# Information Retrieval in a Work Setting:
# A Case Study of the Documentation Part of Chemists' Work

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## Abstract

The purpose of this study is to gain insight into a group of chemists' documentation work in a large, international enterprise. The main concern is how filing is organized to support subsequent retrieval without overloading the primary work. The chemists' documentation work is based on individual, partial systems, such as piles with urgent things. Mostly, the final documentation work where documents are made part of the archive is delegated to the secretaries who act as intermediaries between the chemists and the archive. Recently, a comprehensive computer-based filing and retrieval system was implemented, primarily supporting the final documentation work. However, to some extent it is also the intention that the chemists shall use this system. The study identifies certain problematic issues in providing computer support for documentation work, but technical solutions are not offered.

## 1. Introduction

Documentation work is an essential part of the work of professionals such as lawyers, researchers, and chemists. It involves two activities: (1) Filing, i.e. collecting, organizing, and storing information for future reference. This is primarily a running activity intertwined with the work to be documented, and only to a smaller extent an isolated activity appended to the end of the 'real' work. (2) Retrieval, i.e. requesting, searching for, and locating documents or supporting references.

A vast amount of studies of filing and retrieval in libraries has been carried out in the information retrieval (IR) community, for example Pejtersen (1979) and Borgman (1986). In the library environment documentation is the paramount activity while in private enterprises documentation is only one task among others—and probably considered a secondary one. Until recently the IR-community has shown little interest in what could be called 'IR in a work setting', e.g. documentation work in enterprises. In the keynote address at SIGIR'92 Jens Rasmussen (1992) called for an effort to broaden the perspective of IR-research and eliminate the library bias.

The purpose of this study is to gain insight into the documentation part of professionals' work in a large, international enterprise. The studied professionals are chemists working at Novo Nordisk, one of the world's largest biotechnology companies. The chemists are subject specialists, distinguished from people with clerical work and further opposed to specialists in documentation. The specialists in documentation—in the following termed the documentalists—include secretaries,

archivists, and librarians. The documentation work is described from the chemists' as well as the documentalists' point of view, and it is discussed vis-à-vis the available computer support. Certain problematic issues are identified, but technical solutions are not offered.

### 1.1 Novo Nordisk

Novo Nordisk was founded in 1923-25 in order to produce and sell insulin. Diabetes treatment is still a major field of activity, but apart from that Novo Nordisk has become the world's largest producer of industrial enzymes. Novo Nordisk is a Danish company with over 10,000 employees and a net turnover of DKK 10,699 million in 1992.

Novo Nordisk builds on a strong commitment to research and has a long tradition of emphasizing documentation work in order to increase the benefits gained from the research work done, and especially to avoid repetition of research work already done once. The Bioindustrial Group—the division concerned with industrial enzymes—recently implemented a comprehensive computer based filing and retrieval system, named BORIS. This study takes place in one of the research departments in the Bioindustrial Group and in the surrounding departments providing documentation services.

### 1.2 Method

This study is based on four student reports and ten interviews. The student reports, Block et al. (1992), Christfort et al. (1992), Gammeltoft et al. (1992), and Thale et al. (1992), were made during a course examining the systems development project behind BORIS. They include 26 interviews with 14 different persons. With these reports as background ten separate interviews were carried out by this author. The subjects for these interviews represent all groups involved in the documentation work—chemists, laboratory technicians, and documentalists. Several of the subjects are occasionally in direct, personal contact through their work and some even work on the same project and share office. This overlap has the advantage that different opinions and perspectives on the same activities surface.

A major part of the interviews with chemists and laboratory technicians focused on 'a tour of their office', explaining what information they had, how it was organized, where it came from etc. These tours included the subjects' desks, bulletin boards, shelves, computers, and additional information repositories. All subjects gave detailed descriptions of their office without much need for elaborating questions. Each interview was prepared by making an interview guide of which the subjects, in all but two cases, received a copy a couple of days before the interview. Each subject was interviewed for approximately one hour. The interviews were tape-recorded and within one week the subjects received a digest for correction and approval.

## 2. The documentation work

The documentation work at Novo Nordisk is divided between on the one hand the chemists and their laboratory technicians and on the other hand the documentalists. As will be illustrated below, these two groups view the documentation work from different perspectives stemming from profound differences in the ways they interact with the documents. The chemists and laboratory technicians hold a task-perspective while the documentalists hold a document-perspective.

BORIS, the new filing and retrieval system, seeks to support the documentation work by making filing more exhaustive and by improving access to filed documents. In doing so certain

assumptions are made about the organization of the documentation work. A central idea is to have documents registered in BORIS when they are created, instead of being unaware of them until, eventually, the finished documents are filed. One way of achieving this could be to have the chemists use BORIS, and to some extent bypass the secretaries. However, BORIS reflects a view of the documentation work much closer to the document-perspective than to the chemist's task-perspective.

In the following the task-perspective and the document-perspective are described, as a basis for the subsequent discussion of the computer support BORIS provides in the documentation work.

### 2.1 The task-perspective

To the chemists the vast majority of the documentation work is the running documentation of their current activities. The material making up this documentation can be divided into what is currently in use and what is kept nearby for later use. Almost all this material is kept in the individual chemist's office, and it is entirely up to him or her to decide what to include and how to organize it. The remainder of the chemists' documentation work consists in making their documents part of the joint archive and, thus, available to others within the organization. Mostly, the chemists delegate this work to their secretaries.

The chemists' documentation work is highly influenced by their individual needs, habits, and preferences. To give a feeling of the rich detail in their documentation work and its profound effect on the organization of their offices, the task-perspective will be described through an example. Jacob shares office with Michael, his laboratory technician (the names of the subjects have been changed). Jacob is involved in a project which aims at developing enzymes to the tanneries, for instance enzymes to remove the hair from the hides. A couple of large pieces of hide mark the appearance of the office. Jacob's documents consist of reports on laboratory experiments, textbooks, papers, meeting announcements, correspondence, personal notes etc. and is divided into notices on the bulletin board, piles on the desk, and folders on the shelves.

The bulletin board holds meeting announcements, calls for papers to conferences, and the like. Jacob has made a note of these arrangements in his calendar too, but the original papers are kept visible for easy reference and as reminders. The desk is devoted to the material currently in use. This includes the folder from which Jacob just grabbed a document, but also includes a number of more permanent piles each with a rather well-established 'meaning'. Each pile represents sort of a label attached to the documents in it. Otherwise the documents in a pile are not arranged in any particular order. While the labels are rather permanent the papers in the piles change frequently.

In the middle of the desk is a pile containing the last two days mail. It has been opened and leafed through to see whether it contained anything absolutely urgent. Jacob often finds himself too busy to read his mail. Processing this pile is an urgent task. Beside this pile is another containing additional urgent things. At the moment it consists of two documents—two complaints. A third pile contains nonurgent reading and a fourth various less urgent things other than reading. Documents stay in the reading pile until there is a gap in Jacob's calendar or the pile has grown too big. A fifth pile contains material related to the Chemists' Association. This pile will stay as it is until shortly before the next meeting. After the meeting the papers will probably be filed, and the pile will start accumulating material for the next meeting. Behind this pile is a tray with material Jacob did not

want to throw away when he received it and was afraid he would forget about if he put it in a folder. A couple of times a year he examines the contents of the tray; each time most of the material is either thrown away or left in the tray.

The shelves are Jacob and Michael's archive. The documents on the shelves are of various different kinds and organized according to various different criteria of which the dominant are:

- Experiments. A number of folders contain data sheets reporting the uninterpreted results of some of their experiments. These experiments are part of large series and this has motivated Jacob and Michael to develop standard forms to ease and systemize the documentation. The folders consist of filled-in forms sorted in inverse chronological order and include a table of contents. Experiments forming small series are usually documented in a less structured way.
- Projects. Projects are documented by reports where the experimental data are interpreted and conclusions drawn. Reports normally include examples of supporting experiments, but the majority of the experiments are not included. Consequently, Jacob's reports have accompanying folders with background material: data sheets, product specifications for the chemicals, relevant papers etc.
- Products. Several folders collect information about products. An organization according to products is however vulnerable: Some new products cross existing product groups and others receive their names from old products, even though the old product was named after its enzyme group and the new product belongs to another. While reasonable from a marketing perspective, this has made Jacob's system inconsistent.
- Sources and topics. A number of folders contain papers from for instance periodicals. One folder collects papers with the common property that they originate from the same source, namely an institute Jacob cooperates with. Other folders collect papers with reference to specific topics.

Jacob finds that his and Michael's documents are not optimally organized. They have talked about setting aside a day to reorganize and throw away. The problem is finding the time to do it. This problem recurs in connection with making their documents part of the joint archive. Only reports are at all send to the archive though for instance the data sheets contain much information worth filing. Moreover, almost finished reports often await completion for some time and, consequently, their transfer to the archive is delayed. At the moment nobody but themselves need the results of their experiments, and they take advantage of that by maintaining a personal archive and postpone the transfer to the joint archive. Jacob is however well-aware that this easily evolves into never getting the transfer done.

Jacob has a computer in his office too. It is primarily used to produce documents, not to file them. The documents are stored for later elaboration, correction, or reuse, but they also exist as paper copies on the shelves. When Jacob needs one of his documents he practically always retrieves the paper copy. One concrete reason for this is that he often stores a photo of the hide together with the paper copy. The computer is, however, central to one part of the documentation work. The network includes a shared area where the chemists file their individual week-reports telling what they are currently occupied with. The week-reports are used by management to get a picture of what is going on and by chemists interested in knowing what their colleges are engaged with. On the basis of the week-reports monthly highlights are produced. Week-reports and

highlights provide a frame of reference for the more result-oriented documents in the archive and can sometimes lead to documents of interest or persons worth contacting.

## 2.2 The document-perspective

To the documentalists the documentation work consists in making the chemists' documents part of the archive. The archive serves two major purposes: It stores documents for future reference, and it mediates personal contacts among the chemists. The document-perspective covers the major steps in the development of a document, except the preparation of its contents, and in this sense almost forms a document life cycle. The document-perspective includes: drawing the journal number when the document is created, transferring the document to the archive at completion, filing the document in the archive, and revising the document by filing new versions.

*Drawing the journal number*. When the journal number is drawn a number of fields with information about the document is also filled in. They include author, department, document type, keywords, archival mode, security level etc. Securing the confidentiality of research results is a major aspect of the documentation work. However, for the archive to be valuable care must also be taken not to be too restrictive—causing access to a document to be limited to people already knowing about it. At this point IR in a work setting differs markedly from the library environment where documentation is guided by an ideal of providing everyone with equal access to information (Borgman 1986).

BORIS includes a number of standard document setups which, depending on department and document type, select the archival mode and copy the journal number, title, and some of the other fields into the document in their appropriate places. If the journal number is drawn when the document is created the standard document setups format the document and help ensure that the required information is present. However, when a document is created the keywords, precise title etc. are often unknown and left unspecified. Furthermore, many documents do not receive a journal number until they are finished. This is due to the division of the documentation work between the chemists and their secretaries: The chemists write the documents and when finished usually send them to the secretaries for proofreading and filing. At this point the secretaries draw journal numbers and transfer the documents to the archive.

*Transferring the document to the archive.* Before a document is transferred to the archive the fields should be filled in. Often the secretary fills in all the fields. Copying the title from the document to the appropriate field is straightforward; selecting keywords is more problematic. One of the secretaries, Annie, finds herself capable of choosing reasonable keywords in most cases, because she has been writing for the same group of chemists for a long time. She chooses keywords according to the principle that *"it must be very general words"*. The reasons for this principle are that the people querying the archive are other documentalists with approximately the same prerequisites as herself.

All documents of potential value to Novo Nordisk must receive a journal number, but they can be filed in several ways. A document can merely be registered which means that it receives a journal number and the fields are filled in, but it is not transferred to the archive. People interested in the document have to contact the author, though he or she may have left Novo Nordisk or no longer have the document. Alternatively, a copy of the document is transferred to the archive. This is the recommended possibility, in most cases, as it allows everyone to feel free to throw away their

copy when it is no longer of interest to them. Some documents are transferred in electronic form, others in paper copy. The latter group includes for example documents with graphics in formats not supported by BORIS and documents containing appendixes with product specifications from the manufacturers of the used chemicals. Documents transferred in paper copy are registered in BORIS to make all documents retrievable through the same system.

Apart from adding the documents to the joint archive Annie maintains her own local archive with paper copies of all the documents she handles. The chemists she writes for know this and often ask her, instead of the joint archive, for a copy of one of their old documents. Annie's archive exists for two main reasons: (1) When she decides to merely register a document she feels responsible for ensuring that a retrievable copy exists. (2) Just by making a paper copy she remembers the documents much better. Furthermore, Annie's archive is accessible to the chemists when they are working late and the joint archive is closed.

*Filing the document in the archive.* When documents are added to the archive, but before actual filing takes place, the archivists check that all parts are present, that the fields seem to be probably filled in etc. One of the major sources of errors at this point is series of journal numbers drawn together and kept for later use. Drawing journal numbers in series is done to ease subsequent access to new journal numbers. When these journal numbers are drawn they are not linked to documents yet and the fields are left unspecified. In a number of cases they remain unspecified later when the linking takes place. The check before actual filing increases the likelihood that errors and omissions are discovered and, thus, makes it safer and less demanding for people inexperienced in using BORIS to start using it.

*Revising the document.* After a document has been filed in the archive it can be revised by filing new versions (with the same journal number). The old version remains in existence and is still retrievable, but apart from that the new version replaces the old. In Annie's experience a document is often followed by a number of modifications. She finds that the most practical way of dealing with this is to postpone the filing of the documents until she no longer receives modifications. Of course she can not predict this point in time precisely, but she does not use the possibility of revising documents in the archive extensively.

## 3. Discussion

The documentation work at Novo Nordisk involves the chemists as well as the documentalists, both groups performing indispensable documentation functions. Primarily, the chemists do the personal, running part of the documentation work, while the documentalists do the organizational part when the documents have been completed.

The individual chemist's documentation work is centered around his or her desk and shelves. Most of the documents on the desk are grouped into piles while the documents on the shelves primarily are organized into files. Piles and files are used and organized differently, though both are ways of collecting documents (and other things) into larger units. Cole (1982) highlights the difference by distinguishing between action information and personal work files. Piles are usually defined through their spatial location, explicit titles are not used. Mostly, the documents constituting a pile are not arranged in any particular order and change frequently. Files, on the other hand, are usually folders identified by titles. In general, the documents in a file are ordered, often in inverse chronological order. Removal of documents is rare, but files are often extended with additional

documents.

Two major purposes, also found by Malone (1983), seem to guide the chemists' documentation work. The first is obvious, the chemists organize their documents to have them at hand, i.e. to ease subsequent retrieval. The second, major purpose is reminding. Most of the documents on the desk are not just available for retrieval, they also remind the chemist of something he or she shall do. One of the chemists, Karen, says that she often forgets the exact contents of the piles on her desk, but by their mere presence the piles remind her that there is something she can not keep ignoring.

All searches in the joint archive must be initiated by a person who decides that it is worth consulting, i.e. the archive is used for retrieval, but not for reminding. The archive enables reuse of achieved results and insights, reported in filed documents. However, a document never conveys the actual insight, only some representation of it. Moreover, the reader forms his own interpretation of the contents of a document. To circumvent this, the archive should be used as much for mediating personal contacts as for retrieval of documents.

The documentalists, especially the secretaries, act as intermediaries between the chemists and the archive. As a part of this intermediary function at least one secretary maintains her own local archive. Such local archives are not supported by BORIS, though it seems to be a valuable extension of the joint archive. The documentalists use BORIS to communicate with the joint archive, namely to draw journal numbers, fill in fields, transfer documents, and revise them.

In the following four aspects of the support provided by BORIS are discussed. They focus on the extent to which it will be beneficial to extend BORIS with facilities directed specifically towards the chemists' documentation work, and the nature of such facilities.

### 3.1 Approaching the running documentation work

BORIS primarily reflects the document-perspective. One of the documentalists, Mary, finds it essential that BORIS is extended with facilities making it an active part of the chemists' running documentation work—otherwise BORIS will not get the position necessary for its success. Retrieval is one such facility, but filing is often done to enable others in, say, ten years from now to benefit from the work done at present. Filing itself must be made more visible and immediately valuable. The standard document setups is one facility attempting this. They are immediately beneficial to the chemist and make the documents known to the archive at the time of creation.

The semiannual, personal status lists each chemist receive from the archive serve the same purpose in a simple, but appreciated, way. Documents which have received a journal number but have not yet been transferred to the archive are listed as are the documents transferred to the archive during the last six months. Thus, the status list is a reminder as well as an overview. The secretaries receive similar lists, but apart from that Annie would like status information about what the archive receives and what common searches look like. Such information could improve her decisions about what and how to file, including her selection of keywords.

Most of the subjects, including all the chemists, perceive BORIS as a system restricted to filing and retrieval of final documents (this impression is not entirely correct, as evidenced by e.g. the standard document setups). To them the final documentation work and BORIS is one thing, and the running documentation work another. This separation impedes the final documentation work and, thus, underlines the importance of introducing facilities adding some immediate value to the

filing activities. Furthermore, completing the documents before transfer is a task with low priority, as Michael explains:

> *Filing and completing the writing [of the reports] is perceived as somewhat boring. You'll rather proceed with the next experiment. The reason for this is that right now you have no problem remembering what you did and what you want to improve. It's funnier to make the next experiment that might turn out as hoped and expected than to sit and write why the last experiment didn't.*

Michael does not find it well-justified to use so much time on completing the reports, after all the archive is just an internal one. Filing the documents would be much more practicable if BORIS was a working-copy archive with documents like the ones on the chemists' shelves. This could be achieved merely be deciding so, but it would be advantageous to accompany such a change with facilities allowing the documents to be organized in ways similar to the ones used by the chemists.

### 3.2 Systemizing elements versus overall systems

The archive is external to the chemists' daily work and, thus, can not rely heavily on memory and other human abilities requiring frequent interaction to function reliably. Instead, the archive is organized according to well-defined standard criteria—such as author, year of publication, and keywords—incapable of reflecting individual or situation-specific needs. Contrary to this, the chemists use numerous soft, partial systems to organize their documents. These systemizing elements are meant to fit and further the chemist's present situation—despite its time and context dependence. They are not intended to characterize the documents in a definitive or thorough way; some documents are simply collected in files containing various related material. This minimizes the effort required to maintain the systemizing elements.

To all the chemists urgency is an important systemizing element. It determines the location of some documents; the others are organized according to other criteria. As described above Jacob also uses experiments, projects, products, sources, and topics to organize his documents. Karen makes extensive use of directly visible cues:

- The spatial location of some of her piles is determined by their reminding function. A pile with urgent things located in the middle of Karen's desk received this comment: *"It's in the middle, where I can't get to write if I don't do something about it."*
- The top document in a pile, i.e. the directly visible document, has a special status.
- She uses colour-coded folders, so that general information is in green folders, material about experiments is in black folders, and administrative things are in white.
- Each shelf constitutes a unit collecting folders and other material with some property in common. Furthermore, Karen refers to two shelves as active shelves containing the much used documents while the other shelves mainly are storage shelves.

Several subjects state that they have difficulties organizing their documents in a satisfactory way and almost excuse the lack of an overall system. As found by Case (1991), one reason for the lack of thorough systems is that such systems can not be made until some material has been collected and the direction of, say, the project somewhat settled. Mostly, attempts to establish overall

systems are either not considered at all or not carried through. Karen and another chemist, John, would like to have a simple database covering their papers from periodicals and the like. At first they considered making a database with all papers relevant to their current project which involves chemists from several departments. Now Karen and John talk about a database with their own papers, but they still just talk. The chemists are somewhat frustrated about the ad hoc way many of their documents are organized. This by no means implies that their work is disorganized, but rather that either overall systems are considered inappropriate or the overhead involved in establishing them is considered too big.

Many of the chemists' systemizing elements are what Kwasnik (1991) termed situational factors, as opposed to the document attributes used in the archive. Each document entering the archive must conform to an overall system comprising a number of fields, one of which requires that the document is indexed with at least three keywords from the keyword list. Department-specific keywords have been considered, but currently the keyword list is common to the whole Bioindustrial Group.

If the archive primarily is intended for final documents it has to rely on overall systems, with the week-reports and monthly highlights as possible ways of deriving some advantage from the soft and situational information constituting the systemizing elements. Conversely, a filing and retrieval system intended for the running documentation work should enable and encourage the use of systemizing elements. Lansdale & Edmonds (1992) give one example of a system attempting this. They consider documents one type of events—others being meetings, product announcements, diary notes etc.—and organize events on the basis of time and relations between events. To some extent BORIS is intended to support the final as well as the running documentation work. Because of the profound difference between these two parts of the documentation work, the best way to achieve the combination might be to provide the chemists with one system, the documentalists with another, and devise an interface between them.

### 3.3 Systems overload and end-user searching

BORIS is developed to support the documentation work, but it is not entirely apparent who are the contemplated users. On the one hand, BORIS reflects a view of the documentation work close to the document-perspective, and the documentalists use BORIS regularly. On the other hand, some of the central ideas with BORIS seem to require that the chemists use it themselves. Mary, a documentalist, says that when BORIS was introduced, it was expected that filing documents in the archive would primarily remain the secretaries' responsibility. The chemists already do some administrative work and are not expected to start doing more. It was and is, however, hoped that they will use BORIS *when* they do such work. End-user searching, on the other hand, was perceived as one of the major features of BORIS, without being forced upon the chemists.

At the moment the chemists hardly use BORIS, neither for filing nor for retrieval. All the interviewed chemists appreciate that they can delegate most of their interaction with the archive to their secretaries. One reason for this is that BORIS runs on a heavily loaded network and is annoyingly slow. Another reason is that most of the chemists find themselves too busy to spend time on BORIS. A third reason might be that the chemists are so involved in their documents that it is difficult or even unpleasant to let go of them and step back to a position sufficiently detached to select a few appropriate keywords, an archival mode etc. It is much more convenient to use an

intermediary.

Systems like BORIS are developed to manage information and reduce so-called information overload. However, the sheer number of systems available to the chemists has created a new variant of information overload: systems overload. New systems are made available to the chemists all the time, but utilizing them requires a course as well as regular usage. One of the chemists, John, has attended three information retrieval courses lately, one about searching external databases, one about using the internal library system, and one about the retrieval part of BORIS. It is inconceivable to get acquainted with all these systems and hard just to find out which are worth approaching.

John considers many of the attempts to introduce end-user searching and the like a burden rather than an extension of his freedom and possibilities. To him the most reasonable way of achieving the necessary quality is through delegating the tasks to people with expertise. It is a misunderstanding to extend the chemists' work with tasks in which others are experts. In relation to filing and retrieval with BORIS the documentalists are experts. Thus, John calls for a continued division of labour.

There is a gap between the expectations the developers of BORIS attached to end-user searching and the chemists' lack of enthusiasm. In reviewing the pros and cons of end-user searching Mischo & Lee (1987) note that because of their infrequent searching many professionals remain novice searchers, and that even professionals trained in searching rarely search themselves.

*3.4 Electronic documents and paper copies*

Most internal documents are prepared by computer and, thus, exist in electronic form. However, several subjects state that they have paper copies of all their documents and that the authoritative copy of a document is this paper copy. One reason for this is that paper copies can be used as reminders, while the electronic documents appear only as entries in alphabetical listings. It is also of importance that paper copies can readily be brought to meetings or to the laboratory. Furthermore, the chemists often find it desirable to store their own documents together with documents available only in paper copy, for instance to collect correspondence pertaining to a project in one folder. The preference for paper copies is also reflected in Annie's local archive. It consists of paper copies, and after a while Annie removes faxes and other documents of minor importance from her computer leaving only the paper copy. This is done to clean up the computer catalogs, i.e. to avoid that documents to be processed disappear among the documents already taken care of.

BORIS provides ways of filing documents in paper copy, in electronic form, or in some combination. At present all the possibilities are used, reflecting individual differences as well as the diversity of the documents to be filed. However, BORIS is accompanied by a request to file documents in electronic form. Two reasons for this is that electronic documents occupy less space and can easily be made available to several users at a time. Currently 75% of the documents are filed in paper copy and the remaining 25% in electronic form. One of the goals with BORIS is to achieve the inverse relationship. Thus, the chemists' preference for paper copies is not perceived as merely a habit. This is in accordance with the principle of requisite variety (Ashby 1973) implying that several different filing possibilities are needed to match the variety of the chemists' work situation.

**4. Conclusion**

This study has described and discussed the documentation work at Novo Nordisk—the chemists' part, the documentalists' part, and their interplay. A considerable amount of time and effort is spent on documentation work by all parties involved.

The organization of the chemists' offices is deeply affected by their documentation work. There are large individual differences, but also important similarities. In general, the chemists use soft, partial systems to organize their documents, organize for reminding as well as for retrieval, and prefer paper copies to electronic documents. Furthermore, they mostly delegate the final documentation work to their secretaries.

The documentalists, especially the secretaries, act as intermediaries between the chemists and the archive. Contrary to the chemists' involvement in the contents of the documents, the documentalists have a detached perspective on them—they are objects to be handled. This enables the documentalists to concentrate on entering the documents into the network of recorded knowledge constituting the archive.

BORIS is becoming the way to communicate with the archive and, thus, the reputation of the archive is heavily dependent on BORIS. At present BORIS is almost exclusively used by the documentalists, but it is the intention to extend it with facilities making it an active part of the chemists' documentation work. However, the chemists and the documentalists have profoundly different perspectives on the documentation work. It remains an open question whether it would be better to turn BORIS into a system dedicated to the documentalists and, perhaps, develop a separate system, interfaced to BORIS, to support the chemists' running documentation work.

**Acknowledgments**

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