Teaching historical truth:

Pages from the history of Russian computer science

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Abstract: The history of computing is an important part of teacher education. Special problems appear if the question concerns the countries of Central and Eastern Europe. Until recently, the historical truth in this region has been suppressed and misrepresented.

In this paper, some activities are reported, which are aimed at exploring, publishing, and teaching about this interesting and contradictory subject. Several examples are given from the history of computer science in Russia.

Key words: teacher education, history of computing, CEE countries, ethical issues

1. HISTORY OF COMPUTER SCIENCE: WEST AND EAST

The history of computer science, like the history of any other science, is an important and inseparable part of this science. During previous years the teaching of the history of computer science (ICT) was introduced into the computing curriculum of many Western universities. A special IFIP Joint Task Group published a comprehensive report containing a number of valuable methodological instructions (Impagliazzo, Campbell-Kelly, Davies, Lee and Williams, 1999).

The first steps in teaching the history of ICT were taken at the same time in Russia (Fet, 1998). In fact, historical events and achievements in Russia and other countries of Central and Eastern Europe have never been considered in the context of world ICT history. Meanwhile, they constitute an important part of this history.

In 1996, the IEEE Computer Society, in connection with the 50th anniversary of its founding, presented the Computer Pioneer Award to 16

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scientists from CEE countries, including two distinguished Russian scientists, Sergey Lebedev, who 'designed and constructed the first computer in the Soviet Union and founded the Soviet computer industry', and Aleksey Lyapunov, who 'developed the first theory of operator methods for abstract programming and founded Soviet cybernetics and programming' (IEEE Computer, 1998; IEE Annals of the History of Computing, 1999).

Of course, this reward recognised the important contribution of scientists and engineers from Central and Eastern Europe who played a significant role. However, in our opinion, it was just the first step in exploring and publishing this contradictory history which is of particular interest. It can serve a critical lesson to teachers and students who should learn the truth about suppressing an understanding of cybernetics and other advanced modern sciences behind the 'iron curtain'.

What can be done today in order to make familiar to the world computer community the true history of computer science in CEE countries? Recently, a special group of Russian experts started their investigations in this field. The first result of their efforts was the book 'Essays on the History of computer science in Russia' (Pospelov and Fet, 1998) published in 1998 in Novosibirsk, Russia. In contrast to historical and biographical writings reflecting to a great extent the personal views of their authors, this book is built completely on the basis of authentic documents of the epoch. This book was welcomed by the public and the press. Thus, the leading Russian academic journal on the history of science 'Problems of the History of Science and Technology' published a review written by Professor Sergey Demidov, a well-known expert in the history of science (Demidov, 2000). We would like to cite here a fragment from this review:

"The book is, in a sense, of the same significance as the archive of the history of quantum mechanics, created according to Kuhn's project. The necessity of creating special archives of documents, reflecting the events of modern history of native science has been long discussed. Such documents may include letters, diaries, manuscripts of scientific works, rough copies, memoirs, photos; and, what is important, some materials should be created deliberately, for example by tape-recording of special interviews with direct participants of the events, as it was done by T. Kuhn, and is done now by American historians of physics or French historians of mathematics, creating Burbaki's archive... The book, which is the subject of the review, can be the first step on creating such a centre of collecting information in Novosibirsk and on investigations into the history of cybernetics (or computer science) in our country."

The book, (Pospelov and Fet, 1998), was followed by other collections (Liyapunova and Fet, 2001; Pospelov and Fet, 2001; Kantorovich, Kutateladze and Fet, 2002). All these books are in Russian. However, one

may easily get some acquaintance with them as each book has an English foreword and contents.

The work of the Russian group is still in progress. We have now prepared a prospective plan entitled "Book series History of computer science" containing not only the new, original books but also translations of the best of previously published Russian books into English as well as translations of selected Western monographs into Russian.

As far as we know, active work in this field has not been carried on in other CEE countries. To stimulate the investigation of the national history of computer science, the specialists of several CEE countries attending the IST'2001 Conference in Düsseldorf (December, 2001) agreed to establish an Initiative Group on the history of computer science. They have prepared a corresponding memorandum proclaiming in particular:

"We consider it necessary to combine the efforts of scientists of our countries interested in the history of computer science, to extend the sphere of investigations, and to publish in 2003 a representative book series on the true history of this science in CEE countries. These books will be dedicated to the centenary of John von Neumann."

Members of the Initiative Group appeal to specialists of different countries calling for subscription to the memorandum in order to promote the important and honest cause of studying and teaching the true history of computer science in CEE countries.

2. SOME STORIES FROM THE PAST

2.1 Cybernetics as a "pseudo-science"

The history of Soviet science is a very sad history. This is especially true for cybernetics.

The Soviet rulers commanding the country and its science suppressed any creative undertaking, and every new idea which did not correspond to their understanding of 'purity' of official Soviet ideology. Cybernetics in the USSR shared the 'place of honour' with the sciences of biology and genetics.

In the beginning of the 1950s, a few copies of Norbert Wiener's 'Cybernetics' penetrated through the 'iron curtain' into the Soviet Union under a ban. The mass media and official ideological editions vilified cybernetics.

Thus, in 1953, the leading Soviet ideological journal 'Problems of Philosophy' published a notorious article 'In whose service is cybernetics?'. The author wrote, in particular: "The theory of cybernetics ... is a sterile

flower of the tree of knowledge ...”, “The imperialists are unable to resolve the contradictions splitting the capitalists’ world. In the depth of their despair they resort to the help of pseudo-sciences giving them some shadow of expectation to survive”.

In the article ‘Cybernetics’ of the 4th edition (1954) of the ‘Concise Dictionary of Philosophy’ this science was defined as a ‘reactionary pseudo-science’, a ‘kind of modern mechanism’.

One can easily imagine what it meant to defend and disseminate a ‘reactionary pseudo-science’ at those times in the Soviet Union! Nevertheless, the best Russian scientists of those times like Alexey Lyapunov, Leonid Kantorovich, Axel Berg, and Andrey Kolmogorov stood up in defence of the newborn science. Because of their common efforts and fearless struggle, cybernetics, and later computer science, acquired a proper standing in Russia.

Professor Alexey Lyapunov (1911-1973) occupies a particular place in connection with the activities of defending cybernetics and genetics. In those hard years, when cybernetics was suppressed in the USSR, Professor Lyapunov, in the 1954/1955 academic year, organised at Moscow University a seminar on cybernetics. This seminar attracted, from the very beginning, great attention of different specialists and developed into an all-Moscow, and even into an all-Union event. He invited work from young scientists in this seminar and for them as well as prominent Soviet scientists to present lectures, and sometimes even foreign guests. Over ten years (1954-1964) a total of 121 sessions of this famous ‘Big’ Lyapunov’s seminar were held.

In 1955, Alexey Lyapunov (together with Sergey Sobolev and Anatoly Kitov) published in the same journal ‘Problems of Philosophy’ the first officially permitted positive article on cybernetics entitled ‘Essential Aspects of Cybernetics’. Actually, this publication marked the beginning of the early period of cybernetics in the USSR.

In 1958, Lyapunov initiated the world-wide recognised series of scientific publications ‘Problems of Cybernetics’ as editor-in chief. A total of 41 issues were published during the period 1958-1984.

2.2 Struggle for recognition of cybernetic approach in economics

The name of Leonid Kantorovich, his life, his role in science, and his struggle for his ideas, occupy a special position in the history of science of the 20th century. The mathematical investigations of Kantorovich formed a basis for new important directions in mathematics. At the same time, he is rightfully considered one of the founders of modern mathematical economics, the kernel of which is linear programming. It was a new concept

of economical cybernetics which was highly important because it allowed economics to transform into an objective science, thus ensuring most efficient results of economic activity.

In 1939 Leonid Kantorovich published a small brochure 'Mathematical Methods of Organizing and Planning Production' containing the discovery of linear programming, a new scientific direction which had an enormous influence on the development of economic science. This fundamental work of Kantorovich gave, for the first time, a mathematical statement about economic problems of planning and suggested efficient methods for their solution.

The new, truly scientific approach to economics suggested by Kantorovich was incompatible with official Soviet ideology. The manuscript of his famous book 'Calculation of the Best Use of Resources' was written, in general, at the beginning of the 1940s, while it was not published until 1959.

In 1960, the editor-in-chief of the journal 'Problems of Economics', L. Gatovsky, published in the journal 'Communist' (1960, No.15, pp. 79-90) a paper 'On the Principal Basis of Economic Research', which contradicted Kantorovich and was written in the style of a real denouncement in the spirit of 1937.

For a long time, Kantorovich's discovery of linear programming had remained unknown to the West. At the end of the 1940s, similar approaches to optimisation have been independently proposed in the USA. In 1975, the Nobel Committee awarded the Nobel Prize in economics jointly to Leonid Kantorovich and Tjalling Koopmans (USA) thus recognising the outstanding achievements and independent contributions of the scientists of both countries.

For most of his life Leonid Kantorovich was devoted to the democratisation of economics in his country, to the application of advanced science for the welfare of mankind.

In fact, Kantorovich's archives contain a number of his manuscripts written in the 1940s and 1950s which were not published since they remained for many years in the editorial offices of different Soviet journals. A recently published book (Kantorovich, Kutateladze and Fet, 2002) presents the mentioned papers as well as other unique archive materials. People should know the truth about the fates of essentially the same discoveries in two countries with opposite social systems.

2.3 Copying the IBM Series/360: a fatal blow to the Russian computer industry

The creation of electronic computing machinery in Russia is connected, first and foremost, with the name of Sergey Lebedev (1902–1974). Being a specialist in electrical engineering, Lebedev began, at the end of the 1940s, to build digital electronic computers. These secret investigations were carried out in Kiev (Ukraine) where Lebedev was at that time the head of the Institute of Electric Technology.

The first operating computer of Lebedev was called MESM (Russian abbreviation for ‘Small Electronic Calculating Machine’) and was installed and accepted as a production model in 1951. After the successful development of MESM, Sergey Lebedev was invited to Moscow, to the recently established USSR Academy of Sciences’ research institute called ITMVT (from the Russian ‘Institute of Precise Mechanics and Computing Technology’). He became first the head of a laboratory, and then (from 1953) the director of this institute. The well-known family of computers developed in ITMVT and launched into production under Lebedev’s guidance had a common name BESM (from Russian ‘Large Electronic Calculating Machine’).

The summit of the achievements of Lebedev and his group of designers was the BESM-6. This machine surpassed in performance any previous Soviet computer. It had new advanced structure and many other principles anticipating important features which are considered compulsory in modern computing systems.

In the 1950s and 1960s, many other original projects in the field of computer technology were started in the Soviet Union. This work was carried out in different scientific institutes as well as in industrial organisations. These projects were to become the basis of successful and independent developments of new generations of efficient domestic computers.

Unfortunately, in 1969, during the transition to the third generation of compatible machines, the Soviet authorities thrust forward with their decision to copy the IBM Series/360 computers. It was a tragic event in the history of computing in Russia. Reproducing American computers involved an enormous waste of money. Moreover, all original investigations and developments in the computer field were closed in the Soviet Union. Thus, the Soviet command and administrative system brought about a fatal blow to Russian science and Russian society.

3. CONCLUSION

This paper emphasises the importance of investigating, publishing and teaching the true history of information and communication technologies.

It observes that until recent time the history of information and communication technologies and computer science in the countries of Central and Eastern Europe was insufficiently studied.

Several events from the history of computer science and computer technology in Russia are discussed, which deserve unbiased exploration and publication.

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BIOGRAPHY

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