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Agenda item 5

Industry 2000 - New Perspectives:*

PROPOSAL NO. 5:

INTERNATIONAL INDUSTRIAL TECHNOLOGY INSTITUTE

Paper prepared by the Secretariat of UNIDO

00296

* The attached is an elaboration of the proposal described in ID/CONF.4/3, Part One, section 2.4.2 and Part Two, section 7.4.1. It is available in English only.

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THE INTERNATIONAL INDUSTRIAL TECHNOLOGY INSTITUTE

1. INTRODUCTION

This paper elaborates the rationale behind the proposal for establishing an International Industrial Technology Institute, advanced in ID/CONF.4/3, "Industry 2000 - New Perspectives".[1/] The proposal aims at establishing a focal point, in the South, for motivating, assisting and disseminating the results of technological development. The paper encompasses the background, objectives, suggested methods of operation and funding for the Institute, providing, in a way, the terms of reference for the Institute. The discussion is framed in four main sections and one annex:

1. Statement of Objectives
2. Scope of Activity
3. Priority Areas in Industrial Technology
4. Methodology - Organisation
5. Annex discussing related international, regional or national proposlas for the transfer/development of technology in DCs.

2. THE NEED FOR A FOCAL POINT FOR CREATION AND DIFFUSION OF TECHNOLOGIES IN THE DEVELOPING COUNTRIES

The United Nations Conference on Science and Technology for Development held in Vienna in August 1979 resulted from growing international awareness of the critical role of science and technology in the development process. It simultaneously recognised the impediments arising from prolonged technological dependence of the developing countries on the developed, due to prevailing global imbalances in technological capabilities. It focussed discussion of remedial action on three areas, i.e.:

- Strengthening the scientific and technological capabilities of developing countries;
- Restructuring the existing pattern of international scientific and technological relations;
- Strengthening the role of the United Nations in the field of science and technology and the provision of increased financial resources.[2/]

The present proposal is motivated by two specific objectives which emanate from these broad principles, i.e.:

(i) The need for institutional measures to stimulate the identification of DC technological requirements, and their fulfilment through concerted efforts in both the industrialised and developing countries, and

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1/ See pp. 35-38 and 192-195.

2/ Vienna Programme of Action, Draft, UNCSTD 1979, preamble, para. 8.

(ii) The need for resource flows between and to developing countries with the objective of enhancing their technological self-reliance.[1]

Supportive national, regional and international efforts towards meeting these needs have already been underway for some time now. In developing countries, technology registries, national research and development institutes, universities and a variety of national public bodies have been established in several instances. At the regional level, centres for the acquisition and transfer of technology now exist in all the three regions of the developing world, and at the international level, the specialised agencies of the UN system have undertaken specific programmes to stimulate the creation and diffusion of technologies more attuned to DC requirements.[2]

There have been varying degrees of success of these efforts in propelling DCs along the path of technological self-reliance. Some countries (Korea, India, Brazil, Argentina and Mexico, for example) have been able to attain a considerable domestic capacity for acquiring, adapting and generating modern technology in critical areas of industry. In other cases, the extent of institutional and other capacities has been far less developed. As a result of the unevenness of indigenous technological progress within DCs, the principal source of industrial technologies is North-based TNCs, from which they can be purchased in various forms: embodied in equipment, packaged in DFI or unpackaged. Consequent to this commercial basis for technology transfer, DCs tend to acquire technologies which are often rigid in terms of their factor and resource inputs, and provide little incentive for domestic development or diffusion of technological know-how.

At another level, the internationalisation of technological norms has tended to suppress potential indigenous sources of technological advancements in DCs which include not only more "formal" mechanisms such as facilities for research and development (R + D), but also avenues such as shop-floor innovation and the accumulation of experience through artisanal production. The latter category of innovations, although often localised to the confines of a factory or a region or an individual country, may reveal possibilities and find international application in improving productive capacity.

Finally, the question of the "appropriateness" of industrial processes and products has been the subject of national and international concern. The abundance of literature and discussion of the question of "appropriate" technologies is by now too familiar to call for a recapitulation of underlying ideas here. International policy measures have been proposed in several quarters to identify demand and to support the development of technologies to fulfil these demands.[3]

1/ In this study, the concept of technological self-reliance takes on the relatively unambitious (but more realistic) meaning by emphasising DC capacities for assimilating, adapting and improving upon imported technologies, as a more immediate objective, coupled with long-term programmes to develop the indigenous technology-generating capacities in developing countries. See, for example, the supporting chapter "International Industrial Co-operation, National and Third World Perspectives", section II.2.2.

2/ An elaboration of international efforts is provided in section 6 of this paper.

3/ See, for example, the papers and proceedings from UNIDO's International Forum on Appropriate Industrial Technology, New Delhi/Anand, India, 20-30 November 1979 and the IMAT proposal discussed below.

It is apparent, then, that the potential sources of technology for developing countries are both diffuse and diverse. While there has been considerable national and regional action taken to uncover these sources and to stimulate their capabilities, the major functions outlined below are not being handled in a systematic manner, especially at the international level. Consequently, the International Industrial Technology Institute is intended to provide a sectoral focal point for efforts to support the identification of sources, and the creation and diffusion of industrial technologies for developing countries. Its functions would be to catalyse, support and disseminate DC-oriented technological development programmes in well-defined areas of activity.

3. SCOPE OF ACTIVITY OF THE PROPOSED INSTITUTE

3.1 The Principal Objectives

The principal objective of the Institute would be to fill the need for a single focal point for developing countries involved in improving their industrial technologies in specific sectors. Correspondingly, the Institute would have a service function rather than an initiator or implementing agency for technological development.[1/] The enormous heterogeneity, spread and complexity of the spectrum of industrial technologies, and the huge number of agents of technological change preclude any major directing or co-ordinating role for a single international body. Furthermore, since the bulk of industrial technology is generated and used through commercial market channels by private enterprises, a strongly interventionist role must also be considered impracticable. The service function, as such, however, would have to be multidimensional, in order to make the Institute responsive to at least three aspects of international transfers of technology:

(i) Regional requirements broadly reflecting the level of technological development, and the perceived policy directions of policy makers in individual developing regions.

(ii) Differences in the principal problems associated with specific technologies. For example, with some technologies the needs of developing country clients of the Institute may be more concerned with problems of acquisition and adaptation. In other cases, the clients of the Institute may possess the requisite know-how for the production of a technology, but need assistance in replicating or diffusing it domestically or internationally.

(iii) Differences in the origin and avenues of technological change. Distinct streams of industrial technology have specific characteristics in their diffusion. At one end, patented industrial processes packaged with DFI can be acquired only through the enterprise controlling the patent. At the other extreme, technology generated as shop-floor know-how for adapting and improving upon known processes may best be transmitted through direct exchange of experience between shop-floor personnel.

1/ The actual activity stimulated by the Institute would primarily take place at regional or national levels, as discussed in section 5. Methodology - Organisation.

Each of these aspects of technological development would impose particular demands on the Institute. An elaboration of these aspects is therefore necessary to the discussion on the proposed functions. To look at each one in turn, then:

3.2 Meeting Particular Regional Requirements

A statement of regional positions was presented by the UNDP in its submission to the UNCSTD.[1/] The regional appraisals represented the points of view of the four Regional Bureaux of UNDP, based on their experience with inter-agency co-operative programmes in science and technology-related activities. These functions are summarised in the following.

In Africa it was felt that the specific problems of the region received too little attention at present. Priority areas for co-operation concerned development of technology adapted to tropical conditions of humidity and heat, development of energy resources available in Africa such as solar and wind energy, building up of indigenous technological capacities and investing more in programmes addressing particular African problems. This could be achieved by enhancing TCDC; pooling efforts and resources; by external financing and co-operation from developed countries with a view to assisting the quest for self-reliance; and by firm international commitments for increasing financial resources.

The Arab States stressed the constraints posed by lack of institutional infrastructure and of skilled manpower. Accordingly, priority areas are assessed to be more in the sphere of national action than in international co-operation. International co-operation should concentrate on assisting in the selection, negotiating and application of technologies to sustain development projects; in developing managerial capacities; in adapting training facilities in developed countries to the needs of developing countries, and in identifying endogenous technological capabilities in the region.

In Asia and the Pacific the inappropriateness of technologies transferred from the North was emphasised. The developing countries of the region are beginning to suffer from the adverse effects of "substitution technologies" utilised in the industrialised countries. Beside calls for national action to develop the educational base and research facilities, international measures were felt to be particularly important in providing information on the range and terms of technologies available; in strengthening DC engineering design and consultancy capabilities; in research on primary resource-based products, and in research towards rural production and the social sector. The fundamental role of the Regional Centre for the Transfer of Technology and the plans to organise networks of similar type with a sectoral focus were stressed as being particularly important to regional action.

1/ UNCSTD A/CONF.81/BP/UNDP, Science, Technology and World Development: The Views of UNDP, Vienna 1979, pp. A-6 to A-20.

In the Latin American region the long-standing efforts in building national technological capabilities and successful efforts at regional co-operation came to the forefront. Many co-operative projects in the field of energy, both in the utilisation of conventional energy sources and in the development of new and renewable source, were cited, as well as similar projects concerning agricultural and health technologies. It was pointed out that the differences in technological capabilities within the region opened up a great scope for TCDC, that the accumulation of practical experience constituted a major stock of knowledge which could be utilised by other developing countries. Multilateral co-operation between developing countries was viewed as being important in formulating technological development plans, financing, exchange of experience and training of skilled manpower.

Areas of Concensus

Three main points stand out in the regional assessment:

(i) Differences for scientific and technological capabilities within the region provide for a wide variety of needs for technical co-operation and TCDC.

(ii) Accumulation of practical experience in policy formulation, instruments, procedures and arrangements in science and technology constitute a major stock of knowledge for utilisation in other developing regions.

(iii) Multilateral co-operation could play a role in helping the relatively technologically mature countries, for example, in the design of scientific and technological development plans, financial management of scientific and technological development, interchange of experience in policies for technology acquisition, foreign investment, etc., and the training of skilled manpower.

The preceding scan of regional viewpoints indicates contiguous areas of policy for international co-operation.

(i) There is a desire for increased TCDC, viewed in its widest context, i.e. there is a need for intra-DC exchange of experience on both inter- and intra-regional bases. Benefits in the development of technological policy, management capacities, know-how and R + D capabilities will follow from inter-DC co-operation.

(ii) There is a need to orientate research and development towards specific development needs. In the first instance, the shortage of finance on a steady basis is a critical constraint on "relevant technological efforts". Second, in order to enhance the technological self-reliance of developing countries, the undertaking of research and development should involve DC R + D institutions or skilled personnel, as much as possible. Third, the need for efficient management is a critical element of R + D programmes. A transfer of research management know-how, ranging from project selection and specification, to evaluation and diffusion, from IC and the more successful DC institutions, would therefore be as valuable as the training of scientists and technicians itself.

(iii) There is a need and a willingness to contribute towards efforts towards technology policy formulation and planning, on an inter-regional basis. International efforts towards stimulating governmental interchanges on experience with measures to screen and generate technologies are an immediate area for international action.

(iv) Energy is an immediate priority sector for action in R + D, where efforts in three developing regions (Africa, Asia and Latin America) are already underway. Here, technical and economic results of experiments and the extent of interregional applicability need to be examined and transmitted across countries. More will be said on this in section 4 - Priority Areas.

These areas of concensus clearly point at benefits which could be derived from the proposed Institute. To this effect the Institute should:

(a) provide "seed-money" for DC-oriented technological development;

(b) engage in sponsoring programmes of co-operative research or establish twinning arrangements between research institutions as postulated in the current joint UNIDO-WAITRO[1/] programme;

(c) stimulate policy information or co-ordination between governments. The informational aspects of transfer of technology agreements are already being handled by mechanisms such as UNIDO TIES. The availability of technological alternatives is provided for in specific sectors or areas by information systems such as UNIDO INTIB, the World Bank TRS and other information banks. DC negotiation capabilities on technology transactions are being improved through programmes such as the training courses and manuals prepared by UNCTAD. The activities of the Institute will take into account existing programmes or mechanisms in order to avoid duplication of efforts.

3.3 Technology-Specific Problems

Much of contemporary discussion on co-operation for the technological development of DCs adopts an IC orientation by viewing the problematic as one of enhancing DC R + D capacities to the level of "the state of the art" in ICs. Laboratory-localised approaches to technological development have been successful in many cases. In other, notable negative effects have emerged, ranging from rendering efforts practically meaningless (due, for example, to fundamental misdirection of research in areas of questionable industrial applicability, or the sheer time involved in propelling technologies through to their application), to a cultural alienation of the scientist or technician from the developing country environment rendering him useless to development problems. The appropriate technology movement may in part be viewed as a programme towards redressing this problem. Analogous

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1/ WAITRO = World Association of Industrial and Technological Research Organisations; see UNIDO ID/F/C.3/86, Joint UNDP/UNIDO evaluation of industrial research and service institutions. Note by the Executive Director to the Thirteenth Session of the Permanent Committee, 28 August 1979.

to attempts to generate and transfer appropriate technology, there must be attempts to identify, create and transfer appropriate skills and appropriate agents of technological change.

The Institute will contribute to this in the following ways:

(i) The Technology Institute is not conceived only in relation to an R + D function. On the contrary, it would work on programmes to stimulate a deepening of technological activity in developing countries, as required in specific circumstances. Its service function would enable it to identify agents and elements of technological change most appropriate to the circumstances of given projects. In many instances, programmes would be required to stimulate adaptive development of industrial technologies, more in tune with DC requirements.

(ii) It would be able to provide consultative advice on the economically most efficient and technically feasible short-, medium- and long-term solutions to given development needs.[1/] As an example: in the case of regional energy-saving programmes, it would promote technically feasible solutions in the form of energy-efficient methods of production with existing productive facilities; in the medium term, it could help developing countries assimilate/diffuse or modify existing, imported renewable energy systems, and in the long run it could assist in domestic replication and/or creation of alternate indigenous energy systems.

(iii) Examples of the scope of promotional activities to be undertaken by the Institute could be:

- For the assimilation or diffusion of technologies on both IC/South or South/South axes, it could provide financing and facilities for the interchange of shop-floor personnel to disseminate experience gained through "learning by doing".
- For modification of technology, the orientation of mechanical and engineering know-how to the problems would be supported, either through commissioning DC or IC and DC engineering facilities and consultants in programmes to adapt technology, or through the interchange of personnel and publication of specialised literature.
- Reproduction would require arrangements for the twinning of productive facilities and/or the transfer of process knowledge via licensing agreements.

1/ The Institute, it must be noted, would play a mere advisory role in recommending economically efficient technological development paths and targets for individual programmes. There are obvious cases where either criteria of economic efficiency or the requirement of international co-operation are modified from conventional perceptions of the terms. Military technology stands as a prime example, where governments have made the capacity to create military technology as the only feasible target on dubious evaluations of economic efficiency, without much regard to the opportunity costs imposed on the local economy. Presumably, such instances are abberations from a norm where some notion of the calculus of optimal social resource allocation ought to apply.

- Creation of technology could be stimulated by North/South or South/South co-operative research and development.
- Export of know-how and embodied technologies developed in DCs may require the Institute's assistance in any one or more of market searchs, providing information to potential users, patenting in countries of destination, design for export markets, avenues of product distribution, and directing technology suppliers to sources of export financing.

3.4 Different Origins and Avenues of Technological Change

Three major streams of industrial technology should be of concern to the Institute:

(i) Modern mainstream technologies imported from the industrialised countries

These are the bulk of industrial technology, mostly acquired on commercial terms. The spectrum of DC requirements here spans the selection on sources and processes, acquisition on most favourable terms, transfer and diffusion among domestic users, assimilation and adaptation. The need is to supply government technology planners with information on alternative sources and terms, to locate developing country enterprises that have successfully unpackaged and modified/adapted these technologies to their conditions, to identify factors that have led to their success, and to study their transferability to other developing countries. It is obvious that the Institute cannot absorb all relevant information on technologies. Instead, already existing international, regional and national information sources would be monitored for information in specific sectors in order to enable the Institute to guide its clients to the most useful source. The notion of information networking is particularly relevant. The Institute would function as a prime mover behind the creation of such international networks in areas which come under its sectoral purview. It could commission and disseminate the findings of studies on technological developments in areas critical to DC industry (e.g. developments in energy systems) and their likely impact on developing countries' industrial structure.

(ii) Modern, new technologies produced in the South

Technologies produced mainly by public corporations and research bodies meet local needs and optimise local resources (e.g. nutritional supplements, tropical drugs, alcohol engines).

(iii) Intermediate, small-scale, new technologies generated in both industrialised and developing countries

These would emerge from research undertaken (a) fresh by nationally and regionally-based bodies with their own workshops, testing and production facilities (e.g. Las Gaviotas in Colombia and the Regional Centre for Transfer of Technology in Bangalore, India) or (b) co-operatively generated under the auspices of nationally or internationally created bodies (such as the US Institute for Appropriate Technology or IMAT) or (c) built on traditional skills and technologies to increase their productivity. The Institute would provide an avenue of finance, technical inputs, organise exchanges of experience, create propagation and distribution channels and co-ordinate efforts to avoid the duplication of efforts and enhance their concentration.

4. PRIORITY AREAS IN INDUSTRIAL TECHNOLOGIES

The Institute, it was stated earlier, will provide a focal point across different streams and sources of technology from both the North and the South, for certain priority areas.

The programme should be in two initial phases, the first phase would allow the Institute to concentrate on energy and energy-related technological co-operation, as well as construction materials, and in the second, the emphasis would be directed on health-care systems and the production of agricultural technology. These are critical priority areas, and the rationale for their selection seems evident. The phasing of work is introduced merely to specify a realistic work programme and prevent overstretching the Institute's efforts.

4.1 Energy

The changes in the relative prices of energy during the seventies have had widespread effects on both developed and developing countries in their industrial development. Since the developed countries have produced potentially more dynamic, certain and challenging answers to this particular problem, the developing countries will find themselves in a defenseless position. Efforts will have to be made to help ease the path of industrial development in DCs. The current energy-related investment in developing countries seems to be large - already in 1975 these investments for oil exploration and power were around $ 22 billion - and it will have to be increased in the future.[1/]

The Institute will work in two directions, one would be to identify energy-saving technologies that are based on lower consumption of fossil fuels and technologies using renewable energy (alternate) sources.[2/] The Institute should identify new technologies and select those of direct impact and relevance to DCs, in order to adapt and diffuse them to developing countries who would benefit by their application. It could also help create joint ventures among developing countries with the objective of adapting technologies of the North to their requirements.[3/]

1/ They will presumably be in the areas of $ 300 billion (at 1975 prices) in the next decade, assuming an annual rate of growth of 7 per cent. See UNCTAD TD/B/C.6/31, October 1978, Energy Supplies for DCs - Issues for the Transfer and Development of Technology.

2/ Since developed countries possess the most advanced means in R + D for such technologies, close links with North-based institutions will have to be established; e.g. it will be imperative for the Institute to get as much information as possible from government departments like that of the US in particular, which is developing new technologies based on the use of solar and other renewable energy. See, Cambio 16, Madrid, 14 October 1979, pp. 78-81.

3/ UNIDO has laready initiated programmes in this area. See ID/B/188, Co-operative Programme of Action on Appropriate Industrial Technology, Report by the Executive Director to the Eleventh Session of the IDB, 1977.

4.2 Construction Materials

The Institute will co-ordinate activities with other institutions for the development of construction materials. This co-ordination will have to be done both on a North/South and a South/South basis.

North/South co-operation would consist of and focus on selection of technologies related to construction materials which could easily be reproduced in the South. In the South/South co-operation framework, the Institute should try to spread the technological knowledge that some countries of the South already possess in this area. The objectives of using these technologies are twofold: they utilise more adequately the natural resources of developing countries and also employ and mould the untrained people of developing countries.

In order to attain satisfactory results, the Institute should not only identify and diffuse the use of these technologies but also evaluate their performance when applied to different projects.

4.3 Second Phase

After the initial period of operation of the Institute - during which the main task will have been the finding of an implementation of the most relevant technologies for developing countries -, a second phase will start. This phase will be characterised by two new features.

The Institute will give a proof of maturity by extending its services to two new and broad areas: agriculture-related technologies and indigenous health-care technologies. In doing so, the Institute will draw on the experience acquired during its first phase, and establish links with other UN agencies already operating in these two fields (e.g. FAO, WHO).

Finally, the Institute will in the long term expand its services to other sectors that can improve the technological infrastructure of the developing countries.

5. METHODOLOGY - ORGANISATION

5.1 Introduction

It is not possible to describe an "optimal" format for the institution, at this stage, since its effectiveness would primarily depend on the quality and dynamism of its staff. This section, instead, specifies minimal organisational guidelines placed on the Institute if it were to perform the functions described above with any measure of success. In the broad terms:

(i) There would be a need for a high degree of dynamism in decision-making as well as operating flexibility and autonomy for the Institute, in order for it to initiate and follow through on its projects.

(ii) Long-term sustenance of programmes would require sustained and predictable funding.

(iii) In order to enable the Institute to achieve a wide spread in its projects, without simultaneously indulging in the sinking of funds into large overhead staff, the Institute would have to operate on a fairly decentralised network basis for the projects undertaken.

5.2 Internal Structure

The Institute would be managed by a Board of Directors drawn from among governments, private enterprises and scientists/engineers in an independent capacity. The Board of Directors should be appointed on the basis of rotating developing country membership. It would be responsible for evaluating priority programmes within the sphere of industrial technology, defining and setting up individual projects; defining targets for these projects, and the evaluation of projects in achieving the targets. The Board of Directors would be the trustees and allocating body for the Institute's funds.

The Board would be assisted by a small professional staff who would handle the actual preparation of projects; be responsible for the various informational aspects of the Institute, i.e. maintaining contact between clients and components of its information network, maintaining rosters of consultants, engineering firms etc. who could be involved in the Institute's projects as well as technology surveys in the Institute's activity.

Financing:

The "orders of magnitude" here would obviously be dependent on the scale of operations envisaged. There are no easy guidelines to follow. It may be useful to keep the level of financing suggested in similar proposals elsewhere. For example, the IMAT proposal has recommended a block grant of US $ 10 million for administrative as well as operational expenses over a three-year take-off period. The US AID proposal for an Institute for Appropriate Technology requested an allocation of about $ 23 million per annum for operational and management expenses.

The costs of the proposed Institute would be covered from the following sources:

(i) Multilateral sources: Here the most important and immediate source is the Science and Technology Fund proposed in UNCSTD. The Fund is targeted at $ 250 million for 1980-82. The pledging conference will be convened for January 1980, and presumably allocations will be made by UNDP thereafter. The Institute offers an ideal conduit through which these funds could be channelled into technological activities for developing countries. Other multilateral sources, such as OPEC allocations for energy-related R + D may be tapped for funding specific programmes and projects.

(ii) In order to preserve criteria of economic efficiency and viability of projects, the Institute would in specific cases (e.g. where results of sponsored R + D yield marketable results) build in revenue sharing arrangements in the project contracts with enterprises who work under its sponsorship.

(iii) In its information dissemination activities, the Institute would charge service fees to clients.

The operation of the Institute would be on a non-profit basis, with commercial revenues being flowed back into expanded activity.

5.3 Operating Methodology

The Institute would co-operate, inter alia, with regional and national centres for technological development in developing countries and developing and industrialised country productive facilities and sources of know-how (consultants, public and private sector engineering corporations, R + D facilities, etc.). The actual work of the Institute would cover, inter alia, the following aspects:

1. Identification, pre-feasibility and feasibility studies of projects, determine the efficacy of pursuing different courses of action and setting project targets.

2. Project formulation which would determine the scale of funding, the roles of various participating bodies, contractual and working arrangements. The objective of the Institute should be to set up joint ventures in technological adapataion and co-operative research in technology generation, as far as possible.

3. Project implementation should be at national or regional levels with the Institute granting operating autonomy to the operating bodies. Here the Institute would be responsible only for auditing project progress.

4. Dissemination of project results. In the case of commercially transacted technologies, the Institute would play the role as a disseminator of information to potential clients. In cases of non-commercially transferred technology, the Institute could be involved in technological diffusion by providing any necessary inputs to national/regional extension services.

5. Post-project evaluation. This should be directly carried out by the Institute with the help of specialised consultants. There must be clearly established mechanisms for evaluating project successes/failures and desirable operational modifications in subsequent working of the Institute.

In order to carry through these activities, the Institute would also have to do the following:

1. General technological surveys in sectors of interest. In most cases, literature surveys of the "state of the art" are available, and quite easily accessible. The Institute, with the help of specialised consultants could evaluate most likely areas for further exploration, based on DC requirements.

2. Institutional surveys which would inform the Institute of the location and productive capacities, as well as their quality and past performance.

In both (1) and (2) fullest possible consideration should be given to the potentials from DC-generated technologies and institutions. There would be a tendency in global surveys such as these, for IC technological potentials and capacities to dominate the landscape. This can perhaps be checked by a firm view of "end needs" in mind and field investigation of DC potentials.

3. Formulation of development objectives stating the critical problems that need to be addressed. This would require the Institute to work in conjunction with governmental planning bodies, regional centres for technology transfer, as well as specialised international agencies.

6. ANNEX: PRESENT PROPOSALS RELATED TO THE INTERNATIONAL INDUSTRIAL TECHNOLOGY INSTITUTE

6.1 Introduction

From this section the proposal of an International Industrial Technology Institute may be compared to other proposals (e.g. the US Proposal, UNDP Fund approved at UNCSTD) that might be able to play a co-operative and complementary role to the Institute. The reader will be able to evaluate the main features of the different proposals that have already been advanced or mechanisms that are in operation. The extent and the main areas in which these institutions could operate jointly with the Institute are also indicated.

6.2 The US Proposal for an Institute for Scientific and Technological Co-operation

The US Government proposal for an Institute for Scientific and Technological Co-operation (ISTC) was advanced recently in a speech to the Venezuelan Parliament given by President Carter in March 1978.[1/] The ISTC should have been in operation by the beginning of October 1979. It will function under the International Development Co-operation Agency and in conjunction with the Agency for International Development (AID) and the Overseas Private Investment Co-operation.

The purpose of ISTC is twofold: on the one hand, it will help to strengthen the scientific and technological capacities of developing countries and on the other, it will focus increased US scientific and technological efforts on development matters. High priority will be given to working closely with technological institutions in developing countries and supporting co-operative efforts between them and US institutions who could be assist the improvement of the capabilities of the countries of the South.

During the first year of its existence, the ISTC will initiate a programme directed at intensive planning of priorities, involving scientists and policy makers in other countries, within broad critical areas. Subsequently, the ISTC will exclusively concentrate on certain areas considered to be of greatest relevance to the developing countries. The critical areas on which this mechanism will concentrate are:

(a) Increasing agricultural productivity and rural incomes;

(b) Improving health conditions in developing areas;

(c) Improving population programmes;

(d) Nutritional improvement;

(e) Strengthening indigenous science and technology capacity;

1/ Similar proposals have been advanced by the US Government in various fora since 1974. However, none of these was actually instituted. The proposal discussed here is also referred to as the Foundation for International Technological Co-operation. See, for example, the US National Paper presented to UNCSTD, pp. 34-35.

(f) Improved processes of technological co-operation;

(g) Communications and information systems;

(h) Energy planning and new energy supplies;

(i) Environmental protection and natural resources management;

(j) Non-agricultural employment.

The Institute has several special characteristics:

(i) It will focus on R + D.

(ii) It will utilise specialists and experts from both the US and developing countries who will work at the Institute in Washington and outside the US in planning, programming and eventually evaluating the ISTC activities.

(iii) It will sustain attention to development problems by bringing a long-range perspective to the development process, to specific research and to imaginative application and delivery of science and technology information.

(iv) Priority will be given to problem areas rather than to country programmes. This is intended to jointly use the skills of countries who share common problems, e.g. losses of agricultural productivity, infectious diseases.

(v) Co-operative efforts will be undertaken on a cost-shared basis, with middle tier developing countries (e.g. Mexico, Venezuela). The objectives here are to build on the long-term investments of the US aid programme in these countries, and to generate efforts in these middle tier countries, in fields where they share problems with poorer countries.

(vi) In addition to a network for the search for technology and projects of immediate importance to the poor, the ISTC will collaborate in meeting other requirements common to developing and developed countries (e.g. management of natural resources, environmental planning etc.).

(vii) Private sector involvement will be stimulated by the ISTC, by means of bringing together the skills of this sector and by involving it in co-operative problem solving efforts.

(viii) The ISTC will operate as a relatively small R + D agency, along with the private sector. It will primarily encourage direct institution-to-institution contacts and co-operation.

For ISTC's initial year, the US Congress has authorised $ 21.75 million. A transfer of about $ 66 million in on-going research projects from AID will augment the programme budget for the initial year.

The most notable aspect of this proposal is its national scope. If constituted, it would provide a powerful complementary device for the International Industrial Technology Institute, insofar as it would organise and conduct parallel activities in one of the major source areas for industrial technology - The United States.

6.3 International Mechanism for Appropriate Technology (IMAT)

The International Mechanism for Appropriate Technology (IMAT)[1/] is the major proposal concerning the creation of international mechanisms for stimulating appropriate technology (AT). It originated from a meeting on International Action for Appropriate Technology convened at the invitation of the Netherlands Government at the ILO Headquarters in December 1977. This group of 31 experts who participated agreed on the urgent need for the promotion of appropriate technology. The meeting concluded that although UN specialised agencies were making increased efforts in promoting AT, the existing international institutions needed to be supplemented for the purpose of promoting AT. A feasibility study was commissioned to review existing mechanisms and to consider the need for a new mechanism and to make recommendations on its objectives and functions.

The feasibility study, carried out by Mr. Paul-Marc Henry, Mr. Amulya Reddy and Ms. Frances Stewart, endorses the need for a new international mechanism on the basis of five points:

(i) The neglect of AT in global technological efforts.

(ii) Limitations of current national efforts.

(iii) Deficiencies in the flow of information about AT.

(iv) The fact that no international institution now has the promotion of AT as its sole objective.

(v) The fact that the magnitude of voluntary efforts is too small in relation to the massiveness of the task, and that voluntary bodies, usually originating in developed countries often lack the necessary international and developed-country resources.

The role of IMAT should be both supportive and catalytic in the following functions:

(i) The identification of priority areas for efforts in appropriate technology.

(ii) Identifying institutions and groups which require critical support for the development and dissemination of appropriate technologies.

(iii) Providing suitable assistance by way of information, funds, equipment, training, experts etc. to these institutions.

1/ See, A New Mechanism for Appropriate Technology, a feasibility study by a team of specialists.

(iv) Assisting the passage from the research to the development phase in the generation of appropriate technologies, e.g. through pilot plant trials, and from the technology generation phase, e.g. through pilot demonstration projects.

(v) Strengthening appropriate technology delivery systems by facilitating direct contacts between the producers of appropriate technologies and the users of such technologies.

(vi) Contributing to the generation of an atmosphere in which the prestige of appropriate technology is enhanced.

(vii) Facilitating the exchange of experience among appropriate technology institutions/groups in different countries, sub-regions and regions.

(viii) Disseminating appropriate technology "success stories" as well as insights into causes of failure of hardware and/or software.

(ix) Assisting the creation of a new national or sub-national institution in circumstances which make such institutions crucial to national appropriate technology efforts.

(x) Studying ways in which privately generated and transferred technology might be made more appropriate, both with respect to technology originating from advanced countries and technology developed by firms in developing countries.

(xi) Reviewing developments in the field of appropriate technology including its socio-economic aspects.

(xii) Carrying out all other activities, such as fund-raising and monitoring of the effectiveness of its own efforts to enable it to discharge the above functions.

Twelve detailed guidelines or principles were layed down for the functioning of IMAT. The most significant of these principles are:

(a) IMAT should concentrate on a few selected priority areas (e.g. appropriate agricultural processing technologies), taking into account the existing technological situation, selecting areas where there is lack of appropriate technologies, or where known techniques are of low productivity.

(b) IMAT should aim at the establishment of self-reliant networks of groups and institutions that are currently dealing with appropriate technologies, e.g. the UN Programme on Traditional Technologies, TOOL Foundation in the Netherlands.

(c) IMAT should concentrate on existing institutions as growth poles for appropriate technology and help to establish institutions in countries and regions where needs have been detected.

The proposed organisational structure involved would include:

(i) A secretariat (to be supplemented by ad hoc panels of experts);

(ii) Location (a developing country is suggested);

(iii) Governing body (20 or 30 eminent contributors to the field of appropriate technology);

(iv) Executive Council (jointly from the Secretariat and Governing Body).

The funding of the Secretariat is considered to be in the area of US $ 0.5 - 1.0 million. The idea of a definite target figure for the ratio of administration to other expenditure is rejected since in many cases IMAT should initiate AT activities without having to finance them from its own resources. A total block grant of around US $ 10 million for an initial take-off period of three years has been suggested. IMAT has both a wider sectoral scope and a focus on appropriate technology. Its functions are similar to the Institute's, and it could play the lead role in co-operative programmes on Appropriate Industrial Technology, with the Institute.

6.4 Technology Information Systems

In the ensuing paragraphs, a brief review is given of three major technological information systems. The Institute would interlink the information contained in these systems for its various projects and develop similar information networks if need be.

6.4.1 World Bank Technology Referral Service (TRS)

The World Bank Technology Referral Service (TRS)[1/] is intended to fulfil the following objectives:

(i) The need to improve the quality of technological choices;

(ii) The need for an information system, closely linked with decision-makers; and

(iii) The need for follow-up studies to see that the system is working effectively, and improve its functioning.

In its first phase, the TRS was required to channel information to private business or public enterprises, serving both large and small enterprises. To start with, the service dealt with industry-related issues.

1/ For a more detailed information, see Technology Transfer and Appropriate Technology, The World Bank Role.

This service will be connected with a clearing house, to which DC inquiries will be transmitted through screening institutions, which should have direct interests in appropriate technologies and might primarily consist of a financial intermediary or a national office dealing with transfers of technology. The clearing house, once inquiries have been received, will refer them to technical sources, evaluate the procedure and recommend improvements.

This World Bank proposal emphasises the role that follow-up procedures should play in assessing the value of the advice provided. It is also clearly stated that this service could not act as a complete substitute for on-the-ground technical assistance and in the short run should remain netural as regards the 'appropriateness' of particular technologies to specific requirements.

6.4.2 UNIDO's Industrial and Technological Information Bank (INTIB)

UNIDO's Industrial and Technological Information Bank (INTIB)[1/] was established in 1977. It is intended to function as part of the international network for the exchange of technological information. This project was undertaken in response to the Lima Declaration and Plan of Action on Industrial Development and Co-operation which called for, inter alia, "consideration of the establishment of an industrial and technological information bank, ... to make available a greater flow to the developing countries of information permitting the proper selection of advanced technologies."[2/]

The scope of work of INTIB is:

(i) To be concerned primarily with the selective processing of technological information.

(ii) To collect and assess technological information.

(iii) To provide technological information which might in certain instances require further consultations and advice to the recipient country.

(iv) Not to be simply an archive of information but a system which would provide analysis and synthesis of information, and be capable of providing on-site technical advice to the recipient for its effective application.

(v) To draw on technological information from within UNIDO (e.g. information from the reports of experts of technical assistance projects) and from external sources (e.g. establishment of a system for collecting relevant information when required and avoiding duplication).

1/ See, Establishment of an Industrial and Technological Information Bank, Report by the Executive Director of UNIDO, ID/B/183, 12 April 1977.

2/ Lima Declaration and Plan of Action, section B.III, Co-operation Between Developing and Developed Countries.

(vi) To respond to the level and magnitude of the requirements of the developing countries.

(vii) To provide the required support at government, institutional and enterprise levels.

(viii) To operate as an integral part of certain important activities of UNIDO.

This project started its operations by dealing with selected aspects of information on the sectors specified in the Lima Declaration and Plan of Action. Four sectors were taken up in the initial period: iron and steel, fertilizers, agro-industries and agricultural machinery. After the first phase (1 July 1977 to 31 December 1978), inclusion of additional sectors has been recommended.

The financial allocation recommended for the initial period was about US $ 290,000.

6.4.3 UNIDO Technological Information Exchange System (TIES)

As a result of the Meeting of Senior Officials and Heads of National Technology Registries or Similar Offices in Selected Developing Countries in Vienna 1978, the establishment of a Technological Information Exchange System (TIES)[1/] was recommended, with the suggestion that "the programme for exchange of information should be on a reciprocal, equal and mutually beneficial basis. It should be confined to countries willing to participate in it, the information being treated on a confidential basis. The nature and scope of the information sought should in principle strengthen the negotiating position of developing countries, concern the terms and conditions of technology transactions and enlarge the scope of available technological options for government institutions in their respective countries."[2/]

This programme was required, inter alia, to include:

(a) A periodic review by each participating country of trends and features of foreign technology inflow and the regulatory control of such inflow;

(b) General information on certain selected sectors or priority in the participating countries;

(c) Specific information on individual contracts.

The following priority areas were selected for the activity of the TIES:

(a) Ferrous and non-ferrous metallurgical industries;

1/ See the explanatory note prepared by the UNIDO Secretariat on Technological Information Exchange System (TIES), ID/WG.272/5, 8 May 1978.

2/ Ibid, p. 2.

(b) Chemicals and petrochemicals;

(c) Agro-based and resource-based industries (including mining and extractive industries);

(d) Agro- and food-processing industries, including fish processing;

(e) Engineering goods industries, including metal-mechanic industries;

(f) Capital-goods production, including mechanical, electrical and transport equipment;

(g) Drugs and pharmaceuticals;

(h) Textiles and garments;

(i) Construction and building industries;

(j) Electronics;

(k) Tourism.

UNIDO performs a clearing-house function and is charged with the responsibility of receiving, processing, analysing and disseminating all information sent by the countries participating in this mechanism. The three technology information systems are major examples of the national, regional and international systems which the Institute could network in specific areas.

6.5 UNCSTD Technology Fund

The United Nations Conference on Science and Technology for Development (UNCSTD), convened in Vienna in August 1979, reaffirmed the need to find solutions to the technological requirements of developing countries for the 1980s. The Conference noted that "international development co-operation in the field of science and technology must assist developing countries in strengthening their creative and innovative capacity and thereby promote their autonomous scientific and technological development. This requires fundamental changes in the present pattern of international relations in this field so as to substantially enlarge international co-operation and thus enhance the opportunities for developing countries in the development and strengthening of their scientific and technological capacities reflecting the requirements of each country in accordance with its realities and its vision of the future, as well as in the international process of the transfer of technology so as to substantially increase and facilitate such transfers, in particular to developing countries, and to enable them to have significantly improved access to the technology they require, including advanced technology."[1/]

As mentioned in the beginning of this paper, among the requirements for concrete action at the various levels (national, subregional, regional and international), the following are of significance:[2/]

1/ For full details about this Programme of Action on Science and Technology for Development, see Vienna Programme of Action, Draft, A/CONF.81/14, Annex, p. 3.

2/ Ibid.

- The strengthening of the scientific and technological capacity of developing countries, inter alia, through external support and assistance, to generate scientific and technological knowledge in those countries and to enable them to apply science and technology to their own development.

- The attraction of adequate financial resources for the development of science and technology in and for the developing countries.

- The strengthening of scientific and technological co-operation among developing countries.

The Conference recommended that the General Assembly of the United Nations establish a fund for science and technology for development, aiming primarily at assisting in the implementation of the measures that are envisaged in the Vienna Programme of Action.

The resources of this fund will be allocated for interim and long-term arrangements. The long-term arrangements will start in January 1982.[1/] In the meantime, an Interim Fund will be created from voluntary contributions. During the Conference it was agreed that the target for voluntary contributions for the two-year period 1980-1982 be no less than $ 250 million. UNDP was designated as the executing agency for the fund, and a pledging conference is scheduled for January 1980. Specific programmes will have to be developed subsequently.

As mentioned before (section 5 - Organisation), this is an uncommitted fund, and the Institute could be used as a conduit for its resources in the field of industrial development.

1/ A/CONF.81/14, op.cit., Annex, p. 11.