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SCHOOL OF COMPUTER SCIENCE

The beginnings of the school of computer science in Wrocław University of Economics were naturally quite modest. In the '60s and '70s, within the Institute of Economic Quantitative Methods directed by Professor Z. Hellwig, functioned a research group of Organization and Mechanization of Accounting, led by H. Sobis. It contained a small team-researching data processing, directed by E. Niedzielska. The team began teaching on electronic calculation methods.

Further changes in the second half of the 70's resulted in the creation of an independent Institute of Computer Science, initially combining the interests in computer science and accounting. Since 1987 it has existed as the Institute of Economic Computer Science, consisting of four departments and a study. These are the Departments of: Theory of Computer Science, Organization and Application of Computer Science including the workroom on Designing and Programming of Information Systems, Computer Systems, and Engineering of Computer-Aided Management Information Systems.

Twenty years of development of computer science in Wrocław University of Economics has brought many significant achievements in research and its application. From the start they aimed it at the methodology of creating computerized management information systems and implementing computer technology in company accounting. The team developed the rudiments of analytical methodology and designing of information systems, and the theoretical results were presented in many academic papers, textbooks and monographs. The concepts of the systems design complying with Polish realities appeared in the collective works edited by Professor E. Niedzielska: *Designing Information Systems* (PWE, Warszawa 1997); *Computer Science. A Handbook for Economists* (PWE, Warszawa 1977). The team, directed by Professor A. Smoluk from the Department of Mathematics, prepared the first synthetic presentation of the issues of algorithmic languages. The team from the Department of Statistics, led by Professor W. Ostasiewicz published the paper

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on programming the computers ODRA 1300. The complimentary direction of the research was the monograph by Professor WUE A. Nowicki: *Modernization of the Information System in an Industrial Enterprise* (PWE, Warszawa 1979), which gave the basic research and analysis procedures – which are still valid.

At the same time research of the team under the direction of Professor Z. Hellwig was conducted which published two works on the subject of the possibilities of using computers in solving economic problems: *Automatic Data Processing* (PWE, Warszawa 1971), and *Computers and Their Application* (PWE, Warszawa 1975). Both were reprinted many times and enjoyed popularity among Polish computer specialists.

Besides the theoretical dissertations there also developed research, especially on the subjects commissioned by business organization from the region of Lower Silesia. There was also dynamic cooperation with the Science and Research Centres, developing the projects directed by Professors: Z. Hellwig, H. Sobis, E. Niedzielska and J. Ochman, which finally led to the establishment in 1975 of a group dealing with data bases. Its initiator and head was Dr. L. Maciaszek (now Associate Professor in Macquarie University in Sydney, Australia). The result of those studies was a dissertation by Professor E. Niedzielska (in 1978), which dealt with the conceptual and theoretical aspects of the functioning and development of the management information systems for business organization. At the same time there were also 12 doctoral dissertations written by members of the staff of the University and practitioners from economic and administrative areas. They presented solutions to problems related to methods, techniques and implementation of computer science and computerization of accounting systems in business and other institutions.

More significant research achievements of the Institute's staff were used in international contacts, especially within the framework of long-term contracts with such partners as: Technical University of Dresden, University of Economy in Prague and University of Economy in Berlin, Data Processing Centre in Berlin and Institute of Telecommunication in Prague. The main subjects of international co-operation were the issues on methodology of constructing information systems and the organization, technology and implementation of data bases, and selected problems of higher education.

The 1980's brought important changes to the scientific and research profile of the Institute. There was a continuation of the existing activity and introduction of new ones, especially those relating to management information systems. The main trends in research at that time were: data bases, office work automation, computerized costs accounting, automation and computerization of accounting systems, mini and micro-computer information systems. There was a productive effort of the team working on data base LABADA, originated

by Dr. J. Wojdyła. There were designs and the implementing of new packages of programming tools for a system called SKOT-HADES. The universal package for compression and de-compression of data, KOMPRES and package for formatting texts SKRYBA were prepared in 1983, the latter initiated by Professor WUE A. Małachowski, at the time working in the Science and Research Centre. Where also was completed the final work on the recognition of the RODAN system, directed by Dr. L. Maciaszek. The new field of research was the OSKAR system implemented in 1981, under the guidance of Dr. J. Korczak (at present Professor of The L. Pasteur University of Strasbourg, France). Professor A. Nowicki directed the work of an inter-departmental research team concerning the modernization of the information system in Zakłady Azotowe, Tarnów, from 1983 till 1987. Its results were fundamental for the preparation of the structural analysis of the information system methodics (so-called method ASIIO), which co-authors were Professor A. Małachowski, Dr. W. Domiński and Dr. M. Dyczkowski.

Apart from the strictly specialist research the Institute's two governmental programs were conducted, in connection with the modernization of the economic information system in KGHM-CUPRUM in Lubin (under the supervision of Professor J. Ochman) and resort program RI-14 dealing with computerization of universities of economics (under the supervision of Professor E. Niedzielska), as well as 45 projects for individual companies related to the automatization of office work and micro-computer information systems (directed by Professors J. Ochman, H. Sobis, J. Korczak). The latter was the author of the conversational programs of teaching computer science, accounting and sociology using the systems JS EMC, R-32, SM-4, Elwro 523 and Lidia. Those programs enabled the individualization of the teaching process, enriching its contents and increasing its didactic effectiveness. Their packages were presented at the international work seminar in Budapest in 1982.

The publication of two volumes of collective works edited by Professor E. Niedzielska: *Technology of Data Processing* (PWE, Warszawa 1985); *Technology of Conversational Data Processing* (PWE, Warszawa 1987), was of great scientific importance. Both presented the methods and techniques connected with technology of industrial data processing for economic needs, and showed new program approaches and structures of data bases. The natural continuation of those efforts was the obtaining of several doctorates and higher academic degrees by the Institute's staff based on the subject of economic computer science. The subject of the dissertations qualifying for associate Professorship was catalogs for large text data base (Korczak 1985) and the problems of integration in the accounting information systems (Ochman 1986).

The second half of 1980's marked an intensive research development in the University's computer science. In 1987 the department directed by Professor

J. Ochman commenced work on the micro-computer accounting system using IBM and Elwro 801 AT within the central program related to the computerization of company accounting. Its result was the preparing of five integrated packages, later implemented in a few hundred companies. Professor A. Baborski directed in 1990 the preparation of the modular software for the Local Micro-computer Network for Accounting (LSMR), allowing of composite running of accounts of small and medium-size companies.

In 1990 there was a thorough verification of the issues contained in the Institute's research work, conducted by the team of Professors WUE: A. Nowicki (head of the project), A. Małachowski, J. Sobieska-Karpińska, and Dr. M. Owoc. They prepared the basis of the new directions of research, widely discussed in various academic centres of economics, including conferences in Julin in 1990 and Łódź-Rogi in 1991. The research was to concentrate on the so far neglected issues of languages and methods of programming, artificial intelligence and knowledge data bases, complex management systems and the wide area networks. Some of those problems were solved during the realization of resort grants, specialist projects and own research.

We should mention here some of the studies:

1. Computerization of Didactic and Scientific Research; resort program RR I. 14, directed by Professor J. Ochman, 1990.

2. The System of Assisted Teaching of the Language Prolog; resort program RRI. 14, directed by Professor A. Baborski, 1990.

3. Modeling Data Base for the Computerized Accounting System, a KBN grant, directed by Professor J. Ochman 1990-1993, presented during the international fair INFOSYSTEM in Poznań in 1994.

4. Computer-Aided Evaluation of Effectiveness of a Management System, directed by Professor A. Baborski 1991-1994, based on the grant for 'System of Financial Analysis', presented during INFOSYSTEM in 1994.

During 1991-1994 the department, run by Professor J. Ochman, conducted the research projects connected with computerization of accounting in several companies, e.g. ZGM (copper) in Lubin, FMG (mining equipment) in Zgorzelec, FMS (man-made fibres) in Jelenia Góra, POLAM in Mysłakowice, power plant in Rybnik, HERBAPOL and POLAR in Wrocław.

Since 1993 the departmental team led by Professor A. Nowicki has been working in co-operation with partners from Albania, Bulgaria, Romania, Italy and the UK on two projects, ETCETERA and HANNIBAL, financed by the European Fund COPERNICUS. The aim of this project is to compile a specialist system of international exchange of economic information using Internet.

All the departments of the Institute conducted their own research financed by the budget of Ministry of Education, in the years 1989-1992.

They researched several subjects dealing with standardization of the application systems, automatization of office work, tool packages, accounting information systems for universities and the information and decision- making systems.

The team directed by Professor Z. Hellwig has many achievements in the field of languages and methods of programming. Among them are the following publications A. Gospodarowicz: *Introduction to Programming in Pascal* (PWE, Warszawa 1989): *Programming in Module-2* (AE, Wrocław 1992); *DOS and UNIX Operating Systems* (AE, Wrocław 1994) and edited by him – *Banking Information Systems* (AE, Wrocław 1996).

As a result of intensive activities, in research and its application, many doctoral dissertations were introduced, with subjects ranging from modeling and realization of the management information systems in business, presentation of the economic applications of expert systems, to theory and applications of data bases and knowledge bases. There were also further dissertations dealing with the issues of perfecting the information system in the process, model and application approaches (A. Nowicki 1988), programming the development of tele-information services (J. Sobieska-Karpińska 1989) and the diagnostics of text data in the management information systems (A. Małachowski 1990).

Several monographs were published: J. Wojdyła: *Compression of Data in Information Systems* (PWE, Warszawa 1988); J. Ochman: *Integration in Management Information Systems* (PWN, Warszawa 1982); B. Łukasik-Makowska: *Duplicable Information Systems – Standardization, Verification and Implementation* (PWE, Warszawa 1992). Also collective textbooks were published: *Organization and Using of the Computerized Data Processing System* (H. Sobis, ed., PWE, Warszawa 1989); *Introduction to Computer Science* (E. Niedzielska, ed., PWE, Warszawa 1989); *Microcomputers in Financial Accounting* (J. Ochman ed., PWE, Warszawa 1991); *Designing Information Systems* (E. Niedzielska and M. Skwarnik, ed., PWE, Warszawa 1993); *Effective Management and Artificial Intelligence (*A. Baborski, ed., AE, Wrocław 1994).

In the 1990's a team directed by Professor E. Niedzielska and Professor A. Małachowski commenced intensive research in the fields of systems and technology of economic communication. Its result was a cycle of monothematic publications: A. Małachowski, E. Niedzielska: *An Outline of Technology in Economic Communication* (AE, Wrocław 1994); *Technological and Applied identification of Media in Economic Communication* (E. Niedzielska, ed., AE, Wrocław 1996); *Technological and Applied Identification of Media in Economic Communication: New Research Trends* (A. Małachowski, ed., AE, Wrocław 1996; *Methodology of Creating the Object Systems of Economic Communication* (A. Małachowski, ed., AE, Wrocław 1997).

In the whole period of development of economic computer science in the Wrocław University of Economics, 600 articles have appeared in print, the majority of which in dissertations and specialist publications our in University and other universities. Also several papers and announcements were published and presented during national and international conferences organized in Poland like, for example: INFOGRYF, INFRA, SPIS, ISD, HIS. The research results in computer science were also presented abroad during conferences organized in Austria, Belgium, Belarus, Czechoslovakia, France, Ireland, Germany, Slovenia, in the UK and the US.

This article, in a very brief form, presents the general achievements of the research and didactic and organization of the school of computer science in the Wrocław University of Economics, entering its third successful decade.