Some Key Aspects in the History of Computing in Romania

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IT STAR WS History of Computing
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Authors

Vasile Baltac

- Computer pioneer (MECIPT)
- Significant contributions to the computer industry in Romania.
- Former President of CEPIS
- President of ATIC, the Romanian ICT Association
  - Member of IT STAR,
- CEO of the SoftNet Group
- University Professor

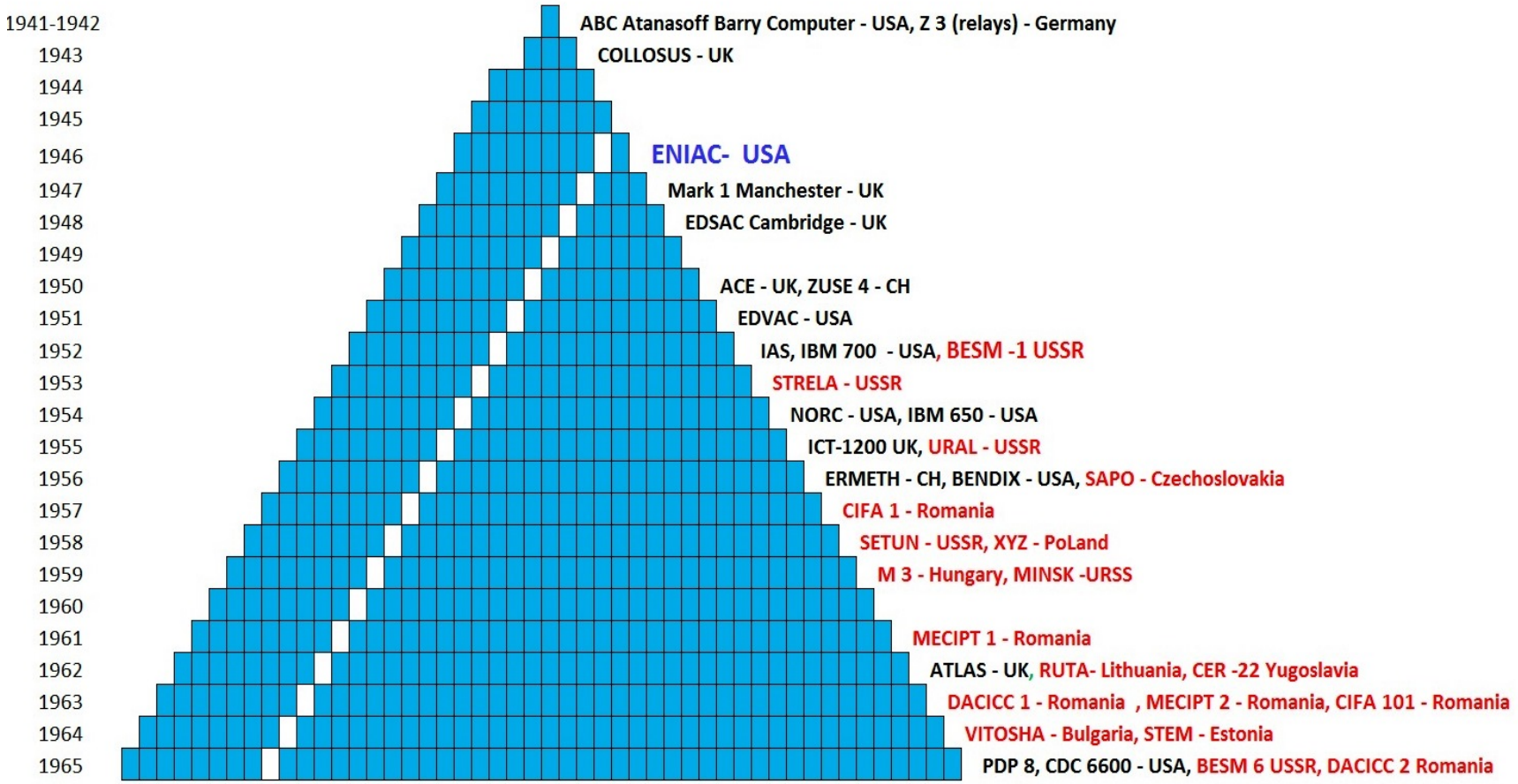
Horia Gligor

- Senior Researcher
- Head of the Timisoara Branch Institute for Computer Technology – ITC
- Vice president of ATIC, the Romanian ICT Association
- Managed the project of MECIPT-1 restoration and set up of the Computer Branch of Banat Museum

Agenda

* First computers in the World
* First Computers in Eastern Europe
* Romanian First Computers
* Computer Industry in Romania 1968-1990
* MPK po VT
  * ES EVM
  * SM EVM
* Computer Industry post 1989
* Computer History

puters in the world



ters in Eastern Europe

Year	Computer name	Country	Place	Computer Generation	Ref.
1952	BESM 1	USSR	Academy of Sciences, Moscow	Electronic tubes	[5]
1953	STRELA	USSR	Special Design Bureau 245, Moscow	Electronic tubes	[7]
1955	URAL	USSR	Scientific Research Institute of the Ministry of Machine and Measuring Instruments Industries	Electronic tubes	[8]
1956	SAPO	Czechoslovakia	Academy of Sciences, Prague	Electronic tubes + relays	[9]
1957	CIFA 1	Romania	Institute of Atomic Physics, Bucharest	Electronic tubes	[10]
1958	XYZ	Poland	Academy of Sciences, Warsaw	Electronic tubes	[11]
1958	SETUN	USSR	Moscow University	Electronic tubes	[8]
1959	M 3	Hungary	Academy of Sciences, Budapest	Electronic tubes	[12]
1961	MECIPT 1	Romania	Polytechnic University of Timisoara	Electronic tubes	[10]
1962	RUTA	Lithuania (USSR)	Special Design Bureau Vilnius	Electronic tubes & semiconductors	[15]
1962	CER 10	Yugoslavia	Mihailo Pupin Institute Belgrade	Electronic tubes & semiconductors	[16]
1962	CIFA 101	Romania	Institute of Atomic Physics, Bucharest	Electronic tubes	[10]
1963	DACICC 1	Romania	Institute of computing, Cluj-Napoca	Electronic tubes	[10]
1963	MECIPT 2	Romania	Polytechnic University of Timisoara	Semiconductors	[10]
1964	VITOSHA	Bulgaria	Academy of Sciences, Sofia	Electronic tubes	[14]
1964	CET 500	Romania	Institute of Atomic Physics, Bucharest	Semiconductors	
1965	STEM	Estonia	Institute of Cybernetics, Tallinn	Electronic tubes & semiconductors	[15]
1965	BESM 6	USSR	Institute of Precision Mechanics and Computer Engineering, Moscow	Semiconductors	[5]

ters in Eastern Europe

National Firsts

* 1952 BESM-1 Academy of Sciences of USSR
* 1956 SAPO in Czechoslovakia
* 1957 CIFA-1 built in Romania
* 1958 XYZ in Poland and M-3 in Hungary
* 1961 MECIPT-1 in Romania
* 1962 CER 22 Yugoslavia
* 1963 Vitosha Bulgaria and DACICC 1 Romania

The Technology Divide

* Cybernetics considered in 1950s a "capitalist pseudoscience"
* Technology divide limited to several years
  * ENIAC 1946 vs. BESM 1952
  * The electronic tubes and the passive circuitry was produced in USSR and Eastern Europe
  * complexity of computer architecture was not big
  * programming was simple
* The divide grows during 1960s to 1980s
  * Integrated circuitry and LSI
  * Complex operating systems

ian computers - CIFA

CIFA 1

Figure 1 Victor Toma and CIFA-1

* The first Romanian computer
* Institute of Atomic Physics (IFA) Bucharest
  * 1954 - April 1957
  * 1500 electronic tubes
  * magnetic drum memory of 512 - 31 bit words
  * paper tape input
  * typewriter output
  * 50 operations per second

* Victor Toma
  * new versions CIFA 2 to CIFA 4
  * 1964 second generation CET-500
  * 1962-1964 Victor Toma contributed to VITOSHA, the first Bulgarian computer
* Armand Segal
  * 1962 CIFA 101

MECIPT 1

- The second Romanian computer – first university built
- Politechnica University of Timisoara
- 1961 put into operation
  - 2000 electronic tubes
  - tens of thousands of passive components
  - magnetic drum memory of 1024 30 bit words
  - paper tape input
  - electric typewriter output
  - machine code programming
- Speed 50 operations per second increased to 70 through interleaving algorithm
- concept of microprogramming
  - paper sent by Prof. Sir M. V. Wilkes, FRS of Cambridge University, father of microprogramming

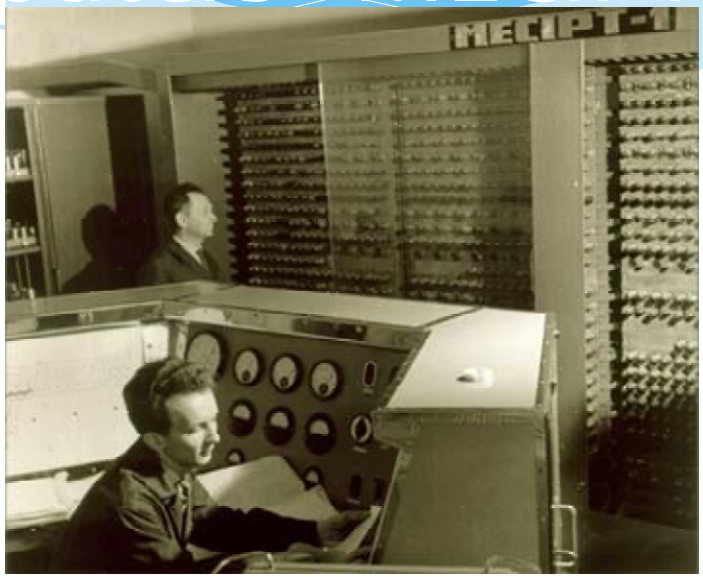


Figure 1 Wilhelm Lowenfeld and Vasile Baltac (at the console) and MECIPT-1 in 1962

- 1957 start Wilhelm Lowenfeld and Iosif Kaufmann
- 1960 joined Vasile Baltac
- 1963 first courses on computer engineering
  - 1966 first graduates in computer engineering.
- 1963 MECIPT 2 second generation
- The magnetic drums for MECIPT from the Academy of Sciences of Budapest
- Prototype for CENA – first Romanian Army computer

...n computers - DACICC

DACICC -1

- Institute for Computing
- Romanian Academy Branch Cluj-Napoca
- 1963 put into operation
- Team led by Emil Muntean and Gheorghe Farkas
- First generation
  - electronic tubes
  - used several transistors
- 1968 DACICC 200
  - fully transistorized
  - nucleus of operating system

Pupitrul de comanda al calculatorul DACICC 1, in timpul primelor exercitii efectuate de cercetatorii clujeni

Computer Pioneers

Mentors

* Academician Grigore C. Moisil (1906-1973)
  * Mathematician
  * founder of a school of polyvalent logic
  * great support to all teams
  * 1966 IEEE Computer Society awarded him the Computer Pioneer Award
* Academician Tiberiu Popoviciu (1906-1975)
* founder of a school of applied automatic calculus

Computer Pioneers

* CIFA - Bucharest
  * Victor Toma
  * Armand Segal
* MECIPT - Timisoara
  * Wilhelm Lowenfeld
  * Iosif Kaufmann
  * Vasile Baltac
* DACICC – Cluj - Napoca
  * Emil Muntean
  * Gheorghe Farkas
  * Mircea Bocu

Computer Pioneers

Figure 1 Romanian Computer Pioneers awarded National Orders - 25 February 2003

ational Cooperation

- Participation to scientific conferences and exchange of published papers
- Academician Moisil – promoter of exchanges of visits
- Active international cooperation
  - Victor Toma visit to Dubna
  - Wilhelm Lowenfeld visit to Leningrad (Sankt Peterburg).
- MECIPT - active cooperation with the Cybernetics Research Group of the Hungarian Academy of Sciences
  - delivery of magnetic drum memories used by MECIPT-1 and 2
  - Vasile Baltac, Kovacs Gyozo and Balint Domolki met for the first time in Budapest in 1962


Lőwenfeld Vili Katával és – valószínűleg – Vasile Baltackal

Budapest 1962
Wili Lowenfeld, Kovacs Gyozo's wife and Vasile Baltac

ational Cooperation

* MECIPT
  * Iosif Kaufmann letter to Prof. M. V. Wilkes, FRS father of microprogramming and creator of EDSAC, first British computer
  * Prints of papers sent – MECIPT micro -programme
  * Prof. Wilkes agreed to accept Vasile Baltac at Cambridge

Vasile, It gave me very great pleasure to receive your letter. (..).

Meeting you when you spent a year in Cambridge in 1966-67 was a great experience for me. I had never met anyone before from such a different background who absorbed, as readily and as rapidly as you did, information that we were able to offer you.
By the time you left, you were a fully experienced user of the Cambridge Multiple Access System with a knowledge of its internal working. ... I am glad that I was able to help you in the early part of your career.

I am now 94 years old and not as active as I was. However, I still read my email and respond to it. I shall always be glad to hear from you.

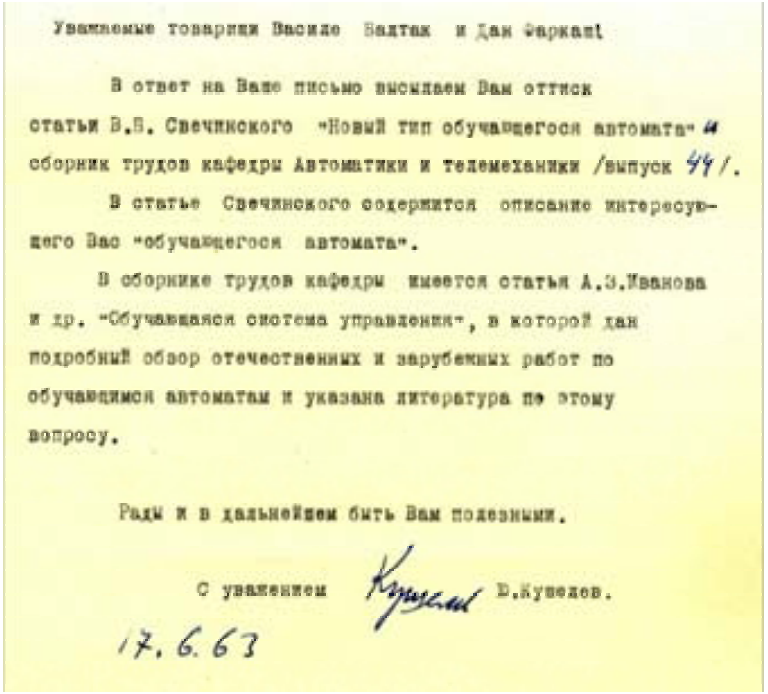
With very kind regards and best wishes... Maurice Wilkes

12 July 2007

Figure 1 Letter of Prof. Sir M. V. Wilkes, FRS to Vasile Baltac (2007)

ational Cooperation

* Teams - more than building computers:
  * research in computer applications
  * language translation
  * mathematical algorithms
  * computer aided design
* New areas explored such as self-learning automata
  * 1963 Vasile Baltac and Dan Farcas exchanged papers with Professor Kusheliov from Moscow Energy University



Уважаемые товарищи Василе Балтак и Дан Фаркаш!

В ответ на Ваше письмо высылаем Вам оттиск статьи В.Б. Свечинского "Новый тип обучающегося автомата" и сборник трудов кафедры Автоматики и телемеханики /выпуск 44/.

В статье Свечинского содержится описание интересующего Вас "обучающегося автомата".

В сборнике трудов кафедры имеется статья А.З.Иванова и др. "Обучающаяся система управления", в которой дан подробный обзор отечественных и зарубежных работ по обучающимся автоматам и указана литература по этому вопросу.

Рады и в дальнейшем быть Вам полезными.

С уважением Кушелев В.Кушелев.

17.6.63

Figure 1 Letter of Prof. Kusheliov to Vasile Baltac and Dan Farcas (1963)

uter Education

- The first Romanian computers brought the new science into the curricula of several universities.
- 1966 - the first generation of computer engineers at Politehnica University of Timisoara
- Professor Alexandru Rogojan
  - initiator of this diploma courses
  - close cooperation with MECIPT team
  - Computer courseware based on MECIPT
- 1967–1968 Computer graduates from universities
  - Bucharest
  - Cluj-Napoca

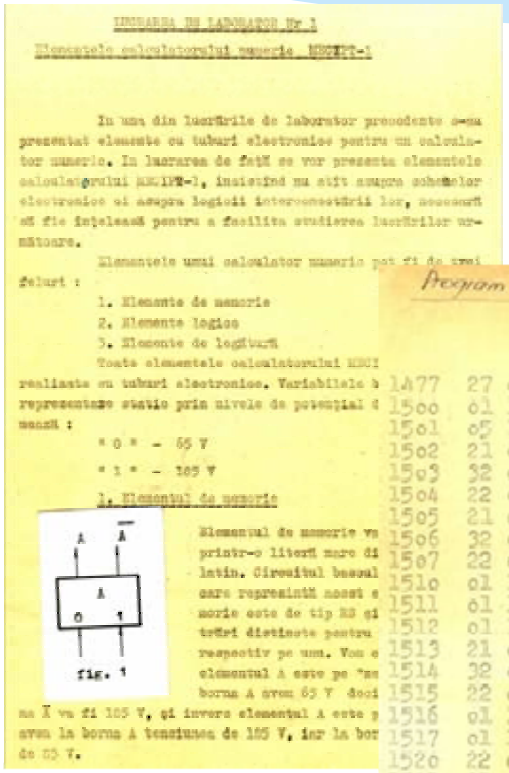


Figure 1 Computer courseware MECIPT (1964)

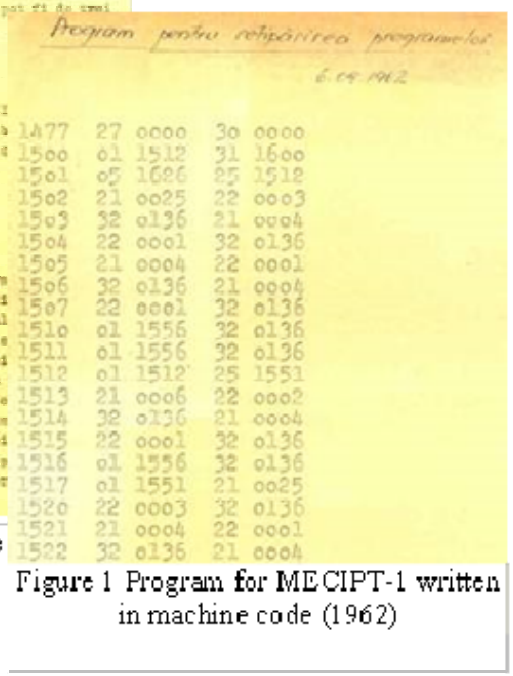


Figure 1 Program for MECIPT-1 written in machine code (1962)

Computer Industry in Romania

* Gap between the own computers and Western computers
  * alarmingly big
  * both as time lag and technological capability to industrial manufacturing
* 1967, the government of Romania decided to promote the industrial development of computers
  * A Governmental Committee for Computers and Data Processing
  * led by a vice prime-minister
  * first permanent secretary Prof. Mihai Draganescu
* National plan to introduce computers in the economy
  * A modern infrastructure of a computer industry
  * All research teams of the country were merged in 1968 in a computer R&D institute in Bucharest – ITC
    * branches in Timisoara and Cluj-Napoca
  * Victor Toma was appointed as the first scientific director
  * Manufacturing plants were set up: Computer Plant FCE, Peripheral Plant FEPER together with a service company IIRUC

Computer Industry in Romania

* 1970 Institute of Informatics ICI
  * promoting the introduction of computers in the Romanian economy
* Missions sent to USA, UK, France, Italy, Netherland and Japan
  * The approach was to build a national computer industry
* The final decision
  * license for a third generation computer from France
  * license for accounting machines from Frieden–Netherlands
  * license for calculating machines
  * continue search for peripheral equipment licenses (disk drives, magnetic tape memories, printers, etc.
* Romanian computers were performant, but:
  * developed in research laboratories
  * no experience for industrial production

Computer Industry in Romania

...uring License

* COCOM - transfer of technology to Eastern countries
  * Export of computers allowed
  * No export of subassemblies, parts and technology to manufacture computers
  * France, led at those times by General De Gaulle
  * out of military structure of NATO
  * upset by the non delivery of a supercomputer CDC 6600 to France
* Plan Calcul
  * CII – Compagnie Internationale pour L'Informatique
  * New third generation computer IRIS-50
  * manufacturing integrated circuits (Thompson CSF) peripherals (Sperac)

Computer Industry in Romania

License

* May 1968 General De Gaulle - state visit to Romania – agreed:
  * Manufacturing license IRIS-50
  * integrated circuit components plant
  * printed circuit board plant
* A very serious leap forward for the Romanian electronic industry
* Big national debate
  * Group, mostly industrialists, supported the license and the creation of an industry
  * Group, mostly economists, was in favor of importing IBM computers
  * End of the the crisis was settled by Ceausescu, who was in favor of an industry.
* Victor Toma was against IRIS-50 license and resigned in 1969 as R&D director of ITC
  * Wished the industrial reproduction of his CIFA computers
  * in his place was appointed the then young Vasile Baltac

Computer Industry in Romania

puter Family

* IRIS-50 renamed in Romania as FELIX C-256
  * C-256 was related to capacity of internal memory that was at IRIS 50 of 256 Kilobytes
  * Operating system was SIRIS 2
  * Production of Felix C-256 started in 1970
  * Total production of FELIX C-256 computers - probably 160
* ITC promoted the concept: buy a license and further develop it by your own R&D
  * Develop the license as a computer family
* First was a smaller member called FELIX C-32
  * New operating system developed including file manager and assembler
  * Production of C-32 started in 1972
* Next was a bigger member FELIX C-512/1024
  * New operating system fully developed in the country HELIOS
  * Upward compatibility for application programs
  * Production of C-512 started in 1975
  * 650 FELIX mainframes compatible IRIS were produced 1970-1990.
    * 11 were exported to P. R. China
* FELIX 5000 15 pieces were produced 1988-1990
  * developed in the country with an advanced hardware technology
  * new operating system HELIOS
* FELIX computers were not IBM compatible

Computer Industry in Romania

puter Family

* FELIX computers peripherals
  * Initially French Sperac disk drives
    * Sperac drives proved to be unreliable and were replaced by Control Data drives
  * Ampex core memories
  * Ampex tape memories
  * Control Data printers

* Technology for core memory manufacturing not in the license
  * COCOM regulations
  * Technology developed at ITC Timisoara Branch
  * Produced at the new Timisoara Electronic Memory Factory- FMECTC

* RCD peripherals
  * Control Data Corporation - CDC agreed to cooperate on peripheral equipment manufacturing
  * A joint venture company Rom Control Data – RCD was set up in 1973
    * Romanian partner keeping 55% of the shares
  * RCD initially produced disk drives, tape transports, drum printers, matrix printers, plotters, etc.
  * RCD was an elite member of the Romanian computer industry with high quality products

Computer Industry in Romania

mputers

* Two minicomputer families were developed in Romania: INDEPENDENT and CORAL
* The first minicomputer INDEPENDENT I-100 created by ITC was launched in 1977
  * occasion of centenary of Romania's independence as a state (1877-1977)
* A second national debate
  * the compatibility or no compatibility with a world recognized minicomputer
* INDEPENDENT -100 was made compatible with DEC PDP-11/34
* INDEPENDENT I-100 model was followed in 1979 by the more powerful I-102F.
* CORAL family was launched a few years later in 1979
  * different technology with more Western components
  * fully compatible with INDEPENDENT family
* INDEPENDENT and CORAL families
  * configured with Rom Control Data peripherals
  * quite competitive
* An estimated 4500 minicomputers of INDEPENDENT and CORAL families were produced
  * Exported in many countries: Czechoslovakia, East Germany, P. R. China, Middle East countries, etc.

Computer Industry in Romania
...ters & PCs

* 1974-1975 microcomputers and latter PCs started to be produced in Bucharest and Timisoara.
  * World pattern INTEL microprocessors.
* Statistics did not found
  * only FCE produced 52.000 pieces of M-8 to M-216.

Computer Industry in Romania

...nd application software

* The first generation computers CIFA-1, MECIPT-1, DACICC-1 and CIFA 101 programmed in machine code and not compatible among them
* The second generation-rudiments of operating systems and assemblers
* FELIX family used licensed operating system SIRIS -2, upgraded to SIRIS -3
* Beginning 1970 in ITC a software engineering concept
  * operating systems were developed in Bucharest, compilers in Cluj-Napoca and assemblers in Timisoara.
* DOS-C32 and DOS C-64 operating systems were developed for C-32 and C-64
* A new original operating systems for FELIX larger mainframes HELIOS was developed
* Two operating systems for minicomputers AMS and MINOS were developed in ITC
  * based on their DEC PDP and VAX models RSX and VMS

VM and SM EVM

* ***ES EVM***
* 1968 - Initiative to create a unified series of mainframes called ES EVM (Edinaya Sistema Electronnykh Vytchislitel'nykh Mashin – Unified series of Electronic Computing Machines).
  * computers compatible with IBM 360 series
  * without the approval of IBM
* Models were called Ryad (Series).
* Romania's participation was insignificant
  * FELIX computers were not compatible with IBM 360
  * Romanian delegations shown obvious reservation on any technical decisions
  * Details about IRIS-50 deal were not yet released
  * Romania already had taken the decision not to manufacture Ryad computers

* ***SM EVM***
* SM EVM (Systema Malyh Electronnykh Vytchislitel'nykh Mashin - System of Mini Computers)
  * compatible with DEC PDP-11 and VAX.
* Romania was quite active
* INDEPENDENT I-100 and I-102F
  * Internationally commissioned
  * Exported in many Eastern countries, except USSR

The Governmental Commission on Cooperation in Computer Technology (MPK po VT)

* International organization created in the 1970s to promote cooperation in the field of computer technology.
  * All COMECON countries and Cuba were members.

* Structure:
  * Council of Chief Designers for ES EVM
  * Council of Chief Designers for SM EVM
  * Council for Applications
  * Economic Council
  * Council for Service and Maintenance

* Coordination Centre
  * Set up in Moscow with representatives from all country members
  * The commission ceased its activity in 1990, but not officially all members left

Th[illegible]mental Commission on Cooperation [illegible]chnology (MPK po VT)

* Romania
  * not interested in ES EVM (Ryad) computers FELIX being not compatible with IBM.
  * participation in SM EVM was important with INDEPENDENT range very popular in Eastern Europe.
* The economic decisions were taken mostly by Soviet Union and were politically based
* Bulgaria was the great winner, being designated the main manufacturer of disk drives exported in large quantities
  * prices much higher than world prices
  * using higher prices than world prices was a more general practice in COMECON
* Due to Romania's independent political position in COMECON and Warsaw Pact, exports of Romanian computer products to USSR were under strict embargo

Industry post 1989

* Transition to market economy has completely changed the industry
* The 1980 decade marked by autarchy that damaged the computer industry
  * all western imports being forbidden by Ceausescu's decision
  * the presence in SM EVM preserved the links and the industry had still grown at a pace superior to other industries
* 1989 Romania had more than 100,000 trained IT people
* Now Romania is a major player in IT in Europe
  * specific brain drain
  * all major IT multinational being present in the country
* Romania had 1,4 Billions Euros exports of software and services in 2013
  * more than tourism

ter History Events

* ATIC – IT&C Association of Romania - active promoter of computer history
* By cooperation with IEEE the international award Computer Pioneer was given to Grigore C. Moisil
* Several conferences organized in cooperation with Romanian Academy
* ATIC awards were given on several occasions to computer pioneers
* One such award was given in cooperation with CEPIS to computer pioneer Kovacs Gyozo from Hungary

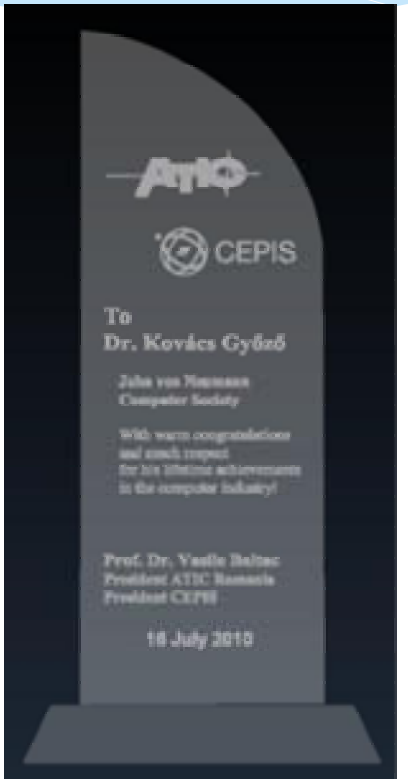


Figure 1 ATIC/CEPIS recognition of Kovacs Gyozo

Computer History Events

Anniversary

* A special celebration was organized in 2011 marking 50 years of MECIPT-1
  * a dedicated conference
  * commemorative plaque the building where MECIPT was built
  * meeting of veterans
  * a book

Figure 1 Participants to MECPT 50 years celebration in Timisoara 2011

Computer History Events

of MECIPT 1 and 2

* Banat Museum finished the restoration of some parts of MECIPT 1 and 2
* Opened a Computer History branch in Timisoara
* Special work at the Museum of Banat by a team lead by Maria Mitzu, expert in metal – ceramics restoration
  * cooperation with ATIC represented by Horia Gligor
  * The command desk two logical circuits with electronic tubes and the memory of magnetic roll have been restored and preserved.
  * The restoration continues

Thank you for attention!

Q&A?