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There are several on-line information retrieval services available in research libraries in Sweden. The major part of those services consists of bibliographic data bases offered through foreign vendors like the European Space Agency promoting their IRS-QUEST service via the Information and Documentation Centre of the Royal Institute of Technology Library in Stockholm, the LOCKHEED DIALOG system, the System Development Corporation ORBIT Search Service and, with a growing portion of the market, there are the host centres of EURONET – DIANE. The last group of services will presumably have an even greater impact as soon as the telecommunication link between Sweden and EURONET is installed and functioning viably.

Although the number of data bases accessible through foreign vendors by far exceeds the number of data bases implemented for on-line access at computer centres within our own country, over 50 per cent of the on-line searches, as measured by the connect time, were in 1981 performed on computer installations in Sweden. The on-line retrieval in medicine is outnumbering any similar activity in other scientific fields. As the responsibility for the Swedish on-line information retrieval in medicine is in charge of the Karolinska Institute, I think it is appropriate that my presentation mainly deals with the services offered by the Karolinska Institute Library and Information Centre, i. e. the services provided by KIBIC. In Figure 1 the formal organization is outlined.

Figure 1: KAROLINSKA INSTITUTE LIBRARY AND INFORMATION CENTER (KIBIC)

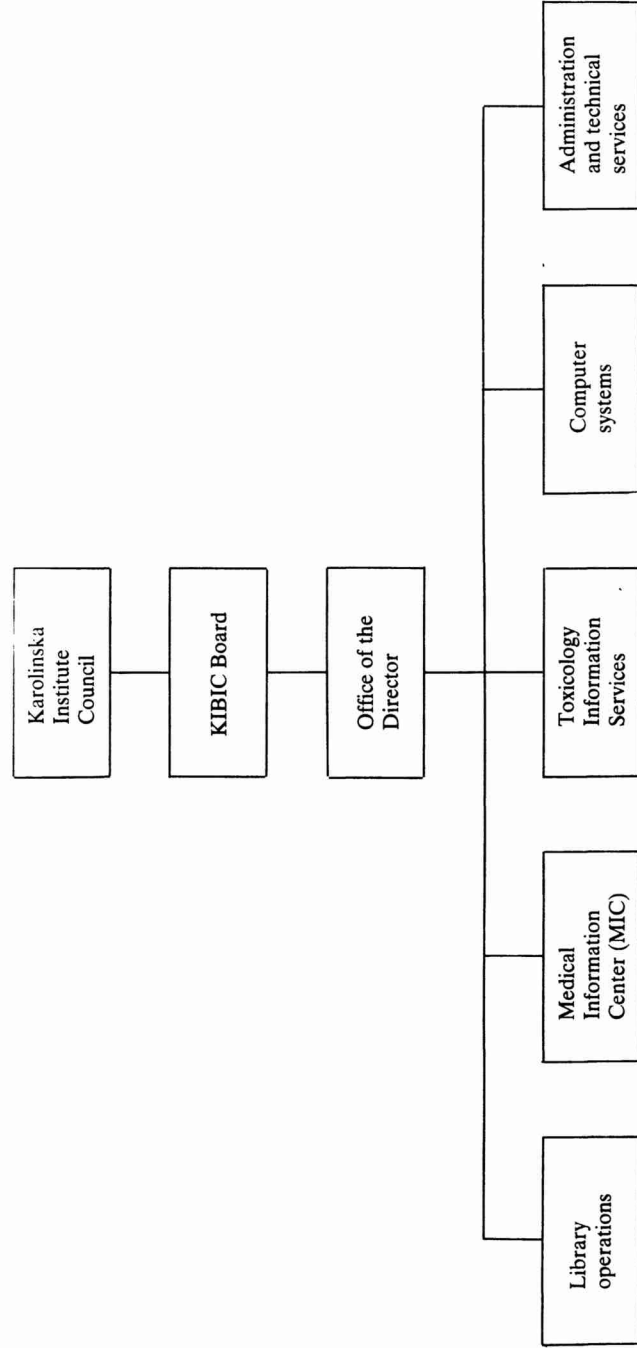


Table 1: KIBIC STATISTICS 1979-82 (by fiscal years)

	1979/80	1980/81	1981/82
<i>The Library:</i>			
<i>Loans</i>			
Requests received	233 665	227 794	244 980
Total number of loans	206 992	190 703	208 246
Replaced with photocopies	161 237	151 337	169 301
Local loans	160 573	142 783	157 118
Inter-library loans	46 419	47 920	51 128
Loans from other libraries	15 067	14 279	14 503
Photocopies taken (number)	1 315 567	1 158 494	1 139 576
Current periodicals (number)	3 178	3 318	3 383
Accessions (metres)	262	287	239
Holdings (metres)	9 774	10 061	10 300
<i>Medical Information Centre:</i>			
Terminals connected	91	114	134
Connect time, MEDLARS/MIC (hours)	2 595	2 995	3 965
No of retrospective searches performed	927	782	719
No of current awareness profiles (SDI)	406	425	458
Articles indexed for MEDLINE	8 409	5 877	4 067

KIBIC is governed by a special committee with the chief librarian as chairman. The KIBIC committee, which is appointed by the Karolinska Institute Council, sets goals and gives general directions for services, approves budget and user charges, as well as having the final decision in matters concerning the professional staff. Responsible for management and operations are the chief librarian and his deputy director assisted by the administration and technical services. There are three customer service divisions within KIBIC: the library operation, the medical information centre and the toxicology information service.

The Karolinska Institute library dates back to the year the Institute was formed in 1810. The library is the Swedish National Medical Library and has well established collaboration with other research libraries as well as libraries at universities, medical schools and hospitals. KIBIC statistics are given in Tables 1 and 2.

There are some essential events during the development of Sweden's computerized information retrieval services in medicine and the field of health care that may be worth a brief presentation. By the end of the 1950s computer technique was tested at the National Library of Medicine (NLM) in the United States as a more efficient method to produce Index Medicus. One outcome of these experiments was MEDLARS (MEDical Literature Analysis and Retrieval System). With this bibliographic data base a new procedure was introduced for more effective and rapid searching of refer-

ences to medical documents. In 1981 over fifty per cent of all on-line usage of bibliographic data bases in the world came from the use of data bases produced by NLM amounting to approximately 2m searches.

When, in 1964, the new computerized retrieval system for medical information was offered to the member countries of OECD as a collaborative project, only the United Kingdom and Sweden entered into bilateral agreements with NLM. A special task-force sponsored by the Swedish Medical Research Council was organized within the Department of Medical Physics at the Karolinska Institute. It took three years of testing the MEDLARS data base, during which period a completely new retrieval software had to be developed to accommodate with available computer resources. A regular

Table 2: KIBIC STATISTICS: LOANS REQUESTED (based on sample figures for 1981)

<i>External requests:</i>	Percentage
University libraries and other public libraries	13
Hospital libraries	9
Libraries in private industry	23
Foreign	<u>5</u>
	<u>50</u>
<i>Local requests:</i>	
by mail	31
over the counter	<u>19</u>
	<u>50</u>

MEDLARS service was operational in 1967, and organized as an independent department, the Biomedical Documentation Centre (BMDC). Regulations for this centre were given in 1969 and today still they have a strong bearing upon the service offered. During 1968-70 additional data bases with relevance to life sciences were implemented. The first MEDLINE (MEDlars on-LINE) operation outside United States was set up by BMDC in 1972. The MEDLARS II package including the ELHILL III software was installed early in 1975, and in the same year the organization was renamed as the Medical Information Centre (MIC).

Following the report of a Swedish government commission on the provision of Scientific and Technical Information, the Karolinska Institute coorganized the Karolinska Institute Library (KIB) with MIC to form KIBIC. This merger was not without disagreements and opposition expressed among the staffs of both organizations. Full integration will take some time and has been allowed to be gradually accepted. KIBIC as a larger organization has a better financial stability which is mutually beneficial both to the library operation and the information centre. Sharing software resources and in-house systems, specialists help in the process to modernize various activities within the library. By linking the computerized reference retrieval with on-line ordering of documents/photocopies, the MIC services will improve essentially.

The advantages of merging a central medical library with a national information centre can be utilized also for other activities involved in the transfer of scientific and medical information. The Swedish Government decided in 1981 that a special Toxicology Information Service should be organized from the fiscal year 1982/83.

The description given of KIBIC's services shows a highly diversified organization, rapidly expanding into new activities in the field of information provision. With this type of organization it follows that in the KIBIC staff there are represented many professionals that one generally would not call librarians. This might be a question of definition, but KIBIC has many non-librarians if one considers formal academic background. We are, for instance, six physicians and more than sixteen pharmacists, chemists or toxicologists in the organization. It is an obvious fact that the rapid increase of non-librarians among the staff is directly related to the computerization and other fundamental changes in the actual handling of the transfer of scientific and medical information.

I think then that it is essential to consider the role of a library and information centre. We all agree that research libraries

deal with scientific information and that the information we deal with is an essential part of the communication between scientists themselves, and between scientists and the general public. The library services are an essential but by no means the only communication link in the chain of information transfer. It has been said before, but it is worth being said again, that 'the ultimate goal for an efficient information transfer system is not the transfer of documents but the transfer of the information/knowledge itself'.

Among the new technologies we first have to take into consideration the rapidly increasing use of computer terminals. The EURODATA foundation reports that in January 1980 the number of terminals in Western Europe was 625 000; in seven years time it is projected to grow to 4m computer terminals. The figures for one country, Sweden, are 46 000 in 1980 and will be 320 000 in 1987. A higher density of terminals means more people working in a computer terminal environment, and that more people will use terminals and access computers and use new forms of telecommunications in their jobs.

We can already see this development taking place within the Karolinska Institute. A special network is under construction to enable those terminals in the various departments to be linked together and with local or central computers, and in the longer perspective also with other countries. Terminals will be used not only as desk-top tools for calculations but also for access, to various numeric and textual registers, to bibliographic retrieval systems, for word-processing systems, for electronic mail, for teleconferencing or computer conferencing and for electronic publishing. The impact on library activities is obvious.

In the long run the continued provision of computer-based information retrieval services will depend upon the producers of data bases and the providers of searches to sell at a price the users are prepared to pay. This means that the unit cost of production must be less than the unit price charged to consumers or that a subsidy element must be maintained by some independent agency, frequently a central government. Often the unit cost of a search is difficult to determine with any accuracy.

For instance McCarn says 'that any attempt to evaluate the costs of the National Library of Medicine on-line services is plagued by the problem of cost allocation', because some of the costs to provide the service are part of the cost of all National Library of Medicine operations. The costs of providing on-line service at the National Library of Medicine are

allocated in the following way: computer costs in accordance with the CPU usage; personnel and overhead costs in-house National Library of Medicine specific to on-line service; specific costs for communications; usage of external files, eg Chemical Abstracts as a part of TOXLINE etc. Just as the National Library of Medicine has its costs subsidized, so does MIC.

But the data base development and maintenance are not allocated because those activities would be necessary for publication purposes regardless of the on-line service. The on-line services, according to the given cost allocation, recovered about 72 per cent of their costs. This is important to have in mind when following the on-going debate in the US, frequently presented recently in editorials in various scientific journals.

The National Library of Medicine has recently been under budgetary pressure, partly caused by the intense lobbying efforts in the United States Congress of the Dutch Elsevier Company represented by EXCERPTA MEDICA. Eight million dollars are the additional costs of providing on-line access to *Index Medicus*, which has to be produced anyway. In the US a total of 200 billion dollars a year are spent on medical care. The subsidee in question accounts approximately for 2.2 m dollars.

We all know how extremely rapid and costly the growth of the biomedical literature is. The whole process of writing, publishing, distributing and using the biomedical literature in

the US amounts to nearly 3 billion dollars in 1977. These expenditures include 428 m dollars for authorship and editing; 1.1 billion dollars for publishing and distribution; 1.84 m dollars for libraries, abstracting and indexing service; and 1.3 billion dollars in user costs, including the estimated economic value of the time that is spent by biomedical researchers and educators in searching for and reading literature. These types of costs are projected to increase to over 5 billion dollars annually in 1985. (All figures are quoted from a report produced by King Research Inc., 1979.)

With this economic background it is discouraging to realise the uneven quality and distribution of the published scientific literature. Garfield of the Institute for Scientific Information reports that 25–50 per cent of all scientific publications are never cited. Urquhart reports that in a one-year period more than one half of the collection available at the British Library Lending Division (BLLD) was never consulted and that 80 per cent of the loan requests were filled from ten per cent of the 9000 periodicals. Cummings has given similar figures for the National Library of Medicine in the US. Three hundred of its 20 000 serials satisfy 70 per cent of its inter-library loan requests.

Perhaps author royalties on photocopies would have an important regulating influence on the publishing behaviour among scientists. The enormous volume of published material has implications not only for libraries but even more for the end user, who must be careful to avoid being overwhelmed.