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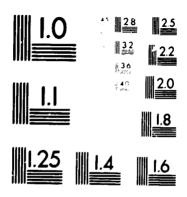
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United Nations Industrial Development Organization

Discussion Meeting of Organizations engaged in
the Application of Information Technology for
Development

Vienna, Austria, 21 - 23 March 1984

MICROELECTRONICS APPLICATIONS

FOR DEVELOPING COUNTRIES:

PRELIMINARY ISSUES FOR CONCERTED ACTION*

prepared by

UNIDO Secretariat

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1.   There is an increasing recognition that microelectronics and information technology could have both adverse implications and potentials for development.* Possible adverse implications extend to employment, comparative advantage and social effects; the potentials lie in new industrial opportunities and employment, increase in productivity over a wide range of economic activities, and innovations which can improve the quality of life. The adverse effects can be easily realized by a developing country simply remaining passive and let various types of microelectronics-based products and equipment flow in; the realization of the potential is, however, a challenge. Actions to avoid adverse effects and inappropriate technologies would include monitoring, assessment and regulation of technology imports. What actions are required to realize the potential of information technology for development?

2.   In the nature of things, response to technological advances has to be made in a context of uncertainty. Strengthening of technological capabilities is an obvious answer both to import and apply technology prudently to products and processes and to develop endogenous technology. But apart from this step, can there be more sharply focussed efforts at national and international levels?

3.   The UNIDO Secretariat has in its documentation to the Fourth General Conference of UNIDO proposed that the beneficial application of technological advances for development should be declared as a major goal of international co-operation in the 1980s.**The International Forum on Technological Advances and Development, held at Tbilisi, USSR, in April 1983, which provided inputs for the UNIDO documentation for UNIDO IV, brought up in this respect a concept of "technolgies for humanity", which will also be presented to UNIDO IV.

4.   The Forum recommended that a new form of international co-operation should be considered, with the designation of a limited number of new advanced technologies to meet particular needs of clear urgency to the human community as "technologies for humanity". These technologies should be developed and disseminated in the public domain. "Technologies for humanity" should be clearly and precisely defined, so that international efforts can be focussed on specific problems until appropriate solutions are found and effectively disseminated throughout the world, especially in developing countries. All nations able to contribute to the development of these technologies should be encouraged

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*The concept of information technology as used here refers to the rapid and convergent developments which have taken place in the fields of computing, systems analysis, telecommunications as well as microelectronics and is concerned with the production, storage, processing and transmission of information.
**ID.Conf.IV.5/5, ID.Conf.IV.5/6

to do so. Commonly funded programmes for such technologies for humanity could make it possible to disseminate the fruits of modern science and technology so as to improve the quality of life of humanity at large. Such a move would reinforce the commonly held aspiration that the human being must be the centre of concern in technological development.

5.   The idea behind the concept is that instead of engaging in occasional and unrelated skirmishes with the problem of applying technological advances for development, the international community should launch a broad frontal attack. This involves mobilization not only of financial resources but the will and commitment of a number of countries as also the dedication and partici- pation of the international scientific and technological community.

6.   A major problem which has to be dealt with essentially at the national level is the integration of technological advances in the mainstream of production and the blending of emerging and traditional technologies. International action would, however, be essential in providing models for such integration as well as promoting, developing and demonstrating specific technologies, products and processes, through which such blending may be achieved. The concept of appropriate technology acquires a new relevance and dimension in this context. It may also be useful to recall the experience of the numerous appropriate technology institutions operating at international, regional or national levels and draw lessons, positive or negative, from their experience. The positive aspect of such efforts has been the practical demonstration of the interest and commitment of scientists and technologists to apply modern science and technology for development; the negative lessons are that the efforts have been generally isolated instances outside the mainstream of production in the respective countries, that they could not be harmonized to introduce elements of synergy and that, in the absence of adequate financial resources, they did not reach a critical mass. Nonetheless, it is now opportune to think of stimu- lating and activating a variety of international institutions and professional associations as well as the academia to engage themselves in activities, with a broad common aim and with full awareness and interaction, in the task of applying technological advances for development.

7.   What is the potential of microelectronics/information technology in this regard? The technological advances in microelectronics have certain characteristics

which make them appropriate for use in developing countries. Microelectronics has opened the door to a vast array of needed applications which can, besides improving productivity over a wide front, help obviate the shortage of middle-level technicians and skilled workers. Microelectronics lends itself to applications which could improve the quality of life of the large masses of population in the rural areas in developing countries, either through providing income-generating opportunities or through direct improvement in welfare. It should, however, be remembered that this is a potential still to be tapped and which enterprises in developing countries may not attempt in the absence of a "market pull". On the other hand, the products developed for the markets of the developed world are already there. This underlines the need for controlling the applications of microelectronics in developing countries through a selective policy. Other advantages of simpler microelectronics-based information and control products are that they can be made cheaply from standard off-the-shelves components which can then be customized by the user; can be very reliable, less sensitive to changes in environments and hard use; easier to develop and expand modularly and better to withstand inadequacies in other systems, skills and materials. Their use requires relatively low skills and decentralized applications are possible. The fact that microelectronics replaces many intricate shop-floor skills could be an advantage to developing countries which have not yet built up such skills; thus saving training time and effort and enabling them to enter the export market where they can in an earlier phase of the product life-cycle.

8. There is a growing perception among developing countries that while the capacity to develop and utilize applications is an important step in the introduction of microelectronics for socio-economic development, attempts to develop applications should not be at the expense of efforts to develop design and manufacturing capabilities for components. The latter efforts are of central importance, since mastery of the technology is not otherwise possible. Such views were forcefully expressed in the UNIDO/ECLA Expert Group Meeting on Implications of Microelectronics for the ECLA Region, held in June 1982. The meeting stressed that the criteria for applications should be derived from a diagnosis of the needs and ultimately for the development strategy of each country. The development of applications should not also be viewed as a iso-lated technological problem. The application effort should encompass the chain of activities essential to successful production and use, ranging from the

perception of a demand to translating it through technology to a cost-effective
way of meeting the demand. The interaction of a number of "agents" is in-
volved, namely government, industry and services, users and electronics pro-
fessionals.

9.   It is against the background stated above that the items for discussion
in the meeting may be viewed. It is suggested that the discussion may centre
around five basic issues, related to the primary objectives of the meeting.

I.   Exchange of Information on Goals and Activities

The objectives of the meeting are, _inter alia_:

(a)   To share information on the ongoing and proposed actions programmes
       of the participant groups;

(b)   To understand the backgrounds and contexts in which these programmes
       were worked out;

(c)   To understand the methodologies used to implement these programmes;

(d)   To understand the follow-up actions, if any, and future programmes
       under contemplation, and the long-term goals.

10.   The meeting may wish to review broadly the activities undertaken by organi-
zations active in the area of information technology and its implications for
developing countries. The activities of each group or organization may be
presented briefly to supplement the paper prepared by it. In regard to UNIDO,
its activities have been presented in "The UNIDO Programme of Technological
Advances: Microelectronics", (UNIDO|IS.445). In exchanging information, the
following elements could be kept in mind: the status of the organization
and its affiliation with government or industry; objectives; sources of
finance; activities in developing countries and special interest in particular
regions or groups of countries; and past, ongoing and planned programmes.

II.   Gaps, Complementarities and Common Ground

The objectives of the meeting are, _inter alia_:

(a)   To analyse gaps in application areas covered and discuss whether more
       consultations between groups in the choice of programmes would help;

(b) To explore possibilities for ensuring complementarities in the action
     programmes of the various groups.

11. The meeting may wish to see whether the existing activities reveal a focus
on any particular sector or problem area; whether thrust areas for common effort
could be identified; and how and to what extent the individual efforts could
be harmonized into an informal world-wide programme at present and in the future,
particularly bearing in mind the concept of "technologies for humanity".

12. The meeting may also wish to consider more systematic exchange of information
among participating organizations. One step in this regard is the exchange
of the information bulletins published by the various organizations. UNIDO's
Microelectronics Monitor could be of use in disseminating such information
to a target audience in developing countries.

III.   Possible Co-operation Mechanisms

The objectives of the meeting are, inter alia:

(a) To explore the possibility of establishing consultative mechanisms
     for continued exchange of information, consultation, advice, etc.
     between groups;

(b) To explore as a future possibility co-operation efforts.

13. It would appear that if a major effort in applying information technology
for development is to be mounted, a mechanism must be available which could,
on a continuous basis, mobilize international co-operation in this area. This
objective could be achieved, if among participating institutions and other interested
organizations including United Nations organizations a Consultative Group on
Information Technology (COGIT) were formed. Such a group would meet once a
year to review activities, share experiences, co-ordinate the future work and
formulate and, if possible, secure funding for joint projects. The UNIDO
Secretariat could act as the Secretariat for such a group. The group could
also identify specific problem areas of importance and urgency that would lend
themselves to solution through the application of information technology and
mobilize its members to a common international effort to solve the problems.

14. In this connection it is also relevant to recall the recommendations of experts in the Meeting on the Implications of Technological Advances in Micro-electronics, held by UNIDO in June 1981. After a detailed review of the potentialities and implications of microelectronics the meeting recommended that UNIDO should promote special applications for developing countries through studies of actual experience and compilation of inventories of applications as well as by setting up design centres and pilot projects in developing countries as required. In this connection the meeting also recommended that UNIDO should establish a multidisciplinary task force which can advise on both the technical feasibility of such applications and the social implications of their use.

IV.   An International Roster of Scientists and Technologists

One of the objectives of the meeting is:

to discuss and understand the role of professional experts in the structuring and implementation of these programmes.

15. From UNIDO's experience it is clear that many scientists and technologists including those at the cutting edge of the relevant technologies are willing and eager to devote some time amidst their busy schedules to solving problems of development. It is important that the interest and efforts of such persons are systematically mobilized. In this connection a workshop organized by UNIDO in Dubrovnik*suggested an International Roster of Scientists and Technologists in technological advances including microelectronics. The Roster has also been proposed for consideration by UNIDO IV. In the meantime preliminary work for compiling the Roster has been initiated by UNIDO.

16. The concept recommended by the Dubrovnik workshop is that a computerized and updated Roster should be developed by UNIDO in implementation of the recommendation made at the International Forum on Technological Advances and Development. The Roster could contain information on the name, qualifications and affiliation of the scientist or technologist, his fields of interest and competence, the countries he is prepared to assist, the period of availability, financial remuneration required etc. Developing countries requiring specific expertise could approach UNIDO, functioning as a clearing house, for information on the basis of which they could contact the expert concerned. The Roster could also be linked to national mechanisms for the utilization of expatriate nationals in their development. UNIDO was requested to establish such a clearing house

*Workshop on Institutional and Structural Responses of Developing Countries to

initially in the fields of micro-electronics, genetic engineering and bio-technology and solar and biomass energy. It was requested to co-operate closely in this matter with UNESCO, the International Council of Scientific Unions (ICSU), the Committee on Science and Technology in Developing Countries (COSTED), the World Association of Industrial Technological Research Organizations (WAITRO) and other relevant organizations. This Roster could also be used to mobilize the co-operation of scientists and technologists in the development of applications unique to developing country conditions and in particular in the development of "technologies for humanity".

17. The meeting may wish to make concrete suggestions on the compilation of the Roster and also discuss other means of systematically drawing from the expertise available from the international scientific and technological community.

V. Silicon Foundry to service Developing Countries' Needs

18. The perception of developing countries to have design and application capacities rather than apply "black boxes" have been referred to earlier. Hence, there is an increasing desire on the part of developing countries to nurture and promote design activities. However, since the establishment of fabrication facilities involves large investments, it is useful to distinguish between the design stage and the fabrication stage, so that design activities could be carried out in a number of developing countries and the fabrications through a silicon foundry which is organically linked to the design activities in developing countries. A clear case for establishing a silicon foundry for joint use by developing countries to meet the fabrication needs has been presented in a document prepared by the UNIDO Secretariat, which is distributed to this meeting entitled "A Silicon Foundry Approach to Developing Countries' Needs: A Preliminary Approach" (UNIDO/IS.444).

19. This being a preliminary meeting, it has not been possible to invite and associate all concerned institutions and organizations including UN organizations and it is hoped that through the proposed mechanism of a consultative group a larger number of interested institutions could be associated.

20. The meeting may wish to discuss the issues stated above and such other matters which will facilitate and accelerate a common international effort in the application of information technology for the benefit of mankind.