

Microelectronics for Man Opportunities and Perspectives for Economy, Education and Medicine.

Tuesday, 11th September 1984 to Thursday, 13th September 1984
Johannes Kepler University Linz

International conference organised by the Research Institute for Microprocessor Technology of the Johannes Kepler University Linz in cooperation with Linz Special Events Planning Corporation (LIVA) and the Austrian Broadcasting Corporation, Regional Studio for Upper Austria.

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Tuesday, 11th September 1984, 9:00 a.m. to 6:00 p.m.
Johannes Kepler University

Main Lectures

9:00 a.m. (Auditorium 1):

o. Univ.-Prof. Dr. Jörg R. Mühlbacher (University of Linz)
Microelectronics for Man

9:30 a.m. (Auditorium 1):

Prof. Dr. Otto G. Folberth (IBM Laboratories, Böblingen)
Perspectives of Digital Microelectronics

10:30 a.m. (Auditorium 1):

Prof. Dr. Johann Löhn (Governmental Commissioner for Technology Transfer, Baden-Württemberg)
Structural Change and Opportunities in the Middle Class Economy

11:15 a.m. (Auditorium 1):

o. Univ.-Prof. Dr. Hans Leopold (Technical University of Graz)
On the Cooperation of Industry and Trade with External Research Establishments

Subjects of the Other Lectures
Structural Change in the Economy (Auditorium 1)
Office Automation (Auditorium 2)
Software Techniques (Auditorium 3)
Environment Protection (Auditorium 4)

o. Univ.-Prof. Dr. Jörg H. Mühlbacher
Microelectronics for Man

The extent of the conceptive quality of the application of microelectronics will influence the international competitiveness of many branches of Austria's industry and trade during the coming years. This influence is particularly evident in the form of structural change, which will be perceptible in new products and related to establishment of new firms, in the modification of working places to general socio-cultural changes. Therefore it is not only the scientists and users of microelectronics who will be affected by this development, but all of us who, due to the stormy "computerization of society", are affected by the changes.

We strongly believe that microelectronics is far more than just the possibility of placing many transistors onto one small semiconductor in order to replace conventional construction, and in principle to integrate possible components such as circuits with the correspondingly more compact ones. There is a wide range of single disciplines to be included under microelectronics. The opportunities of research, development and application of microelectronics lie in an integrative approach. The conference therefore offers a wide spectrum of topics ranging from pure economic political questions to new information media such as videotext to office automation and sociological subjects.

The conference title "Microelectronics" has the additional clause "for Man" emphasizing that Man is the focal point. That is why the use of microelectronics in medicine and environment protection will be given special coverage.

During recent years universities have become a permanent public economic factor and must therefore be interested not only in pure research activities but also in their active transformation in direct cooperation with the economy.

For this reason we, from the Research Institute for Microelectronic Technology, have sponsored and organized this conference.

Prof. Dr. rer. nat. Otto Gert Folberth
Perspectives of Digital Microelectronics

During the last 25 years the development of digital systems has boomed. This was possible due to parallel advancements in semiconductor technology. The development progressed synergistically: Each advancement of the silicium technology was used to create better systems. New applications and markets were developed, which, together with the financial gain, allowed an intensification of the development of the technology, etc. During this interplay practically all the essential qualities of digital systems were improved by orders of magnitude.

The entire development is however just in the starting phase: The density of integrated circuits will be even further increased and still have a high influence on the development of digital systems. The availability of many cheap circuit elements due to progressive miniaturization and increase of the degree of integration together with the anticipated more

difficult and complicated design and topological implementation continuously shifts the developmental limits.

The social consequences of microelectronics cannot be completely envisaged. There will certainly be extensive professional changes and new kinds of communication, that will also have a lasting effect on recreational activities. Microelectronics thereby allows a multitude of widespread, flexible solutions.

Prof. Dr. Johann Löhn
Analysis of the New Technologies

What are the structural characteristics of the new technologies, in particular of microelectronics ' communication techniques, information processing and manufacturing engineering.

Strategies

What are the universal strategies, in particular from the aspect of High Tech, mass-produced articles, mature products, applications and services.

Measures

Which measures should be taken, in particular for training, consulting, research and development, establishment of new firms, cooperation, financing and promotion.

o. Univ.-Prof. Dr. Hans Leopold
On the Co-Operation of Industry and Trade with External Research Establishments

The continual improvement of currently manufactured products and the introduction of new products is a prerequisite for the competitive capacity of device and equipment manufacturers, especially on the international market. Furthermore, a product line specific research and development potential is necessary, which is not available to many small and medium-sized companies. If, with the introduction of products, new methods are introduced, such as the use of microelectronics or other at present internally unavailable technologies (so called discontinuous innovation), then larger companies will also reach the limit of their research and development resources. Moreover, the design and development of products, the preparation of new production, rationalization and automation, quality control, marketing and the customer specific application of the new products often require additional skills and knowledge. Faced with the development of such problems, it would appear appropriate for many companies to seek cooperation with external research establishments.

There are many research establishments in Austria of various legal entities, which, depending on their structure, seem to be more or less suitable as cooperative partners for the named companies. The scope ranges from the university institutes and non-academic institutes with different objectives to management consultants and consulting engineers. Some of these potential know-how sources are not, however, sufficiently prepared for the cooperation with industry and trade, even though, as far as the educational status of their employees is concerned, they seem to be particularly qualified. It is therefore relatively difficult to gain contact, particularly with these institutes.

Hans Leopold attempts to bridge the gap between the presumptive cooperative partners by highlighting the starting position of both parties and by looking into the organizational problems which includes the mutual learning process and motivational questions. The conflict of interests will also not be overlooked: the desire to publish on the side of the university researcher and the desire for secrecy by the industrial contractor, the evaluation of the research with regards to the academic qualification, the refusal of outside ideas by the internal developer (the "not invented here syndrome") or the problems in the definition of the readiness of a prototype for production.

Wednesday, 12th September 1984, 9:00 a.m. to 6:00 p.m.
Johannes Kepler University

Main Lectures

9:00 a.m. (Auditorium 1):

Univ.-Doz. Dr. Heinz Fischer (Federal Minister for Science and Research, Vienna)
Microelectronics for Man—The Research and Technology Concept of the Austrian Federal Government

9:45 a.m. (Auditorium 1):

o. Univ.-Prof. Dr. Gerhart Bruckmann (University of Vienna)
Microelectronics and the Economical Structure

Subjects of the Other Lectures

Structural Change in the Economy (Auditorium 1) Microelectronics in Medicine (Auditorium 2)

Videotex (Auditorium 3)

Man in the Automated Working System (Auditorium 7)

Univ.-Doz. Dr. Heinz Fischer

Microelectronics for Man—The Research and Technology Concept of the Austrian Federal Government

The present status of microelectronics can be attributed to a large extent to the (culturally seen) very short history of the computer. The first programmable computer—it was equipped with relays from the telephone, and therefore had nothing to do with electronics—was already used for military homing purposes during the Second World War. The development progressed from space and energy consuming electron tube computers to the transistorized calculators, whose operating efficiency was further extended by the use of integrated circuits. Together with mass storage devices and ingenious access methods the computers, which were mostly centrally used by economy and administration, proved to be so efficient that at the end of the sixties/beginning of the seventies the first privacy considerations were introduced in order to protect people from the results of uncontrolled computerization, and in the mid-seventies Austria was one of the first countries to introduce privacy legislation.

About this time efforts were made—demanded by military interest—to increase efficiency by means of miniaturization and adaptation of the manufacturing process, known as "microelectronic technology", whose areas of application were first seen to be very limited. Only the revolutionary emergence of micro-chips in highly civilian products such as wrist

watches, minicomputers and later microcomputers, showed that it was not so much a new branch of industry or a new process technique but a new technology capable of being used for different products, manufacturing processes and applications and must therefore be seen not as a technical but as a social phenomenon.

In order to establish the prerequisites for the use of this new technology in all branches and areas of application, the Ministry of Science and Research ordered a microelectronic study and increased the relevant teaching capacity. In the research and technology concept for the 1980's emphasis was put on "Microelectronics and Information Processing". At the beginning of 1984 the Federal Government agreed to the Microelectronic Promotion Program, with the object of increasing cooperation between industry and trade with university and non-academic research establishments in order to achieve an improved structure and increase the international competitiveness of the Austrian economy. Preference was given to those cooperational projects which include the corresponding sociologically supported measures assisted by the employees' representatives during the introduction of new technologies on industrial levels (e.g. use of industrial robots, office automation).

o. Univ.-Prof. Dr. Gerhart Bruckmann Microelectronics and Economical Structure

The current phase of the industrial revolution, characterized by microelectronics will undoubtedly ease our material existence, although, as with earlier phases, it will make human work superfluous. Whereas, due to the corresponding sharp rise of the gross national product, it was relatively easy to deploy the superfluous manpower during the earlier phases, it will, henceforth, due to the waning increase of the gross national product, become harder to find employment for the superfluous manpower in the same amounts.

This "affluent unemployment", of which we are just at the beginning, offers, if seen correctly, many opportunities. The gross national product will be large enough to finance new activities in long neglected sectors, such as care of the aged, care of the handicapped, environment and disaster protection, etc. Correctly put, the question therefore should not read how microelectronics will effect our economic structure but how it can or should effect it.

A study carried out at the Austrian Academy of Sciences has shown that there will be a difference of 300,000 work places in Austria in the next few years, depending on whether the offered opportunities of microelectronics are perceived or not.

According to Charles Sable, the most promising strategy is the "flexible specialization", the shift from competition of prices to the definition of the product. Properly applied, microelectronics can be used to reduce the vulnerability of our social system and also reduce the consumption of resources (and thereby the environmental problems).

Thursday, 13th September 1984, 9:00 a.m. to 6:00 p.m.
Johannes Kepler University

Main Lectures

9:00 a.m. (Auditorium 1):

Prof. Herbert Krejci (Federation of Austrian Industrialists, Vienna)
Against the Fear of Microelectronics

9:45 a.m. (Auditorium 1):

Helmut Braun, M. P. (Austrian Trade Union of Salaried Clerical, Commercial and Technical Employees)

For the Hope of Microelectronics: Confidence is Good, Codetermination is Better!

Subjects of the Other Lectures

Structural Change in the Economy (Auditorium 1)

Microelectronics in Medicine (Auditorium 2)

Videotex (Auditorium 3)

Man and Society between Fear and Hope (Auditorium 7)

Prof. Herbert Krejci
Against the Fear of Microelectronics

The acceptance of modern technologies, and therewith of microelectronics, is a main problem, not only for the economy but also for the society as a whole, even for the existence of democratic ways of life. The achievement of the highest possible degree of employment is a prerequisite for social harmony, and for a largely conflict-free solution of the tasks of economy and society in the transition to new ways of life. Therefore, the existence of a democratic society also depends on the attitude of the nation to technology. In this aspect is the struggle against the fear of microelectronics, and above all against a consciously nurtured fear, more than just a question of a country's competitiveness, it becomes a democratic-political responsibility.

The application of microelectronics is indispensable also in Austria. This presents a challenge not only to economic policy but in particular also to a coordinated attitude of the social partners and to changes of company management styles. An essential prerequisite for the acceptance of new technologies is the active cooperation of the education policy.

Helmut Braun
Symbol "Screen Work"

The union movement, and here in particular, the Union of White Collar Workers, has been active with the question of what risks and opportunities are connected to the introduction of new information and communication technologies, for a long time. However, starting points and formulation of questions have changed considerably.

The principle problem with EDP is the screen.

Questions regarding eye strain and ergonomics have been discussed and investigations undertaken for more than 10 years. And attempts were made to transfer the results to industry. Just how difficult this transfer is, is shown by the fact that measures, such as the inclusion of screen work in the "Night Shift-Heavy Work Act" as "heavy work", and the Central Work Inspectorate's screen edict were rather slowly realized.

In spite of all the necessary efforts it has been proven that the symbol "screen" is only the tip of the iceberg, the terminal device of comprehensive systems, which result from the combination of hardware, software, data and work organization.

The Pressure of Rationalization Increases

In order to recognize the entire complex of problems that are connected to the new technology, one has to look farther than the considerations of these technologies as working aids and rather see their features as information, organization and management and control technologies in connection with managerial rationalization strategies and technical possibilities.

Reduction in personnel costs and processing times are the primary goals of rationalization investments. Technical-organizational rationalization in the administrative and service sectors, which have been extended, where the fixed costs have risen and the increase in productivity has been relatively slow, appears to be particularly lucrative. Here, the conditions for the use of computers become ever more favourable: Organizational rationalization offers the basis, the price and efficiency relationship of the information devices improves steadily, the interlacing of systems via data processing and cabling advances.

Trade Union Stipulations

If we want to overcome future problems, we cannot be content with the moderation of the consequences of rationalization especially in view of the complexity of the systems.

With the extension of the rights of codetermination for the employees, the dangers, which due to new technologies or production methods can influence the working conditions, can be recognized in the early stages and prevented. Man must have priority over economic and technical goals.

In order to take advantage of the many opportunities connected with modern technologies and at the same time avoid the hazards that could result therefrom, the complete codetermination of the employees and their representatives in all technical and organizational decisions is imperative.