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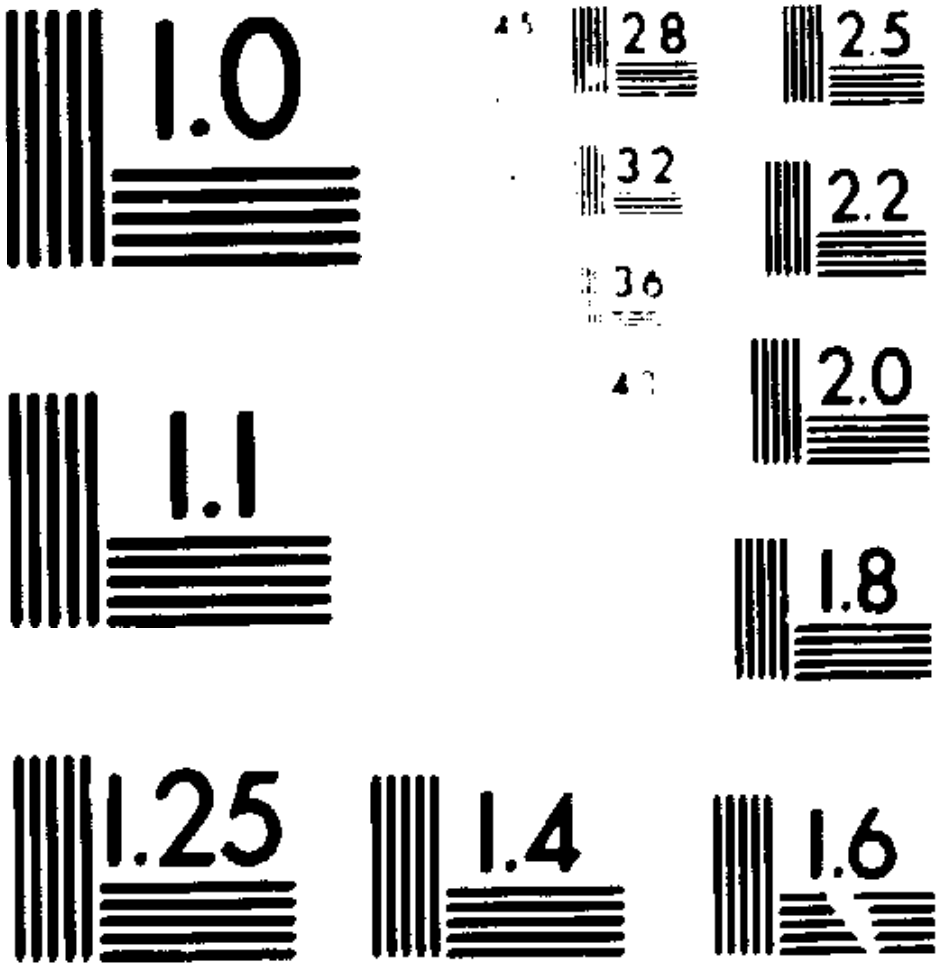

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14178

PROPOSALS (MICRO-ELECTRONICS).

FOR THE AFRICAN EXPERT GROUP MEETING TO ASSESS IMPLICATION OF NEW TECHNOLOGIES FOR THE LAGOS PLAN OF ACTION, 22 - 26 October, 1984, MBABANE, SWAZILAND

I. Fields of interests and activity

My main interests in micro-electronics are the following:

1. Education and research organization in Computer Science on a national scale

2. Information systems and data bases theory and applications

3. Expert systems, i.e. computer aided decision - supporting methods

4. Microcomputers applications in the above fields

Ad 1. Education and research

a) In 1970 - 1975 I supervised and implemented the national program for high school teacher education in informatics. In a number of coursee several hundreds of teachers have been trained to teach informatics at high school level from both theoretical and practical point of view. The courses included: theory of computation and algorithms, computer structure and organization, programming languages and computer applications in high school environment, i.e. application in

teaching mathematics, physics, chemistry, etc. Practical exercises and simple computer applications were included in the courses.

b) In 1965 - 1975 I chaired the Ministry of Higher Education and Technology Commission for Computer Science Curricula Development which worked out the educational policies in computer science at university level in Poland.

c) Since 1965 I have chaired the Computer Science Education Branch in the half-yearly vocational courses on Applied Mathematics and Computer Science organized every year by the Polish Academy of Science, Institute of Mathematics and Institute of Computer Science. The courses includes lectures on programming languages (Fortran, Cobol, PL1, Pascal, Prolog, Simula, Ada), software engineering, operation systems, translators, microprogramming and microcomputer applications, etc. Several hundreds of engineers, economists and others have been trained at these courses.

d) In 1970 - 1979 I supervised a national research program in theoretical computer science in Poland, including research in programming languages development, new computer architecture, concurrency, data bases and information retrieval, computer applications in medicine and others.

Ad 2. <u>Information systems</u>

Five years ago I developed a new theoretical approach to information systems design and statistical data bases (the least one with American colleagues). The method simpli-

fies the organization of the system and speeds up the retrieval algorithms. In the case of statistical data bases the method enables one to use micro- and personal computers in statistical computations. The method has been implemented for:

- Warsaw Institute for the Mechanization and Automation of Agriculture - for collecting agriculture data (ICL 1900),
- Warsaw Technical University - for production management (IBM 370),
- University of Silesia - for Technological Management Department (small computer of Polish design),
- Technical University of Silesia - for statistical computations (Sinclair '81)

Ad 3. Three years ago I proposed a new theoretical approach to expert system design, knowledge representation, inductive reasoning and learning from examples. The method seems to be of special value for the algorithmization of approximate reasoning when data are vague and uncertain, for example, in medicine. There are five experimental implementation of the method, three for clinical data analysis and computer - aided medical diagnosis, and two for industrial process control (cement production and steel mill control). The method is very simple and can be implemented with micro- and personal computers. Practical experience gained so far seems to indicate that the method can be used instead of statistical computation in many cases as it provides very simple algorithms and a natural interpretation. But the

method requires farther investigation from theoretical and practical points of view.

II. Propcsals (in Micro-electronic)

1. Education

In order to meet the Lagos Plan of Action requirements in relation to micro-electronics the plan of extensive education in micro-electronics at different levels, branches and regions is urgently needed.

At the level of University education computer science departments with their own curricula, programs and computer facilities should form the basis for qualified high-level personnel for micro-electronics and its applications.

Beside this in university curricula for engineering, medical, agricultural, geological, geographical, legal, educational, etc. departments special programs of education in computer science applications should be carefully designed and implemented.

Universities should also do research work in the field of micro-electronics applications in areas of interest.

Vocational training requires special attention, and is to provide middle-level technical personnel. Special permanent courses on micro-electronics and computer science application are needed.

Also an educational program for high-school teachers of micro-electronics and computer science is needed.

Research should stress the need for the development of programming methodology, system design and various applications of micro-electronics. Competent assistance in all these branches can be provided by ou · Institute.

2. Information systems and data banks

Data banks and information systems of various kinds are of primary importance for micro-electronic applications in management, industry, agriculture, geology, geography, foreign trade, health care, etc. They may range from small, local data banks implemented on personal computers to regional and inter-regional data networks providing access to international data networks.

The experience gained in our Institute in this area can be of use in solving problems related to data bank organization and implementation in various branches and in various hardware and software environments.

3. Computer aided decision methods

To increase the decision-making capacity at governmental and individual levels an intensive use of computer-aided methods is greatly valuable and promising. The methods worked out in our Institute may find applications in computer-aided diagnosis automatic process control, geological data analysis, sociological data analysis, etc. High-quality software can be developed in Poland and high-level training courses in those areas can be held. Methods of statistical data analysis computer programs can also be included on the list.