DOCUMENT RESUME

ED 052 813 LI 002 960

TITLE	Committee for the Development of Scientific and Technological Information Networks in Israel: Summary of the Report.
INSTITUTION	Israel Society of Special Libraries and Information Centres, Tel Aviv.
PUB DATE	70
NOTE	23p.; (87 references); Contributions to Information Science No. 4
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	Developing Nations, *Foreign Countries, Information Needs, *Information Networks, *Information Science, Information Services, *Information Systems, *National Programs
IDENTIFIERS	Israel, *Scientific and Technical Information

ABSTRACT

The report submitted by the Committee for the Development of Scientific and Technological Information Networks in Israel to the National Council for Research and Development in the Prime Minister's Office is summarized. This bilingual synopsis of the 210 page report is for those desiring an overall view only. The report proposes a framework for the development of existing information systems. The creation of a national information network is proposed and the designation of a national focus for the planning and coordination of the information activity is recommended. It was found that the Israeli information system lags, relatively and absolutely, behind the level of existing services in industrialized, developed countries, and that the present system does not meet the needs of research, industry and management in Israel. The report appendices cover the following subjects: Information Services in Israel, Information Policies in Foreign Countries, and Existing Information Systems in Some Countries. (Author/NH)

CONTRIBUTIONS TO INFORMATION SCIENCE

No. 4

ISRAEL SOCIETY OF SPECIAL LIBRARIES AND INFORMATION CENTRES — ISLIC

SUMMARY OF THE REPORT

COMMITTEE FOR THE DEVELOPMENT OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION NETWORKS IN ISRAEL

Team: Prof. D. Abir - Chairman
Carel Keren - Member

Tel-Aviv
1970

UDC
047:[002:65.01](569.4)

TEL AVIV P. O. B. 20125

CONTRIBUTIONS TO INFORMATION SCIENCE series

1. A generally applicable facet for the UDC, by H. Wellisch. 1966. (Out of print).

2. A computer-produced index to current scientific research in Israel, by C. Keren, B. Arbel, N. Fichman, and H. Parnes. 1969.

3. An international center for standards documentation, by H. Wellisch. 1969.

4. Committee for the development of scientific and technological information networks in Israel. Team: Prof. D. Abir - Chairman, Carel Keren - Member. Summary of the report. 1970.

EDITOR'S NOTE

The following pages constitute a summary of the report submitted by the Committee for the Development of Scientific and Technological Information Networks in Israel to the National Council for Research and Development in the Prime Minister's Office.

The complete report (210 pages) was published in Hebrew in 1970 and met with great interest in Israel and also abroad.

In view of the importance of this report to the development of information networks in Israel and considering that this is an area of great concern to ISLIC, it has been decided by the Editorial Committee of ISLIC to prepare a bilingual synopsis of the report for those desiring an overall view only.

This summary remains fairly close in its outline to the original report. Most of the quantitative and some of the qualitative descriptions of the existing system in Israel have been omitted or considerably shortened, as have been the detailed comparisons with systems elsewhere. The original report quotes extensively conclusions reached and recommendations made in other countries, mainly to enable policy decisions in Israel to be made in the context of practices and plans throughout the world. These quotes have been also omitted from the summary.

1. F O R E W O R D

The growing investment in R&D in Israel, the rapid rate of industrialization, and a closer involvement with modern concepts of science policy motivated the Director of the National Council for Research and Development to appoint a small team to examine the existing organization for scientific and technological information and to make recommendations regarding government policy in this field, taking into account the developments of services and systems in other countries.

The team was appointed in July 1968 and submitted its final report in April 1970: The members of the team were Prof. D. Abir (Chairman), of the Technion in Haifa and the Israeli Aircraft Industries, and Mr. C. Keren, Director of the Center of Scientific and Technological Information. They were assisted by Mr. S. Gonen (Secretary) and the staff of the Center. Special surveys of various components of the Israeli information network were conducted by senior information specialists and incorporated into the report.

For the purpose of its work, team members and staff visited R&D facilities in Israel, industrial enterprises, and libraries, and interviewed information scientists as well as users of information. A large number of literature references were also consulted.

The findings of the Committee and their implications as regards research and development in Israel, and proposals for a national policy for the handling of scientific and technological information, were published in a comprehensive report in April 1970.

In this report a framework is proposed for the development of existing information systems. The creation of a national information network is proposed and the designation of a national focus for the planning and co-ordination of the information activity is recommended. Very early in its work the team decided that it must work on the basic assumption that most of the information which will be required already exists, and that information workers in a small country must learn where it is located, when it is needed, and how to develop ways to acquire it.

In a small country only a limited quantity of information is generated locally. In order to avoid duplication of research, to further development and to assist industrial and agricultural production, world-wide resources of scientific and technological resources must be called upon to the widest possible extent.

The team found that the Israeli information system lags, relatively and absolutely, behind the level of existing services in industrialized, developed countries, and that the present system does not meet the needs of research, industry and management in Israel.

The team is convinced that the development of an efficient information network must be given suitable priority in the policy planning for research and development, and believes that such a network is imperative for the technological and economic development of Israel. The team is convinced that any investment in improvement of the information services will be repaid within a short period of time.

2. MAJOR RECOMMENDATIONS

After an examination of the existing situation in Israel and a survey of the information systems in a number of selected countries, and in view of the accelerated scientific and technological research and development in Israel and also considering the probable future development of world-wide information services, the team made the following recommendations:

1. The Israeli government should actively support current information services in Israel and assist in their development and rapid improvement. The team recommends the creation of a national information network based on the specific needs, present and future, of the State of Israel. This network will develop effective ties with information services in other countries and with international institutions active in this field.

2. The existing Center of Scientific and Technological Information (COSTI), which is a part of the National Council for Research and Development of the Prime Minister's Office, should be designated by the Government as the National Center for Scientific and Technological Information (NCSTI). NCSTI will bear the responsibility of the realization of the government policy adopted, whose major goals are outlined in the following recommendations.

3. NCSTI will develop and activate in the shortest possible time a suitable national information network. This network will be based, as far as possible, on information systems already existing in Israel, and will assist in the establishment of others at the time and place at which they are deemed necessary.

   The basic task of NCSTI will be to co-ordinate the activities of the components of the national information network, and to act as a national clearinghouse for information.

4. NCSTI will develop, within or outside its organizational framework, additional components to the national information network, of the

kind that provide direct services to institutions or organizations if the establishment of these services as independent units within an individual institution is unjustified from an economic or managerial viewpoint. In addition, NCSTI will act as an executive body, directing, formally or informally, systems and subsystems of information of an interdisciplinary nature, or those whose high cost or the professional skill required for their activation precludes their inclusion in any other component of the national work.

5. NCSTI will encourage, develop, activate and co-ordinate the use of scientific and technological information. This activity will include the "education" of users and continuous training of information workers, etc.

6. NCSTI will have final authority in the field of standards and procedures relating to information activity in Israel.

7. NCSTI will establish a center for directing users of information to the most suitable sources of technological and scientific information. NCSTI will make every effort to ensure that the necessary sources of information needed in the country will be available.

8. NCSTI will execute, directly or through the funding of other bodies, applied research in the field of information. (Examples of subjects for such research: the adjustment of information stores imported from abroad to local conditions; surveys of available information resources; users requirements in government, academic institutions, industry, etc.)

9. NCSTI will represent Israel in international organizations dealing with information in which national representation is a requirement. NCSTI will ensure active Israeli participation in international activities.

10. Further integration of libraries belonging to institutions of higher learning into the national network should be encouraged in order to enable researchers outside of these institutions to make use of their collections and to provide easy access to the large store of information available.

11. Expenditures in the National Information system, including NCSTI, should stand in reasonable proportion to the rest of the experditures for Research and Development in Israel. It is recommended that the extent of expenditures on information in Israel should reach about five to six percent of the total expenditure for R&D, instead of

today's level of 1.4 percent. A gradual increase of the part of the budget directed to information activities has therefore been recommended.

12. The number of professionals in information work should be proportionate to the number of professionals employed in R&D. Today the ratio in Israel is 1:100 or even smaller, whereas a ratio of 1:18 should be the goal to be achieved within the next few years.

13. The organizational and legal status of NCSTI should be equal to that of other government research institutes. The question of whether NCSTI should be associated with the Prime Minister's Office or with some other Ministry will be dealt with separately.

14. NCSTI should be directed in its activities by a board of directors chosen to represent major R&D activities and information users. These should include representatives of the governmental R&D Authority, the Chief Scientist's Offices of Ministries, the institutions of higher education, and industry.

3. DEFINITIONS

A number of terms which appear frequently throughout the report are defined below:

Information: Knowledge and expertise regarding a specific topic, circumstance or datum, on the condition that it is available in a form transferrable between men, machines, or in a man-machine interface.

Information may be in the form of a book, a document, a patent specification, a tape, a photograph, a drawing, etc. It may also be a sequence of unprocessed data (e.g., the contents of a file of correspondence on a specific subject), an analysis of a particular subject (e.g., "a state of the art" report), a collection of data (e.g., a statistical publication) or a single datum (e.g., the melting point of an alloy).

Technical and Scientific Information: That part of the wider term "information" which relates to the fields of technology, the natural sciences, medicine, agriculture, statistics, and economics.

Information Systems: The integration of the various operating parts which together make the handling of information either in a specific or a general field possible.

Information Center: An organization whose function is to supply information which is derived from publications or from any other source, on a specific subject. Information supplied should be complete, relevant, provided at the time needed, and adapted to the needs of the information users. The information center occupies itself with the collection storage, retrieval and analysis of information in all forms: conventional forms, computerized forms, microforms, etc. The information center regulates, controls and directs the flow of information to the place where it is required.

Special Library: Primarily a collection of information and data relating to a specific field of interest, and serving the needs of those whose area of interest is included in the field to which the library's collection is principally devoted.

4. INFORMATION SERVICES AS PART OF RESEARCH AND DEVELOPMENT

The role of communication and resulting information in the due process of Research and Development is not always universally recognized. Whereas the allocation of means for laboratory equipment, buildings, technical assistance, etc. is considered to be beyond discussion and can easily be qualified, no yardsticks exist, as yet, for the investment needed in concommitant information services required. This part of the report endeavors to draw on the experience gained abroad and points to some conclusions to be drawn in Israel.

Expenditures for R&D throughout the world stood, in 1968, at about $50 billion per year. Some 2-2 1/2 million units of information were published in the form of articles, books, technical reports, patents and the like as result of this investment. In the same year in Israel, some 350 million Israeli pounds were spent on R&D and some 5,000 units of information were published by Israeli scientists. Much has been written about the exponential growth of scientific publications and its doubling (in quantity) every 10-15 years. Scientific and Technological information is published in a large number of languages, not all of them easily accessible to the user without need for translation.

A scientist or development engineer most often requires information published within the last five to seven years. The total potential reservoir from which useful information might be extracted thus includes approximately 12-14 million items. Clearly, most of the information is irrelevant to current needs, so that the development of special systems for the dissemination of specific information has become ne-

cessary in order to deal with the enormous quantities which "flood" the scientist and engineer. These systems utilize advanced methods for information storage and retrieval, as well as routines for current awareness services. More and more use is made of electronic computers, data transmission systems, man-storage devices, advanced reprography and the like, and highly specialized experts in information who have additional training in science and technology are needed in order to operate these systems at an optimum level.

The number of information experts necessary is relatively large. In some science-based industries the ratio of information workers to those active in R&D lies between 1:7 and 1:10. In some countries a ratio as low as 1:30 has been reported on. In Israel, in contrast, more than 100 scientists or R&D engineers are served by one information specialist.

5. EXISTING INFORMATION SYSTEMS IN ISRAEL

Information services existing in Israel can be divided into the following basic categories:

A. National Information Centers: This group includes the Center of Scientific and Technological Information (COSTI) of the National Council for Research and Development in the Prime Minister's Office; the Center for Documentation and Market Research of the Ministry of Commerce and Industry; the Center for Documentation of the Atomic Energy Commission; and the Center for Documentation and Information in the Office of the Chief Scientist, Ministry of Defense.

B. Specialized Information Centers: A number of centers collect specialized information for different areas of science and technology, but most of them are large special libraries providing additional services. These centers do not yet hold complete collections of information in their fields of specialization, and they are not organized to supply information on a nationwide scale.

C. Industrial Information Centers: Out of the more than 15,000 industrial enterprises (mostly small-- or medium-sized industries), only 35 have libraries of their own and even these few lack, in most cases, a reasonable-sized collection as well as professional management.

D. Special Libraries in Science and Technology: More than 280 libraries which can be classified in this category have been reported. Their total holdings are not known. The total number of books in all

libraries in the country, covering all areas, is 3.5 to 4 million, which includes textbooks, holdings in the social sciences, humanities, etc. (For comparison it is to be noted that the total number of books approximately equals the number contained in a large university library in the United States). Special libraries subscribe to a total of approximately 15,000 serial titles of which about 2/3 relate to science and technology. (Again for comparison it is noted that the total number of serial titles published in the world is estimated to be about 100,000 of which science and technology account for approximately 30,000 titles.) At present there are almost no mechanized or interdisciplinary information services, nor ordered collections of patents available in the country.

6. EXPENDITURES ON INFORMATION IN ISRAEL

Expenditures on information services which could be identified have been estimated to amount to about 5 million Israeli pounds per year (3.5 Israeli pounds = 1 US dollar), less than 1.4 percent of the total budget of R&D which approximates 350 million pounds per year (all figures relate to the financial year 1968/69). These information expenditures contain expenditures of libraries in institutions of higher learning, which are generally not reckoned for this purpose. Expenditure in Israel does not therefore even reach the level of 2% of R&D, which was considered to be a minimum by the experts discussing UNISIST.

The team spent some efforts on the question of expenditure for information relative to the general expenditure for R&D, because it was felt that no criteria exist, as yet, by which the cost effectiveness of information can be measured.

It is realized that total costs of information have never been accurately assessed, be it only because so many different interpretations as to the meaning of information exist. Should expenditures for conferences be included, should the time spent for browsing be accounted for, and similar questions crop up whenever an attempt is made to sum up the cost of information transfer. The team still reasons that in the absence of other criteria the costs for information in relation to total R&D costs allow some indication of the role this expense should take in science policy making.

Expenditures on information in Israel are compared with figures available from other countries. In OECD member countries, for example, the average information expenditure is reported to be 4-5% of the total expenditure in R&D. This average includes expenditures on information in the

entire economy. Relative expenditures are lower in industries with a slow innovation rate and higher in branches in which innovation is rapid, such as electronics, instrumentation, aerospace, etc.

The rate of information input also varies with the emphasis on type of research, i.e. it is highest for basic research, lower per dollar spent on applied research, and lower still on development costs. The averages quoted result therefore from a very wide range of variables.

One conclusion regarding Israel might still be drawn. Local research is mostly of the type described as basic, and local industry belongs largely to branches having a high innovation rate. If information input in industrialized countries with a well-balanced economy and research establishment averages at about 5%, then the Israeli average should be at least as high or even higher. Today the figure is 1.4%, a figure so low that it certainly raises the question of whether the full information available regarding each and every project is utilized in R&D.

A Canadian study postulated that it should be possible to improve the performance of R&D dollars by about 10-15%, if good information services are provided. Translated into Israeli conditions, an investment of about 10 million pounds in information would mean an increase of 40 million pounds in the value of R&D and thus certainly constitute a sufficient goal to justify additional investments in improved information services.

7. WHY SHOULD THE GOVERNMENT BE INTERESTED IN INFORMATION SERVICES?

The large investment required for the establishment of modern information systems and the demonstrated inability of such systems to exist at a national level on a self-supporting and self-financing basis makes government subsidies unavoidable. It is also to be considered that the government is generally the main financial supporter of the national R&D effort and therefore has an interest in making this effort as efficient as possible. But whereas government support for R&D in general is usually taken for granted, similar support for information services is not always - and certainly not in Israel - self-evident.

Two basic assumptions were adopted in the report:

i) Information services increase the value of the R&D dollar and are therefore beneficial to the sponsor of research.

ii) There is no activity in which the government has an interest - scientific, technological, economical, social or otherwise - which can be conducted in a vacuum, i.e. without application of previously accumulated knowledge.

The report cites case studies, extracted from the files of the Center of Scientific and Technological Information (COSTI), which demonstrate clearly benefits or failures, due to availability or lack of relevant and timely information, and an attempt was made to attach a monetary evaluation to each one.

The conclusion from the foregoing is obvious. The Israeli government invests large sums of money in health services, transportation, education, industrialization, agriculture, etc. The information base which serves the decision makers is far from optimal and its improvement would probably add much to the effective use of these investments.

Studies made in the U.S.A. and England show that a significant portion of R&D duplicates work already done elsewhere. Most estimates for unnessary duplication run to about 15% of invested means and could have been prevented if the available information had been more diligently used. With respect to Israel, this means that the prevention of duplication by even a single percentage point would add at least 3.5 million pounds per year (one million dollars) to the R&D budget.

In industrialized countries, it is a recorded fact that on the average the annual technological innovation rate approximates about 10% of the industrial product value.

The value of Israeli industrial output in 1969 amounted to about 10 billion pounds (approximately 3 billion dollars). At an innovation rate of 10%, products at a value of one billion pounds undergo a significant economic change each year and most of these changes will be decided on by international technological developments. Any intelligent evaluation and appreciation of technological innovation, prospective as well as retrospective, demands sound information.

Furthermore, the industrialization of Israel is proceeding at a very rapid pace. In 1969 more than 200 million dollars were invested in industry, much of it out of public funds and most of it related to the manufacture of products new to the economy. Here again relevant, timely and comprehensive information might add greater value to the investment dollar. This is especially true if it is considered that many new products are related to defense, thus requiring an increasing degree of sophistication and adaptibility to foreign technology.

The team recommended in its report the establishment of a national information network in Israel having extensive government support, financial as well as organizational, in order to assist the government effort in R&D and the economy in general.

Though such a project will require larger investments in information services than in the past, the team believes that the additional expense will pay for itself within a short time.

In conclusion, the team strongly urges the government to accept responsibility for the formulation of a national policy for scientific and technological information and the implementation of the changes resulting from such a decision.

8. INFORMATION SERVICES IN FOREIGN COUNTRIES

Information services existing in a number of industrial countries, large and small, were studied by the team. Special attention was paid to the experience which has been accumulated in the United States, the USSR, Japan, West Germany, the United Kingdom, France, Canada, Sweden, Holland, Poland and Denmark. (Specific experience which in the opinion of the team is applicable to Israel is discussed in detail in the report.).

Probably the most important conclusions reached concern the finding that no country, even the largest and richest, is able to operate information services without having constant and close contacts with similar services existing elsewhere. Larger information networks of an international character (formal or informal) are created as a result, and small countries like Israel have to participate in these in order to have access to world knowledge.

9. TOWARD A NATIONAL NETWORK IN ISRAEL

The major recommendation of the report - a recommendation which the team considers to be a pre-condition for any improvement in the present state - is the creation, by the government, of an effective national network for scientific information which will encourage, organize and direct the use of information in all sectors of the economy, public and private. After studying the various organizational forms of networks the team recommends that Israel should create a "network of networks" which is led by a national focus designated to be a national institution.

The basic organization of the national network is the following:

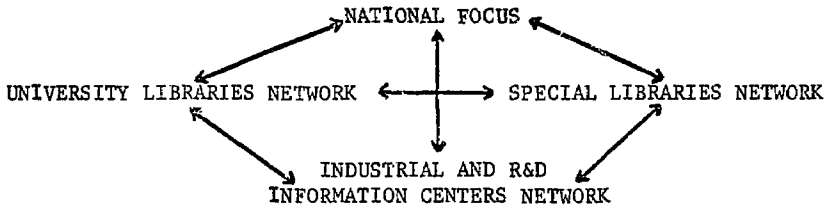

Fig. 1 - Components of the National Network for Information.

An organization such as the one proposed here enables each of its components to interact freely with its users and to respond without hindrance to their requirements. It enables each unit in a component to be mission- or subject-oriented, to be as specialized or as general as required and to participate in the national scheme with a minimum of interference. Co-ordination between the various components will be excercised through or by the national focus.

The main guidelines for the operation of the national network are set out as follows:

1) To operate information services which are geared to the needs of users and capable of providing a full and comprehensive service with a high degree of efficiency.

2) To ensure compatibility and co-ordination of services by the creation of standards and operating procedures within the network as well as in its participation in the international network.

3) To facilitate maximum adaptability of the network to changes occurring in the Israeli economy and society, as well as to changes made necessary by interaction with the international network.

4) To adopt and execute programs for the education of information workers at all levels.

5) To ensure availability of government, public and private support in order to permit the network to operate at an optimum level.

6) To "educate" users, actual as well as potential, in the application of information media to their requirements.

The national focus of the National Center for Scientific & Technological

Information (NCSTI) is recommended to have the following functions:

1) The major function of NCSTI is to serve as a national clearinghouse for scientific and technological information. Its report is drawn from the libraries and information centers in the country and from corresponding institutions abroad. Its output includes publications, guides to sources of information, services for the selective dissemination of information, tables of data, counseling and training services, etc.

2) Information users will thus continue to receive services from centers and libraries which are closest to their interests, organizationally or from a disciplinary point of view. NCSTI will support these centers with services to which only a national institution has access or services which transcend in scope and expense the individual specialized facility.

3) As part of its clearinghouse activity, NCSTI will maintain guides to sources of information available in the country and abroad, ensure adherence to standards and procedures and fill in the gaps existing in the national network.

4) In view of the latter, the transfer of information to industry, the operation and/or co-ordination of large scale interdisciplinary services, and the operation of large scale mechanized systems will generally be within the executive responsibility of NCSTI.

5) NCSTI will encourage and if necessary finance, research in information science, follow closely informational developments in the field, further the training of professionals and act in an advisory capacity to government and public bodies in all matters pertaining to information services.

10. THE PLACE OF NCSTI IN THE GOVERNMENT HIERARCHY

The existing Center of Scientific and Technological Information (COSTI) is the only government-operated organization in Israel today which supplies interdisciplinary information services on a national scale. Since it has some experience, though in a limited way, in most of the areas in which NCSTI should be involved, and since it has personnel already experienced in the field of information, the team recommends that COSTI be designated as the national focus.

The team examined the place which national foci take in the government hierarchies in a number of countries. It seems to be a consensus that

the national focus should be able to operate without the restrictions imposed by a specific ministerial portfolio and in nearly all countries it reports directly to the highest authority vested with the national responsibility for R&D.

In Israel no such single authority exists and each government ministry is responsible for R&D in the specific area of interest. The team suspects that if - for reasons of administrative convenience - NCSTI should be subordinated to any of these ministries, its activities as a national and interdisciplinary body might be hampered. The present affiliation of COSTI to the National Council for Research and Development in the Prime Minister's Office might, of course, be retained for NCSTI, although in the wake of the present reorganization the NCRD will retain only its planning function and divest itself of all executive responsibilities. In the report this problem is discussed extensively but without making any specific recommendation towards its solution. The team feels that the character of NCSTI as a truly national institution has to be maintained, but has been unable to recommend a proper administrative frame for this purpose.

11. THE ORGANIZATION OF NCSTI

The team recommends that a Board of Directors be appointed to direct the activities of NCSTI. On this Board, government, public and private organizations should be represented reflecting the interest of both information users and suppliers.

The basic organization of NCSTI is to be composed of the following bodies:

1) Board of Directors
2) Managing Director and Administration
3) Directorate of National Network:
   a. Mechanized Services and Operations
   b. Information Services for Industry
   c. Documentation Services
   d. Liaison Services with other mission- or subject-oriented centers
4) Directorate of Information Systems development:
   a. Training and Education
   b. R&D Systems
   c. Liaison Services with the international network

The report describes each of these functions in greater detail.

12. THE MEANS NECESSARY TO ACTIVATE NCSTI

Since the development of information services is of national interest, the team recommended that all basic expenditures of NCSTI such as buildings, personnel, library material, equipment, etc. be covered by the State Budget. The government will also aid in financing R&D of information systems, development of local and foreign network expansion, the training of professional personnel and other activities which aid the improvement of information services on a national level. On the other hand, the team recommended that every activity undertaken on behalf and by request of any particular user be paid for by that user. The team recommends that a reasonable price list be drawn up specifying all the services of the national network and that this list be made binding on all components of the network.

Such a dual financing scheme places a heavy administrative burden on NCSTI, but ensures that its services will not be frivolously used and is based on the assumption that a client for any service is more inclined to apply something he has paid for than if he receives it for free. The budget requested for the first year amounts to about 2.5 million pounds (approximately 650,000 dollars) and income is estimated at about 600,000 pounds. (The breakdown of the budget can be found in the report). This initial budget recommendation is to be reviewed and upgraded yearly until the total expenditure for information services reaches the level considered optimal by the team (about 5% of R&D expenditure).

APPENDICES

The report includes appendices which cover the following subjects:

APPENDIX A: INFORMATION SERVICES IN ISRAEL

Five surveys are included in this appendix covering the following topics:

1) Industrial and institutional information centers
2) The University library network
3) Special libraries in government offices

4) Medical information services

5) The Center of Scientific and Technological Information

The purpose of these surveys has been a review of the activities of some of the major bodies involved in information science in Israel.

The following generalizations can be made in this synopsis: Information services in a modern sense are almost unknown to Israeli managers and industrialists. R&D engineers tend to seek information abroad, but are not able to follow this up with local services. COSTI has provided some of the missing links, especially with SDI services and clearinghouse facilities, but has been restricted by financial limitations in its activities.

Some research institutes in Israel spend on information services about one fourth of the amount reported to be spent by similar institutes in the United States. The team feels that an additional investigation is warranted in order to explain this discrepancy.

The survey of libraries in government ministries shows that these libraries, supposed to provide the information on whose basis officials make decisions, are not for the most part capable of fulfilling their task properly. Their collections are incomplete and not current, they lack professional manpower and are generally heavily underbudgeted and understaffed. The survey on information services in the field of medicine reflects also the current state of information services in other interdisciplinary areas. The service is, in the opinion of a large number of users interviewed, lacking in nearly every respect (with a few exceptions such as the Medical School libraries) and many users, particularly those engaged in medical research, feel that their effectiveness is therefore severely restricted. (This survey is available from COSTI. in full in English).

APPENDIX B: INFORMATION POLICIES IN FOREIGN COUNTRIES

This appendix provides a summary of the major conclusions and recommendations proposed by national committees which investigated the formulation of information science policy in their respective countries.

APPENDIX C: EXISTING INFORMATION SYSTEMS IN SOME COUNTRIES

In this appendix a number of information systems in selected countries are described. Their relation to the government, and the major policy lines along which they function, are discussed.

LIST OF REFERENCES רשימת מקורות

1. COMMITTEE ON SCIENTIFIC AND TECHNICAL INFORMATION COORDINATES INTER-AGENCY INFORMATION SYSTEMS, R.E. Barry
Navy Management Review, v. 12, no. 4, April 1962, pp.3-14.

2. LITTLE SCIENCE BIG SCIENCE,
D.J. de Solla Price
New York. Columbia University Press.1963. 118p.

3. SCIENCE, GOVERNMENT AND INFORMATION. THE RESPONSIBILITIES OF THE TECHNICAL COMMUNITY AND THE GOVERNMENT IN THE TRANSFER OF INFORMATION. A REPORT OF THE PRESIDENT'S ADVISORY COMMITTEE.
Washington, D.C., U.S. Government Printing Office. Jan. 10, 1963. 52p.

4. NATIONAL INFORMATION CENTER. HEARINGS BEFORE THE AD-HOC SUBCOMMITTEE ON A NATIONAL RESEARCH DATA PROCESSING AND INFORMATION RETRIEVAL CENTER OF THE COMMITTEE ON EDUCATION AND LABOR, HOUSE OF REPRESENTATIVES, 88TH CONGRESS, 1ST SESSION ON H.R. 1946; A BILL TO AMEND TITLE IX OF THE NATIONAL DEFENCE EDUCATION ACT OF 1958 TO PROVIDE FOR A SCIENCE INFORMATION DATA PROCESSING CENTER TO BE LOCATED AT ONE PLACE IN CHICAGO, Ill.
Appendix to vol. 1, Pts. 1, 2 and 3.
Washington, D.C., U.S. Government Printing Office. 1963. 508p.

5. UNION LIST OF SERIALS IN ISRAEL LIBRARIES: NATURAL SCIENCES AND TECHNOLOGY (EXCLUDING CLINICAL MEDICINE) Prepared by Jewish National and University Library, Jerusalem. 2nd ed. (as of 1.1.1963)
Jerusalem, Weizmann Science Presa. 1964. 552p.
- - Supplement. 1st (as of 1.1.1966)
Tel Aviv, CSTI. 1967. 386p.

6. TOWARDS A NATIONAL INFORMATION SYSTEM. PROGRESS OF THE U.S. GOVERNMENT IN SCIENTIFIC AND TECHNICAL COMMUNICATION
Waahington D.C., COSATI. 1965. 42p.

7. A STUDY OF INFORMATION PROBLEMS IN THE ELECTROTECHNICAL SECTOR, E. Jantsch
Paria, Organization for Economic Cooperation and Development. March 22, 1965. DAS/RS/64.250

8. RIJKSNIJVERHEIDSDIENST; OVERZICHT DER WERKZAAMHEDEN. WAARIN OPGENOMEN GEGEVENS OVER DE JAREN 1960-1964
's-Gravenhage, Verzorgd door de Rijksvoorlichtingsdienst. Autumn 1965. 32p.

9. ORGANIZATION OF SCIENTIFIC AND TECHNICAL INFORMATION IN THE COMMUNIST WORLD. (Translation of pp. 494-544 of "Foundations of Scientific Information" by A.I. Mikhaylov, A.I. Cherny and R.S. Gilyarevskiy. Moskva, Izd-vo "Nauka", 1965. 656p.)
Washington, D.C., Library of Congress, Aerospace Technology Division. Jan. 24, 1966. vii, 88p.
Surveys of Communist World Scientific and Technical Literature, ATD Report 66-11.

10. ENTWICKLUNG UND PROBLEME DER WISSENSCHAFTLICHEN INFORMATION IN DER VOLKSREPUBLIK BULGARIEN, E. Savova
Sofia. Bulgarische Akademie der Wissenschaften, Zentralbibliotek, Zentralstelle fur Wissenschaftliche Information und Dokumentation. 1967. 34p.

11. PROGRESS OF THE UNITED STATES GOVERNMENT IN SCIENTIFIC AND TECHNICAL COMMUNICATIONS
Washington, D.C., Committee on Scientific and Technical Information of the Federal Council for Science and Technology. 1967. vi, 91p. PB-180 867

12. MUTUAL EXCHANGE IN THE SCIENTIFIC LIBRARY AND TECHNICAL INFORMATION CENTER FIELDS. A REPORT FROM THE SPECIAL LIBRARIES ASSOCIATION DELEGATION TO THE SOVIET UNION, 1966. J.P. Binnington, ed.
New York, Special Libraries Association. 1967. 87p.

13. CAS TODAY. FACTS AND FIGURES ABOUT CHEMICAL ABSTRACTS SERVICE. 60th Anniversary Edition.
Columbus, Ohio, Chemical Abstracts Service, American Chemical Society. 1967.

14. NATIONAL PATTERNS OF R&D RESOURCES. FUNDS AND MANPOWER IN THE UNITED STATES 1953-68
Washington, D.C., National Science Foundation. April 1967. 26p. NSF 67-7.

15. A STATE INFORMATION SYSTEM, L. Zaderman and O. Kolokolova
Bibliotekar, no. 5, May 1967, pp. 4-7.

16. MOVE THE INFORMATION ... A KIND OF MISSIONARY SPIRIT, R.W. Swanson
Arlington, Va., U.S. Air Force, Office of Aerospace Research. June, 1967. 192p. AFOSR67-1247

17. OECD SCIENTIFIC AND TECHNICAL INFORMATION POLICY GROUP: SUMMARY REPORT ON MEETING, JUNE 26-28, 1967
Paris, Organization for Economic Co-operation and Development, 1967
DSA/CSI/67.38 (Revised) June 16, 1967.

18. INFORMATION SERVICES IN HOLLAND, DENMARK, NORWAY AND U.K. TRAVEL REPORT, C. Keren
Tel-Aviv, Israel. Center of Scientific and Technological Information. July, 1967. 28p.

19. FEDERAL FUNDS FOR RESEARCH, DEVELOPMENT, AND OTHER SCIENTIFIC ACTIVITIES; FISCAL YEARS 1966, 1967 and 1968, vol. XVI
Washington, D.C., National Science Foundation. Aug. 1967. 248p. NSF 67-19.

20. INFORMATION ACTIVITIES OF SOME MAJOR INTERNATIONAL ORGANIZATIONS
Paris, Organization for Economic Co-operation and Development. Aug. 8, 1967. 95p. DAS/CSI/67.45.

21. THE INFORMATION DELUGE
Johns Hopkins Magazine, vol, 18, no. 4, Fall 1967. 33p.

22. EVALUATION OF THE TECHNICAL INFORMATION FUNCTION, G.J. Brockis and P.F. Cole
Chemistry in Britain, v. 3, no. 10, Oct. 1967, pp.421-423.

23. ANNUAL HISTORICAL SUMMARY;1 JULY 1966 TO 30 JUNE 1967
Alexandria, Va., Defense Documentation Center. Oct. 1, 1967. 42p. AD-662600

24. STANDARDIZATION IN INFORMATION SYSTEMS
Paris, Organization for Economic Co-operation and Development. Oct. 16, 1967. DAS/CSI/I/430.

25. PAPER FOR MEETING WITH ACS REPRESENTATIVES, OECD RECOMMENDATIONS
Paris, Organization for Economic Co-operation and Development. Dec. 1, 1967. 2p.

26. GOALS IN INFORMATION TECHNOLOGY - THE TRANSFER OF SCIENTIFIC AND TECHNICAL INFORMATION
Paris, Organization for Economic Co-operation and Development. Dec. 7, 1967. 9p. DAS/SPR/67.113.

27. SCIENTIFIC AND TECHNICAL INFORMATION POLICY
Paris, Organization for Economic Co-operation and Development. 1969. RC(68)3, pp.21-24.

28. SURVEY OF THE PRESENT SITUATION OF DOCUMENTATION IN THE DEVELOPING COUNTRIES. Prepared for FID/DC Committee for Developing Countries
Budapest, International Federation for Documentation. 1968. FID Doc.6/1968/FID/DC.

29. REVIEWS OF NATIONAL SCIENCE POLICY - UNITED STATES
Paris, Organization for Economic Co-operation and Development. 1968. 546p.

30. DUTCH DOCUMENTATION PRACTICE, Dr. C. van Dijk
The Hague, 1968. 6p.

31. SCIENTIFIC AND TECHNICAL INFORMATION SYSTEMS AND POLICIES, INFORMATION ACTIVITIES OF SOME MAJOR INTERNATIONAL ORGANIZATIONS. THIRD MINISTERIAL MEETING ON SCIENCE OF THE OECD COUNTRIES
Paris. Organisation for Economic Co-operation and Development. Feb. 29, 1968. CMS(68)21.

32. GAPS IN TECHNOLOGY BETWEEN MEMBER COUNTRIES; ISSUES AND RECOMMENDATIONS. THIRD MINISTERIAL MEETING ON SCIENCE OF OECD COUNTRIES - AGENDA ITEM V
Paris, Organization for Economic Co-operation and Development. March 11 and 12, 1968. 10p. CMS(68)3.

33. PROMOTION AND ORGANISATION OF FUNDAMENTAL RESEARCH; ISSUES AND RECOMMENDATIONS. THIRD MINISTERIAL MEETING ON SCIENCE OF OECD COUNTRIES - AGENDA ITEM VI.
Paris, Organisation for Economic Co-operation and Development. March 11 and 12, 1968. 7p. CMS(68)16.

34. SCIENTIFIC AND TECHNICAL INFORMATION SYSTEMS AND POLICIES. THIRD MINISTERIAL MEETING ON SCIENCE OF OECD COUNTRIES - AGENDA ITEM VII
Paris, Organisation for Economic Co-operation and Development. March 11 and 12, 1968. 17p. CMS(68)18.

35. AFTER THE MINISTERS'MEETING: A DEVELOPING PROGRAMME FOR OECD IN INFORMATION POLICY
Paris, Organisation for Economic Co-operation and Development. March 14, 1968. 5p. DAS/CSI/I/161.

36. PLAN FOR STUDY AND IMPLEMENTATION OF NATIONAL DATA SYSTEM CONCEPTS. IN: STUDY OF SCIENTIFIC AND TECHNICAL DATA ACTIVITIES IN THE UNITED STATES VOL. I. Prepared for Task Group on National Systems, Committee on Scientific and Technical Information, Federal Council for Science and Technology.
Washington, D.C., Science Communications Inc. April 30, 1968. AD-670606

37. THE PROSPECTS FOR TECHNOLOGY TRANSFER. REPORT OF THE SUBCOMMITTEE ON SCIENCE AND TECHNOLOGY TO THE SELECT COMMITTEE ON SMALL BUSINESS, UNITED STATES SENATE, 90th CONGRESS, 2nd. SESSION.
Washington, D.C. U.S. Government Printing Office. May 1, 1968. 19p.

38. THE EVOLVING U.S. NATIONAL SCIENTIFIC AND TECHNICAL INFORMATION SYSTEM, G.S. Simpson, Jr.
Battelle Technical Review, v. 17, no. 5-6, May-June 1968, pp.21-28.

39. ASLIB RESEARCH PROGRAMME, 1969-71.
Aslib Proceedings, v. 20, no. 7, July 1968, pp.300-305.

40. COMPARATIVE INDEX TO PERIODICAL PRICES, W.I. Veasey
Library Association Record, vol. 70, no. 8, Aug. 1968, pp.202-204.

41. SCIENTIFIC AND TECHNICAL DOCUMENTATION AND INFORMATION IN BULGARIA, D.H. Kraus
Atlanta, Ga., Georgia Institute of Technology. Sep. 1968. 72p. PB-179981.

42. SCIENTIFIC, TECHNICAL AND ECONOMIC DOCUMENTATION AND INFORMATION IN CZECHOSLOVAKIA, D.H. Kraus
Atlanta, Ga., Georgia Institute of Technology. Sep. 1968. 298p. PB-179982.

43. SCIENTIFIC AND TECHNICAL DOCUMENTATION AND INFORMATION IN POLAND, P. Zunde
Atlanta Ga., Georgia Institute of Technology. Sep. 1968. 545p. PB-179984.

44. SCIENTIFIC AND TECHNICAL DOCUMENTATIOI AND INFOEMATION IN ROMANIA, D.H. Kraus
Atlanta, Ga., Georgia Institute of Technology. Sep. 1968. 90p. PB-179985

45. ANALYSIS OF THE MAIN SCIENTIFIC AND TECHNICAL INFORMATION SOURCES FOR INDUSTRY, W. Pirog
Symposium on Communication of Scienti and Technical Information to Industry Moscow, Sep. 1968. Paper C.1(9)
The Hague, International Federation f Documentation, Study Committee FID/11 Sep. 1968. 17p.

46. THE FINANCING OF LIBRARY AND DOCUMENTATION SERVICES, C.V. Penna
UNESCO Bulletin for Libraries, vol. 2 no. 5, Sep.-Oct. 1968. pp.229-235.

47. REPORT OF THE NATIONAL ADVISORY COMMISSION ON LIBRARIES
Congressional Record - Proceedings an Debates of the 90th Congress, second session, Oct. 1968. 27p.

48. RECENT DEVELOPMENTS IN NATIONAL INFORMATION POLICY
Paris, Organisation for Economic Co-operation and Development, Scientific and Technical Information Policy Grou Oct. 22, 1968. 15p. DAS/CSI/68.86.

49. WORKING PROGRAMME FOR THE RESEARCH INFORMATION CENTER OF THE AGRICULTURA COLLEGE OF SWEDEN FOR THE FISCAL YEAR 1967/68
Uppsala, Agricultural College of Swed Oct. 25, 1968.

50. REVISION OF THE ORGANIGRAMMES OF NATIONAL INFORMATION SYSTEMS
Paris, Organisation for Economic Co-operation and Development, Scientific and Technical Information Policy Grou Nov. 22, 1968. 5p. DAS/CSI/I/595.

51. REPORT OF THE COMMITTEE TO INQUIRE INTO THE ORGANISATION AND ADMINISTRATION OF GOVERNMENTAL RESEARCH
Jerusalem, Israel, Prime Minister's Office. Dec. 1968. 120p.

52. THE CORPORATE LIBRARY/INFORMATION CENTER, C.P. Bourne, J.B. North and J.W. Nelson
European Long Range Planning Service. Report No. E-21.
Stanford, California, Stanford Resear Institute. Dec. 1968. 20p.

53. DECREE AUTHORISING THE ESTABLISHMENT OF A NATIONAL COMMITTEE FOR SCIENTIFIC AND TECHNICAL DOCUMENTATION. (In French)
Paris, Secretariat General du Gouvernement. Dec. 9, 1968. 3p.

54. NATIONAL SCIENCE FOUNDATION. EIGHTEENTH ANNUAL REPORT FOR THE FISCAL YEAR ENDED JUNE 30, 1968
Washington, D.C., National Science Foundation. Dec. 30, 1968. 279p.
NSF 69-1.

55. SCIENTIFIC AND TECHNICAL COMMUNICATION; A PRESSING NATIONAL PROBLEM AND RECOMMENDATIONS FOR ITS SOLUTION. REPORT OF THE COMMITTEE ON SCIENTIFIC AND TECHNICAL COMMUNICATION OF THE NATIONAL ACADEMY OF SCIENCES-NATIONAL ACADEMY OF ENGINEERING
Washington, D.C., National Academy of Sciences. 1969. xiii, 322p.

56. INFORMATION SERVICES FROM CHEMICAL ABSTRACTS SERVICES 1969
Columbus, Ohio American Chemical Society, Chemical Abstracts Service. 1969. 32p.

57. HARNESSING THE WORLD-WIDE INFORMATION EXPLOSION, TO SERVE ALL ENGINEERS. ENGINEERING INDEX INFORMATION SERVICES 1969
New York, Engineering Index Inc. 1969.

58. DER INGENIEUR UND DAS SCHRIFTUM, J. Tehuzen
Industrie Anzeiger, v. 91, no. 48, 1969.

59. DIRECTORY OF CURRENT RESEARCH IN ISRAEL. 2nd ed.
Tel-Aviv, Center of Scientific and Technological Information. 1969. 690p.

60. SCIENTIFIC RESEARCH IN ISRAEL
Tel-Aviv, Center of Scientific and Technological Information. 1969. 251p.

61. DIRECTORY OF SPECIAL LIBRARIES IN ISRAEL 3rd ed.
Tel-Aviv, Center of Scientific and Technological Information. 1969. 158p.

62. SURVEY OF ELECTRONIC COMPUTERS 1969. IN: SUPPLEMENTS TO THE STATISTICAL BULLETIN OF ISRAEL, NO. 6, 1969
Jerusalem, Central Bureau of Statistics. 1969.

63. SCIENTIFIC AND TECHNICAL INFORMATION IN CANADA. Prepared for the Science Council of Canada
Ottawa, The Queen's Printer for Canada. 1969. 62p.
Special Study no. 8.

64. SCIENTIFIC AND TECHNICAL INFORMATION IN CANADA PART II. CHAPTER 2, INDUSTRY. Prepared for the Science Council of Canada.
Ottawa, The Queen's Printer for Canada. 1969. 80p.
Special Study no. 8.

65. FUNCTIONS ON THE OFFICE FOR SCIENTIFIC AND TECHNICAL INFORMATION; ESTABLISHMENT OF A "DOCUMENTATION AND INFORMATION COMMISSION" BY THE INTER-MINISTERIAL COMMITTEE FOR SCIENCE AND RESEARCH; FUNCTIONS OF THE "NATIONAL FOCUS" FOR INFORMATION ACTIVITIES
Annexes I, II and III
Paris, Organisation for Economic Cooperation and Development. 1969. 3p.
DAS/STINFO/69.10.

66. SCANDINAVIAN DEVELOPMENTS IN DOCUMENTATION AND INFORMATION SERVICES, B.V. Tell
Library Trends, v. 17, no. 3, Jan. 1969, pp.289-298.

67. INVENTORY OF SOME ENGLISH LANGUAGE SECONDARY INFORMATION SERVICES IN SCIENCE AND TECHNOLOGY
Paris, Organisation for Economic Cooperation and Development, Directorate for Scientific Affairs, Scientific and Technical Information Policy Group. Feb. 1969. 21p. DAS/STINFO/69.3.

68. RESEARCH AND DEVELOPMENT IN INDUSTRY, 1967. A PRELIMINARY REPORT ON R&D FUNDS AND R&D SCIENTISTS AND ENGINEERS (JANUARY 1968)
Reviews of Data on Science Resources, no. 17, February 1969. 8p. NSF 69-12.

69. SCIENTIFIC ACTIVITIES OF NONPROFIT INSTITUTIONS, 1966
Washington, D.C., National Science Foundation. March 1969. 82p. NSF 69-16.

70. RECENT DEVELOPMENTS IN NATIONAL INFORMATION POLICY
Paris, Organisation for Economic Cooperation and Development. March 17, 1969. 11p. DAS/STINFO/96.5.

71. NATIONAL ACTIVITIES AND RESPONSIBILITIES IN SCIENTIFIC AND TECHNICAL INFORMATION AND DOCUMENTATION
Paris, Organisation for Economic Co-operation and Development. April 9, 1969. 7p. DAS/STINFO/69.22.

72. PRELIMINARY CENSUS OF SCIENTIFIC AND TECHNICAL DATA ACTIVITIES.
in: Study of Scientific and Technical Data Activities in the United States, vol. II (in 2 vols.). Prepared for Task Group on National Systems, Committee on Scientific and Technical Information, Federal Council for Science and Technology.
Washington, D.C., Science Communications Inc. April 30, 1968. AD-670606.

73. NATIONAL SCIENCE RESEARCH DATA PROCESSING AND INFORMATION RETRIEVAL SYSTEM. HEARINGS BEFORE THE GENERAL SUBCOMMITTEE ON EDUCATION OF THE COMMITTEE ON EDUCATION AND LABOR, HOUSE OF REPRESENTATIVES, 91ST CONGRESS, FIRST SESSION ON H.R. 8809. April 29-30, 1969.
Washington, D.C., U.S. Government Printing Office. 1969. 405p.

74. IMPROVED INFORMATION FLOW: TO BE OR NOT TO BE? A.F. Goodman
St. Louis, California. McDonnell Douglas Astronautics Co. May 1, 1969.

75. THE ROLE OF SCIENTIFIC INFORMATION IN THE SCIENCE POLICY OF DEVELOPING COUNTRIES, I. Malecki
UNISIST Working Group on Scientific Information in Developing Countries - Second Session, Paris, 6-7 June 1969.
Paris, UNESCO. May 6, 1969. UNISIST/WG.DC/2.5.

76. A COMPARISON OF INFORMATION SYSTEMS, L.R. and S.M. Greybourne
Paris, Organisation for Economic Co-operation and Development. May 14, 1969. 50p. DAS/STINFO/69.23.

77. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, OECD. THE FUNCTION OF OECD AND ITS ACTIVITIES IN THE FIELD OF INFORMATION AND DOCUMENTATION
Paris, Organisation for Economic Co-operation and Development. May 16, 1969. 11p.

78. WISSENSCHAFTLICHE DOKUMENTATION UND INFORMATION. BUNDESBERICHT FORSCHUNG III - ZUR LAGE IN DER BUNDESREPUBLIK DEUTSCHLAND
Nachrichten fur Dokumentation, v. 20, no. 4, Aug. 1969, pp.148-151.

79. UNISIST (THE PRESENT STATE), A. Wysocki
Symposium on communication of scientific and technical information to industry. Rome, October 1969. Paper B.2(38).
The Hague, International Federation for Documentation, Study Committee FID/11. 1969. 7p.

80. GOVERNMENT RESPONSIBILITIES IN INFORMATION FOR INDUSTRY, P.J. Judge
Symposium on communication of scientific and technical information to industry. Rome, Oct. 1969. Paper C.20(37)
The Hague, International Federation for Documentation, Study Committee FID/11. 1969. 12p.

81. THE INFORMATION ANALYSIS CENTER AND THE CREATION OF RELIABLE DATA, L.J. Kieffer
National Bureau of Standards Technical News Bulletin, v. 53, no. 10, Oct.1969. 3p.

82. WHAT DRIVES INDUSTRY? (IN HEBREW)
"Ha-Aretz" Oct. 12, 1969.

83. DIVISION OF RESEARCH WORK BETWEEN DEFENCE AND INDUSTRIAL ORGANISATION, Z. Sharf (in Hebrew)
"Ha-Aretz" Oct. 19, 1969.

84. ACQUISITION AND CATALOGUING COSTS. COLORADO ACADEMIC LIBRARIES BOOK PROCESSING CENTER PROJECT
Library Research and Technical Services, v. 13, no. 1, Winter 1969, pp.127-141.

85. DANISH TECHNICAL INFORMATION SERVICE. COST ANALYSIS 1968/69
Copenhagen, Dansk Teknisk Oplysningstjeneste. 1969.

86. THE JAPAN INFORMATION CENTER OF SCIENCE AND TECHNOLOGY (JICST): ITS ORGANISATION AND FUNCTION, T. Fukudome
American Documentation, v. 18, no. 3, July 1967, pp.146-152.

87. ORGANISATION, ARBEITSTEILUNG UND COMPUTEREINSATZ BEIM REFERATEORGAN FOOD SCIENCE AND TECHNOLOGY ABSTRACTS (FSTA), U. Schlitzsack
Nachrichten für Dokumentation, v. 20, no. 3, 1969, pp.108-115.