Preface

For the 30th anniversary of the Soviet Association of Fuzzy Systems foundation and the 15th Anniversary of the Russian Association of Fuzzy Systems and Soft Computing foundation


On January 18th, 1990, the Founding Congress of the Soviet Association of Fuzzy Systems (SAFS) was held in Kazan. It was organized on the initiative of the section “Intelligence systems with fuzzy, incomplete and contradictory knowledge” of the Scientific Council on the problem of “Artificial Intelligence” under the Presidium of the USSR Academy of Sciences. The decisive role in the foundation of the Association was played by the Deputy Chairman of the Council, Doctor of Technical Sciences, Professor D.A. Pospelov and the head of the above mentioned section, Doctor of Technical Sciences, Professor A.N. Melikhov. 31 people from 12 cities of the USSR took part in the congress.

At the congress, the by-law of SAFS was adopted, the main directions of scientific and organizational activities were discussed, an order was given for the Association to join the International Fuzzy Systems Association (IFSA), and governing bodies were formed - the executive committee and the scientific council. Askolod Nikolayevich Melikhov was elected as the first president, and A. N. Averkin, A.F. Blishun and A. N. Borisov were elected as vice-presidents. A. B. Proskudin was appointed as a Treasurer of Association. Dmitry Alexandrovich Pospelov became the Chairman of the Scientific Council of SAFS, and V. B. Tarassov became his deputy. The scientific council of the Association included I.Z. Batyrshin, L.S. Bershtein, N.V. Bessarabov, V.G. Chernyaev, A.P. Shostak, A.V. Yazenin, S.V. Ulyanov was elected as the Chairman of the Audit Committee.

The SAFS emblem was adopted, in which the letter μ, forever associated with the membership function of a fuzzy set, with a helping hand of L. Zadeh, was successfully combined with cat’s face resemblance. And this is not coincidence. Many people saw humorous pictures in which there is a gradual, step-by-step transformation of a moustached and quite decent gentleman into a big cat, who has seen a lot in his lifetime. Such a transformation perfectly illustrates the idea of a smooth transition from belonging to not-belonging of elements to a set.

The foundation of the Soviet Association of Fuzzy Systems was by no means the beginning of a way, but rather a natural formation of the first stage in the development of fuzzy set theory and its applications in the USSR, which lasted almost a quarter of a century from the late 1960s to the early 1990s.

Domestic science has played an important role in the formation of fuzzy logic. Here are some interesting historical facts. L. Zadeh made his first report on fuzzy sets and fuzzy logic for a wide circle of
scientists in September 1965 in the USSR at the III All-Union Conference on Automatic Control. The opening of the meeting took place at the Odessa Opera House, and then it took place on board the sea liner “Admiral Nakhimov” (voyage from Odessa to Batumi and back). The enormous scale of this scientific event is evidenced by the fact that more than one thousand Soviet scientists and about 60 foreign guests, including L. Zadeh, took part in the meeting. L. Zadeh’s report was quite well taken and caused a number of interesting, sometimes fierce discussions. After this trip to the USSR L. Zadeh made good acquaintances and friends among Soviet scientists. N.N. Moiseev, R.V. Gamkrelidze, G.S. Pospelov, Ya.Z. Tsypkin and others were among them.

It is no coincidence that the first two articles by L. Zadeh on fuzzy sets appeared almost simultaneously in English and in Russian. In June 1965, the fundamental article “Fuzzy Sets” was published in English in the journal “Information and Control”, and in February 1966, the article “Shadows of fuzzy sets” was published in Russian in the journal “Problems of Information Transmission”. The translator of this article V. L. Stefanyuk testifies that Professor L. Zadeh, being a native speaker of Russian language, proposed the translation of English phrase “Fuzzy Set” as “nechotkoye mnozhestvo” in Russian.

Scientists of the Soviet Union were among the first to respond to L. Zadeh’s call to create a new approach to the analysis of complex systems and decision-making processes based on fuzzy sets. Thus, at Riga Polytechnic Institute (RPI) research in the field of theory and applications of fuzzy sets began in 1967, two years later after the publication of L. Zadeh’s fundamental article “Fuzzy Sets”, and in 1968-1969 the works of A.N. Borisov on the recognition of images represented by fuzzy sets were published. In Riga, the works of the initial period were developed in two interrelated directions: firstly, the development of methods for constructing and evaluating the membership function; secondly, the construction of methods for the recognition of fuzzy images for the problems of classification and technical diagnostics.

At the end of 1960s D.A. Pospelov proposed the concept and model of “situation control”, which was actively developed by a number of research teams in the 1970s, and this model found real practical application, for example, in modeling the operation of the Kaliningrad cargo port. Situation control is required for the class of large (or complex) systems, where it is impossible or impractical to formalize the control process in the form of mathematical equations, and only its description is available in the form of a sequence of natural language sentences using logical-linguistic models. Based on the expert information a classifier is built allowing dividing all observed situations into fuzzy classes (forming covering, but not partitioning). Semantic nets and models of knowledge close to them are used to describe situations.

In July 1977, the first Riga seminar “Application of fuzzy sets theory in the problems of complex systems control” (12 reports) was held, in July 1978, the second Riga seminar with the same name was taken place (14 reports), and in July 1979, the third Riga seminar “Problems of development and application of the fuzzy sets theory in artificial intelligence and control systems” was conducted. Perhaps, these particular seminars were the starting point for effective cooperation of specialists in the field of artificial intelligence, representing the school of D.A. Pospelov, with Riga colleagues, grouping around A.N. Borisov and dealing with the theory of fuzzy sets and its applications. The most essential part of domestic research in the field of applications of fuzzy sets and systems began to shift gradually to the field of decision making, control, and artificial intelligence.

In this regard, it should be noted the important consolidating role of the next Riga conferences “Models of choosing alternatives in a fuzzy environment” (1980, 1984 and 1990), as well as the interuniversity proceedings “Methods and decision-making systems”, published in the period from 1983 to 1991 in the RPI.

Later, the Kalinin (now Tver) State University, on the initiative of A.V. Yazenin, began to publish interuniversity proceedings on fuzzy systems. The following volumes have been published: “Fuzzy systems: structure modeling and optimization” (1987), “Fuzzy systems support for decision-making (1989)”, “Fuzzy systems: models and software” (1991).

Finally, the other significant milestone in the development of the theory and applications of the fuzzy sets theory in the USSR was the organization of all-Union scientific and technical seminars “Control in the presence of vague categories” (the supervisors were D.A. Pospelov and D.I. Shapiro) in the late 1970s early 1980s under the aegis of the Scientific and Technical Society of Radio Engineering, Electronics and Communications named after A.S. Popov. Six seminars with this name were held from 1978 to 1983 in Riga, Izhevsk, Frunze (now Bishkek) and three times in Perm. Perhaps the most memorable seminar took place in 1981 in Kyrgyzstan, where 42 reports were read. The main part of the seminar was held at the Issyk-Kul lakeside which greatly encouraged the informal exchange of views and the establishment of new contacts.

In general, it can be stated that in the USSR a community of scientists and specialists in the field of fuzzy sets and systems had already developed and actively worked by the beginning of the 1980s.
Textbooks and study guides on this problem have appeared. For example, in the Taganrog Radio Engineering Institute, a textbook was published: Melikhov A.N., Bershtein L.S. Finite clear and fuzzy sets. – Taganrog: TRTI, 1980-1981. – Part 1. – 101 p. – Part 2. – 91 p. In 1986, the Kalinin (now Tver) State University Press published a textbook by A.V. Yazenin on fuzzy mathematical programming.

The publication of the first original domestic monographs in this area belongs to the same period:


Practically all of these books were devoted to the problem of decision-making with fuzzy initial information, which was very popular in those years. In 1986, in the publishing house “Science” Pospelov’s book “Fuzzy sets in models of control and artificial intelligence” was published under the editorship of D.A. Pospelov, the team of authors included A.N. Averkin, A.F. Blishun, I.Z. Batyrshin, V.B. Silov, V.B. Tarassov. In fact, it became the first Russian reference book on various sections of the theory and applications of fuzzy sets, and it is still a guide to the theory of fuzzy sets for many Russian scientists.

For the sake of justice, several earlier monographs by domestic authors containing sections describing the elements of the fuzzy set theory should be mentioned here:


At the very end of the 1980s - early 1990s, new monographs “Processing of fuzzy information in decision-making systems”, “Decision-making based on fuzzy models: examples of use” by A.N. Borisov and his coworkers were published; books “Production systems with artificial intelligence”, “Production control with fuzzy initial information”, “Fuzzy Process Control and Knowledge Engineering in Petrochemical Robotic Manufacturing” by R.A. Aliyev and the members of his scientific group were also published. The monograph “Situational advising systems with fuzzy logic” by A.N. Melikhova, L.S. Bershtein and S. Ya. Korovin became the most popular book of that period among readers. One more monograph by L.S. Bershtein et al. was devoted to fuzzy models of design automation.

Monographs and textbooks of the most famous foreign specialists in the field of fuzzy set theory and its applications were translated into Russian:


In 1978, the scientific journal of the International Fuzzy Systems Association (IFSA) “Fuzzy Sets and Systems” was founded, its first editorial board included Academician N.N. Moiseev and Professor M.A. Aizerman.


From 20th to 23rd of September 1988, in Moscow a large international conference “Fuzzy Sets in Informatics” was successfully held under the leadership of Academician N.N. Moiseev, it brought together more than 150 participants from all over the world. At this conference Russian scientists and specialists in the field of fuzzy sets and systems met the leading foreign scientists D. Dubois, M. Rubens, K. Hirota, R. Yager and others.

Thus, by 1990 in our country there were already several scientific schools working in the fields of fuzzy sets and systems. They were the schools of N.N. Moiseev and D. A. Pospelov (S.A. Orlovsky, S.M. Makeev,

In addition, in the 1980s, unique hardware and software tools were already developed to implement fuzzy models and technologies. So, in the Taganrog Radio Engineering Institute under the leadership of A.N. Melikhov, work on the hardware implementation of fuzzy computers and fuzzy controllers was actively carried out. The first certificates of authorship for the creation of a cell for a homogeneous associative processor of fuzzy information processing were obtained in 1982, and in 1986 prototypes of a fuzzy coprocessor DVK-2M were manufactured. By the early 1990s, the FUZEX hardware and software environment was created for real-time fuzzy inference. There were real prospects for launching domestic fuzzy computers into mass production. Unfortunately, like many other strategic scientific projects, these works were left without financing and they were stopped in the 1990s.

But luck was on KOSMoS system (Fuzzy Cognitive Strategy Modeling System) side, developed in Sevastopol under the leadership of V.B. Silov. It was replicated by “Data S” company and highly appreciated by users. Theoretical foundations of fuzzy cognitive modeling and practical applications of the CoSMoS system were described in V.B. Silov’s monograph “Making strategic decisions in a fuzzy environment”, published in 1995 and becoming a notable event at difficult time for our science.

The SAFS has been founded in January 1990, the Association held two all-Union conferences and two congresses in the period before the dissolution of the USSR: in November 1990, in Riga and in October 1991 in Sevastopol. At the congresses by-elections were held to the council: V.B. Gisin, I.V. Ezhkova, B.Ya. Kovalerchuk, S.Ya. Korovin, S.V. Makeev, S.A. Orlovsky, A.P. Ryzhov, V.B. Silov, S.V. Ulyanov became its members in addition to the previously elected people.

The 3rd scientific conference of SAFS was held in Moscow in November 1993. The third congress of the Association took place after it, it was decided to reorganize SAFS and establish the Russian Association of Fuzzy Systems (RAFS) with an open membership of scientists and specialists from other countries.

Askold Nikolaevich Melikhov was at the head of the Soviet (and then Russian) Association of Fuzzy Systems for six years. A project of a comprehensive program “Intelligent systems with inaccurate and incompletely defined information for 1993-1999” was developed on his initiative, but it did not receive funding at that time.

After the sudden death of A.N. Melikhov in 1996, A.N. Averkin was the president for the next 8 years. During that period, the international relations of the RAFS were strengthened, especially due to the regular participation of Russian scientists in the European congresses EUFIT (European Congress on Fuzzy and Intelligent Techniques), and then in the events of the European Society for Fuzzy Logic and Fuzzy Technologies EUSFLAT (European Society for Fuzzy Logic and Technology).

In October 1996, Kazan hosted one of the world’s first international scientific events on soft computing – International Workshop on Soft Computing (SC-96). L. Zadeh became its honorary chairman, D.A. Pospelov became the chairman of the program committee, I.Z. Batyrshin and A.N. Averkin were the chairmen of the organizing committee. In addition to the reports of Russian scientists, the seminar included reports of such well-known foreign scientists as B. De Baets, R. Mesiar, G. De Cooman, H. Bustince, M. Wagenknecht and others.

The prehistory of the term Soft Computing is as follows. In 1994 Professor L. Zadeh introduced the term Soft Computing into scientific use as a “partnership of several methodologies”, including fuzzy logic, neural networks, genetic algorithms, probabilistic reasoning and chaos models. It concerns mutual strengthening of the advantages and compensating for the disadvantages of each individual methodology. In such an integrated model fuzzy sets provide work with linguistic and fuzzy information, as well as approximate reasoning; neural networks provide learning and parallelism of information processing; genetic algorithms ensure optimization of the neural network structure and the membership function parameters; and the methods of chaos theory are “responsible” for nonlinear dynamics.

In 1995-1996 A.N. Averkin and S.V. Prokopchina met with Lotfi Zadeh at the 6th IFSA World Congress and the EUFIT European Congress, and by analogy with soft computing, the concept of soft measurement was developed as a result of these meetings and discussions. In June 1998, the First International Conference on Soft Computing and Measurement SCM (Soft Computing and Measurement) was organized and held in St. Petersburg. At SCM-98, L. Zadeh was the honorary chairman of the program committee, D.A. Pospelov was the chairman, A.N. Averkin and S.V. Prokopchina were the vice-chairmen. Due to the inexhaustible enthusiasm...
and organizational efforts of S.V. Prokopchina, the SCM conference became annual: in May 2019, the XXII SCM-2019 International Conference took place, and in May 2020 SCM-2020 was held (in distance regime).

In the late 1990s - early 2000s, R.A. Aliyev organized two representative international conferences – ICAFS (International Conference on Applications of Fuzzy Systems) and ICSCCW (International Conference on Soft Computing and Computing with Words in System Analysis Decision and Control), as well as the conferences which became traditional: ICAFS is held in even-numbered years, and ICSCCW in odd-numbered years. In August 2019 the X International Conference ICSCCW-2019 was held in Prague, and at the end of August 2020 the XIV International Conference ICAFS-2020 is to be held in Budva (Montenegro).

Russian scientists are regular participants of these conferences. The first ICSCCW-2001 conference, organized in Antalya in June 2001, was devoted to the 80th anniversary of L. Zadeh; the hero of the day took part in its work making a big report “A critical look at the basis of the theory of control and decision-making”. As a result of the conference a special issue of the journal “Artificial Intelligence News” was published, No. 2-3, 2001, devoted to Lotfi Zadeh, his role in science and the transformation of the scientific worldview.

In the 2000s, a number of new textbooks on fuzzy sets and soft computing appeared in Russian, the following ones should be mentioned among them:


The important monographs of this period are:


In 2001, a special issue “Soft Models in Decision-Making” contained the works of Russian scientists, edited by I.Z. Batyrshin and D.A. Pospelov, was published in the “International Journal of General Systems”.

In May 2001, on the initiative of V.V. Emelyanov and V.B. Tarassov in Kolomna (Moscow region), an international seminar “Integrated models and soft computing in artificial intelligence” (IMSC) was organized, it aroused wide interest and attracted participants from different regions of Russia. Then, in 2003 and 2005, two more seminars were held in Kolomna, these seminars resulted in the decision to raise the status of this event to the level of an international scientific and practical conference. Until 2020, 9 international IMSC conferences were held (taking into account the first two seminars).

From 17th to 20th of June, 2004 a very representative international FSSCEF-2004 (Fuzzy Sets and Soft Computing in Economics and Finance) conference was held in St. Petersburg. L. Zadeh became its honorary chairman; O. Nedosekin was the chairman of the organizing committee; and I.Z. Batyrshin, A.N. Averkin, J. Kasprzyk were the co-chairmen of the organizing committee. On the basis of the selected works of the FSSCEF-2004 conference the book “Perception-Based Data Mining and Decision Making in Economics and Finance”, edited by I. Batyrshin, J. Kasprzyk, L. Sheremetov and L. Zadeh, was published in the Springer publishing house.

After the 3rd IMSC seminar, on May 17, 2005, the RAFS congress was held, at this congress a memorandum on the transformation of RAFS into the Russian Association of Fuzzy Systems and Soft Computing (RAFSSoftCom) was announced. A new by-law of the Association was prepared and approved by the congress, in which the periodic rotation of its leadership was prescribed according to the model of the IFSA. The President of the Association is elected for a term of 2 years and takes office after 2 years from having been elected. Thus, in RAFSSoftCom collective leadership is carried out in practice. There are three presidents at the same time: President –in- office (current President), President-elect, the previously elected future president, and the Past-president, who performed these duties before the President-in-office, which ensures both turnover and continuity in the work of association leadership. With such a structure, the President is actually elected for 4-6 years, during this period the President gets the opportunity to represent the association in external scientific and educational structures, as well as to prepare, implement and complete the events and programs announced by him/her. The duties of the President include paying the annual membership fee to the International Fuzzy Systems Association (IFSA) and organizing a national or international scientific event on fuzzy systems and soft computing with the publication of proceedings.
Also, the by-law provided for the introduction of a special membership “Honorary Member of the Association” (Fellow). Fellow is a permanent member of the Association with the right to vote.

I.Z. Batyrshin was elected as the first president of RAFSSoftCom, and the president-elect was A.V. Yazenin, who was instructed by the congress to prepare documents for registration with the IFSA within a month. The official date of the Russian Association for Fuzzy Systems and Soft Computing establishing is June 17, 2005.


Each of the former presidents made a significant organizational and scientific contribution to the development of fuzzy systems and soft computing in Russia. During the first presidency of I.Z. Batyrshin in 2005-2006, the international activities of the Association sharply intensified. Thus, in November 2005 the delegation of the RAFFSoftCom, including I. Z. Batyrshina, A.V. Yazenin and N.G. Yarushkina, took part in the international BISCSE’2005 conference, which was held at the University of California, Berkeley, USA. I.Z. Batyrshin was the co-chairman of the organizing committee of the conference devoted to the 40th anniversary of fuzzy logic and its “Father” Professor Lotfi Zadeh. He also participated in the founding of the international Society of Mathematics of Uncertainty (SMU) and was its secretary in 2005-2009.

In June 2006 the 2nd International Conference on Fuzzy Sets, Soft Computing and Their Application in Economics and Finance (FSSCEF-2006) was held in St. Petersburg.


N. G. Yakushkina held the 2nd All-Russian Conference FSSC-2008 (27-29 October, 2008) at Ulyanovsk State Technical University. The collective monograph “Fuzzy Hybrid Systems” was published by the Phyzmatlit publishing house in 2007 under her editorship. In June 2007 a delegation of the RAFFSoftCom including I.Z. Batyrshin, V.B. Tarassov and N.G. Yarushkina took an active part in the work of the 12th World Congress IFSA-2007 in Cancun (Mexico).

S. M. Kovalev, together with a participant in the founding congress of SAFS A.V. Zaboleeva-Zotova, held the 3rd All-Russian Conference NSSC-2009 in Volgograd (September 21-24, 2009). Since 2011 the conference has become known as “Fuzzy Systems, Soft Computing and Intellectual Technologies” (FSSCIT). S.M. Kovalev, being the current president, consistently organized the 4th conference FSSCIT-2011 (October 3-6, 2011) and the 5th conference FSSCIT-2013 (October 14-17, 2013) in Sochi.
The next two FSSCIT conferences were organized by A.L. Tulupyev, they took place in St. Petersburg in summer: the 6th FSSCIT-2014 conference (from June 27 to 29, 2014) and the 7th FSSCIT-2017 conference (from July 3 to 7, 2017).

In 2016 N.G. Yarushkina organized the All-Russian Scientific and Technical Conference “Fuzzy Systems and Soft Computing”, which took place in Ulyanovsk. In November 2017 and in October 2018 two more conferences with this name took place in Ulyanovsk State Technical University.

In 2017-2018 V. B. Tarassov organized a number of scientific events devoted to the scientific heritage of the “Father of Fuzzy Logic” L. Zadeh, including a joint meeting on April 11, 2018 at the Central House of RAS Scientists of the Cybernetics Section of the Central House of Scientists and RAFSSoftCom, as well as a special meeting on the theory of possibility of L. Zadeh at the international conference SCM ‘2018.

In September 2019 S.V. Prokopchina and V.B. Tarassov organized and successfully conducted a special section “Intelligent and Soft Measurements” at the 5th International Conference SEIA’2019 (Sensors Engineering and Electronics Instrumentation Advances) in Spain.

I.Z. Batyrshin organized a special issue of the journal “Acta Polytechnica Hungarica” (2017), as well as a section devoted to the memory of L. Zadeh in the “Journal of Intelligent & Fuzzy Systems” (2019). It should be noted that during the last year of his second presidential term in RAFSSoftCom, he became one of the editors of the proceedings for the IFSA Joint Congress and the North American Society of Fuzzy Information Processing (NAFIPS), and he became a member of the Board of Directors of NAFIPS and received the powers of the representative of RAFSSoftCom at IFSA.

During the International Conference IMMV-2019 in Kolomna, on May 20, 2019, a regular congress of the FASSC was held. V.V. Borisov was elected as the President-elect of the RAFSSoftCom at this congress. In our anniversary year he initiated to held the VIII International Scientific and Practical Conference “Fuzzy Systems, Soft Computing and Intellectual Technologies” (FSSCIT-2020) at the “National Research University “MPEI” in Smolensk. In this one of the ancient cities of Russia, a particular scientific school on fuzzy systems and soft computing has long been formed; the famous representatives of this scientific school are also M.I. Dli, A.S. Fedulov.

Dear friends and colleagues, we congratulate you on the anniversaries of Russian community of scientists and specialists in the field of fuzzy systems, soft computing and intellectual technologies related to them!

V. B. Tarassov – President-in-office of RAFSSoftCom
I. Z. Batyrshin – ex-President of RAFSSoftCom
V. V. Borisov – President-elect of RAFSSoftCom