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# Twentieth Anniversary of the Russian Virtual Museum of Computing and Information Technology History

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**Abstract.** In 2018, the Russian Virtual Computer Museum (RVCM, [www.computer-museum.ru](http://www.computer-museum.ru)), created on the Internet by Edward Proydakov, celebrated its twentieth anniversary. Over the past two decades of its existence, the RVCM (also VCM) has taken its rightful place in the historical section of the Russian and the world's Internet. The popularity of RVCM in the worldwide **Internet** space is ensured by its English-language version, functioning in parallel with its Russian-language version and providing accessibility for foreign guests. Every day, various sections of the RVCM are visited on an average by two thousand people. A large collection of books, documents and articles related to computer science subjects is stored in digitized form in RVCM. Currently, RVCM on the history of Soviet computers and computer science is the largest computer museum in the world. This article reveals the very existence of RVCM and its main features to the computer community. On the one hand, the advantages of RVCM compared to other computer museums on the Internet are shown. Analysis of its content is done in the article, and some shortcomings of the RVCM are identified and ways to improve its structure are outlined.

**Keywords:** Computer Museum • History of Information Technologies • History of Software Development • History of Management Information Systems • Russian Virtual Computer Museum (RVCM).

## 1 Introduction

In the second half of the twentieth century, electronic computers of the industrially advanced countries were mainly implemented for solving military-oriented mathematical problems, connected with the development of new weapons and command organization of various armed forces branches. Creation of computer-based information retrieval and data storage systems for making optimized managing decisions became the subject of special scientific research interest at numerous centers both in the USSR and in the USA with its NATO partners. Quite naturally, numerous theoretical and applied works aimed at the computer software and technical complex improvement were strictly classified. Most of that development was assigned the status of high secrecy [1, 2, 3, 4].

The history of the development of Soviet computers and their usage in solving problems of “atom and rocket shield” creation, which provided the Soviet Union military parity with the United States, is very rich. It is clear that the current publication of

numerous, formerly classified materials and documents related to the development of Soviet military computers and computer systems could not take place in earlier years. As soon as the formerly classified, secret documents are openly published, they immediately become a research subject for historians of information and computer technologies. One should equally mention the damages caused to the archives of scientific centers and industrial computer enterprises in the 1990s during the changing of the national economy to capitalist development and, connected with that, transformations of the state-owned companies and enterprises. Those processes resulted in total destruction of many historical artifacts, which otherwise could have found proper places in RVCМ.

That is why our researchers and historians often have to perform time- and power-consuming work (sometimes almost detective work) for restoring some of many successful computer projects of the USSR time.

The Virtual Computer Museum ([www.computer.museum.ru](http://www.computer.museum.ru) – BKM in Russian) occupies unique place among dozens of Russian computer museums, both real and virtual.

## 2 First Steps of the RVCМ

The first proposal for organizing the RVCМ was made on 30 September 1997, when Edward Proydakov, the chief editor of Russian weekly *PCWeek-RE*, published his article “Let’s Create a Museum” [5]. Proydakov described the necessity of collecting “traces of outgoing computer generations” and, therefore, of founding a special Russian Virtual Computer Museum (RVCМ). The first efforts were made in 1998. However, as there were not many volunteers to immediately join the project, the main work had to be done by the author of the idea himself (nothing unusual). Therefore, establishing the RVCМ Council (see Fig. 1) was the first important thing to do. Finally, a number of famous Soviet computer designers supported the idea and entered the council. Dr. V. V. Przhijalkovskiy, the first chairman of the Council, and his deputy, Dr. E. N. Filinov, initiated and headed the work on defining the structure of RVCМ and preparing the first materials on computer families. Numerous biographies of outstanding scientists and designers have been written for special “Hall of Fame” section. As the volume of accumulated materials was growing, the number of RVCМ structural sub-divisions was growing proportionally.

For a couple of years during the museum’s establishing period, sponsor support was provided by the Moscow branch of Microsoft Corporation (general manager Olga Dergunova). After Microsoft, the museum was sponsored one by one by Russian companies IBS, 1C, and RTSoft, but there were also long periods when Proydakov invested personal funds into the development of the museum. Financial assistance to the museum in conducting conferences and publishing works was rendered by the Russian Foundation for Basic Research (RFBR - state scientific foundation).

## 2.1 RVCМ's Structure

The RVCМ structure consists of three large blocks, which in their turn are sub-divided into appropriate smaller parts. The museum's materials in Russian language form the first block and its sub-divisions ([www.computer-museum.ru](http://www.computer-museum.ru)). The second block consists of the English language sections (articles and other materials) (<http://www.computer-museum.ru/english/index.php>).

The third block, "Service Keys," is the line in the upper right corner of the screen. It is used both in the Russian and English RVCМ parts.

Collection and systematization of historical materials on the Soviet (and Russian) computers, informatics and related subjects is the primary goal of museum's activity. Therefore, it is only natural that currently it contains much more documents and articles in the Russian language than in English.

## 2.2 RVCМ Section in Russian

As the structure of Russian part of the museum is much different from the section containing English materials, we will describe it in more detail.

The main page of the RVCМ's Russian part visually displays three parallel information columns. The left one shows references on important information blocks: "On Our Museum," "History of National Computer Engineering," "History of Electro-communications," "Hall of Fame," "History of the Soviet Electronic Components," "Documents and Publications," "Computer Press and Books," "English-Russian Dictionary." Each of these sections in its turn consists of numerous subdivisions. Each information block, in both columns (right and left), has its own link, "All Subjects," connecting user with each of the seventeen basic sub-divisions of the Russian part.

Visitors of the site can find information about the RVCМ Council members, contact addresses, and information for museum's partners in the information block "About Our Museum."

The section "History of National Computer Engineering" presents the development of the Soviet computers. It consists of eight following large sub-divisions: "The Computers in Alphabetical Order" (with information about 330 Soviet computers), "The First Computers," "The Specialized Military-Purpose Computers," "The Control Computers," "The Universal Computers," "The Analog Computers," "History of Semiconductor Producing Industry," and "Systems and Complexes." The sub-division "The Computers in Alphabetical Order" contains the full list of computers. Each name of a computer in this list is linked to the description of corresponding computer. This sub-division contains big volume of information and is permanently extended. A big general overview of the history of Soviet home computers was added in 2017.

The sub-section "The First Computers" presents the first Soviet electron tube computers; such as the projects initiated and supervised by the computer pioneers, outstanding scientists I. S. Bruk (computers "M-1," "M-2," "M-3"), S. A. Lebedev (computers "MESM" and "BESM" family), B. I. Rameev and Y. Y. Bazilevskiy (the first Soviet serial computer "Strela"); also electron-tube computers "TsEM-1" and "TsEM-2," designed at the Kurchatov Institute of Atomic Energy.

The sub-division “Specialized Military-Purpose Computers” contains detailed descriptions of special computers used in the Soviet antiaircraft and anti-missile defense systems; naval computers used on battleships, on-board computers of air forces, computers for strategic missile forces, military space systems, etc. This sub-section is completed with a list of Soviet military computers.

The section “Control Computers” presents information on the computers and computation complexes for management of industrial enterprises and control of industrial technological processes, produced during the period of 1960–1980s. Control computers and computing complexes in automatic process control systems were directly connected to various industrial automation means (such as: sensors, regulators, operation units, etc.). This part stores information about the following control computers: UM-1, M-6000/M-7000, CM1, CM2, CM 1210 (designed at the Scientific Research Institute of Controlling Machinery in the town of Severodonetsk); computer MN-1 NH (designed at Leningrad enterprise “Design Bureau №2); computer “Dnepr” (designed at the Kiev Institute of Cybernetics); computers M7, M-400, SM3, SM4, SM 1420, SM 1800 (designed at the Moscow Institute of Electronic Control Machines – MIECM / ИИЭУМ); control computers designed at the Moscow Scientific Research Institute of Electro-mechanics.

The section “Universal Computers” deals with large information cluster on widely implemented computer families “BESM,” large computer family “URAL,” numerous computers of the “ES Computers” series (Soviet-East European analogue of IBM computers -IBM/360; IBM/370), Armenian computers “Aragats,” “Razdan,” “Nairi”; unique ternary computers “Setun”; Ukrainian computers “Kiev,” “Promin’,” “MIR”; supercomputer family “Elbrus”; space/military computers “Vesna” and “Sneg”; big Byelorussian computer series “Minsk,” and many others.

The subdivision “Analog Computers” (AC) provides essential and meaningful information on analog computers. Their industrial implementation did not need “impressive” resources but provided high performance at comparatively low costs. Characteristic features of those devices were simplicity of synchronization with various real devices and instruments, simple adjustments and readjustments for solving different problems and convenient interaction with users. Analog computers designed by computer pioneers S. A. Lebedev, I. S. Bruk, L. I. Gutenmakher and some others were famous, popular and widely implemented in the USSR.

The last RVCМ subdivisions are the “History of Semiconductor Producing Industry Development” and the “Systems and Complexes.” The latter contains, not yet fulfilling, information about the large-scale Soviet projects: “ETCBL/EGSVTs,” “ОГАС/OGAS,” “Выборы/Elections,” “Самсон/Samson,” and others. The narration begins with description of some of the USSR first automatic management systems at industrial enterprises “Lvov” and “Kuntsevo.” This part is to be essentially extended with new documents and articles.

The RVCМ section “Hall of Fame,” alongside with the “History of the National Computing,” is one of its most important and largest sections. The “Hall of Fame,” in its turn, consists of two subsections, “Soviet/Russian Scientists and Engineers” and the “Foreign Scientists and Engineers,” which contain biographic articles about 140 Soviet

scientists, and also such world-famous persons as A. Turing, K. Zuse, V. Bush, S. McKinley, N. Wirth, R. Hamming, S. Jobs and others.

The RVCМ has also three important sections: “History of the Soviet Electronic Components Basis,” “Documents and Publications,” “Books and Computer Press.” There is also “Big English-Russian (on-line) Dictionary of Informational Technologies and Computing” composed by E. M. Proydakov and L. A. Teplitsky.

The middle column of the RVCМ site contains complete collection of news on IT history, important dates and jubilees, information about projects and actions related to computer history, etc.

The right column on the RVCМ’s site contains sections: “Computations in Pre-computer Era,” “History of Foreign Computing,” “History of Software Development,” “Technologies,” “Calendar of Events,” “History of Computer Games,” “Computer Museums in the Internet,” “Archive of News,” and “Guest Book.”

### 2.3 RVCМ Sections in English



**Fig. 1.** RVCМ logo.

The main English site of RVCМ consists of three columns: “Sections,” “News,” and “Persons and Articles.”

The column on the right contains sections, “Hall of Fame,” “Articles,” and “RVCМ News Archive.” The section “Hall of Fame” presents sixty translated articles about the most famous Soviet computer scientists. The right column, “Articles,” contains information about more than thirty types of Soviet computers and computing systems (“Radon,” “Diana system,” “Argon,” and others) and information on the programming languages development and implementation history. There are also some articles on the first radio-communication technologies.

The RVCМ’s visitors can access subsections containing articles and descriptions, in English language, about the structures, systems of instructions, inner organization of RAM and ROM and about practical usage fields of widely popular computers “STRELA,” “BESM,” “Ural,” “Minsk,” “M-20,” “Razdan,” and some others.

The third subdivision in the right column of the English site is the “RVCМ News archive,” which stores all news statements published in RVCМ since 2000 until the present day.

### **3 How RVCM Differs from Other Museums**

Of course, there are a number of other, quite informative, virtual computer museums in the world. The basic advantages of the RVCM, which make it different from other museums, are the following:

- RVCM possesses one of the world's largest electronic storage of USSR computer history materials. It has the first Soviet articles, books, descriptions of IT projects, numerous veterans' memoirs, etc.
- A special section containing rich and detailed collection of materials about on-board and mobile computers (primarily military ones).
- RVCM regularly organizes international conferences and seminars on Soviet computers and software development history.
- The history of the Soviet communication systems and technologies is actively studied and displayed by the RVCM.
- Much attention is paid to analog computers and computing systems, as well as to the Soviet scientific and research institutes and industrial organizations that made that computer development a reality.

The RVCM exposition also displays the history of the national microelectronics and communication means. This is one of the museum's biggest parts and the famous expert on electrical communications P. P. Chachin heads the work on its processing. In reality, this sub-division is a sort of "museum within museum." It contains sections on: "Cable Communications," "Radio Communications," "TV and Broadcasting," "Special Communication Technologies," "Consumer Electronic Appliances," "Networks and Communication Lines," "Components and Technologies." There are also parts such as "Calendar of Events," "Companies and Enterprises," "Russian Industry of Communication Means," "Public Organizations and Associations," "Educational Institutions," "Museums of Communications," Internet links, etc. This part even has its own "Hall of Fame" with biographies of the outstanding scientists, designers and prominent administrators of this branch. The Museum's Council itself is a notable feature of the RVCM. It consists mainly of the scientists who are the Soviet computer pioneers and of some other experts. They regularly conduct workshops and other meetings; provide the RVCM with their personal (as well as other) scientific, engineering and historical materials, and also perform strict control of all museum content's value and authenticity.

### **4 Scientific Forums Organized by RVCM's Council**

RVCM's Council, together with the Russian Polytechnic Museum, several leading universities, the Russian Foundation for Basic Research (RFBR), and number of some other scientific centers, regularly organizes the Russian national and also international conferences dedicated to the history of computers and software complexes, which were created and practically implemented in the USSR, Russian Federation and the former USSR republics.

They are SORUCOM-2006 in Petrozavodsk (RF, rep. Karelia), SORUCOM-2011 (Novgorod, RF), SORUCOM-2014 in Kazan (RF, Tatarstan) and SORUCOM-2017 (Zelenograd /Moscow area/). The conferences are sponsored by the state fund RFBR and some companies from the Russian IT-sector.

In 2011 the RVCМ published a book *Proceedings of the Virtual Computer Museum. History of the National Control Computers (1955–1987)*.

Running the historical documentation archive and its systematization (by authors, subjects and topics) is one of important fields of the RVCМ's activity. Numerous books, scientific and other reports, theses and proceedings of various computer conferences, relevant directives of the Soviet government and many others, which could be characterized as belonging to “computers” and “information science” fields, should be digitalized. All of them are placed in appropriate storage in RVCМ. That is why, each month the group of enthusiasts (volunteers) thoroughly makes scanning of new and often restores, very rare and unique, documents, articles, monographs and textbooks. RVCМ support the activity concerning systematization of the first computer books both of Soviet [6] and foreign [7].

Currently, RVCМ lays 10 to 15 archival publications a month on its site (for public access). The members of its Council are proud to admit that more than 3000 historical documents and articles (both archival and written specially for the RVCМ) are already placed and stored in the museum's structure.

Its electronic library already contains more than 150 scientific and educational books on information technologies (published during 1950–1960s), which are hard to find in other sources.

## 5 Users of the RVCМ

According to the statistics that are made upon the museum's visits counters' data, between one and two thousand individuals from different countries (mostly countries of the former USSR, Israel, Germany, USA, Canada, etc.) work daily with RVCМ's materials, entering its sites via links provided by search engines (up to 80% of visitors). As the museum was filled with materials, the number of visitors increased steadily. Currently, the museum is visited daily by 1,500 to 2,500 unique guests. The amount of the visitors naturally depends on current season of year or educational period at schools and universities. Thus, it drastically increases at the time of semester projects preparation by university students, as the RVCМ is recommended by the Russian educational organizations as an auxiliary information resource for informatics studies.

Therefore, students are forming one of the RVCМ's basic user groups. Nevertheless, it is equally interesting for IT and computing experts. The veterans of computing, scientists, programmers, computer designers and other people whose professional activity was – or is – connected with computer development demonstrate particular interest to the museum's publications.



## 6 Perspectives, Limitations, and Difficulties of RVCМ

RVCМ contains a huge volume of information and is permanently extended. For example, the big general overview of the history of Soviet home computers was added in 2017. The creation on the basis of computers of information retrieval systems and the storage of a multitude of data for making optimal management decisions have been the subject of research by scientists both in the USSR and in Western countries. The development and use of automated management information systems (MIS) in the Soviet Union is clearly not sufficiently studied and not systematized both in the historical works of Russian and foreign authors. Therefore, one of the most important directions of RVCМ development is the creation of a separate section “Management Information Systems.” This is very important not only for the history of Soviet computers, but also for the history of all Soviet science, because in the 1960s and 1970s in the Soviet Union, according to various estimates, about eight hundred thousand specialists in various fields worked on the creation and use of management information systems for various purposes and levels of use: economists, analysts, project managers, algorithms, programmers, employee data entry services, electronics engineers, computer operators, etc. In the USSR, at that time, a whole independent industry was created and operated – the MIS industry. The study of this industry is relevant in our time because many ideas, projects and scientific publications of those years are the primary sources for the creation of modern digital information technologies. The analysis of RVCМ documents on the theory of Soviet MIS, as well as practical issues of their use, is an independent scientific research. First of all, in the new section of the RVCМ it is necessary to collect and systematize projects and documents on the Soviet MIS, as well as to establish the chronology of their appearance in the USSR. The history of the Soviet MIS is little studied and is a historical “white spot.” To highlight the large-scale and so far little-studied layer of the history of Soviet science – the history of the Soviet MIS industry – is the primary task of RVCМ. Also, the specific step of improving RVCМ is the creation in its structure of a separate section “History of Cybernetics.”

Unfortunately, until now the RVCМ site did not have its own servers and had to rent hosting services from a hosting provider. Therefore, the limited disc/storage space available for the RVCМ is the biggest technical bottleneck in its work. Of course, the 10 Gbyte is insufficient volume for an on-line collection like this: it drastically cuts possibilities of multimedia usage, as well as of storage of video and audio-materials.

Due to the current secrecy still, RVCМ has no access to the documents on military and on-board computers and software for them. The range of the museum’s activity is also limited with shortage of financial resources. For that reason, some materials and work, which should be paid for, remain inaccessible; RVCМ relies mainly upon the free assistance of some scientists and volunteers.

## 7 Conclusions

The RVCМ Council in its monthly meetings constantly try to improve the structure of the museum to make it as interesting and convenient for visitors as possible. It should

be noted that all their work is carried out only on a voluntary basis. Work on this article highlighted a number of necessary upgrades of RVCM. One of the most important of these is the substantial update of the “Calendar of Events.” It is necessary to include in it a number of historical documents on defense and military informatics, which recently appeared in open publications. It is necessary to create a section “History of Management Information Systems (MIS).” It is necessary to create a section “History of Cybernetics.” This is not a difficult task because most documents and other historical papers about world and Soviet cybernetics have already been published. They need only to be systematized. It is advisable to introduce an additional section on scientific organizations and enterprises at which system and application software was produced. The USSR and Russia, undoubtedly, can be proud of the huge number of original world-class applied computer programs. In this regard, the section “Application Software” existing in the RVSM requires significant expansion. The RVCM Council would be grateful to everyone who is interested in scientific and cultural cooperation with it.

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