COMPUTING
IN HUNGARY

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JOHN von NEUMANN SOCIETY FOR COMPUTING SCIENCES

Contents

Abreviations

NJSZT	=Jonh von Neumann Society for Computing Science
MTESZ	=Federation of Technical and Scientific Societies
VT	=Videoton
KFKI	=Central Research Institute for Physics
MOM	=Hungarian Optical Works
TERTA	=Telephone Company
ORION	=Radio and Electrical Company
VILATI	=General Contractor and Manufacturing Company for Electric Automatics
SZKI	=Computer Research and Innovation Center
MTA-SZTAKI	=Computing and Automation Institute of the Hungarian Academy of Sciences
SZÁMALK	=Computer Applications and Service Company
BME	=Technical University of Budapest
NME	=Technical University of Heavy Industry (Miskolc)

President Eisenhower decorates John von Neumann with the Medal of Freedom

Welcome

We welcome you on behalf of the members of the John von Neumann Society for Computing Sciences—*the professional association for Hungarian experts working in the computer field. We are mostly engineers, mathematicians and economists who work with computers—either as researchers in specific fields of science or as developers of hardware and software, systems analysts, teachers or students. We greet the reader with the few thoughts that follow here. With this small volume we would like to make you interested in our work and achievements, but before introducing computing in Hungary, we would like to present some general information.*
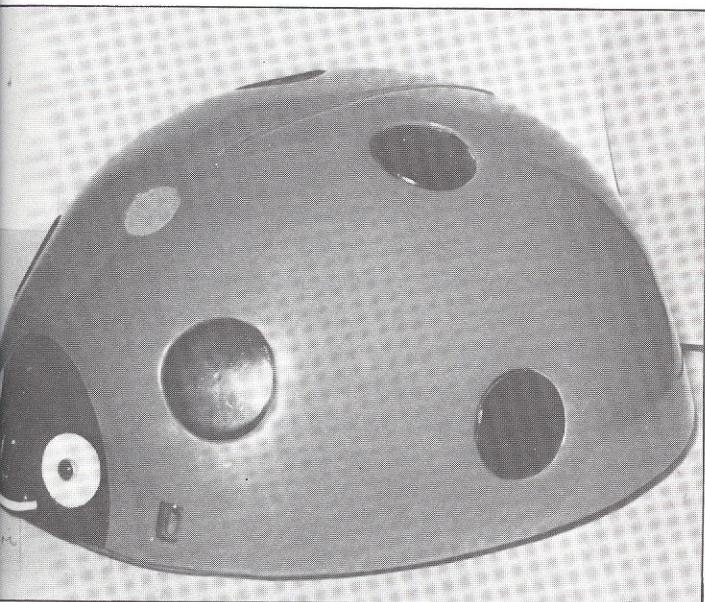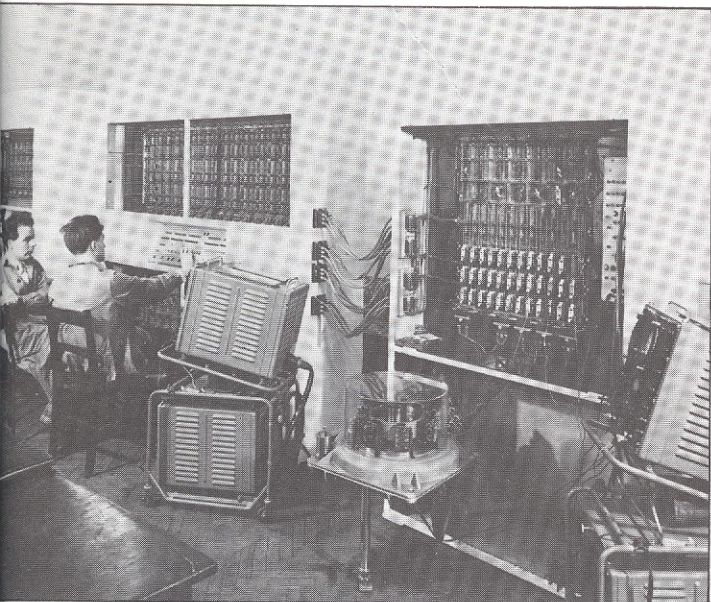
We live and work in Hungary, which covers less than one per cent of the European territory. Our people is the Hungarian nation of ten and a half million, less than 2 per cent of Europe's population. Our country was founded almost 1100 years ago, our language is about 3000 years old, and is definitely different from all those of the neighbouring nations. We live and work in a socialist social system. In our country, which is poorly endowed with raw materials, everything is created by physical and intellectual work. Our national income is near to 19 thousand million dollars. The good international reputation of Hungarian cultural and scientific achievement is due to many of our world renown compatriots. A number of them from the early decades of this century are Béla Bartók, the composer, Albert Szent-Györgyi, who discovered Vitamin C and received the Nobel Prize for that, and Dénes Gábor, the physicist who invented holography. We are equally proud of John von Neumann, who gave his name to our society. He was born Hungarian, became one of the leading mathematicians of the cen-tury, and co-founder of modern computer science. He has never forgotten his origins, although the world knew him as an American. We are pround of other leading Hungarian mathematicians too. Their achievements still continue to influence computing in Hungary as well as abroad.

In spite of the worldwide economic recession, computing and especially its applications have leapt forward a great deal recently. The increased use of different classes of microcomputers has brought about decisive changes and, as we have anticipated, their use is beginning to be an everyday fact in the schools and homes in our country too. If we make comparisons with other countries, we may not be content with the pace of our progress, but if we take into consideration the Hungarian conditions and the external limitations upon our country, then the achievement and progress is beyond doubt.

As well as the personal efforts and the work of different specialized workshops and firms, our society also played an important part in this progress.

The most important feature of our efforts was that we have tried to reach even those people who are not specialists and who constitute a large part of our society, for instance, elementary school pupils, and other interested laymen. To this end, we have a monthly periodical, "Mikromagazin". Together with Hungarian Television we have organized a course in the programming language Basic, which finished with an examination, and have also sponsored other programmes in the mass media. We have organized computer competitions in schools, summer camps on computing, exhibitions and software marts. All this allowed us to progress further than our technical basis alone could have permitted, and our achievements stand good even in international comparison.

The enthusiasm which proved to be so infectous, grows even stronger, when the initiators see that they have found followers and a grateful public. This dedication has helped the experts in this field to overcome many a difficulty since the beginnings 30 years ago and helped to make progress in the broad dissemination of computing in the last ten years. But we still face many obstacles, fake prophets and a poor material background, we will need this enthusiasm even more in the future.

Looking back

The first electronic computer in Hungary was built in 1959. You can see a few documents from this early development period on the following pages. In the pictures you will see documents and photos about a few decisive achievements from the past. The pioneering phase drew to a conclusion at the end of the sixties. From 1971 purposeful computerization was started in the framework of the Central Computerization Development Programme, initiated by the government.

László Kozma (1902—1983), academician, builder of the first Hungarian relay computer, MESz-1, completed in 1955.

Detail from the circuit diagram of the first Hungarian computer built between 1937 and 1939 from the components of a telephone exchange, constructed by László Kozma.

A meaningful development programme followed in the use of computers and in the dissemination of a computer culture. With the adaptation of foreign technologies and their domestic development as well as with basic research, a relatively modern industry was founded. About 32,000 experts and almost 300,000 users in every part of the Hungarian economy and society have already learnt how to use these—nowadays unavoidable —techniques.

Between 1981 and 1986, due to the availability of personal computers (PC), the number of organizations using computers on a daily basis has doubled; 80 per cent of all economic organizations are among the end-users.

1 | 2
3
4 | 5

1. The M-3, the first electronic computer built in Hungary in 1959.

2. The improved magnetic drum storage for the M-3 computer. The combined capacity of both storage units was 4 K words (31 bits/word). In the picture, Győző Kovács and Imre Molnár.

3. The first Hungarian robot at the end of the fifties—the so-called "ladybird" from Szeged . . .

4. . . . during his or her construction . . .

5. . . . and being serviced by one of its two designers, Daniel Muszka, the other being József Király.
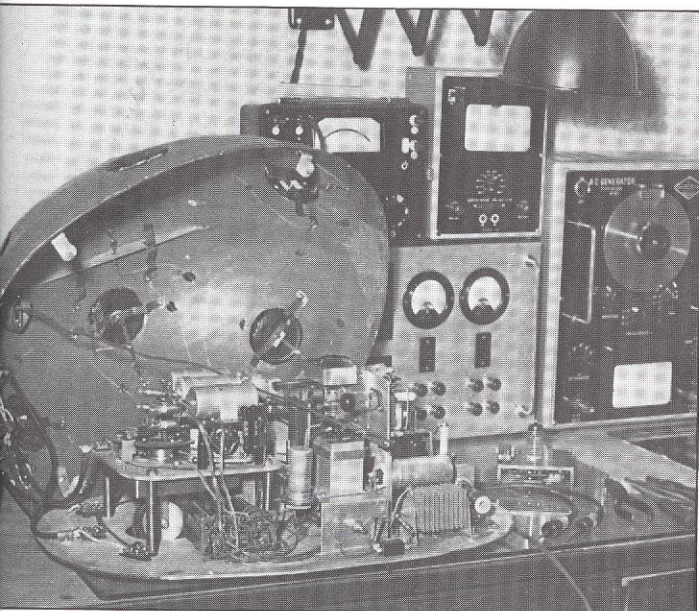
Nearing the Nineties

In order to boost the economy at the beginning of the eighties, the government adopted a measure, according to which private citizens could establish small enterprises —common law societies, economic workshops and small cooperatives. In parallel more and more state owned enterprises and institutions have become interested in the application of computers.

Therefore it is not by chance that the most important small enterprises are working in the field of computing, especially in the field of PC-s. The small organizations are good for economic competition; they widen the supply side and thus depress prices in the market. Accordingly, 60 per cent of the Hungarian PC-market of hardware and software is in the hands of these small organizations.

From 1985 a new central economic development programme has been initiated with the backing of the government, in order to enhance the central economic decision making process for widening the socio-economic use of electronics even further. According to the programme, the home market is to be supplied basically with Hungarian made professional PC-s. Nowadays there is no parliamentary session or economic meeting where it would not be emphasized that the future of the country can not be envisaged without the research and development and wide practical use of electronics, computers and robotics. The state helps to achieve this goal with duty and tax concessions, with central financing programmes and by putting attractive development contracts out on public tender.

At the end of the eighties, tens of thousands of personal and micro computers and more than 3 thousand small, medium and mainframe computers will have been installed in economic organizations.

Apart from that, people at home also use more than ten thousand home hobby and personal computers. What says more than sheer numbers is that in Hungary—first among the socialist countries—an actual PC-market has been established. The achievements of Hungarian research is reflected by the fact that nowadays more than 50 different organizations put PC-s on the market.

A big plus is that PC-s produced in Hungary are IBM-compatible and thus conform to the de facto world standard. But, while the supply and the choice more or less corresponds to the West European level, this can not be said about the prices. In spite of the constant fall in prices, they are still many times higher in forints—calculated in dollars at the official exchange rate—than those of the same categories marketed in convertible currencies.

It is a fact that Hungary is not among the world leaders in informatics and electronics. Our per capita production per year in the field of electronics is 120 USD, of computers 20 USD, of software and other services 40 USD. Our consumption is 60, 15 and 40 USD respectively.

However, our opportunities are good, because we have a relatively high standard of public education, a flexible economic steering system, which takes into consideration market forces and the independence of firms in the framework of a planned economy, and we have a policy of open international cooperation.

And Now The Facts

The Hungarian "Big Blue" and the others

The Hungarian computer manufacturing industry plays an important role in supplying the country with computer systems in the small category and some micro and personal computers as well.

The two prominent manufacturers of computers in Hungary are Videoton (VT) and the Central Research Institute for Physics (KFKI); the title in quotation mark refers obviously to the former one, classifying it as the leading manufacturer. The reason for that is that Videoton produces some 50—60 per cent of the total output. Besides its other electronic products (colour TV sets, radios, and

acoustic equipment), this company with a staff of twenty thousand has been developing and producing different computers for almost twenty years. Four thousand employees work in the firms computer manufacturing plant. Besides the family of computers compatible with the French made CII-Mitra type machines—it also offers 16 and 32 bit professional personal computers. The other important part of their production concerns peripherials. Its printers and display terminals are popular in Western countries as well.

KFKI produces DEC-PDP compatible minicomputers.

According to the value of their output there are other leading computer manufacturers such as the Hungarian Optical Works (MOM), the Telephone Company (TERTA), Computer Research and Innovation Center (SZKI); VILATI and ORION Radio and Electrical Company and among the smaller firms are the Instrument Technical and the Microsystem Cooperatives.

Expressive numbers

In the middle of the eighties the number of state owned companies, co-operatives and other economic organizations, employing 75 per cent of all computer specialists, was above 3000. The number of societies and small organizations active in computing was above 1200, although they employed only 25 per cent of all computer specialists.

More precisely, in 1985 there were 2200—among them 406 larger and 1974 smaller—societies involved in computing. The per capita income was the highest in the small organizations, where it exceeded the figures achieved in the big organizations by 24 per cent. In spite of that, the greater production value and market activity of the 406 large productive organizations yielded 70 per cent of all returns from sales.

General and professional training was spread with the support of the government. For the training of students a school computer programme was started. At present there are about 20 thousand school computers in primary and secondary schools in the country, several hundred thousand people get ele-

mentary computer knowledge through television, and the hundreds of microcomputer hobby clubs in Cultural and Community Centres, and in the army. New, popular magazines have been issued, the publishing of technical books has prospered. The mass media arouse and captivate the interest of a wide strata of the population.

In universities and other institutes of higher education more than ten thousand students receive basic and applied training in computers. Between 1981 and 1986 —not to speak of the years before then— more than ten thousand students were involved in professional training at middle and higher level. There are also some initiatives in Hungary concerning the establishment of a school system based on teleteaching ideas. In this respect we have significant international connections, which were enhanced by the Teleteaching conference held in Budapest in the autumn of 1986.

Things we are already proud of

We list here some results which have gained an international reputation for us.

For the application of artificial intelligence, the PROLOG Language is preferred all over the world. Its Hungarian version, the MPROLOG has been installed in more than a thousand places abroad, including Japan and also in the USA.

The export of computer software from Hungary to non-socialist countries, mainly to Western Europe, is valued at 10 million USD annually.

Hungary has realised the importance of personal computers in time, and was the first in Eastern Europe to produce and apply them. There are school computers at every primary and secondary school, at some places there are even several dozen.

The complex control system in our atomic power station is based on Hungarian made computers.

We played a successful role in the Halley's Comet Vega Research Programme, supplying the video-system and the on-board computer for preliminary data processing.

Our fast on-board processors are used in the Soviet Union for basic research in Oceanography.

We have internationally recognized results in the design and manufacturing of numeric control, CNC, and free form surfaces.

Finally, we can survey the problems and projects our researchers are working on at present. The government supports several basic research areas, for example:

1. Mathematical models of fifth generation computers.
2. Study of cellular automata machines, construction of cellular algorithms.
3. Methodology for building up expert systems.
4. Powerful, parallel computer architectures.
5. Scientific means of intelligent systems for solving engineering problems.
6. Modelling bodies surrounded by free form surfaces.
7. Acoustic-phonetic speech recognition, using a synthetized human voice.

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An Overview of Hungarian Information Systems
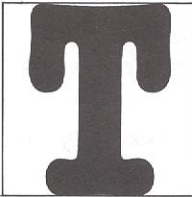
The achievements of research in electronics, informatics and computer science and in related disciplines sooner or later appear in practice and are reflected in the development of end- user systems. In these systems the greatest number of applications fall under a widely interpreted term: information system. Therefore, a survey of the above mentioned disciplines provides a good opportunity to get an overall picture of the development of the information technology of a country. Taking this survey as a basis helps us to evaluate trends and to compare descriptive and analytical reports presenting specific fields of information technology. Moreover, overriding conclusions might be drawn from personal experience and the importance of results could be better judged.

That is the reason why we'll touch upon information systems first when outlining the results achieved in Hungary. Since the chronology of events unveils a lot, first we'll go back to earlier periods.

The Early Period

In Hungary, in compliance with international trends, computers were first employed in company management. Having proved to be effective in personnel and salary administration, computers the representatives of a new technological era, gave confidence and facilitated the training of experienced experts.

In the beginning, concrete demand for information systems was formulated at random. Companies started to computerize their information systems depending rather on their ad hoc possibilities (computers, qualified programmers and the attitude of potential users) than on rational criteria. For lack of expertise and eagerness of those early users, quite a few systems failed and this led to a downturn in further application and investment.

However, this fall-back lasted only for a short time and soon information system research and application started to unfold in Hungary. Third generation computers and programming have spread quickly and this induced significant development primarily in data management technology. The data bases, the foundation of present-day information systems, were laid down, and the first Hungarian data management programs (e.g. SÁMÁN) were written, which, for their time, were innovative and of good quality. In additon to company data bases serving primarily bookkeeping purposes, the first central data banks, ancillary information systems and industrial data bases were set up more than 10 years ago. Moreover, the computerization of the economic and social spheres proceeded apace.

The impact of the establishment of data banks and the introduction of up-to-date data management was twofold. Firstly, the amount of manual work devoted to getting, maintaining and storing data has significantly decreased. Secondly, the speed and reliability of services have increased. All this, however, had hardly changed the traditional characteristics of information services. In fact, only traditional services were rendered, though at a higher technical level.

The Change in Concept

It was the concept and the organization of information services that had to be changed to upgrade the quality of information services. Both research and practice were set the goal to develop and establish information systems that would meet the requirements of company management in a selective way, with an immediate follow-up of changes and with the introduction of effective information derivation methods. These requirements have then shaped the structure of information systems. In order to provide as much gain as possible on work invested into the establishment of data bases, decision support systems and up-to-date mathematical methods capable of derivation of information were given a greater role.

The operation of derivation modules in a management information system is greatly influenced by computers which are generally arranged and give access to data in a network system. Therefore, in system improvement the priority is that the output module should be suitable for establishing interactive links.

Information system enhancements carried out in accordance with the above principles have resulted in several new applications in the establishment of comprehensive information systems. Today, the application of information systems is quite wide; they are used almost everywhere, in industry for stocktaking, in production management, in the automation of commercial activities and in the simplification of accounting, not to mention the comprehensive information system of banks and the management information systems in agriculture.

Stemming from the characteristics of Hungarian economic planning, the establishment and the operation of information systems serving company and economic management planning are important and interesting tasks. The main characteristic of these systems is that, relying on statistical data bases, they add evaluative and analytical calculations and thus draw up alternative plan versions. As a result, economic planners are given the opportunity to analyze growth trends on the basis of this comprehensive service.

It is state management that requires a large proportion of the Hungarian information systems. These systems work in fields of paramount importance. We think that the most important of these systems is the one providing information to assist the economic and social organizational activity of the state. The national computerized population registration system has been operational for more than 5 years in Hungary, and it provides a new and important source of information both for state institutions and Hungarian citizens.

In the state sector, documents not previously existing, the unified registration of legal provisions and the registration of valuable national works of art, have all appeared, and data bases reflecting the condition of health of the Hungarian population have been set up. Though they have mainly servicing functions, they provide essential information for the preparation of those governmental decisions that determine the living conditions of the population.

Requirements and Conditions of Further Progress

Considering the complexity of the establishment of information systems, besides system organization work, we have to take into account the characteristics, the approved working methods and the office work traditions of a given organization. It is a well known fact among developers that social consequences, deriving from the introduction of up-to-date information systems, have to be taken into consideration as well. That is the reason why work teams in Hungary dealing with the establishment of management information systems are made up not only of system analysts and programmers but of management organizers, experts of institutions, work psychologists and sociologists.

In establishing information systems special care and attention are devoted to the questions of security and privacy (personal security). Keeping in mind the experiences of

innovative computer applications and other countries' norms that the Hungarian population has already accepted, those working in computer science and technology pay special attention to ensure that up-to-date information technology does not violate fundamental human rights. In Hungary, this question is carefully considered as early as in the development process of information systems.

As for the future, the Hungarian information system improvement project, as the next stage of development, set itself the goals: 1. to introduce office work automation methods in order to simplify administration work by applying user friendly computer technologies and to thus humanize work, 2. to ensure the accessibility of data bases by establishing a public computer network, 3. to spread expert systems into decision preparation processes as widely as possible.

The achievements and prospects of related fields of science provide a foundation for this, since the modernization of equipment and adequate system-support are needed for the continuous development of information systems.

Finally, it is important to note that the government follows with keen attention the execution of the information system development project which is part of the so called "Central Economic Development Programme." The execution of concrete goals set for concrete periods is controlled by a flexible action plan, which maintains the equilibrium between development and resources.
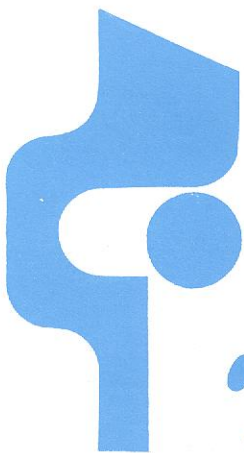
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Creation of Computer Networks

As is well known, two main kinds of networks can be distinguished on the basis of one of the classification criteria—their extent.

— The so-called Wide Area Networks (WANs) *can link distant towns and countries without any spatial limitation. But their effective exploitation depends on the existence of local networks.*

— The so-called Local Area Networks (LANs) *in general extend over just one building, or within one firm or institution, thus up to a few kilometers at most.*

In MTA-SZTAKI systems have been designed to ensure the unified functioning of local and wide area networks. It is of paramount importance that they have created a functioning system which enables both local and remote data transmission and is linked with world-wide networks.

The mass production of the equipment necessary for this system has already been partly begun. One of the pieces of equipment—the so-called packet switched center—has been installed in the Central Telegram Office of the Hungarian Post, in preparation for the introduction of a public packet switched data network service in Hungary.

Networks of both the Unified Computer System (ЕС ЭВМ) *and the* Minicomputer Systems (СМ ЭВМ) *have already been linked into this system.*

Hungary has had to create its computer networks completely from its own resources because of the restrictive measures—the technology embargo—*in this field, which covers both hardware and software.*

Development and production in Hungary is concentrating on establishing local networks: this was begun in MTA-SZTAKI. The COBUS network has a bus structure, a CSMA/CD algorithm and a speed of 1,2 Mbit/sec. Its primary field of application is office automation. COBUS enables the linking of up to 255 work stations within a radius of 1 km.

The hierarchic local network LOCH-NESS developed at KFKI also has a bus structure, and a CSMA/CD algorithm. It was designed mainly for process control and can be connected to intelligent CAMAC controllers. Its advantage is that it can be connected to DECNET, so that the services of DECNET can be accessed through LOCHNESS.

VIDEOTON developed the EXLOC network, compatible with Ethernet, with a speed of 10 Mbit/sec, for designing and developing systems and for office automation.

The PROP-NET system created by SZKI links Proper-16 personal computers. The system has a token strategy too and is suitable for office automation and application in laboratories.

The LANDEX network of ATOMKI (Nuclear Research Institute of the Hungarian Academy of Sciences) is also noteworthy. It aims to share resources between the microprocessors controlling measurements in the Cyclotron Laboratory and the processing micro-computers.

MTA-SZTAKI's latest result is the development of tools and software in a PROWAY compatible process controlling LAN. The PROWAY standard enables secure transmission of messages and an acceptable reaction time. PROWAY is a modern and trendsetting development in LANs used in industrial process control. SZTAKI's LAN uses twisted pairs, its speed is relatively slow, but in general it meets the requirements of process

control perfectly. The MTA-SZTAKI's system is in all respects compatible with the requirements of the PROWAY recommendation. This local process controlling network can be connected through a suitable gateway to a higher level network, e.g. to the network of DEC machines. Not only has the software for the network been prepared, but also the multi-terminal user program package for process control development and testing is also completed.

Besides implementing networks, there is also research work going on in Hungary in the field of network models and algorithms, partly as preparation for network implementation. In relation to this we should mention the work of the specialists in the foremost institutes in computer sciences, such as MTA-SZTAKI, KFKI, SZKI and SZÁMALK. For example the MTA-SZTAKI researchers have achieved results in the comparison of state transition specific languages. KFKI's researchers used the LOTOS (Language of Temporal Ordering Specification) specification language based on algebraic methods in order to define and implement communication processes.

Some investigations are under way concerning measurement and testing of networks and protocols, in order to realize the cooperation between independent, heterogenous systems, also the field of conformance testing.

We should also stress that NJSZT is playing an active part in this field. Its Computer and Communications Engineering SIG (Special Interest Group), the Data Communication Committee and the Teleinformatics Committee of the Society have regular discussions about current questions on computer networks, and also organize courses and conferences. We invite different foreign enterprises working on Data Communication to present their newest products. Several committees of ISO TC97 have held their workshops in Hungary: these were organized by our Society.

* * *

Expert System Developments

In the world at large expert systems *appeared as practical results of utilizing the knowledge-based AI technologies having been developed in leading research laboratories. Systems meeting these new demands have been preceded by research projects, mostly LISP-based developments in the last 20—30 years. Their history has been marked by much success, and some failures, with some projects left in an experimental stage since the early 70-s. How can little country like Hungary experience its own revolution in knowledge-technology? How does our technological atmosphere react to the "musketools" of the American "big four", to the "AI winter" characterizing the American market at the end of the last year, or to the news items about the fifth generation computer developments in Japan?*

About PROLOG

In Hungary practical sources rather than theory have formed the basis of the first experiments to develop expert systems. The first Hungarian PROLOG implementation in 1975 was born in an atmosphere where young and inventive developers, application programmers and researchers interested in the theoretical issues of logic programming were sitting in the same room, working together, criticizing and inspiring each other. A good and increasingly capable PROLOG system, and a number of advanced experiments and successful applications have come out from this environment.

In the late seventies—based mainly on the experiences of domestic PROLOG applications—the Hungarian experts were already able to specify the basic requirements that a PROLOG implementation aiming at practical applications must meet. It must be able to handle large programs by means of modularity, support must be given (by special built-in predicates and interface possibility to conventional languages) to definition and handling of those partial problems which are less suited to logic, it must provide a comfortable interactive programming environment, its operation must be efficient (based on the most advanced results of computer science); in a fully compatible way the same system must be available on a wide range of computers (PC-s, workstations, mainframes), and operating systems. Having specified these requirements the SZKI was able to start a PROLOG implementation project oriented especially to the solution of practical problems. Because of the modularity as its most important feature, this system has been named MPROLOG. Through this our Hungarian experts had a PROLOG system applicable for practical purposes at the time when (in the consequence of the explosive increase in the popularity of—PROLOG) the demand for such a system was appearing all over the world. The most attractive feature of MPROLOG—partly due to its previously mentioned modular structure—is its extendable nature. The most important extension is TPROLOG, a very high level simulation language which was also developed in SZKI. Other extensions realized through the modular structure of the system include a 3-dimensional graphics package, a window and menu management subsystem, and an applicational module library.

Other research topics

Some of the people interested in the theoretical questions of logic programming are working in the Mathematical Research Institute and in SZÁMALK. Their work resulted

in the development of a general theory of logic programming, and based on that they have also created a new logic programming language (LOBO). A general constructive logic framework has also been developed that serves for handling all the logic programming approaches uniformly. This framework was the basis of a specification language project that develops problem solving systems for engineering and software engineering applications.

People engaged in research and development projects on logic-based and other expert system development technologies are working mainly in SZÁMALK, SZKI, KFKI, SZTAKI and BME, while other application oriented expert system developments are also going on in some other places (about 15), not to mention the increasing number of institutions (about 25 at present) requiring the application of expert systems, or undertaking to supply their specific, subject area oriented knowledge in the appropriate form.

The present Hungarian computer park promotes PC based developments. Of course not all expert systems are being written in PROLOG, traditional software technologies working well in various institutions also play a role in the developments. The non-logical school of expert system developments is also represented, where deductions are made by applying statistical or pattern recognition methods. Expert system development environments or shells are also preferably applied in more and more projects; these serve well in getting the new expert system specific technologies known and spread all over the country.

Background

To the Hungarian overview belongs also the fact that in 1976 the Artificial Intelligence and Pattern Recognition Section of the NJSZT was founded. In the first years the different Hungarian research projects presented themselves in the form of regular seminars letting each other know even the deepest secrets of their trade. In parallel, a weekly series of lectures started, titled "Theoretical and practical questions of software engineering"

under the sponsorship of NJSZT, SZKI, and SZÁMALK. During the 6 years of its existence its program consisted of explaining the current results of research activities, software engineering methods and tool developments, and reviewing the most important international events and periodicals in the relevant topics. For example the systematic review of the publications about the Japanese Fifth Generation Project took about six months, and was attended by 100 people coming from 70 institutions, and good professional connections were established during the dicussions in a creative atmosphere. In forming and propagating the Hungarian technology the domestic professional press has also played a great part. For example in Spring of 1987 an overview titled "Artificial Intelligence" was published in five parts in the monthly Micromagazin. Another Hungarian monthly, titled Information & Electronics has also played —and still plays—an essential role in popularizing this special knowledge, and in developing the national technology.

Practical applications

In Hungary, as in many other countries, the first expert system developments started in the medical field. The first practical results came from this area, and a number of hospitals, clinics and universities took part in these activities. Further systems have been prepared in the fields of architecture, chemistry, and the computer industry. Currently running developments are listed below according to application areas:

Medicine, health service:

— diagnosis of gastroenterological diseases
— diagnosis and therapy of ischemic heart diseases
— antibiotic therapy of bacteriological infections
— diabetes management advisor
— hemodialysis therapy advisor
— diagnosis, therapy and neurohabilitation of brain injured infants
— prodrug and softdrug design
— estimation of drug interactions for new pharmacons at phase I—IV clinical trials

— consultation on pharmacon drug interactions
— drug therapy

Chemistry:

— sequence analysis of amino-acid and nucleic acid sequences
— prediction of metabolic fate of substances in the human body
— prediction of hydrofobicity in organic compounds
— on line control of biophysical processes
— design of propesticides, softpesticides and selective herbicides
— scheduling of batch chemical processes
— estimation of hazardous effects of organic chemicals in the environment and in the plant

Building industry:

— logic based architectural design of multilevel appartment houses
— geotechnical testing of damaged buildings
— architectural design of floor structures
— consulting in the application of Hungarian building regulations
— technical economic planning and design of building structures

Computing:

— composition of computer system configurations (hardware and software)
— testing and specification of communication protocols
— test generation for digital circuits
— intelligent telex dispatching

Other industrial applications:

— fixture design
— advising support for real time industrial systems
— control of cement grinding processes
— distribution of power plant usage (optimal allocation of load between power stations)
— geological prognostics
— flood control

Administration:

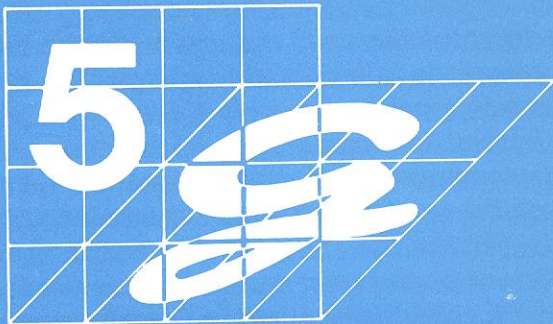— consultation in legal administration

The spectrum of the expert systems listed above ranges from the systems applying the simplest backtracking and retrying method of resolution up to systems explaining their deductions in a natural language. The projects in some cases are in a very preliminary phase of development, others can already be demonstrated, and some (about 10) will reach the level of a marketable software product before the end of 1987. Short descriptions of those expert systems implemented in MPROLOG can be found in. There is some increasing interest in other fields e.g. application of expert system technology to financial administration.

Plans

Some work is going on concerning expert system development tools. In SZÁMALK the first version of an expert system building tool named GENESYS has been completed, oriented mainly to the development of systems for diagnostic purposes. SZKI is working on an MPROLOG module library to provide solutions for the expert system developers to some generally felt particular problems, like forming a general purpose user interface, explanation generation, etc. In SZTAKI a long term research project has been started together with BME to develop methods and a tool set to create intelligent systems for industrial applications. Linguistic and other experts and institutions are cooperating in the research and development work aiming at the realization of natural language communication (in Hungarian). There is a real-time industrial consultation system under development in the BME.

Hungarian experts have established a number of connections in the field of theoretical and practical questions of expert systems mainly with English, German and Soviet colleagues—including several joint developments. Relations with developers working in other fields of AI (pattern recognition, image and sound processing, robotics, etc.) are also increasing. Such a professional atmosphere and steadily increasing enthusiasm for AI developments may raise our hopes for results at a high professional level and the production of worldwide competitive software products.

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In the Forefront of CAD/CAM Research and Development
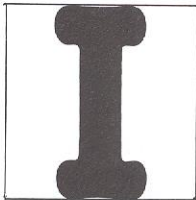
In recent years many Hungarian companies have recognized that technological renewal cannot be accomplished without applying the advanced techniques of computer aided design and manufacture (CAD/CAM). Not only are the demands rapidly growing, but more and more universities, research institutes and software companies have got involved in this area and support the dissemination of CAD/CAM in Hungary. Much effort has been made by MTA-SZTAKI, BME, NME and GTI to propagate the concept of CAD/CAM and introduce computer systems into industry.

In the past few years new companies have joined the domestic CAD/CAM competition, SZÁMALK, Graphisoft, KFKI and Videoton must be mentioned among others. The latter two sell CAD systems on their own computers—the TPA/580 32-bit computer and the VT32 graphic work station, respectively. It must be noted that beside these viable foreign and domestic systems, some dubious ones have also appeared in Hungary. These without adequate user support cannot be useful in industrial practice.

Returning to the roots of domestic CAD/CAM, more than 10 years ago MTA-SZTAKI played the pioneering role in laying the foundations of the Hungarian CAD culture in mechanical engineering. The significance of computer aided geometric modelling was first recognized by Dr. Joe Hatvany. Two outstanding people in the field, Steven Coons (USA) and Malcolm Sabin (Great Britain), spent one year each in the institute. Their personalities and lectures inspired the young research workers very much and a geometric modelling school was gradually established. Since then many significant scientific results and industrial achievements have proven the efficiency of the research staff in the institute.

Major areas of interest

From a disciplinary point of view the CAD/CAM activities in MTA-SZTAKI are primarily based on mathematics, computational geometry, computer graphics and mechanical engineering. The basis of each system is a geometric model, which can be created, modified and visualized by means of the computer and can also be utilized in different ways, for example in numerical evaluation of the model, finite element analysis, automatic NC manufacturing, etc.

The CAD research activities of the institute are concentrated in three major areas. In the case of so-called 2D systems, drawings are represented in a plane. By means of these, complex industrial objects can be drawn, documented and archived. The so-called "free-form" systems describe shapes in space, which are bounded not only by geometrically simple elements, such as planes, cylinders, cones and spheres, but by free form surfaces, where the freedom of geometry is not constrained by single mathematical equations. Typical examples include a telephone receiver, a car body or a mould. Due to the above mentioned features, these surfaces are often called "sculptured" surfaces. The third major area is volumetric (or solid) modelling. Here not a set of covering surface patches is modelled, but the objects themselves. Volumetric models store the structure of the whole boundary, including the data of the vertices, edges and faces. Complex parts can be created by set operations (i.e. union, intersection, subtraction, negation) and the so-called local operations (e.g. blending, chamfering, bending etc.).

Turn-key systems

A considerable part of the systems developed in SZTAKI has been released in turn-key form. The industrial drafting system GRE-CO (Figure 1.) and the FFS (Free Form Shapes) system for computer aided design and manufacture of free-form parts (see Figure 2., and 3.) are based on a modular CAD framework software (VIRGES, ADBMS, PLACSY). These systems were originally implemented on PDP 11/40 computers.

In FFS, it is sufficient to define some characteristic points or some section curves or profiles, and the system interpolates a mathematically and aesthetically smooth surface using the given geometrical data. By means of the drawings appearing on the graphic screen the designer can check whether the specification was correct or not. Furthermore, the surfaces can be modified in an interactive way, if required. Combining such surfaces, complex parts and tools can be defined. Based on the data stored in the computer, these shapes can also be manufactured using the NC processors of FFS. Manufacturing is performed automatically by numerically controlled high accuracy machine tools. The system is capable for NC roughing in 2.5D and for 3 and 5-axes finishing. FFS is used for many practical purposes especially in tool production.

Leading companies in Hungarian industry, including the IKARUS Coach Factory, the Csepel Works and the SZIM Machine Tool Factory have been using or are going to use FFS. The COMECON market is also showing considerable interest in the topic: in Czehoslovakia and Rumania several FFS and GRE-CO systems have been installed, and sales to the German Democratic Republic and the Soviet Union are in preparation. Negotiations
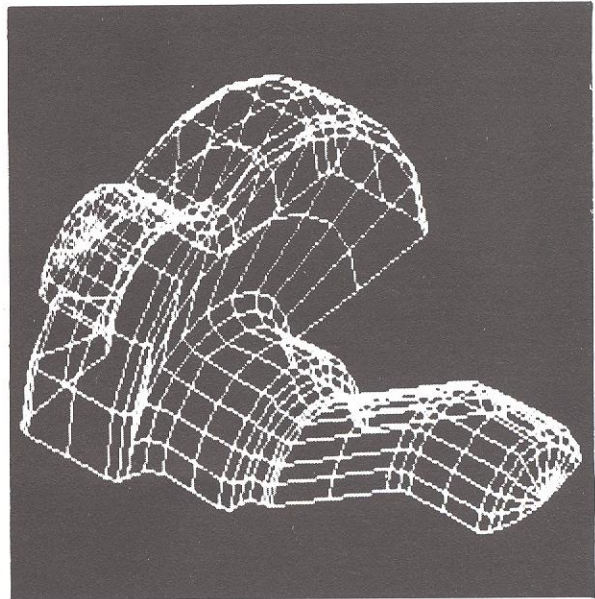
(Fig. 2) A free-form surface

(Fig. 1) Drawing of the King's College Chapel
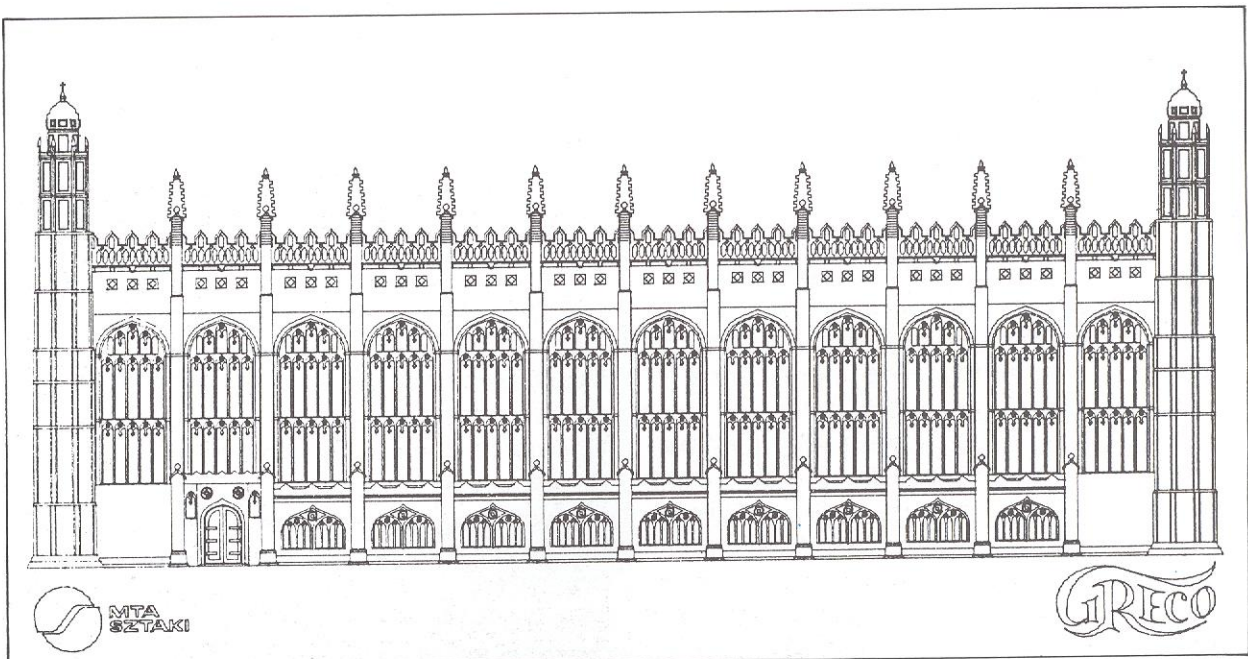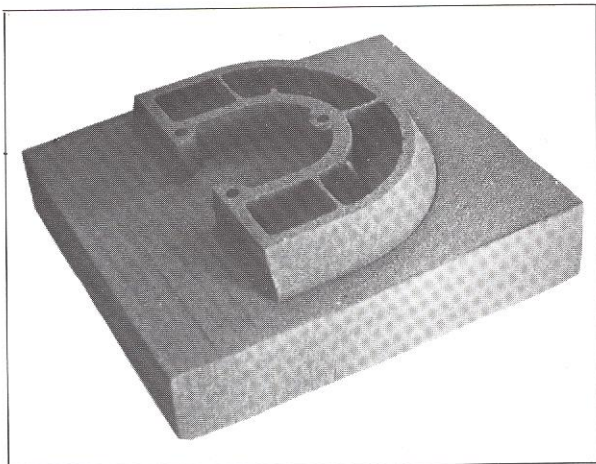
(Fig. 3) An automatically manufactured part

are under way on marketing in West Germany and the U.K.
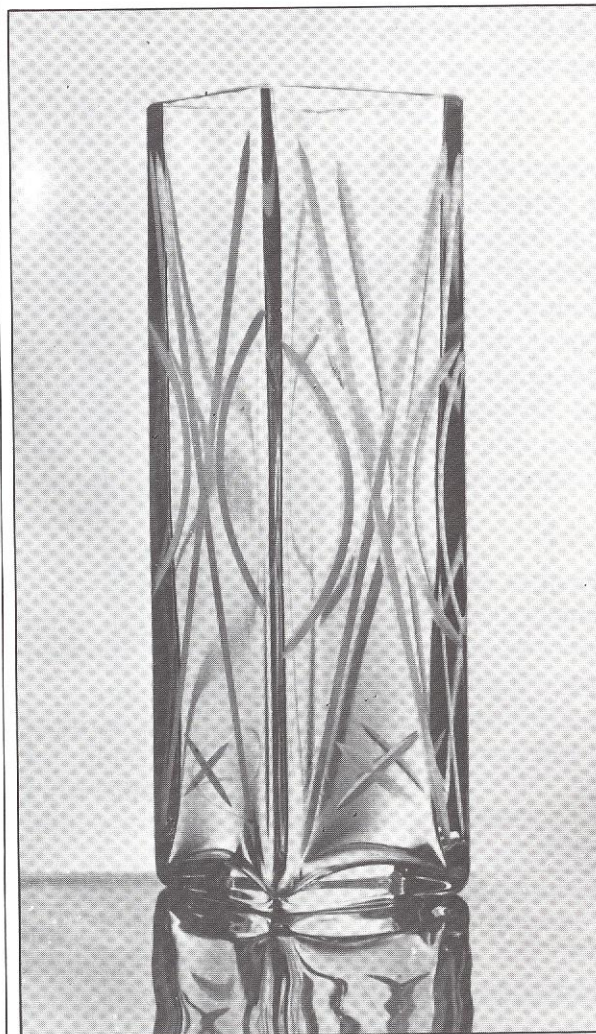
The above mentioned software have also been implemented for IBM PC/AT computers, constituing subsystems in a CAD application package. This also includes the MODBUILD and SOLO systems for modelling

(Fig. 4) A glass made by 5-axes grinding

simple solids and the MOSY motion simulator system; which is mainly used in robotics. A new version of FFS for advanced graphic work stations (32 bit, VME bus) is going to be released in the near future.

Industrial systems

In addition to the development of turn-key systems, the experts of MTA-SZTAKI have often been engaged in developing industrial systems, where specific requirements had to be satisfied.

The ISTER stamping-tool design system was the first industrial CAD system in the country. (It was completed in 1978, being far ahead of its time.) It was developed for the TUNGSRAM Works. According to the particular needs of the Gamma Works a system for graphic design of process control equipment was developed. The close links with industry is also shown by the fact that the second release of the FFS system was implemented according to the particular tool making demands of the experts in the Csepel Machine Tool Factory. The breadth of the CAD activity in MTA-SZTAKI can also be illustrated by a system which facilitates the design and NC grinding of glass patterns (Figure 4). This system was prepared for the VEB Numerik Factory in the GDR. A shoe CAD/CAM system is also under development in cooperation with the Austrian company VICAM. Preparations for introducing a tool design and manufacturing system in the IKARUS Coach Factory are also in progress.

(Fig. 5) A volumetric model
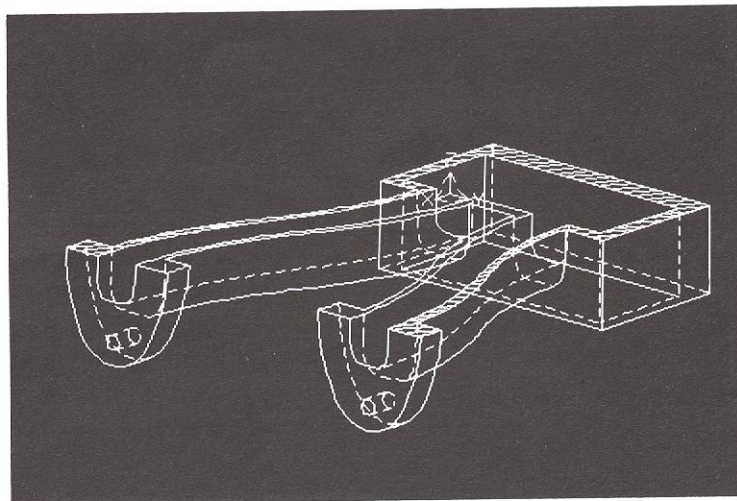
Central state programmes

In order to keep pace with the technological progress of the most advanced countries there are short-term and medium-term plans supported by the State Office for Technical Development *and the* Ministry of Industry, *which from time to time set the most important (and financially possible) targets and trends in the CAD fields. The research and development of the above mentioned systems were also partly financed by these state resources. Being aware of the suppressing effect of the embargo policy, the permanent lack of hard currency, the necessities to meet the special domestic requirements and the importance of educating Hungarian CAD/ CAM specialists, central government organizations are pressed to keep on granting financial support for work on CAD. The* Hungarian Academy of Sciences *also pays special attention to the research issues in this area.*

The most significant project among those in progress may be the development of a modelling system (called FFSolid), where objects bounded by free form surfaces can be described (Figure 5).

Scientific research

In the past 10 years the scientific work of the MTA-SZTAKI research associates has been featured by many publications and several dissertations. The first basic volumes, written in Hungarian, which study the theory of sculptured surfaces and volumetric modelling, were published by MTA-SZTAKI. Many results, primarily in curve and surface interpolation and in the synthesis of surface and volumetric modelling, gained favourable reception at international scientific forums. Many foreigners visit the institute and many Hungarian researchers visit foreign universities and companies, thus a continuous exchange of information is provided. Some leading CAD experts in MTA-SZTAKI also assist in university education and in the domestic propagation of CAD by giving lectures and writing lecture notes.

The Hungarian research workers have quite extensive connections with leading foreign research groups. The most important partners come from the United Kingdom, USA, West Germany, Japan, GDR and Finnland. For example, there is fruitful bilateral Anglo-Hungarian cooperation with the University of Cambridge and the Cranfield Institute of Technology. Besides regular working meetings, joint CAD seminars are held alternately in the U.K. and Hungary biannually. The proceedings of the last three seminars were widely welcomed in many places.

Future

An intensive search for establishing the next generation of CAD/CAM systems is in progress. The Hungarian CAD staff is involved in researching several interesting topics currently receiving international attention.

(Fig. 6) An N-sidded surface patch

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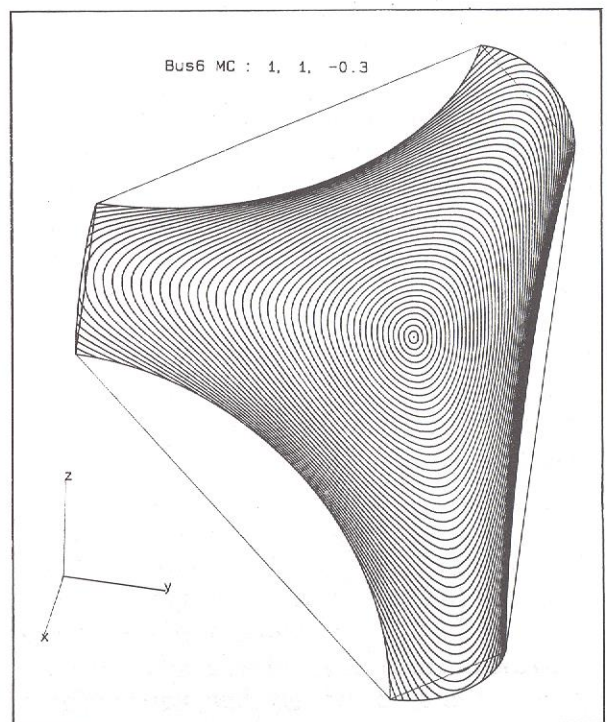
These include the mathematical methods for describing free-form surfaces with general topology (Figure 6), the integration of free-form geometry into volumetric modellers, the description of so-called blending surfaces and automatic NC manufacturing based on volumetric models.

Computers in Schools

Organized courses on computing and informatics were started in Hungary in 1969, however, the first Hungarian graduates in Mathematics were able to attend special seminars on computing as much as ten years earlier, as part of their studies. The first stage meant training of experts having either general or specialized knowledge of the discipline. Application-oriented training was introduced in 1975. The future teachers of technical subjects and natural sciences started to be trained. In 1980 a decree extended the computing-informatics courses into the whole training system.

The programme started in 1980 called for introducing the methods and benefits of computing to the public at large and for setting up basic courses on the subject in public education. The development of the theoretical and practical basis, conditions and ways of studying informatics in higher education must go ahead. Training programmes for adults must be set up for those who need knowledge of computers as a consequence of job changes related to.

Training programmes must be organized through evening and correspondence courses. Teachers must be trained for these new goals must be assured and those already in the basic and higher education inevitably will have to brush up their knowledge of informatics and computing.

Study materials and the related auxiliaries, work booklets, experiments and exercises must be upgraded.

A suitable amount of high-quality educational software must be produced and distributed and the education system as a whole from the elementary schools through to postgraduate training must be provided with enough computing facilites, from programmable pocket calculators to professional PC-s. The institutes of higher education also should have small-, medium sized and mainframe computers.

The programme has been showing marked and continuous progress towards its targets, thanks partly to the expert groups formed on the basis of a Ministry of Education directive.

The activities of these groups justify the former expectations that the development of microelectronics and informatics would spur students and their teachers to combine their efforts to develop study materials, changing themselves into active agents in the knowledge distribution procedure, compared to their previous role of more or less passive education consumers.

The nation's public education system has nearly 20,000 computers in all. At the beginning of 1987, on average some 90 pupils shared one machine against a 400/1 ratio a few years ago. As the accelerating implementation of computers in schools spurred research and practical work to run in parallel, there has been a great need for conferences and exhibitions and the exchange of experiences on a regular basis. Schools had lots of opportunities to show their remarkable progress in both provincial and Budapest forums. The Micromagazine, an NJSZT publication started in 1983 is supporting the goals to be achieved. In its "School Computer" and other columns it includes lots of useful information, programs and discussions, bringing the remote parts of the country close to current knowledge.

Together with youth and professional organizations the NJSZT has set up summer

camps to help disseminate the basics of informatics and deepen knowledge already acquired.

The general public training is basically a matter of public education. A number of cultural centers have launched computing courses and lots of private initiatives also made it a real public programme to join the "world of computers" and reach the basic and ever higher levels of computing within autonomous self taught groups—and later in a more organized manner.

The NJSZT, a principal supporter of the school computer programme in many activity spheres, plays, of course, an exceptional role in spreading computing knowledge. They, for instance, initiated a microclub movement to offer opportunities to gain practice in computing, using the excess computer facilities of institutes, factories and private businesses.

Conceptions for the nineties

Through the 1990's, an ever wider slice of the education spectrum must be taken into consideration in accordance with the long-term development programme and the development made so far, as the whole society is expected to get in touch with electronics and information technology within several years. This is also reflected in the upgrading of the goals.

Requiring basic electronics and informatics knowledge and creating an informatics culture for Hungarian school children remain among the goals of elementary education. All the means available for this have been continuously modernized, within our

possibilities. The high school system must offer the students knowledge on a higher—but still basic—level and shape an application-oriented attitude in specific schools. In some cases, the definite aim is to train medium-level technicians in informatics and electronics.

To meet the aims described above, all the up-to-date network facilities and peripherals have to be available in schools to computerize study methods.

The higher education system creates highly qualified experts in an ever wider spectrum and offers practical information paving the way towards the most sophisticated specialisation. Nearly every faculty has incorporated in its syllabus the system-oriented topics inevitable to the users of computers and, in close relation to this, the training of teachers and instructors.

Some excerpts from the goals of teacher training in the upcoming years: the system orientation must be strengthened in the updating of electronics and informatics study materials, new training auxiliaries, books and computer aided instruction software will be worked out; we go on searching for teacher training methods and with the implementation of a dynamic syllabus.

Upon an NJSZT initiative, an open informatics training system is being organized which is to offer courses and graduation possibilities for adults who—for no fault of their own—failed to get the needed infromatics knowledge in time. The system is based on today's modern technologies and the material and the examination method will be created in close cooperation with universities and colleges.
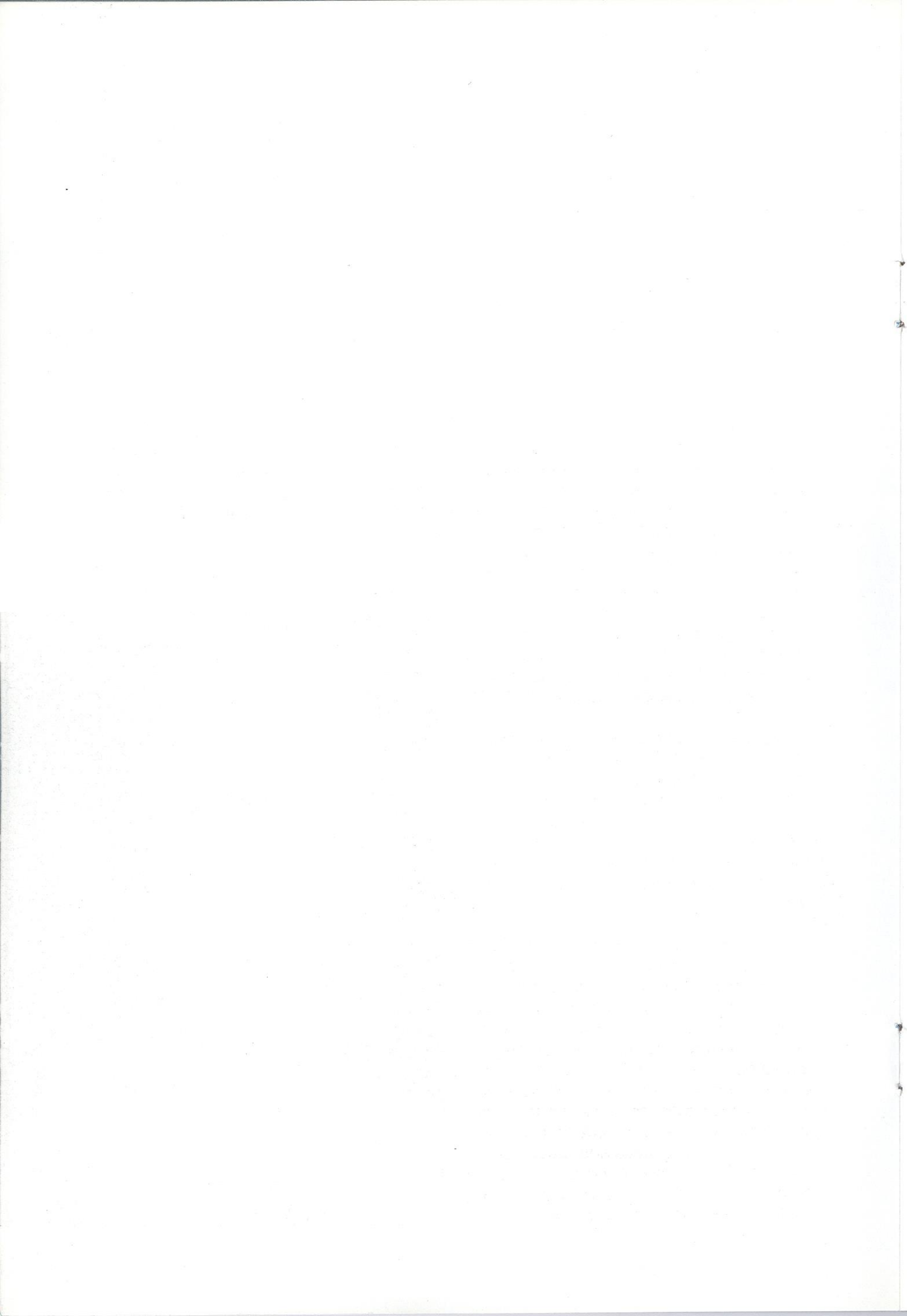
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A BROADLY BASED SOCIETY FOR COMPUTER SPECIALISTS:

NJSZT

## JOHN von NEUMANN SOCIETY FOR COMPUTING SCIENCES

Introduction

The forerunner of the Hungarian Computer Society was founded in the early 60's by the specialists who built the first Hungarian valve computer, and by mathematicians, economists and engineers interested in modern science. The Society, then with several hundred members, received its present name in 1968. In 1975, the John von Neumann Society of Computing Sciences became an independent scientific society and a full member of the Hungarian Federation of Technical and Scientific Societies (MTESZ).

According to its Constitution, the aims of the Society are to bring together people dealing with computers whether professionally or privately from all walks of life, to promote the development of computer science, to diversify its applications, to publish information regularly, to undertake the high level training of experts and to disseminate the computer culture.

In order to fulfil these aims, the Society —mobilizing its members to active participation—organizes lectures, debates, conferences, congresses, discussion sessions, professional and technical shows, exhibitions, film programmes and refresher courses, gives professional advice, prepares study tours at home and abroad, edits and publishes specialist magazines and other printed material, deals with relevant educational questions, initiates, evaluates and reports on research and development themes. It organizes competitions, offers awards and provides prizes for the solution of problems.

All this illustrates that NJSZT intends to promote the development of informatics in this country. It has been fulfilling this mission since its foundation, we hope that the information in the following pages will convince you of this.

Our eponym John von Neumann (1903—1957)
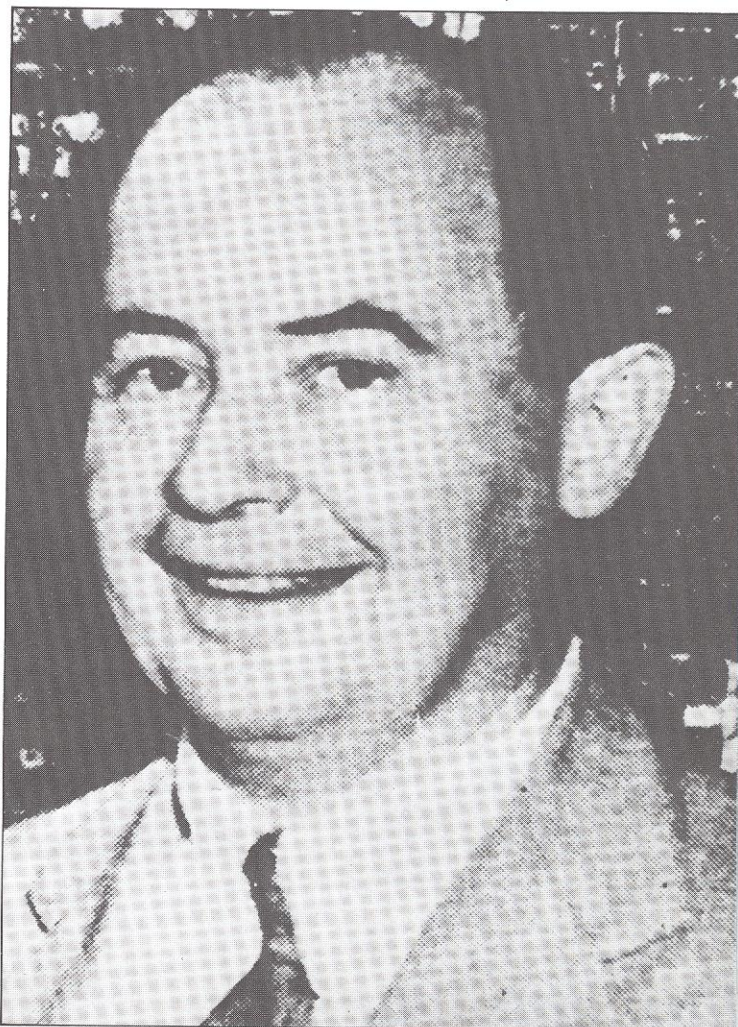
Basic Information

The Society's office bearers

President:

Dr. Bálint DÖMÖLKI (1935—)
Candidate of Mathematical Science,
Scientific Director in the Research Institute and Innovation Center for Computers.

Honorary Presidents:

Lajos PESTI (1925—)
Vice-president of the Central Statistical Office.

Dr. Tibor VÁMOS (1926—)
Academician,
President of the Scientific Council of Computing and Automation Institute of the Hungarian Academy of Sciences,
Past President of IFAC.

Vice-presidents:

Győző KOVÁCS (1933—)
Electrical engineer,
Scientific adviser in the Research Institute and Innovation Center for Computers.

Dr. Gyula OBÁDOVICS (1927—)
Candidate of Mathematical Science,
University Professor, Head of Department at the Agricultural University of Gödöllő.

Dr. János SZELEZSÁN (1934—)
Candidate of Mathematical Science,
Scientific Director of the Computer Applications and Service Company.

General Secretary:

Miklós HAVASS (1940—)
Mathematician,
General Manager of the Computer Applications and Service Company.

Deputy General Secretaries:

Dr. Kathie TARNAY (1933—)
Electrical engineer, mathematician,
Senior researcher at the Central Research Institute for Physics of the Hungarian Academy of Sciences.

György VASVÁRI (1930—)
Electrical engineer,
Director of the Computer Center of the Hungarian National Bank.

Managing Secretary:

Mária TÓTH (1944—)
Economist,
Head of the Secretariat of the John von Neumann Society for Computing Sciences.

Address of the Society:

Budapest V., Báthori u. 16.

Phone: (36 1) 329-349
        (36 1) 329-390

Cable: 22-5369 h mtesz

Mailing address:
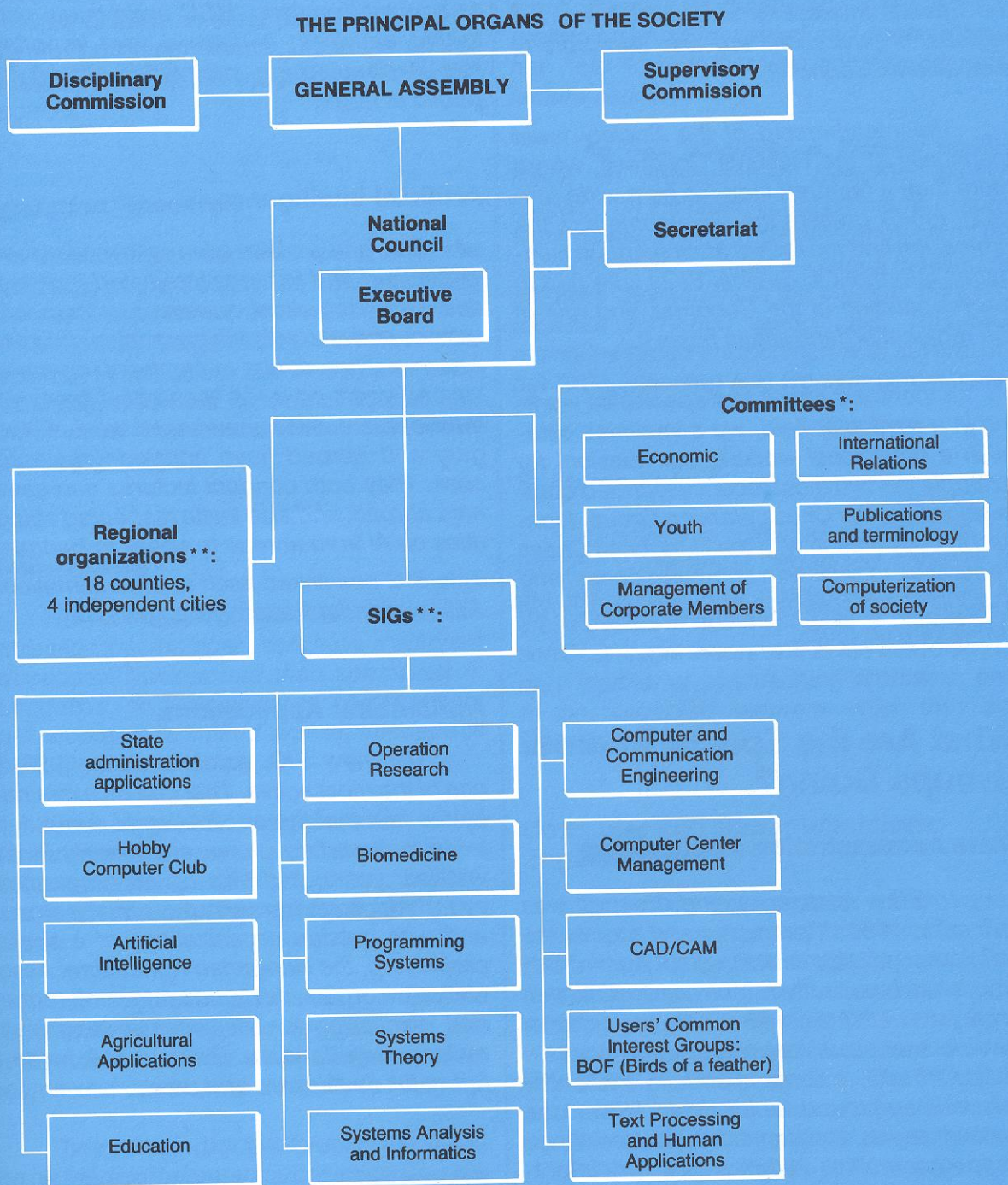Budapest P.O.B. 240
H—1368

Anyone can become an individual member of the Society. He or she must accept its aims, take part in their fulfilment and pay the subscription regularly: corporate members can be enterprises which give financial assistance for the realisation of the Society's goals.

The Society has more than 5000 individual members and some 200 corporate members. Our professional influence is much more significant than these numbers would suggest. The governmental agencies responsible for the profession (National Technical Development Committee, Central Statistical Office, Hungarian Academy of Sciences, Ministry of Education etc.) *regularly consult NJSZT. In our experience, our suggestions are accepted and become reflected in official studies and decrees. We can state that NJSZT has been accepted among those organizations which establish computing policy in Hungary.*

During the 20 years since its foundation, the organization of the Society has been steadily adapted to the developments in our profession and to its proliferation in Hungary.

Structure of NJSZT

At the end of 1985 the General Assembly accepted the following organizational structure:

THE PRINCIPAL ORGANS OF THE SOCIETY

Disciplinary Commission	GENERAL ASSEMBLY	Supervisory Commission

National Council
Executive Board

Secretariat

Committees*:

Economic	International Relations
Youth	Publications and terminology
Management of Corporate Members	Computerization of society

Regional organizations**:
18 counties,
4 independent cities

SIGs**:

State administration applications	Operation Research	Computer and Communication Engineering
Hobby Computer Club	Biomedicine	Computer Center Management
Artificial Intelligence	Programming Systems	CAD/CAM
Agricultural Applications	Systems Theory	Users' Common Interest Groups: BOF (Birds of a feather)
Education	Systems Analysis and Informatics	Text Processing and Human Applications

* Their presidents are members of the Executive Board

** Their presidents are members of the National Council

The highest organ of the Society, the General Assembly, *elects the* National Council *which decides on all questions of principle relating to the running of the Society. It elects the President, the Vice Presidents, the General Secretary, the Deputy General Secretaries and the Presidents of the Standing Committees from among its members. The day to day management of the Society is in the hands of the Executive Board. The leaders of the Special Interest Groups (SIGs) and the regional organizations are also members of the National Council.*

The membership of the Society meet triannually at the National Congress, *where more than a hundred lectures on a wide range of topics present the development of the profession and the recent attainments in Hungarian informatics. Several SIGs take part in the preparation of the Congress and one of the regional organizations hosts it.*

If there are only a few specialists working in a particular field, we sometimes establish a provisional working commission, for example the two most recently founded commissions are the Chess Working Group, founded in cooperation with the Hungarian Chess Federation to deal with computer chess, and a group which collects specialists working on computerized music.

What Are the Special Interest Groups Doing?

State Administration Applications

This is a relatively young group: it was formed in 1981. It promotes and assists the application of informatics in State Administration. It has been active since its foundation. It organizes national conferences, professional seminars on users' premises, half-day workshops, shows, lectures in special fields, discussions and round-tables. In addition to the national events, the Hungarian-Austrian Workshop "Informatics 2000" was a very important event held in June 1987. The urban applications commission within the SIG constitutes a forum for informatics in the field of local and urban administration.

Hobby Computer Club

Originally this was for constructors of home computers, but its profile has since been widened, in practice it is now the association for amateur computer owners. It has about 1000 members in 15 towns. In Budapest there are several sections, which bring together the owners of a particular computer modell. It organises preparatory and refresher courses regularly. HCC undertakes publishing activities; it plays a very important role in popularising informatics among the public at large.

Artificial Intelligence

This group offers a forum to researchers in this field and to those interested in it; they deal with theoretical questions of computer science and also with fifth generation computer systems. Their series of seminars, spanning several years now, on theoretical research, development and experimental work in Hungary and abroad have enjoyed great success. They both conduct lectures and seminars abroad, and also invite respected authorities on AI from abroad to speak in Hungary.

This SIG has linked itself to the International Association for Pattern Recognition.

Agricultural Applications

This new SIG, established in 1983, is one of the most active. That can be explained by the fact that the application of computers in agriculture has grown enormously in the last few years. It draws up its programme every year together with our county organs and with outside organizations of a similar profile (e.g. the Hungarian Agricultural Association). It organizes round table conferences and discussion forums, often inviting high-ranking state leaders. Every year it holds a forum for developers and users.

Education

It is one of our oldest SIGs. It organizes the Hungarian Conference on Informatics Education and took part in the organisation of

the World Congress of Computer Education. It initiated the circle of BASIC programmers. It takes part in the preparation of national competitions, it works actively in the organisation of competitions, summer schools and camps on informatics, which it has been doing since 1982. They played their part in the compilation of a remote teaching course, revising and editing a TV series, and in its examination and assessment. Several times they have expressed their opinion on state plans and proposals and assisted the setting up of the school computer programme by giving courses for teachers.

Operation Research

This SIG has been functioning since the foundation of the Society. Its most important task is to organize the annual National Operation Research Conference which has done since 1971 (with about 250 participants each year). They also hold individual lectures and conferences with invited well-known lecturers from abroad.

Biomedicine

The foundation of this SIG is due to the realisation that medical users have a different educational background than specialists in informatics, so their ability to communicate and cooperate is limited and an interface is needed between them.

Their biggest and regular event is the Conference "Computer and Cybernetic Methods in Medicine and Biology" held in every odd year, with about 80 papers and 300 participants.

The regularly published conference proceedings assume the role of a journal, since they contain almost the whole gamut of research and development results in Hungary.

Their other important forum is the Meeting on Medical Informatics, organised in a different town each time, in cooperation with the Hungarian Association of Physicians. This meeting has in general 150—200 participants and papers oriented to practical topics.

Programming Systems

It is also one of the original SIGs. Its current goals were formulated in 1981 (systems programming, programming technology; protecting the interests of domestic programmers, etc). They conducted an inquiry among the members of the SIG in order to get to know their needs and wishes. It has four working committees (Data Base Management, Parallel Programming, Systems Programming and Simulation) and each of them has held several thematic conferences and lecture series.

The SIG organises a triennial conference on Programming Systems, always touching on the most recent problems of software development. The conference could be considered as the most important meeting of software developers in the country, bringing together 250—300 participants. This SIG maintains broad cooperation with several other SIGs, standing and working committees.

Systems Theory

Its activity is reflected above all in the national conferences organized annually in the early 70's. The favourable reaction to these events in due most of all to popularisation of systems theory and to the interdisciplinary manner of approaching problems, and to the respected lecturers which they attracted.

Computer and Communications Engineering

Its activity takes place within varied forms and organisational frameworks. The SIG's work as a whole is complemented by that of three working committees and a local working group. The Remote Data Processing working committee holds seminars on networks and protocols regularly. The SIG takes and active part in the work of other SIGs, Associations and international organisations (IFIP TC6). Beginning in 1977, it organizes the internationally known COMNET Conference on computer networks every fourth year, assisted by not only IFIP, but also by UNESCO and ITU.

Computer Center Management

Besides holding many lectures and round tables, this SIG has placed the current professional questions of computer centers and their regulatory measures into a wide ranging discussion, involving data protection, contracts, price setting, etc. The questions received from members and their enterprises have laid the basis for this.

The legal committee within this SIG examines complicated legal problems during their several-day conferences and seminars.

CAD/CAM

This is one of the most recent SIGs. Some of its experts have attained noteworthy results on an international scale.

Users' Groups

These bring together users of particular computers into specialised clubs. They hold shows and seminars, and facilitate exchanges of experiences concerning the novelties and problems of different computer types. They foster good relations with the manufacturers. The club for the users of the Hungarian made TPA computers and of DEC computers organises the most popular events. Its major annual conference attracts roughly 200 participants.

Text Processing and Human Applications

This SIG belongs to the recently founded ones. It often holds lectures on special application fields which are followed with great interest each month. An ambitious undertaking of this SIG is the organising of the International Conference on Computational Linguistics (COLING '88) in Budapest.

On the work of county and urban organisations

Establishing regional computer centers, computer workshops at regional educational institutions and spreading applications within enterprises requires that NJSZT depart from the typical "Budapest-centrism" of the country, and that it should create regional organisations. These organisational entities function as "smaller societies". The creation of county and urban organisations was completed by 1980.

There is a considerable growth in the number of local events, most of which are related to personal computers. They realised correctly that it is possible to bring specialists from different parts of the country into their particular county if they organize their events together with SIGs.

We also have to mention the exhibitions on different topics. Among the participants are manufacturers, organisers and users from neighbouring counties and also from the whole country. These exhibitions are in line with the Society's aims and strengthen the position of the regional organisations.

The Csongrád, Szolnok and Fejér county organisations have done an excellent job in organising three of the Society's Congresses. In several counties successful events have concentrated on agricultural applications of informatics.

Public administration organs ask for the professional opinion of our regional organisations on the application of informatics.

* * *

NJSZT and MTESZ (Federation of Technical and Scientific Societies)

MTESZ *is the umbrella organisation for 33 Hungarian technical and scientific associations and as such includes altogether some 200 thousand graduate engineers, scientific researchers and agronomists, in fact all the Hungarian technical intellectuals. The management of the Association relies heavily on our Society, while at the same time respecting our independence.*

There are several related associations in MTESZ *with which we jointly accomplish projets, assisting and complementing each other, either regularly or occasionally. It is evident that many specialists working within the Scientific Society for Telecommunication, in the Scientific Association of Measurement and Automation, in the Bolyai János Mathematical Society or in the Society of Organisation and Management are interested in* NJSZT's *activity and that some of them are even our members. We organise together several conferences (among them international ones) and other shared events. It goes without saying that such cooperation is of mutual benefit, and NJSZT readily enters into it. Since informatics and microelectronics feature in every field, industrial and fundamental science associations in* MTESZ *have also become our partners as users.*

*We play a leading role in the working committee on Electronisation of MTESZ and we take part in the work of its central committees dealing with questions of principle (e.g. Advisory Board, Committee on Scientific Po-*licy, Scientific Information Board, Press Committee) and of course in that of its National Council. We advise on the development of MTESZ's information system; our systems for performing everyday administrative tasks (registration of individual and corporate members, events and accounts) are considered as an example by other Societies.*

The Society's International Relations

International Federation of Information Processing — IFIP

Hungary is represented by our Society in IFIP. Our experts have been working and fulfilling leading functions in its different technical committees and working groups for many years. There is often a Hungarian member in the programme committee of IFIP events. We have been hosts of several conferences, seminars and working group sessions. The COMNET conference, regular since 1977, is the biggest professional meeting on networks in Central Eastern Europe.

We have organised meetings of several TC-2 working groups. Concerning TC3, which deals with education, we initiated the first Teleteaching Conference and the creation of the working group on remote teaching.

The president of the International Committee of our Society, dr. Péter Kovács, was elected trustee by the IFIP General Assembly in Dublin 1986.

The Society strives to assist our specialists to take part in IFIP events—up to the li-

mits of our financial resources. We were glad to be able to host the General Assembly of IFIP in September 1987.

Other International Relations

Our Society has joined other international organisations as well (e.g. IAPR, DECUS) and has relations with several professional organisations. We have cooperation agreements with the Austrian, Greek and Slovak Societies for Computing Sciences and with the Bulgarian Union of Mathematicians. This enables the organising of common events and a well prepared exchange of experiences. We attach great importance to the international contacts of our young informaticians; we organise communal camps for pupils and in 1989 we shall host the International Student Olympics.

We are glad that several international organisations have asked us to organise their larger and smaller national or international professional conferences in Hungary. A WASCO Congress, the first TAKIS Congress, a conference and workshops of SIMULA Users' Association contribute to our good reputation. We undertake the organising of pro-

duct shows in Hungary for foreign firms: the professional background of our Society is a guarantee for the customer that specialists in suitable positions and with relevant interests will be reached and for the facilitation of future business relations.

There are several million Hungarians outside Hungary—living mostly in neighbouring countries. The Society considers it to be an important task to transfer information to Hungarian experts living outside our borders and to promote their contacts with the specialists working in Hungary.

Scientific Literature and Publications

The Society contributes to the publishing of Hungarian computer journals, and has done so since its foundation. In the most widely circulated professional-political monthly "Számítástechnika" (Computer Technics) we had our own column and the whole profile of the magazine reflected the activity of our members. Since 1983 NJSZT acts not only as an "adviser" to magazines growing in parallel with the burgeoning of informatics; it now publishes the second most widely circulated

Academician Tibor Vámos and dr. Norbert Rozsenich signing the cooperation agreement between the Austrian Computer Society and NJSZT

Hungarian technical magazine "Mikroszámítógép Magazin" (Microcomputer Magazine) —alias "Mikromagazin"—itself, which is both for qualified specialists and also for those just beginning with microcomputers. This magazine is at the same time a professional forum where articles appear regularly initiating discussions in the whole a professional society, which go beyond the current information in the branch. The titles of the regular columns reflect their content, eg.: Programming Technics, Microprograms, School Computer, Pupils, Books and Market. Beyond these, the "seasonal" columns (e.g. Courses) are successful too. Feature articles, presenting current and/or particularly interesting topics occupy the majority of each issue.

Every individual and corporate member of NJSZT and the institutions collaborating with them receive a monthly broadsheet containing news of the Society's activities.

In addition to professional publications and contributions to specialist magazines, the Society is working consciously to establish regular contacts with the mass media. Our scientific and science popularising events are reported in the newspapers; our guests and leading experts are interviewed by radio and television. Often our members initiate, organise or contribute to programmes or series on computing—they write the scenarios, revise the scripts, etc.

A selection of Hungarian computer periodicals

Awards, Distinctions, Competitions

Our most outstanding distinction is the Neumann Medal, established in 1976 to commemorate our eponym. Up to three medals can be distributed each year to people who have attained successful results in the popularising of computer culture or who have performed outstanding work in the Society.

During the last ten years 22 Hungarian and four foreign experts have been awarded this distinction.
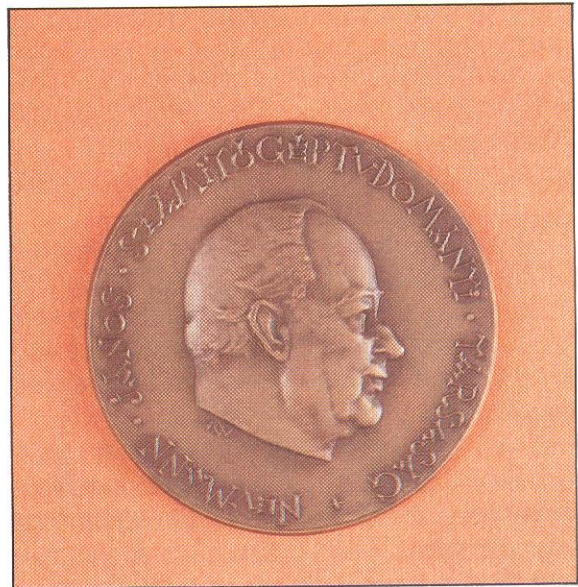
The Neumann Medal

Our Honorary President Dr. Tibor Vámos, who was the President of the Society from 1975 to 1985, receiving the Neumann Medal from Dr. Bálint Dömölki, the current President.

Among the decorated Hungarian experts you can find founders of the Society, excellent colleagues in computer production, applications management or professional publication and those assisting the Society's activity in many directions including the organisers of successful international conferences.

Concerning the foreigners, one of the best known experts of networks, Donald W. Davies was awarded the distinction on the occasion of the 20th anniversary of the discipline in a commemorative meeting organised in his honour.

Dr. Norbert Rozsenich was distinguished because of his efforts in the establishing and intensification of the relations between the Austrian and Hungarian Computer Societies.

Prof. Hermann H. Goldstine, a colleague of John von Neumann, was distinguished because of his computer developments and his lifelong acitivity in informatics, which is interesting in itself from the viewpoint of scientific history.

Prof. Helmar Frank received the Neumann Medal for his attainments in educational cybernetics.

NJSZT's second distinction, established in 1976, is the Kalmár László Award. Kalmár was a professor at the József Attila University of Science in Szeged, a foundation figure of cybernetics research in Hungary. The award can be given to distinguished experts in practical applications of computer science. 12 people have so far received this award.

The Society has recognised the importance of informatics education by awarding a separate prize in 1987 for prominent specialists in this field. The eponym was Rezső Tarján, the first President of our Society, academician and a leading figure in electronics.

The work done at national or branch level in our Society is also recognised by governmental organs. In line with our proposals, several experts have already received state awards.

Through our competitions we want to stimulate eminent youth and give them a chance to show their talents. The Society distributes 3 special prizes at the Graduates Conference organised each year in the Electrical Engineering Faculty of the Technical University of Budapest.

In 1986 we first announced a competition for diploma theses, open to any students finishing their studies at any university, college or high school and working on informatics (hardware, software and applications). It helps the most outstanding ones to make practical use of the contents of their theses.

The Kalmár Medal
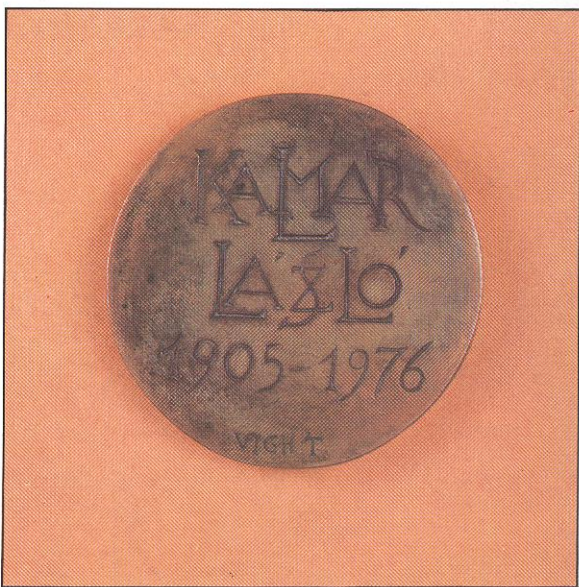
Every year there are several smaller competitions too; the professional journals and collaborating organisations and institutions take part in preparing and publicising them.

The Society takes a special interest in the education of gifted secondary school pupils. Illustrious computer experts regularly give lectures for these pupils and help them to solve their individual computing problems.

Popularising Computers

While our Society wanted to devote its efforts to its fundamental goals, to remain the standard bearer in computer applications, it has had to meet the challenge of the informatics explosion caused by the appearance of microcomputers in the early '80's. It called upon all those interested in informatics, including non-professionals and secondary and high school students to become its members. So the amateur computer constructors joined us in 1982 and proceeded to set up Home Computer Clubs.

With the authorisation of the Society and in line with its aims, the club leaders direct the clubs' activities, each according to their own circumstances, to ensure that their members can attain useable knowledge according to their abilities and needs.

Children gaining hands-on experience at the key-board and the mouse

The management of the Society considers one of its most important tasks the work done with young people during the past few years. In addition to the School Computer Programme, NJSZT organises a national computing competition for secondary school pupils. The best ten pupils are admitted to their university or high school faculties without having to sit the usually compulsory entrance examination in mathematics.

TV Course on BASIC

There was an enthusiastic demand for the beginners' BASIC course held in 1985. We prepared, together with Hungarian Television and SZÁMALK, a TV series of 16 programmes and a study book to accompany it. At the end we announced a nationwide final examination for the participants, which was held in 50 different locations simultaneously, using the same test over the whole of Hungary. Among the more than 3000 participants, 1470 people attained more than 56 points out of a possible 75, which was the pass mark.

The social composition of the applicants shows the extent of the demand for this kind of course. Among the examinees were representatives of every age group (the youngest was 8, the oldest 67 years old), of varied levels of educational attainment and of both sexes. The certificate from this exam is accepted nationwide in workplaces and refresher courses, where a programmer's certificate is required. We repeated our TV BASIC Course in 1986 with success, but with fewer applicants.

Access to a computer was almost a prerequisite of success in the course. This presented difficulties, of course, because the prices of computers in Hungary were high at that time—the more so if we compare them to salaries. In order to find a solution we called upon enterprises, institutions, schools and cultural centers to allow participants of the TV BASIC Course to use their computers when they were free.

In this way more than 200 micro-clubs were created throughout the country, and these have continued functioning after the course and even accept new people wishing to get acquainted with computing.

Remote Teaching

Enormous numbers of people throughout the world are having to change their profession or develop new skills. The traditional methods of retraining are obviously not sufficient; that is why only remote teaching via television and radio will provide an efficient solution. In our country the teleteaching of informatics at university level as a first step was proposed by our Society to the Hungarian governmental organs. The remote teaching group WG3.6 of the IFIP TC3 was initiated by us. This happened during the Teleteaching Conference in 1986 which enabled the exchange of experiences gained up till that time.

Microfestival
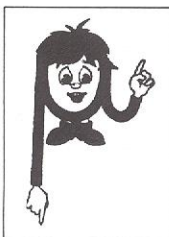
NJSZT arranged a big exhibition in 1982 with the title "Computing for everyone, everyone's computing". But our aims in this regard were fully attained only in 1986 and more so in 1987. Our exhibition is a part of the already well-known Budapest Spring Festival; we organise not only a professional exhibition, but also a series of events to stimulate producers and developers to display their newest products and thereby attract large numbers of interested people.

Every year we announce competitions for programs useful in the home, for teaching and games programs, and for amateur built peripheral equipment for computers. The announcement of the results is followed by demonstrations. We assist in the marketing of the winners' programs or devices.

We display the computer's capacity to assist blind and other handicapped people; how computers can enable them to work.

In order to assist the personal meeting of editors and their readers, we invite staff members of computer journals; we time the publication and launching of an important professional work to coincide with this occasion and celebrate its dedication on the spot.

The hardware and software trade and the robot shows give the impression of a market swarming with activity; lovers of computer chess and bridge have a unique opportunity to get together. Many listeners make a point of attending the premiere concert of computer music.

In the beginning there were people anxious that the scientific character of NJSZT might be lost if it turned its attention to the general public. The experience of the past years has proved that the Society's popularising activity can be harmonised with its more directly scientific work being pursued in parallel. It shows that a scientific association with sufficient energy to devote to the conscious popularisation of its work can evoke approval and respect and hence attain a higher level of prestige.

. . . And so the circle is completed. We would like to remind the reader of the ideas with which we concluded our introductory thoughts, on the importance of enthusiasm, hard work and respect, and of maintaining harmony between each of these in our profession.

So we aren't saying Good bye but

WELCOME!

MADE
IN HUNGARY

MTA SZTAKI
Computing and Automation Institute of the Hungarian Academy of Sciences

Research in computing and automation

Academic and University research teams which formed the Institute at the beginning of the sixties were the forefathers of the Computing and Automation Institute of the Hungarian Academy of Sciences. *The task of the Institute is to do overall research, to develop the most up-to-date technology and introduce it into different fields of the national economy. The aim is to implement integrated systems, to make production and process control systems and automate designing and manufacturing.*

The Institute runs the mainframe computers and the computer network of the Hungarian Academy of Sciences *and oversees the introduction of computing techniques in the* Academy's Institutes. 45% of the more than 600 employees are researchers; half of them are mathematicians and the other half are engineers. The work of the scientific departments is supported by an important experimental workshop and an economic and clerical staff. In addition to the mainframe computers (IBM 3031, IBM 3148, CDC 3300) and dozens of minicomputers (PDP 11/34, PDP 11/40, TPA 11/40, TPA 7025, R-10) there are more than 100 microcomputers available for researchers. 200—300 scientific publications a year show the results of SZTAKI's research work but what really attests its quality is the fact that more and more systems are operating in production and in other spheres of everyday life in different branches of the nationaly economy: in industry, agriculture, trade and the health service.

Some examples can serve to represent the main efforts of the Institute.

Control system of fuel handling machines in nuclear power plants

The controller of manipulators in nuclear power plants demands special requirements on the driving and control system since heavy duty frame-crane-type equipment must be positioned with the precision of a millimeter.

To solve the task in question, which is important in respect to the national economy, we have developed the first highly reliable computer control system in which microcomputers are working together in a linked local network. In addition to extra technological provision the defining feature of the system is the increased safety which is indispensable in nuclear power plant techniques: every important function is at least duplicated. The detection of possible errors is provided by permanent self-diagnostics and the proper operation will in no way be affected by errors.

The control system of the manipulator has already been made for the 400 MW blocks of the Paks Nuclear Power Plant as well as the control system for fuel handling delivered by GANZ-MÁVAG to the Bulgarian People's Republic. The proof of the high technical standard of fuel handling machines is the Grand Prix awarded at BNV (Budapest International Fair) in 1985, as well as the fact that it will be the control system of the Soviet 100 MW fuel handling machines too.

Computer aided design and analytic systems in agriculture

In the last five years the computer aided design and analytic system of the field growing of plants has been worked out. It determines the sowing system for farms taking into account not only agronomical but market and many other aspects. This system is fast, needs little conventional organization work and detailing, is relatively cheap and enables the production to adjust itself flexibly to changing requirements. It enables the farm to work out the technological measures to be taken for many variations of sowing systems considering the current conditions and then to choose the best one on the basis of a quick economic analysis.

The technological design and analysis system has been perfected step by step in the course of research cooperation with KITE (Corn and Industrial Plant Cultivating Cooperation) of Nádudvar since 1975. KITE has also improved its consultative activity so that some 40 to 50 farms annually determine their sowing systems successfully in this way.

Neonatological expert system

Cooperating with the Szabadsághegyi Gyermekszanatórium (childrens' Sanatorium), we have achieved mutual success in aiding dr. Ferenc Katona's internationally acknowledged pioneering work with an expert system based on new theories. Its novelty is the combination of pattern regonition and logic analysis.

The new procedures, based on embryological and neurological methods in treatment, diagnostics and rehabilitation of birth-related nervous system injuries, have raised several additional problems in research and method propagation. Examining the rapidly changing and not fully revealed diagnostic facts led to new connections which form a semantic net in a knowledge-based system. The expert system assists in research, in daily medical practice and in the teaching of new methods as well.

Pattern recognition

In automating the related tasks of visual identification, sorting and recognition of faulty-shaped workpieces, the VM-02 single-card pattern recognition module (vision module) is an excellent tool. As an additional component for manufacturing and processing equipment, it makes it possible to disengage numerous subsidiary workers employed in certain phases of production (e.g. transportation, sorting and quality control). This module makes the manufacturing process more reliable for it can replace workers in production phases where human senses and decisions (intelligence) have been required and which were impossible to automate in the past. Some well-proved applications are: industrial robot control, supplying automatic assembling and manufacturing lines, sorting equipment. For example, in Bakony Works, Veszprém, it is used for positioning and recognition tasks in a bowl feeder system. The module is produced by the Mechatronika Cooperative.

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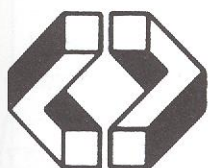
Szki
Computer Research and Innovation Center

Research and innovation

SZKI *was founded in 1968 as* "Institute for Coordination of Computing Techniques". *Changing activites of the institute in recent years were reflected in the new name adopted in 1985:* "Computer Research and Innovation Center". *As for its main profile* SZKI *is a research institute working as a state-owned enterprise. Its basic R&D activities are, however, complemented by its two affiliates* (SCI-L *and* SCITEL) *dealing with production, sales, marketing, support and maintenance activities, performing in this way a full innovation chain. (A third affiliate Proper SARL located in Paris assists in export activities.)*

Research, development and applications

SZKI *performs R&D activities in a wide range of areas, often connected to various national development projects and international cooperation. Working as an innovation center, its activities may cover the whole range of the innovation process, starting from discovering market requirements (both domestic and foreign) up to active participation in certain production, education and commercial processes.*

Application activites of SZKI are directed mainly towards some preferred branches of the Hungarian national economy, like the agricultural and food industry, energy production and distribution, transportation and traffic organization or the topic of electronic design, production and testing systems. The most important hardware and software tools required by the complex application systems are also developed by SZKI, providing services through the full innovation cycle. SZKI offers its products and services to interested organizations and institutions on a commercial (contractual) basis.

Key to success: the human being

There are about seven hundred people workig in SZKI, more than 60% of the staff has university degrees. The average age is 33 years. There are stringent requirements and the result is a staff which is competitive in the Western European market as well.

Each year many university graduates start to work at SZKI on a one year trial contract basis. Special contacts have been made with the Technical University of Budapest, where an SZKI foundation has been established to support informatics education by supplying PROPER-16 personal computers to the University and by participating in educational activities as well as by providing opportunities for practice to the most talented students.

Software export, presence in the world market

As a result of its successful and increasing software export, SZKI has become a software house with a good world-wide reputa-

tion. A marketing organization has been built up in Western countries as well, including distributors/partners working under long-term cooperation agreements in countries like USA, Canada, France, Germany and Japan. Activities are increasing in the South-East Asian region as well.

The software repertoire of SZKI as well as the skills and experience of its personnel are oriented towards the demands of the developed markets. In this way there are good possibilities to build up mutually advantageous partner relationships with leading foreign companies. Software export to the more developed countries has helped very much in increasing the professional level and experience of the research and development staff.

Briefly on products

SZKI is continuously appearing with new hardware and software products. To mention some of the recent results:

Desktop Publishing is a new field SZKI is to enter with the complex editorial system PROPRESS.

An optical character recognition system for low-cost (300 bpi) scanners has also been developed and is distributed world wide under the name RECOGNITA.

The integrated software package OPEN ACCESS as well as the personal computer network PRONET are also appearing.

Several expert systems have been developed using SZKI's MPROLOG language which is distributed world-wide.

The PC-based image processing system PRIMA incorporates several innovative ideas.

SZKI's professional personal computers (the PROPER family) have been complemented with interesting new options, like high-resolution graphics, Turbo-board etc.

A TELEDATA/TELEDOS system is also available based on PROPER machines.

* * *

Central Research Institute for Physics—Research Institute for Measurement and Computing Techniques

Research and development of measurement and computing techniques

The Central Research Institute for Physics *looks back on a past of more than three decades. It works under the directions of the* Hungarian Academy of Sciences. *It is the largest modern research center not only among the academic Institutes in Hungary but in Central Europe. At present it concentrates on five main fields of research. In accordance with this the Institute consists of five scientific units and institutions. The Institute's activities are the following: research on particle and nuclear physics, nuclear energy, measurement and computing techniques and micro-electronics.*

The Institute has always paid attention to research and development directly or indirectly supporting the economic progress of the country. By making use of its results in the field of measurement and computing techniques among other things the Institute has revealed its applications both at home and abroad. A multi-faceted report should be required to describe the extensive activity of the Institute but we can undertake to survey nei- *ther the whole KFKI nor all of its activity. This article confines itself only to the activity of the* Institute for Measurement and Computing Techniques.

KFKI-MSZKI engaged in servicing practice

The aim of the Institute's work is to research and develop measuring, data-collect- ing, information processing and design supporting systems as well as their hardware and software tools. In addition to nuclear (experimental physics) and many other (medical-biological and agricultural) laboratory applications in industry the Institute deals with measuring and data acquisition systems used mainly in the field of energy and energy resources as well as computer management and computer aided design systems. In this way more and more computers available for users will be integrated into local, fast and wide area networks. The reliability of systems is increased by building in redundant (backup) units which means developing special architectures. CAD/CAM is being introduced to a wide range of applications in the fields of electronics, machine industry and several other fields of application.*

The results of hardware development

More than 500 of the TPA-8 minicomputer family members have already been produced which are compatible with the DEC PDP-8 computer family at the level of programming and the instruction set. The TPA-11 computer family consists of the 16-bit micro- and megamini computers of the TPA-11/100 and TPA-11/400 series and the megamini computers of the 32-bit TPA-11/500 series. The 16-bit and 32-bit computers are compatible with the PDP-11 family and the VAX-11 series respectively in respect to programming.

As they have modern architecture, with a modular structure of up-to-date units with the help of expanded software support based

on world-wide industrial standards, they can adequately meet all the user's long term needs. Up to now 600 systems have been installed. A similarly important product of the Institute is the ICA-80 programable multichannel analyzer. Its characteristic features are the up-to-date, modular architecture and the low price.

The CAMAC system with a similar modular architecture solves the problem of maintaining two-way connections between digital computers and their surroundings (e.g. technological processes, physical experiments etc.). Among nearly 200 types of modules, intelligent frame controllers, D/A and A/D converters, processors, counters, optolinkers, timers and displays etc. can be found. The list is far from being complete since the KFKI-MSZKI has been developing peripheral interface and control devices and deals with the development of intelligent terminals, magnetic disks and displays as well as video processing.

References

Finally we would like to show some fields of application of the Institute's TPA computers. There are three large power plants in Hungary, the Duna Thermal Power Plant, the Tisza Power Plant and the Paks Nuclear Power Plant in which TPA-11 computers are used in the plant's measuring, data collecting and process control systems. There are TPA-8 and TPA-11 computer systems implementing technologies of exploiting liquid and gaseous hydrocarbons, their transportation through piper or railway containers as well as processing and storing them in tanks; these systems are operating at Tisza Oil Refinery, ÁFOR Oil Company, Duna Company of Oil Industry, Nagyalföld Oil and Natural Gas Exploiting Company and Natural Gas and Oil Transporting Company etc.

Configurations of TPA-8 and TPA-11 computers are used in the field of management data processing of institutions and companies e.g. the national financial and statistical information system in the Central Statistical Office, the decentralized data processing network of the Hungarian Post Office, the systems of MEDICOR, GANZ-MÁVAG and the Haemotological Institute are all based on that data base. Finally it is characteristic of the Institute that beyond installing and turn-key delivering of computer systems the KFKI-MSZKI is willing to take part in cooperation with other institutions and solving common problems with them. A typical example of this is the fact that within the framework of international cooperation the Institute is taking part in the Vega programme.

* * *

Computer Applications and Service Company

The number one company in computer applications

Its name reflects the jobs the Computer Applications and Services Company (SZÁMALK) *do in the field of computing.*

They have all round services in computer techniques on offer. You can always encounter one name in education, in the publication of books, in development and commerce and in the technical and end-users services: this is the SZÁMALK, the biggest Hungarian systems house and computer services company.

Beside their achievements on the Hungarian market, this firm is quickly expanding abroad as well. Its outstanding features are constant development, the accelerating pace of innovation and the production of world standard products which are good even by international comparison. The knowledge of its experts, their experience and the level of its technology make it possible for SZÁMALK to cooperate with many firms in several continents.

We will show here in broad outline the increasingly sophisticated international role this great enterprise plays in computing.

Development

The computers marketed by SZÁMALK are equipped with operating and systems software. Programming and management technologies (mainly developed at SZÁMALK) are also provided.

The departments involved in development projects provide services such as software for mainframes, medium sized, small and microcomputers, technologies for software development, interactive programming and testing systems, microcomputer networks, expert systems, teleprocessing software, performance analysis and enhancement of data base systems.

The other wide area of development work concerns writing application programs. Besides programs specially suited for customer needs, development or adaptation of general purpose program packages is also carried out.

The need often arises to reconfigurate and/or enhance the original hardware systems made by different manufacturers. Consequently, their engineers are working on various hardware development projects. A great part of their work is to put powerful microcomputer systems into practice.

Trade in hardware and software

SZÁMALK's marketing of hardware has great traditions and achievements. SZÁMALK imported and distributed those first 200 or so mainframe computers upon which the Hungarian computer park was based.

The significance of the commerce with computers at SZÁMALK is illustrated nowadays by the fact that they sell items to the value of 1 billion forints per year on the home market. Beside the mainframe, medium and small computers, also key-to-disc systems, microcomputers, peripherals, parts and materials, etc. are included in this total.

In the commerce of software SZÁMALK offers products of the most diverse origins and in different commercial constructions. On offer there are original products designed by SZÁMALK's own experts as well as products distributed on behalf of other Hungarian software developers and import products which are all of good quality.

Technical service and maintenance

SZÁMALK *takes charge of the complex technical servicing of all the computers which it has marketed. They set up the technical environment for the machines and if needed they design and build the computer room, install and test the newly built machines, link up the required configurations and fulfil the services required by guarantee and beyond the guarantee. The good reputation of SZÁMALK's service experts is boosted by the fact that they have already been exporting services to Western European countries for years.*

Applications

The SZÁMALK is also in the business of computer applications. Therefore, it offers different types of consultancy services to enterprises and institutions. Besides the above mentioned interactive program development, such a service is for example assistance in starting new computer centers, providing backup machines for its partners, the online service built on data base inquiry, the designing and introduction of manufacturing control systems and econometric systems based on mainframe, medium, small and microcomputers and the designing and introduction of unique information systems, etc.

Education — Career training and short courses

Here are a few figures illustrating the role of SZÁMALK in the life of the present and future Hungarian computing experts.

6,500 students per year are trained by 90 full time teachers during 35,000 study hours. The main commitment is giving career training foundation courses. 1100—1200 systems analysts, programmers and operators are awarded diplomas annually.

Beside this SZÁMALK runs about 100 short courses to keep specialists up-to-date.

The global education at SZÁMALK is rounded out with courses given in English, Russian and German languages. These international courses have been running for 10 years and attended by students from more than 50 countries.

Information services

SZÁMALK *has a public library with 15,000 books and with 500 periodicals at the disposal of those interested in computing. The computerised data base of the library is made up of Hungarian, English, German, French and Russian language titles. The library serves not only those frequenting it, but it is also open to those partners who subscribe to selective information services.*

The experts at the library are continuously working on the development of different documentative and library oriented computer systems for their own purposes and for other libraries. The publication of specialised books and educational curriculums at SZÁMALK have a decisive role on the Hungarian market of books on computing.

Some other data

SZÁMALK *runs a 60-room hotel mainly reserved for Hungarian and foreign students taking computer science courses. When not full the free capacity of the hotel is marketed through travel agencies.*

The Aula, the main auditorium and congress centre with multi-channel translation in the central building is at the disposal of both SZÁMALK and its partners to house different Hungarian and international meetings and congresses.

The reception area in the SZÁMALK headquarters
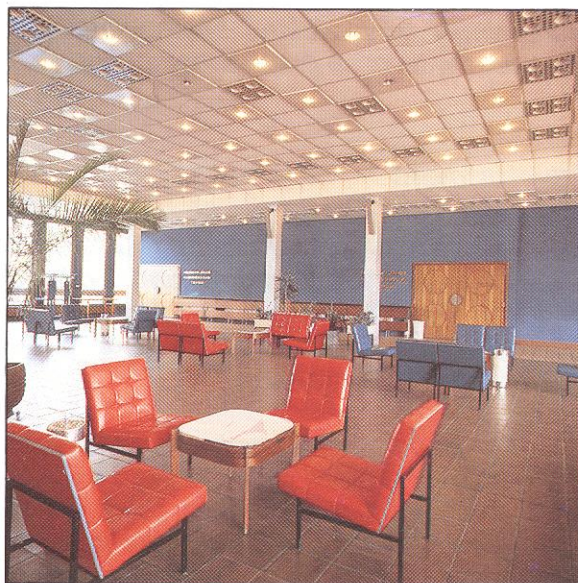
Computerta

The range of products bearing the trade mark COMPUTERTA is closely related to the IBM and EC mainframes, though its components can be fitted into telecommunication systems controlled by other types of computer as well.

The multimicroprocessor based programmable multiplexer having 32 data communication lines, the single and multiline boosters of varying speed and the various terminals are just a sample of these products.

The family of terminals is made up of intelligent terminals that are standalone microcomputers capable of local job processing and program development in addition to the common terminal functions.

Hard copy printing is done by the reliable and fast TMT-120 matrix printer manufactured under license from Mannesmann-Tally.

The specialists are keenly interested in our recent products. Especially the prize winning communications control unit has aroused their interest. Having this processor, there is no need for the traditional multiplexers and even the performance of the mainframe computer system is significantly increased. Moreover, large information networks can be set up in this way.

The IBM compatible TPC/XT professional personal computer and the TMT-125 printer which can use stationary of various sizes and thickness have both attracted great interest.

The new TAM-1200/E modem has the advantage that usage of the data communication lines is highly increased. The TAM-1200/B modem, enabling a call from the terminal side, makes it possible to use public telephone networks.

Our products can be used effectively in many areas of science and business. The trade mark COMPUTERTA is well known throughout the world.

Our experience as a telephone manufacturer is a guarantee for our customers.

TERTA

TELEFONGYÁR
1143 Budapest,
Hungária krt. 126–132.
Telefon: 634-240,
834-340
22-4087
Telex:

COMPUTING IN HUNGARY

53

Hungarian Optical Works

LETTERS: H-1525 BUDAPEST, P.O.B. 52
CABLES: »MOMER« BUDAPEST
TELEX: 22-4151 momos h

Founded in 1876 by Nándor Süss, the Hungarian Optical Works is renown among the enterprises of the electronics industry for having the longest traditions in instrumentation, precision mechanics and optics.

One of the most characteristic features of the enterprise over more than 110 years has been its readiness to incorporate state-of-the art scientific achievements in its industrial products. In the wake of the world-famed torsion pendulum, invented by Lóránd Eötvös and manufactured here, the MOM family of geodetic instruments based on up-to-date technology have raised our enterprise to the ranks of the outstanding precision mechanical and optical companies of the world and rendered the trade mark MOM well-reputed on all five continents.

Keeping pace with world-wide development of technology and adapting indigenous inventions, MOM has produced a variety of excellent products for the instrumentation of industrial and scientific research, testing of materials, biomedicine, environmental projects and also various peripheral computer devices.
Notable examples include the "derivatograph", a thermo-analitical instrument, the analytical and preparative ultracentrifuge, fibre-optical cables for light and image transmission, lasers, flexible and fixed magnetic disc storage devices.

85 % of the overall production stemming from the 7300 strong staff are sold on international markets.

The production of computer peripherals today amounts to 40 % of the whole turnover. 1987 will see the mass-produced. 0,5 Mbyte and 1 Mbyte, single and double sided members of the 5,25 inch slimline floppy disk drive family. New products under development include the 1 Mbyte version of 3,5 inch floppy drives, further the 5,25 inch 20 Mbyte and the 14 inch 160 Mbyte storage devices of the Winchester type. In order to better meet users' requirements, various control and adapter units as well as maintenance/service packages are offered, too.

Up-to-date production technology ensures the high quality and reliability of products: clean room assembly, automatic QC of components and sub-assemblies and computer-aided testing of completed devices are among the methods applied.

MOM is authorized to conduct foreign trade deals resulting in short delivery times.

It is the primary objective of MOM to meet the requirements of its clientele at a high professional level. To this end, it flexibly observes market demand, strives for keeping development cycle times short and attaches great importance to competitive quality and reliability of its products.

NOVOTRADE

Introducing Novotrade Inc.

The company was established on 1st of January 1983. It is a real share-holders company.
The majority of the shares belong to the four largest Hungarian banks, while the remaining stock is divided among 90 different Hungarian business entities among them agricultural, industrial cooperatives, foreign trade enterprises, etc.

It has been five years already that Novotrade is into software development for the West European and North American market. (This activity is done in cooperation with a London based company called Andromeda Software Limited).
The range of software developed at Novotrade varies from the home-computer level through personal computers to professional personal computers.

As far as the personal computer level is concerned, here the Company concentrates its efforts on developing products in the category of business software. Typical products are multi-lingual wordprocessors taking into consideration all the characters of the different European languages, Data-Base management programs and integrated business packages. All these programs are super-sophisticated and very successful in their market, among the users.

The company also develops educational software for the primary school level. These programs are simple and comprehensive. Their aim on the one hand is to increase the pupils' knowledge of the different subjects and on the other hand they want to develop combination skills among the users. Characteristic products here are in the field of mathematics, physics, chemistry, geography, history, etc.

In the entertainment software field the results of the Company are also quite outstanding. Their graphics and animation packages met with considerable success in the West European market. These packages are suitable for semi-professional artists as well as for the everyday user. The wide spectrum of the company's capabilities can be judged by the number of machines they are working on, which practically covers all the home-computer field beginning with the Spectrum up to the Atari 520St. The company also develops text-adventures and arcade games. At the moment the number of programs developed in the entertainment field is approximately 90. Out of this lot about 70 programs are on the market already

Based on the availability of more than a hundred skilful programmers the Company is glad to be at the service of any publisher or software developer to cooperate in any of the three subjects mentioned above.

Contact address: NOVOTRADE Inc.   Budapest,
Software Studio   Fürst S. u. 24–26.
H–1136

ÁSzSz–Computer Service for Public Administration

In order to provide application support and computer bureau services to computerized information systems, primarily basic registers being developed in the field of state administration, ÁSzSz came into being in 1975.

By means of its 200 application development, engineering and systems programming staff and of its large Honeywell BULL computer systems, ÁSzSz has achieved significant successes in developing the basic registers of the

state administration, population recording, agriculture, cartography, health service and social politics.

In the future, too, ÁSzSz wishes to expand its international connections, intensify cooperation and exchange of experiences with institutions active in state administration and civil service. ÁSzSz regards as one of its major tasks the practical application and wide-scale propagation of the latest achievements in computer technology.

By making use of its teleprocessing system, based on the HwB mainframe computer and microcomputers integrated in LAN, ÁSzSz is playing its part in the development of the information industry in this country.

ÉGSZI

Institute for Building
Economics and organization

**Budapest,
Csalogány u. 9.
H–1027
Tel.: 152-291
Telex: 22-5138**

Computer-related research, development and services at ÉGSZI

Our institute, the Institute for Building Economics and organization, commemorates the **30th anniversary** of its existence this year. After having 141 staff at the time of its foundation, it has by 1987 developed into a 1300-strong concern while its scope of activity, number of customers and assets have also grown several fold. Over the past 18 years we have established the **second largest network** for computer-related research, development and services in this country. Our activities span not only the building and building material industry but virtually all branches and sectors of the economy. One half of our annual turnover comes from orders by customers outside the building industry branch.
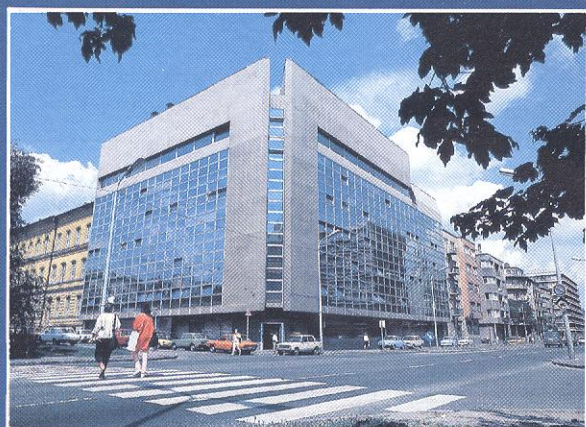
ORGANIZATIONAL STRUCTURE

Our highly qualified engineers, economists, mathematicians, organizers and computer specialists are making substantial contributions to meeting our customers' requirements. They are employed by the concern's head office, the 10 affiliated companies and a Finno-Hungarian joint venture. Our affiliated companies and their branch offices are

located in **12 major towns.** Of the 12 companies 10 provide development and services in the fields of corporate organization and EDP. Our **clientele numbers almost 500** including customers from Eastern and Western Europe. Industry branches represented on our reference list include building and construction, engineering, trade and transport, with large corporations, small enterprises and co-operatives being equally welcome customers.

TASKS IN THE BUILDING INDUSTRY

Determining the path of activities for ÉGSZI has been the fact that it is the staff computing institute of the Ministry for Building and Urban Development. Accordingly, its primary tasks at the time of its foundation and for more than a decade to follow were to support the top management in this branch of industry through analyses and other decision-preparing services. The Institute relies on the results of economics and on the general principles of the regulatory system of the economy. It is in keeping with these "hinges" that the Institute carries out its tasks, elaborates proposals for the economic control and regulation of the industry, develops technological norms and provides consulting services at both industry and enterprise management levels.

Since the late sixties another distinguished task of the Institute has been the propagation of up-to-date organizational methods and **computing technology,** that is, the introduction of the same to the enterprises within the industry. Related training services make this task complete.

DEVELOPMENT ACTIVITY

Development of standard and widely applicable unified solutions at our own risk has always played a significant role in our corporate policy. The organizational and EDP system solutions introduced to enterprises in the second half of the seventies were with little or no exception of this ready-made type.

The usability of our computerized material management system, to name one notable example, is evidenced by the fact that over 100 enterprises and companies still apply this package. Other commercial data processing packages like work force management, payroll and fixed assets management have met with similar if less numerous acceptance.

Parallel with the increasingly self-contained and market oriented operation of enterprises and companies, customized information and EDP systems have been gaining ground. The growing assortment of hardware equipment also justifies a more diversified approach. Our Institute is prepared and well-equipped to meet wide ranging requirements and supply customers — whether large enterprises or small cooperatives — with **tailor-made, complex information systems.**

To provide for the necessary computing environment we offer the development, implementation, introduction and running of mainframe and micro based, functionally and geographically distributed systems. The purchase and installation of equipment and communication facilities as well as on-the-job training are also offered to help customers to expeditiously set up their EDP systems.

Once equipment is installed and operations launched, we lay stress upon the quick and efficient accomplishment of **continuous maintenance/service tasks.** Covering systems, software and hardware maintenance, our services are appreciated by the clientele.

For our forthcoming tasks, too, we regard as one of our main assets the capacity of accommodation to changing customer requirements and emerging new technologies. To date, such new technologies offered as components of complex information systems include
– bar code reading equipment
– equipment for computer aided design
– microcomputer networks

Our services include the leasing of such equipment.

For details of MPG 60, a systems development and run time environment framework, please refer to the attached description.

EQUIPMENT

Not only has ÉGSZI kept pace with the development and spreading of computing equipment in this country but it has always been in the vanguard of progress. Our central equipment comprises 10 mainframe computers including R-22, R-40, IBM-370 and various Siemens models. Siemens equipment, supplemented by local hardware, has been supporting **interactive teleprocessing** for more than 10 years. Since the advent of mini and micro computers on the Hungarian market, this technology, too, has been incorporated into our development and business policy. We have invested substantial resources into the dissemination of small-scale equipment: more than 300 of these have been **leased** to our customers and their numbers are growing rapidly, especially in the IBM-compatible PC category.

As in the past 30 years, ÉGSZI pledges itself to a flexible, market and customer oriented policy and wishes to be at the disposal of its clientele with an ever advancing spectrum of methods and technologies.

mpg·60 ®

A development and run time system for interactive data processing

Due to the development of computer equipment technology, the widening assortment of devices, the improving performance/cost ratio and the growing requirement for application systems, the activity of systems development (i.e. systems analysis and design, programming) is becoming a bottleneck. The use of traditional systems development methods and software tools results in high labour costs, long development cycle times and poorly testable and maintainable systems. Considerable efforts are needed to achieve satisfactory quality of even un-sophisticated, smaller scale systems. Reinforcing some single links in the chain of development technology (design-implementation-running) may undoubtedly increase efficiency, but typically the gain is marginal. It is only by the critical review of the overall process as a whole and by building up an integrated software framework to provide development and runtime support that a satisfactory, general solution can be arrived at.

At ÉGSZI, such a framework has been implemented for the development of interactive data processing systems. The objectives of the framework have been set as follows:

- A "designer-friendly", high level, commercial data processing oriented language and a related systems development methodology
- A development environment that enables the tasks to be defined, tested and modified quickly, comfortably and at low programming effort/cost
- The capacity to produce comfortable, user--friendly, easily handled, uniform application systems
- Portability at basic software level.

. . . .

MPG-60 is a registered trade mark of ÉGSZI

These objectives have been met, resulting in MPG-60, a development and run time system for interactive data processing.

Looking at it, MPG-60 is a framework that controls and units two basic components, the development and run time systems. It is the framework that interfaces with both the operating system kernel and the user, thereby accomplishing the portability.

The development system consists of an interactive editor program and a compiler for the PROJEKT-60 programming language which contains Hungarian key words.
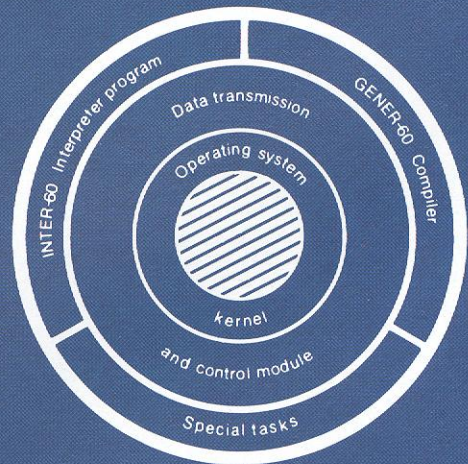
The structure of MPG-60

The run time system comprises screen handling, data manipulation and operation management modules.

MPG-60 is capable of multi-user support on networked processors. It allows distributed data bases to be set up, too.

MPG-60 has been implemented on various machines. It can be run on CM-4 (PDP-11), IBM-PC/XT and compatible computers. Several application program packages have been developed including

- invoicing
- accounts payable and receivable
- wages and salaries management

MPG-60 is well suited to the development of administrative data processing systems containing small and medium size files with up to a few tens of thousands of records. By means of its up-to-date, efficient data handling system, comfortable and flexible screen handling and high level data processing oriented programming language it can be used as an adequate tool to support complex sytems of enterprise management.

Comporgan

The COMPORGAN Software House has nearly two decades experience in computing.

Our activities cover various fields of informatics, information systems and computing, such as

- developing and marketing application programs and program systems in the areas of machine industry, the chemical industry, engineering, the building industry and public health,
- designing, developing and implementing information and control systems for our customers,
- adopting and implementing program systems.

Although we have several customers in Hungary, our activities as well as our business strategies have been mostly export oriented right from the beginning.

About one third of our staff, each with a university degree and with many years experience in computing, are engaged in foreign projects.

Over the years more than a hundred foreign projects have been undertaken.

Among our clients are leading computer manufacturers, software houses, analysts and of course end users.

In addition to the subjects mentioned above we have thorough experience in the following areas as well:

- travel agency applications
- hotel industry uses
- public health, hospitals
- accounting
- inventory control
- production control
- engineering computations
- process control

We are ready to undertake either the whole development work from the analysis phase through realisation to the implementation or any stage of it.

Should you require additional information about our services, please contact us.

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Saxonia.

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