OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

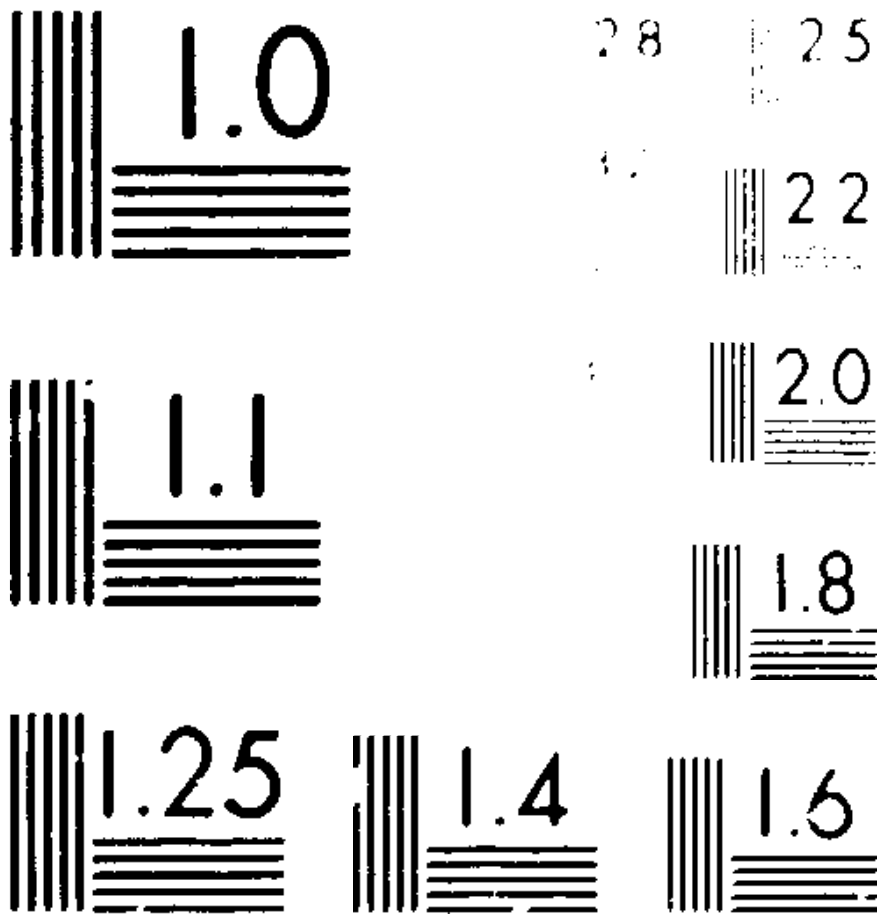
FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org


1.0
2.8
2.5
2.2
1.1
2.0
1.8
1.25
1.4
1.6

11692

Distr.
LIMITED

UNIDO/IS.325
15 March 1982

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

ENGLISH

UNIDO'S INDUSTRIAL AND TECHNOLOGICAL INFORMATION BANK (INTIB)

AND

INTIB 2nd NATIONAL INDUSTRIAL INFORMATION AND ADVISORY SERVICES

with a problem identification and information extension function

as an interrelated system of services to industry in developing countries*

Presentations to seminars of the
Committee of Engineering Information of
the World Federation of Engineering Organizations

by

Kjeld Klintøe

and

Roch T. de Mautort

Industrial and Technological Information Bank (INTIB)
Industrial Information Section
UNIDO Technology Programme

* This report has been reproduced without formal editing.

V.82-28195

Contents

INTRODUCTION

Scientific and technological information STI is one thing, commercial information on industrial technologies is another, and industrial and technological information INTI something else. "What serves the research and development engineer right, does not necessarily serve his colleague in industrial planning, investment decisions and operations much, and certainly not the small and the medium and industrial enterprises as such".

UNIDO is engaged in promoting the flow towards developing countries of INTI under the related aspects of advising governments on the integration of an INTI perspective in their industrial development policies, providing technical assistance to the establishment and development of national structures for the extension of INTI to industry, and of supplying information services to such structures from its Industrial and Technological Information Bank (INTIB).

The principal agent for the identification of problems to be solved and the procurement and extension of relevant processed information will be the Industrial Information and Advisory Service, manned by engineers with an understanding of business economics and some exposure to documentation techniques, knowing themselves some of the answers mainly knowing where to find them, from INTIB inter alia. In a working paper commissioned by UNESCO for the WFEO/CEI seminar on information for small and medium industrial enterprises, Kjeld Klintoe, (retired director of DTO, the Danish Technological Information Service to Industry, and past chairman of the Industrial Information Committee of FID, currently on an expert assignment for UNIDO to the setting up of such a service in Tanzania), develops applicable concepts insights and experiences.

The Industrial and Technological Information Bank of UNIDO, INTIB, cannot seriously serve its purpose in isolation and from a distance and it has a networking function of its own under which it has to engage in a working relationship with intermediaries to end users of INTI in industry, among which industrial and advisory information services as described by K. Klintoe will be the most practically concerned. In papers presented by Roch T. de Mautort, Chief of the Industrial Information Section, UNIDO, to WFEO/CEI seminars, on "Engineering and Technological Information, Budapest, 1980, and on "Information for Small and Medium Industrial Enterprises", Buenos Aires, 1981, an effort is made at sorting out STI from INTI, both STI and INTI from commercial information flows, at defining technological information as distinct propositions under the same name, of relevance to

R+D towards the development of industrial technology, or of relevance to industrial development concerning industrial technologies in operational existence. The suggestion is tnat UNIDO integrate and affirm a vision of its own mission at the service of industry in the area of information, both in terms of the development of its own INTIB, and in its technical assistance operations for the establishment of industrial information and advisory services, specific enough to warrant completely independent progress outside the otherwise perfectly commendable development of STI flows and networks, and that from the inception of relevant TA projects, their purpose of serving as relays to INTIB be consistantly borne in mind.

Seminar on Information for
Small and Medium Industrial Enterprises
(Buenos Aires, 14-18 November 1981)

THE SMALL AND MEDIUM INDUSTRIAL ENTERPRISES AND TECHNOLOGICAL INFORMATION SERVICES: CONCEPTS, INSIGHTS AND EXPERIENCES

by

Kjeld Klintøe

A. Introduction

The aim of this paper is to present a body of information and experience designed to help those concerned with the improvement of methods and techniques for the management and operation of small and medium industrial enterprises. It is hoped that the present document will be instrumental in reinforcing their role in society and their contribution to economic and social development.

The paper is not the result of a scientific or academic study, but the summary of observations and experiences in connexion with the operation, over several years, of a technological information service for (and within) industry.

As the methods described have been applied in a number of countries, the general conclusion is that human ability and will to apply simplified methods is of the same nature all over the world; local conditions may differ but these differences can be overcome when methods are geared to the end-users' needs and interests.

This paper is intended to stimulate the participants' reflection on their own situation, needs and interests and lead to a fruitful discussion and evaluation of the application of new management methods and techniques.

> "No one should be interested
> in the design of bridges,
> (i.e. systems per se)
> they should be concerned with
> how to get to the other side!"
> (i.e. how to put it across)
>
> Cedric Price

1. The Environment

The environment concerned is that economic sector of society known as small and medium industrial enterprises.

In general, the main characteristics of enterprises manufacturing and marketing goods and services which are important for other enterprises, individuals and society as a whole are either their size (the number of people they employ, the capital they invest or their turnover) or else the technology they apply.

Let us consider these characteristics.

In Denmark, for example, one finds about 90.000 firms which provide valuable products and services.

Some 83.000 firms base their operations on skills designed to transform raw materials into products used by people wishing to improve their condition. We call them craft industries. They are important, but most of them are limited in their business scope. They usually employ up to 50 people each.

About 7.000 firms form what we call the industrial sector. Of these: less than 5.000 each employ less than 50 persons, about 1.200 each employ 50-200 persons, about 250 each employ 200-500 persons, less than 100 firms employ over 500 persons each. This means that Denmark has only about 100 enterprises above medium-size. The above figures do not show the business scope of Danish industrial enterprises. Some of these enterprises operate in the fields of mechanical engineering, electrical engineering, chemical engineering, civil engineering; some can be described as scientific industries.

Out of these 7.000 industrial enterprises, only about 3.500 firms employ one engineer or more each and only about 650 firms employ 3 engineers or more each.

A number of companies are market-oriented, i.e. they have investigated the conditions, needs, demands, etc., of their clients, their clients' clients, etc., and have compared them with their own capabilities and they use all their available resources to shape their products and services to meet the identified market demand by applying exactly the technological information at their disposal.

To them, "any kind of information", be it technical, economic, marketing, managerial or social, is considered as technological information which as such can further progress when it is used to improve and innovate.

2. The Industrial Enterprise and Technological Information

Technological information is a commodity - an intellectual raw material, (fig. 1) - and, like any other commodity, must be marketed.

What does this mean? It means that we can define enterprises in terms of their organizational capabilities.

A. There are enterprises - regardless of their absolute size - whose staff is qualified enough to be fully aware of their firm's opportunities, tasks and responsibilities.

   They have the capacity and the authority to take actions designed to collect details concerning their clients' professional profiles, the structure of their clients' organizations and to work out projections regarding the evolution of their information needs in the future.

   These enterprises also search information sources in order to improve and renew their contributions, performances and functions.

B. There are enterprises which have intellectually-qualified staff members but these are too few to be able to take action, either in investigating the market structure in which they operate, or in searching for and procuring information to significantly increase their firm's contributions, performances and functions.

C. There are enterprises which do not have the intellectual qualifications or capacity to take major steps to develop

contributions - but they often employ very good craftsmen and have an entrepreneurial spirit which insures their survival and growth.

What has just been said should make us understand that an enterprise is a living organism - whatever its size, its field or its level of operation.

Any enterprise should be vital, strong, conscious of its merits, but flexible. It can be compared to an amoeba (fig. 2) - a one-cell mechanism. Such a mechanism consists of a nucleus (the fundamental idea or purpose), the protoplasm (the living matter, i.e., the talents, vitality and competence of the management, the staff and the workers) and the cell-wall (strong but flexible, i.e., the corporate policies and strategies applied).

It is of vital importance to an enterprise to be able to identify and work towards its basic objective, to make its corporate image clear; to attract the attention of present and future clients; to create an "esprit de corps" among its employers; to motivate its most qualified employees; to attract the attention of its suppliers and supporters. But intentions and works are not enough - only performance and the successful utilization of resources for progress count.

In all enterprises management is responsible for the survival and growth of the organization.

That is an economic as well as a social responsibility - generally - accepted together with a personal commitment.

The manager has at his disposal two sets of resources - the physical assets (always limited) and his staff's intellectual assets (the protoplasm - the living matter) whose number may be occasionally limited but not the enterprise's capabilities, if he chooses the right strategy (fig. 3).

The staff must be carefully recruited in accordance with the purposes, aims, objectives of the entity. Staff members must accept to share in the elaboration of the corporate strategy and policies. They must be meaningfully employed and their talents and competence should be further developed in order to contribute to the improvement of the enterprise.

Why this reflection on industrial structures and behaviour?

We must not forget that technology and its applications and hence technological information, is part and parcel of our culture.

The economic sectors - among them industry, the most progressive - are considered as the basis of progress in health, welfare, education, and as the prerequisites to the pursuit of culture and the assertion of human dignity.

If we do not develop industrial operations designed to ensure efficiency and to serve social and humanistic purposes, we will fail.

Science and research-related information is of value for the community only in so far as it is applied for improvements and innovations.

KNOWLEDGE: a COMMODITY

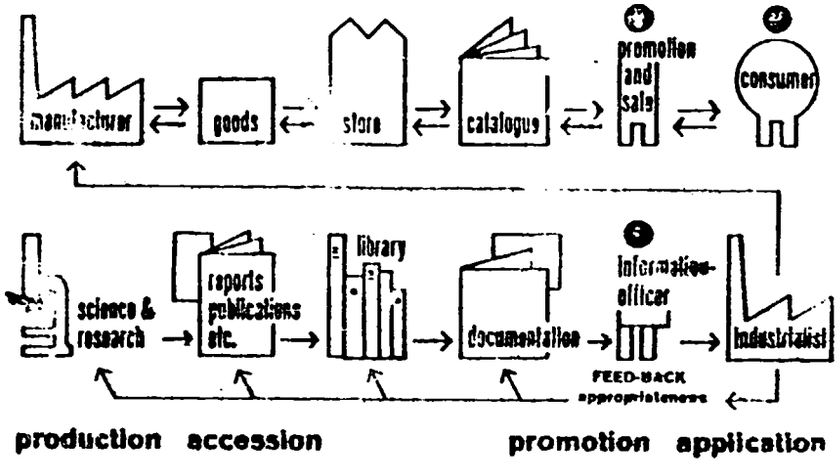


Fig. 1

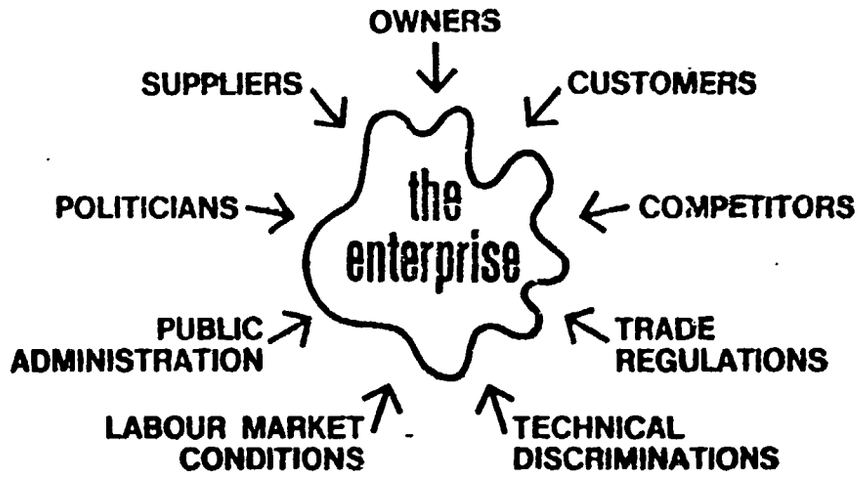


Fig. 2

RESOURCE-ELEMENTS

PHYSICAL	INTELLECTUAL
fixed assets equipment capital	human beings knowledge talent

must be: acquired
useful, employed
maintained
developed

Fig 3

B. How to organize the flow of technological information into and within enterprises

In either the public or the private sector, each enterprise is established to fulfil a purpose, implement an idea or to exploit natural or intellectual resources. Qualifications are acquired in order to help the enterprise to grow and serve its present and potential clients. An enterprise is formed by people.

What follows holds true for any type of enterprise and should serve to reach the professional (equality of performance) standard of each enterprise.

The attainment of professional standards presupposes on the part of the staff an awareness of these standards and the will to meet them. It also supposes the use of evaluated information for the optimal exploitation of the enterprise's resources; not merely taking advantage of immediate opportunities but also serving objectives designed to give long-term benefits.

1. Government Responsibilities

Governments are responsible for the management of the pysical and intellectual resources of their countries and for the former's optimal utilization.

They should give careful consideration to the fact that their natural resources are limited unlike the country's intellectual assets which are not limited to the same degree but are dependent on the strategy chosen for their development and use.

Governments should develop a long-term policy for the establishment of a co-ordinated national infrastructure of semi-autonomous institutes responsible for assessing, evaluating and applying technological information and using expertise relevant and appropriate to the natural resources of their own country.

National capabilities (i.e. the infrastructure of scientific and applied research institutes) should include, as a minimum, a focal point and a servicemechanism designed to link up with similar mechanisms in other countries for the exchange of registered results of scientific and research operations. Advanced means such as telecommunications should be applied to serve the national infrastructure most effectively.

Taking into account that scientific information and research results only have value for the community when applied for practical purposes (i.e. improvements and innovations in enterprises), governments should establish a further mechanism, a country-wide network of technological information services with the aim and the responsibility of furthering the transfer, the application and the conversion of technological information into industrial enterprises (in particular the small and medium industries).

Generally, these enterprises are neither aware of their needs, nor do they have the capacity to search for and acquire external relevant and appropriate information and expertise (see the middle two columns of fig. 4).

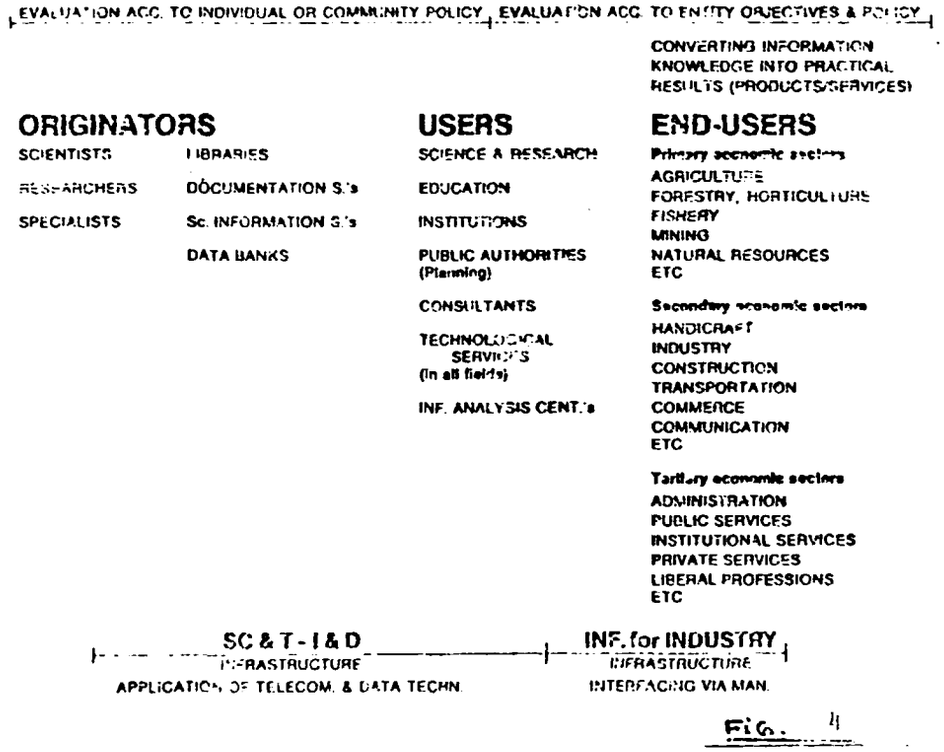


Fig. 4

2. Identification of the Information Needs of Small and Medium Industrial Enterprises

Many small and medium industrial enterprises operate with very short-term planning and they are market-oriented only to a limited degree.

Problems related to break-down of machinery and equipment, difficulties in the management process, complaints from clients concerning the quality and reliability of products or the quality and workability of raw materials, etc., are well-known and very often require immediate action.

Too many enterprises rely exclusively on the advice of suppliers; while such advice may be good, managers cannot ascertain that it is.

Any enterprise operating exclusively as a subcontractor to larger and often too few industrial clients is in just the same position.

It becomes too dependent on information, skills and expertise that are the proprietary rights of other people.

A third type of vulnerable position is found in cases of transfer of technology, when the receiver has not reached the appropriate level of professional competence and independent qualifications through the organized acquisition of technological information.

It is important for small and medium enterprises to realize that the basic elements of the industrial process are:

a) Knowledge of the market;
b) Design of the products:
c) Manufacturing of the products;
d) Marketing, selling and servicing the products;
e) Controlling and measuring the products, processes and performances of the enterprise;
f) Evaluating current achievements with a view to the elaboration of a future strategy;
g) Acquiring appropriate and relevant technological information for improvement and innovation.

The success of an industrial enterprise is largely due to the capacity of its managerial and other staff to reflect on their observations and to ask the right questions.

a) Knowledge of the market

The staff in enterprises should endeavour to answer the following questions:

- Why are my clients buying this product? For what use?

- Why are they buying from this enterprise? Design, function, reliability, price, etc.?

- What will be their demand be in the future - for what reason?

- How many potential clients are there? (locally, in the district, nationally, in other countries?)

- What position do we want to have in the market?
  - be on an equal footing with our competitors;
  - be on an equal footing and sometimes lead;
  - lead all the time.

- What distribution channels and methods do we want?

- Do we want to be competitive on prices or exclusively on quality?

- etc.

b) Design of the products

- What did we learn from the demand of the market concerning the product,
  - its functions,
  - its design,
  - its dimensions and tolerances,
  - how will the end use of the product influence choice of raw materials?
  - how will the end use influence requests for maintenance and service,
  - etc.

c) Manufacturing the products

- Which methodologies (technologies) are to be applied?
- Are there more advantageous methodologies available?
- Where and at what costs?
- How much would we have to invest?
- What would the production costs be?
- What quality level should we choose?
- Is the appropriate manpower available?
- How can we arrange the plant lay-out and production cycle in the most appropriate manner?
- etc.

d) Marketing, selling and servicing the products

- How should promotion, sales and service be organized?
- Distribution network?
- Transportation?
- Service units?
- etc.

e) Controlling and measuring the products, processes and performances of the enterprise

- Quality control? According to what standards?
- Environmental standards?
- Productivity?
- Costs?
- Share of the market?
- etc.

f) Evaluation of achievements with a view to the elaboration of future strategies

- Are we good enough to
  - be competitive;
  - be competitive and occasionally lead?
  - lead?
- From which outside sources do we need to obtain technological information?
- Where do we get relevant, appropriate, reliable information? - And fast enough?

g) Technological information services

- Do we have appropriate technological information services available?
- What can they do for us?
- How do they operate?
- Do we need to have an internal technological information service?
- How are we to organize, and benefit from, such a service?

To search for, gather, evaluate, repackage and transform information for presentation to the final user (the converter of information into practical measures for progress) is an effort which should be undertaken by external as well as internal services.

Let us look at what they are, how they are programmed, and how they work.

3. The Technological Information Service for industry

Governments expect industry to contribute most actively to economic and social development. Governments should therefore see to it that a national network of technological information services is set up and operated with a view to stimulating and assisting enterprises in taking greater advantage of the technological information provided at their request.

A technological information service for and within industry presupposes:

- An intellectual effort to stimulate, advise and serve the management and staff of individual enterprises within the private and public sectors in order to enable them to improve their present operations and to stimulate innovation by developing methods, processes and services through the acquisition and evaluation of relevant information presented in the appropriate forms, so as to bring about practical results.

- An active professional service geared to the needs and profiles of endusers. The service should aim at creating a favourable environment for innovation in which, with the proper motivation, information can be used to yield practical results.

- A service for marketing intellectual raw material (information) in this case technological information.

It is now clear that information for industry is a term implying the use of information to foster industrial growth (as opposed to the term industrial information, which refers to the gathering of information on industry and its operations with a view to decision-making conerning guidance, policies, investments and the orientation of the industrial sector as a whole.

b) Programmes

The market structure

Identifying within the assigned geographical area, established manufacturing enterprises - classify them according to products and services provided (who are their clients and the clients' clients? What is the driving mechanism of the business? By size, by locality, and by key-persons.

The resource structure

Identify, in the local area, resource centres and persons of special capability - useful to mobilize, when actual needs arise.

Identify in areas of the district, in other national districts, in foreign countries, similar "specialized centres" - which seem to be of potential interest to local industrial enterprises.

The resource and reference file

Establish a small collection of directories, handbooks and other reference material; also subscribe to a few, carefully selected primary journals and abstract/indexing journals (Engineering Index, etc.). If possible, establish a terminal connexion in co-operation with the national focal mechanism for scientific and technical information, in order to link up to international networks by telecommunication.

"Great is he who knows -
greater he who knows where to find information".

The visiting programme

In marketing, it is necessary to pay visits in order to get results, that is to promote and stimulate the use of available information, to take initiatives and to look up potential clients (fig. 5).

Meetings should be organized with top management - and later on with the staff. The bottle neck is always at the top. The opening question will always be: "How is it that you have such a wonderful business?" (It is by principle a wonderful business, even when you have ascertained that it has problems). "Why do they buy your products?" etc. etc. This question is necessary in order to show that the information officer has called on his client to adapt himself to the client's situation, his problems, plans and interests. The aim is to gain confidence in order to obtain a picture of the enterprise as a "living organism".

During the conversation problem areas and needs should be indentified. The idea is to establish a profile of the client's requirements so as to be able to identify the information that is best suited to his level of understanding and experience. Staff members should take part in the conversation and the plant should be visited.

The reporting phase

After his visit, the information officer establishes a confidential file on the client, in which he keeps a record of all the information thus collected. A letter is sent to the client to confirm the phrasing of his request for information, and the key-words for his other areas of interest. If relevant information is located in the reference file, it is forwarded to the client who will thus be in a position to check whether the information officer has correctly identified his areas of interest.

The provision of information tailored to the needs of each client

Remembering the terms of reference and the profile of interest of the client, the information officer will investigate "the resource structures" and sources of information (primary and secondary journals) and evaluate any kind of technological information which may or should be of interest to his client. He will ensure follow-up by forwarding cuttings, clippings or copies and keep the dialogue going (fig. 6).

The question and answer service (fig. 8)

As soon as a mutual understanding is reached between the information officer and his client - the small and medium enterprise - the latter will appreciate the information officer and recognize that he is his "extended intelligence and resource", to whom he can turn any time a new idea or a problem arises ("What do you think of ...?", "Where do I find ...?", "Who can assist me in ...?") and he will have confidence in him.

It is very important that the external information officer shows by his attitude and conversation that he is familiar with the life of the enterprise, while not being overly conservative or wary of suggesting changes. It is very important that he has the courage and personal ability to enter into the dialogue with all his knowledge of the external world of resources ready to be mobilized for the benefit of the entrepreneur. He should provide the intellectual support which will assist the entrepreneur in his search for information; he might carry out such tasks as referring to a handbook, looking up a directory, making a few telephone calls, or scanning the relevant literature.

The information analysis phase - State-of-business, state-of-the-art

An enterprise aware of the need for a business strategy - whether it has established a technological information service of its own or not - will run into the situation of having to evaluate its current position in relation to competitors in the market, the application of technology in marketing, management practice and upgrading of its own competence for survival and growth.

Now that the manager has realized that information is a commodity - intellectual raw material - he also realizes that this commodity has its price: "I am willing to pay you, Mr. Information Officer, to work for me as an analyst of my problem situation; as an intelligence officer to identify my competitors in various markets; as a collector on my behalf of market/technology information; I want you to be my adviser on how I should read, understand, apply the state-of-the-art report you will be able to write for me".

The briefing of the enterprise

"Well, Mr. Information Officer, we are doing well in this enterprise, our progress is fine, but are we sure that we should not diversify or change our policy or our strategy? (fig. 7). Could you prepare, organize and conduct a company conference whereby we - my staff and I - could be forced to remove the dust from our spectacles, identify our strength and weaknesses as a team, think in an innovative manner, become more adjusted to our corporate goal and renew our corporate image. We, as a business, are successful (our local social responsibility is growing) and so many families as well as the public authorities depend on us, and we must not let them down".

The information officer enjoys such a challenge; now he can bring together for a "happening" the enterprise and external specialists, generalists, policy makers, politicians (maybe even foreigners) to act together as a catalyst in the operations of business based on technology. Such business constitues an integral part of the society and culture of our time.

1 FIELD LIAISON SERVICE

a) Visiting firms uninvited

b) Stimulating demand for information through interviews

c) Promoting the use of available sources of specialized knowledge

FEED-BACK

The profile of fields of interest and receptivity

Relevance of available sources and services

Fig. 6

3 CONFERENCES AND COURSES

a) Within a branch of industry or a geographical area, stimulating the efficient utilization of knowledge

b) Stimulating the flow of information on an important topic

c) Promoting specialized information services

d) Training in the transfer of information to and within the enterprise

FEED-BACK

Requests for the setting up of specialized information services and individual internal information services

Fig 7

2 ACTIVE INFORMATION SERVICE

a) Searching information and evaluation according to "profiles" of individual firms

b) Selectively disseminating information (uninvited)

FEED-BACK

Requests for information, documentation and service

Fig. 6

4 QUESTION & ANSWER SERVICE

a) Transmitting requests for information, documentation, advisory services, etc. to appropriate sources of information - establishing personal contacts

b) Confidential intelligence service upon request (on a free basis)

c) International referral service

Fig. 8.

c) The information officer

(i) Profile

The information officer should have a professional education, have gained experience in industry for several years, so that he can have the outlook of an industrialist. He should be able to speak the same language as managers, as well as the professionals, salesmen, economists, personnel managers, etc. He should be trained in management. He should master one or several languages besides his mother tongue and be able to convince people in the course of a talk, a lecture or a conversation.

He should know enough of research and science as well as of Library, documentation and information sciences to be able to formulate requests for information and he should be energetic enough to take the initiative to call on new clients, and to follow up established contacts. By his personal qualities, he should be able to obtain the confidence of his clients and of his suppliers.

(ii) Functions

The information officer is expected to:

- Become acquainted with the structure of industry in the area to be served (including the various sectors of industry, the sizes of the different enterprises and their locations).

- Become personally acquainted with each individual enterprise in a particular sector with its commercial and technological activities, its organizational structure and its management and staff, and their qualifications, for using information to get practical results.

- Become personally acquainted with the structure of institutions which are considered relevant to and important for the development of the various sectors of industry, whether these institutions be education and training organizations, research institutions, libraries, documentation services, or public authorities (both domestic and foreign).

- Call on and visit enterprises, interview members of the management and staff in order to identify information needs and other needs of support and services.

- Assist in formulating problems and requests for service.

- Be able to identify and evaluate the capacity of an expert, an institution, and information source and to fulfil a given request within a reasonable lapse of time.

- Ensure that service is provided in adequate forms, checking that the information is understood, adapted and correctly used in order to yield practical results.

- Identify areas and requests for training courses, conferences, exchange of experiences within each individual enterprise (or among companies of a given sector of industry or across the sectors of industry, or in a geographical locality) aimed at improving the operations of the enterprises involved.

- Evaluate and provide programmes which fulfil requests for such group training.

- Arrange study tours (to firms, research centres, information centres, fairs, etc.) aimed at providing information relevant to the participants' special requests and backgrounds.

- Participate in all kinds of activities of the information service so as to be fully acquainted with the structure of resources available to the service and to be used in connexion with its potential prospects.

- Provide feed-back to the information service in the form of observations that will be evaluated and perhaps lead to the improvement and development of programmes, methods of services geared to the needs of the environment to be served.

4. The Technological Information Service within an Enterprise

The concept of the enterprise, considered as a living organism and for which management has the exclusive responsibility of making use of its physical and intellectual resources to obtain optimal positive results, has already been mentioned.

a) Objectives

The importance of organizing the transfer of technological information to and within the enterprise has been emphasized as a means of motivating and upgrading its staff and to render it alert and dynamic with a view to the improvement of the firm's operations and its innovative development.

A lot of what has been said about external information services can be applied to that of a particular enterprise. The external information service can in fact be seen as a structure made up of several "mini-enterprises".

The manager sets the scene (the organization of the transfer of the staff, the corporate goal, the major orientations of the business and the details and experience of the enterprise), directs the information and the professional communication flows. The information officer is there to stimulate, assist and serve them all.

The information service centre must be closely affiliated to top management, which formulates the major orientations and strategies of the business (the information officer acts as adviser to the management).

b) Functions

According to a market structure analysis of the various sections, groups and individuals of the enterprise, a preliminary information source strategy is worked out as the initiative of the information officer.

The information source strategy leads one to identify:

a) Internal feedback of experience gained by the technical, the marketing and the economic sectors.

b) Current need for directories, handbooks, standards, authority regulations, etc.

c) Competitors and their position and performance in the market.

d) Suppliers of raw materials, equipment, machinery, etc. including profiles and relevance and performance.

e) External sources of specialized knowledge in the areas of marketing, technology etc., specifying their level of expertise - operation, applied research and science.

f) Current information sources like primary journals, secondary journals and newsletters, as tools for the evaluation of reports, articles, advertisements, etc., of relevance to the enterprise.

g) News on exhibitions, meetings, conferences, courses, etc., where information can be collected by attending staff members.

h) Places to visit on study-tours by members of the staff in order to report on observations which are important for the enterprise.

It is the task of the information officer to ensure that all these types of information are collected; also that staff members are involved in evaluating the information for its importance in relation to the company's goals and strategy for the coming one to five years.

c) Methods

To do so, he will organize co-operative screening groups, challenging them to analyse the material, using the following criteria (figs. 9 + 10).

Usefulness of the information;
Its likely benefit to the enterprise;
Staff member most likely to make use of it in the enterprise;
Relevance to the enterprise's experience;
Does its purpose serve the aims of the enterprise?
Does it open new possibilities of improvement and/or innovation?

A screening group consists of five to ten staff members from the various sections (marketing, technical, economy and service are always represented). The information collected (including journals) is distributed equally among the members. They read and analyse it during working hours, and should prepare themselves for the oral presentation of their evaluation of the information they have selected. Once or twice a month (during late working hours), the screening group will meet with the information officer to report on their findings.

JOURNALS

procurement

CRITERIA

- PROFESSIONAL FIELD TO BE COVERED
- LEVEL OF COMPETENCE OF READERS
- CURRENT INFORMATION OR RESTROSPECTIVE RETRIEVAL
- LIMITATION IN NUMBER OF SUBSCRIPTIONS

Fig 9

JOURNALS

Appropriate utilisation

METHOD

- DISTRIBUTION 5-10 journals per individual in the Screening Group
- READERS' ACCOUNTABILITY - Feedback on "What is relevant to our enterprise ?"
- INFORMATION MEETING - Discussion of "What are we able to use for the work of the enterprise ?"
- EVALUATION AND EXTRACTION - Selection of material for immediate and future use
- FILING AND REGISTRATION
- ANNOUNCEMENT (brief notices of available information)

Fig 10

The presentation will lead to discussion on experiences, present knowledge, upgrading of knowledge and imaginative thinking and will result in an appropriate input to the information service file - for utilization when needed. The staff will use the information service centre because it is their centre - they have built it up themselves.

The information officer asks for the guidance of the group to ensure that information which has been evaluated is used immediately by the right person; and from the group reporting he edits a short news bulletin for circulation to all professionals of the enterprise, to inform them of what has been acquired for the enterprise's "think-tank", the information centre.

The information centre gains an input which should help it to operate as the intelligence service of the enterprise (scanning the outside world for more detailed information of importance for decision-making). Other aspects of this exercise are that the staff, through this co-operative, professional communication, can attract the management's attention: "Is it the policy or strategy of this enterprise to deal with this area, discipline, etc. - now or later?

The information service centre is not a depository or library for records, reports, books, etc. (because such material must be sent where it is most needed). Rather, it is a central register of the intellectual assets of the enterprise, whether they are the written or printed records of internal or external intellectual resources.

The information service centre is the point of liaison which mobilizes an external information service, to supplement the qualifications and knowledge of readily-available specialists and the "neutral" capacity to elaborate state-of-business or state-of-the-art reports.

d) Registration and Storage of Evaluation Information

Experience shows that registers of information must be arranged in a simple way, in order to ensure their optimum use. Each enterprise has its individual language and set of key-words for products and their application, processes, working methods, etc.

When necessary, the information service centre should be capable to transform/translate these terms into the thesaurus terms used by the external world. The register may be established on Mortimer Taube index cards, peak-a-boo cards or on a computer memory, but one must never let the system overshadow the importance of the message itself.

To keep registered material in order, it is very effective to give each evaluated individual item of information (a report, a book, a catalogue, etc.) a consecutive serial number - in order to "look it by number" - because titles can be misinterpreted, authors can be forgotten but numbers are unique.

e) Summary

The aim of a technological information service is:

- To stimulate the staff members of an enterprise and find solutions to the acute problems with which it is confronted.

- To support the work of staff members and to develop their talents into competence, in order to improve operations and innovate.

- To provide in time basic information for decision-making on strategies, policies and investments.

- To help ensure that company goals are currently adjusted to the opportunities, limitations and restrictions imposed by external forces or by the authorities.

"Your decisions are only as good as your information, your information is only as good as the reliability and integrity of your information source".

- A quotation from the Industrial Conference Board (USA).

C. Examples of Technological Information Services

1. Technological Information Services in Denmark

Dansk Teknisk Oplysningst-jeneste (DTO) was established in 1955 on the initiative of the Government to assist in furthering industrialization. It was given the status of a private, semi-autonomous institute mainly (up to 70%) financed by the government. DTO has served enterprises in all branches of industry located all over the country, preferably companies employing at least one practising specialist.

The choice of this type of enterprise was made because most of the technological information to be exploited was of foreign origin and written in foreign languages, of which English, German and French were understood by the specialists concerned.

About 4,000 companies and 800 units possessing specialized knowledge were identified - and confidential files were established. Files on 2,500 enterprises and 500 centres have been kept updated since the founding of DTO. About 500 enterprises have been visited per year, and 2,000 enterprises are frequently kept informed of DTO's initiatives by the distribution of about 40,000 individually selected information items per year. About 800 (approximately 40%) of the addressees have requested more information, and about 200 companies have requested information analysis and state-of-business or state-of-the-art reports.

a) Examples of service offered by DTO

Several case histories are mentioned below in order to show how industry has been served. They illustrate various types of assistance provided to small and medium enterprises:

Production and Production Capacity

A firm manufacturing a product with an export value of approximately US $ 3 million per year has misjudged the marketing possibilities and had, during a transition period of one to two years, delivery difficulties until new plants had been installed.

A survey carried out in co-operation with the Foreign Office revealed that a number of firms could, without great difficulty, undertake production and contracts established with several firms in the United States.

A firm used multiple cardboard packings closed by tape. But this type of packing is very expensive, partly because of the difficulty in removing old tape. DTO found a factory which had just developed a cardboard packing which could be folded and closed without tape. Moreover, it could be re-used more intensively than the one previously used. The total savings by the change-over to the new type was approximately 1/4 million Danish Crowns per year.

A firm knew that foreign machine tools were equipped with a component with a certain trade mark. It wanted to know who made the component and where it could be purchased. The name indicated a European origin, but German, component was found in an English handbook, and details on the manufacturer as well as on the Danish representative could be provided.

Innovations and Development - "A breakthrough was just round the corner"

Improvement of a well-known product.

A Danish industrial enterprise knew that some years before a foreign periodical had carried an article about a subject then of special interest to the enterprise. DTO who asked to investigate what had happened since the appearance of the article. DTO approached the Danish specialist in the field. It turned out that seven to eight years previously, he had arrived at the result which was later described in the foreign periodical. Moreover, it happened that, at the time, he had two young researchers working with the results previously obained. In this particular case, the enterprise started its investigation by asking questions "outside the house", but much too often we see that industrial enterprises are experimenting with materials and methods which have been described in the literature long before.

A firm had seen an isolated information item on a Czechoslovakian/ Soviet co-operation on the development of Servo-mechanisms for heavy industry". They asked for information on this co-operation and research reports. Through DTO's Czechoslovakian network of contacts, a Russian report on the subject was procured and a translation of it given to the firm. Besides, DTO was able to give information on a relevant Czechoslovakian patent and procured its translation.

Market Research and Sales

How to become competitive: the application of new methods.

A young firm in the instrumentation trade had masses of good ideas, but only little money and a lack of qualified technicians - they had only themselves. They asked the following questions:

"Can the apparatus which we have thought of find a market?"

"What similar apparatuses are on the market?" "What do they cost?"

"On which principles are they based?"

Within four hours of intensive search, DTO collected information which enabled the young firm to take a short-out in its developmental work and to capture a market in few months whereas it would have taken years otherwise.

Are we the first in the market?

A firm in the food industry worked at developing preservative additives for its products. Before undertaking a systematic investigation of the effects of the additives, they wanted to know how far advanced in this field were other firms abroad.

DTO used its foreign network of contacts to investigate all over Western Europe, the United States and Canada. It appeared that only in Japan and in Hungary had an interest been taken in these substances, and that only the Hungarian solution might be of value. The firm was able to continue profitably its developmental work, it had the lead.

A firm in the shipbuilding trade asked for information regarding the equipment of a special Swedish ship to be included in a quotation. The firm was pressed for time and could only indicate the trade name of the equipment. Through DTO's network of contacts, the name, address and telephone number of the relevant company was found in one and a half hours; moreover, the information was passed on that drawings of the equipment were available for a fee.

b) The Danish Network

Based upon the experience of DTO, a network of technological information centres (TIC's) has been in the course of development over the past 10 years.

Denmark is divided into 15 counties (administrative regions). The intention has been that each county should have its own TIC-unit to ensure that even the small craft enterprises are stimulated and provided with technological information and advice.

A TIC is manned by four people: an engineer, an economist and an experienced craftsman, plus a secretary to arrange visits and meetings. The TIC's are managed by local steering committees, but are linked up with major service institutes having experience in repackaging and transforming foreign technological information to adapt it to Danish conditions.

2. The Experience of other Countries

Experiments similar to those of Denmark are also carried out and experience gained by other industrialized countries within the area of the Organization of Economic Co-operation and Development (OECD). Canada established its Technical Information Service, affiliated to a National Research Council, in 1945; the United Kingdom established its Industrial Liaison Service, affiliated to the DSIR (Department of Scientific and Industrial Research), in the early fifties. France has developed and implemented such services on a regional basis.

Within the Commission of the European Communities (CEC) a working group, Information for Industry (CIDST/ii), acted in 1974-77 to exchange ideas and experience among the nine member countries; some study reports were published and may be obtained from Directorate XIII of the CEC, Bâtiment Jean Monnet, Luxemburg-Kirchberg.

Infotec-Mexico is an example of a UNDP-supported project in which the concept, the basic organizational structure and programme, including training for operation, was transferred from Denmark, while the information officers were practically trained in field operations in Canada (TIS). The assistance period was four years.

Technonet-Asia (headquarters in Singapore) is an example of a regional co-operation scheme. Eleven countries of South East Asia take part in Technonet, which is designed for the establishment of extension services and the training of relevant personnel. Their extension services are comparable to the Danish TICs.

D. Suggestions for consideration of the participants

1. Topics for Discussion

a) The need to set up technological information services designed to serve small and medium industrial enterprises for technological information services and advice;

b) Evaluation methods to be used to assess such services considered as intermediaries between industrial enterprises and the infrastructure of scientific, research and educational institutions, including libraries and documentation services;

c) Should technological information and advisory services adopt a "marketing approach" to information problems?

d) Should they be designed on a "person-to-person" consultation format?

e) The demand for confidential information services working on a fee basis;

f) If there is a demand for technological information services, who should take the initiative to establish them?

- Branch organizations?
- Professional organizations?
- Investment Banks?
- Local Authorities? (Because of the social value of the services.)
- Government? (Because of the economic and social value of the services.)

g) Should a technical information and advisory service (irrespective of the reply to question f) be:

- A public utility service that can be used free of charge;
- A public utility service which does not charge for "promotional" activities and routine information service, but does charge for requests for confidential information?
- A non-profit semi-autonomous institute, basically financed by public funds, taking promotional initiatives vis-à-vis enterprises, but charging clients for all requested services.

2. Possible Recommendations

It may be recommended that national governments give careful consideration to establishing an appropriate mechanism within their policy framework for furthering economic and social evolution by means of industrial development.

Such a mechanism (a technological information and advisory service) should operate as an intermediary between the sector of small and medium-size industrial enterprises (both private and public) and the national infrastructure (scientific, research and education institutes, etc.) thus ensuring that existing knowledge is applied to the greatest extent in industry for progress, particularly for improvements and innovations.

Concerning the technological information and advisory services, the following may be recommended:

a) An operating technological information and advisory service should be based on person-to-person communication, and cosultation with established enterprises which provide goods and services that are of value to socio-economic development.

b) The technological information and advisory service should take the initiative to call upon enterprises in the private and public sector, stimulating and assisting them to analyse and formulate needs for improvement of their operations and for innovations. The service should recognize the importance of establishing confidence in its services.

c) Furthermore, the service should identify within the national infrastructure of specialized information sources or within the region, or internationally, the most appropriate and competent sources of information likely to meet the requirement of the identified potential users of technological information and of technology.

d) It should be the responsibility of the service not only to refer users to such identified sources, but also to establish contact and an effective communication and to follow-up to ensure effective transfer of information.

e) In operating such a service, feedback from other national mechanism should be established, thus making it possible to identify existing deficiencies which could be remedied through training, improvement, etc.

f) To ensure its competence and efficiency, the service should be staffed with qualified and experienced people. Training should be provided at home and abroad by operational services of the same nature, calling for the provision of back-up for the service during the first several years of operation.

g) Governments of Member States of the UN or of its Specialized Agencies should request these bodies and other international and national organizations to provide the intellectual and financial means for such an upgrading of their national capabilities.

h) Once established and put into operation, such services should share their knowledge and experience on a bilateral, regional and international basis in order to improve the transfer of technological information and of technology.

International Conference on
Delivery Mechanisms for
Engineering and Technological Information
(Budapest, 3-5 November 1980)

AMBIVALENCE OF TECHNOLOGICAL INFORMATION

by

Roch T. de Mautort

AMBIVALENCE OF TECHNOLOGICAL INFORMATION

What serves the research and development engineer right does not necessarily help his colleague in industrial planning, investment decision and operation much.

Technological Information never shows up on its own, it always leans on something else, engineering information at this conference, industrial information in the title of UNIDO's Industrial and Technological Information Bank (INTIB) and scientific information most everywhere else.

Surely Technological Information has an identity problem well worth looking at with the eye of the analyst.

"Engineering and Technhological Information". When WFEO/CEI drew up this programme, they must have had a problem with its very title, because this binome does not represent a straightforward nor a very usual association.

Not a straightforward one because CEI always insisted on defining the engineering information of its concern by its destination, i.e. engineers in whatever professional function, rather than by its nature or origin, i.e. technical or generated by engineers. It is not possible to proceed likewise with technological information because that cannot be limited to whatever is being destined for technologists engaged in technological development work. Technological information also has its destination where technologies are actually being put to practical use, inter alia in industrial development as far as industrial technologies are concerned, where technologists are not at the receiving end.

Not a very usual binome either, at least to those engaged in the operation of information systems and services in the UN organizations, or in the conceptualisation of such, while also providing technical assistance to developing countries in this broad area of concern, such as UNIDO. The accepted associations here, written into terms of reference and acronyms, are Scientific and Technological Information (STI) on the one hand, and Industrial and Technological Information (INTI) on the other which is UNIDO's hand.

Scientific and Technological Information: this association reflects the dropping of the concept of "applied science". Now they speak of science and technology, related to research and development, scientific research and technological development, scientific research of natural laws and absolute if revokable truths, technological development of instrumentalities, including industrial technologies, of relative value to the needs of man under whatever different sets of circumstances man may live. There is, of course, a technologist dormant in every scientist, and technologists like to be referred to as scientists to lend the credibility of the absolute to their achievements in the relative; this should not, however, blur the language nor the issues in the minds of engineers.

This is what the UN Conference on Science and Technology for Development and the project of a Worldwide Network for the Exchange of STI are all about. STI is also the subject matter referred to by UNESCO under its UNISIST and GPI programmes on which the next speaker is going to elaborate.

In that association, STI constitutes inputs to R+D, a raw material in fact; their destination is scientists and technologists engaged in such pursuits, many of whom will happen to have engineering degrees. Technologi[illegible]

information in this sense will, like scientific information, most likely be of the sort that is best suited to make the best of information science and technology. It will, as primary as it can, have to be unprejudiced by previous manipulation, processing and comment. Any R+D project must be based on an autonomous assessment of the state-of-the-art based on as comprehensive a documentation as can be accessed. Those engaged in R+D are highly dependent on and grateful for whatever information science and technology can open to them and bring close to them, from world-wide sources of information. They need every hard data, bibliographic and referral data to base their labours on, and to relate them to. Scientists and technologists compete for attention to their information needs with another category of information users, no longer those engaged in scientific research and technological development, in a limited sense of the word development, but those engaged in economic development in a broader and more direct sense of the word, inter alia industrial development.

Industrial and Technological Information by contrast definitely relates to industrial development in the broader sense, in which the outcome of technological development work, in the form of novel industrial technologies, is to represent an input among others, the more desirable in developing countries, as indigenous technological development centres are increasingly able to offer genuine alternatives to imported "proven" technologies, but only again an input among others, where "proven" technologies long past the R+D stage are in the vast majority with their weight of experience and know-how.

Industrial information offers inputs to industrial planning, pre-investment technology selection and acquisition, feasibility studies etc. to industrial management, engineering and marketing. Its destination is anyone with a planning, managerial or operational function in industry, whether in an advisory or decision-making capacity. Many of those concerned will obviously be engineers.

Technological information singled out from the broader context of industrial information, is no longer what has been referred to in the scientific context, it relates to industrial technologies. In an industrial technology anything that is not tangible hardware is knowledge, whether written down or held as individual knowhow, whether freely accessible or proprietory, whether offered on whatever terms or withheld altogether, whether susceptible to acceptance and usage at the receiving end or not. Technological information is anything that gives access to such knowledge most of which does not flow through formalised data banks and systems, and if it does to some extent, does not reach the end-user in a palatable format.

This is what UNIDO's Industrial and Technological Information Bank (INTIB) is all about, together with UNIDO's efforts to centre assistance to developing countries on the development of industrial information facilities with an extension function, operated to the largest possible extent by engineers rather than by documentalists. The information called upon for industry represents a processed commodity rather than a raw material, by qualitatively concentrated rather than quantitatively comprehensive inputs. Identification and solution of problems, answers to questions, are being called for, not printouts nor masses of documentation.

This may look like a simplistic vision from the vantage point of major industries in industrialized countries, where the functions of documentation, R+D, technological decision-making and operations are intimately related into a whole, and where sectoral data banks providing more and more material about more and more specialized subjects are becoming available. It is close to reality in small and medium industries wherever and in developing countries in particular.

This brings us back to the problem of competition for attention to the information needs of R+D which information science and technology can aptly take care of through data banks, systems, networks and ancillary services, and those of active industrial development. The former are developed from the point of view of the super librarian's project which must be to open up sources into every reservoir of documentary knowledge accessible to organize and channel the flow of the information contained in such documents downstream towards a distant end-user, as close to him as possible with a formidable competence as to the instrumentalities of the identification, the collection, the organizing, the channelling and the movement downstream towards terminals ... and presuppositions as to end-users' needs.

The needs of end-users in industry can only be identified and served in fact by industry itself, drawing, inter alia, on what is offered by documentation systems and networks, but inter alia only. There will be information "gate keepers" within the firms, there will be consultant engineers outside of these, there will be industrial information officers, there will be information analysis and ad hoc generating services there will be INTIB to back them up, all drawn from the engineering profession with past or present experience in industry.

INTIB is a service, a service to the technology selection process. It brings a new dimension to the ongoing industrial information activities of UNIDO which, themselves, are part of a programme under which the organization assists in strengthening the technological capacities of developing countries. Capacities to deal with technological acquisitions: the paper by Mr. Janiszewski will relate to this in particular, capacity to adapt or develop indigenous technologies and to transfer these among developing countries, capacity to chose among technological alternatives, capacity to obtain and assess information on these. INTIB relates to the latter aspect of this programme.

The description of INTIB contained in the document made available to participants, lists the 20 sectors of industry dealt with for 1980-81. Inquiries into options under any of these sectors will be received at UNIDO and answered with particular care and resort to international expertise. Technological profiles showing options in comparative technical and economic terms will be drawn up. A methodology for the rationalisation of technological choices will be developed.

While INTIB, by virtue of GA resolution, is to be part of the world-wide network for the exchange of STI referred to, it is not really in STI ...and it has a networking function of its own relating to information on industrial technologies, and this is the aspect on which the speaker wishes to dwell: the rest is to be read about in material distributed on INTIB and related activities of UNIDO.

The industrial technologies to be set in motion in developing countries over the next 20 years will be adding up towards the 25% target set at Lima in 1975 whereunder, by the year 2000, developing countries between them will turn out one quarter of the world's industrial output. The starting position was estimated at that time at 7%, and the total world industrial output does not stop augmenting in absolute terms which therefore does not make for an increase from 7 to 25 but from 7 to anything between 50 and 100.

Whatever these figures, it is clear that most of the industrial enterprises and production units that will be in operation at the end of the century in developing countries, do not exist today, at whatever stages of planning, R+D, financing and eventual operation they may be. The crucial point in every single decision-making process that will lead up to the relevant investments, is the "appropriateness" of the technological choice. Under tight constraints the wrong choice is an unpardonable waste. Hence the importance for national authorities in developing countries not to leave the selection process out of sight.

They did not when they directed UNIDO to set up INTIB to serve the process; it remains that such a global establishment cannot succeed if it does not find in each of the developing countries one or more national corresponding institutes with a similar preoccupation at the national scale. Networking for INTIB consists in identifying these and offering them their services, and in drawing the attention of local authorities if no such correspondent exists, leading up perhaps to technological assistance projects towards institutional development in this area.

Many countries have set up industrial information services directed by engineers, served by documentation centres, manned by extension officers, some directed towards small and medium-scale industries, such as the members of the TECHNONET network, others with a broader scope involving all levels of industry such as the Industrial Development Board and its information services of Sri Lanka or INFOTEC in Mexico. Presentations on each of these experiences are on the programme of the Conference. INTIB is in a working relationship with each of these facilities.

There are other agents involved in the technology selection process, development banks, engineering consultants for instance. This presentation will conclude on a call to engineering associations in the WFEO membership. There may, for each of these, be a substance to be strengthened or to be added to their associative life in the form of an involvement in the industrial information function. INTIB offers its backing to the development of this. In more and more developing countries local engineering consultants and consultant firms are offering their services. However competent and well informed, they may be in need of the services of INTIB when it comes to lining up technological options.

Before leaving the floor to presentations by sister organizations of greater relevance to STI, I must refer to the possibility offered to INTIB under an agreement with WIPO and the Austrian Patent Office, to draw for the benefit of developing countries on the information on industrial technologies contained in patent documents, a well organized store of which is at hand at INPADOC in Vienna. This has been working to the satisfaction of information users in industry in developing countries thanks to the state-of-the-art search operations carried out by engineers. The Industrial Information Section of UNIDO, and those involved in the operation of INTIB at large, are engineers also.

I would like to conclude, being neither an information scientist nor an engineer myself but an industrial information officer astride the two corporations, that everyone has to follow his own call. Information scientists to develop their data banks and push their systems as far as they can reach, engineers to preserve their critical distance, intellectual curiosity and doubts that data banks and systems have all the answers, industrial information officers to provide the answers from wherever they may come. But it is up

to national authorities to set their priorities. Spokesmen for the 77 at various conferences, while confirming their will to access technology, are very sceptical as to their capacity to foot the bills for operating the data bank terminals and systems pressed upon them for what use they anticipate to derive from them.

It remains that if the resources which developing countries are ready to assign to that very last segment of the information flow on industrial technologies that reaches the decision maker's ear, are earmarked for the setting up of teams of resourceful industrial information officers, mostly engineers, with an extension function to find their information wherever they can locate it, they will find their money well spent, and very little money indeed it will be in relation to the cost of industrial investments. One single major saving caused by an appropriate choice of technology may well offset the total cost of the whole national industrial information structure.

As to the identity of technological information with which we introduced this presentation by worrying about it, did this help it to stand on its own feet? Certainly not, it remains an ambivalent proposition, but it only relates directly to industrialization, which results from an accumulation of investment decisions, when given the meaning of information to those, engineers or not, with advisory or decision-making responsibilities in the technology selection process, on industrial technologies, whether "proven" or right out of the R+D process.

Whatever UNIDO undertakes, and this applies to INTIB in particular, will be deemed by developing countries, by its close and direct relevance to where the action towards the Lima objective takes place, and this is where engineers are at work. The relations between UNIDO and WFEO are therefore highly appreciated.

Seminar on Information for
Small and Medium Industrial Enterprises
(Buenos Aires, 14-18 November 1981)

INTIB FOR INDUSTRIAL DEVELOPMENT: THE UNIDO APPROACH TO INDUSTRIAL AND TECHNOLOGICAL INFORMATION

by

Roch T. de Mautort

Participation by UNIDO and of some of its most distinguished consultants, in the work of the Committee of Engineering Information of WFEO and its annual international seminars, has been continued over a long period of time with the long affirmed intention to reach out, through the prestigious channel offered by WFEO, to the world community of engineers of which it represents the corporate expression.

Working at the industrialization of developing countries, by serving it inter alia under the acronym of INTIB with industrial and technological information services, UNIDO, whatever makes the difference of its intergovernmental character within the UN system from non-governmental organizations such as WFEO, cannot dispense with calling the attention and requiring the co-operation of engineers in all countries, and particularly those in developing countries, who are certainly the most important agents of industrialization at the stages where investment decisions have to be assisted with expert knowledge and taken, and subsequently,where industrial operations have to be conducted. They are the principal holders of industrial and technological knowledge, know-how, and technology that INTIB was established to draw upon. They are the principal end users,through whatever channels they may be reached, of the services that INTIB is to provide. Many are the engineers from all parts of the world, who directly have been engaged in serving technical assistance projects of UNIDO, or who have made their knowledge available to UNIDO's Industrial and Technological Information Bank, and this presentation will have started with a call for more such assistance to INTIB as this major project develops, along its own very specific lines.

UNIDO's participation in this seminar is at the same time the starting point, and perhaps the culminating point of a series of encounters in this form, with engineers, research and development centres at the service of industry, industrial development banks and, of course, civil servants with responsibilities in the area of industrial development, in 11 countries of Latin America. The object of these encounters, as was the case in 8 countries in South-East Asia in 1980, and is planned to be the case in a number of countries on the African continent in 1982, is to pass on and receive a certain

number of messages, of relevance to the subject of this Seminar, that relate to several levels of concern. At the level of the very industrial development policies, at the level of industrial information structures that ought to be established or strengthened to serve such policies, at the level of co-operation between such structures in the form of national, regional and world-wide networks, at the level, finally, of the role that INTIB is called upon to play at the service of these policies, these structures and these networks. INTIB was established as a central and common facility for developing countries to assist them in the area of industrial and technological information, but there obviously is not much it can do from a central and distant point if it does not find partners in developing countries with a mission at the national scale, similar to its own at the international scale. Before relating this mission specifically to small and medium industries, may I try to visualize the concept with a drawing (Annex 1).

First we have an arrow, it represents an organized information flow, between libraries for documents, between computerized systems for data. It starts at the entrance points where documents and data present themselves and their terminal point at terminals in documentation centres. What happens to documents and data along the route is the business of librarians, documentalists, archivists and data bank operators, collectively referred to as "information scientists", internationally organized and encouraged, at the non-governmental level by FID, and at the intergovernmental level under the General Programme of Information (UNISIST) of UNESCO, with an additional contribution in terms of world-wide networking for the benefit of developing countries, by the UN Committee of Science and Technology for Development. What this arrow carries mainly is scientific and technological information (STI), as generated by scientists and technologists under their research and development activities, and as needed by other scientists and technologists engaged elsewhere in similar pursuits. What relevance the flows of STI to the needs of engineers in industrial enterprises, and in particular to the needs of small and medium industrial enterprises, where the smaller the enterprise, the fewer the engineers? What serves the research and development engineer right, does not necessarily help his colleague in industrial planning, investment decision and operation much, and certainly not the small and the medium industrial enterprises as such.

Then we have two circles, right and left of the STI arrow. The one to the left represents the world of industrial knowledge, know-how, expertise, the world of industrial technology taken in the sense no longer of an R+D endeavour but in the sense of a technological capability in existence and fit for transfer. The one to the right represents the world of question-marks in industry, i.e. of needs for information out of the circle to the left, whether perceived, expressed or latent, whether clearly definable or an unorganized plasma of problems.

Two symetric situations prevail. From the world of knowledge, a segment freely flows, and spontaneously too, in the form of documents and data into the STI flow. From the world of question-marks, a segment spontaneously and consciously comes to the fore in the form of requests for identifiable data and documents out of the STI flow; and more often than not, offer and demand will match, proving the value also to industry

of the services of documentation centres set up under STI policies. Another symetry exists at the other extreme in terms of spontaneity in contributing to information flows. In the world of knowledge, there is that hard core of classified, proprietory technology, unaccessible through other than commercial channels, if at all, save the cracking of safes and the washing of brains, which is not the area in which UNIDO works. In the world of question-marks, there is also that hard core of persistent ignorance and total allergy to any kind of information and advice. At both ends, UNIDO has a role to play at the service of industrialization in developing countries, namely to the left to show the hard core of proprietory knowledge for what it really is, mostly much smaller than is imagined in developing countries, and in many instances with substitute knowledge of a free-flowing nature easily and inexpensively accessible. To the right, the mission is to promote a sense of the value of industrial and technological information to enterprises in developing countries, in terms of investment savings and operational benefits, to be secured at no or little cost through good use of information services.

But between the extremes of free-flowing documents and data to the left, spontaneous demand for such to the right, and of the hard core proprietory knowledge, or technology, call it as one wishes,to the left and hard boiled ignorance to the right, there is a vast zone for INTIB to explore to the left and for appropriate industrial information structures to explore to the right, and there is a necessary information flow distinct from STI, call it INTI for industrial and technological information, between INTIB and such structures.

INTIB was established within UNIDO under the Lima Declaration and Plan of Action on Industrial Development and Cooperation, Lima, Peru March 1975, as one of the means whereunder developing countries should be granted access to technological know-how and advanced technology, whether patented or not, under fair equitable and mutually acceptable conditions taking into account the specific development requirements of the recipient countries; appropriate measures including consideration of the establishment of an Industrial and Technological Information Bank should be taken to make available a greater flow to the developing countries of information permitting the proper selection of advanced technologies. There was a history of industrial information services to developing countries by UNIDO, these have all been integrated under a broad acceptance of the acronym as a general function of the organization, but the exercise of that function has increasingly been geared to the specific objective of assisting in the technology selection process. The function includes the provision of technical assistance to the setting up of matching industrial information structures in the countries.

The descriptive brochure on INTIB that goes with this presentation, includes the list of sectors particularly being dealt with, both in the form of answers to inquiries "Pregunte y Responderemos" and in the form of printed material, technological profiles, information packages, and other UNIDO generated material. Whatever UNIDO produces for INTIB

purposes in the form of documents and data, is naturally floated into the STI flows, but the main is problem-solving information going directly through other channels to recipient countries. The vast area between the above-mentioned extremes, where technology is neither too freely nor too restrictively available, is the hunting ground for the INTIB operators, wherefrom, and from a large diversity of countries, east or west, north or south, they propose to fill their mandate.

Industrial information services geared to information processing for problem-solving, oriented towards the provision of extension services, distinct from industrial documentation centres, whether or not institutionally adjacent to such, operated by industrial information officers, with no pretence of belonging to the community of "information scientists", engineers with industrial experience and a polytechnical outlook, with a value added in terms of enterprise economics and management techniques, and, of course, a better than average familiarity with documentation techniques: a long sentence to put in a nutshell what sort of partner INTIB essentially wishes to interact with at the country level. The functions of such services are most aptly described in the basic working document of this Seminar, written by the very well known and highly respected retired Director of one of the great success stories in this area, and certainly the oldest, DTO Copenhagen. Ing. Kjeld Klintøe has largely contributed to internationalize the concept, in his capacity as past President of the Industrial Information Committee of FID, as an expert for UNIDO on a number of technical assistance projects in all continents, currently in Tanzania. Members of the mission throughout Latin America in a consultant capacity to UNIDO, also speaking at this Seminar, are associates of the author of this paper within FID/II, his successor as Chairman of this international Committee, Dr. J.R. Pérez Alvarez-Ossorio from Spain, the Vice-Chairman, J. Kirouac who has been heading, in Canada, for a working career the Technical Information Services, also a success story in this area in a different context and a source of inspiration and assistance to developing countries over the years, and E. Medina-Ramos from INFOTEC Mexico, an extension officer in his own right attached to a well-known and effective institution, which in its inception has drawn upon Canadian and Danish experience as well as on UNIDO's technical assistance. The three of them, surely echoed by L. Chico, TECHNONET ASIA, Head of a regional network of information services for small- and medium industries set up with Canadian assistance,and a regional associate of INTIB, will present extension services with the function in the circle to the right on my drawing to identify problems, formulate them and look for information of a problem-solving capability wherever it is to be had, in particular as nodes in an INTIB network. Whatever information needs they identify can be expressed in the form of requests for documents and data, will of course be placed with the closest STI terminal at hand.

There is another information flow, distinct from STI, distinct from INTI but obviously relevant to needs for technological information, which is the commercial flow of technology, beginning with the external information on technologies offered for licensing or other forms of partial or total transfer and continuing with the internal information supplied under the terms of agreements concluded for such transfer purposes.

None of this pretends to be objective nor to facilitate the orientation of the choice of the recipient towards technologies perhaps more appropriate. It is the joint function of INTIB at one end and extension services at the other to help developing countries to make the best out of the contents of these commercial information flows by placing the information supplied as far as possible in a comparative perspective.

We are addressing engineers but we are discussing service to small and medium industries, and we are thinking in particular of developing countries, It is clear that the less developed the country, the less there will be engineers to be found, even in industries that they would like to consider medium and that by other standards would be small. How better could one think of making the best out of existing engineering capability than by giving some engineers an industrial information function for all the small- and medium-scale industries in one area. UNIDO therefore fully endorses the views contained in the working paper.

Coming back to a policy level of consideration from which the spokesman of an organization such as UNIDO cannot stray too long from, I want to refer to the presentation by Dr. Adam Wysocki, who is also travelling through Latin America with the UNIDO team. Surely, he is the one of its members with the greatest international reputation as the outgoing Director of UNESCO's General Programme of Information known under the acronym UNISIST. This has successfully affirmed the importance of STI policies and structures as such, i.e. without relevance to any particular end user groups, as far as conceptual guidelines and operational frameworks for the operation of STI centres are concerned. He now comes to the fore with us to affirm that STI policies under the aegis of Ministries of Science and Technology will continue to develop, a general information network,as advocated by the 1980 UN Conference on Science and Technology for Development, may materialize in a not too distant future with the current progress of informatics, but all this will be to no avail if no efforts were made for the future to integrate information components into industrial development policies or,for that matter, agricultural, health and other policies, with a vision of industrial information as a commodity the costs of the provision of which, related to those of investments which they permit less costly selection of, and to industrial turnovers which they help maximise, will be negligible. One cannot agree with him more.

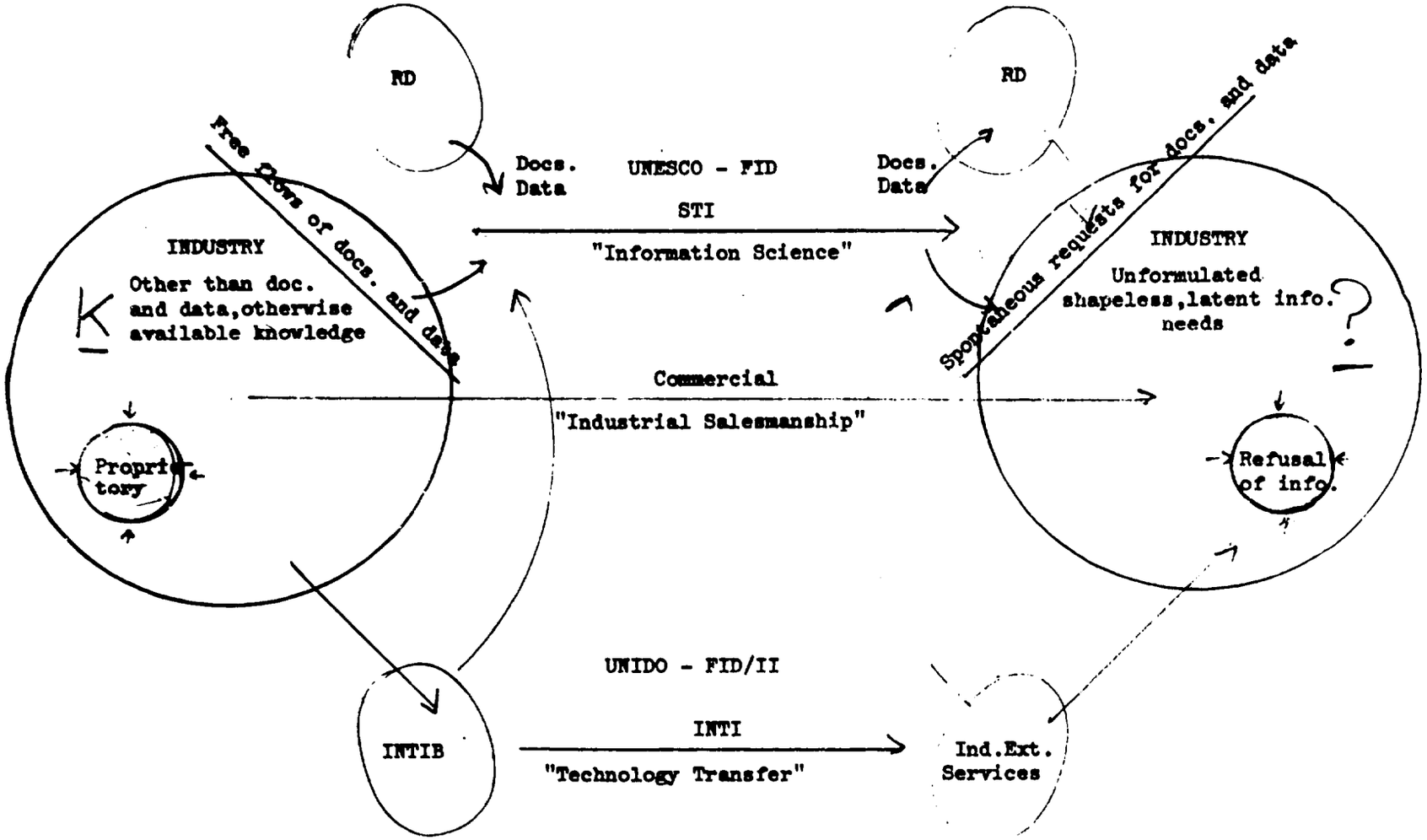
One would, however, wish to put it before decision-makers and those who advise them, many of whom engineers, that the services of INTIB and those of extension services,to be fully serviceable to industrialization as such, ought to be geared with a corresponding diversification of staffing to all sectors of industry, the 20 INTIB sectors in particular, but also to any size of industry. The extension service concept as indicated in the working paper is extremely elastic in terms of size of enterprise, and, apart from enterprises as such, they should be able to provide INTIB-backed information and guidance to those with industrial and technological forecasting assessment and planning responsibilities.

UNIDO has a mandate for promoting co-operation between developing countries also in the area covered by INTIB. Development banks are being presented with projects the technological contents of which will more often than not be problematic. They have past horror stories they will be

reluctant to recognize outside the circle of their peers. UNIDO tries to establish linkages between development banks in a variety of developing countries for the exchange of technological information between them. The same applies to technology registries, engineering consultant organizations, industrial R+D centres etc. Regional linkages, the model of which for S.E. Asia may be seen in TECHNONET ASIA as previously referred to, between industrial and technological information services with a particular target group for their efforts in the small and medium sizes of industry, should certainly come off the ground in Latin America, as they already have conceptually under the acronyms of RITLA and CEILA.

Participants in the Seminar are cordially being referred to illustrative material of the workings of INTIB at the service of small and medium industrial enterprises: the brochure on INTIB, the "Pregunte y Responderemos" pamphlet of the Industrial Inquiry Service, advertised as Mail-Order Technical Assistance: one might refer, in the case of INTIB, to mail order transfer of technology. Also printouts to illustrate that we do operate with computer support are there, with listings of inquiries placed over the past two years to INTIB from individual Latin American countries, the scanning of which from the point of view of dynamic user needs, are worth any a priori survey, with listings of the holdings of INTIB in terms of subject files, with listings of institutions at the service of industry in Latin America in one capacity or the other. The Guides to Sources of Information for each of 39 sectors of industry are a best selling instrument, inter alia for small- and medium-scale enterprises, to establish their own external relations for information exchange, the Industrial Development Abstracts are all on a data bank, permitting retrieval of twelve years of publications, reports, studies etc. generated within UNIDO and frought with useful technological information. The corresponding documents are in great demand. The UNIDO Newsletter, on free subscription, will carry information on the progress of INTIB.

It has been a privilege to take part in a seminar where so much of concrete value to the development of small- and medium-scale enterprises will have been expressed that one can wholeheartedly adhere to, that it has left scope for a presentation of where INTI stands as an information flow, vis-à-vis STI and commercial informatinn flows, of what policies and what structures are most likely to make the best at the receiving end of the services of INTIB.


RD
RD
Free flows of docs. and data
Docs.
Data
UNESCO - FID
Docs.
Data
STI
"Information Science"
INDUSTRY
Other than doc.
and data, otherwise
available knowledge
INDUSTRY
Unformulated
shapeless, latent info.
needs
Spontaneous requests for docs. and data
Commercial
"Industrial Salesmanship"
Proprietory
Refusal
of info.
UNIDO - FID/II
INTIB
INTI
"Technology Transfer"
Ind.Ext.
Services