

NEWS

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1 Editorial Introduction

CRORS News Continues to Inform OR Community



Dear CRORS members and all interested readers,

this is the 4th issue of CRORS News by which we inform society members and all other interested researchers and practitioners about the activities of Croatian Operational Research Society and some international OR events that occurred since our last issue in April 2016. There were two annual meetings of the society in the meanwhile; one was held on September 29, 2016 at Faculty of Economics Osijek and the other on December 15, 2017, at Faculty of Economics and Business - Zagreb. At the annual meeting in Osijek 2016, a new administration for the next 2 years was elected, headed by new president - Professor Zrinka Lukač, vice president - Assistant Professor Jošip Arnerić, secretary - Assistant Professor Anita Čež Časni and treasurer - Assistant Professor Berislav Žmuk. In the previous period three new issues of the scientific journal *Croatian Operational Research Review* (CRORR) were published (Volume 7, Number 1 and Number 2, Volume 8, Number 1), bringing altogether 46 new scientific papers. We are proud to announce that CRORR has been accepted for indexing in the Web of Science Emerging Sources Citation Index (ESCI) starting from Volume 7, 2016. In this issue, we continue to bring news about activities of related international societies in which our members are also active. We also bring announcement of some forthcoming conferences. A special part of this issue is devoted to Professor Ljubomir Martić (1922-2017), a distinguished scientist and a great scholar who contributed significantly to the development of OR and CRORS. In the end, and thank all members who participated in writing this issue and I invite all CRORS members and other interested researchers to participate KOI 2018 that will be held in charming Zadar, Croatia, from 26 - 28 September 2018. Enjoy!

Margareta Gardijan, Editor, mgardijan@efzg.hr

2 CRORS Activities in 2016 and 2017

Margareta Gardijan, mgardijan@efzg.hr

Participation of our Members at EURO 2016 Conference

The 29th annual meeting European Conference on Operational Research - EURO 2016 was held from 3-6 July 2016 at Poznan University of Technology, Poznań, Poland. Altogether 1580 presentations were delivered at EURO during the conference days. As stated in the EURO2016 Final report, most of the participants came from Germany (168), Turkey (118) and UK (127).

Our representatives at EURO at the time: Marijana Zekić-Sušac and Kristina Šorić, participated a meeting of all representatives of national societies from OR - the EURO Council meeting. In addition to participating in meetings and workshops, Marijana Zekić-Sušac and Kristina Šorić presented their papers and participated in panels organized by the EURO association.



K. Šorić and M. Zekić-Sušac at EURO2016 conference

Six Croatian researchers had their paper accepted for presentation at the EURO 2016 conference; 5 of them are active CRORS members. Our member Tunjo Perić was a chair of a section, and Marijana Zekić-Sušac participated a Panel Discussion on OR/MS Education: *Countries' Differences within a Shared European View?* These are the papers presented by our members:

- **Tunjo Perić, Zoran Babić:** *Vendor Selection and Supply Quotas Determination by using Analytic Hierarchy Process (AHP) and a new Multi-Objective Programming Method*
- **Tunjo Perić, Maid Omerović:** *Three Different Approaches for Multiple Objective Fractional Linear Programming Problem Solving*
- **Kristina Šorić:** *Implementing Croatian Business Best Practices into OR Education Process*

- **Marijana Zekić-Sušac, Adela Has:** *Performance of Big Data Business Analytics*

The abstracts of all presented papers were published in the EURO 2016 – Conference Handbook available at: <https://www.euro-online.org/conf/admin/tmp/program-euro28.pdf>

The next conference EURO 2018 will be held in July, 7-11 in Valencia, Spain. We wish all our members who will participate the EURO2018 a successful conference.

Participation of our Members at SOR 2017 Conference

The 14th International Symposium on Operational Research in Slovenia - SOR 2017 was held in Bled, Slovenia from 27-29 September 2017. Its admired organization can be once again thanked to Slovenian Society Informatica, Section of Operations Research, as well as University of Maribor, Faculty of Organizational Sciences, Kranj, Slovenia.

As reported in the Foreword, SOR 2017 Proceedings includes 97 papers or abstracts written by 184 authors and 47 of them were from Croatia. Our member and ex-president Professor Marijana Zekić-Sušac was also one of the acknowledged invited speakers at SOR '17.

All accepted papers are published in the SOR '17 Proceedings available at: <http://fgg-web.fgg.uni-lj.si/~sdrobne/sor/SOR'17%20-%20Proceedings.pdf>.



SOR '17 participants, [<http://sor17.fov.uni-mb.si/sor17-highlights/>]

Participation of our Members at IFORS 2017 Conference

Zrinka Lukač, zlukac@efzg.hr

IFORS 2017 conference was held from 17 - 21 July 2017 in Quebec, Canada.

Our current president Professor Zrinka Lukač participated at the conference and the meetings as an official representative of the CROR Society. On 16th July 2017, she attended a traditional meeting of representatives of European National Operations

Researches - EURO Council Meeting. During the meeting, representatives of the organizing committee of the forthcoming EURO 2018 conference submitted a report on preparatory actions.

A meeting of the Editorial Board of CEJOR was organized on 17th July by the editor-in-chief Urlike Leopold Wildburger, which was followed by the IFORS Board of Representatives Meeting, where participants were informed that Russia and Colombia will be new members of IFORS. Representatives of South Korea presented the next Triennial Conference to be held in Seoul in 2020. Lastly, Professor Lukač participated in an informal meeting of the IFORS association, the so-called IFORS Correspondants dinner, organized by Elisa del Rosario. The members of the jury for prizes and several invited representatives of national societies attended the event.

Our member, Vedran Kojić, PhD, (Faculty of Economics, University of Zagreb) also participated in the conference and presented a paper *Coupon bond duration and convexity analysis: A noncalculus approach* written in collaboration with Professor Lukač and Margareta Gardijan, PhD.

CRORS Annual Meetings 2016 and 2017

The 23rd Annual Meeting of CRORS was held on September 29, 2016 at Faculty of Economics in Osijek. During the meeting, the Board presented operative and financial reports as well as plans for 2017. News about CRORS journal were reported by Marijana Zekić – Sušac. Main part of the meeting was dedicated to elections for new Board of our Society for the period 2017-2019. New members of the Board of Directors are:

President – Professor Zrinka Lukač,
Vice president – Assistant Professor Josip Arnerić,
Secretary – Assistant Professor Anita Čeh Časni,
Treasurer – Assistant Professor Berislav Žmuk.

Representatives of CRORS for the following events are: EURO – Zrinka Lukač and Marijana Zekić-Sušac, IFORS – Zrinka Lukač and Josip Arnerić, IAOR Contributing author - Snježana Pivac.

The 23rd annual meeting ended festive with our member Kristina Šorić being awarded the CRORS Distinguished Service Award.

The 24th Annual Meeting of CRORS was held on December 15, 2017 at Faculty of Economics in Osijek. As usual, the meeting covered the operative and financial report of the society for the previous period. In addition, new editors of CRORS and CRORS News were elected, as well as new members of Board of Directors and Supervisory Board. Marijana Zekić – Sušac reported about the CRORS journal. However, the main topic of this meeting was the organization of the 17th International Conference on Operational Research KOI 2018 that will be organized in Zadar. In the end, new operative plan was adopted.

Other activities of CRORS members

CRORS member, Professor Luka Neralić participated both 14th *International Conference on DEA - DEA2016* in Wuhan, China, (May 23 - 26, 2016) and 15th *International Conference on DEA - DEA2017* in Prague, Czech Republic (June 26 - 29, 2017). During the DEA2017 conference, **Professor emeritus Neralić was awarded the 2017th William W. Cooper Lifetime Contribution Award in Data Envelopment Analysis**. Congratulations! In the following sections, you can also read about his visit to the Central South University, Changsha in China.

We encourage all our members to send us their reports and share experiences from interesting conferences and events!

International Conference on Data Envelopment Analysis Wuhan, China

Luka Neralić, lneralic@efzg.hr

The 14th International Conference on Data Envelopment Analysis (DEA) was held in Mingde Hotel, at the Jiangnan University in Wuhan, China, from May 23 to 26, 2016. There were about 200 attendants from all over the world. The organizers of the Conference were the International DEA Society (Rajiv Banker, Temple University, USA and Ali Emrouznejad, Aston University, UK) and Jinaghan University (Lei Chen, Jiangnan University, China and Subhash Ray, University of Connecticut, USA). On Monday, June 30, 2016 there were six tutorials: Tutorial #1: Selection of Inputs and Outputs in DEA (S. Ray), Tutorial #2: Efficiency Analysis with Ratio Measure (V. Podinovski), Tutorial #3: Benchmarking Software (A. Emrouznejad), Tutorial #4: Introduction to Two-stage DEA Models (R. Banker), Tutorial #5: Stochastic DEA (O. Olesen), Tutorial #6: Undesirable Outcomes and Production Theory (F. Forsund). Sessions were on different topics of theoretical DEA and applied DEA, like DEA Modeling and Algorithm, Applications of DEA in Banking and Finance, in Eco-Efficiency, in Agriculture, in Health and Hospital Efficiency, in Energy/Electricity/Water Industry, in Manufacturing, in Transportation, in Education.

14th International Conference on Data Envelopment Analysis, Jiangnan University, Wuhan, China, May 23-26, 2016



第十四届数据包络分析国际会议合影留念 2016.5.26 中国武汉

Participants of the DEA2016 conference (Luka is in the last row on the right)

I was the only attendant from Croatia, and I presented a review paper on "Algorithmic Approaches to Sensitivity and Stability Analysis in DEA". The other paper with co-authors from Croatia entitled "Efficiency Gains in Croatian Electricity Distribution Centers Following Industry Structure Changes" (authors M. Mihelja Žaja, R. Banker, S. Fang, D. Hunjet, L. Neralić, R. Wendell and A. Zaja) was presented by R. Banker. The Conference Venue was the Mingde Hotel, which is inside the campus of the Jiangnan University, Wuhan. A half-day city tour was organized, with the visit of the Dongfeng-Honda automobile manufacturing plant and of Yellow Crane Tower, the most interesting touristic place in Wuhan. At the end, there was a cruise on the Yangtze River with buffet dinner. After the Conference, on Friday, May 27, 2016, an optional tour with the visit to the Three Georges Dam close to Yichang was organized. I was on the tour and everything was very nice and interesting.

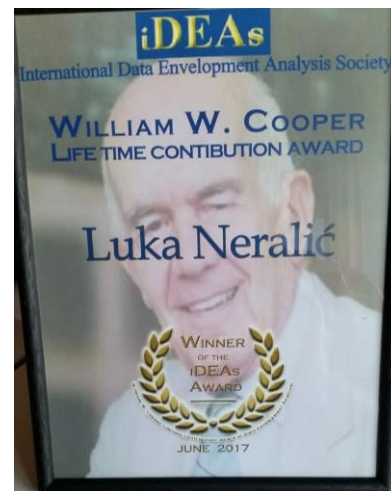
International Conference on Data Envelopment Analysis Prague, Czech Republic

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Margareta Gardijan, mgardijan@efzg.hr

The 15th International Conference on Data Envelopment Analysis was held at the University of Economics, Prague, Czech Republic, June 26 - 29, 2017. The main organizers were Josef Jablonsky, University of Economics, Prague (chair), Mehdi Toloo, Technical University Ostrava (co-chair), Rajiv Banker, Temple University, USA and Ali Emrouznejad, Aston University, UK. Given the seminal contributions of Professor Abraham Charnes to DEA, as well as many other fields, there was a special session devoted to him on the occasion of hundred years since his birthday. The honour to organize, chair and participate this session was given to our distinguished member Professor emeritus L. Neralić. L. Neralić also actively participated at the conference with his paper *Algorithmic Approaches to Sensitivity and Stability Analysis in Data Envelopment Analysis*.



Professor Neralić giving speech at the DEA2017



WW Cooper Award given to Luka Neralić

At the conference, Professor emeritus Luka Neralić was awarded the William W. Cooper Lifetime Contribution Award in Data Envelopment Analysis by The International Data Envelopment Analysis Society (iDEAs). This award is given to the most distinguished scholars who have contributed substantially and significantly to the theory and practice of DEA during their academic career.

Visit of the Central South University, Changsha, China May 28 – June 5, 2016

Luka Neralić, lneralic@efzg.hr

I accepted an invitation of Professor An Qiangxian and visited the Department of Management Science and Information Management of the Central South University (CSU), Changsha, China, May 28 to June 5, 2016. Situated in the famous historical and cultural city of Changsha, CSU is a comprehensive and national key university under the direct administration of the Ministry of Education of China. During my visit, I presented two lectures for PhD students and professors at the Department on DEA applications entitled „An Application of Categorical Models of Data Envelopment Analysis“ and „Evaluation of the Dynamic Efficiency of Croatian Towns Using Data Envelopment Analysis“. An agreement on cooperation was accepted, and a joint paper of with Professor An and his students and colleagues started at that time. One of the attractions of Changsha that I visited is Orange Island, island and park in the middle of Changsha in the Xiangjiang River. At the island, there are gardens and thousands of fruit trees, and a big statue of Mao's head. I also had the opportunity to visit Chairman Mao's hometown Shaoshan and Mao's family house, which is not so far from Changsha.

3 CRORS prizes and awards

Since 2013, CRORS awards two awards:

- CRORS Distinguished Service Award (CRORS DSA)
- CRORS Best Young Researcher Paper Award (CRORS BYRPA).

Since our last issue, two of our notable members were awarded CRORS Distinguished Service Award.

The 2016 winner is Kristina Šorić, a former HDOI president from 2000-2004.

We bring you curriculum vitae and interview with Kristina Šorić, PhD.

Curriculum Vitae of Kristina Šorić, PhD



Kristina Šorić graduated at the Department of Mathematics, Faculty of Science, University of Zagreb in 1989 and in 1993 she achieved a master degree at the Faculty of Economics, University of Zagreb. She finished her PhD at the Department of Theoretical and Applied Mathematics at the University of Padua, Italy. Her

areas of scientific and research interest include operational research with an emphasis on special combinatorial optimization, heuristics and metaheuristics for mixed integer programming, special problems of scheduling in manufacturing, as well as methods of supply chain management. She participated in numerous specialized expert seminars and workshops in the field of OR.

From 1990 - 2012 she was a member of the Department of Mathematics at the Faculty of Economics, University of Zagreb, with the teaching position of an Associate Professor. In 2012, she joined the Management Department at Zagreb School of Economics and Management. She was a guest lecturer on University of Udine (Italy), Instituto Superior Tecnico, Lisbon (Portugal) and Marshall School of Business, Los Angeles (USA).

Kristina Šorić has published scientific works in many prestigious international journals in the area of operational research and optimization. She is an active member of CRORS from the very beginning, obtaining functions of a member of the Board, a secretary of the Society and a president from 2000 to 2004. She is currently the head of the Engineering Section of the Croatian Mathematical Society.

Interview with Kristina Šorić, PhD, winner of the DSA Award in 2016

Dr. Šorić, first of all, congratulations for this award and thank you for your contribution to the Society. You have been an active member of the Society since the very beginning and a president of the CRORS in two

mandates - from 2000 to 2004. What would you say was the most challenging task during that period and what were the greatest achievements?

K. Šorić: Thank you! I am very happy for receiving this award. It sends me back to 90s when we started with this CRORS journey. Since then many things have happened and changed. The people, the places, the way of doing the research... I think that the most important achievements are our international conference KOI that really became international, many young PhD students and researchers, our journal CRORR and the OR community that we created.

Now you are the Director of Business Mathematics and Economics Program and the Director of MBA Supply Chain Management Program at Zagreb School of Economics and Management, the head of the Engineering Section of the Croatian Mathematical Society, the member of the Croatian Mathematical Society management board, the member of the COST Action European Network for Game Theory ... just to name some, and at the same time you are a productive scientist. Seems like a lot of time and effort. Where do you get your energy and motivation?

K. Šorić: Well, I know that it sounds theatrical, but it's true! When you believe in what you do, when you love what you do, when you enjoy what you do, when you see the purpose of what you do... I will not say it's easy, but everything is in the flow. You just leave the flow to take you further and further. And the doors open. To enjoy the flow we have to be ready to learn, to innovate, to be creative, to be agile and to accept all the changes around us. We have to be open for new opportunities and they will meet us! One more thing is that I am working with young people. It's really nice to have these curious beings around! They motivate me all the time.

You were a head of two scientific projects, and besides your academic work, you have some very successful cooperation with the practice. How would you rate the current cooperation between the OR academics and practice in Croatia and what is, in your opinion, the future of this collaboration?

K. Šorić: From my experience, I can tell that there is a big difference between the scientific and practical work. In order to be successful in both fields we need to have a team, a good project management and communication. Today many companies want to collaborate with the academic world, but they say how the academy is closed. I think that the academy has to find the way to approach the business practice. Especially today with all this digital issues, the sky is the limit. But academy has to change the mindset. There are many possibilities through EU funds, but in my opinion, the academy has to be more proactive towards the business practice and has to make more effort in order to understand the practice.

You were a CRORS representative in EURO and IFORS. What are your experiences from the international collaboration in the field of OR? What could we learn and adopt from other OR and scientific societies in general?

K. Šorić: I was lucky since I made my PhD in Italy and had the opportunity to meet many OR community members and young PhD students many years ago. I had the opportunity to create my network that helped me a lot to become who I am today and to contribute to CRORS with all the knowledge and trends from abroad. In the beginning of CRORS it was very helpful to have people from abroad who created contacts for us, the knowledge transfer and opportunities for research positions. Today is easier because everything is available also via internet, video calls, webinars and similar technological resources. I think that we are good in what we are doing, but we should be more mobile and use the opportunities to be hosted abroad. International experience is good for the development and growth. The horizons are wider and we can contribute more to CRORS. The other OR associations are using more these mobility funds.

And finally, what do you see as the main role and the key challenges of CRORS society in the future?

K. Šorić: CRORS as the link between business practice and digital issues. CRORS as the actor who will connect developers and managers. CRORS that will connect academy and business practice, but also CRORS who will educate young people for very uncertain future and help them to be ready to challenge it. Also the science research, although more business practice oriented.

The 2017 award was handed to professor emeritus Sanjo Zlobec, one of the founders of CROR Society.

We bring you explanation of the proposal for DSA award to Professor emeritus Sanjo Zlobec.

The winner of the 2018 DSA Award - Professor emeritus Sanjo Zlobec

The DSA Award Committee decided to give the 2017 DSA award to Professor emeritus Sanjo Zlobec due to his outstanding contribution to both CRORS and Operations Research at the CRORS Assembly.

Professor emeritus Sanjo Zlobec was born on November 16, 1940 in Brezaci near Banja Luka. He started his academic career at the Department of Mathematics – Faculty of Science, University of Zagreb where he defended his Master thesis "Matrix Iterative Analysis in Finite Dimensional Spaces and Applications", under the guidance of Professor Svetozar Kurepa in 1967. As a Fulbright scholar, he attended the Department of Engineering Sciences, Northwestern University, Evanston, Illinois, where he received his PhD in 1970 under the guidance of Prof. Adi Ben Israel.

At the Department of Mathematics and Statistics, McGill University, Montreal, Canada, he was Assistant Professor (1970-1976), Associate Professor (1976-1984), Professor (1985-2005), and Professor Emeritus since 2009. He spent a winter semester of 1970/71 at the Department of Mathematics, University of Zagreb.

Sanjo Zlobec started his scientific work with generalized inversions of matrices and linear operators, and then continued with optimal conditions for different areas of mathematical programming, including parametric programming and stability of mathematical models in applied mathematics. He held more than 100 invited lectures at international conferences and universities around the world, related to mathematics, OR, mathematical programming, parametric programming and similar fields. He was an organizer or a section chair at more than 30 international symposia all over the world. As a supervisor, he guided 15 master students and 5 PhD students. Prof. Zlobec is an editor of the journal *CIT* and a member of editorial boards of journals *Optimization*, *Questiones Mathematicae*, *Mathematical Journal*, *Mathematical Communications*, *International Journal of Optimization: Theory, Methods and Applications* and *CRORR*. There are over 100 papers in his bibliography, published in journals, conference proceedings and encyclopaedias in mathematics and applied mathematics, especially in OR and optimization. He is an (co)author of 3 books: A. Ben-Israel, A. Ben-Td, and S. Zlobec (1981) "*Optimality in Nonlinear Programming: A Feasible Directions Approach*", Petrić, J. and S. Zlobec (1989) "*Nonlinear Programming*" and Zlobec, S. (2001): "*Stable Parametric Programming*". Connections of Prof. Zlobec with Croatia and especially with the CROR Society are numerous and permanent. He is one of the founders of CRORS and he held many seminars at the University of Zagreb at Faculty of Economics and at the Department of Mathematics - Faculty of Science. He was a member of the Program and Organizational Committee of the 6th International Conference on Parametric Optimization and Related Topics in Dubrovnik 1999 and an active member of the scientific project "Mathematical Methods and Models of Operations Research in Economics and Decision Making" at the Faculty of Economics, Zagreb, financed by the Ministry of Science, Education and Sports of the Republic of Croatia since 2007. He was also a reviewer of the postgraduate study program for the National Foundation for Science, Higher Education and Technological Development of the Republic of Croatia. 70th birthday of Prof. Zlobec was celebrated at KOI 2010 and attended by several prominent scientists, including his mentor Adi Ben Israeli. At the 50th anniversary of the Seminar for Mathematical Programming and Game Theory, Prof. Zlobec, as its first secretary, contributed the celebration with his paper.

CRORS Best Young Researcher Paper Award 2016

The winners of the CRORS Best Young Researcher Paper Award for 2016 are Slobodan Jelić and Domagoj Ševerdija

According to the decision of the Awarding Board (Snježana Pivac, Zrinka Lukač and Josip Arnerić), CRORS Best Young Researcher Paper Award in 2016 was

given to authors Slobodan Jelić and Domagoj Ševerdi from the Department of Mathematics, University of Osijek, for their paper entitled "The Government Formation problem". The prize consists of a certificate and release of the fee for the next KOI conference. The prize was awarded to them during the closing session of the KOI 2016 conference.

We congratulate Slobodan Jelić and Domagoj Ševerdija for their award.

Call for Applications for Distinguished Service Award and CRORS Best Young Researcher Paper Award

The nominations of candidates for CRORS DSA can be made by members of CRORS, EURO, and IFORS. The nominations should contain a CV or an equivalent document of the candidate. Nominations must be made in confidence (i.e. the nominee should not be informed), and sent to hdoi@hdoi.hr or CRORS postal address until September 1 of the current year.

The applications for CRORS BYRP should be made by the young researchers who are the authors of the paper submitted to a forthcoming KOI conference. The candidate's full paper, CV, and the explanation of the scientific contribution of the paper in the area of OR should be sent to hdoi@hdoi.hr or to CRORS postal address entitled with "CRORS BYRP application".

The Award Committee will consider the nominations, verify that the candidates satisfy all conditions and make a decision by the majority of the Committee members.

All CRORS members are welcome to make nominations for 2018/2019 awards!

4 Collaboration with Other Societies

Ivan Soldo, isoldo@mathos.hr

Many CRORS members are also members of other relevant societies and institutions academic institutions in Croatia with whom CRORS has a good collaboration. We bring you a short overview of their activities and lectures organized in the field of operations research.

Seminar for Mathematical Programming and Game Theory

Chairs: V. Boljunčić and Luka Neralić

Celebration of the 50th anniversary

V. Boljunčić, Z. Lukac, Lj. Martić, L. Neralić, M. Zekić-Susac, S. Zlobec

On November 17, 2016, Seminar for Mathematical Programming and Game Theory celebrated its 50th anniversary. The ceremony was held at the Faculty of Economics and Business, University of Zagreb. The meeting was opened by one of the seminar leaders - Professor emeritus L. Neralić and chaired by Professor Zrinka Lukač. The participants of the meeting were the present members of the Seminar, some members of the Seminar for Theoretical Computing and other distinguished guests. During the meeting, participants learned about the long history of the seminar. The

Seminar was founded on November 15, 1966 by the Institute of Mathematics, University of Zagreb, and initially chaired by Prof. Ljubomir Martić, dr. Vladimir Vranić and Sanjo Zlobec as a Secretary. In the first year, 5 lectures were held, and the topics were from mostly from linear programming followed by integer, dynamic and stochastic programming. Along with Professor Martić, who was the chair of the seminar from the very beginning (1966-2017), the Seminar was also co-chaired by dr. Milorad Zec (1970-1971), dr. Sanjo Zlobec, dr. Mladen Alić, dr. Luka Neralić, dr. Sanja Đurinović, Luka Neralić (1997.-), Kristina Šorić (2007-2013), and Valter Boljunčić. We cannot enlist all the lectures that were held by members of the Seminar and invited lecturers, which were of theoretical and empirical character. There is also an admirable list of master and PhD degrees which were defended within the seminar. Altogether, researches in OR in Croatia are greatly initiated with the work of the Seminar's members. It is very important to highlight two years - the year 1991 when the first conference on OR - KOI was held, in organisation of the members of the seminar, and 1992 when CRORS was established, again by distinguishing members of the Seminar - Professor emeritus L. Neralić, Lj. Martić, T. Hunjak and others.



Participants of 50th anniversary celebration

Within our oldest seminar on University of Zagreb following activities were organised during the academic year 2016-2017:

Presentation of original papers:

V. Kojić - *Optimization and analysis of selected economic problems without the use of differential calculus*, October 13, 2016

T. Hunjak - *Operational Research in Action - multicriteria analysis and economically best offer*, November 17, 2016.

M. Gardijan - *Assessing the relative efficiency of portfolio hedging strategies with options*, December 14, 2016.

V. Kojić, T. Škrinjarić - *The relationship between sustainable profit and sustainable business in companies in Croatia*, September 7, 2017.

Other:

The celebration of the 95th birthday of Professor Ljubomir Martić, April 6, 2017.

L. Neralić - *In memoriam to Professor Abraham Charnes on the occasion of the centennial of his birth 1917.-2017.*, June 1, 2017.

Guest lecturers:

A. Čustić (Simon Fraser University, Vancouver, Canada) - *The Bilinear Assignment Problem: Complexity, Special Cases and Heuristics*, August 31, 2017.

M. Mihelja Žaja (University of Zagreb, Faculty of Economics) - *Efficiency Gains in Croatia's Electricity Distribution Centers Following Industry Structure Changes*, September 25, 2017.

HMD Engineering Section Seminars

Croatian Mathematical Society – Engineering Section

Chair: Kristina Šorić

The Engineering section of HMD mainly consists of mathematicians working in economic practice (but not only them), who apply OR methods in their work, and who participate in the KOI conference. The majority of CRORS members is on the mailing list of the engineering section of HMD and actively participates in its seminars. The list of lectures presented at HMD Engineering section from May 2016 – February 2018 is as follows:

- A. Budin, *Big data analytics – possibilities and challenges in business and society*
- I. Augustin, *Monte Carlo DCF – The valuation of firms using the dynamic model of discounted cash flows*
- D. Lukić, *Risk measures for financial risk management*
- L. Ferbar Tratar, *Holt-Winters forecasting methods and joint optimization of the forecasting/inventory problem*
- D. Mahmić, *Business analysis in IT*

Mathematical Colloquium

Department of Mathematics, University of Osijek

Chair: Ninoslav Truhar

Mathematical Colloquium in Osijek is active since 1993, as an activity of the Scientific section of the Osijek division of the Croatian Mathematical Society and the Institute for Applied Mathematics in Osijek with the help of the Central branch of the Society in Zagreb and the Department of Mathematics, University of Zagreb. Since 1999, Mathematical Colloquium has been organized by the Department of Mathematics, University of Osijek. Lecturers of the scientific colloquium are researchers from Croatian universities and abroad who usually report on their researches, PhD theses, or give an overview of recent trends in mathematics and its applications. Lecturers of the educational colloquia are teachers from Croatian universities and secondary schools. They usually present their ideas and approaches to teaching or discuss a historical topic connected to mathematics and mathematicians. Further information about the Colloquium can be found on associated [web page](#). The following lectures were presented at the Colloquium during the academic year 2016/2017:

- H. Šikić, Department of Mathematics, University of Zagreb, Croatia, Bayesian truth serum - axiomatic systems, October 6, 2016.
- T. Žakula, Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, Croatia, Model-predictive control of heating and cooling systems in buildings, October 27, 2016.
- I. Gutman, Faculty of Science, University of Kragujevac, Serbia, Graph energy - old and new results, November 3, 2016.
- D. Jakobović, Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia, Symbolic regression and applications of the genetic programming, November 24, 2016.
- N. Sandrić, Faculty of Civil Engineering, University of Zagreb, Croatia, Stochastic stability of Markov processes, December 1, 2016.
- I. Jovanović, School of Computing, Union University of Belgrade, Serbia, Graph spectral distance, December 15, 2016.
- F. Poloni, Department of Computer Science, University of Pisa, Italy, When is a system of Sylvester-type matrix equations well posed?, March 30, 2017.
- B. Milošević, Faculty of Mathematics, University of Belgrade, Serbia, Characterizations of probability distributions, goodness of fit tests and Bahadur asymptotic efficiency, April 13, 2017.
- I. Iveć, Faculty of Metallurgy, University of Zagreb, Croatia, Lebesgue's spaces with mixed norm, April 27, 2017.
- M. Nurkanović, Department of Mathematics, Faculty of Natural Sciences and Mathematics, University of Tuzla, Bosnia and Herzegovina, Perturbed discrete models of the Beverton-Holtonovig type with delays, May 11, 2017.
- Z. Vondraček, Department of Mathematics, University of Zagreb, Croatia, On purely discontinuous additive functionals of subordinate Brownian motions, May 25, 2017.
- R. Alam, Department of Mathematics, Indian Institute of Technology, Guwahati, India, Fiedler companion pencils of rational matrix functions and recovery of minimal bases and minimal indices, June 1, 2017.

Optimization and Application Seminar

Department of Mathematics, University of Osijek

Chair: Dragan Jukić

Organized by Department of Mathematics, University of Osijek, the Optimization and Application seminar covers topics such as mathematical modelling, problems of identification and estimation of parameters in mathematical models, statistical aspects of the problem of identification and estimation of parameters in mathematical models, optimization of mechanical systems, applications in natural, technical and other sciences. Basic seminar outline is presentation of original papers, presentation of papers from literature and guest

lectures. In the academic year 2016/ 2017 the following lectures were presented at the Seminar:

- Matea Puvača, Department of mathematics, University of Osijek, Optimization of damping vibration systems, October 25, 2017.
- Ivana Šain, Department of mathematics, University of Zagreb, The application of Ljapunov equation in optimization of vibration system damping viscosity, November 8, 2017.
- Matea Puvača, Department of mathematics, University of Osijek, The comparison of parameter grades for damped system, November 15, 2017.
- Ninoslav Truhar, Department of mathematics, University of Osijek, Angles between eigen subspaces; min - max grades I, December 6, 2017.
- Rudolf Scitovski, Danijel Grahovac, Ratko Grbić, University of Osijek, A method for solving the multiple ellipses detection problem, December 13, 2017.
- Ninoslav Truhar, Department of mathematics, University of Osijek, Angles between eigen subspaces; min - max grades II, December 20, 2017.

5 OR Area in Focus

IN MEMORIAM TO Prof. Ljubomir Martić (1922-2017)

Boško Šego, bsego@efzg.hr

This column text is reprinted with permission of the editors of the journal *Economic Review*. The full text is available online at: <https://hrcak.srce.hr/191152>.



A distinguished professor at the Faculty of Economics and Business at the University of Zagreb and a prominent scientist, Professor Ljubomir Martić left us on August 19, 2017. The entire working life, from December 1949 until his retirement on September 30, 1992, he spent at the Faculty of Economics - Zagreb.

Professor Martić can be talked about from many aspects. As a professor and a scientist, he has left an indelible trace through his numerous works, many of which represent pioneering work, especially in the field of operational research. We believe that many did not only read but seriously studied his books and articles, attended his lectures at graduate and postgraduate studies, Seminar on Mathematical Programming and Game Theory and gained knowledge from either direct and indirect contacts with the Professor. The fact that his university textbooks can be found in libraries of prominent universities worldwide speaks volume about their value and importance. Professor Martić was awarded four times for scientific works with awards "Mijo Mirković" by the Faculty of

Economics of the University of Zagreb. In 1989, the University of Zagreb, on its 320th anniversary, awarded him as the honorary professor of the Faculty of Economics, and the same year he received the Republic awards for the Lifetime Achievement.

During World War II, Professor edited the journal *Riječ* and since February 1945 he worked in the editorial of *Vjesnik*, which brought him to Zagreb in May that same year. In the autumn of 1945, he enrolled in the Faculty of Philosophy at the Mathematics Group, leaving *Vjesnik's* editorial office in 1947 as he fully devoted himself to the faculty, which he successfully finished in October 1949.

Professor Martić was also a great lecturer. The Commission for his election for an associate professor complemented that '... his lectures are always on a scientific level ...'. I listened to the professor's lectures at the postgraduate studies and they were indeed very interesting and novel. He usually introduced us, his students, to some new and unpublished results and it obvious how much energy he brought into those presentations. In addition to his daily research, Professor liked to walk past the Maksimir Park for an hour before his lectures to think and repeat the lecture in the peace of the forest.

Professor Martić was a formal supervisor to many respected scientists from Croatia and neighbouring countries for their master's theses and doctoral dissertations. He was a supervisor (at least) 39 times for scientific master's degree, and at least 24 times for doctoral dissertations, mainly at the Faculty of Economics - Zagreb and the Faculty of Science. Of course, he has selflessly helped many as an informal mentor as well.

Particular emphasis should be put on great efforts the professor invested in both profiling operational research as a scientific discipline as well as to scientists who have continued to develop that discipline. His long-lasting persistence has led to operational research becoming a discipline that is highly appreciated and used even by many non-mathematicians. Professor Martić was a coryphaeus of operational research and generally of applied mathematics, which was before his efforts mostly referred just to implementation of mathematics in physics.

I will personally remember the professor as a great humanist and, above all, a wise man. Professor was a man who loved to unequivocally pronounce his judgment, his thoughts, his attitudes, provide young people with valuable information, but left them willing to decide about their own destiny. He led by example in his respectful relationship with his younger colleagues. Being always very focused and calm, he first thought about the problem and then offered the solution. In general, we all knew this was the optimal solution. I am sure that we, who knew him well, will often remember and follow his moral and scientific principles. Therefore, let him be eternal thanks and glory.

Doctoral dissertations of our members

On October 13, 2016, Vedran Kojić defended his PhD on Faculty of Economics and Business, University of Zagreb with the topic: *Optimization and analysis of selected economic problems without the use of differential calculus*.

Margareta Gardijan had her PhD viva on December 14, 2017 on Faculty of Economics and Business, University of Zagreb. The topic of her PhD was *Assesing the relative efficiency of portfolio hedging strategies with options*.

Marko Čular defended his dissertation on November 14, 2017 on Faculty of Economics, University of Split with the topic: *External auditor's judgement on the reliance of internal audit work*.

Tea Pokleповić obtained her PhD on 26 October 2017 on Faculty of Economics, University of Split with the topic *Neural Network Structure Identification in Measurement of Expected Inflation*.

Marko Bohanec (Department of Knowledge Technologies, Jožef Štefan Institute Ljubljana) and Associate Professor Tibor Illes (Department of Differential Equations, University of Technology and Economics, Budapest).

On each day, a special section was organized in honour of Professor Goran Lešaja from Georgia Southern University, who is an active member of CRORS since the very beginning and participates in KOI conferences. The topic of the section was "Interior-Point Methods and Related Topics". An important event at the conference was the Roundtable on "Operational Research in Education" chaired by dr. Kristina Šorić (Zagreb School of Economics and Management) with guest lecturer Hans Allenmann (University of Johannesburg, South Africa). The panellists concluded that there should be more courses on quantitative methods at the Croatian faculties and their programs should follow the recent developments and market demands. Also, cooperation with the practice is recognised as vital.

All paper abstracts were printed in the Book of Abstracts, and they were published in full in CRORR vol. 7 (2), vol. 8 (1) and (2). Chosen papers were sent for publication in CEJOR in a Special Issue of Croatian Operational Research Society and Collaborators, which is expected to be published in 2018.

Furthermore, a social tour of the city of Osijek, a trip to Ilok, a winery tour, and a joint dinner were organized.

The award for best work by young researchers was given to Slobodan Jelić and Domagoj Ševerdija from the Department of Mathematics, University of Osijek, for their paper "The Government Formation Problem". The paper proposes a model of linear programming that will make a candidate choice for the government based on their expertise and social networking. The Award for Special Contribution of HDOI, according to the report of the Awarding Commission Zdravka Aljinović, Marija Marinović and Luka Neralić, which was adopted by the Steering Board of HDOI, was awarded to dr. Kristina Šorić, for her long-term activity at HDOI, running the company in two terms from 2000 to 2004 as president, formerly as vice president and secretary of society, and chairman of the CIO's Organizing Committee. We congratulate all winners for their awards.

You can find more information at KOI 2016 website: <http://hdoi.hr/koi2016/>.

Looking forward to KOI 2018

The 16th International Conference on Operational Research - KOI 2018 will be held in Zadar, Croatia from September 26 - 28, 2018. The venue of the conference is Hotel Falkersteiner Club Funimation Borik. KOI 2018 is organized in collaboration with the Faculty of Economics and Business Zagreb; the program committee chair is Zrinka Lukač and the organizing committee chair is Anita Čeh - Časni.

The abstracts of the papers presented at the conference will be published in the "Book of abstracts - KOI 2018".

6 KOI 2016 and KOI 2018

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Overview of KOI 2016

The 15th International Conference on Operational Research KOI 2016 was held in Osijek from September 27 - 29, 2016, in organisation of the Croatian Society for Operational Research, the Faculty of Economics in Osijek and the Department of Mathematics of the University of Osijek.

Here is KOI 2016 in numbers:

119 papers presented,
237 authors and co-authors,
147 registered participants who presented their papers,
79 participants from abroad (53.74%),
68 participants from Croatia (46.26%),
5 invited lecturers.



Participants of KOI 2016

All invited lecturers were acknowledged international scientists and experts: Professor Emeritus Jakob Krarup (Department of Computer Science DIKU, University of Copenhagen), Professor Andrew R. Barron (Department of Statistics, Yale University), Associate Professor Francisco Martinez Álvarez (School of Engineering, Pablo de Olavide University, Seville), Scientific Councillor

Full papers will be send for a double-blind review for publishing in CRORR journal. Important dates for the KOI 2018 are:

- 15.6.2018.- abstract submission
- 1.7.2018.- letter of acceptance
- 7.9.2018.- fee payment deadline
- 30.9.2018.- full paper submission



Zadar at night [Croatia.hr]

Workshop "Data Science and Machine Learning" will be organized during the conference. We invite all conference participants, especially scholars and other interested OR researchers and practitioners to actively participate in the workshop. Workshop will be held by Vincent Charles, PhD. Also, a special session on Data Envelopment Analysis (DEA) will be devoted to the 40th anniversary of DEA. Session will be organized by Luka Neralić and Valter Boljunčić.

You can find more details on KOI 2018 at conference website: <http://hdoi.hr/koi2018/>

7 Croatian Operational Research Review (CRORR) Journal

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Wits 150 active members in 2017 (mainly university professors), CRORS continues to publish its scientific journal Croatian Operational Research Review (CRORR). During the 2017, two numbers were published - the spring issue - Volume 8, Number 1, 2017 and autumn/winter issue - Volume 8, Number 2, 2017. The 8 (1) issue consists of 22 and the 8 (2) issue of 18 original scientific papers.

The aim of the Croatian Operational Research Review journal is to provide high quality scientific papers covering the theory and application of OR and related areas, mainly quantitative methods and machine learning. The society plans to continue the publication of this scientific journal which is indexed in relevant databases such as: Current Index to Statistics, Current Mathematical Publications, Mathematical Reviews (MathSciNet), Directory of Open Access Journals (DOAJ),

EconLit, EBSCO host, Genamics Journal Seek database, Hrcak, INSPEC, ProQuest, Scopus, Web of Science Core Collection / Emerging Resources Citation Index, Zentralblatt fuer Mathematik/Mathematics Abstract, MATH on STN International (CompactMath).

The next issue is expected to be published in spring/summer 2018. Authors from any area of operational research are welcome to submit their manuscripts by using our *Online submission system*. All published issues are available online at the Hrcak database - Portal of scientific journals of Croatia, with the full-text search of individual papers.

All information about the journal can be found on <http://hdoi.hr/crorr-journal/>.



CRORR included in the Scopus database

Croatian Operational Research Review has been evaluated for inclusion in Scopus by the Content Selection & Advisory Board (CSAB). In January 2018 the CSAB has advised that the journal will be **accepted** for inclusion in Scopus. These were the comments of the reviewers:

This is a regional journal with a focus on the theory and application of operations research. The journal publishes some interesting articles on quantitative methods and machine learning. Hope the inclusion into Scopus can help the journal improve its profile and citation counts. In future, the journal needs to strengthen its editorial team. The journal also needs to provide clear guidelines for authors regarding the abstract style and content. Some of the abstracts are without adequate detail to be of value in understanding the article content.

Source Collection Management department promised to initiate the indexing process for Scopus in three months from this report.

8 Calendar of Conferences

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- **April 15-17, 2018 - 2018 INFORMS Conference on Business Analytics & Operations Research, Baltimore, Maryland, USA**, <http://meetings2.informs.org/wordpress/2016international>
- **April 16-18, 2018 - International Conference on Data Envelopment Analysis DEA40, Aston University, Birmingham, UK**, <https://deaconference.com/dea40/>
- **May 10-11, 2018- ISCCRO'18: The 2st International Statistical Conference in Croatia, Opatija, Croatia**, <http://www.hsd-stat.hr/en/international-statistical-conference-in-croatia-iscro18/>
- **May 16-18 2018 - The 61st Meeting of EURO Working Group for Commodities and Financial Modelling, Kaunas, Lithuania**, <http://ewgcfm2018.ktu.edu>
- **July 8-11, 2018 - 29th European Conference on Operational Research EURO2018, Valencia, Spain** <http://euro2018valencia.com/>
- **September 26-28, 2018 - 17th International Conference on Operational Research KOI2018, Zadar, Croatia**, <http://hdoi.hr/koi2018/>

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