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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

**INTERNATIONAL FORUM
ON APPROPRIATE
INDUSTRIAL
TECHNOLOGY**

Anand, India 28-30 November 1978

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**REPORT OF THE
MINISTERIAL LEVEL MEETING**

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

**International Forum on Appropriate
Industrial Technology
Anand, 28-30 November 1978**

**REPORT OF THE
MINISTERIAL-LEVEL MEETING**

Anand, 30 November 1978

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INTRODUCTION

1. The ministerial-level meeting of the International Forum on Appropriate Industrial Technology was held in Anand from 28 to 30 November 1979. The meeting was attended by 29 developing and developed countries. The list of participants is annexed in schedule I.
2. This meeting constituted the second part of the International Forum on Appropriate Industrial Technology, the first part of the Forum comprising the technical/official level meeting in New Delhi on 20-25 November 1979. The report of the technical/official level meeting in New Delhi had been circulated to the participants in the ministerial-level meeting both in respect of the conceptual and policy framework for appropriate industrial technology and the programmes of action recommended by the 12 sectoral working groups, which met in New Delhi in the first part of the Forum.
3. Welcoming the participants to the ministerial-level meeting, Mr. Babubhai J. Patel, Chief Minister of Gujarat State, underlined the need for technology to benefit the masses of the population.
4. In his welcome address, supplemented by a statement already circulated, Mr. George Fernandes, Minister of Industry, Government of India, stressed that the formulation of the technology policy of a developing country in transition from a traditional economy to technological self-reliance called for clarity of perception and economic foresight. Developing countries should look for technological systems and inputs which could meet the requirements of better geographical redistribution, decentralization and disaggregation of the production process, upgrading of human skills and restoring man to his rightful place in the centre of things. He suggested that identifying appropriate technologies only with intermediate technologies did not represent a comprehensive definition of appropriate

technology which could cater to the range of requirements, resources and skills in developing countries. In his view, that technology was appropriate which was capable of solving the problems of the people. The Indian experience was that giant power generation plants could exist side by side with small biogas plants. Big textile mills could exist side by side with an improved and revitalized handloom sector. The requirements of a developing country would require a blend of technologies of different sophistication. Mr.

Fernandes drew attention to the need to promote systems designed to match the environmental conditions and needs of developing countries by adapting high-level technologies to suit local requirements, the development and dissemination of employment-generating technologies which can be conveniently adopted by small enterprises and by developing a national urge for innovative technology. He called for the interaction between countries, so that the research on technology in one country might be available to other countries.

5. Welcoming the participants, Dr. Abd-El Rahman Khane, Executive Director of UNIDO, called on developing countries to undertake an audit of performance, a frank appraisal of their development objectives and to what extent these had been achieved. Economic growth had not always resulted in adequate social development and the vast majority of the population had not necessarily benefited from the strategies of development adopted so far. External international constraints of a structural character including technology, appeared to create basic distortions. In a situation where developing countries had to depend almost completely on external sources for industrial technology, the application of such external technologies had a decisive influence on the type of industrial structures created and hence on the pattern of the ultimate distribution of benefits within a country. The application of industrial technology in several developing countries had, among other things, created a dichotomy between modern and languishing traditional technologies. A linkage between modern and traditional technologies should therefore take place for

their mutual reinforcement. The conventional approach of starting with industrialization as a successive implementation of projects should be reversed. Technology instead should become a derivative of the development strategies a country wished to pursue. It was only in this manner that the potential of the concept of appropriate technology could be realized and made operational. A narrow definition of appropriate technology, while sometimes useful for identifying particular techniques and processes in given situations, could hardly be merged in the mainstream of industrial development. Furthermore, for an appropriate choice of technology to be applied in a given set of conditions, there should be an adequate national technological capability.

6. In the course of the preparation of a Co-operative Programme of Action on Appropriate Industrial Technology by UNIDO, it had been realized that a greater awareness of the scope for and implications of technological choice was needed. This was the rationale for the Forum. In bringing together the policy-makers, the need was also felt for a review of the state-of-the-art in several industrial sectors as a result of which major policy issues arising from the sectors could be considered. In this way, perhaps for the first time, representatives of many countries had an opportunity to jointly examine the technological problems in a large number of industrial sectors on the one hand, and the entire range of conceptual and policy issues involved on the other. He hoped that it should be possible for the Ministers to arrive at a common and agreed stand which could be the springboard for further action.

7. Inaugurating the meeting, Mr. Morarji Desai, the Prime Minister of India said it was fortunate that the meeting was taking place in Anand where the blending of appropriate technology in different fields had led in the last 30 years to a pattern of development which was a model for the whole country. He drew attention to the need for securing a satisfactory life for each and every person. No person should be dependent on another for achieving

satisfaction. Technology should provide the opportunity for everyone to gainfully employ himself for his own satisfaction without depending on others. The objective of technology was ultimately not merely its own continuous improvement but its capacity to provide happiness to man. Technology furthermore should be a tool of man and not his master. Even though machines were necessary in certain circumstances, man's capacity to use his hands should be preserved. Man should not be mechanized. Human capacity was more enduring than machines. Mr. Desai recalled the approach of Mahatma Gandhi who was not against machines, but stood for the dignity and value of labour and its ability to contribute to man's happiness and economic well-being; he went on improving the hand-spinning wheel so as to increase its productivity.

8. Mr. Desai pointed out that difference and variety in production could not be avoided. Industry meant not merely large, medium, small or cottage industries. Consequently the variety in technologies could not be avoided. There was a need for all of them, but the emphasis should be to provide a mix which would contribute a satisfactory life for all persons. Conditions in developing and developed countries varied, requiring different mixes of technology but the question of appropriate technology was common to all. Mr. Desai pointed out that technology could also create problems for man. He recalled how the traditional spinning and weaving technologies in India had been replaced resulting in adverse effects on the local economy. Technology which resulted in urban concentration also created social problems. Technology had also created problems in the energy field, necessitating the search for alternative sources of energy. Mr. Desai called for an appropriate blending of management and technology for solving the problems of the people.

9. Mr. Denzil Fernando, Deputy Minister of Sri Lanka, proposed a vote of thanks to conclude the inaugural session.

10. Following the inaugural session, the ministerial-level meeting commenced its deliberations. Mr. D.T. Lakdawala, Deputy Chairman of the Planning Commission of India was unanimously elected as Chairman of the meeting and Mr. E. M'wamunga, Minister of Commerce and Industry of Kenya, as the Vice-Chairman.

11. In his introductory remarks, the Chairman suggested that in the light of the report of the technical/official meeting held in New Delhi from 20-25 November 1978, the issues for the ministerial-level meeting could be considered under five major headings: (a) the concept of appropriate technology; (b) governmental policies and mechanisms needed to promote the use of appropriate technology; (c) the role of governments in formulating national technology plans and promoting domestic technological capability; (d) appropriate institutions at national level; and (e) action required at the international level.

12. In the discussions, participants thanked UNIDO and the Government of India for their initiative in organizing the International Forum on Appropriate Industrial Technology. Appreciation was expressed of UNIDO's efforts to prepare valuable documentation within a short period of time. They also expressed satisfaction over the results of the technical/official level meeting, and it was agreed that it provided the necessary basis for further discussions and concrete action.

PART I

CONCEPTUAL AND POLICY FRAMEWORK FOR APPROPRIATE INDUSTRIAL TECHNOLOGY

13. The Ministerial-Level meeting had before it a report of the technical/official meeting which was in two parts: Report of the Working Group on the Conceptual and Policy Framework for Industrial Technology and the Group Reports on twelve industrial sectors. The first of these reports on the conceptual and policy framework was discussed in depth. The Ministerial meeting endorsed the conclusion as regards the general application of the concept of appropriate technology, both to the large-scale and small-scale sectors, and noted that it was relevant to policy both in developing and developed countries. It welcomed the practical suggestions made in the technical groups which included many which were relevant to the implementation of dispersed small-scale and low-cost technologies which could be of benefit to a number of developing countries. The meeting commended both documents as a useful contribution to the consideration of policy with respect to the promotion of appropriate technologies, broadly defined.

Appropriate technology and industrial development strategy

14. The meeting considered that there may be need for reorientation in industrial strategy in several developing countries in order that, while overall growth was sustained, the benefits of industrialization were extended to all sections of the population. The degree of reorientation and the choice of industries would vary with specific country situations, factor endowments and development objectives. The use of appropriate industrial technologies was considered an essential element in any reorientation of industrial strategies and programmes.

15. The concept of appropriate technology was viewed as being the technology mix contributing most to economic, social and environmental objectives, in relation to resource endowments and conditions of application in each country. Appropriate technology was stressed as being a dynamic and flexible concept, which must be responsive to varying conditions and changing situations in different countries.

16. It was considered that, with widely divergent conditions in developing countries, no single pattern of technology or technologies could be considered as being appropriate, and that a broad spectrum of technologies should be examined and applied. An important overall objective of appropriate technological choice would be the achievement of greater technological self-reliance and increased domestic technological capability, together with fulfilment of other developmental goals. It was noted that, in most developing countries, a major development objective was to provide adequate employment opportunities and fulfilment of basic socio-economic needs of the poorer communities, mostly resident in rural areas. At the same time, some developing countries were faced with considerable shortage of manpower resources, in some other cases, greater emphasis was essential in areas of urban concentration. The appropriate pattern of technological choice and application would need to be determined in the context of socio-economic objectives and a given set of circumstances. The selection and application of appropriate technology would, therefore, imply the use of both large-scale technologies and low-cost small-scale technologies dependent on objectives in a given set of circumstances.

17. The meeting stressed that the formulation of objectives and the determination of appropriate national development strategies was the responsibility of governments. Consequent on determination of such strategy and the priorities to be accorded to various production sectors, appropriate industrial

technologies should be selected and applied in the context of each country situation. For this purpose the capacity of institutions may need to be strengthened in developing countries in order that appropriate choices are made on an informed basis. Such choice would involve taking several factors into account, such as the size of the potential market; the optimal utilization of natural resources and the exercise of national sovereignty in such utilization; role of the public and private sectors; appropriate scales of production; the desirability of geographic dispersal; capital- and labour-intensity of various techniques and processes; use of appropriate sources of energy; technical efficiency; availability of trained manpower; and the impact on the environment. Technological choice should not be confined to the production techniques only but should include management methods and other aspects of industrial operations. "Simple" technologies, to the extent that they tended to serve a specific objective, might be utilized provided, however, that their application was conducive to techno-economic growth and did not result in a stagnation in industrial skills and income of workers. Neither should the use of such technologies have the effect of continuing or worsening the technological backwardness of the developing countries.

18. The meeting considered that, for developing countries having considerable surplus labour and requiring significant increase in employment opportunities, greater industrial dispersal to semi-urban and rural areas may constitute an important developmental objective. It was felt that inadequate emphasis had hitherto been given in most developing countries to the selection and application of low-capital and labour-intensive technologies, which would be of direct benefit to poorer sections in these countries. This needed to be corrected. The scope and potential of such dispersal in respect of several production sectors directly relevant to the fulfilment of

basic socio-economic needs had been inter alia elaborated in the reports of the sectoral Working Groups in the technical/official level meeting held at New Delhi on 20-24 November 1978. The reports not only highlighted various technological alternatives available in different sectors such as food processing, agricultural implements, building materials, paper products, textiles, light industries, oils and fats, drugs and pharmaceuticals and the like, but had also dealt with essential infrastructure needs of rural areas, viz, energy and transportation.

19. The meeting, while recognizing that modern and capital-intensive technologies were essential in some sectors, and in certain country-specific situations, emphasized that such technologies should be related to the particular factor conditions and circumstances of each country. This would require that foreign technology when acquired should not only be obtained on suitable terms and conditions but should also be rapidly absorbed and adapted to domestic conditions. Transfer of technology from developed to developing countries should be carried out on the basis of equality and justice, without detriment to the national sovereignty of developing countries.

20. The meeting stressed, in the above context, the need for close inter-linkage between large- and medium-scale industries using capital-intensive technologies, and small-scale and rural industries using relatively simple and labour-intensive techniques. The example of dairy development around Anand, India, as visited by participants, which effectively combined the use of highly capital-intensive techniques at the processing stage with improved traditional systems of milking and collection and organized on a village co-operative basis with the necessary Government assistance, was considered to be very appropriate. It was felt that scope and potential for similar

interlinkages should also be established in other production sectors in the context of resource endowments and factor conditions in each economy.

21. It was considered that the selection and application of an appropriate spectrum of industrial technologies could significantly accelerate the pace of industrialization in developing countries towards the achievement of the quantitative target of 25% of global industrial production by the year 2000 and greater fulfilment of the qualitative objectives set by the Lima Declaration and Plan of Action. This would, however, require appropriate measures at the national and international level. Noting the role of foreign aid in determining technological choice, the meeting felt that governments concerned should ensure that such aid did not result in distortions in appropriate technology usage in developing countries. The application of appropriate technology also required the right international climate conducive to the establishment of a New International Economic Order.

Governmental policies and measures in developing countries

22. The ministerial-level meeting was of the view that the role of governments in developing countries was of vital significance in determining the appropriate technology spectrum and in promoting the growth of technological capability in each country. A wide range of policies and measures should be considered, including a comprehensive programme for technological development and the creation of a suitable technological environment and capability for choice and application of appropriate processes and techniques.

23. While foreign technology-inflow and exchange would continue to be necessary, greater attention should be paid to the selection of such technologies and the terms and conditions under which these are acquired. While user enterprises should generally select the technology they consider most suitable, governments may prescribe guidelines in this regard and also increase the bargaining capacity of such enterprises through screening of foreign technology proposals. Policy and institutional measures should also be formulated to encourage the rapid absorption and adaptation of such technologies to local conditions.

24. The meeting was of the view that, since in most developing countries greater emphasis was necessary on industrial dispersal and rural industrialization together with the use of technologies appropriate to such dispersed industries, a comprehensive set of policies should be formulated for this purpose by the governments concerned. It was felt that existing policies in developing countries had tended to favour the growth of large-scale and medium industries in the organized urban sector. Policies and other measures required for effective growth of small-scale and rural industry, would comprise the provision of necessary infrastructure, financial assistance and incentives, provision of technological information in suitable forms, technological support and guidance, common service and extension facilities, extensive training programmes, adequate access to machinery and equipment, scarce raw materials and the like, together with fiscal and other measures designed to foster

the rapid development of such industries. The extent to which national policies and programmes should be oriented in this direction would necessarily have to be related to specific country situations.

National technology plans

25. The ministerial-level meeting considered that each developing country would need to formulate a programme for the growth of national technological capability and the effective utilization and development of industrial technologies suitable to their respective industrial sectors. This may require a national technology plan. Such a technology plan should facilitate the evaluation and upgrading of traditional technologies, the effective acquisition, absorption and adaptation of foreign-owned technology and the development of innovative processes and techniques. The upgrading of human technological capability should be an essential part of such a plan and should be incorporated in education and training programmes.

26. The essential ingredients of a technology plan or programme for each developing country could comprise (i) the identification of technological needs in critical and priority sectors in each economy; (ii) the development of an effective technology information and dissemination system for identification and evaluation of technology alternatives and diffusion of innovations and adaptations; (iii) the development of national technological service capacity, including design and engineering; prototype testing; quality certification; metrology, and the like; (iv) the creation of suitable mechanisms for regulation, screening, monitoring and adaptation of foreign technology inflow; (v) industrial R and D activities at institutional and enterprise levels, and the strengthening of functional linkages between research centres and educational institutions on the one hand, and production distribution and service sectors on the other; and (vi) technology assessment to take account of the impact of technologies including environmental impact and working conditions. In this

connexion attention was drawn to the fact that poverty in itself constituted an environmental degradation, and its removal contributed to the improvement of the human situation.

27. It was considered that screening of foreign technology, which had already been undertaken in several developing countries may comprise (i) provision of guidelines for selection of technology and know how in relation to national policies and local factor resources; (ii) determination of suitable terms and conditions under which foreign technology was acquired in different production sectors; (iii) disaggregation of the technology set, so that national capability for technological services and supplies of various inputs could be adequately utilized. It was felt that governments of developing countries should provide guidelines in respect of the acquisition of technology. The screening of foreign technology proposals should also take account of alternative indigenous techniques and processes and those which had been acquired and subsequently adapted to local factor conditions.

National Institutional Mechanism

28. The ministerial-level meeting considered that suitable institutional arrangements should be set up at national level in developing countries to co-ordinate the development and application of appropriate industrial technology in various production sectors, within the framework of development objectives and factor situations in each country

The functions of such an institutional mechanism would comprise inter alia :

(i) identification of technological alternatives in various sectors; (ii) co-ordination of R&D programmes relating to appropriate industrial technology in various domestic institutions and enterprises; (iii) recommendations as to policy and other measures to promote the application and development of more appropriate techniques in particular production sectors.

Measures for International Co-operation

29. The ministerial-level meeting considered that greater technological co-operation among the developing countries was essential. The specific measures recommended for increased co-operation among developing countries were: (i) collection and dissemination of information regarding the experience and availability of alternative technologies; (ii) greater inflow of such techniques and processes between R&D institutions and production enterprises in developing countries including joint ventures and the like; (iii) greater utilization of technological services, including consultancy engineering, from other developing countries and (iv) joint programmes for research in specific sectors, exchange of experience between expert personnel, training and the like. The meeting endorsed the recommendations made in this regard by the UN Conference on Technical Co-operation between Developing Countries (TCDC) held in Buenos Aires in September 1978.

30. Greater co-operation between developed and developing countries was also considered essential in the context of exchange and inflow of more appropriate technologies. Technological development programmes should have necessary support of governments of both developing and developed countries. It was stressed that greater technological exchange should take place between medium and small-scale enterprises in developed and developing countries and that appropriate measures to encourage such inflow should be taken by governments concerned and by international agencies. It was also felt that R&D activities in respect of appropriate processes and techniques should be further expanded by institutions in developed countries in collaboration with counterpart institutions in developing countries.

It was also considered that transnational corporations should be encouraged, where appropriate, to adopt and engage in research on more appropriate technologies for and in their industrial establishments in developing countries.

31. The question of an institutional international mechanism for appropriate technology was also discussed. The general view of participants was that, at this stage, greater priority should be attached to the establishment, development and strengthening of national institutional mechanisms for the development and absorption of appropriate technologies. Where found necessary, regional or sub-regional mechanisms could also be considered. At the international level, the meeting considered it necessary to strengthen substantially the programme of UNIDO and other United Nations agencies in respect of development and appropriate technologies including international instruments for this purpose. It was felt that UNIDO in particular should perform a catalytic role, especially in respect of diffusion of information on available technologies in various industrial sectors of special interest to developing countries and provision of assistance to institutions in developing countries engaged in R and D on appropriate industrial technology. UNIDO's resources for this purpose needed to be augmented.

PART II

Programme of action

32. The meeting appreciated the work of the twelve sectoral working groups on appropriate industrial technology and commended the programmes of action recommended in each sector for national and international action. It was observed that, in preparing the sectoral reports, experts from developing and developed countries had collaborated with each other in formulating their overall approach to appropriate industrial technology. The meeting recommended that joint technical work of this kind should be continued, updated and extended to new sectors.

33. It was noted that the working groups addressed themselves mainly to the identification and assessment of alternative technologies in the respective sectors and the policy requirements and the actions to be taken for their adoption. While it is for the individual countries to determine their industrial sectors of primary importance, the sectors covered by the experts in a sense reflected those production branches which cater specifically to the socio-economic needs of the poorer sections; those sectors which contribute to the better utilization of natural resources, and those which provide a stimulus for upgrading skills and the manufacture of such basic inputs as metals, fertilizers, chemicals and the like. It was further noted that the detailed examination of these sectors was related not only to the consideration of employment potential both direct and indirect, but also industrial dispersal to non-metropolitan and rural areas, and provision of adequate impetus for the growth of a broad-based industrial structure.

34. It was noted that the possibilities of dispersal of industries and for application of relatively small-scale economically and technically feasible technologies in the sectors examined by the Working Groups were much greater than generally thought of.

Accordingly, governments in their industrial development plans and programmes may wish to place greater emphasis on R and D and other support mechanisms for small-scale industry. The exploration of such possibilities needed to be undertaken by developing countries in a systematic manner through appropriate policy and institutional mechanisms. Attention had been drawn to a number of policy aspects such as the need for incentives both in the form of direct financial assistance and through tax exemption or differentiation; credit policy for assistance to small producers; encouragement of dispersal by methods such as licensing, adoption of standards and product designs, price and labour practices, etc. Particular emphasis would need to be given to strengthening technological capabilities in developing countries and the development of a wide range of technological services for consultancy, design and engineering, etc. The role of pilot plants, of testing centres and the facilities for demonstration was recognized as well as the need for collection of technological information and its dissemination through manuals, technological journals, films, inter-country visits, mobile exhibitions, etc.

35. While stressing that the determination of the technology spectrum and the choice of appropriate technologies was a national prerogative, the meeting urged developing countries to examine the policy recommendations as well as the programmes of action recommended by the Working Groups in the light of their requirements and to ensure suitable follow-up. The governments of developing countries needed to draw up their own implementation plans and review or establish institutional infrastructure and undertake training in specialized skills to develop the capacity for choice of technology in various sectors.

36. The meeting welcomed the number of offers made during the meeting of the Working Groups for raw material testing; for examination and evaluation of processes suitable for small-scale plants; for pilot plant operations and commercialization as well as the offer of bulk drugs at cost to be formulated and distributed on a non-profit basis. These and other offers of assistance would need to be followed up through bilateral assistance programmes and through international organizations such as UNIDO as appropriate. The meeting also noted that the Working Groups had identified a number of techniques and processes which seemed to hold great potential for the developing countries if they were technologically further updated and brought to commercial levels of production. These included the small vacuum pan sugar mills, mini-cement plants, small pharmaceutical formulation units to cater for the health care of the majority of the rural population, establishment of rural workshops, biogas units, wind mills, solar driers, etc. These and other valuable elements of programmes of action arising out of the sectoral Working Groups needed to be followed up in a systematic way. This would involve contacts with governments both of developed and developing countries, discussions with technological institutions, promotion of research and development projects and providing focal points for these and other elements of the programmes of action including their financing.

37. The significant role to be played by UNIDO was emphasized by the meeting. UNIDO was requested to initiate the implementation of programmes of action through advisory and consultancy services undertaken as part of its technical assistance programmes, financing a certain number of projects through its Industrial Development Fund and accelerating the flow of information on technological alternatives through its Industrial and Technological Information Bank (INTIB). UNIDO was also requested to accelerate its programmes of co-operation among developing countries in the field of appropriate technology and facilitate

inter-country exchange of experience through country visits, information exchange and other suitable means, utilizing in this connexion regional and sub-regional mechanisms.

38. The meeting emphasized the need for specialized training in regard to choice of technology, evaluation of technology alternatives, and screening of acquisition of technology in accordance with the policies of the country concerned. UNIDO, in co-operation with other United Nations agencies, was requested to accelerate its training activities in this field.

39. It was also considered necessary that UNIDO should promote research on critical technological problems and provide guidelines for evaluation of technologies and negotiation of technology contracts and, more particularly, assist developing countries in the preparation of technology plans at the request of the governments. UNIDO was furthermore requested to publish as soon as possible the documentation submitted to the meeting as well as the valuable material submitted to each of the 13 Working Groups suitably selected and edited. An offer of financial assistance was made by Sweden to facilitate the task.

40. The meeting requested UNIDO, under its existing mandate, to monitor and review the implementation of the programme of action including any new initiatives in the field of appropriate industrial technology. The meeting invited UNIDO to monitor progress on the implementation of the programmes of action and to inform member countries in a manner it deemed to be appropriate.

41. It was felt that the Forum, through the initiative of UNIDO and the Government of India, had made an important contribution to the preparatory activities of the United Nations Conference on Science and Technology for Development and to the Conference itself. UNIDO was requested to submit the report of the ministerial meeting to the

forthcoming United Nations Conference on Science and Technology for Development to be held in Vienna in August 1979 as well as to the Third General Conference of UNIDO to be held in New Delhi in January/February 1980.

* * *

The meeting adopted the following resolution:

"The ministerial-level meeting of the International Forum on Appropriate Industrial Technology expresses deep gratitude to the Government and People of India for the excellent arrangements and kind hospitality extended to all participants;

Extends the same gratitude to the Government and People of the State of Gujarat and to the National Dairy Development Board."

The meeting ended with a vote of thanks to the Chairman, Mr. D.T. Lokdawala.

International Forum on Appropriate
Industrial Technology
Ministerial-Level Meeting
28 - 30 November 1978

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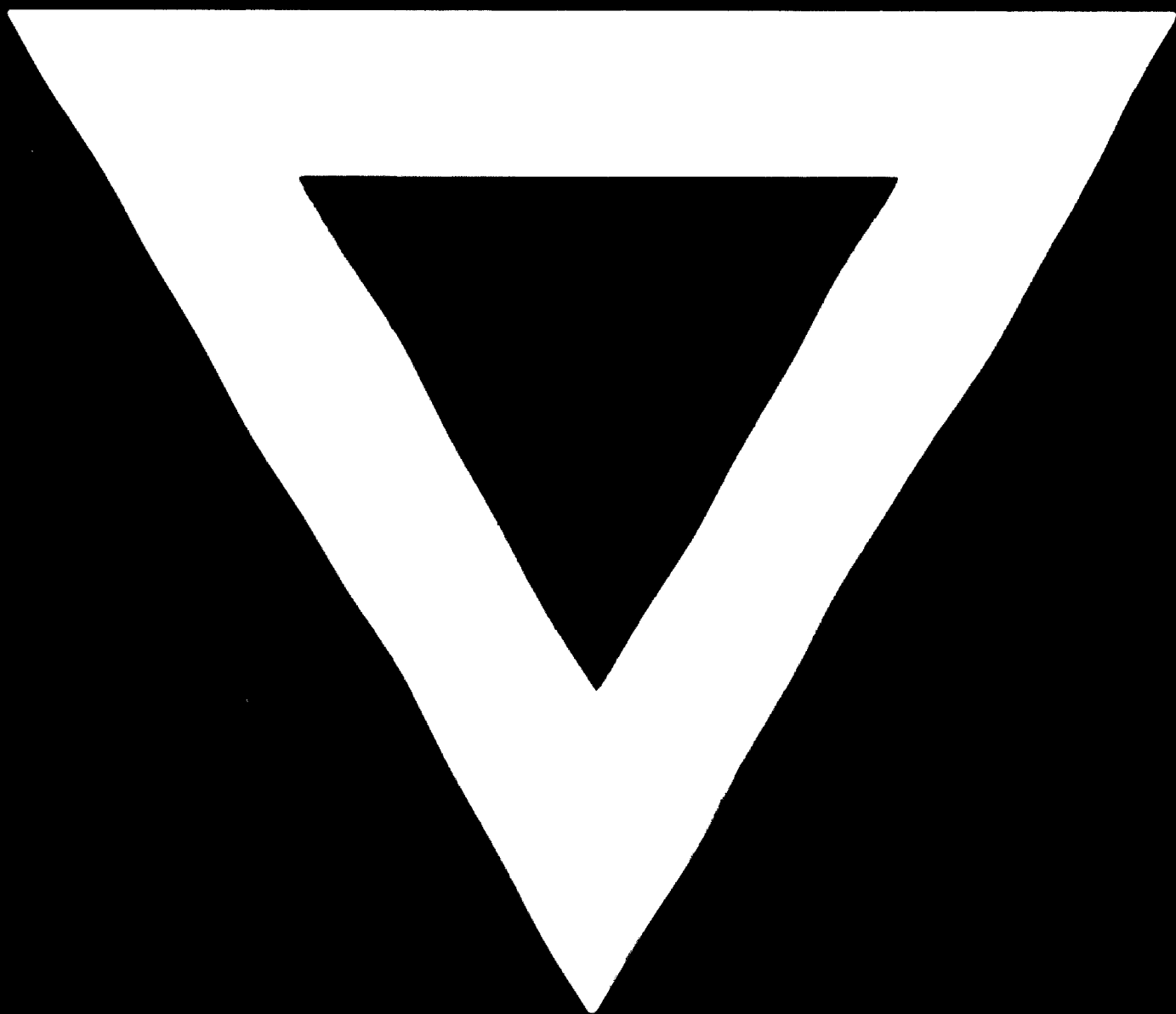
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