

Management of Operations and Services in the Hercules Technical Information Division*

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Management of information operations and services is concerned with knowing objectives and goals, achieving the objectives and goals economically and effectively, having literature chemists with the required knowledge and skills, and changing and introducing operations and services in harmony with the changing needs of the environment. These factors are discussed for the library, journal literature system, translating function, Hercules report system, and technical editing function.

If we define management as the process of directing the knowledge, talents, and energies of people toward the achievement of objectives and goals, then management of information operations and services is most intimately concerned with:

1. Knowing and understanding objectives and goals.
2. Establishing the value and cost of solving problems related to the achievement of objectives and goals.
3. Recruiting and training people to solve the problems and to maintain the operations and services that serve useful and necessary functions.
4. Providing for the technical growth of those on the staff.
5. Changing operations and services in harmony with changes in objectives and goals, and designing new operations and services to meet new needs.

This paper considers the above factors, first in general terms, and then for several of the information operations and services in the Hercules Technical Information Division.

ORGANIZATION

Figure 1 shows the organizational set-up of the Hercules Research Center and the position of the Technical Information Division in the organization. The Departmental Research Divisions are responsible for research and development in areas defined by the interests and needs of their respective operating departments. Central Research is responsible for research and development in areas of potential Hercules growth. The Associated Research Divisions represent those skills and disciplines of science which must be brought into the research and development teams carrying out the programs. The General Services Divisions also play an important role in the research and development programs; their skills and functions, however, are of a more continuing nature than are those of other divisions. Indeed, the skills and functions

of the General Services Divisions are those which are necessary and essential in the management of any operating enterprise, such as a chemical plant.

This organizational set-up places a high premium on good communication within and between divisions, and between the Research Department and all other departments and plants. The communication of technical information is the responsibility of the Technical Information Division, which is made up of the groups shown in Figure 2.

There are 28 people in the division: 13 are chemists with B.S., M.S., or Ph.D. degrees, one is a mathematician (M.S.), one is a librarian (B.S. in science and M.S. in library science), and 13 are assistants, clerks, and typists.

OBJECTIVES AND GOALS

The objectives and goals of the information operations and services for which the staff of the Hercules Technical Information Division is responsible are derived from those of the company's research and development programs, and from the needs for information of the scientists assigned to the programs.

Hercules research and development programs are managed through a well-established communication system, from budgeting and program write-ups to divisional newsletters and periodic research and development reports. The communication system flows downward and upward, as well as across divisions and departments, and involves the services of members of the Technical Information Division, to ensure that everyone with a need to know is included in the system.

It is not enough, however, to know research and development programs. To relate information to these programs, members of the Technical Information Division must know the community of scientists they serve. There are over 300 scientists at the Hercules Research Center, with varying needs for information. These scientists are organic, inorganic, polymer, physical, and analytical chemists; physicists; and chemical and other engineers. Their work assignments include idea seeking, product and process

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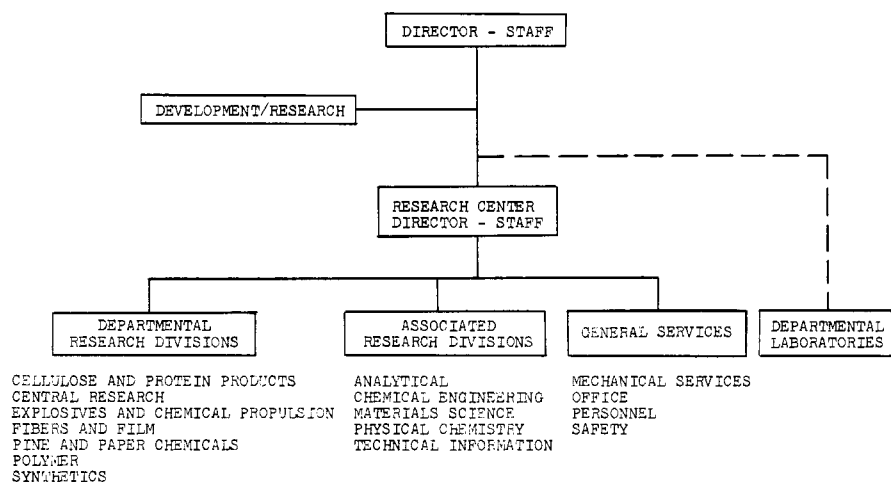


Figure 1. Research Department

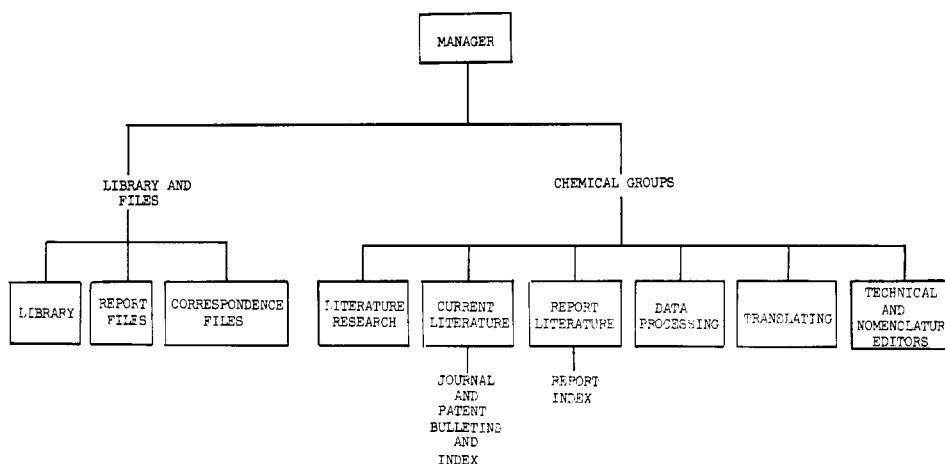


Figure 2. Technical Information Division

research and development, product analysis and testing, and product uses and applications. Areas of research include organic chemicals, polymers, resins, paper chemicals, food chemicals, explosives and chemical propulsion, rubber and elastomers, pesticides and agricultural chemicals, to name a few.

The skills and knowledge of the members of the Technical Information Division are also called on by many hundreds of scientists at other locations of the company, in particular the 39 principal Hercules plants and the Hercules Home Office. These scientists are heavy users of our translators and of our literature resources; they employ our skills in finding answers to their questions of the literature and in setting up special information systems. Many of these Hercules locations maintain their own libraries, report files, and information groups. Members of the Technical Information Division maintain a close relationship and open communication with these groups in serving the scientists at their location.

THE HERCULES LITERATURE CHEMIST

The Hercules literature chemist is first and primarily a chemist. He or she is recruited on the same basis and within the same standards as are those for laboratory assignments, and with the same salary scale. One of the major problems in recruiting literature chemists is the general lack of appreciation among graduates of the opportunities open to them in information work. Consequently, our recruiters, on their visits to college campuses, describe these opportunities, as well as others in the Hercules environment, to interviewees. We also encourage transfers between divisions, and about one-half of the chemists in the Technical Information Division are former laboratory chemists who requested the transfer after discovering the opportunities and challenges of information work.

A new member of the Technical Information Division is put through a training program which covers Hercules chemistry and technology; indexing, abstracting, and

classification systems; literature resources for reference work and literature search reports; and, for some, assignments in designing new information systems. This is not a formal training program, but rather one which is based on learning through doing under close supervision of a senior member. As the new member acquires skill and knowledge, he has the opportunity to continue his training under other senior members. During the initial training period, which may take from three months to a year, the new member slowly absorbs a full-time assignment. We encourage continual professional growth and exploration of each person's own potentialities as a literature chemist through self-study and -development, attendance at special courses and meetings, and involvement as a member of a research and development team. We find that involvement with the environment is an important factor in bringing out latent abilities and potentialities. The literature chemist, through this involvement, gains an intimate appreciation of the value of solving problems and of the need to change operations and services in harmony with the needs of the environment.

These and other factors concerned with the management of information operations and services will be more explicitly described for several of the groups in the division.

THE LIBRARY

A first-class scientific library is essential to the information needs of the Hercules Research Center scientists. The library comprises the functions of obtaining, storing, and circulating a specialized collection of books, journals, patents, government specifications and publications, trade publications, and other published documents. Smooth and efficient operation of the library requires the services of a head librarian whose educational background includes a B.S. in science and an M.S. in library science. With a scientific background, the librarian is able to catalog and classify the collection effectively, appreciate the importance of the library to the research and development scientists, and handle reference questions knowledgeably in terms of the needs of the scientists. As a librarian by choice and by education, he is motivated to know how and from whom to get documents, he is aware of information services and sources throughout the world, and he develops his library skills and knowledge by his association with other librarians and by involvement in the Special Libraries Association.

One distinguishing characteristic I have observed in scientists turned librarians by choice is their high motivation to serve or help others. This characteristic and his motivation as a scientist to understand nature are what makes an outstanding librarian in a scientific community. The combination of science and librarianship directs him to question existing library systems and to design new ones that meet the needs of the community more effectively and more economically. In short, he tends to be a problem-finder and problem-solver, very much like the scientists his library serves. In counterpoint with his desire to serve scientists is his understanding of and empathy with their needs for information.

The Hercules Research Library is the oldest technical information service in the company. Hercules was formed in 1912. The Research Department came into existence

in 1916, and in that year the library was established to serve the research personnel. As the Research Department grew and as the chemical literature expanded, the library staff by the 1950's had expanded to four librarians and three clerk-typists. When the Technical Information Division was formed in 1952, the Library Group was the largest in the division. Much of the effort in the library was dissipated by unsuitable working areas and storage facilities. This was corrected with the construction of the Technical Information Building in 1957.^{1,2} With ample space for the large holdings of the library and for those using the library, we were able to turn our attention to the systems aspect of managing the library in harmony with the research and development objectives.

A new book classification system was designed to reflect the areas of science of interest and importance to Hercules. At the same time, the new book classification reduced cataloging time appreciably. We scrutinized the work of the librarians and assigned the nonprofessional and less professional tasks to the nontechnical staff. Many of the routine assignments of the clerical staff were computerized, thus releasing these persons for more challenging assignments. Concomitant with these changes, the nontechnical staff was upgraded through special training by the head librarian. Thus, over the past 12 years, while the literature continued to grow and the technical interests and personnel of the Research Center expanded, it was possible to reduce the library staff to one head librarian, one chemist (for reference work), and three library assistants. Most important, each of these people is employed at a considerably higher and more challenging level than he was before, and the group is serving more scientists with an increasing flow of documents. To illustrate the flow of documents, the library subscribes to about 700 journals, loans or circulates duplicate copies of current journals in response to about 4000 requests per month, loans over 400 patents and 200 to 300 books per month, and handles approximately 250 reference questions per month.

JOURNAL LITERATURE

A well-designed current journal operation and a computer storage and retrieval mechanism for the journal literature illustrate how a research community can utilize the time and effort of research scientists efficiently and effectively. To keep abreast of the advances and developments in their fields of interest, scientists at the Research Center have access to about 700 journals. The decision to subscribe to a journal is made jointly by a scientist in the Technical Information Division and a scientist from another division whose assignments would require him to read the journal regularly. The head librarian is in a particularly good position to suggest a subscription when interlibrary loans for it pass a minimum level. A scientist paging the 700 journal subscriptions, and reading only articles pertinent to his work, would have little time left for research. Consequently, his journal reading is concentrated on the handful, probably five to 15, in which he will find the majority of articles of interest to his research and to his continuing scientific education. These he will read regularly at his desk or at home. For the remainder of the articles he may need, and for a retrieval system

covering his total needs, he depends on the Current Literature Group.

Issues of all the journals received go to a chemist in the Current Literature Group. He examines each journal for articles that are pertinent to Hercules products, processes, and research and development programs. He classifies, indexes, and abstracts the selected articles. The work sheet containing this and the bibliographic information are keypunched into tab cards. The keypunched cards, in a classified and subject alphabetical order, are put through an IBM 870 Document Writing System for the production of the weekly *Journal Literature Bulletin*. The information on the keypunched cards is then transferred to a magnetic tape and processed through an IBM 360/50 system for the production of up-to-date cumulative indexes by subject, author, company, and classified order.³

The *Journal Literature Bulletin* was first introduced in 1932. It went through many changes of format, style, and publication schedule. One of the reasons for introducing it was to help Hercules scientists be aware of the evolving literature as it was published and many months before it was abstracted in *Chemical Abstracts*. Hercules scientists have been the force behind the *Journal Literature Bulletin's* being the prime communication system for their current journal reading. They were also the force behind our evolution of an adequate indexing system for this literature. At first, their need for the index was most acute during the interval between publication of the journal article and the issuance of the *Chemical Abstracts* Annual Index, in which the article was indexed. Because the index system we designed relates the journal literature directly with Hercules products, processes, and research and development programs, it is generally used before a search is made in *Chemical Abstracts*.

All Hercules technical people, who wish to, receive the *Journal Literature Bulletin*. The bulletin provides means for readers to request the articles and, for their personal files, computer-produced cards. A team of Hercules scientists may request computer printouts of the cumulative literature by subjects of interest to the team's program. The printouts include abstracts with full bibliographic information. A parallel operation for the patent literature is also provided.

TRANSLATIONS

It is generally recognized that language is a major barrier to the chemical literature. Although chemical journals and patents are published in over 40 different languages, about 98% of the better literature is published in less than a dozen different languages.⁴ The solution to this problem is the technical translator—the literature chemist with linguistic skills. Hercules Research Department has had technical translators since 1927. In the late 1940's and early 1950's, there were as many as four full-time translators in the Translating Group. Much of the translating load then was due to the Russian journal literature. By making optimum use of outside services and realignment of linguistic skills, we have been able to reduce our staff to one full-time translator and one half-time translator. Because linguistic skills in 14 languages are spread among about half of the chemists in

the division, we have ready access to translating power when the need arises. In recruiting new scientists for the division, regardless of the opening, we look for linguistic skill among the other talents.

Chemists with linguistic skills are exceedingly important members of any scientific community. We try to be aware of these skills among scientists in other divisions.

HERCULES REPORT LITERATURE

A necessary product of industrial research and development is the periodic technical report or progress report. This is the key technical communication in our environment among all technical people who are involved in research and development programs, from and between laboratories to research supervision and research management. The Hercules report literature goes back to almost the very beginning of the company in 1912. We receive approximately 4000 reports per year. In addition to being an essential component of our communication system, these reports constitute an important storehouse of company knowledge and know-how.

Hercules research management decided in 1928 to set up a group to index and abstract the company's report literature. The initial information system designed served the needs of Hercules scientists well for many years. Although the system went through a series of relatively minor changes over the years, a new system was devised in 1958.⁵ The new system was required because of the many great changes in the science of chemistry and in the Hercules research and development programs over the 30-year period. The differences during this interval were essentially language, the conduct and complexity of research, and the number and kinds of scientists in the environment.

Research management's interest in having an efficient and effective information system for the report literature is to avoid laboratory work that merely repeats the past. But equally important to Hercules research management is the capability of an index to provide the thread of unity that allows the researcher to know objectives and changes in objectives, to explain phenomena, to create ideas, and to evaluate or test hypotheses. These requirements place upon the information system the need for literature chemists who are able to learn the information needs of the environment and to modify the system to conform to these needs.

In general, we start new technical members to the division in the Report Index Group. Because assignments in this group are within categories of related Hercules research and development programs, the literature chemist has an opportunity to learn thoroughly the chemistry and chemical knowledge in the assigned area. At the same time, he is trained in abstracting, indexing, and literature searching. As he gains knowledge in the assigned technical area and acquires the skills of the literature chemist, the laboratory scientists involve him increasingly in their information problems, and thus he gradually becomes a member of program teams. In addition, he will be given assignments in other groups of the Technical Information Division or a special assignment, such as the design and operation of an information system for a large group of Hercules scientists.⁶ In short, as his

knowledge and skills increase, so increase his opportunities and challenges, his value to the research and development programs, and, consequently, his salary.

Our involvement in the report literature includes the responsibility for the reporting system itself and for the report distribution system. We also have the liaison responsibility for the research and development program and project write-ups. These assignments are primarily staff functions for the Director of Research and for the Director of the Research Center. We have been given these assignments because they fit in with our over-all responsibilities. In addition, they allow us to learn the evolving research and development objectives, and, consequently, contribute to our ability to meet the evolving information needs of Hercules scientists.

TECHNICAL EDITING

Technical editing is another staff function which was transferred to us in the early 1950's from the Research Director's staff. Hercules research management encourages the publication of technical papers. The technical editor implements this encouragement by assisting the authors in the requirements of the scientific and technical journals for submitted papers. In addition to editing the papers for grammar, style, format, clarity, and for suitability of figures, tables, and illustrations, the technical editor is the liaison for the author with Hercules reviewers. The technical editor, thus, concentrates his knowledge and experience to the needs of the author and saves the author considerable time which he would otherwise have to devote in what is for some a rather frustrating and discouraging activity. Furthermore, it is economical to concentrate knowledge and experience in one person to serve for many,

particularly for those who do not publish frequently, just as it is in technical translating, information system design, and other functions.

CONCLUSIONS

Underlying most functions and activities of the Technical Information Division is the philosophy of freeing the Hercules scientists as much as possible for accomplishing their technical objectives. If we increase their productive reading of the technical literature, we increase their research productivity. If we provide them with answers to their questions of the technical literature when and to the degree they want, we increase their research productivity. When we are successful in these objectives, we are managing information operations and services successfully.

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Administrative Considerations at BioSciences Information Service*

Personnel Management

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This paper discusses three general areas of personnel administration at BIOSIS: employment, benefit programs, and general personnel administration.

EMPLOYMENT

Procedures concerning employment are particularly important because the consequences are so far reaching. At the same time, it is difficult to measure the adequacy of the program. It may take months or years before inadequate departmental performance shows up, or there is poor morale or other tangible evidence of success or failure.

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We presently use all of the conventional channels for attracting and recruiting employees: newspaper ads, referrals, employment agencies. None of these resources is either outstandingly good or bad, but rather depends upon the available labor market, the level of the staff being recruited, the time of year, and maybe even the position of the stars. Regardless, there is no substitute for careful, discriminating selection, and we try to make it clear to our staff that hiring someone short of their ideal for a given position is often poor economy and usually bad management. It is often helpful for the manager concerned to reduce to writing the general requirements of the person