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SOME REFLECTIONS ON THE UNIDO PROGRAMME ON
APPROPRIATE INDUSTRIAL TECHNOLOGY*

by

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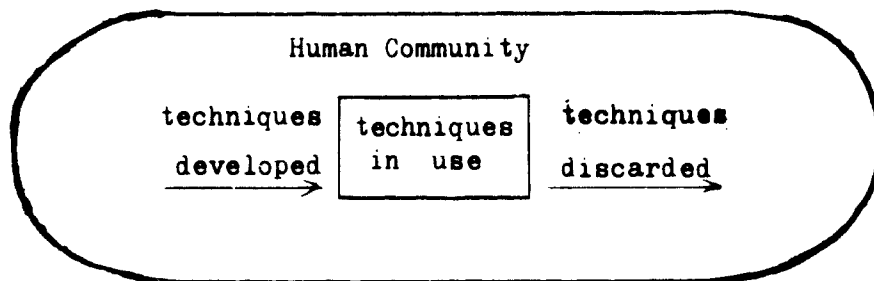
A. About Appropriate Technology

1. When I use the words "appropriate technology" I have in my mind not so much material objects or processes which transform materials, but rather the manner in which human being equip their existence.

Technology, in my understanding, is a gender name which covers a great variety of notions. To summarise just two main groups of these notions:

- a. Technology is the whole of techniques that are used in a human community;
- b. Technology is the systematic development of techniques present to fulfil specific functions in a human-community.

Central to both characterizations is the human community, using technology and changing technology used, suiting the needs of that community in the proper way. Appropriate technology refers precisely to these use and change processes, both initiated and controlled by human community.



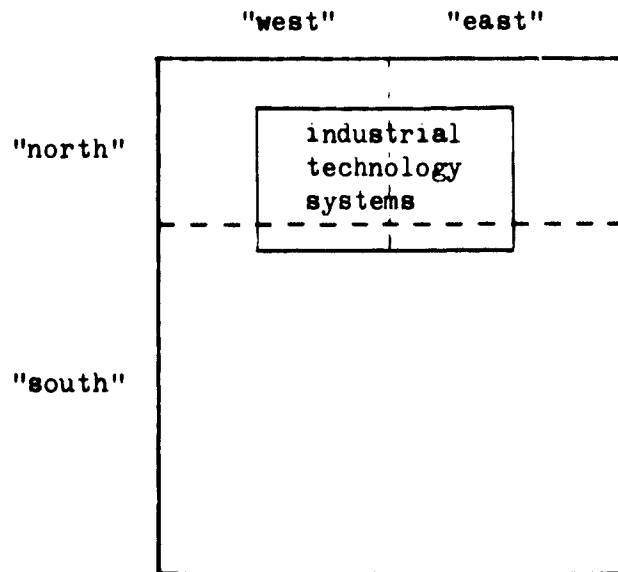
2. Now two questions arise: How does the human community organize itself with respect to the processes that use or change technology? and: Which kinds of technology are being considered?

I will not dwell too long on these questions, but restrict myself, for the purpose of this contribution, to the observation that not all techniques in use in human communities are equally (well) attended to. By which I mean that here is a marked difference in organizational structures that were developed around the use and change of techniques. The most pronounced organization has developed around industrial technology.

The need for a well defined organization of industrial technology seems to be very strong. Which is understandable, as the products of industrial technology are vital to human communities; human existence at present is considered to be closely linked with the material base provided by industrial technology.

3. However, when viewed on a global scale, the industrial technology system is situated increasingly in the so-called northern countries. Of approximately 5 billion people on the earth, only 1 billion is served by this system. 4 billion people are outsiders, living on entirely different basis, much less organized, and rather poorly equipped.

Graph II



Now it seems obvious that a major political issue on the global level, must be the re-organization of this industrial technology system, so as to have more members of the world community to profit from its material base. Such political issue could be termed appropriate industrial technology, as it is concerned with initiating and controlling processes of the use and change of industrial technology.

4. Such re-organization processes are going on, but to my opinion only part of the problem of appropriate technology is considered with it. I say this because we have not looked at the organization as such. True, a larger proportion of the world population is entering into this debate, but the actual deliberations, or negotiations or agreements are executed or arrived at in small groups, composed of members from a limited number of persons who are holding key positions within the industrial technological system. Whether these groups are selected in a lopsided way, or on a multi-partite base, the fact remains that a few insiders discuss and decide on behalf of all others.

5. Fritz Schumacher has subtitled his first book^{1/} Economics as if people really mattered. To my feeling this sentence contains the key to understanding the notion of appropriate technology. Fritz has often said: "Appropriate technology is posing a question, and intermediate technology provides merely one answer to that question".

In my understanding, the question of appropriate technology is concerned with the manner in which human beings equip their existence (A.l.). Hence, human beings are to be taken seriously in this matter!

6. It is sheer logic, that intermediate technology is characterized in terms of:

- labor intensive rather than capital intensive;
- small-scale rather than large-scale;
- intensively using local resources;
- responsive to local skills available;
- fitting to local requirements.

To me this list follows directly from the premise, because most people on earth have a very limited access to resources, other than those within their immediate reach. They can only throw in their own labour, willingness, creativity, using what is at hand in instruments and tools, relying on extremely small amounts of money for "working capital", and unable to do anything beyond their understanding. And this is precisely what kept large numbers of people afoot, over centuries under harsh conditions, and while defending themselves to all sorts of attacks on the continuation of their lives.

7. Technologies fitting the above characterisation are found in many places of the world, in rural areas as well as in urban areas, both in the so-called northern countries and in the so-called southern countries. Many gender names have been suggested for indicating and classifying these technologies, among which I would recall: village technologies, fourth-world technologies, survival technologies, scrap technologies. The existence of all these technologies, however, indicate the presence of another kind of organization for technology, another and living proof for the reality of the question of appropriate technology in the world. Most certainly, there exists a dominant need for equipping one's existence and to fulfil this need in one's own strength, self-reliant.

8. Having said that, I admit that one key policy issue might be found in supporting the above kind of "self-reliant development". Hence the question for appropriate technology, that is regarding the manner in which human beings equip their existence, implicitly posits the right of all mankind to technology. Such right is in fact already recognized in what is written in the Declaration of Human Rights of 1945. But I would go further than the presently used interpretation which is limited to sharing the fruits of technology. I would include technology itself, thereby referring both to the technical stock, as to controlling and changing the use of that stock.

Self-reliant development, then, will include learning what technology is about, how technology can be controlled, and above all: learning how to develop technology that is best suited to one's needs. And such development is guarded by accepting the fundamental right to technology, for all mankind.

B. Participating in industrial technology

1. Under A.3. I have dwelled a while on the global re-organization of the industrial technology system. I have recalled the concentratedness of that system in the 'northern' countries. Such re-organization is correctly understood as a response to the question for appropriate industrial technology. Because changing the control structure to the benefit of the now "outsider-countries" is at stake.

But, as I said under A.4., it seems to be dealing with only one part of the problem. It is not just a matter of 'north-south negotiations', or 'tapping' the flows of technology in this world. I sincerely feel that the emphasis should be put on getting as many human beings as possible to actively controlling technology! Seen in this perspective appropriate industrial technology does not only appeal to less developed countries, but to the world at large.

2. The question of technology control has been put forward in different ways, and at various moments in time. To me, the recurrence of such question is another expression of the wish to get one's needs fulfilled better. True, no requests for appropriate industrial technology as such are clearly ^{put} but the question of appropriate industrial technology is a real issue! And this issue pervades in several disguises, the minds of people. Some of them can express themselves better verbally than others, and some expressions are even non-verbal, in most cases not even noticed. With this latter remark I have before my mind's eye the many instances of practical solutions, techniques and objects that I have

seen in the countries where I worked, visited or toured. Only a very few of the techniques and objects are registered, e.g. in books such as "Cultural Expressions of the Fourth World"^{2/}, "A Village Technology Catalogue"^{3/}, and in documentary films like "New Heretics"^{4/}. But equally well I would be able to refer to practises in the developed countries, as those are found in the many publications of I.T.D.G., in periodicals such as Coevolution Quarterly, Mother Earth News, Journal of the New Alchemist Institute (all in the US), or Undercurrents (issued in the UK).

3. It would be a grave mistake, however, to assume that these expressions are bound to a sub-culture of one sort or another, which will disappear. I would posit that these sub-cultures are of high relevance to the issue because they are to be understood as field laboratories for materializing the ideas and testing the appropriateness of solutions found. What I am trying to say, really, is that the desire to be involved in arriving at more appropriate technologies has already found its expression in many forms. From which fact I derive the statement that a fresh idea in appropriate industrial technology would be to organize a wider forum, including the many who are already involved.

4. Now, such organization would face a great many difficulties. Due to the dispersed nature of the groups concerned. Due also to the differences found among conceptual models used, languages and jargons, variation in experiences.

In fact, although no formal organization exists, there have been developed several organized contributions to the forums that handle the question of appropriate industrial technology nowadays. The fact that most if not all UN agencies carry or support programmes associated with at least the words appropriate technology, is to me a proof of the feasibility of introducing opinions and ideas, or more relevant perhaps, the creativity of those many who are concerned with the issue.

5. One major difficulty, as I see it, is connected with our inability to discuss with many thousands. Even a discussion of a small group like ours is already pulling a heavy burden on the secretariat! But this difficulty is not well overcome in the classical way, that is summarising what was discussed and adopting this summary, with some amendments, as the outcome of discussion. In small meetings like ours, such end result can only be considered as a temporal consensus over phrases, and leaves many contributions either aside, or not presented at all. One member of the present meeting

expressed this in terms of dualism: What is said at the conference table does not reflect what is meant, hence what is registered not necessarily reflects the feelings of the participants! Hence, especially with large-scale discussions in mind, it might open a new possibility when new communication techniques are developed - such as:

- TV programmes on A.I.T.
- Popular books on A.I.T.
- A.I.T. contests.

6. Some countries have experience with this type of approach. A model of a A.T. contest was developed by the Tool Foundation, in co-operation with the A.T. Department at Eindhoven University of Technology, under the name: NEDSAT, A learning programme for technical schools^{5/}. And many other instances can be recalled as well. I personally would stress the relevance of such practical approaches, mainly directed towards young people, a little more. Technology is of its nature a practical affair. Techniques, objects are discovered, ideated, and experimentally developed and put into practice. Hence discussions about technology should at least connect to the practise of technology. Because the vocabulary of technology consists of things and doings, rather than concepts and relations. Which fact tempted me to posit that most discussions about technology should be conducted in a non-verbal way!

7. With that statement I come back on what was said under A.8.: "... one key policy issue might be found in supporting (...) self-reliant developments." I now elaborate this idea further, bearing in mind what was said under A.6.: "(the intermediate technology characteristics are just right).. because most people on earth have a very limited access to resources, other than those within their immediate reach." It seems to be logical, then, to extend that reach. But precisely here we may meet an extremely difficult problem. Because extending the reach of human beings can perhaps not be done for all alike, or in the same pace. Also because an extended reach presupposes, at least initially, a supply at what is needed, such as money, materials, new skills taught, new objectives understood. Will these supplied be bound to the sponsor? So that in fact what the sponsor perceives as needs, will be fulfilled only? Will the sponsor select among those who will be supplied, leaving out others?

8. I feel that there is a real danger here. I must confess that I see no way to stay out of the dilemma entirely. But in order to stay out of it as much as possible, it might be considered to provide a large variety of packages of supplies. These perhaps not just composed from the estimates of the sponsor, but after consulting all persons who have knowledge of the field to be supplied. In a way the supply perhaps can be considered as "fertilizer", for the particular area!

9. Hence, there remains a proper cause for appropriate technology, if understood in its original meaning. As appropriate technology is posing a question (A.5.) and as appropriate technology is concerned with the manner in which human beings equip their existence (A.1.) any programme on appropriate technology should contain at least:

- (B.3.) - a broad forum, composed of all who are already concerned,
- (B.4.) - new communication techniques, to cope with many contributors,
- (B.5.) - practical experiences as a basis for discussion,
- (B.6.) - field fertilisation with supply packages.

I think that these elements should precede, or at least complement, more "directive" approaches, if any.

C. Appropriate Industrial Technology

1. Much of what was said in the previous chapters, can be of use for considering the problems and prospects for appropriate industrial technology. In a way there exists a similarity. In fact we could even use the previous as a judgemental model for discussing this subject. Let me recall the previous in short sentences:

- (A.5.) - A.T. is concerned with the manner in which human beings equip their existence,
- (A.7.) - equipping one's own existence in a dominant need, the need to be self-reliant,
- (A.8.) - self-reliant development means learning about technology, and derives from the fundamental right of humanity to technology,
- (B.1.) - A.T. is not a concern of either the developed nor the developing countries, but a concern of both, simultaneously,
- (B.9.) - which calls for a broad forum, communicated with through new techniques, bearing the discussion on practical experiences, that can be imitated by "fertilizing" through supply packages.

It will not be difficult to reformulate these statements so as to fit the subject of appropriate industrial technology. I will not be able to do it in this contribution, though. But I will examine a number of UNIDO documents with the above model.

2. The reason that I opt for such a simple model is not because I underestimate the subject at hand, on the contrary! But I have in mind the broad Forum that eventually will judge all plans and outcomes. One cannot ask from those to go through a few academic studies, and - say - half a year of reading through all documents! What I am after is direct understanding, using a simplification as intermediary.
3. The Forum for AT, in the UNIDO papers, has been working for quite some time on new international standards for development. Appropriate Technologies were already mentioned in the ACAST paper on a World Plan of Action. Ever since an "AT movement" is said to have developed leaving no UN agency untouched. Various private organizations started their work on AT. UNIDO sees its role as coordinating and stimulating, working through an international Forum, fed from various sources, among others a consultative group.
4. AT is considered relevant to both the developing and the developed countries, but a particular stress is put on ^{inter-}least developed countries cooperation and eventually on a regional basis. There should be a global reorientation of the technology policies in the world and ldc's should effectively tap the global flows of technology.
5. Emphasis is laid on skill development both for productive purposes, as for selecting and adapting technology. A proper R+D infrastructure is asked for but in order to arrive at really appropriate solutions, a practical approach is chosen. In this approach pilot schemes and training programmes hold a central position. The human resources aspect is accumulated, and indigenous development of technology must be encouraged.
6. Self-reliant is a basic issue, and reference is made to the "25% of world trade in 2000" statement of Lima Declaration in 1975. To which is added the need for attending to basic needs, and more generally, to promote a qualitative development.
There will remain a need for technology transfer, but ldc's should control the transfer so as to arrive at industrial development which minimizes on bad side effects.

7. Economic and social objectives are goals in development, and technologies are to be selected or developed, that will maximise which development given the resource endowment of the country and other conditions. Although enterprises will have the final word in the choice of technology, governments will set the rules of the game in order to assure a proper development pattern.

Attention is to be given to the process of comparing, selecting and implementation of technologies, as well as evaluation. More in particular technologies for rural development, for alternative energies and for appropriate industrial technologies are to be considered. Within the latter field, some specific branches is indicated: iron and steel, metal working, fertilizer, agro-industries, wood-working, leather, and building materials. Appropriate Industrial Technology is to be understood within a general framework of industrialization, and against the background of development plans.

In most ldc's a dualistic development has been noticed, connected with dependency in technology matters and a discrepancy between urban and rural areas. It is expected that a balanced industrialization will result from an approach to industrialization that distinguishes between a modern-centralized industrial sector, and a dispersed industrial sector, the latter located in rural areas.

8. To summarise, the industrial equipment of human existence in ldc's is found to be dualistic in its nature. A more balanced development is sought after, and will require a stronger control over technology transferred, both nationally and internationally. Hereby enabling the ldc's to follow a course towards increased self-reliance. National cooperation is to be promoted, and internationally, UNIDO is willing to act as an intermediary, as a co-ordinating and stimulating body in order to promote reorientation of technology policies on a global sense, through an international Forum.

9. So far everything said can be accommodated within the list given in C.1. However, one thing is still missing, the connectedness of the entire planning to the human beings in the name of whom all activities are undertaken.

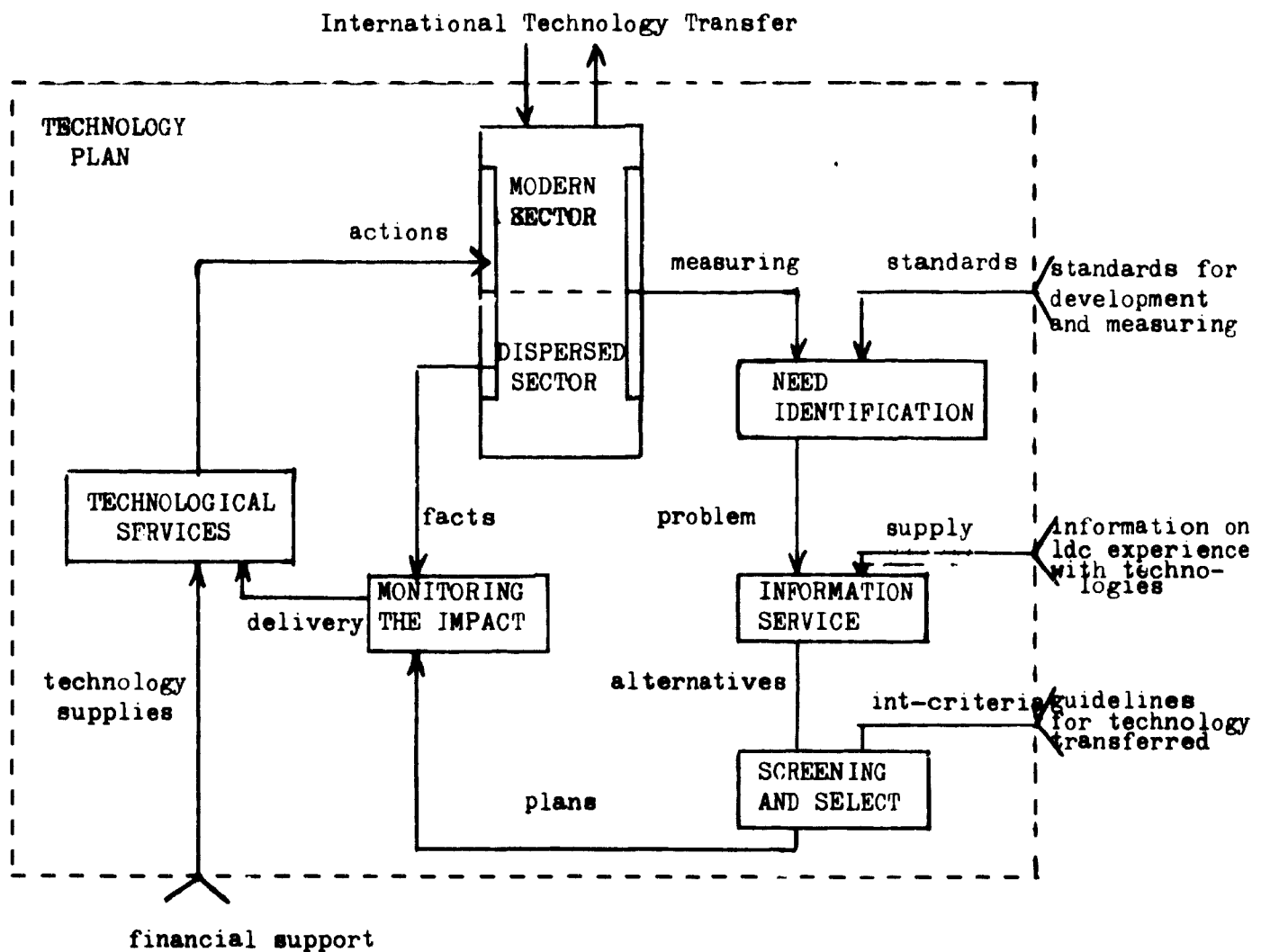
The entire operation, then, is carried out beyond sight for the millions who are involved, or will be shortly. It is my opinion, nevertheless, that the name of the operation should indeed be: Appropriate Industrial Technology. True, in the sense of the definition used, the word appropriate is connected to optimize technology choice. But in the whole approach it is clear to me that the operation is concerned with a restructuring of the control processes that reign the use and change processes in industrial technology!

10. Essentially, the documents point at setting up national control systems in ldc's. Controlling the flow of technology between the national state and developed countries.

The subject matter of the second consultative group has precisely to do with designing the control mechanism, that is called a "technology plan".

When I reconsider what was summarized up on page 8 of the document ID/WG.279/4, it occurred to me that everything could be neatly fitted into the type of schemes that are used in control engineering. (See Graph III below)

Graph III



11. The agenda items of the second consultative group meeting are aimed at detailing the box in the centre of graph III, representing the system to be controlled. This system is conceived as being composed of two sectors, one modern and internationally oriented, linked with another system of dispersed industries.

Put in other words, the agenda items ask for another judgemental model, to be used when detailing a national technology plan. Technological items were already mentioned in the first documents on A.I.T. but there still is no clarity about how to specify particular items in a specific case.

12. To my opinion, what should be know in the first place, is the actual structure of the ldc economy. As well as its peculiarities. I did some work in Indonesia and have summarised my findings in a diagram which shows both the - aggregated - economic/geographical areas where the people of Java live, and the type of technologies found. (See Graph IV below).

Graph IV

	U R B A N			R U R A L	
	METROPOLE	SUBMETROPOLE	PERI URBAN	AGRARIAN	
MODERN TECHNOLOGY	1	3	6	10 20	
SUB-MODERN (INTERMEDIATE) POST TRAD.	2	6	12	20 40	
TRADITIONAL TECHNOLOGY	3	5	12	20 40	
	6	14	30	50	

Proportion of Java's Population, living in different areas and using certain types of technology.

It occurs to me that for working out the two-sector approach as suggested by UNIDO one should acquire detailed information on the areas which are indicated as shaded in the diagram. Using this diagram was very useful for me in discussing possibilities for (small) industries in developing countries. Because it turned out that countries differ remarkably. In Nigeria for instance, the structure is entirely different as less people live in a rather centralized - dispersed way, and the transitional areas are indeed rather small.

Graph V

	U R B A N			R U R A L	
	METROPOLE	SUBMETROPOLE	PERI URBAN	AGRARIAN	
MODERN TECHNOLOGY	1	1	1	7	10
INTERMEDIATE	1	1	1	7	10
TRADITIONAL	8	8	8	56	80
	10	10	10	70	

Proportion of Nigeria's Population, living in different areas and using certain types of technology.

13. Industrial strategies are pursued by all nations. But there are marked differences, in natural resources endowments, the population characteristics, in economic-geographic conditions and many other aspects. The two-sector approach will be possible in most countries, but its outcome will vary greatly, due to the differences mentioned. For instance, there is a good base for covering over 30% of the population, for dispersed industry in Java, but Nigeria lacks such base with only 6% of a much smaller population. Hence, the industrial strategy should not be the same in both cases. While in Java small, dispersed industry can be introduced, Nigeria should first follow a course at dispersing its economic-geographic structure, extending its transitional areas.

14. Finally, as differences are more common than similarities between ldc's, it is my conviction that only national groups can solve industrialization problems. Hence it should be emphasised that at least one part of the control cycle, shown in diagram III must be established soon. Because it is my experience that even within countries, the knowledge of its needs is rather limited.

Material referred to:

0. A variety of books, essays, pamphlets connected to the subject of appropriate technology, that I have read, and of which some are in my library.
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2. Graburn, N.H.H.(ed), Cultural expressions from the Fourth World, University of California Press 1976.
3. Alvarez, Claude (ed), A Village Technology Catalogue, Goa, The Learner's Centre, forthcoming.
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5. Anon, NEDSAT, a learning programme for experimenting with appropriate technologies, aimed at vocational schools, TOOL and THE, Eindhoven, 1976-78.
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ID/WG.264/4 - 27 February 1978: Report on the First Meeting of the Consultative Group on A.I.T., by the UNIDO Secretariat;
452/8 - June 1978: Aide Memoire (Forum): by the UNIDO Secretariat;
ID/WG.279/4 - 20 June 1978: Reorientation of Industrial Strategy in Developing Countries and Selection and Application of Appropriate Industrial Technology, by the UNIDO Secretariat.



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