of interview types, and one type of interview may require an interviewer trained only in interviewing techniques, while another may require the interviewer to have a considerable degree of knowledge in common with the interviewee.

Slater (195) successfully used ordinary interviewers to question chemists and recommended that this method be more widely used; for large scale surveys this seems the best approach.

But focused interviewing or indepth questioning of a small number of selected respondents—the case study approach—could more profitably be done by research staff themselves after training in this highly skilful interviewing technique.

One major disadvantage is the cost of using interviewers for large surveys: interviewers are expensive though given their higher response rate and data-quality, the cost per item may not significantly be higher than other methods. The use of telephone interviewing is uncommon in the U.K., but common in the U.S.A. A recent example of its use, by Zweig (235) achieved a disappointingly low response rate of 44%; in contrast, a Swedish survey achieved a response of 99% (62).
Interviewer-bias is another disadvantage though precautions can be taken through adequate training, spot-checking and analysing the data to spot inter-interviewer differences. It is easier to measure bias and reliability in an interview situation than in an observation situation where there is no original document against which to correlate the different observers' answers.

Survey Design

The types of survey design are shown in Fig. 7.3; past user studies tend to have concentrated upon Design A which is excellent for describing the field but will not get us further than that. If we are to go further and develop theories we must use one of the other designs. There is a need for more "evaluated experimentation", a new term describing a method long used in market and social research - that of panels and longitudinal studies. We could use Design B and set up some experimental services, perhaps put boxes of books in factories or start a new information service in a library and monitor the before and after effects. There have been some experiments in the user behaviour field, such as the initiation of Current Papers in Physics with its before and after studies (196, 197). More recently, a small scale experiment with variation of publishing patterns and indexing styles of an abstracting service has shown the possibilities of experimentation (490, 498).

Going one step further, we could set up a comparison group experiment in an attempt to discover effects of test variables or to test hypotheses. Design C(a) involves picking different samples and the evidence comes from the inter-sample comparisons. Panel conditioning does not operate since all samples are surveyed only once. Design C(b) is technically an experiment and we survey two groups after subjecting one group to some experimental stimulus - it could be the showing of a film on racial relations or comparing two branch libraries, one of which has an experimental service. Design D uses the additional rigour of the before/after effect coupled to the target/control group aspect. One problem here is that of panel conditioning and attrition, but the multi-method approach will assist with this factor. The BBC use panels combined with regular street interviews as a measure of radio and television programme impact, and there is no reason why similar techniques should not be used in user studies (20).
**Fig. 7.1 - Taxonomic Chart of Survey Designs**

<table>
<thead>
<tr>
<th>Letter</th>
<th>Type of Study</th>
<th>Aim</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>One-off case study</td>
<td><strong>Aim:</strong></td>
<td>To discover change/trend in the group/panel Causal hypotheses may be formulated but not tested</td>
</tr>
<tr>
<td>B</td>
<td>One group Recurrent study</td>
<td><strong>Aim:</strong></td>
<td>A) Cross-section - relations between variables B) Target control - discover effect of test variable</td>
</tr>
<tr>
<td>C</td>
<td>Comparison groups ex post facto study</td>
<td><strong>Aim:</strong></td>
<td>Test hypotheses re change trend A) Cohort-sequential design B) Time-sequential design C) Cross-sequential design</td>
</tr>
</tbody>
</table>

It is significant that one recent user study which used panels in a longitudinal study was initiated in a School of Marketing (172); these techniques are common in market research.

We have said little about the details of collecting data since there are many handbooks of survey techniques which can be followed with confidence (125, 148, 176).

We have mentioned examples of the use of particular techniques of data collection; but it should not be overlooked that questions of research design and the presentation of results are also important. Again these points are adequately covered in various handbooks (125), and examples can be found in recent publications of models for layout and method (93).

It is commonplace for the results of user studies to be presented in tabular form, and for figures to be quoted in percentages; but tests of significance are frequently ignored, and much data that is printed adds little to our knowledge. More sophisticated techniques of analysis are rare; there is no reason why factor analysis, multiple regression and cluster analysis should not be applied, perhaps to data already extant, in order to give useful results. Examples of the use of these techniques in user studies are rare (33, 173).

Brittain has summarized the refinements of conventional techniques that are needed for the future conduct of user studies (28). We may
repeat these here since they reflect our own views.

(1) Questions should reflect user priorities and not those of the enquirer.

(2) Only questions which users are in a position to answer should be asked. General questions about future information needs should be avoided.

(3) Longitudinal studies are preferred to single studies: this has the advantage of establishing changing trends as well as giving the user greater opportunity to recall his activities. Users typically cannot give good recall in a single enquiry.

(4) Only significant results should be reported and this implies a rigorous application of statistical tests of significance.

(5) The objectives of the study should be clearly stated before the enquiry is made and an indication given of the way in which the results can be applied.

Going on from the above, we come to the question of how to establish future information needs. Again Brittain has some useful suggestions here; his main thesis is that it is up to information scientists to do the work of prediction by examining the structure of information. Among the approaches which might be tried are the Delphi technique and variations thereon; studies of the diffusion of information; and the continuous assessment of the use made of information systems (and in particular, online interactive systems). Research on the statistical characteristics of literature, characteristics of knowledge and aspects of communication will combine to enable predictions of need to be made.
Section 8

CONCLUSIONS AND GENERALISATIONS

From this review of research in the field of user studies we can distil some generalizations about user behaviour. These have no claim to originality but we think it useful to present them in summary form.

1. Users of information belong to identifiable groups with characteristic patterns of information requirements.
2. The role of the user is an important determinant of information need.
3. Accessibility is a key factor determining the use of an information source.
4. The user's awareness of, and ability to use, information sources is often imperfect.
5. Interpersonal communication is one of the most important means of transmitting information.
6. The amount of information required varies considerably between persons.
7. Users often require information to be supplied at short notice; decisions may have to be made at a given time regardless of the availability of information.

While a large number of studies of information needs and behaviour have been carried out, results are difficult to compare directly owing to the lack of standardization in methods. Enough research into information use has been done to enable us to make general statements; future research should concentrate on providing results which are directly applicable in the notification and design of information systems. Such research should be based on user behaviour rather than on opinion.

We need to know more about the context in which information needs arise: this may involve studies of attitudes, temperament and total life situations so that information seeking behaviour may be better understood.
As we have pointed out, the term information covers a wide spectrum of concepts. For this reason different styles of research may be required for different bands in the spectrum. Thus in the leisure market, where information consumption activities are competing with other cultural and recreational pastimes, market research techniques are appropriate; on the other hand, in the field of professional services, where information consumption is an essential part of a person's work role, different techniques of research and evaluation may be required. In most professions and trades the need for education and training is unquestioned - only the means are in dispute. It cannot be said that the need for information awareness is less widely perceived - both the necessity and the means are in dispute. Perhaps the first goal of research in this field should be to achieve convincing demonstrations of the necessity. At various points in this review we have suggested areas where research is desirable; one topic which does not seem to fit in any compartment is that of the relationships between information needs and organizational structure. Some work on this is already in progress - notably Project INISS (229). An area ripe for investigation is the interaction between information system objectives and the expectations and perceptions of users.

In the design of information systems, research into specific problems at a local level may be needed; such research should be related to the general theory of user behaviour as currently established, and account should be taken of factors such as those listed on p.478. In undertaking research, the guidelines on methods suggested by Brittain (28) and reprinted on page 69 of this review are appropriate.
BIBLIOGRAPHY

This is a list of the documents referred to in the text. They are arranged in alphabetical order of first-named author or, in the case of anonymous works, of title. The numbers in the text refer to the sequence numbers in this list. Groups of documents (e.g. DISISS) have been given a single number, followed by a letter for individual items.

Whenever possible the most accessible version of each document has been listed, and in many cases the NTIS or ERIC numbers have been quoted.
1. ADAM, R. Meeting the information needs of social scientists. Information Scientist 9, 4 (Dec. 73) 141-8.

2. ADVISORY COUNCIL ON SCIENTIFIC POLICY. Survey of information needs of physicists and chemists. Journal of Documentation 21, 2 (June 65) 83-112.


Volume 1 (1963): PB 164, 49c.

7a. APA - PSIEP Overview Report 1: An overview of the structure, objectives, and findings of the American Psychological Association's Project on Scientific Information Exchange in Psychology.

7b. APA - PSIEP No.1: Scientific activity and information problems of selected psychologists: a preliminary survey.

7c. APA - PSIEP No.2: An informal study of the preparation of chapters for the Annual Review of Psychology.


7e. APA - PSIEP No.4: Convention attendants and their use of the convention as a source of scientific information.

7f. APA - PSIEP No.5: Convention participants and the dissemination of information at scientific meetings.

7g. APA - PSIEP No.6: Publication fate of formal presentations at the 1957 Convention of the American Psychological Association.
7h. APA - PSI No.7: Archival journal articles: their authors and the processes involved in their production. Revised Dec.63.

7i. APA - PSI No.8: A comparison of scientific information-exchange activities at three levels of psychological meetings.

7j. APA - PSI No.9: The use of scientific journals by psychologists and the readership of current journal articles.

**Volume 2 (1965) PB 169 005**

7k. APA - PSI No.10: A preliminary study of information exchange activities of foreign psychologists and a comparison of such activities.

7l. APA - PSI No.11: The discovery and dissemination of scientific information among psychologists in two research environments.

7m. APA - PSI No.12: Theoretical and methodological considerations in undertaking innovations in scientific information exchange.

7n. APA - PSI No.13: The role of the technical report in the dissemination of scientific information.

7o. APA - PSI No.14: The use of books as a medium for the dissemination of information.

7p. APA - PSI No.15: A study of Psychological Abstracts: some findings on its current functions and operation and a proposed plan for innovation.

**Volume 3 (1969) PB 182 962**

7q. APA - PSI No.16: Innovation in scientific communication in psychology.

7r. APA - PSI No.17: The use of scientific information in the undergraduate teaching of psychology.

7s. APA - PSI No.18: Information exchange at the American Psychological Annual Convention and the function of the Convention Proceedings in such exchange.

7t. APA - PSI No.19: Information exchange activities involved in psychological work.

7u. APA - PSI No.20: Scientific communication at the XVIII International Congress of Psychology, Moscow, 1966 and some implications for the design and operation of international meetings. Supplement to Volume 2, April 1968.

7v. APA - PSI No.21: Networks of informal communication among scientifically productive psychologists: an exploratory study.
8. **ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY (ARIST)**
   Volume 1, 1966 - Washington (DC), ASIS, 1966 -
   The relevant sections in these volumes are:

8a. LERNER, H. Information needs and uses. ARIST 1 (66) 41-49.

8b. HORN, S. Information needs and uses in science and technology. ARIST 2 (67) 1-33.

8c. PAISLEY, T.J. Information needs and uses. ARIST 3 (68) 1-30.

8d. ALLEN, T. Information needs and uses. ARIST 4 (69) 3-29.

8e. KATTNER, R.V. Design and evaluation of information systems. ARIST 4 (69) 31-70.

8f. LIEPTZ, B. Information needs and uses. ARIST 5 (70) 3-32.

8g. CRANE, D. Information needs and uses. ARIST 6 (71) 3-39.

8h. LIN, N. GARVEY, J.D. Information needs and uses. ARIST 7 (72) 1-37.

8i. MARTIN, T.H. The user interface in interactive systems. ARIST 8 (73) 204-19.

8j. MARTIN, J. Information needs and uses. ARIST 9 (75) 3-29.


14. BAXBOUT, L., DAVIS, D. and O'MALLEY, P. User studies in the humanities: a survey and a proposal. RQ 15, 1 (Fall 1975) 40-44.


18. **BETHELL, J.P.** Communications in an international research laboratory. Lond., City University - Centre for Information Science, September 1972.


25. **BOOKSELLER.** A report of publishers' supply delays is usually published during "arch in the Bookseller; see the appropriate issues each year.


33. BRYANT, B. B. CURRIER, F.P. NORRIS, A.J. Relative life style factors of persons in the choice of a newspaper. Journalism Quarterly 51, 3 (Spr. 76) 76-9.


42. COHEN, R. The information service in practice: an experiment at the City University Library. Journal of Librarianship 1, 4 (Oct.69) 225-35.


44. CRANE, D. The nature of scientific communication and influence. International Social Science Journal 22, 1 (71) 26-41.


49. DISSEY. Design of information systems in the social sciences. Bath, Bath University Library, 1971-

49a. Working Paper 1: Comparison of results of science user studies with PROMESS.


49e. Working Paper 5: Citation patterns in social science monographs.


49g. Working Paper 7: Size and growth of monograph literature with particular reference to the social sciences.


49k. Yorlning Paper 11: Clustering of journal titles according to
citation data -- preliminary report on preparatory
work, design and data collection.

Research Reports Series A.

49. 1: Not yet published.

49n. 2: Size, growth and composition of social science literature.

49o. 3: Not yet published.

49p. 4: Evaluation of operational effectiveness and its use in the
design of information systems.

49q. 5: The planning of indexing and abstracting services in the
social sciences: coverage, overlap and content.

Research Reports Series B.

49. 1: User evaluation of an information service in social welfare.

49r. 2: Analysis of requests made to the National Children's Bureau
question and answer service.

49s. 3: The relationship between usefulness and style of secondary
publication.

49t. 4: Characteristics of social science serials: the construction
and analysis of a file of social science serial
titles.

49u. 5: Not yet published.

49v. 6: Not yet published.

50. --- Discrimination and use of the information of physics.
Information Part 1 4, 4 (July-Aug.73) 205-214.
Reprinted from NATIONAL ACADEMY OF SCIENCE, et al:
Physics in perspective; vol.1. Wash. (DC),
NAS, 1972.

51. DCHIMI, C. Some experiments fail: the Public Information
Center Project at the Hoover Free Library.

52. DUCHEREK, R.M. Management information from computer aided
systems.
Int. MACKENZIE, A.J. STUART, I.M. Planning
library services; proc. Research Seminar held at
the University of Lancaster 2-11 July 1969.
University of Lancaster Library Occasional Paper
No.3, 1969.


57. EVANS, T.E. Book selection and book collection usage in academic libraries. Library Quarterly 40, 3 (July 70) 297-308.

58. EVANS, B.M. LINE, M.B. A personalized service to academic researchers: the Experimental Information Service in the Social Sciences at the University of Bath. Journal of Librarianship 3, 3 (July 73) 214-232.


62. FULBERT, N. CTHB - Publication No.10: A study of user behaviour and needs at Chalmers University of Technology Library, Gothenburg (Sweden). Publication No.11: A study of user behaviour and needs at the Biomedical Section of Gothenburg University Library, Chalmers University of Technology Library 1976.


66. FREILICHER, L. At Reader's Digest, they produce books to the order of their (16-million) readers. Publishers Weekly 209, 5 (2/2/76), 59-60.


10. QA All., G.W. Regional access to libraries and information sources. BIRD Report (not yet published).


74. GIFFORD, R. HASKER, R. The desk or the bed? Personal and Guidance Journal 46 (18) 87-870.


76. GRANT, R.S. Predicting the need for multiple copies of books. Library Resources and Technical Services 16 (Winter 72) 26-32.


78. GROOMECHIDGE, B. The Londoner and his library. Lond., Research Institute for Consumer Affairs, 1964.

81. HALL, J.L. Experimental current awareness service for the social sciences. OSTI 5011, 1969.
89. HERNER, S. Information gathering habits of workers in pure and applied science. Industrial and Engineering Chemistry 46, 1 (Jan.54) 228-236.

97. IBIS. The effectiveness of direct mail promotion received by academic staff in Great Britain and Ireland. Lond., IBIS, 1976.

98. INFROSS. Investigation into information requirements of the social sciences. Bath, Bath University Library, 1971.

98a. Research Report 1: Information requirements of researchers in the social sciences, V/II.


98e. Research Report 5: The research procedures of social scientists.


102. JACKA’IN, P. The library and the illiterate. Assistant Librarian 65, 7 (July 77) 102-104.

103. JACKA’IN, P. Public libraries, information, and the community, Assistant Librarian, 66 (2), Feb. 77, 10-21.


116. LANCaster UNIVERSITY, Library Research Unit. Acquisition, stock holding, stock control and discarding policy in libraries (final report not yet published).


120. LooHT, H.A. The information professional and the Neighbourhood Information Service. Special Libraries 67, 3 (March 76).


130. LINE, M.B. Student attitudes to the university library: a survey at Southampton University. Journal of Documentation 19, 3 (September 1963) 100-117.


132. LITTLE, P. Converting bookmobiles to paperbacks (Oklahoma County's successful experiment). Library Journal 104, 7 (1.4.76).

133. Loughborough University, Dept. of Library and Information Studies. Regional access to libraries and information sources. HEDD Report (not yet published).


138. MCLAUGHLIN, P.J. A survey of Bakston and the surrounding area in North-West Derbyshire; being a study of educational, recreational, and information needs with particular reference to the use of public libraries in this context. Sheffield University, Postgraduate School of Librarianship and Information Science, 1976, MA Special Study.


152. MANN, P.H. Teenage girls and fiction reading. "Not yet published."


159. HINER, R.L. Information input overload: features of growth in communication-oriented institutions. Libr. 13, 1 (69) 1-34.


-97-


180. --- Project for evaluating the benefits from university libraries: final report. OSTI 5056, 1969.


182. REVIEW COMMITTEE ON EDUCATION FOR INFORMATION USE. Final report. BLDR 5325, 1977.


184. ROSENBERG, V. Factors affecting the preferences of industrial personnel for information gathering methods. Information Storage and Retrieval 3, 3 (67) 119-127.

185. HOSSEINLOOM, R.S. Information and organization: information transfer in industrial R & D. Boston (Mass), Harvard Graduate School of Business Administration, 1967.

186. ROTHWELL, R. Information patterns in innovation. In: ROBERTSON, A. ROTHWELL, R. Scientific and technical information needs (see No.184).


189. SCALIS, P.A. Citation analysis as indicators of the use of serials. Journal of Documentation 32, 1 (March 76) 17-25.


193. SKELTON, B. Scientists and social scientists on information users: a comparison of results of science user studies with investigation into information requirements of the social sciences, Journal of Librarianship 5, 2 (Apr. 73), 150-156.


-89-
1. WHITNEY, M.A. User and library surveys. In- WHITNEY, M.A. British librarianship and
information science 1966-70. Lond., Library

into Londoners' book habits. Books 321 (Jan-Feb.60)
7-22.

200. SOMMER, R. The ecology of privacy. Library Quarterly 36 (66)
234-269.

201. SOMMER, R. Reading areas in college libraries. Library
Quarterly 36 (66) 249-260.

202. SPARKS, M.S. Chemical literature and its use. Urbana (Ill.),
privately published, 1919.

203. STEVENSON, W.R. Education in use of information in university
and academic libraries. Aslib Proceedings 28, 1
(Jan.76) 17-21.

204. STUART, I.H. Some effects on library users of the delays in

205. SURRIDIS, R. Management information in the Bremley computerised
book-charging system. London, University College

206. TAYLOR, G.P. A survey of scientific and technical information
in Ireland. Dublin, Institute for Industrial and


208. TAUBE, H. An evaluation of use studies of scientific information.
AD - 206697.

209. TOTTEDRELL, B. BIRD, J. The effective library. Lond.,

210. TROTTER, B. Librarians and their users.
In- HARRISON, K.C. Prospects for British

211. TUCKER, P.S. The sources of books for undergraduates: a survey
at Leeds University Library. Journal of Documentation
17, 2 (61) 77-95.

212. UNIVERSITY GRANTS COMMITTEE. Report on capital provision for

213. VAN TURNER, B. The effect of a large-scale photocopying service
on journal sales. Journal of Documentation 32, 3
(Sept.76) 190-204.

-90-
214. WILST, M.J. The researcher and his sources of scientific information. Libri. 9, 3 (59) 177-193.

215. WALLHART, T.J. WALLHART, V.S. Communication research in library and information sciences: a bibliography on communication in the sciences, social sciences, and technology. Littleton (Co), Libraries Unlimited, 1975.


224. WHITE, M.D. The communications behaviour of academic economists in research phases. Library Quarterly 45, 4 (Oct.75) 337-394.


