

Jana Zvárová – A Distinguished Personality of Medical Informatics

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1 Introduction

The history of science has shown that the development of any field is the result of many researchers' efforts, some of whom put a specific footprint on certain important aspects in some stages of the field's development. When we think of Jana Zvárová, we have first to reveal her efforts in promoting the field of medical informatics, while this field was still seeking its proper definition, and mainly to underline her role in favouring and supporting direct contacts and collaborations between the scientists, in the political context of a Europe still politically divided into "East and West" [1].

This biographical paper tries not only to recall Jana Zvárová's sustained scientific activity but also intended to evoke her remarkable personality.

2 Early Work: Studies and Scientific Pursuits

Jana Zvárová was born in 1943 in Prague, Czechoslovakia. She received her degree in mathematics, graduating the Faculty of Mathematics and Physics of the Charles University in Prague. Working after graduation with the Faculty of Paediatrics, she took contact with the complexity of medical data, deciding to approach the interdisciplinary area at the intersection of mathematics and biomedical sciences. She started her PhD studies in 1967 under the supervision of Prof. Dr. Albert Perez, member of IFIP, who brought her attention to the field of medical informatics and opened the contacts with founders of IMIA [2]. A unique chance to continue her PhD studies at Medical Faculty of the University of Edinburgh gave her an integrative vision upon the great potential of medical data analysis and new knowledge on practice of medical computing. She realized that medical applications of statistical methods will be among the first applications of computers in medical research, initiating in 1978 the medical informatics section within the Czech Society of Biomedical Engineering, one of the societies of the Czech Association of Medical Societies of J.E.Purkyně.

In 1983, in the light of a slight political relaxation, with the support of Jan Roukens, Jana Zvárová managed to attend MEDINFO 83 in Amsterdam, IMIA's tri-annual World Conference on Medical Informatics, foreseeing the importance of direct communication between scientists and the true role of scientific meetings for establishing durable collaborations. Thus, she participated in the 6th COMPSTAT Conference [3], organized in 1984 in Prague by International Association for Statistical Computing – IASC [4] for the first time in Eastern Europe.

Previous contacts and favourable circumstances of the period allowed for the organization of a working conference in Prague in 1985 under the auspices of International Medical Informatics Association (IMIA, a special interest group of the International Federation for Information Processing (IFIP), to which Jana Zvárová paid her due attention. The topic of the conference – computer-aided medical decision – remained her beloved subject throughout her life. She requested François Grémy and Jan van Bommel to chair this four-day meeting. An important book from North-Holland Publishing Company was the result of this conference, the first one of that kind in the communist world [5, 6]. This conference played an important role in the history of European medical informatics, as nicely described by van Bommel, Ball & Hasman: "Since that time, Jana organized many meetings and projects herself, in close collaboration with several colleagues from abroad. During the past years, we have learned to know many active members in IMIA and EFMI; all of them were active and energetic, but hardly any of them could be compared with Jana Zvárová, whose creativity and endeavours were far beyond those of all others" [6].

Despite all difficulties, specific for East European countries before the collapse of communism in 1989, Jana Zvárová worked hard for pursuing her scientific goals, coordinating research projects or organizing and attending local or international conferences. She paid a special attention to educational issues [7], a preoccupation which she continued for more decades.

As a result of her proposal, the Czech Society of Biomedical Engineering and Medical Informatics joined both the European Federation for Medical Informatics (EFMI) [8] and the International Medical Informatics Association (IMIA) [9], having Jana Zvárová as representative in both organizations.

3 Ascension Period

The years after the “velvet revolution” in 1989 in Czechoslovakia offered better conditions for plenary assertion of work potential and scientific career of Jana Zvárová: she received her State Doctorate Charles University in 1991 and the position of full professor, the title being handed to her by the then president Václav Havel; in the same year she also obtained the highest Czech title of Doctor in Sciences of the Academy of Sciences of Czech Republic [2, 6].

An important achievement of Jana Zvárová came from the European project “Education in the Methodology Field of Healthcare” – the creation in 1994 of the EuroMISE Centre for Education in Medical Informatics, Statistics and Epidemiology, of Charles University and Czech Academy of Medical Sciences. EuroMISE aimed to offer educational programs in a broad European co-operation focusing on teaching teachers and health professionals from Central and Eastern European countries [10, 11]. The activities of this centre received a strong support from EFMI members and also other outstanding professors and scientists: Jan H. van Bommel, Arie Hasman, Rolf Engelbrecht, Reinhold Haux, Bernard Richards, Hartmut Dickhaus, Bernd Blobel, etc. It was functional several years even after the official end of the project; more than 150 participants have attended these courses [12, 13].

Three other European projects have synergistically completed her scientific activities: MUM, TripleC and MGT.

MUM (Managing Uncertainty in Medicine, 1994 – 1996) aspired to incorporate logical approaches probability methods into diagnostic knowledge-based systems and to gain practical experience in the field of medical data analysis and knowledge processing by introducing software tools in selected medical health care facilities.

TripleC was a continuation of I4C project (Integration and Communication for the Continuity of Cardiac Care 1998-2000). The scope was to develop methods for designing the ORCA (Open Record for Care) Electronic Health Record (EHR) applied to cardiology. First structured EHR in Czech and Slovak languages were created allowing systems interoperability. The results of this project were further developed in the EuroMISE Centre. A Minimum Data Model of a Cardiology Patient was also proposed, along with a voice-recognition component of an EHR used in dental medicine - DentCross.

The objective of MGT (Medical Guideline Technology, 1998-2000) was to develop computerized tools providing patient-specific practice guidelines; three main applications were created

in the domain of hypertension and cardiology by countries that differed in their health care systems. Results were validated in co-operation with the Municipal Hospital in Čáslav.

4 Full Affirmation Period

The intense activity involved in these projects and the numerous co-payments that have taken place within them have elevated Jana Zvárová among the most dynamic and well-known researchers in medical informatics, both nationally and internationally.

Together with Štěpán Svačina they set up the Scientific Board of Biomedical Informatics, chaired by Jana Zvárová, as a result of cooperation agreement between Charles University and the Czech Academy of Sciences. This action has been followed by the foundation of the Centre for Biomedical Informatics (CBI) in 2006. Under the directorship of Jana Zvárová CBI gathered about eighty personnel, highly qualified, forming a strong multidisciplinary team. As a national research centre and joint work environment, CBI aimed to coordinate advanced studies in genetic aid for the diagnosis and prognosis of cardiovascular diseases as well as decision support systems for personalized healthcare with applications in cardiology and dental care. It also contributed to the enhancement of the quality of PhD programs in biomedical informatics. Unfortunately, despite the very good results, CBI's activities have been terminated in 2011 due to some bureaucratic reasons.

An important part of her work was represented by publication activities which comprise 10 monographs, 3 patents and over 300 articles in peer-reviewed journals, cumulating over 600 citations [2]. An appreciated outcome in this direction was the publication of the European Journal of Biomedical Informatics, EJBI [14], whose Editor in Chief she was since 2005, and which is one of the EFMI endorsed journals. By that time the evolution of technologies and strategies concerning publication activities became the object of an EFMI Task Force in which Jana Zvárová played an important role [15].

She delivered several invited lectures at national and international meetings, acting in scientific program committees and conducting significant peer reviewing for conferences and journals, serving also in the board or editorial committees of different professional journals. For her expertise she also was asked several times by the European Commission and Czech governmental institutions in project evaluation activities [2].

Her rich experience has been revealed once again at the unforgettable EFMI Special Topic Conference “Data and Knowledge for Medical Decision Support”, organized by her in Prague in the spring of 2013. The program comprised

a synergic mix of her beloved previous topics, approached in a modern manner, strengthened also by prestigious outstanding keynote speakers – Jan van Bommel and Marion Ball [16]. The large audience attended with interest also the panel on History of European Medical Informatics [17], an avant-premiere event to mark four decades of EFMI activities.

She has never relinquished the idea that the education of new generations of specialists should be an important task of all scientists, continuing to develop the methodologies for education and training in medical informatics [18]. In the same direction is her initiative to edit an accessible journal (both in English and Czech language) – International Journal on Biomedicine and Healthcare, published since 2013 and having Jana Zvárová as Editor in Chief [19].

Likewise, for facilitating a more intensive cooperation among teachers and researches in the field of medical informatics, the EuroMISE Mentor Association was founded in 2014, focusing mainly on mentoring activities in the field of biomedical informatics and biomedical informatics research. EuroMISE Mentor Association, EMA, is closely cooperating with Czech Society of Biomedical Engineering and Medical Informatics.

5 Recognition of the Professional Prestige of Jana Zvárová

Jana Zvárová was a modest person, never hunting titles, prizes or positions. Nevertheless, her professional competence was unanimously recognized, both in her country and abroad. She was a member of the Board of the Czech Society for Biomedical Engineering and Medical Informatics for a long period of time, head of the Biomedical Informatics Section of the Society, member of the group for electronic healthcare of Czech Medical Association J.E. Purkyně, member of Czech Society for Cybernetics and Informatics and member of Czech Statistical Society.

Jana Zvárová's scientific reputation was awarded by several distinctions and honorary titles [2]: Honorary Membership of Romanian Society of Medical Informatics (1997), Medal of Erasmus University Rotterdam Department of Medical Informatics (1998), Honorary Membership in the Foundation Grigore C. Moisil for Applied Informatics (1999), University medal of University for Health Informatics and Technology Tyrol (2004), Honorary Membership in the Czech Society of Biomedical Engineering and Medical Informatics (2004), Medal of Charles University, Faculty of Science (2005), Medal of Charles University 1st Faculty of Medicine (2008), Honorary Membership in the Society for Cybernetics and Informatics (2010).

A special attention was paid by Jana Zvárová to her role within EFMI and IMIA, showing a deep feeling of her responsibilities as a national representative. She not only participated in almost all the conferences organized by EFMI and IMIA but has always supported the participation of her co-nationals, especially her young collaborators, initiating them in international cooperation.

Her position in EFMI Council Meetings or IMIA General Assemblies was always well balanced and realistic, gaining the support of the whole audience. In 2015, as a recognition of her professional merits and excellent activities, she was awarded the honorary title of "EFMI Fellow" [8] and in 2017 she was elected as member of International Academy of Health Informatics Sciences (IAHSI).

6 Personality of Jana Zvárová

The enumeration of achievements, papers, projects, titles or honours would remain a simple list of facts unless revealing the remarkable personality of Jana Zvárová and also understanding the tempestuous socio-political context of the period in which she worked. The friendly atmosphere in EFMI let us know better one another, understand, support and help whenever possible. That is why in this section she will be simply referred "Jana".

Jana was a tenacious person, following patiently her scientific goals. With a solid mathematical background, her first contact with the complexity of medical data opened her desire to deepen the data processing field applied in biomedicine and healthcare, a direction which she perseveringly followed all her life. Her scientific goal was "to try to use methods from mathematical statistics and information theory to solve medical problems, e.g. in cardiology, gynaecology, obstetrics, rheumatology, dentistry, epidemiology and public health" [20]. She had the chance to be initiated in information theory by Albert Perez, then to go for PhD studies to Edinburgh where she not only learned many new approaches and ideas on medical data analysis and computing, but also enjoined having fruitful discussions with her colleagues. Unfortunately, due to the political changes in Czechoslovakia in 1968 she had to interrupt her PhD stage and return back home. Starting to work at the Institute of Haematology and Blood Transfusion she joined a group of young researchers in biocybernetics; they became more aware about the increasing role of computers in medical information processing, particularly in medical decision making. But, due to the contacts with IFIP-TC4, this group was going to receive another blow, being perceived as unacceptable for political leaders at this time for their open minded opinions and was dissolved in 1976 [20].

Jana always struggled for a good and close collaboration between the scientists [12, 13]. The experiences she had at the beginning of her scientific career have led her to decide to fight against any type of discrimination or isolation. And, when the opportunities have occurred, she put these ideas in practice. Having a strong support from Jan van Bommel, François Grémy and other IMIA leaders, she organized a series of conferences in Prague, starting with the memorable conference in 1985 [5]. This conference was a real success, representing a milestone in European medical informatics.

Indeed, the strategic position of Prague, in Central Europe, easily accessible from Western Europe countries, but within the Eastern block, allowed in some cases also participation of people from communist countries. She continued to follow this credo also after the big political changes in Eastern Europe in 1989. Thus, the most successful of her projects – EuroMISE – became a flagship of cooperative actions in Europe since 1994, followed recently by EMA – EuroMISE Mentor Association, oriented also towards a closer cooperation among teachers and researches in the field of medical informatics.

Jana was a school creator, raising educational activities at highest levels [7, 10, 18]. Since joining Charles University, she has given great importance to educational tasks. She was confident that the scientific progress cannot be imagined without preparing new generations of highly skilled professionals. The creation of EuroMISE as well as the organization of several seminars, workshops and conferences fits this view. She was always surrounded by several young collaborators when attending international conferences.

Shortly before her death she planned to publish a special issue on Women in Health Informatics in the International Journal on Biomedicine and Healthcare, co-edited together with Pirkko Nykanen and Dianne Whitehouse [19, 21]. This issue appeared

in December 2017, and many of the international medical informatics female professionals were invited by her to make a contribution.

She was a conscientious and modest person, honest, perseverant, always ready to engage in voluntary activities within EFMI and IMIA, with good spirit of initiative, skilful leader, excellent organizer, respected by her colleagues for her competence and her outstanding merits. More details about her scientific work are available on professional websites [22].

Finally, as described by van Bommel, Ball & Hasman [6]: *“Not only was Jana a professional of the first order, she also was a devoted wife and mother having raised very successful children and being a role model for women in the field of Health Informatics internationally”.*

Her passing away shocked the entire medical informatics community, her activity and personality being evoked by several colleagues and friends [2, 6, 8, 9, 21].

Through her work, her life and her example, Jana Zvárová has earned a well-deserved place in the world pantheon of medical informatics. We will always remember her!

7 Photo Gallery



Figure 1. Jana Zvárová



Figure 2. Shigekotu Kaihara, Jana Zvárová, François Grémy and Jan H. van Bommel.



Figure 3. Albert Perez, Jan H. van Bommel, Jana Zvárová, Leodegar Cigánek and Jan Münz members of the committees of the first IMIA conference in Prague 1985.



Figure 4. Diane Whitehouse, Izet Masic, Arie Hasman, Casimir Kulikowski, Jana Zvarova, George Mihalas (chair), Marion Ball and Jan van Bommel in Prague, April 2013, as panelists about Medical informatics history (from left to right).



Figure 5. Invited speakers at IJM EuroMISE: Arie Hasman, Jana Zvarova, Rolf Engelbrecht, Pirkko Nykanen, William Edward Hammond, Lenka Lhotska, Bernd Blobel and Izet Masic (from left to right).

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