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COPY NO. - 138

DATE - August 12, 1965



TALKS PRESENTED AT RECENT MEETINGS
ON INFORMATION PROBLEMS

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TALKS PRESENTED AT RECENT MEETINGS

ON INFORMATION PROBLEMS*

Francois Kertesz

The first two papers were presented at the AEC Specialized Information and Data Center Director's Meeting, on June 4, 1965 at the U. S. Atomic Energy Commission, 1717 H Street, Washington, D.C. "Scanning, Indexing and Abstracting" was part of Session IV on Input and Operating Problems, Mr. John Sherrod, DTI, Chairman; "Inter-Center Cooperation" was included in a panel discussion on various aspects of cooperation in Session V on Output and General Problems, chaired by Mr. Richard E. Bowman, DTI.

The third paper was presented on June 10, 1965 at the 56th Special Libraries Association Convention in Philadelphia, Pennsylvania. It was part of a panel discussion chaired by Dr. Michel O. Friedlander, Grumman Aircraft Engineering Corporation, Bethpage, New York.

* There is a certain amount of overlap in the three papers, intended for oral presentation to separate audiences.

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SCANNING, INDEXING AND ABSTRACTING

My assigned subject, "Scanning, Indexing and Abstracting", represents the backbone activity of information centers. As such, it was touched upon by most of the previous speakers who described the operation of their information centers. While I cannot hope to arrive at startlingly new conclusions, I would like to underline the areas of agreement, adding some of my own thoughts on this subject.

It was emphasized in one of the talks that documentalists and technical people have separate, clearly defined duties in the operation of the information centers. In my opinion, in the area of scanning, indexing and abstracting, the activities of the work of these two groups overlap to a certain extent; both the subject specialists and documentalists play an important part in this area. I would like to take this opportunity to underline the importance of skilled professional librarians and other information people who are not technical experts, for the operation of information storage and retrieval systems.

Many reports and papers have been written in the defense of this or that system considered by the author as the most suitable one for his information center. In this connection, I would like to re-emphasize that an information center is only as good as the input. No matter what system is used, the material actually employed is the most important factor in the quality of the output. An information center is similar to a bank operated on strict, old-fashioned ideas, not giving out more money than was put in. The individual author may have "imagination" or "inspiration" but an information center cannot "borrow" and cannot make "something out of nothing" when preparing a bibliography or a critical review.

find an article of potential interest for IIC, even though outside of the scope of NSA, they put a paper clip on the first page of the article and send the journals over to IIC. There, the subject specialists look at the paper; if it appears that it is indeed of interest to their system, they remove the paper clip and make a Xerox copy, otherwise they simply send back the journal. The system works quite well, without entailing additional effort on the part of the scanner. IIC thus obtains the material several weeks earlier than it would otherwise, and is able to cover a larger number of journals than would be allowed by its limited resources. Similar tests have been organized recently, extending the cooperation of DTIE to the Nuclear Safety Information Center and the Nuclear Data Project. I would like to propose to broaden the alerting activity to include all AEC-sponsored information centers. It must be realized, of course, that there is a limit, beyond which the efficiency of the literature scanner decreases.

I would like to turn now to the second item in the title of my talk: indexing. This is a more difficult function than simple scanning; it requires a good knowledge of the subject matter and the persons doing such work must be carefully trained. The editors of Chemical Abstracts claim that it might take as much as five years to train a good indexer in organic chemistry, able to assign efficiently the standard organic name to any compound reported in the literature, without supervision by additional editors. Unfortunately (so I hear) the CA experience revealed that most indexers last on this for about four and a half years. Of course, the training periods do not have to be that long and may vary, depending on the information center in question. In view of the newness of most of the centers, no sufficient data are available on this subject.

The time required for indexing a given article also varies depending on the field covered. The indexer must be reasonably familiar with the subject matter and he must know well the thesaurus used for indexing. I heard that when indexers were checked by time-study experts with stopwatch in hand, an article was indexed in about 4 minutes. Taking this unnatural factor, the presence of a man with a "whip" in hand, we may allow to increase this to 6 minutes but even this figure appears

I believe, therefore, that scanning is a very important function of the operation of an information center. The first duty of the manager of a center must be to ascertain where the best sources of information lie. He is aided in this task by the well-known Bradford's law of scatter of technical information. For each field, be it broad or narrow, there is a limited number of core journals which contain half of the material; the number of journals is still fairly well defined up to about 70 to 80% but if a nearly 100% coverage of the field is wanted perhaps as many as a thousand journals must be scanned. This removal of the material of interest from the vast technical literature is similar to the washing of photographic prints. The first two washes take out 99% of the hypo from the paper, but perhaps 20 more washes are necessary to approach asymptotically the 100% level. Therefore, a decision must be reached concerning the level of coverage on the basis of the probable importance of the material in obscure journals; in some cases, as in the case of a patent search, exhaustivity could be a goal. The information center manager must identify the journals, institutes, organizations or even individuals whose output is of interest to him. It might be desirable to make special arrangements to make sure that the material will flow into the system rapidly without passing through intermediate points where it might be held back. Several such private arrangements have been concluded by the ORNL information centers.

In view of the limited resources available to information centers, it would make sense to let the wholesaler, namely DTIE, take over the alerting function for the marginal journals; as they are covering a variety of areas of interest to nuclear science and engineering, they must read anyway a much larger number of journals than is possible for an individual information center. If the persons in charge of scanning receive clearly outlined instructions, they could easily and without a considerable additional effort alert the center. This fact was proved in practice in a cooperative effort between DTIE and the Isotopes Information Center. Nuclear Science Abstracts does not cover articles on the routine application of isotopes but such papers are of great importance to IIC. It was agreed that whenever the scanners

extremely short to me for doing a good job. I understand that the DTIE experience indicates a time requirement of about 15 minutes per article. On the other hand, I was told that indexing a book by a trained librarian might take as much as an hour. In view of these differences, I propose to examine closely the indexing cost. I hope that such a study will yield an outline that could be helpful to managers in various fields for estimating the expense involved in the extension of the coverage.

Most of the information center managers are technical men who more or less drifted into this type of work, without having acquired a formal background in documentation. Their education in the field of indexing is usually incomplete because their primary interest lies in the subject field of their center as it indeed should be. I feel that DTIE, with its expert staff well trained in documentation could be extremely helpful to the information centers by organizing courses and seminars in indexing and by providing special lectures to selected personnel in the various centers. They, in turn, could transmit the latest techniques in indexing to their colleagues. I am normally a proponent of permissiveness in documentation technique; my own report on ORNL information centers carries a subtitle "A Study in Diversity", because I believe that technical men should be allowed to use methods best suited to the subject field. However, I do feel that there is a limit to diversity. While not wanting to pursue a Procrustean philosophy, I think that it would be beneficial to acquaint the information center managers with the principles of the currently used indexing methods.

Means must be found to lighten the load of indexers. In this connection, I am in favor of the proposal made by Dr. Way to pre-index published journal articles. The authors are indeed best suited for this job as she suggests but I feel that their effort must be checked by the editors, in order to achieve uniformity, most editors of the important journals should collaborate; this presents a serious bottleneck. In certain fields, such as physics, many of the important core journals are published by technical societies or federations such as American Institute of Physics and thus have a mechanism of control over the publications. This isn't true in the field of biology which

is widely scattered; therefore the scientists must read a large number of journals. In addition, the fields of interest of the journals often overlap.

Special problems are presented by the indexing of certain types of government reports, such as the contractors' annual progress reports, which may cover a major area of activity. As an example, I would like to cite the progress reports of the Oak Ridge National Laboratory's research divisions covering the work carried out by 100 to 200 scientists and engineers. Indexing such a report under one or two or even a few more headings is completely inadequate because the contents are extremely varied. T. F. Connolly of this Laboratory proposed that the annual progress reports of the divisions be abstracted and indexed by separate sections, breaking down the work into homogeneous individual parts. Such a pre-indexing experiment was successfully carried out recently at the Physics Division of this Laboratory. If these bulky reports are thus pre-indexed, the overworked indexer is relieved from the necessity of reading every page of the document and the information contained will not be lost.

The above-described activities can be more easily carried out in a major laboratory under a single supervision; top management can issue a single instruction to the involved parties, checking later whether they are followed. As I mentioned, the problem is more difficult in the field of scientific journals, the editors of which are mostly volunteer scientists who are perhaps coordinated but not supervised in the strict sense of the word by a central agency. In any case, it is very important to convince the top level people, asking their support to initiate indexing or other documentation changes. I saw an excellent illustration of this fact a few years ago when I visited with some of my colleagues, the old ASTIA before it became the Defense Documentation Center. Colonel Vann, who received us, mentioned that as a result of the recommendations of the Weinberg Report issued the Department of Defense an order requesting all contractors and subcontractors to send a copy of their reports to ASTIA. Before the high-level order was issued, input from contractors was rather spotty and reception from subcontractors was practically

nonexistent. The order signed by a top official in the Pentagon was received at the West Coast and a short time later five planes arrived in Washington for ASTIA, loaded with documents that were not previously submitted to the agency. As at that time ASTIA was about to move to a new location and was changing its type of activity, the boxes were left unopened in a basement where we had seen them. ASTIA simply did not have the manpower to take care of this tremendous influx of material and anyway they thought it was more expedient to wait until after the move. I hope that in the meantime these documents have been merged with the rest of the DDC material and are used by the scientists and engineers for whom they are intended. I mention this story only to illustrate the importance of high level instructions in our hierarchically oriented society.

The poor, overworked indexer would be also greatly helped by improvement in the quality of technical writing. Obscure writing makes it difficult for the indexer to get the gist of the report and covers up the true character of the report which thus may be mis-indexed and mis-filed. The reason for this obscurantism in technical reports may be due in part to the contractual requirement to submit monthly, quarterly or other periodical reports. If a technical man must write a certain number of pages even when he has nothing new to say, he will use the words to cover up his lack of progress rather than to admit the fact that he has nothing to report. Once he gets into such a habit of writing in a confused foggy manner, he will continue to use words which cover up rather than clarify a problem even when he has something important to say to his colleagues. Many institutions have taken steps to teach their technical men how to write and to impress upon him how to write clear and concise writing. At the Oak Ridge National Laboratory a "Project Literacy" was established last year and produced good results. It involved rewriting of some of the reports and training of scientists in the use of clear, understandable English. Such an activity requires continued attention; institutions with a central technical information division should take the lead in this matter. I was gratified to hear at a recent technical meeting that papers submitted by technical men working in large institutions do show a marked improvement. This again points out the importance of editors.

Having worked as an abstractor, I read many technical articles in various fields and languages. I was surprised to find that in some journals all the articles are of higher quality while in others it is difficult to get the true meaning of the material because of poor organization. I am quite sure that the technical men are of the same caliber in both cases. The difference lies in the editor. He is the one who can instruct the prospective authors how to organize the material logically and how to raise the caliber of the papers. A strictly enforced editorial policy, or preferably, careful editorial assistance to the authors is a tremendous help to both indexers and abstractors because it becomes easy to determine what is truly new in a paper and what has been borrowed from previous literature.

According to DDC, 50% of the reports received are never requested again although announced together with the rest of the material. It should be kept in mind, of course, that DDC is a secondary distribution system. This lack of interest in half of the input could be due to a carefully worked-out original distribution, placing the report on the desks of all the people who might be interested in it; on the other hand, it might be the result of the low quality of the report, a highly specific interest which would result in a complete lack of interest for people outside of the immediate field or it could be due to poor title or indexing. I believe that it might be worth while to investigate the reason for this lack of demand; results of such an examination might point out the faults in our current report writing technique.

It is a truism in technical information that anything worth doing is worth reporting. I do not mean thereby that every routine item should be reported to the technical public at large but I do feel that if a research work is of no interest, it should have been stopped long before it reached the report stage. In these days of expensive science, large sums of money are spent even on relatively minor projects; if the results of a study is not reported to the technical community the money spent will be wasted. I would like to modify the above slogan by stating that "everything should be reported well and to the proper audience". Poorly written reports and those submitted to an audience which is not interested in the subject matter are also lost for all practical purposes.

In order to ensure that the technical work of scanning, abstracting and indexing is done by competent technical men it is important that such individuals will be indeed attracted to information centers. The center must be made a technical institute rather than a library as recommended in the Weinberg Report; the individuals working there should be interested in becoming "the keepers of the gate". The scientists will be interested in supporting the center if they become convinced that the center's output is an important way of making their papers known by the technical community. A reference in a critically evaluated data collection might be more important professionally to a scientist than the original publication in a journal. This prestige value of the center should not be underestimated because it could become a very important tool in procuring input material.

Abstracting usually requires a higher-level technical activity but in order to save time, in some cases an extract might be sufficient. The information centers at Battelle and the NSIC at ORNL, among others, report a satisfactory experience with extracts, even though this method usually produces a jerky text. This is not necessarily a serious problem because the material is not published, being used primarily by experts who prepare critical reviews.

Managers of the information centers should take advantage of the many abstracting services sponsored by government agencies or technical societies; these services are often available at a relatively moderate cost; in several narrow, highly specialized fields commercial organizations provide abstracts. As long as speed of input is not an important factor, I would urge the centers to make use of these services in order to avoid duplication of effort. Of course, the specific viewpoint of a given information center may not reflect the scope of an abstracting service. On the other hand, the same material is often abstracted in different journals; in that case the abstract may not only be reprinted but re-evaluated abstract. Such a duplication is not necessarily bad; the overlap is justified if an article contains material of special interest to various groups such as experimentalists, theoreticians, physicists, chemists, etc. An information center might collect material on apparatus or instrumentation used in field while another

might be interested only in the numerical data obtained. I feel that it is perfectly justified for an information center to prepare its own selective abstract, mentioning only the material within its scope, neglecting the rest of the material contained in the paper, important as it may be for others.

In this connection I would like to refer to the Information Center for Internal Exposure, established at the Health Physics Division of ORNL. The scientists in this center often find material of specific interest to them, although the aim of the work was not the determination of internal dose. They found articles in the medical literature, describing experiments with a therapeutic purpose in mind but during the investigation radiation sources introduced in the body may have been carefully studied, recording resulting radiation. In such a case, even though the aim of the experiment was the healing of the sick rather than the measurement of the absorbed dose, the material was useful to the people who knew where to look for it.

Nuclear Science Abstracts is probably the most important abstract journal for the AEC-sponsored information centers; many centers found it sufficient to rely on it alone. Sometimes, a discipline-oriented abstract journal, such as Chemical Abstracts or Physics Abstracts, may be needed to supplement the input material. Information centers which collect material for many months or even years before publishing a compilation can afford to wait and to note a paper three months after it is published, rather than scan the original literature as it comes out. On the other hand, a center like Battelle's Radiation Effects Information Center cannot afford to wait that long because its customers usually want immediate answers to a specific question based on the latest data. As mentioned above, occasionally the emphasis must be different than that of NSA. ORNL's Nuclear Safety Information Center examines the papers primarily from the viewpoint of new safety information contained in them and could neglect some specific, nonrelevant aspect. In other cases, as in the case of the Research Materials Information Center, the field is inadequately covered by NSA because it lies outside of its scope, or it represents a borderline area. I mention these

examples to show how important it is for the manager of the center to know to what extent he can rely on the various abstracting services for his input.

I hope that the current experiments and close collaboration between NSA and DTIE on one hand and information centers such as the Nuclear Data Project, Nuclear Safety Information Center and the Isotopes Information Center on the other hand will continue; as a result of meetings, such as this a very close relationship should be formed between all the groups involved in various phases of supplying nuclear information to the ultimate users. Of special interest for the information centers is the material that is scanned but rejected by NSA as being outside of its scope. About 140,000 articles per year are checked by NSA's staff but are not included in the printed abstract journal. A certain amount of this material might be of interest to one of the centers. It would be highly desirable to extend the fruitful collaboration established between the Isotopes Information Center and NSA, as a result of which IIC manages to increase its coverage of journals beyond the level permitted by its funds.

In concluding my talk, I would like to express a thought that in some respects might follow a direction opposite to the current cooperative experiments. DTIE accepted the responsibility for indexing material of interest to some of the information centers. Obviously, such a cooperation cannot be extended indefinitely because a headquarters-type operation is unable to provide technical men with expert knowledge in a great variety of fields. On the other hand, it might be possible to reverse the process at some future date: the information centers could profit from the alerting services of NSA; in turn, they could prepare indexes of material both for their own use, satisfying the indexing needs of the abstract journal catering to a general audience. Such an effort would require a carefully divided responsibility; while I cannot foresee its implementation in the immediate future, the possibility should be kept in mind.

INTER-CENTER COOPERATION

During the last few years several information centers have been established at the Oak Ridge National Laboratory. Following the philosophy that an information center should be a technical institute rather than a library, the centers are placed under the supervision of a scientific division covering the discipline involved. Thus, the physicists in the Nuclear Data Project and the Charged Particle Cross Section Data Center are members of the Physics Division of the Laboratory; the Nuclear Safety Information Center is supervised by the Reactor Division. This approach ensures that the individuals assigned to information activities stay in close contact with their colleagues engaged in experimental or theoretical studies. In many cases, the same persons are involved in information and technical activities.

Although this system helps to amalgamate the most recent technical progress into the output of the information center, it tends to separate the technical men working in an information center from their colleagues engaged in a similar activity in another field. In our Laboratory the information spreads through established channels from management through the division directors to the scientific and engineering staff but there is a definite barrier to the passage of information laterally from one division to another.

In order to overcome this difficulty and to ensure cooperation between the centers, I was appointed as Coordinator of the Information Centers. This is an exciting assignment but I am afflicted by the same disease as others who share this title: responsibility without authority! On the other hand, working within the framework of a large organization such as ORNL has its advantages because the general management practices in the various divisions are quite similar; coordination between centers located in different organizations must have a much harder job.

The most important item to make a coordinating effort a success is the interest of management; people who are not necessarily directly involved in the generation of the information and in the use of the

output but are responsible for the funds must be convinced that the information activity is a legitimate one for furthering the progress of science even though it might compete with the direct research activities. I am lucky in this respect because the climate in our Laboratory is very favorable to information centers.

The first problem that a coordinator must watch is that of the overlap between centers. A certain amount of marginal overlap is unavoidable and not necessarily undesirable. As an example of such a situation, I would like to discuss the scope of the Isotopes and the Research Materials Information Centers, both interested in data on pure materials. Isotopes, a specially covered subject of IIC, are of course also very pure "research materials". Therefore, the two centers agreed that as long as the material is radioactive or is a separated pure, stable isotope, IIC will collect the data and maintain them up to date. Thus, if a query on this subject is addressed to RMIC, its manager will know where to look for the answer, without being forced to maintain a collection in a field that is only of marginal interest to him. In the same manner, there is a potential and actual overlap of coverage between the IIC and the Nuclear Safety Information Center as far as the safety aspect of handling of isotopes is concerned. Again, it was agreed that NSIC will take care of all problems involving hot cells, containment, etc. Similarly, the scopes of NSIC and the Radiation Shielding Information Center could overlap. Our philosophy is that it does not matter who collects the information and who maintains the files as long as the potential recipients of inquiries on the subject know where they can find the most up-to-date answer.

The above examples all involve information centers operating in widely separated areas with only a limited overlap. There are cases where the overlap could be more extensive; information centers operating in the general field of "materials" present such an example. Nobody knew exactly how well this important area was until RMIC took the initiative, calling a meeting of managers of materials information centers for the purpose of "dividing the pie". As a result of this meeting, attended by representatives of about 10 non-ORNL information

centers in addition to the interested local ones, clear-cut limits have been established concerning the coverage of each of the participating centers.

When liaison is established between centers and the technical men they serve, the habits of that scientific community should be kept in mind. It is well known that theoretical people keep in close touch with each other and are aware of the latest developments without relying on the relatively slow published literature; engineers working in rapidly changing areas are in greater need for "prepackaged" special information. The practices of groups consisting of primarily academic men and production or design will also show considerable differences. The coordinator could be helpful to the information centers with the evaluation of the makeup of their clientele. Exactly, like the speaker or the author must know to whom he is talking or who will read his book or article, the information center director must, as far as possible, tailor his material to the needs of the user.

Not only the limits of coverage but also emphasis of the interpretation must be clearly stated. Battelle's Radiation Effects Information Center is primarily interested in property changes of the irradiated materials; on the other hand, the ORNL's newly organized Nuclear Fuel Technology Information Center emphasizes fabrication and economic problems of fuels rather than the irradiation-induced changes.

Another task of the coordinator is the checking of purchase requisitions concerning the hardware used in the various information centers to ensure that they do not buy equipment available at a neighboring location and could be used without hardship. Such cooperative arrangements have been made at ORNL for the joint use of the Termatex punching machine, a relatively expensive piece of equipment, not in continuous use; on the other hand, the viewers which are in daily use are distributed at locations convenient to the users. A similar cooperative arrangement is currently being organized for the initial use of a Flexowriter machine until the centers are able to justify the purchase of their own machine on the basis of their initial experience and demonstrated continued need.

Some of the other joint problems of the centers may be conveniently solved in a cooperative manner; one of these is arrangement for computer services. None of our centers are large enough to justify acquiring a computer or hiring computer experts; therefore, most of the information centers are serviced by the Central Data Processing of the Union Carbide Corporation, Nuclear Division. As a result of this arrangement, an experienced staff is ready to solve information problems submitted by the centers which are very similar even though they refer to different subjects. Thus, the special experience gained in solving individual problems is lost but will be used to the advantage of scientists working in another center.

At a somewhat different level, a similar collaboration could be arranged by sharing ordinary clerical assistants. I did not have an opportunity to do it yet but I consider it desirable to rotate clerks from one information center to another, training them to be able to help out in case of a sudden influx of work or to replace people on vacation or otherwise absent.

Assistance with the input of material represents an important area of collaboration between centers. At ORNL, the Central Research Library is the chief procurement agency for information regardless of the type of material; therefore the procurement for government reports, books and microforms has been centralized. A procurement coordinator, in the person of an experienced professional librarian, has been appointed to assist the centers for routine accession. Thanks to her help, the centers do not have to follow through the procurement of items that have been ordered but for various reasons not received yet. Quite often, reports are ordered from an announcement list published before the reports become actually available. Following up such items could be time consuming and may interfere with the main goal of the center.

During the last few years a number of clearinghouse-type agencies came into existence; they are assuming increasingly important roles in information procurement, especially for government-generated or sponsored material. These services are usually not too well known and in

most cases they require a certain specific bureaucratic approach. The coordinator of the centers, in cooperation with the expert librarian can usually be of help in obtaining the services of these agencies. On the other hand, the agencies themselves could greatly profit by receiving regularly the output of the information centers; they also gain access to experts to whom they may turn, should the need arise. In any case, the collaboration between the clearinghouse-type agencies and information centers should be strengthened.

On the other side of the coin, the coordinator could also be helpful with the output of the material, expediting the necessary graphic art work, composition and reproduction. Most of our centers are too small to justify employing such specialists although at least one of the centers employs its own graphic artist. Services of the centralized Technical Information Division of the Laboratory provides assistance also with editorial problems.

I would like to list several points that represent other highly desirable aspects of coordination of the information center activities; although not yet in effect, they may serve as point of departure.

People working in the information field are continuously flooded with advertising circulars on new hardware for information handling. The material offered for sale ranges from modest, individual microfiche readers to complex information retrieval systems. These items are often exhibited at technical meetings. The harrassed information center manager is usually not in position to make a judicious selection; he spends all of his energy on the improvement of the existing system and he is usually not able to do much "comparison-shopping". It would be a great service to the cooperating groups if a central organization would assume the responsibility for maintaining a file on all the new material offered for sale. Such a central agency, preferably organized under the auspices of DTI, should also make quality evaluations and recommendations for purchase.

The information center managers must keep in contact with advanced theoretical studies in the information field; they must be aware of research at the frontiers of information science; they should know

about all of the latest developments in advanced mathematics applied to information handling. It might be even desirable to establish a central advanced mathematical service for the benefit of the cooperating information centers.

The centers need the same type of material and services as individual scientists; the chief difference lies in the amount. As most centers cannot afford the services of a linguist-scientist, they must have access to a competent translation service. Accidental linguistic ability of staff members should be made mutually available to the cooperating centers. This activity also can be conveniently taken care of by the coordinator. At ORNL the situation is simplified by the fact that I happen to also be in charge of the Laboratory's translation services.

The ORNL centers enjoy a special advantage and we intend to profit by it. As the centers are established in a large, multipurpose laboratory we have the privilege to work side-by-side with many temporary employees, including summer participants, professors on Sabbatical leave, foreign scientists and visiting experts. I feel that the centers should take advantage of the presence of these visitors from the academia with whom many of us lost contact. We should also make use of the resident foreign scientists for establishing contact with faraway colleagues; this is always easier to do face-to-face with a person than by correspondence. It occurred repeatedly that a technical man who visited a particular department of the Laboratory, was taken on a general tour of the information centers; during the tour he "discovered" the concept and became very interested in the possible application. Upon his return, he reported on his experience to his colleagues, and as a result, we obtained new sources of input.

There is another group of scientists whose contributions to information transmission is often neglected: the specialized consultants, the so-called "scientific troubadours" who "sing" for food and board. They usually know all new developments in their special field of interest and are aware of all important work in progress long before

any publication appears; that's how they earn their honoraria. As they are usually under contract to the Laboratory, their specialized knowledge could be made available and should be used to best advantage.

A similar neglected group of experts who can be very helpful for advising on scientific work carried out abroad, is the fine body of science attachés at the Washington embassies. While their primary assignment is to help their own compatriots who want to visit their American colleagues, they might be able and willing to assist American scientists indicating specialized sources of information in their own country. Through the State Department we could get in touch with our science attachés working out of the more important U. S. embassies. It might be desirable to invite the science attachés as a body, preparing a special program to acquaint them in detail with the activities of our information centers.

In order to assist the centers, the coordinator should attempt to pinpoint the locations where the specialized work is in progress. I hope to be able to do this at a later date by maintaining an up-to-date contract file, listing the government contracts issued to individuals, universities and private companies as released periodically by the issuing agencies. In the case of a major contract, as that involving a national laboratory there is little specific information to be gained from the listing but contracts awarded to smaller groups usually have titles with a high information content.

As I mentioned before, alerting the people in charge of the input is one of the most important problems. A whole plethora of such tools become available lately both from commercial groups and from nonprofit organizations. Most of these tools, such as the tapes supplied by Chemical Abstracts Service, Institute for Scientific Information, American Society for Metals Documentation Service, etc., are fairly expensive and usually they cover relatively broad fields; therefore, several information centers could profitably make use of them. Our Library Committee is currently evaluating these tools; we are also reviewing the means how to make the service conveniently available to the ultimate users, be they individual scientists or information centers. A cooperative effort may result in a reduced unit cost and could possibly justify the purchasing of some of these services.

Information centers are usually supported by a single government agency or technical society; this meeting of AEC-sponsored information centers is a good example of this. I noticed there is a tendency to use primarily the material prepared by the auspices of that agency for input. This might be justified in the case of the more mission-oriented agencies; on the other hand, pure thermodynamics or nuclear physics stays the same and requires the same input, regardless whether the work was supported by NASA or AEC. I would like to take this opportunity to warn the information centers: they should be careful to abandon any tendency to become parochial. It is their duty to make sure that their field is completely covered and in doing this they should not rely solely on collections, abstract journals or other tools based on an arbitrary administrative division. The pure scientists are well aware of this fact when they study the published literature but they may require guidance when they venture into the jungle of government reports.

A potentially fruitful area of collaboration between centers is that of the preparation of publicity material. The whole problem of publicity, - or more generally of public relations, - is of great importance for the continued existence of the centers. They are ready to help their colleagues but a large portion of their potential customers do not take advantage of the available services, either because of ignorance or because of lack of interest. The National Academy of Sciences conducted a survey recently on behalf of the Department of Defense to determine how many of the more than hundred information centers sponsored by that department are known to working scientists. The results of the survey were rather disappointing. A well-conducted publicity campaign could overcome this inertia of the scientific community, ensuring that the activities of the center will be made known to the technical man whom it intends to serve. As an example, I would like to mention that the AEC-sponsored centers are planning to prepare an exhibit at the forthcoming meeting of the American Nuclear Society*

* Although the exhibit was relatively simple, it was quite effective. Many of the participants of the ANS meeting stopped to browse at the stand and about eighty of them requested additional material to be sent to them.

in Gatlinburg describing their activities. If this will be successful, similar presentations will be exhibited at other technical meetings.

Of course, publicity can be made in many other forms; it should include articles written for journals read by all scientists in a given field such as Physics Today, Chemical Engineering News, etc. Special lectures at local meetings of technical societies should be considered and it is important not to forget the undergraduates at universities. The sooner in his career a technical man learns about the available information tools, the more probable he will actually make use of them.

A very important but frustrating job of a coordinator is the development of tools for determining the efficiency of a center. I have in mind something like the ASLIB-Cranfield project to evaluate the various parameters of an information system regardless whether it is mechanized or manual. In view of the variety of methods used in the operation of the centers and the differing criteria involved in the evaluation process, it is not possible to develop a single set of figures or other indicators to describe quantitatively the efficiency or the usefulness of a center. Figures such as inquiries received or satisfied per unit time, etc. are meaningless if they are used to compare an engineering answering service with a basic scientific center; the role of the latter is the preparation of critically evaluated compilation rather than maintaining an up-to-date, fast-moving answering service. As a matter of fact, if too many inquiries come in to such a center it might be assumed that the primary work is at fault because its aim is to provide every scientist working in that particular field with a copy of the most recent compilation.

In closing, I would like to suggest that no avenue be neglected to strengthen the bond between the information centers and the scientific community. In order to ensure collaboration between the centers located in remote areas and scattered technical men they intend to serve, I would propose that DTI establish an advisory committee consisting of information center directors and "bench" scientists. Such a committee,

meeting at regular intervals, could become useful to DTI management by serving as a two-way communication tool; it would ensure that the needs and desires of scientists and of information centers will be heard by the policy-making individuals.

OBSTACLES FACING THE GOVERNMENT CONTRACTOR'S LIBRARIAN

First of all I would like to express my sincere thanks for being invited here to talk on this interesting subject.

When Dr. Friedlander discussed this assignment with me, several words in the title puzzled me. I wondered why I should talk about "obstacles", thus assuming a negative attitude. Then I started to think how the government contractor's librarian differs from other librarians. Of course, the main puzzle for me was how to approach the question in view of the fact that I am not a librarian myself. As to this last point, I was reassured that the librarians' viewpoint will be adequately covered by the second speaker*.

Still, the problem was there and it was still facing me rather than a librarian. I knew that I could not prepare this talk like I would write a technical paper; I was not able to go back to my laboratory notebooks, pore over the data, exclude the trivial observations, and extract some nuggets of new scientific thought which then, hopefully, would be eagerly read by my colleagues when published. (Technical men are known to dislike keeping notebooks and preparing papers. When they do not have to do all this, they become nostalgic about it.) Therefore, I did what I always do when I am puzzled and cannot find an immediate solution to the problem: I tried to find the man who knows the answer and went to the best friend a technical man has, the librarian.

At Oak Ridge National Laboratory we are blessed with an excellent technical library, staffed by highly competent professional people. I

* J. C. Shipman, Director, Linda Hall Library, Kansas City, Missouri.

started my task by interviewing them, trying to find out their viewpoints, their frustrations, their difficulties, and if possible their recommendations for eliminating them. I then pursued this approach a step farther: I wrote to a number of prominent librarians, mostly in the nuclear field that I know best, asking them to express their opinion on this subject. I received answers of various lengths; in some cases I even felt that the letter to me served the purpose of a safety valve or of a psychiatrist's couch for the writer. The approach was not that of a Gallup poll; I did not ask a specific question, but the letters gave me a general feeling of the profession about obstacles, problems, and difficulties facing the individual librarian who serves a government contractor*.

Having received the permission of my correspondents, I am making use of these answers but I do not intend to tabulate them and will not bore you with a list of percentages or colorful graphs. I will not even identify the individuals for fear of misquoting them; on the other hand, I will take advantage of my relatively short involvement with the technical information field and will attempt to express my own thoughts on this interesting phase of librarianship.

Being a member of a nuclear terminology committee, by acquired habit I would like to define the terms in the title. How does a government contractor's librarian differ from a librarian serving a government agency or private industry? First of all, I would like to emphasize the libraries operated by a prime contractor for the government, such as the libraries of the Oak Ridge National Laboratory, are in a special category. Although we are paid by Union Carbide, the Laboratory itself and thus its libraries, are owned by the government and is more closely supervised by the sponsoring agency than the library of an organization which only sells a specific service to the government while retaining ownership over the tools needed to perform it.

* I would like to take this opportunity to express my thanks to Mrs. Margaret N. Sloane, George B. Stultz, James C. Andrews, Mrs. Madeline T. Barringer, Walter A. Kee, Lawrence I. Chasen, L. F. Parman and R. R. Dickison.

The situation represents the first difficulty. The librarian working in a private organization that performs an important service for the government is plagued by a situation that, at least according to "good" management manuals, should be avoided at all cost; I am referring to the problem of "double-bossing". The daily operation of the library is subject to the directives laid down by company policy; the often far away top management and the local supervisors exert strong pressures in this respect. At the same time, the librarian is in a vulnerable position being exposed to varied and changeable outside pressures. He must be "sensitized" to the current philosophy of various COSATI panels; the money at his disposal depends greatly on the funds appropriated or withheld by Congress for various major projects of which his contract may be a small part. He must also consider the varying attitudes of the contract-awarding agencies. The approach to special problems, such as security, is not the same at the Department of Agriculture or at the Department of Defense.

Let us consider first the problems arising from the fact that our librarian's employer operates on a contract. Regardless of the actual legal time period of the contract, the librarian who wants to be of service to his technical community must estimate its anticipated overall duration. It makes a great difference in his planning if he has to serve a technical group to be disbanded after six months of operation or if he is expected to provide long-range retrieval services in a complex field for an activity, the end of which is not in sight.

In the case of a new contract, the librarian must also carefully consider whether it involves primarily research and development or production of a specified piece of hardware; occasionally, both of these activities might be included in the same contract.

The requirements of the library users also vary greatly; persons working in pure research usually know the field well and are acquainted with the available sources of information. They tend to rely more on published journals, often they have a personal subscription copy of the most productive journals in their field as a result of their membership in scientific societies. On the other hand, in the engineering

development and production fields, the designers, field supervisors and other technical men traditionally change their field of activity rather frequently. They are usually not experts in specific areas such as corrosion, strength of materials or nuclear cross sections although they may need the data urgently in the course of their work. The librarian must assemble for them a material that is up to date, covering the field as completely as possible. In the second case his interest should be centered on facts and hard data rather than on methods and theory. The source material is also different: the engineering user generally relies, to a great extent, on report literature and project publications rather than on published journals.

At this point, I would like to mention a source of frustration that seems to be common to all librarians who have dealings with the government: the difficulty of obtaining the needed report literature, especially when one has to go outside of his own agency. There is a great difference in the ease of communication within and between agencies. I think that I am on safe ground when I state that the AEC's Division of Technical Information has an excellent record of fulfilling requests even those originating outside of its family. The attitude toward collaboration with contractors depends on the agency's original charter, specifically whether dissemination of information is one of the explicitly stated purposes of the agency, as was noted in the Weinberg Report. The law directs the AEC, Department of Agriculture and NASA to disseminate the information generated under their auspices but the Department of Defense is not controlled by such a statutory directive. It is only natural that agencies consider that collecting, disseminating, and retrieving the material generated by them as part of their mission have a more positive approach to this problem than agencies without such an assigned responsibility.

As I mentioned before, it is usually easier to obtain needed documents from the sponsoring agency than from other departments. This problem is somewhat confusing to a technical man. A chemist or a physicist does not care whether a university or a private laboratory sponsored a given research; he simply wants to know what were the results of that study. Collection of papers authored by members of

a given laboratory might have an advertising, prestige-building, or administrative interest but very few scientists attempt to store or retrieve material on this basis. Therefore, the technical man's thinking must be completely changed when he becomes involved for the first time in government contract work; his librarian can be very helpful in advising and educating him.

Work of the contractor's librarian may be also affected by some of the legal commitments in the contract. I think that it is very important for the person in charge of a library to become familiar with the various contractual provisions, especially such as deadlines for progress reports, submission of new proposals, etc. He might have to abandon an otherwise leisurely pace, in order to make sure that the users will have the material when they need it. Knowledge of the contract requirements enables him to alert and warn the technical men rather than wait until the engineers and scientists, true to form, request reports that should have been in their hands yesterday and cannot be procured for weeks.

Let us now consider some problems that face our hypothetical government contractor's librarian in his capacity simply as a "librarian" without any qualification. He faces many problems which do not directly arise from a government contract, but are similar to those encountered by any librarian, or more generally by any manager of a complex operation. His problems may be classified into three groups associated with space, money and people. As far as libraries are concerned, this simply means they do not have enough space, enough staff and enough money. Of course, these problems are interrelated: more space usually demands more staff and more money; more staff usually means more space and more money. I believe that the situation of having too much money can be safely neglected.

There is no need to despair. We heard about calculations that in a few days the whole world will consist of fruit flies, assuming that their number doubles every few hours. In spite of this, thanks to some natural law, we manage to keep the fruit fly population in check. Similarly, library collections cannot continue to increase exponentially. The librarian must therefore stabilize his staff and

control his space requirements; he should be able to stabilize his library's budget for the steady increase in the cost of materials. Two relatively recent significant developments offer hope in this respect: there is a rapidly accelerating trend to computerization of the library's record keeping reducing the requirements for additional clerical help; this is accompanied by a similarly fast-moving trend toward microfiche or similar miniaturized storage schemes.

Many of the larger technical laboratories possess or have access to a computer, making it easy for the library to initiate a computerization program for the purpose of simplifying the record-keeping activity. This will make it possible to keep up with an ever-increasing volume of materials and records by transferring the data to the computer rather than being forced to hire new staff members. Judging from the relatively short period of experience in this field, this aspect of simplifying the record-keeping rather than the speed of access appears to be the chief advantage of the computerization.

Introduction of the microfiche possibly might be a mixed blessing. It enables the hard-pressed librarian to stabilize his space requirements by controlling the physical size of his report collection. For the time being the chief advantage of microfiche lies in the increased ease of the availability of reports which, as you well know, is usually the most important part of the government contractor's libraries. It is difficult to anticipate at this time whether this trend toward microfiche will cover also the field of journals and books: such a trend is not apparent at this stage, yet, it might be enhanced when the user resistance is overcome.

Let me point out parenthetically the curious fact that in some fields of learning the microform has gained complete acceptance while in other fields the users fight vigorously against it. Scholars in humanistic fields such as medieval literature, archeological research, biblical studies, etc. accept it as a perfectly normal fact of life that their investigations should be made on microfilmed documents rather than on rare and difficultly available originals. Mention the word microfiche to an engineer or especially to a pure scientist! He will see red and will not talk to you for days. I

believe that this attitude can be changed by patient education and by proper organization. The technical man does not like to go to a central reading room, spend perhaps twenty minutes going to and from it and only about five minutes reading the material. It is important for a large organization, and perhaps even for smaller ones, to saturate the user population with small, reasonably priced but well-operating microfiche readers. Nobody should be forced to walk more than about a minute from his place of work before finding a microfiche reader. A busy technical man should not be asked to waste his time in walking and waiting in line for a routine reading. By providing each small group of technical men with its own microfiche reader we can probably contribute greatly to the acceptance of this new storage system, especially if you tell the users that they do not have to account for the microfiche: they can use it and store it or throw it away; after all, a single microfiche costs only ten to twenty cents for fifty pages. The librarian should also point out to his customer that he can build a complete private library of reports of interest to him in his own desk drawer.

While awaiting the spread of microfiche into the book and journal area, the space problem status-quo might be partially maintained by a vigorous weeding out of older and little used books and by storing older journals in remote storage areas.

Lets continue checking the other words in the title and see where we stand with respect to other "obstacles". There is a unique obstacle that the government contractor and his librarian face: I refer to the government purchasing regulations, including the low-bid requirement. Luckily, contract administrators seem to become more understanding and take specific requirements into account. General rules, such as awarding the contract to the low bidder or surplusing unused items may appear logical on the surface but if strictly enforced they can cause hardships. I know of a biochemical department that painstakingly built up a beautiful collection of special biochemical compounds. Most of these compounds were used only rarely but when needed, they were available and saved many months of impatient waiting for the researcher. You can imagine the consternation when it was found out by accident

that all the items that were not used for more than a year were automatically surplused and were about to be sold for a small fraction of the original purchase value. It took all the convincing power of the scientists to rescind this order based on government ruling. Somebody could arbitrarily apply the same yardstick to little-used items in a collection. The fact that a report is only needed occasionally, is not an indicator of its intrinsic value. When usage drops, the value of each retrieved report goes up, compensating partially for the increased cost of maintaining a collection. The above-mentioned weeding should be carried out by a competent and knowledgeable person.

I noted with interest when perusing the answers received from my librarian informants that the purchasing policies, in particular those of the military agencies, indeed present a serious problem. This is perhaps due to the fact that they are more rigidly applied to library purchases than for other fields. I think that in this area the librarian's main job is to educate purchasing agents, government auditors, and other involved individuals showing concrete evidence (whenever possible) that a rigid application of the rules results in waste rather than in savings for the government.

Before continuing the discussion of the obstacles, let me point out that there are, of course, also advantages in serving a government contractor. In most cases, the work to be carried out lies in the contracting agency's special field of competence and interest; therefore, the contractor's librarian is often able to obtain pertinent documents more easily than a general librarian. Even so, many of the major government document collecting and disseminating groups have a long "incubation time" before they are able to fulfill a request. A good librarian must become sensitized to his users need and must establish his own pipelines in organizations in which information of interest to his clients is generated. Such personal contacts shorten the procurement period and may save months because documents of interest to the project are received directly.

Let us not forget that the government contractors are in private business and therefore many of the obstacles facing the librarian employed by the private company apply also in this case. A tremendous

amount of information is generated while paid for by taxpayers money but is kept in the proprietary field. Prying loose this information to which his customers are entitled, but which is held back by competing firms, is another difficult task facing our librarian. In the past, the major depository agencies such as DDC, have permitted such restrictive strings to be tied on reports, they have allowed the originators to limit the circulation too rigidly while fulfilling their contractual obligations. Elimination of this hindrance to the free circulation of the reports is beyond the capability of an individual librarian; indeed, such an initiative must be taken at a fairly high administrative level. Until about three years ago the military departments were especially negligent in this respect; they often did not require their contractors to supply copies to a central depository. On the other hand, they are more responsive to top-level pressure than other agencies. I recall a visit to ASTIA (now DDC) sometime after publication of the Weinberg Report in which this requirement was emphasized. We were told that the Air Force issued an order to all of its contracting officers to require, that their contractors submit a copy of their reports to the document center. Within a week after receipt of the order at the West Coast, five large transport planes arrived filled with hitherto unsubmitted documents from contractors in the San Francisco and Los Angeles area. As ASTIA was about to be reorganized, the cases remained unopened, awaiting removal to the new location. I hope that by now these thousands of documents are actually in circulation.

In his capacity of "government contractor's librarian", our librarian faces another obstacle, the problem of classification. He must learn to live with the cumbersome mechanism of document control while satisfying the justified needs of the users of his collection. Acquisitions and circulation problems become greatly magnified when classification enters into the picture. Arrangements must be made to solve the bothersome problem of "need to know" efficiently and tactfully while safeguarding security requirements.

It appears highly desirable to develop a standardized system for controlling classified documents, specifying in detail the criteria

for access and compartmentalization. A carefully prepared system would make it easier for an AEC library to obtain DOD or NASA reports or vice versa. The primary distribution of reports from the originating agency usually is based on fairly broad lines. The current method is usually sufficient to enable a library to obtain the material of interest; however, if individual scientists and engineers were also supplied directly with reports of potential interest to them without recourse to intermediate groups, the load of the librarian would be reduced. This cannot be done as long as the distribution list contains very broad terms such as "physics", "chemistry", etc. because the user is flooded with much unwanted material. As his room overflows with documents he will act quickly to remove his name from distribution lists. I propose that the government contractor's librarians, more than anybody else, should encourage the spread of the current experiment on the selective dissemination of information. Of course, each document should receive a standard distribution also; otherwise, it is very difficult to become aware of its existence because they escape the proper bibliographic control. I am hopeful that the SDI will provide a powerful tool for getting the information where it belongs: off the shelves and on to the bench of the ultimate users.

Classification and categorizing also presents another difficulty. The librarian's employer might want to obtain state-of-the-art information needed to prepare a contract proposal in a new field. The current classification system makes it very difficult for the librarian to procure the material if the company has no contract in force entitling it to receive the needed reports. The same problem arises when a contract expires because then the contractor loses his right to obtain specific documents. This makes it very difficult to maintain an interim research and development effort while preparing a new contract.

All this underlines the necessity for the librarian to become acquainted with the contract system of the government and to understand all the legal implications. He will be in good position to propose improvements in this complex field that affects his work so strongly.

While talking so much about classification, I should perhaps also say a word about declassification. Well-informed and competent classification reviewers who operate at the generating stage of the report, could reduce the number of classified reports issued. I think that many of the current reports are overclassified; often a full report becomes classified because of a few words on a single page that could be easily rewritten without jeopardizing the technical value of the document. I would suggest that the librarians support classification reviews asking a greater emphasis on declassification, of course while safeguarding national security.

In order to discover his best sources for documents of interest to his clients, the contractor's librarian should maintain an up-to-date file on government contracts; they are useful for pinpointing laboratories or companies working in a specialized field. Of course some of the contracts are so broad that they are useless for this purpose. At the Oak Ridge National Laboratory, our reports are identified by contract number, W-7405-eng-26. However, about 5,000 scientists, engineers, and other employees work under this contract; they developed, built, and operate many reactors, cyclotrons, linear accelerators, pilot plants and carried out untold numbers of experiments in various fields ranging from biology to instrumentation and metallurgy. In such cases, knowledge of the contract number is of little use to the librarian in view of the broadness of coverage. On the other hand, listing of the highly specialized contract awarded to an industrial organization or a university provides a valuable opening into a highly specialized field of technical knowledge.

Now let us look at the other side of the coin: the government contractor's librarian works for a private employer and has plenty of problems when he faces his own management. As a general rule, the library is considered an overhead cost item and is not a part of the research effort. As a result of this, the library is usually the first department to receive cuts in budget and manpower and very often the last one to expand when everything goes well. The librarian should try to do his best to explain to his management that a good library must have a competent staff and a stable budget. It can pay dividends

not only by supporting current research and development efforts during good times but, as indicated above, it can be of even greater assistance when the parent organization is struggling to obtain contracts. If the library is to operate efficiently, top management should keep it apprised of new research efforts and new attempts to obtain contracts making the librarian a part of the management team.

The librarian probably has many communication problems with management, personnel, scientists, engineers, accountants, etc. The functions of the modern library and its services are varied; the librarian has the duty to bring pertinent facts to the attention of all individuals who might profit from such knowledge. It is hard to believe, but even today there are people who rose to high administrative positions without having spent much time in a library. The attitude of such persons can impair the usefulness of the library.

If supervisors consider the time spent in the library by members of their staff as loafing, the world's best service provided by competent, professional librarians will come to naught. Such an attitude can be felt in many ways, management can strongly influence its people without issuing a memo or giving oral instructions. I could cite the case of a boss who once felt strongly that safety meetings were a loss of time. The meetings were duly scheduled but the staff correctly guessed the boss's reaction and they were shunned by most people. When the top management's viewpoint changed and high-ranking people attended these meetings, the others automatically followed suit. Library services deserve such an example-setting support; it is the librarian's duty to convince his colleagues and supervisors.

Let's not forget the librarian himself is a manager. It is his duty to evaluate the methods and tools most suited to solve his problem and to make the most effective and economical use of space, manpower, and budget. He must plan ahead and make specific recommendations to management, exactly as the engineering supervisor must translate his ideas into a language that is understood by the top man whose interests lie elsewhere.

All this requires a continuous dialogue between the librarian and the management. However, there are other difficulties that are

encountered only by a certain group of librarians. If the librarian happens to be a woman, she must be careful to speak convincingly to her management people. If a lady librarian gets too forceful, she might be accused of being emotional; if a man does the same thing, he might be considered a "dynamic leader".

There are other obstacles over which the librarian has no control. One of them is the problem of location. Working in a plant or laboratory and its associated library located in a big city presents a tremendous amount of advantages in resources such as ease of hiring competent personnel, etc. However, many of the newer facilities are scattered in less accessible areas. A library serving personnel in a remote area of the country, located many miles from the nearest major city, may encounter many difficulties: people may have to be lured to work there, mail service might be slow, it might be difficult to find a backup facility to supplement the collection available on the premises. On the other hand, such a faraway location could be an unexpected advantage. Speaking from personal experience, my colleagues and I do not find it at all difficult to work in Oak Ridge in the back-hills of Tennessee. It is true that this is a special situation: we are blessed with five major technical libraries and DTIE (the central information agency of the Atomic Energy Commission) also happens to be located in our area; in addition, we are able to take advantage of the large library resources of the University of Tennessee.

Remoteness requires special remedies: the librarian must be alert and must ferret out available collections, making cooperative arrangements with the university or private libraries nearby to take advantage of their facilities. As a general rule, a large university library, a government agency depository library, or a centralized company library can and should be used to supplement the collection of the contractor's librarians to keep the latter small, reduce the storage space and the staff.

Of course, remoteness is a relative concept. It may refer to distance from major cultural centers or to the location of the library itself with respect to the potential users within the plant or laboratory complex. The librarian usually does not have too much control

over this factor but, in any case, he should prepare plans to improve the situation. If the library is not conveniently accessible to the majority of its potential patrons, staffing requirements and the physical facilities must be changed. It might be necessary to arrange special pick-up and delivery services; facsimile transmission capability might also be desirable.

As a manager, our librarian must also face his personnel problems squarely. It happens all too often that potentially good library clerks must be trained with great expenditure of supervisory time and when they are about to start to produce, they are hired away within the company for a pay higher than the library can offer. The previously mentioned discussion with top management should include this point, attempting to eliminate pay inequalities that might exist.

Personnel problems intrude into the previously discussed computerization efforts. Nowadays, management can be extremely enthusiastic about all facets of automation and pressure may be applied on the library supervisor to make him use the available funds for computers and electronic data processing equipment. These devices are often considered a panacea to solve paper shuffling, housekeeping and information-retrieval problems. If this is the case, the contractor's librarian may be caught in the middle between the usually conservative and caution philosophy of the contracting agency and the impatience of the engineers who wanted to be served by the most efficient tools. It is possible, and even probable, that his staff might have the wrong kind of skills for this type of work. Even if everything works out all right, the hardware is suitable and the right personnel is available, it is possible that because of the relatively short period of the contract, the investment in computers (which otherwise would be perfectly acceptable) cannot be justified. I mention this as another example of the managerial problems that might face the contractor's librarian.

If the library services are created simultaneously with the obtention of a contract, the librarian may have to solve another problem: he must evaluate the nature and the makeup of his potential customers. He must be able to anticipate the probable turnover of the

technical personnel in the organization he is to serve. As a rule newly hired, recently graduated engineers and scientists who are working on their first major assignments are ambitious, have a great "vision" and are ready to shake the Earth off its axis. Such people require a continuous supply of unexpected material and want more library services than the more mature whose enthusiasm is tempered by the knowledge that a hundred years from now their efforts won't make too much difference.

In addition to overcoming obstacles, the librarian should take the initiative within his company, developing new services in areas which he has special competence.

There are many information-type activities in a large organization but some of them have been taken over by outside groups because the librarians let them slip through their fingers. Depending on the size of the organization, the librarian should take the initiative to act as the coordinator or at least as the "focal point" of all technical information services. This would definitely enhance the stature (and perhaps even the pay) of the librarians.

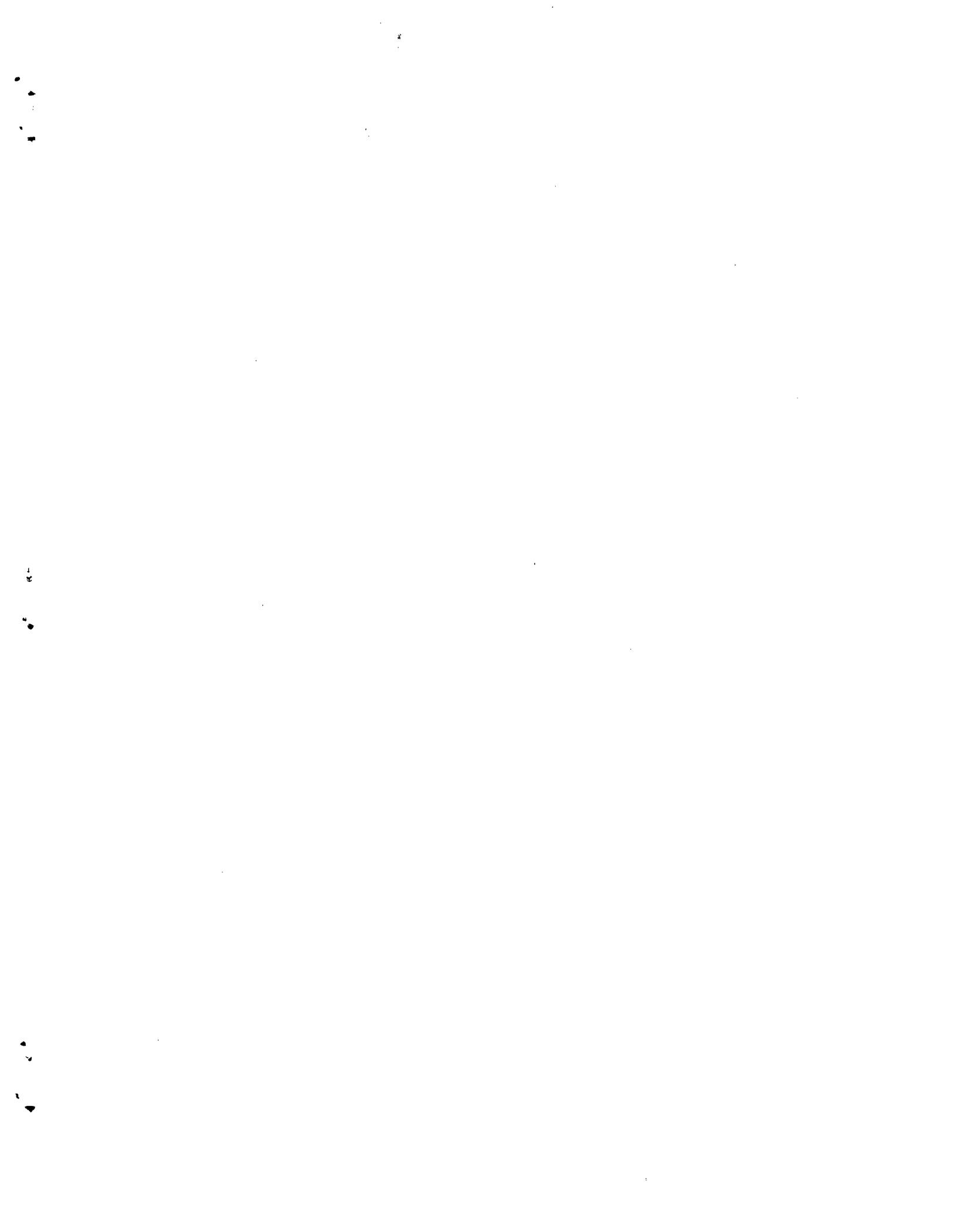
My current personal field of interest is the organization and coordination of technical information centers. This concept requires close collaboration between the technical men and librarians, much more than fulfilling a casual request concerning hard-to-find books and help with a confusing index. Experience in these centers has shown that close collaboration can be developed by organizing technical experts and librarians in closely-knit work teams. While I firmly believe that the highly specialized information centers should be operated by technical men who are active in that narrow field, there are many areas of potentially fruitful collaboration between trained librarians and scientists. The librarians have special knowledge in areas where the scientists and engineers lack competence and welcome any assistance.

I also believe that librarians should develop "information centers", developing directories of "who knows what" which could become of great potential interest to their employer and to the government agency they serve. I would recommend to follow the example of organizations such

as the Battelle Memorial Institute which organized a "capabilities information center" listing the specialized skills of the employees, acquired both before they joined the company and while they were at work at their present location. This should be the duty of the personnel department but often goes by default: when a man is up for transfer they usually list his experience as a grocery delivery boy during his high school days, possibly mentioning his work at the college newspaper, but they overlook his fifteen years of varied experience at the present location. The available specialized tools (whether reactors, high-temperature furnaces, lathes, computers, or a well-indexed document collection) should also be listed. In conjunction with the up-to-date knowledge of contracts awarded and advertised, the operator of such an information center could be very helpful to his management by providing the data needed to obtain new government contracts. Thus, the contractor's librarian can become a key person, making sure that his employer remains a government contractor who fulfills a much needed service or fabricates an important product for the government. By his wisdom, tact, knowledge of his chosen field, and his cooperation with his management and the government agency served by his company, the librarian could become instrumental in ensuring the payroll for the engineers, the scientists, the administrators, and last but not least, for himself.

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