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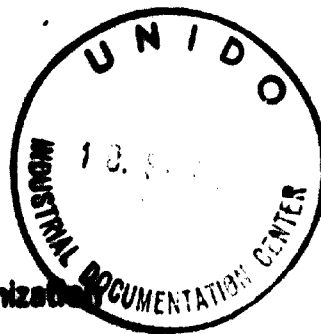
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**301541**



United Nations Industrial Development Organization

Distr.  
LIMITED  
ID/WG.77/8  
26 August 1970

ORIGINAL: ENGLISH

Seminar on Industrial Information  
(for the ECAFE and ECA regions)

Tehran, Iran, 14 - 25 September 1970

**INDUSTRIAL INFORMATION SERVICES IN THE INDUSTRIALIZED COUNTRIES**  
**(OUTSIDE THE COMECON AREA) AND CO-OPERATION BETWEEN SUCH**  
**SERVICES AND THEIR COUNTERPARTS IN DEVELOPING COUNTRIES** 1/

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id.70-4646

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## SUMMARY

A study was made of the characteristics of industrial information systems and organizations in industrialized countries, which may serve as a guideline for the establishment of such services in developing countries.

The information needs of developing countries are discussed as well as the infra-structure needed before establishing an information system.

Possible ways of improvement in the cooperation between industrialized and developing countries in the information field are outlined.

### I. INTRODUCTION AND GENERAL OUTLINE

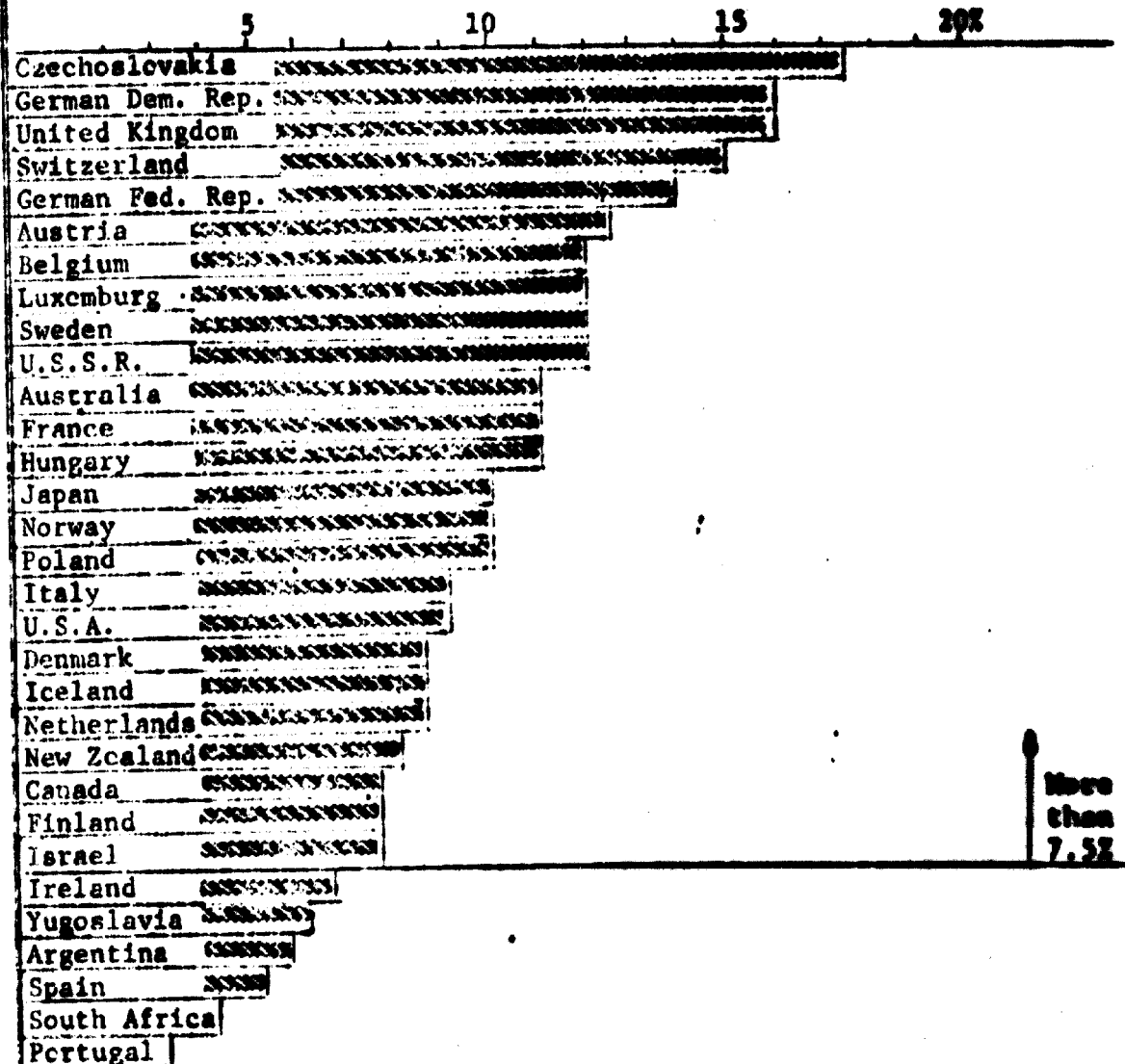
The author of this paper was requested by UNIDO to provide a background paper on industrial information services in industrialized countries (outside the COMECON area) and on possible improvements in cooperation between these services and their counterparts in developing countries. The treatise was to be especially based on the experiences of the International Federation for Documentation (FID).

In studying the organization of information systems or services in developing countries, possible improvements which might be made in such organizations and in looking for ways and means of improving cooperation between industrialized and developing countries in this area, one may benefit from a study of the organization in industrialized countries. A study of this nature takes up the first part of this paper, especially Chapter III.

Developing countries in various stages of industrialization have their own characteristic needs for information, expanded on in Chapters IV and V.

Chapter VI discusses briefly some aspects of possible improvement in cooperation between industrialized and developing countries in the information field.

People Engaged in Manufacturing  
as a Percentage of Total Population.



All countries in Africa, Asia, Central & South America except Argentina, Japan and South Africa have a percentage smaller than 2.5%

**TABLE I**

## II DEFINITIONS

Before treating the subject, a definition of terms seems appropriate. Terms can usually be defined in more than one way and the definition favoured by the author should be made known to the reader, who may be accustomed to a different definition. This serves to delineate the subject properly.

Industrial Information Services are organizations which provide to industry scientific, technological and economic information on the properties and processing of materials and on new techniques, developments and results of scientific research as they apply to industrial production. Information services for industry may deal with primary (mining, metallurgical, basic raw materials) as well as secondary industry (manufactured products). Industrial information encompasses subjects of a scientific and technical as well as socio-economic nature, the latter in the fields of business, management, financing, productivity, labour etc.

Industrialized countries. It is more difficult to define "industrialized". This obviously is a matter of degree since there is a more or less continuous spectrum, from highly industrialized to not industrialized at all. One consequently will have to draw the line somewhere as has been done in the last paragraph of this section.

Expressing the degree of industrialization as the number of people working in manufacturing as a percentage of the total population, figures range from 17.5% down to less than 0.5%.

In table I we have plotted these percentages for many countries in the world based on figures taken from the Statistical Yearbook 1967 published by the United Nations. It is obvious when studying the sequence of countries obtained that the percentage figures do not tell the complete story and that there are other factors involved. Still one may draw from this graph some picture of the approximate degree of industrialization.

It is noted that all countries in Africa, Asia and South and Central America (with the exception of Argentina, Japan and South Africa) fall in the category of countries which are hardly industrialized, (below 2.5%).

In order to limit the number of countries to be examined we have, quite arbitrarily, taken the cut-off point at 7.5%. This means that, for the purpose of this paper, countries in which more than 7.5% of the population works in manufacturing industry are termed "industrialized".

### III ORGANIZATION OF INDUSTRIAL INFORMATION

#### 1. General remarks

In studying the organization of information in many countries, one will find a variety of systems, of types of organization and of services provided.

For convenience sake these differences may be labelled according to certain characteristics, although one will not always find pure forms; very often they will be mixed.

One may distinguish

- a. Centralized and decentralized systems
- b. Organizations in the public and private sector
- c. Libraries, documentation and information services, referral centers, clearinghouses
- d. Active and passive services
- e. Current awareness versus retrospective search.

#### a. Centralized and decentralized systems

The centralized system is based on an information centre which administers and coordinates the work of a number of specialized services. This type of system is usually encountered in the COMECON countries.

In the countries outside the COMECON area one often finds a central or national information service which may be the officially designated centre having established ties without having direct responsibility for a number of specialized services. Most often the organization of this type is an autonomous documentation or information service. Sometimes it is an information service which forms part of a productivity organization, such as exist in Austria, France, the German Federal Republic, Luxemburg and Italy. In a few instances the information services are part of a research organization, for instance in Australia and Canada.

Some of the larger countries have no central information service, on the contrary they work with a decentralized system of specialized services. This, for example, is the case in France, Germany, Sweden, the U.K. and the U.S.A. In a few other countries locating the many specialized services is aided by a referral service, which registers the various sources and refers prospective users to them. Typical examples of this situation may be found in the U.K. and the U.S.A.

#### b. Public and private sector

Organizations may operate in the public sector, such as in the case of governmental services. On the other hand the organizations



may belong to the private sector and be financed by membership fees, proceeds of services, grants, etc. It is rather rare however, with the exception of the situation in the U.S.A., that private information services do not receive part of their income from public funds.

c. Libraries, documentation and information services, etc.

The industrial information service proper is not by any means the only type of organization providing information to the industrial user. Libraries have historically been the collectors of printed knowledge and many of them have established special services for the industrial sector, in particular the libraries connected to universities for the applied sciences, technological institutes, research organizations, etc.

With respect to documentation and information services some people make a definite distinction between documentation services and information services. We do not wish to enter into this controversy here, for the sake of brevity, and will often combine the terms. For our purposes we will consider these services equivalent in that the goal of either organization is service to industry.

A referral centre is an organization which is not engaged in information work, but which registers sources of specialized information for referral to enquirers.

A clearinghouse is a centre which passes on demands for information to specialized sources. In this respect it is more or less equivalent to a referral centre. "The Clearinghouse" in the U.S.A. is not a referral centre but a dissemination service for report literature.

d. Active and passive services

One may distinguish between active and passive information work. The active services deal with unsolicited information which is sent to prospective users, hoping that it may be applied. The passive services deal with information provided upon request. A service may of course be of the mixed type and engaged in the two types of work.

e. Current awareness, and retrospective search

Since the times of the computer one often makes a special distinction, namely between current awareness, and retrospective searching. Although new names, these are fundamentally old concepts which are more or less synonymous with active and passive.

The current awareness type of information is sent out by a service without being solicited. It keeps the user informed about new findings such as books, reports, articles, abstracts, reviews, patents, etc. This may take the form of Fast Announcements, News Briefs or Review Journals.

Retrospective searching on the other hand refers to specific requests for information which may be obtained by searching the existing literature. The characteristics of these two types of information: active-current awareness and passive-retrospective call for somewhat different treatment, under both computerized and non-computerized systems.

#### Assuming a non-computerized system

For an active-current awareness type of service one needs a number of experts in various fields who will scan the literature for important new inventions or developments which will then be announced to prospective users.

In a passive service doing retrospective work one again needs a team of information experts who will treat incoming enquiries by searching the literature for answers to the query. The answers may be given in the form of bibliographies without further comments. When technical experts are available, the information found may be evaluated and presented in report form. An intermediate treatment would be the provision of annotated references.

The number of people needed depends very much on the treatment which one gives to the documents, e.g. whether translation is involved, whether the information has to be abstracted, or whether critical review is carried out.

#### Assuming a computerized system

Treatment of the two types of information takes a somewhat different aspect if a computer is available. At present a computer is more practical and economic for providing current awareness type information than for retrospective searching.

For current awareness work, magnetic tapes containing new developments, suitably coded, are available from various organizations for sale or rental. Often the treatment given amounts to matching the codes with "interest profiles" of prospective users, similarly coded. In this way one selects from the numerous items those of interest to the user. This system is often called SDI, Selective Dissemination of Information.

In retrospective searching the problem is, that although one basically uses the same approach as for the current awareness system, one needs the various items of information in coded form on magnetic tape before one can match with the coded description of the enquiry. These magnetic tapes simply do not exist for the years prior to 1966-68, with a very few exceptions (in the biological and medical fields). Retrospective searching moreover takes more computer time than current awareness

and consequently is expensive.

## 2. Description of information systems in individual countries 1,2,3

We shall now give a description of the systems in use in a number of industrialized countries as defined earlier. This should be qualified in that two areas have been omitted from the description, the defence sector and the field of atomic energy and its applications. Information in the military sector is largely classified and thus not available for free exchange between countries.

The same holds for much of the information in the field of nuclear energy. Where this information is freely available it is being handled by an international information network sponsored by the International Atomic Energy Agency (IAEA). The exchange system is called INIS, International Nuclear Information System.

Another area which has not been treated is the one concerning patents. Patents undoubtedly form a very important source of technical information. However the information services in most countries do not perform actual patent searches, because of the specialized nature and the expense of this type of work.

Since the COMECON countries will be reported on separately, we shall not dwell upon the organization in countries such as Czechoslovakia, German Democratic Republic, Hungary, Poland and the U.S.S.R., countries which all figure high on the list of industrialized nations. We will only mention here that the systems in the COMECON countries in general are based on an intricate network of services specialized according to industrial branches, as well as a network of regional centers, all administered by a central organization which coordinates the overall activities.

### Austria

Austria has a number of specialized services giving information to industry, as well as the library of the Technical University in Vienna. The main organization in Austria serving industry is the Austrian Productivity Center (in German: Oesterreichisches Produktivitätszentrum, O.P.Z.), in Vienna. The centre which is primarily a productivity organization and sponsors training courses, lectures and seminars, offers a "Question and Answer" type technical information service.

### Australia

Australia is in a peculiar position, possibly because of its vast dimensions, which caused the development of an excellent library system spread out over the country. The task of providing industrial information is mainly executed by these libraries as well as by a great

number of public and private research associations.

The CSIRO, Commonwealth Scientific and Industrial Research Organization is emphasizing agricultural research and for that reason, although it has a documentation centre, may be somewhat weak on information for industry.

International Technical Services a non profit organization, was recently formed for providing technical and economic services to industry and other sectors. It is sponsored by Battelle Memorial Institute, Columbus, Ohio, U.S.A.

### Belgium

Until the establishment of the National Centre for Scientific and Technical Documentation, Belgium only had a productivity organization which took care of some forms of technical information.

The Belgian Office for Increase in Productivity (Office belge pour l'Accroissement de la Productivité) in Brussels is mainly engaged in organizing seminars and training courses in the management field, but it will answer technical enquiries.

The National Centre for Scientific and Technical Documentation (Centre national de Documentation scientifique et technique, CNDST) in Brussels established in 1964 is linked with the Royal Library Albert I. It is concerned with documentation questions and information in the natural sciences and technology.

### Canada

Canada, not unlike Australia, is a country of vast dimensions and the information system is geared to serving industries which are far apart. The country has little in the way of specialized services in the private sector. Of the various governmental departments (ministries) a number provide information for industry. The Department of Energy, Mines and Resources provides assistance to the primary and mining industry, the Department of Forestry to the pulp, paper and wood industry and the Department of Industry, Trade and Commerce to industry in general, especially in the planning stage and with respect to economic matters. The Technical Information Service (TIS) of the National Research Council of Canada is the central information service for manufacturing industry. It maintains field services in the 10 provinces. TIS has a technical inquiry service dealing strictly with technical matters and an industrial engineering section dealing with management problems. Both sections have their field officers divided over the country for direct contact with the customers. The third section of TIS operates a computerized current awareness system based on items selected from the published literature, books, reports, periodic literature, etc. All TIS services are free.

The National Science Library of the National Research Council provides conventional documentation and library services and operates a computerized SDI system (Selective Dissemination of Information) for a

fee. The letter is mainly for scientists in the natural sciences but is being extended to industrial users.

### Denmark

Denmark has a number of specialized services for industry. Of the more general ones, there are two, the Danish Center for Documentation and the Danish Central Technical Library which provide documentation and library services. The latter organization operates an SDI (Selective Dissemination of Information) system.

The Danish Technical Information Service (in Danish, Dansk Teknisk Oplysningstjeneste, DTO) in Copenhagen provides technical and economic information to industry. Its services are generally free. It maintains an active dissemination service of selected material as well as a question and answer service. DTO operates with a team of experts in Headquarters which evaluate the available information and it maintains a field service. Liberal use is made of the services of outside consultants. Seminars and training courses in technical and administrative subjects are provided for the staff of enterprises. DTO stresses the value of good communication between provider and user of information and specializes in lectures, seminars and training courses, etc., for management in order to develop efficient flow of information within the enterprise.

### Finland

The main organization for industrial information in the country is the Technical Information Service of the State Institute for Technical Research in Helsinki.

The service provides documentation and translating services and actively disseminates information.

### France

As mentioned in the preface France is a country which has a typically decentralized information system, based on a great number of specialized information services which are often connected with research associations. A number of universities, through extension services, maintain close contact with and provide services to industry.

We wish to single out and describe the activities of a few of the major organizations which provide very important services for industry without making the claim of being central information services.

The Documentation Centre of the National Centre for Scientific Research (in French: Centre national de la Recherche scientifique, CNRS) in Paris provides documentation and bibliographic services. CNRS publishes

the well known abstract journal "Bulletin Signalétique", dealing with scientific and technical fields.

The French Association for Increase in Productivity (Association française pour l'Accroissement de la Productivité, AFAP) in Paris deals mainly with economic and managerial problems but it has a section for technical information.

The National Association for Technical Research (Association nationale de la Recherche technique, ANRT) is an association of public and private organizations for applied research in various fields. The association maintains documentation and library services for its members.

### German Federal Republic

The German Federal Republic is another example of a country with a decentralized information system based upon approximately 500 different documentation institutes. There is no national center.

The activities of the various components in the German information network are promoted and coordinated by the Institute for Documentation (Institut für Dokumentationswesen, IDW) in Frankfurt am Main.

Of the various important organizations which take a part in the overall system, we may mention the German Society for Documentation (Deutsche Gesellschaft für Dokumentation), promotion and training; German Standardization Committee (Deutsche Normen Ausschuss), standardization, classification and terminology; Central Institute for Mechanized Documentation (Zentral Institut für Maschinelle Dokumentation), development of computerized and other mechanized systems.

The German Productivity Council (Rationalisierungs - Kuratorium der Deutschen Wirtschaft, RKW) is a productivity organization dealing mainly with economic and management problems. It operates an information service and provides assistance on technical problems. It has a field service operating in the various states using consultants locally.

### Iceland

This country has an Industrial Productivity Centre in Reykjavik which apart from the usual economic and managerial problems deals with documentation. It maintains abstracting and translating services and actively disseminates information.

### Israel

Israel has, apart from a number of organizations dealing with specialized fields such as agricultural industry, food industry, fibres and forest products and radioactive products, one central service which

deals with general information for industry.

The Center for Scientific and Technological Information in Tel-Aviv, supplies consulting services, maintains a question and answer service and gives training in documentation techniques. A field service is being maintained. The Center disseminates abstracts in a number of selected fields.

### Italy

This country has a number of specialized information services which operate in a decentralized system. There is presently only one organization providing general information, the Italian National Committee for Productivity (Comitato Nazionale per la Produttività, CNP), in Rome. Its objectives are the spreading of knowledge of productivity methods and techniques in the fields of business management and industrial production. CNP maintains an information service for technical and commercial information.

### Japan

Japan has services for industry at three levels. For assistance to small industry, approximately 300 institutes exist, while there is a governmental Smaller Enterprise Agency offering consultative services through consultants in the field.

At a higher level Japan has the Japan Information Centre for Science and Technology, JICST in Tokyo which is the national information centre. The centre provides translating and abstracting services and publishes "Current Bibliography" an abstract journal. JICST actively disseminates information and performs literature searches.

At a more scientific level one may mention the National Diet Library, comparable in function to the Library of Congress in the U.S.A. The National Diet Library provides the user with scientific material, aided by 10 regional centres.

### Luxemburg

Luxemburg, the smallest of the Benelux countries has a productivity organization, the Luxemburg Office for Increase in Productivity (Office Luxembourgeois pour l'Accroissement de la Productivité, OLAP) in Luxemburg. OLAP operates a technical information service, apart from carrying out the usual functions of a productivity organization.

### Netherlands

This country has a large number of specialized centers but it does not have a central information service. The main function of

providing information for industry is divided between three organizations.

The Central Organization for Applied Research (in Dutch, Centrale Organisatie voor Toegepast Natuurwetenschappelyk Onderzoek, TNO) in The Hague is a non profit research organization which in various specialized fields maintains information services connected with its research laboratories for contact with industry.

The Netherlands Institute for Information, Documentation and Filing, (NIDER) in The Hague is a private organization which has a literature and a patent searching service. NIDER promotes the easy flow of information by giving training courses for documentalists and organizing documentation in enterprises.

The Government Technical Consulting Service (Ryksnyverheidsdienst, RND) in The Hague is a consulting service for small and medium sized industry, which also maintains a technical information service. RND operates through a network of field offices.

#### New Zealand

The Department of Scientific and Industrial Research used to have a Technical Information Service which presently is not operational. The information system in this country is being reorganized.

#### Norway

Norway has a number of specialized sources of information. furthermore it has a central information service called the Norwegian Industries Development Association (in Norwegian, Studieselskapet for Norsk Industry, SNI) in Oslo. It is a non profit organization financed by industry and from the proceeds of services. SNI maintains a literature searching service. It specializes however in active dissemination of information by publishing a current awareness journal Ajour Teknisk Informasjon and an abstract bulletin divided into 20 categories, Artikkel - Indeks.

#### Sweden

This is another example of a country with a decentralized system of information for industry provided by a variety of non-governmental agencies, such as trade and research associations, university research laboratories and technical societies.

With the many agencies in existence the need was felt for a clearinghouse for scientific and technical information which is provided since a few years by the Information Secretariat of the Royal Swedish Academy of Engineering Sciences in Stockholm. The Secretariat actively disseminates information in the form of a "current index" and maintains a literature searching service.

#### Switzerland

Switzerland has a number of specialized services, but no



central organization. There are a number of excellent libraries, one of which, the Library of the Swiss Federal Institute of Technology in Zurich, is the unofficial centre for scientific and technological information.

#### United Kingdom

The U.K. has a very well developed system of information for industry, working on a decentralized basis. It does not have a national information centre.

The overall coordination and promotion of the use of information in natural and social sciences and technology is the task of the Office for Scientific and Technical Information (OSTI) of the Department of Education and Science.

The specialized services in the U.K. are mostly of a private nature although usually subsidized to varying degrees by government.

Firstly there is the system of industrial research associations, specialized according to technical field. These associations have their information services which supply information to members as well as non members. They usually have field officers visiting industry.

Government subsidy to the research associations is handled by the Ministry of Technology (Mintech). It maintains a referral service for directing enquiries to the specialized sources of information. The Ministry furthermore maintains a system of industrial liaison officers, located throughout the country at technical colleges and advanced colleges of technology. The task of the liaison officers is promotion of use of scientific and technical information.

Secondly one should mention the U.K. library system, which is well developed. In various areas public libraries have combined their efforts to give special extramural services to industry.

The National Lending Library for Science and Technology in Boston Spa is the central depository of literature for the practicing scientist and technologist. It operates via local libraries and organizations, rather than directly to the user.

The British Productivity Council through a large number of local committees and associations is active in the field of increasing productivity by arranging meetings, seminars and group visits in the fields of business management and industrial engineering.

Aslib in London, a private association is well known for its activities in training documentalists and providing consulting services, as well as carrying out research in documentation and information science. It operates a referral service for technical enquiries.

The following private organizations and professional associations should be mentioned as very active in information work, the Commonwealth Agricultural Bureaux, The Chemical Society and the Institute of Electrical Engineers.

U.S.A.

Understanding the information network of the U.S.A. is difficult because of the great number of information sources, and the existence of many types of organizations which are active in dissemination of information. We are dealing in the U.S.A. with a decentralized system which can be broadly divided in a federal (governmental) and a non-governmental part. In describing the various organizations we are excluding agricultural, atomic energy and medical fields as well as the defence sector.

Among the federal services which deal with industrial information we wish to emphasize the following:

COSATI, the Committee on Scientific and Technical Information is responsible for studying the needs of and advising on the activities of the various government agencies. The recommendations are executed by the Office of Science and Technology, OST, part of the Executive Office of the President.

The Library of Congress is the largest and most important library. It does not provide specific information but maintains a referral service, the National Referral Center for Science and Technology, which identifies and catalogues scientific and technical information sources.

The Government Printing Office prints and announces all government publications and distributes copies to depository libraries.

The Clearinghouse for Federal Scientific and Technical Information (CFSTI) in Springfield, Virginia has the task of announcing and disseminating all government unclassified reports. This is a major task since the publication of results of applied research and development in report form takes on enormous proportions in the U.S.A. due to the system of government sponsored R & D assignments.

NASA, the National Aeronautics and Space Administration, has a large information organization and produces two abstract journals, STAR, Scientific and Technical Aerospace Reports and IAA, International Aerospace Abstract.

The Office of State Technical Services operates state and interstate programs to "place the findings of science usefully in the hands of enterprise". This is done at the local and regional level, usually through universities and colleges.

In the private sector a committee was set up, similar to COSATI in the federal sector, namely SATCOM, Committee on Scientific and Technical Communication. The committee has the task to express the views of scientists and engineers and make it possible to exchange ideas with others in the non-federal sector.

In the private sector there are a number of trade associations, as well as professional societies engaged in the dissemination of information, mainly of a secondary nature. Among the trade associations we mention the American Petroleum Institute, the Institute of Paper Chemistry, the Institute of Textile Technology, the Copper Development Association and others specializing in various metals. There are several others. All these organizations publish specialized abstract journals or digests. Well known abstracts services provided by professional societies are: Chemical Abstracts Service, Engineering Index, Metals Abstracts and International Aerospace Abstracts.

An increasing number of commercial enterprises perform services such as the Institute for Scientific Information, ISI. The enterprises have their own association, Information Industry Association.

Many of the universities provide consulting services for industry. Some university and public libraries have formed geographical or discipline oriented networks. Most of these provide services for industry, such as John Crerar Library, MIT (Massachusetts Institute of Technology) Library, New York Public Library, University of California Library.

3. The present state of information systems for industry and government responsibilities for the efficiency of such systems.

Present State

A description of the activities of information services in industrialized countries as given in the preceding section III .2 cannot very well express the one most important fact, the state of flux in which most systems are. The information process is presently a most dynamic one, changing from the classical "manual" system, through more or less mechanized to the computerized system.

In describing what kind of service the various organizations give, we have done just that. However in many cases one should have added that the organizations are experimenting with mechanized systems of various kinds. Personnel closely connected with this type of development work will know that generally speaking difficult, time-consuming and expensive projects are involved and that computerized systems for suffi-

ciently efficient retrieval of information are still a thing of the (near?) future.

It is therefore not surprising that in most countries the government is stepping in, in the realization that strong governmental support is needed for assisting the expensive projects carried out by various organizations.

#### Governmental Responsibilities

While individual governments have had committees to study the need for efficient information systems in connection with the economical development of the country it has been especially the OECD, Organization for Economic Cooperation and Development which organized high level meetings on the subject over the last few years.

The OECD countries have recognized that the systematic organization and exploitation of scientific and technical knowledge are vital to the nations' prosperity and that only governments are effectively in a position to plan and finance the attainment of these objectives. The OECD recommended that the individual governments would formulate information policies as part of their overall science policies and, more important, take pertinent action.

Similar intergovernmental activities are being pursued in other geographical areas for instance by the Asia and Pacific Council.

#### IV. DEVELOPING COUNTRIES

##### 1. Information needs as to discipline

The author is of the opinion that the information needs of the developing countries are basically the same as those of "developed" countries and that differences only exist in degree. For instance all countries need agricultural, economic, geological, medical, nutritional, political, technical and veterinary information, to mention the most important ones.

Since it was decided that this paper should restrict itself to industrial information one should try to describe what might come under that term. When looking at the various disciplines mentioned in the previous paragraph one will see that hardly any disciplines will be completely excluded, many have fringe areas of interest. For instance pure agriculture is excluded, but not agricultural equipment and machinery, fertilizer, pesticide and insecticide manufacture. Pure geology again does not apply but mineralogy has industrial connections in the mining field. Pure medicine is not directly industrial but pharmaceutical manufacturing is; so is industrial hygiene. Nutrition

is industrial with respect to the food industry.

Whether economy should be included is a matter of contention. In the past many organizations tended to treat technology and economics separately because of the different educational backgrounds needed for the two disciplines. Nowadays, there is a tendency to include economics in industrial information because of the awareness that technology and economics are interwoven to the extent that one cannot treat technology without looking at economic consequences. In the industrial enterprise obviously many subjects are of importance which normally come under economics such as accounting, financing, marketing, and managerial activities such as scheduling, planning, personnel and labour relations, etc. etc.

## 2. Information needs as to organizational form

In a previous chapter we have described the information systems and organizations in industrialized countries and one may wonder what system or type of organization would be most suitable for a particular developing country.

It is obviously not possible to give an answer to this question in a general paper such as the present.

A study of existing information systems shows that there is a variety depending on factors such as geographical extension of the country, politico-economic structure, amount of information handled, budget, etc. For all these reasons it is only possible to advise on a system after considering all variables for a given country.

## 3. Information needs with respect to degree of industrialization

A few words should be said in connection with the kind of information which is needed for the different stages of industrialization in a developing country.

### Establishing a new industry

Before setting up a new industry, studies have to be made regarding availability of raw materials, energy, labour, transport facilities, market potential, etc., in general called feasibility studies. Further studies involve financing, patent rights, actual technology transfer, etc.

The information needed is to be collected in the developing country and may have to be transferred to the industrialized country. Usually the channels for transfer will fall outside the ordinary ones for exchange of classical scientific and technical information.

### Running an industry

Once an industry is established it is important to maintain the installations and keep up with competition by constant improvement. It is in this area as well as in research and development, R & D that most of the classical scientific and technical information is found. Of course this applies to newly established as well as existing industries in the country.

### Research and Development

It is generally accepted that countries, in order to keep up with world competition, need well developed R & D establishments and many of the developing countries are in the process of developing such organizations. Where these facilities have not been developed yet, the countries will have to rely on information from industrialized countries. Obviously in order to make use of the results of R & D one needs organizations which can handle and use the data. This calls for local information centers.

## V. DEVELOPING COUNTRIES. INFRA-STRUCTURE

The development of an information system in a developing country not only should deal with the information system itself but should give due consideration to development of an infra-structure. It is not possible to maintain information facilities in a country without having developed 1) education at the university as well as at the technical school level, 2) libraries, in particular in the natural sciences and technology.

Although not immediately needed one will want to develop basic and/or applied research facilities.

### Basic needs before implementing new information system

1. A depository is needed for a basic number of directories, text and handbooks and periodicals in the scientific and technical fields. This usually takes the form of a library attached to a university or to an information service itself. If a library is too costly one may investigate the feasibility of establishing a regional library thus avoiding duplication of the basic stock of books and periodicals.

The idea of a world data bank accessible through a computer system by the various countries seems the ideal solution, but realization of this goal is still far away.

2. The training of personnel takes from 1 - 5 years depending on academic degree and should therefore be premeditated. The need for

trained personnel varies according to the system used, mechanized or non mechanized. In a computerized system one needs electronic technicians, programmers, operators and computer experts at the university level.

It cannot be sufficiently emphasized that a computerized system cannot just be purchased and installed. Experience shows that the practical difficulties in running a computer call for the constant presence of computer experts, including maintenance and repairmen.

For a conventional system one needs documentalists and information specialists usually at university level and trained library personnel at various levels.

3. An important part of running an information system satisfactorily, consists of training the user. This is true in industrialized countries, but it applies even more to developing countries. In conventional as well as computerized systems it has been found that frequent communication between the service and the user is necessary for proper understanding. This training includes training of the management in methods of establishing an efficient flow of information within the enterprise, so that the user will be reached properly.

## VI. COOPERATION BETWEEN DEVELOPING AND INDUSTRIALIZED COUNTRIES

The Tehran seminar will examine ways and means of improving the effectiveness of industrial information services in ECAFE and ECA regions including possibilities of cooperation between the services in industrialized and developing countries.

It would be highly precarious and presumptuous to anticipate the results of the discussions with respect to the very complex problems in question. The author consequently does not venture to delve too deeply in the problem of finding solutions, but will only discuss possible action in the light of the experiences of FID and its Committees "Developing Countries" and "Information for Industry".

The world is at present looking towards a computerized treatment of many problems in cases where the classical non-mechanized approach has become too time consuming because of sheer volume, or insoluble because of complexity.

The same is true for storage of data and documents and their retrieval. ICSU/UNESCO are in the process of developing a worldwide information system (UNISIST). This is a project of tremendous scope and it should not be concealed that an enormous amount of work, of a technical

nature as well as in the fields of classification and semantics, will have to be carried out before the system will become operational. It seems not unrealistic to think in terms of a decade.

This means that this worldwide computerized information system will not help us right now. Consequently, in the author's opinion, one cannot do better than look at the classical approach in information transfer for the time being. Of course, we have to keep in mind that we are in a transition stage and that our approaches will constantly have to be changed, and updated as new developments become practicable.

The approach taken by UNIDO is transitional. It acts presently as a clearinghouse for bringing the user of information in contact with the source. At the same time it keeps files on technical experts, equipment suppliers, etc. All these activities may at any time be made fully computerized.

#### Participation in the transfer of information

If one takes a look at the participation of industrial information services of industrialized countries in the transfer of information one will notice that participation is by no means universal, not multilateral and often based on historical ties between certain industrialized and developing countries. The latter, mostly bilateral, type of transfer is natural but it is certainly not in the interest of those developing countries which have severed historical ties for political or economic reasons.

With the unevenly distributed flow of information which could result in the long run it would seem that only an intergovernmental agency, such as UNIDO is in a position to handle the requests for information fairly, confidentially and without bias.

Let us now look at the work which the committees of the International Federation for Documentation have done with respect to developing countries.

FID Committee "Developing Countries" (FID/DC) has published certain recommendations with respect to aid to developing countries. The recommendations are in the classical documentation sphere and deal with the need for,

- a) establishing national centers, together with reprographic, translation and training facilities
- b) close contact between the centres and users of information
- c) regional networks, at least in initial stages, in order to share costs and to promote cooperation



- d) publishing: directories of organizations dealing with external aid, literature on documentation problems, literature on user studies.

FID Study Committee "Information for Industry" (FID/II) <sup>7</sup> based on its experiences would agree with the principles behind the recommendations and particularly emphasizes the idea of personal contact between the user and provider of information. This may take the form of a field service in which the field officers act as an extension of the information service. <sup>8</sup>

The member organizations feel that providing information to developing countries can only be effective if the information service working on the problem has full details not only of the problem, but also on the background of the industry and the country. This calls in the first place for a proper, sufficiently detailed formulation of the enquiry.

As a practical way for improving cooperation between industrialized and developing countries it should be mentioned that a number of organizations, members of FID/II, have expressed their willingness to have suitable persons from developing countries work temporarily in their organizations for training purposes. Several member organizations also are prepared to act as sources of information or referral centres for information useful to developing countries. A number of organizations are already involved via UNIDO.

#### Improvements

The recommendations of FID/DC naturally deal with documentation and related problems, in this case mainly with regard to the initial stages of establishing information services. They hardly deal with possible improvements once the services exist.

It is the author's personal opinion that improvements in cooperation mainly should be sought in the social area, that is through improved human communications. There are no better ways for cooperation than by personal contact and the author feels that these contacts should be increased, even if the financial consequences may cause difficulties. More frequent contacts may be achieved, not only by experts from industrialized countries visiting developing countries, but vice versa by suitable people from the developing countries visiting the industrialized countries for studies, training courses, etc. It is realized that the costs of these travels are high.

Organizing more frequent seminars and similar gatherings is another form of stimulating personal contact, of which the expenses may be comparatively low.


At the governmental level it would seem that certain improvements could be made in persuading the proper authorities in external aid circles that information transfer is part of the overall picture. Often one will find that information centers in industrialized countries do not

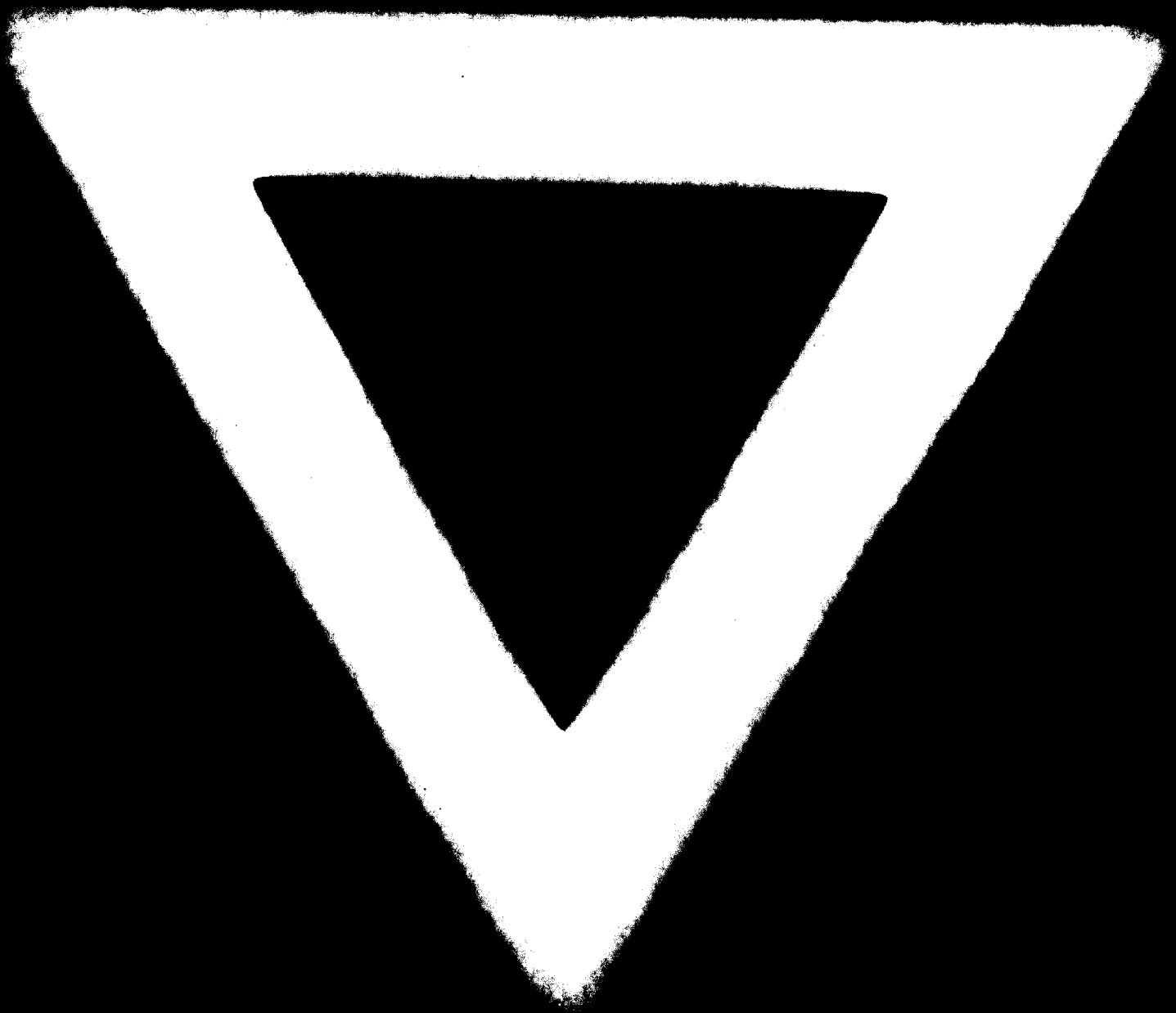
have the funds for financing assistance to developing countries, and that the organizations, if sympathetic to the idea of providing assistance, will perform the work involved as part of their ordinary operations.

Furthermore it would seem that many information services in industrialized countries, although entirely qualified in the technical sense, do not have the proper background for dealing with or evaluating the special needs of developing countries. Improvement in this area can only be obtained by better cooperation between the agencies dealing with external aid and the regular information services.

The steps to be taken for improving this situation in the industrialized countries should be initiated by the United Nations' agencies at the governmental level.

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  8. See also: Third Report of the ACAST, May 1966, paragraphs 91 and 104.
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