

NEWS

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1 Editorial Introduction

CRORS News Continues to Inform OR Community

Dear CRORS members and all interested readers,



This is a third issue of CRORS News by which we inform not only society members but all interested researchers and practitioners about the activities of Croatian Operational Research Society and some international OR events occurred in 2015. The main event was CRORS Annual Meeting that was held at Faculty of Economics and Business Zagreb on June 29, 2015. Within CRORS Annual Meeting professor Marijana Zekić-Sušac (CRORS president) and Adela Has, from Faculty of Economics in Osijek, have organized the Workshop “Neural networks for prediction and classification”. Some other events also marked the last year. In March and October two new issues of the scientific journal „Croatian Operational Research Review” were published. Volume 6, Number 1 (published in March) brings 23 scientific papers, while Volume 6, Number 2 (published in October) consists of 16 scientific papers in the area of OR. In this issue we continue to bring news about activities of related international societies in which our members are also active (EURO and SOR). The column “European Study on OR/MS Education” brings an article about how HEI - universities, colleges, polytechnics and research centers - are addressing OR/MS education topics in Europe. We also bring announcement of some forthcoming conferences. I invite all CRORS members to participate KOI 2016 and enjoy beautiful scenery of Osijek in late September.

Enjoy!

Josip Arnerić, Editor, jarneric@efzg.hr

2 CRORS Activities in 2015

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Participation of our Members at EURO 2015 Conference

CRORS members actively participate in international conferences in the area of OR and related fields.

Last year, the 27th European Conference on Operational Research EURO 2015 was held from July 12-15, 2015 at University of Strathclyde in Glasgow, Great Britain. A day before the conference, the EURO Council Meeting was held, at which the national representatives discussed past and future EURO activities. Around 2200 participants presented their papers or posters at the conference. Publisher such as Elsevier, Springer had their booths with the samples of journals and books. Also, the meeting with EURO research group „OR/MS in Education“ was led by Ana Paula Teixeira from Portugal. CRORS agreed to participate this survey, and that the results of this survey will be presented at KOI 2016 conference.



Opening ceremony of the EURO 2015 conference

Nine Croatian researchers HDOI participated the EURO 2015 conference; five of them were CRORS members. Our members Tunjo Perić, Goran Lešaja and Tihomir Hunjak were chairs of sections, while Marijana Zekić-Sušac participated as an author and as an official representative of CRORS at EURO Council Meeting. Representatives discussed about former activities and future plans of EURO.



M. Zekić-Sušac (CRORS President) at the EURO conference in Glasgow, 2015

Members of CRORS participated EURO 2015 conference presenting six research papers:

- Tihomir Hunjak, Zoran Babić: *Advantages and Disadvantages of using the AHP Method in Public Procurement*
- Marijana Zekić-Sušac, Adela Has: *Modelling Neural Network for Predicting Company's Creditworthiness*
- Tunjo Perić: *A New Multiple Objective Integer Linear Programming Methodology for Vendor Selection and Supply Quotas Determination Problem*
- Jadranka Kraljević, Tunjo Perić, Josip Matejaš: *A New Iterative Method for Solving Multiobjective Fractional Programming Problem*
- Goran Lešaja: *An Improved Infeasible Full Nesterov-Todd Interior-Point Algorithm for the Linear Complementarity Problem over Symmetric Cones*
- Sead Rešić, Zoran Babić: *Goal Programming Methodology for Solving Multiple Objective Problem of the Technological Variants and Production Plan Optimization*

The abstracts of all presented papers were published in the EURO 2015 – Conference Handbook available electronically at the web page:

http://www.theorsociety.com/ygu575kjg/132727_Conference_Guide_USB_v2.pdf.

Participation of our Members at SOR 2015 Conference

CRORS members participated SOR 2015 conference that was held in Bled, Slovenia. We can say that a record number of our members presented their papers at the conference (19 of them) which strengthened our collaboration with Slovenian Society Informatica, Section of Operations Research. The conference proceedings is published at <http://sor15.fov.uni-mb.si/>.

Authors are invited to submit extended versions of their papers for publishing in one of the journals: CEJOR, Business Systems Research, and Organizacija Journal.



Closing session of SOR 2015 conference in Bled, Slovenia

CRORS society presented its journal CRORR, and also announced the next KOI conference in September 2016 in Osijek. We had a chance for a short to see the beauty of Bled lake and the old city Bled and Radovljica.



SOR participants from Croatia, Bled, Slovenia, 2015

CRORS Annual Meeting 2015 in Zagreb

Croatian Operational Research Society, as a non-profit organization, has its regular annual meeting once a year, although additional meetings are also occasionally organized. The 22nd Annual Meeting of CRORS was held on June 29, 2015 at Faculty of Economics in Zagreb. The main decisions made at the meeting were about the forthcoming 16th International Conference on Operational Research that will be organized in 2016 (program committee, organizing committee, time and place of the conference were set, as well as some plenary speakers). It was decided that the conference will be organized in Osijek, Croatia, September 27-29, 2016. Marijana Zekić-Sušac submitted a financial report of the society as well as working plans of CRORS future activities in the period 2015-2017 were adopted at the

meeting. Also, the program and organizational aspects of upcoming KOI conference were discussed. It was decided that the next KOI 2016 conference will be also held in Osijek, Croatia.

Workshop "Neural networks for prediction and classification"

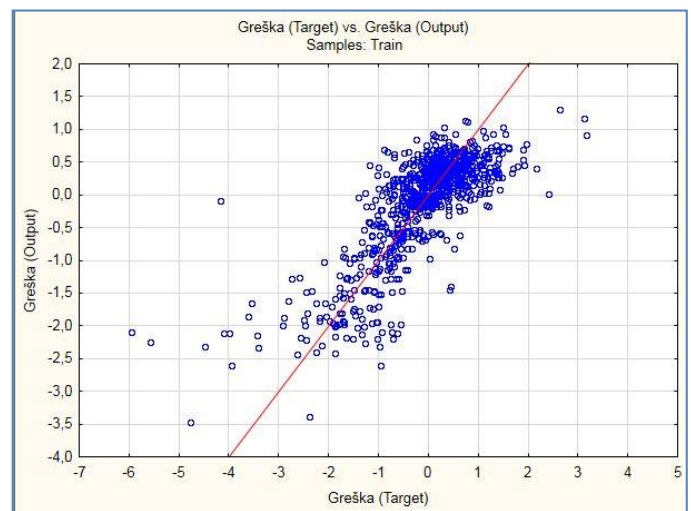
Marijana Zekić-Sušac, *marijana@efos.hr*,
Adela Has, *adela.has@efos.hr*

On June 29, 2015 CRORS organized the Workshop "Neural networks for prediction and classification" given by professor Marijana Zekić-Sušac and Adela Has from Faculty of Economics Osijek. The workshop was held at Faculty of Economics and Business – Zagreb, before the Annual Meeting of the CRORS and was open to all interested researchers and practitioners. 19 CRORS members attended the workshop.

Artificial neural network is a machine learning method that learns on past data through an iterative process, trying to find a connection between the input and output variables, i.e. approximates function that gives the smallest error on the observed sample. Neural networks have proven to be successful on prediction (regression), classification and association (pattern recognition) types of problems.

At the beginning of the workshop, M. Zekić-Sušac explained the basic principle of neural network learning, input and output functions, learning algorithms, such as backpropagation, conjugate gradient and others. It was shown how to build the neural networks model through several steps: (1) Data preparation, (2) Model development in Statistica software, (3) Prediction (regression) NN model, (4) Classification neural network model, (5) Neural network model validation, (6) Neural network model implementation in business practice.

Adela Has presented a procedure of neural network modelling in Statistica Data Mining software on the examples of real-estate prediction and classification of credit applicants. At the end, some statistical tests for validating neural network models and benchmarking



with other methods, such as logistic regression, decision trees, etc. were also discussed with participants. The participants were active in asking questions and sharing their experiences with statistical comparison of different model results. It was a nice opportunity to get an overview of neural network methodology which attracts even more interest of research community in the today era of Big Data analytics. We believe that participants got interested in using this method in their own research in the future.



Workshop "Neural networks for prediction and classification" held on June 29, 2015 in Zagreb

CRORS new web site design

Our society also launched new web page design at: <http://www.hdoi.hr>, and the CRORR journal web page: <http://www.hdoi.hr/crorr-journal>.

Other activities of CRORS members

Luka Neralić, lneralic@efzg.hr

A CRORS member, Professor **Luka Neralić** participated at the International Conference for Energy, Environment and Commercial Civilization (EECC) and the 13th International Conference on Data Envelopment Analysis (DEA2015).

The International Conference for Energy, Environment and Commercial Civilization (EECC) was held at the Business School, Sichuan University (Wangjiang Campus) in Chengdu, China, November 22 – 26, 2015. Sichuan University was founded in 1896 and it is one of the oldest universities in China, among the most prestigious national key universities in education, research, and social impact. It is actually the product of a series of mergers involving 3 national universities: the former Sichuan University, the former Chengdu University of Science and Technology, and the former West China University of Medical Sciences. Sichuan University boasts a qualified faculty of over 3900 full-time teachers, including 993 full professors and 1437 associate professors, 12 academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering, 6 "Sichuan University outstanding

professors". There are over 40,000 undergraduate students, over 20,000 master and PhD candidates and more than 1000 foreign students and students from Hong Kong, Macau and Taiwan. It is one of China's key universities under the direct supervision of Ministry of Education. It is located in downtown Chengdu, a famous historic and cultural city known as "the land of abundance". It consists of three campuses of Wangjiang, Huaxi and Jiangan, and covers an area of 470 hectares with a floor area of 308 hectares. The Sichuan University, with its favorable environment and beautiful scenery, is a wonderful place for learning and doing research.

As the first conference for energy, environment and commercial civilization with a specific focus on the area of "One Belt, One Road", the emphasis at this conference was on the impact of collaborative energy structure adjustment and clean energy development on environmental protection and business ethics, among over sixty countries, scattered across Asia, Europe and Africa. The population of these countries is about 4.4 billion, which accounts for 60% of the world's population and 30% of the world's GDP. The organizers intention was that the conference build up the network and bring people from all over the world and to join this new area of scientific inquiry.



The International Conference for Energy, Environment and Commercial Civilization (EECC) held at the Business School, Sichuan University (Wangjiang Campus) in Chengdu, China, November 22 – 26, 2015.

At the Conference there were more than 100 attendants, distinguished scientists, representing about 27 countries from the area of Economics, Finance, Energy and Environmental Science, Applied Mathematics, who shared their scientific interests and practical experience. Many of them were academicians of the National Academy of Science and the deans of business schools from countries along the "One Belt, One Road". General Chair of the Conference was Academician Heping Xie, President of the Sichuan University and the Secretary-General was Prof. Dr. Dr. Jiuping Xu, Associate Vice President, Sichuan University, Dean of Business School. Members of the Scientific Committee were Professors B. Raj (India), A. Hajiyev (Azerbaijan), S. E. Ahmed (Canada), and N. D. Singpurwalla (Hong Kong).

At the Conference there were six keynote lectures presented by Professors B.Raj („Energy Foresight: Security and Sustainability“), G. Duca („Chemistry for Sustainable Development“), Z. Anjuan („Ways of Investment and Financing on “The Belt and Road Initiative“), M. H. A. Hassan („Challenges and Opportunities for International Collaboration in Sustainability Science“), M. Abdou („The Road to Environmentally Responsible Energy Security“) and I. Guliyev („Hydrocarbon potential of the Caspian Region“). Other lectures of invited speakers were presented in four Breakout Sessions. L. Neralić was invited speaker from Croatia and his presentation was in Breakout Session II, on „The Production-Transportation Problem In Petroleum Industry And Its Extensions“.



Luka Neralić at the EECC conference in Chengdu, China, 2015

The 13th International Conference on Data Envelopment Analysis (DEA2015) was held in Braunschweig, Germany, August 24 – 27, 2015 at the Technische Universität (TU) Braunschweig. Founded in 1745, TU Braunschweig is the oldest technical university in Germany. It belongs to the TU9 group which represents Germany's leading technical universities. TU Braunschweig has over 18,400 students and a staff of 3,500 people, organized in about 120 institutes and 6 faculties. The core disciplines of the university are engineering and natural sciences. These are closely linked to other disciplines such as social sciences, humanities, education and business sciences. Carl Friedrich Gauss (1777-1855), who is considered to be the greatest German mathematician of the nineteenth century, was born in Braunschweig. The organizers of the Conference were DEA Society (R. Banker, President of the DEA Society and A. Emrouznejad) and the Institute of Management Control and Business Accounting, TU Braunschweig (H. Ahn, Conference Chair and M. Afsharian, Conference Coordinator, with collaborators). At the conference there were about 200 participants from all over the world. They were researchers and practitioners interested in the development of the DEA methodology and its applications to performance management in both public and private sectors, with a special emphasis on regulation. Theoretical and empirical papers on DEA and related fields in efficiency and productivity analysis as well as performance measurement have been presented at the Conference.

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During the first day of the Conference six tutorials were presented: „Introduction into Benchmarking with DEA“ (R. Banker), „Benchmarking in Manufacturing“ (K. Triantis), „PIM-DEA“ (A. Emrouznejad) „DEA and Regulation“ (F. Forsund), „Value Judgments in DEA“ (V. Podinovski), „Selection of Inputs and Outputs in DEA“ (S. Ray). Keynote speakers were H. Dyckhoff, RWTH Aachen, Germany („Decision-based Production Theory and DEA“), and R. Banker, Temple University, USA („Caveat Emptor: Bootstrap-based Tests of Contextual Variables in DEA“). In the first panel discussion on „DEA in Regulation“ panelists were M. Ilonen, T. Langset, R. Moesgaard, U. Rührnössl, M. Westermann with moderator R. Banker. In the second panel discussion, moderated by A. Emrouznejad, on „Past-Present-Future of DEA“ panelists were M. Asmild, J. Chilingirian, N. Davutyan, H. Fukuyama, L. Neralić and Ole Olesen. The winner of the William W. Cooper Award was F. Forsund, University of Oslo, Norway. The 14th International Conference on Data Envelopment Analysis (DEA2016) will be held at the Jiangnan University in Wuhan, China, May 23 – 26, 2016. Attendants at the Conference from Croatia were M. Mihelja Žaja and L. Neralić. In the session „Energy and Regulation“ (Chair L. Neralić) M. Mihelja Žaja presented the paper entitled „Evaluation of the Relative Efficiency of Electricity Distribution Centers in Croatia Using DEA“ (co-authors R. Banker, D. Hunjet, L. Neralić, R. E. Wendell and A. Žaja).

Josip Arnerić, jarneric@efzg.hr

At the invitation of SUIBE School of Business and with the support of Confucius Institute at the University of Zagreb in Croatia, Assistant Professor **Josip Arnerić**, is teaching Experimental Classes every year since 2014 at SUIBE - Shanghai University of International Business and Economics, China.



Josip Arnerić teaches Econometrics at SUIBE – Shanghai University of International Business and Economics in China, 2015

In November 2015 it was his second visit to SUIBE, Shanghai, China. For the two weeks Josip Arnerić

lectures in English on Econometrics for students of International Economics and Trade as well as students of Finance. Josip Arnerić is the first teacher from the University of Zagreb to teach at SUIBE, since the two universities launched the Confucius Institute in Croatia in 2012. The involvement of professors such as Dr. Arnerić from the University of Zagreb in SUIBE programs is designed to strengthen cooperation between teachers from both universities in teaching and research and to broaden the students' horizon, thus enhancing the friendly ties between the two universities.

Kristina Šorić, ksoric@zsem.hr

A CRORS member, Professor **Kristina Šorić** gave a lecture at an open seminar entitled "Inventory management", February 2015, Zagreb, Croatia. At March 2015 she held an executive education seminar titled "Financial Asset Management using Excel" in Belgrade, Serbia, together with Ph.D. P. Posedel Šimović from Zagreb School of Economics and Management. The same seminar was held in Sarajevo, Bosnia and Herzegovina in September, 2015.

Also, Kristina Šorić, gave an open executive education seminar on "Supply Chain Management", together with G. Oblaković, in Belgrade, Serbia, September 2015.

Kristina Šorić leads the first generation of the 4-year undergraduate study programme „Business Mathematics and Economics“ at Zagreb School of Economics and Management. The structure of the programme is determined in a way where the first two years are comprised of basic mathematic and economic subjects, with insights into the subjects of applied mathematics in economics and business administration. The students are acquiring theoretical knowledge, with an intensive use of information technology and existing software. In the third year, the students are learning to individually program mathematical algorithms for solving problems in the business practice, and are deepening their knowledge in the area of financial mathematics and organization. In the fourth year, the Capstone subject is created, where the students will take part in creating projects and solving business cases through the use of the knowledge acquired in the course of the programme. Moreover, the fourth year entails a list of optional subjects that allow the students to specialise in financial mathematics and/or optimization.

The working language of the programme is English and students are expected to have an active and passive command of the language. Lectures and exercises are conducted by professors with immense experience both in Croatia and abroad. Alongside, as a part of the cooperation with the business world, the students have the opportunity to learn from associates that transfer their experiences through presenting real examples and problems solved through mathematical methods, starting from financial problems, to programming, creating optimisation algorithms, prediction, and other.

More information on that study programme can be found on the following link:

<http://www.zsem.hr/index.php/en/programs/undergraduate-programs/preddiplomski-studij-poslovne-matematike-i-ekonomije>

Call for Applications for Distinguished Service Award 2015 and CRORS Best Young Researcher Paper Award 2015

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.

Award Committee for CRORS DSA Award in 2015/2016: Zdravka Aljinovic, Marija Marinović, and Luka Neralić.

Award Committee for CRORS BYRP Award in 2015/2016: Zrinka Lukač, Snježana Pivac, and Josip Arnerić.

All CRORS members are welcome to make nominations for 2015/2016 awards!

3 Collaboration with Other Societies

Ivan Soldo, isoldo@mathos.hr



CRORS has a good collaboration with related societies and academic institutions in Croatia that occasionally organize lectures in the field of operations research, due to the fact that some CRORS members are also members of those societies and institutions.

Organized by Department of Mathematics, University of Osijek, the Optimization and Application Seminar covers topics such as mathematical modeling, 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 2015 the following lectures were presented at the Seminar:

- Darija Marković, Department of Mathematics, University of Osijek, Shifted Gompertzova distribucija: svojstva i problem procjene parametara, 16 December 2015
- Ninoslav Truhar, Department of Mathematics, University of Osijek, Optimizacija prigušenja - globalni minimum, 9 December 2015
- Ivan Matić, Department of Mathematics, University of Osijek, Relacija sačuvanja u teoriji reprezentacija, 2 December 2015
- Ivana Crnjac, Department of Mathematics, University of Osijek, Efikasno računanje normi sustava, 28 October 2015
- Ivana Crnjac, Department of Mathematics, University of Osijek, Norme u upravljanju linearnim dinamičkim sustavom, 21 October 2015
- Krešimir Burazin, Department of Mathematics, University of Osijek, Exact solutions in optimal design problems for stationary diffusion equation, 27 May 2015
- Domagoj Matijević, Department of Mathematics, University of Osijek, On the bounded-hop power assignment problem, 13 May 2015
- Kristian Sabo, Department of Mathematics, University of Osijek, Matematički model za precizno određivanje dimenzije objekata izmjerenih s pogreškom, 22 April 2015
- Zoran Tomljanović, Department of Mathematics, University of Osijek, Damping optimization in mechanical systems with external force, 15 April 2015
- Slobodan Jelić, Department of Mathematics, University of Osijek, Brzi aproksimacijski algoritmi za frakcionalni problem pakiranja i pokrivanja, 25 March 2015
- Rudolf Scitovski, Tomislav Marošević, Ratko Grbić, University of Osijek, Multiple ellipses detection problem, 21 January 2015



The Engineering section of HMD mainly consists of mathematicians working in economic practice (but not only them), which certainly apply operational research methods in their work, and also participate in the KOI conference. The majority of CRORS members is on the mailing list of the engineering section of HMD and

through the seminars actively participates in its work. The list of lectures presented in 2015 is as follows:

- Organizacija poslova u društvu za upravljanje, investicijskom društvu i riznici banke te potencijal matematičara u njihovom poslovanju: H. Krstulović, ZB Invest d.o.o.
- Analiza rizika u zamjenskom cjeloživotnom modelu ulaganja u drugom stupu mirovinskog osiguranja u Hrvatskoj: R. Kovačević, Raiffeisen društvo za upravljanje obveznim i dobrovoljnim mirovinskim fondovima d.d.
- Likovna umjetnost, matematika i algoritmi: V. Čerić, professor emeritus Sveučilište u Zagrebu
- Allocation of Greenhouse Gas Emissions in Supply Chains: G. Sošić, USC, Los Angeles
- Introduction to Building Option Pricing Models: R. Bunčić, Risk Division of Credit Suisse AG

Greys Sošić, professor at University of Southern California, Marshall School of Business, Los Angeles, SAD and the head of the doctoral program "Information and Operations Management", gave a lectures in November 2015 and promoted their doctoral program scholarships among our students. Organized by the Engineering section of Croatian Mathematical Society she gave a lecture at Faculty of Science, University of Zagreb on November 24, 2015, while the next day, on November 25 she gave a lecture at Department of Mathematics, University of Osijek (organized by Mathematical Colloquium).



Mathematical Colloquium

Department of Mathematics, University of Osijek

Chairman: Ninoslav Truhar

Mathematical Colloquium in Osijek was initiated in fall 1993, as an activity of the Scientific section of the Osijek division of the Croatian Mathematical Society, together with 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. Lectures are primarily intended for the faculty members and students of the Josip Juraj Strossmayer University of Osijek, as well as for high school teachers and other mathematicians, but may also be of interest to people working in computer centers and others.

Lecturers of the scientific colloquia are researchers from Croatian universities and abroad. They usually give a report on their own recent results, present parts of their PhD theses, or give an overview of recent trends in various branches of mathematics and its applications. Lecturers of the educational colloquia are teachers from Croatian universities or secondary schools. In these lectures they usually present their own ideas and approaches to teaching a particular subject, 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 2014/2015:

- M. Essert, K. Štrkalj Despot, Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb; Institute of Croatian Language and Linguistics Zagreb, *Computational linguistics*, September 11, 2014.
- P. Benner, Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany, *Parametric model order reduction of dynamical systems: survey and recent advances*, October 9, 2014.
- Ž. Tomovski, Ss. Cyril and Methodius University Skopje, Macedonia), *Generalized Cauchy type problems for nonlinear fractional differential equations with composite fractional derivative operator*, October 30, 2014.
- L. Grubišić, Department of Mathematics, University of Zagreb, *Low rank approximations of infinite-dimensional Lyapunov equations*, November 6, 2014.
- M. Kazalicki, Department of Mathematics, University of Zagreb, *Modular forms in number theory*, December 11, 2014.

- F. Najman, Department of Mathematics, University of Zagreb, *Elliptic curves over the algebraic number fields*, January 15, 2015.
- Barron, Yale University, Department of Statistics, USA, *Neural net approximation and estimation of functions*, March 12, 2015.
- X. Liang, Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany, *Variational principles and their applications for hyperbolic quadratic eigenvalue problems*, March 26, 2015.
- M. Huzak, Department of Mathematics, University of Zagreb), *Polynomial distribution*, April 23, 2015.
- S. Vidak, Department of Mathematics, University of Zagreb, *Geometry of some special classes of IM-quasigroups*, April 30, 2015.
- G. Radunović, Faculty of Electrical Engineering and Computing, University of Zagreb, *Fractal analysis of unbounded sets in Euclidean spaces: complex dimensions and Lapidus zeta functions*, May 14, 2015.
- B. Muha, Department of Mathematics, University of Zagreb, *Fluid-elastic structure interaction problems*, May 21, 2015.

4 OR Area in Focus

IN MEMORIAM TO MAURICE F. SHUTLER (1931-2015)

Jakob Krarup, krarup@di.ku.dk
Graham K. Rand, g.rand@lancaster.ac.uk



Maurice Francis Shutler, treasurer of the OR Society (1983-1991) and President of EURO (1993-1994), died on 27th December 2015, when he finally succumbed to cancer three days before his 84th birthday. Born in Wolverhampton, England, and educated at Wolverhampton Grammar School, Maurice earned a classics degree from Balliol College, Oxford.

EUROPEAN STUDY ON OR/MS EDUCATION: FIRST RESULTS AND PROSPECTS

Belien, J.
Ittmann, H.
Laumanns, M.
Miranda, J. L.
Pato, M.
Teixeira, A. P.

He began work in Organisation and Methods for the steel company Stewarts and Lloyds in the early 50s, and they enabled him, through paid leave, to become an Operational Researcher by the early 60s via the British Iron and Steel Research Association and the London School of Economics. He was then seconded as adviser on OR to the National Board for Prices and Incomes to help investigate the efficiency of nationalised Industries. In 1982 he became a Visiting Professor at the London School of Economics, an appointment he held until 2006. His OR interests were wide-ranging: inventory control, vehicle replacement, the development of corporate planning models, models of mergers and performance measurement.

For the OR Society he served as a study group chairman, as a chairman or member of conference committees, the National Events Committee and others, and as a member of Council, ultimately serving as Treasurer from 1983-1991. In the early 70s, he became the leading advocate of the establishment of a professional structure for OR, in what was a divisive episode in the history of the OR Society. In 1980 Maurice chaired the Organising Committee of the EURO conference held in Cambridge.

He was elected President Elect of EURO in 1990 in EURO's first contested election and served as President from 1993-1994. During his term of office he established a Permanent Secretariat for EURO and introduced two new instruments aimed at promoting collaboration between OR societies in Western Europe and those in Central and Eastern Europe. Drawing on his experience of the potential financial benefits of publications, he played a leading role in discussions that resulted in EURO receiving financial benefit from Elsevier for EJOR.

During the first author's EURO presidency (1989-1990) all EC meetings were also attended by Maurice, EURO's President-Elect (1991-1992). It was a great benefit to have him on board: capable of identifying and focusing on the most important issues on long agendas, meticulous with details at times overlooked by others, a true tower of strength during, what in hindsight, were EURO's most turbulent years.

He was the consummate OR professional, but also was a man with a plethora of outside interests spanning Greek, Latin, the Anglo-Saxon versus Roman roots of today's English, music and musicology, games, history, model trains.

Moreover, he contributed greatly to the OR Society and EURO. To acknowledge this, the OR Society inducted him as a Companion of Operational Research in 1996 and EURO presented him with the Distinguished Service Medal in 2010, at the EURO conference in Lisbon, the last one he attended.

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Introduction

Education in Operational Research / Management Science (OR/MS) has shown significant progress, but further developments that may help to identify key factors related to OR/MS programmes at Higher Education Institutions (HEI) are still required. With the support of partner institutions of the Association of European Operational Research Societies (EURO), a study on OR/MS education in European countries was initiated. The first phase focused on the following main aspects namely: enrolment of students to OR/MS courses, first year OR/MS students' failure rates, continuous promotion of the subject area, OR/MS courses, and the transition of graduates into the labour market. With this objective, the working group prepared a questionnaire aimed mainly at the OR/MS academic community, in order to gain a better understanding of how HEI - universities, colleges, polytechnics and research centers - are addressing OR/MS education topics in Europe.

Methodology aim

The survey, available at <https://ec.europa.eu/eusurvey/runner/ORMSeducation>, was directed at HEI boards, deans and school directors, OR/MS programs coordinators, those responsible for creating OR/MS courses, professors, researchers, and other OR/MS professionals, and it was carried out with the active collaboration of EURO, OR/MS national societies and HEI, which disseminated the information regarding the initiative through newsletters, mailing lists, websites, etc. Additionally, dissemination and information sessions took place during several national and international conferences.

To ensure inputs from the largest possible sample, the project team invited colleagues (collaborators) in EURO membership countries, via their national societies, and who represented their national perspectives to promote the survey and distribute the questionnaire within their respected countries. These collaborators may participate in subsequent studies involving the results relative to their respective countries. As a way to encourage contributions, and with the kind support of Springer Verlag, it was proposed to randomly distribute among the identified respondents sixty electronic copies of the book from the EURO Advanced Tutorials series on Operational Research: *Linear and Mixed Integer Programming for Portfolio Optimization* (Mansini et al., 2015).

During the study comments and suggestions were received for improvements, both with regard to the questionnaire itself and also the promotion of the study and the dissemination of the results of the study. A list of *Frequently Asked Questions* (FAQ) was therefore drafted and included in the questionnaire webpage, to address particular issues and questions of either the respondents or the collaborating colleagues.

The outputs from the questionnaire are to be analyzed in order to identify key factors relating to OR/MS education, propose sub-factors and plan subsequent phases of the study. It is envisaged that the main results of this research are to be presented at future congresses and conferences within the OR/MS field.

Some results

The active participation of colleagues from Belgium (BE), Croatia (HR), Denmark (DK), France (FR), Germany (DE), Italy (IT), Portugal (PT), Slovenia (SI), South Africa (ZA), Switzerland (CH), The Netherlands (NL), United Kingdom (UK), and Ukraine (UA) shows that there is general interest in the topic.

The questionnaire was available for completion online from June to October 2015, and, in total, 190 responses were obtained. Since its completion did not formally require the respondent identity, only about 30% of respondents from 16 different countries indicated from which country they originate (also from Czech Republic-CZ, Estonia-EE, India-IN, Norway-NO, Turkey-TR), either partially or totally. From Figure 1, it can be seen that the highest number of identified participants corresponds to Portuguese affiliation, followed by Croatian and French.

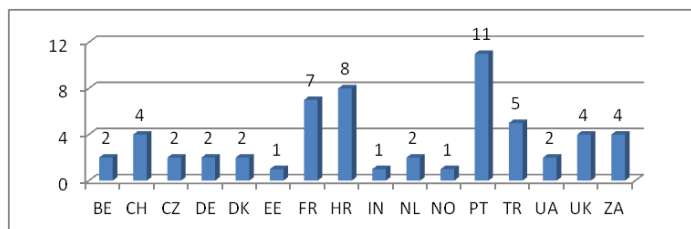


Figure 1 – Identified respondents by country.

In this short report the results concerning the introductory question of the survey is presented, as well as the eleventh one. The introductory question is targeting the type of OR/MS courses in analysis, including Bach./MSc. degrees, specializations (as part of Bach./MSc.) and curricular units (CU) or modules (which do not constitute a specialization). Assuming a context of programmes accreditation and restructuring (e.g. Bologna process), the eleventh question concerns the increase of the number of OR/MS courses or modules in Economics/ Engineering/ Exact Sciences/ Management programmes after the restructuring within each HEI. The graphs in Figures 2 and 3 present the results (in percentage) for both the European respondents and respondents just with Croatian affiliation.

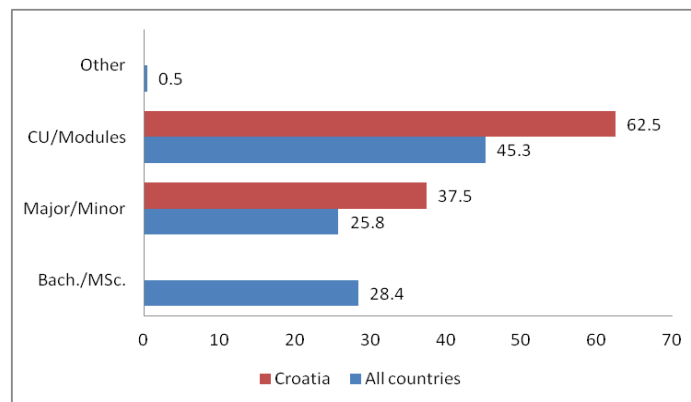


Figure 2 – Answers to introductory question: type of OR / MS modules addressed.

Figure 2 shows that most of the Croatian respondents are referring to curricular units or modules under the scope of OR/MS, while the Bach./MSc. option is mentioned only in other European countries.

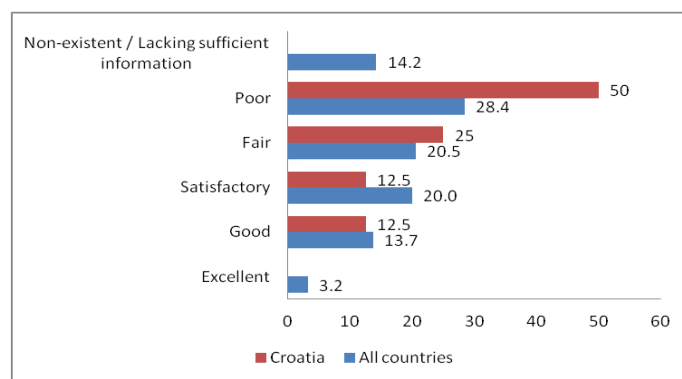


Figure 3 - Answers to eleventh question: number of OR/MS courses or modules after programs restructuring.

From Figure 3 it can be observed that all the Croatian respondents were aware of the programmes restructuring in their respective HEI, while about 14% of the European respondents were not. In addition the responses from those in European countries seem more positive about this topic.

Comments and future developments

The satisfaction and interest expressed by several collaborating colleagues in carrying out sessions and roundtables on OR/MS Education is encouraging. Additionally, it is great to observe that the total number of responses to the questionnaire is significant, either when compared to other related European consultations or with the survey on *OR Practice* of Ranyard *et al.* (2011). In certain cases, the outputs from different affiliated countries will enable the development of other studies, comparing the national situation with that of the EURO countries as obtained from this study as well as other general attributes.

Finally, since the proposed methodology for developing this research work is based on grounded theory (Strauss and Corbin, 1998), additional interviews or questionnaires focusing on specific subjects can be carried out.

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- Mansini, R., Ogryczak, W., Speranza, G. (2015), Linear and Mixed Integer Programming for Portfolio Optimization Springer Series "EURO Advanced Tutorials on Operational Research" (eBook).
- Ranyard, J., Hoffman, K., Rosario, E., Dunstall, S., Ittmann, H. (2011), OR Practice Stream, IFORS Conference, Melbourne, Victoria, Australia.
- Strauss, A., Corbin, J. (1998), Basics of Qualitative Research: Grounded Theory Procedures and Techniques, Sage Publications: Newbury Park, CA, USA.

5 Looking forward to KOI 2016

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Explore the beauty of Slavonia region

In 2016, Croatian Operational Research Society (CRORS) is organizing 15th International Conference on Operational Research - KOI 2016 in Osijek, Croatia from September 27 to September 29, 2016. The conference is organized in collaboration with Faculty of Economics in Osijek and Department of Mathematics, University of Osijek. The program committee chair is Rudolf Scitovski and the organizing committee chair is Marijana Zekić-Sušac.



We invite all our members to participate KOI 2016 with a reduced registration fee available for HDOI/CRORS members, as well as distinguished colleagues from Slovenian Society of Informatica – Section of Operations Research. Call for papers is available at: <http://hdoi.hr/koi2016/about-koi-conference/call-for-papers>

The abstracts of the papers presented at the conference will be published in the "Book of abstracts – KOI 2016", and the full papers will be sent for a double-blind review after the conference. Accepted papers will be published in the Croatian Operational Research Review journal.

Round table "OR in Education" will be organized in conjunction with the KOI 2016 conference with the aim of enhancing the quality of teaching OR courses at the university level. We invite all conference participants, especially scholars and other interested OR researchers and practitioners to actively participate the round table. The following topics will be discussed:

- Analysis of OR education in Europe (Report from the research „OR/MS in Education)
- Analysis of OR education in Croatia
- What business practice needs from OR?
- Standards and new trends in OR education

Round table guest will be a member of EURO research group on „OR/MS in education“.

We invite authors to submit their paper for one of the KOI 2016 conference sections:

- OR Theory and Applications
- Mathematical Programming
- Multicriteria Decision Making
- Quantitative Methods in Banking and Finance
- Statistics and Econometrics
- Machine Learning, Data Mining and Analytics, and
- Special Section on Interior-Point Methods

Keynote speakers of the conference KOI 2016 are as follows:



Jakob Krarup

Professor Emeritus

Department of Computer Science
DIKU

University of Copenhagen,
Denmark

Title of the talk:

Steven Vajda – the pioneer of OR
who introduced linear
programming to Europe and Asia



Andrew R. Barron
 Professor
 Department of Statistics
 Yale University, New Haven, USA



Tabor Illes
 Associate Professor
 Department of Differential
 Equations, Mathematical Institute
 University of Technology and
 Economics, Budapest, Hungary

Title of the talk:
 Linear complementarity problems
 - matrix classes, algorithms and
 applications

Abstracts of the keynote speakers are available at:
<http://hdoi.hr/koi2016/about-koi-conference/keynote-speakers>



Francisco Martinez Alvarez
 Associate Professor
 School of Engineering
 Pablo de Olavide University,
 Sevilla, Spain

Title of the talk:
 Earthquake prediction based on
 data mining techniques

**6 Croatian Operational Research
 Review (CRORR) Journal – Vol. 6**

Anita Čeh Časni, aceh@efzg.hr



Marko Bohanec
 Scientific Councillor
 Department of Knowledge
 Technologies
 Jožef Štefan Institute, Ljubljana,
 Slovenia

Title of the talk:
 Qualitative Multi-Criteria Modelling
 Method DEX Approach, Recent
 Advances and Applications

With its 150 active members in 2015 (mainly university professors), CRORS continues to publish its scientific journal Croatian Operational Research Review (CRORR). Two new issues of the scientific journal „Croatian Operational Research Review“ were published in 2015. Volume 6, Number 1 (published in March) brings 23 scientific papers, while Volume 6, Number 2 (published in October) consists of 16 scientific papers in the area of OR. Also, Volume 7, Number 1 is published in April 2016 consisting of 11 papers.

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



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 scope of the journal is focused, but not limited to the following areas: combinatorial and discrete optimization, integer programming, linear and nonlinear programming, multiobjective and multicriteria programming, statistics and econometrics, macroeconomics, economic theory, games, control theory, stochastic models and optimization, banking, finance, insurance, simulations, information and decision support systems, data envelopment analysis, neural networks and fuzzy systems, and practical OR and applications.

CRORR is published by **Croatian Operational Research Society** & co-publishers:

- University of Osijek, Faculty of Economics in Osijek
- University of Osijek, Department of Mathematics
- University of Split, Faculty of Economics
- University of Zagreb, Faculty of Economics and Business

In the period from 2010 to 2013, the journal was published once a year, while starting from 2014 the journal is published regularly twice a year, containing positively reviewed original scientific papers evaluated by two independent reviewers in a double blinded review process.

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Expected date of publishing the next issue (Volume 7, Number 2) is November 2016. 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.

7 Calendar of Conferences

Anita Čeh Časni, aceh@efzg.hr

- **May 5-6, 2016- ISCCRO'16: The 1st International Statistical Conference in CROatia**, Zagreb, Croatia, http://www.hsd-stat.hr/en/iscro_en/about-iscro16
- **June 3-6, 2016- 28th European Conference on Operational Research, Poznan, Poland** <http://www.euro2016.poznan.pl>
- **June 12-15, 2016- INFORMS International Conference, Hilton Waikoloa Village, Hawaii** <http://meetings2.informs.org/wordpress/2016international>
- **June 26-29, 2016- The Computational Fluid Dynamics (CFD) Society of Canada: 24th Annual Conference, Kelowna, BC, Canada** <http://www.cfdcanada.ca/>

- **July 4-8, 2016- MINZ 2016 Mathematics-in-Industry NZ**, Victoria University, Wellington, New Zealand <http://www.minz.org.nz>
- **October 21-23, 2016- International Conference on Applied and Engineering Mathematics (AEM 2016)**, Shanghai, China, <http://www.engii.org/cet2016/AEM.aspx>
- **April 2-4, 2017- INFORMS Conference on Business Analytics & Operations Research Caesars Palace, Las Vegas, USA**, <https://www.informs.org/Attend-a-Conference/Conference-Calendar/2017-INFORMS-Conference-on-Business-Analytics-Operations-Research>

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