

# IFORS

International Federation of Operational Research Societies

NEWS

## FROM THE PRESIDENT

**Janny Leung** <jannyleung@um.edu.mo>

This month marks the sixty-fifth anniversary of the First International Conference on Operations Research, held on 2-5 September 1957 in Oxford, England. It was at this conference that the idea for the formation of an international federation of national operational research societies was born. That was a visionary decision by the senior delegates of the conference, because at that time Operational Research has yet to be established as a recognized profession, and only a few countries had organised national OR societies. Sir Charles Goodeve led a committee to draft the Charter and Statutes, and thus IFORS came into being in 1959!



At that initial Oxford meeting, it was discussed that the objectives of the yet-to-be-formed International Federation of Operational Research Societies should include: coordinating OR effort on international problems, establishing an abstracting and translation service in OR publications, and ensuring the continuity and consistent high quality of international OR conferences. In the 60+ years since, IFORS has devoted its efforts to successfully meeting those objectives. The development of OR worldwide is a core mission of IFORS, with special attention to the promotion of OR in developing countries. There are now 54 Member Societies of IFORS across 6 continents. Through sponsorship of Distinguished Lectures and focussed workshops and support for students attending summer/winter schools, IFORS encourages the teaching and training of the next generation of Operational Researchers. Our latest initiative, the Global Webinars, enables an even wider audience to be reached. For more than half a century, the *International Abstracts in Operations Research (IAOR)* have been a valued reference for researchers and practitioners. The IFORS flagship journal, *International Transactions in Operational Research*, is highly ranked. The new open-access IFORS journal, *Sustainability Analytics and Modeling*, ensures that OR work in this emerging new field is well publicized. Of course, the series of high-quality triennial IFORS conferences has remained unbroken for the past 65 years!

That first OR conference at Oxford in 1957 was attended by 242 delegates from 20 countries. Over 5 days, the conference programme included sessions on: Methodology, Applications, Discussion Panels, as well as an opening session where future directions of the field of OR were actively discussed. The presentations on Methodology included papers on gaming, queuing, inventory, simulation and linear programming (given by George Dantzig); these topics remain central to OR methodology even today. Practical applications presented include freight transport, vehicular traffic, mining, manufacturing and agriculture --- again areas with strong use of OR even today. With ONLY 7 minutes (!) allowed for each talk, those speakers had to be super-organised! The conference programme also included site visits to relevant industries, informal group discussions, and a social excursion to Stratford-on-Avon on the Wednesday!

The IFORS triennial conferences have, by and large, preserved this successful format: a rich and comprehensive mix of talks across all areas of methodology and applications, ample time for interaction among delegates, and the Wednesday social excursions --- where many friendships and collaborations have been forged over the years. >>

## WHAT'S INSIDE

### 1. From the President

Janny Leung

### 2. From the Editor-in-Chief

Antonio Mauttone

### 3. OR Tutorial

Opponent Choice in Tournaments

### 4. OR Impact

A Decision Support System for  
Brewery Production Planning at  
Feldschlösschen

### 5. Conferences

Reports on conferences, webinars,  
summer schools and more

### 6. Book Review

Productivity - Concepts,  
Measurement, Aggregation  
and Decomposition

### 7. Editorial Box

### 8. Miscellaneous

CLAIO 2022 Conference

APORS 2022 Conference

IFORS Prize for OR in  
Development 2023

IFORS 2023 Conference

>> Of course, IFORS and the conferences have grown much bigger since 1957. For the Santiago conference next year, Programme Chair Prof. Alice Smith is planning a fantastic programme with talks in over 30 Cluster Areas --- from Analytics to Zero-sum games --- in multiple parallel sessions as well as plenary talks and tutorials by distinguished experts. The triennial conference is a signature global event for the IFORS community; the 2023 conference is only the second one hosted in South America (the previous one being 35 years ago in 1987!). The 2020 Korea conference was postponed and then held online due to covid19; so the 2023 conference will be the first time in 6 years where

delegates from IFORS Member Societies can meet in-person to exchange ideas, share experiences, and cooperate to build the future of OR.

I hope you are already preparing your presentation and travel plans. I look forward to seeing you in Santiago in July 2023!

**Reference:**

Page, T. (1957) First International Conference on Operations Research—Oxford, England, September 2–5, 1957. *Operations Research* 5(6):863-871. <https://doi.org/10.1287/opre.5.6.863>

# FROM THE EDITOR-IN-CHIEF

**Antonio Mauttone** <mauttone@fing.edu.uy>

Welcome to the September issue of the IFORS Newsletter!

During this year several large OR conferences have been held in-person and some others are planned to be held in the near future. This is the case of the CORS/INFORMS, EURO, APORS and ALIO conferences. The OR community worldwide is experiencing the benefits of in-person scientific meetings, which contribute to the exchange of knowledge and experiences. In this context, the IFORS flagship conference, to be held in Santiago, Chile, in July 2023, constitutes a unique opportunity to meet the global OR community. The organization of the conference is moving forward to ensure an enjoyable and productive event. Stay tuned to be updated with the latest information regarding the conference and do not miss the opportunity of visiting Santiago!



This issue of the newsletter comprises material related to our classical sections. In the *OR Tutorial*, colleagues from The Ohio State University and University of Michigan, USA, describe strategies for tournament design with application to sports. The methodology presented, which is a theoretical study, aims to avoid unwanted characteristics of conventional tournament design, for instance, unfair opportunities for players and non-appealing events for spectators. In the *OR Impact* article, colleagues from Universität Hamburg, Germany, present the development of a Decision Support System (DSS) for a large brewery and beverage distributor in Switzerland. At the core of the DSS, a multi-level capacitated lot-sizing problem is modeled, while the complete software tool integrates graphical user interfaces, visualization features and cloud-based optimization. The application of the DSS allowed for reducing both operating costs and planning effort. The *Conferences* section reports 17 events worldwide on OR and related disciplines, while the *Book Review* section reports on the volume “Productivity - Concepts, Measurement, Aggregation and Decomposition”. Finally, in this issue you will find information about upcoming regional OR conferences, the IFORS 2023 conference and the IFORS Prize for OR in Development 2023.

We thank all contributors, authors and section editors for their work, and we hope you enjoy the reading! 🌍




## SUBSCRIBE TO THE IFORS NEWSLETTER

## BY SCANNING THIS QR CODE >

<https://www.ifors.org/subscribe>

**FROM THE PRESIDENT**  
Joyce Leung - jleung@polyu.edu.hk

I am honored to have been elected the 2022 President of IFORS. Together with the other members of the Editorial Committee for the 2022-2023 term, I look forward to serving IFORS to support our member societies and the next generation to pursue Operational Research around the world.

Like every year, I discovered Operational Research in my undergraduate days. The methods and methodologies of Operational Research include linear, integer, mathematical programming, stochastic programming, simulation, and are applied to decision-making in practice. Doing OR means solving the problems that are intellectually stimulating and have practical impact - what I tend to love about OR!

Operational Research has crossed out of my specialty, where scientists of different disciplines - mathematics, physics, statistics, philosophy - were brought together to solve complex problems. The generalization leading to a new discipline, like OR, is the result of Operational Research from several domains: demand of production, transportation, distribution, inventory, location, etc. Throughout OR's development, it has historical connections to its members and colleagues.

**What's Inside**

- 1. Editor-in-Chief
- 2. From the President
- 3. From the Editor-in-Chief
- 4. News
- 5. IFORS News
- 6. IFORS Prize for OR in Development
- 7. IFORS 2023
- 8. IFORS 2023
- 9. IFORS 2023
- 10. IFORS 2023

# Opponent Choice in Tournaments

**Nicholas G. Hall** <hall.33@osu.edu> Fisher College of Business, The Ohio State University

**Zhixin Liu** <zhixin@umich.edu> College of Business, University of Michigan - Dearborn

Many multiple round tournaments consist of a preliminary or group stage, followed by several rounds of single elimination play using a fixed seeding or *bracket*. This design is used in, for example, most U.S. major sports, the FIFA World Football Cup, and the ICC World Cricket Cup. The objectives of the designers of such tournaments include: providing the players with equally fair opportunities, motivating them to perform well, selecting among them, and providing an appealing event for spectators. Our work addresses several deficiencies that arise in such tournaments with respect to these objectives. First, various reasonable criteria such as stronger ranked players having a higher probability of winning are not satisfied. Second, the probability that the top two players meet is not maximized. Third, there is the widely observed issue of *shirking or tanking* at the preliminary stage, where a player deliberately avoids winning a game, in order to obtain an easier path through the tournament. Fourth, top ranked players randomly incur unfortunate matchups against other players, which introduces an unnecessary element of luck into the tournament.

To address these deficiencies of conventional tournament design, we propose a new design under which the players, in ranked order that is at least initially determined at the preliminary stage, *choose their next opponent at each single elimination round*. We study the performance of two versions: under *static ranking*, the ranking of the players when they entered the single elimination stage of the tournament remains fixed; whereas under *dynamic ranking*, a lower ranked player inherits the ranking of a higher ranked player which it beats.

We study the performance of the opponent choice design using three established measures from the related literature: (a) whether the opponent choice design provides a reasonably higher tournament win probability to the top ranked player(s), (b) whether it provides a reasonably higher probability of the top two players meeting, and (c) whether it provides a ranking by tournament win probabilities that closely matches the original ranking of the players. The opponent choice design outperforms the conventional design for the first two performance measures, and provides very similar performance for the third measure. It also reduces shirking.

Tournaments where opponent choice is currently used include:

- The EBEL Austrian Ice Hockey League
- The Southern Professional Hockey League (U.S.)
- The U.S. Bridge Federation
- The PRO Chess League.

We consider a tournament consisting of a preliminary stage, followed by a single elimination stage. The single elimination stage consists of  $n$  rounds and  $N = 2^n$  players. At the time they enter the single elimination stage, the players have a ranking that is established through earlier performance. For a bracket

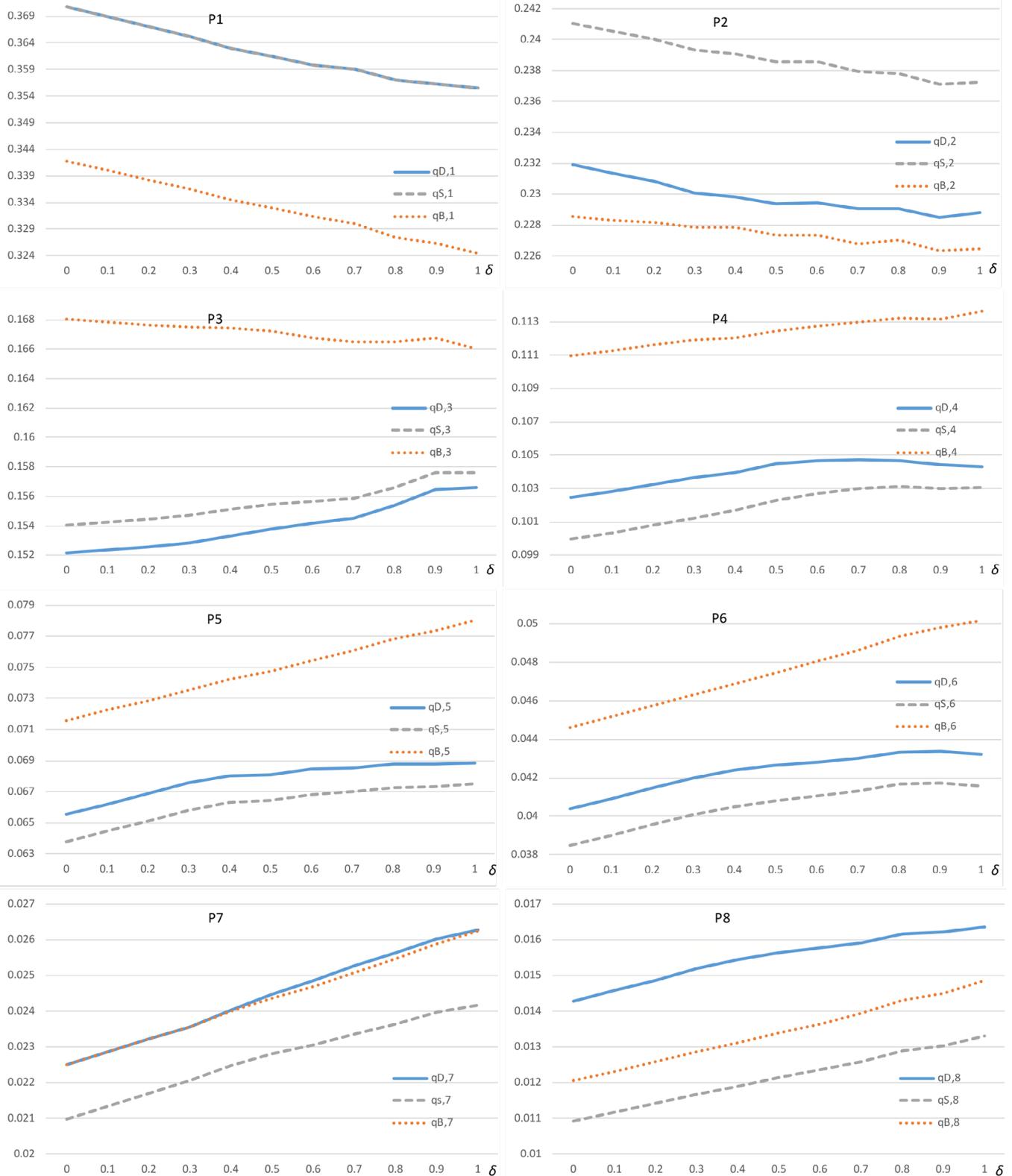


tournament design, this ranking completely specifies the matches that ensue for the winners at each round. However, under the opponent choice design, it is always advantageous to qualify for the single elimination stage with a higher ranking.

We use computational studies to compare the performance of the opponent choice design, under both static and dynamic rankings, to that under a conventional bracket design, with respect to measures (a), (b) and (c) above. We begin with a regular win probability matrix with  $N = 2^n$  players where  $p_{ij} = .5 + .05(j - i)$ , for  $1 \leq i < j \leq N$ . We control the degree of irregularity  $\delta$  by adding to each matrix entry a randomly generated value  $d \sim U[-\delta, \delta]$ , for  $\delta = 0, .01, .02, \dots, .1$ . For the semifinal round the dynamic and static rankings are the same under the opponent choice design since only player  $P1$  can choose its opponent, whereas for the quarterfinal round they are different.

We discuss the quarterfinal round results shown in Figure 1. The opponent choice design benefits player  $P1$  similarly under the dynamic and static rankings. Moreover, the relative benefit is highest when matrix irregularity is high, since it is then that the value of choosing an opponent other than  $P8$  is greatest. If player  $P1$  loses and player  $P2$  wins different games at the quarterfinal round, then at the semifinal round under the static ranking player  $P2$  chooses its opponent first, while under the dynamic ranking the player which beats player  $P1$  in the quarterfinal round which is likely to be a weak player chooses its opponent first. Hence, player  $P2$  benefits greatly from the flexibility of choice under the static ranking, but less under the dynamic ranking. Players  $P4 - P8$  have consistently lower tournament win probabilities under the static ranking than under the dynamic ranking.

A desirable feature of tournament design is the probability that it provides for the top two players to meet; such matchups typically generate great spectator interest. Under the conventional bracket, players  $P1$  and  $P2$  can only meet in the final, whereas under the opponent choice design they can meet in any round. Our instances contain no cases where players  $P1$  and  $P2$  meet in the quarterfinal round, hence we report the probabilities for them to meet in the semifinal and final rounds.



▲ Figure 1: Tournament Win Probabilities for Quarterfinal Round.

In Table 1, columns  $q_{D4,12}$ ,  $q'_{D4,12}$  and  $q_{B4,12}$  contain the mean probabilities that players P1 and P2 meet in the final and semifinal rounds under the opponent choice design, and in the final under the conventional bracket design, respectively, for the semifinal round. Similarly, the next five columns are for the quarterfinal round, with the dynamic ( $q_{D8,12}$ ,  $q'_{D8,12}$ ) and static ( $q_{S8,12}$ ,  $q'_{S8,12}$ ) rankings separated. With increased irregularity, the opponent choice design achieves relatively greater probability for players P1 and P2 to meet. In the quarterfinal round, even with high irregularity and increased probability for players P1 and P2 to meet in the semifinal round, the opponent choice design still offers greater

probability for them to meet in the final than the conventional bracket design does.

We now drop the above assumption of complete information. With information that is known to be imprecise, the players may simplify their estimates into a few categories; such as “win”, “draw”, and “lose”. If the win probability is estimated as greater than 0.6, the player uses a value of 1; if the win probability is between 0.4 and 0.6, the player uses a value of 0.5; and if the win probability is smaller than 0.4, the player uses a value of 0. We assume that each player breaks ties by choosing a player with the lowest ranking, and repeat the above study.

Parameter	$q_{D4,12}$	$q'_{D4,12}$	$q_{B4,12}$	$q_{D8,12}$	$q'_{D8,12}$	$q_{S8,12}$	$q'_{S8,12}$	$q_{B8,12}$
$\delta = 0$	0.358	0.000	0.358	0.257	0.000	0.257	0.000	0.258
$\delta = .01$	0.356	0.000	0.356	0.256	0.000	0.256	0.000	0.256
$\delta = .02$	0.354	0.000	0.354	0.254	0.000	0.254	0.000	0.254
$\delta = .03$	0.353	0.000	0.352	0.252	0.000	0.252	0.000	0.252
$\delta = .04$	0.352	0.000	0.351	0.250	0.000	0.250	0.000	0.251
$\delta = .05$	0.352	0.000	0.349	0.250	0.000	0.250	0.000	0.249
$\delta = .06$	0.351	0.002	0.348	0.249	0.001	0.249	0.001	0.247
$\delta = .07$	0.348	0.013	0.346	0.249	0.003	0.249	0.003	0.245
$\delta = .08$	0.345	0.022	0.344	0.248	0.007	0.248	0.007	0.243
$\delta = .09$	0.339	0.039	0.343	0.247	0.011	0.247	0.011	0.241
$\delta = .10$	0.337	0.049	0.341	0.247	0.015	0.247	0.015	0.240
Mean	0.349	0.011	0.349	0.251	0.003	0.251	0.003	0.249

▲ Table 1: Probability of Player  $P1$  Meeting Player  $P2$ .

The results in Figure 2 show that, for all players except for  $P2$  and  $P7$ , the tournament win probabilities under opponent choice with incomplete information fall between those obtained by the other two approaches with complete information. This is intuitive: with simplified estimates of 0, .5, and 1 for the pairwise win probabilities, players cannot accurately differentiate the other players in their opponent choice and hence make decisions that are more similar to those under the conventional bracket design. However, players  $P2$  and  $P7$  benefit from opponent choice compared with the conventional design, even more with incomplete information than with complete information. This is because with imprecise information, the first mover player  $P1$ , cannot make opponent choice decisions that are as accurate as in the case of complete information.

We list several notorious examples of shirking in multiple round tournaments.

- In the 1998 Tiger Cup Asian football competition, the winner of the last group game between Thailand and Indonesia would travel to Hanoi to play the hosts Vietnam, whereas the loser could stay in Ho Chi Minh City and play Singapore.
- At the 2012 Summer Olympics, the Chinese, Indonesian and S. Korean women's badminton teams were all disqualified for deliberately losing their group stage matches.
- At the 2018 FIFA World Football Cup, the last group match involved England and Belgium. The winner would face a potential quarterfinal match against five-time world champions Brazil. Belgium won the match 1-0, but later beat Brazil anyway.

Consider the final game at the end of the preliminary round, where shirking is most likely. Moreover, this situation includes, for example, the England - Belgium and Thailand - Indonesia games described above. We consider the incentive for a player,  $P$ , to shirk in the final game against an opponent,  $O$ . We provide the following anti-shirking result.

**Theorem 1** Assume

(a) the subset of players who continue to the next round is not dependent on the result of the final preliminary round game, and

(b) any player in the last preliminary round game which continues to the next round will choose an opponent, rather than be chosen, at that round.

Then, the opponent choice tournament design eliminates shirking at that game.

Proof. There are three possible cases, as follows.

(a). Player  $P$  will continue to the next round, but player  $O$  will not. A higher ranking for player  $P$  in the next round gives player  $P$  a superset of choices against a fixed set of potential opponents with a fixed ranking - and therefore a fixed order of opponent choice - relative to a lower ranking for player  $P$ . Therefore, player  $P$  has no incentive to shirk. Clearly, player  $O$  which is playing its last game has no incentive to shirk.

(b). Both players will continue to the next round. Both players have an incentive to improve their rankings, and therefore enlarge their choice of opponents at the next round, by trying to win the game.

(c). Neither player will continue to the next round, hence neither player has an incentive to shirk.

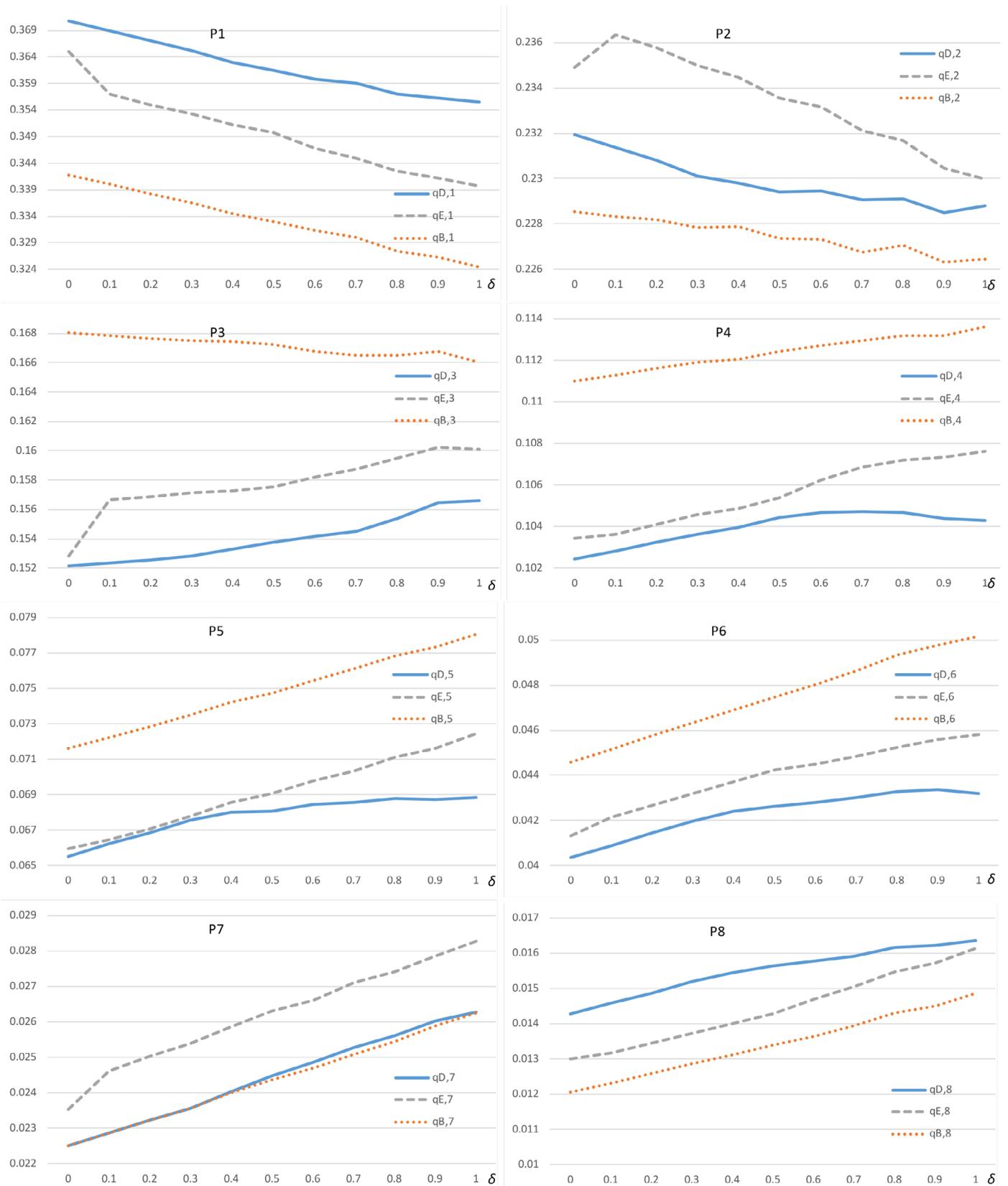
In the situations described in Theorem 1, our opponent choice tournament design represents an improvement over the conventional bracket design where winning the final preliminary round game may result in player  $P$  having a bad matchup at the next round, which provides an incentive to shirk at the last preliminary round game.

We also consider possible strategic behavior by groups of players. We study whether the positive anti-shirking results in Theorem 1 continue to hold under group strategic behavior.

**Remark 1** (a). The result in part (a) of the proof of Theorem 1 partly fails under group strategic behavior. It remains true that player  $P$  will not shirk, but player  $O$  may shirk in order to provide player  $P$  with a higher ranking at the next round.

(b). The result in part (b) of the proof of Theorem 1 also partly fails under group strategic behavior. In a situation where one player's ranking will not change depending on the results of the game, but the other player's ranking will change, then the former player may shirk.

(c). The result in part (c) of the proof of Theorem 1 still holds.



▲ Figure 2: Tournament Win Probabilities with Incomplete Information.

In summary, to address several well known deficiencies that arise in multiple round sports tournaments, we propose a new design for the single elimination stage of a tournament, where highly ranked players may choose their opponents at each round. This design is implemented for both static and dynamic rankings of the players. Most importantly, an easier path through the tournament is available to any player as a

result of obtaining a higher ranking, as verified by the results of our computational study. This feature from our opponent choice design discourages, and in some cases eliminates, strategic shirking behavior at the preliminary stage of the tournament. In conclusion, we hope that our work will encourage interest in this topic that influences the enjoyment of billions of sports fans around the world. 🌍

# A Decision Support System for Brewery Production Planning at Feldschlösschen

Markus Mickein <markus.mickein@uni-hamburg.de>, Matthes Koch, Knut Haase

## Introduction

Feldschlösschen, the largest brewery and beverage distributor in Switzerland, was founded in 1876 and accounts for 40% of the Swiss beer market with an annual revenue of over 900 million CHF (£747m). Feldschlösschen has been a part of the Carlsberg Group since 2000. Its portfolio includes many regional brands but also international brands such as Carlsberg. This study was based on the traditional brewery in Rheinfelden with an annual production volume of 1.8 million hectolitres.

The production schedule contains 220 finished products, 100 semi-finished products, 13 production resources, 8 storage resources, 3 main production levels, and a planning horizon of 52 weeks. The brewery production process is subject to restrictive dependencies, such as lead times for fermentation and maturation, a short shelf life of finished beer and divergent production structures. Moreover, the changing demand of different customer groups for various packaging volumes, variants of beer (particularly craft beers such as India Pale Ale) and specific brands, enlarges the manufactured product portfolio of the brewery but increases production complexity.

The aim of the study was to improve production planning processes with the aid of a Decision Support System (DSS), which would better integrate the actions of the departments involved and also provide more transparency of the planning process. The work was carried out by a team from Hamburg University, working closely with company planners and managers.



▲ Fig 1. Brewhouse of the Feldschlösschen Brewery.

## The Production Processes

Beer manufacturing requires integrated planning of several multilevel sub-processes: brewing, fermentation, maturation, filtration, and bottle/can filling. Fig 2 shows the production process from the base beer to the finished beer.

Beer production starts with brewing the wort (unfermented



beer) in the brew house. After adding yeast, the fermentation begins, which is followed by maturation. These processes last up to three weeks. Next, filtration removes the yeast and other undesired particles, producing several types of semi-finished beer. The semi-finished beer is stored in buffer tanks until further processing. Finally, the beer is transferred to bottles, cans, or kegs. The finished beer is stored in the warehouse until delivery to customers.

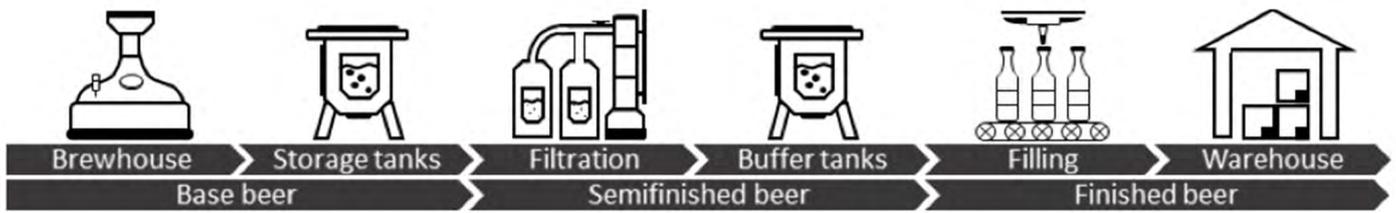
In addition to the general brewing process, producing alcohol free beer and mixed beers requires additional production stages. Corresponding sub-processes increase the planning complexity due to additional equipment and ingredients.

## The Decision Support System

Production planning at a brewery can be regarded as a general multilevel bill of materials problem, also known as the multi-level capacitated lot-sizing problem (MLCLSP), and this is modelled at the core of the DSS. Thus this new DSS develops production schedules for the entire production system to support tactical and strategic planning by scenario analysis or "what if" queries.

Fig 3 illustrates the structure of the DSS, which consists of a **user interface (UI)** and **visualization tool** embedded in a **cloud-based optimization framework**. The UI includes data collection and validation. A virtual machine in the cloud runs the calculation, generates planning reports, and stores optimization results. Finally, customized dashboards visualize the optimization results.

The **User Interface** is a desktop application for Microsoft Windows, designed for Feldschlösschen, and enables production planners to prepare data scenarios and initiate calculations: production data (i.e., product, resource, and demand data) specifies the input data of a production scenario. The UI validates the data and reports errors, enables data collection and input from the Enterprise Resource Planning (ERP) system and various spreadsheets. Users can manually adjust existing data and add new data from different sources and each data category can include several data scenarios.



▲ Fig 2. Beer manufacturing process.

The **Visualization Tool** displays the optimization results (i.e., lot sizes, inventories, and capacities) for the computed production scenarios in interpretable dashboards. These derived Key Performance Indicators (KPIs) for each resource within the multilevel production system, support decision making and the comparison of different scenarios by planners and managers.

The **Cloud-Based Optimization** is carried out on virtual machines because of the computing power required to ensure rapid calculation times and to enable multiple simultaneous uses of the DSS. In the cloud, a virtual machine hosts an SQL database and executes the mathematical program using the optimization software GAMS. An adaptable fix-and-relax-and-optimize heuristic is used to achieve good solutions in a reasonable time. The optimization model and solution approach are implemented in GAMS and solved by CPLEX. Further details of the optimisation are provided in Reference 1.



▲ Fig 3. Structure of the Decision Support System.

Some assumptions that are not critical to the outcome have been made in the mathematical model, including, for example, that demand is satisfied in each period and that raw and packaging materials are available at any time, in any quantity. The model formulation accounts for set-up times and losses but assumes set-up times to be sequence-independent. Each product has a fixed allocation to one production line and one storage facility. Multiple identical tanks are aggregated into tank groups. In addition, an initial and final inventory is assumed so as to ensure production capability at the beginning of, and beyond, the planning horizon. Unexpected demand is handled by including a dynamic safety stock, which depends on future demand and a product-dependent risk factor.

### Implementation

Local planners and managers were involved in the project from the very start, so as to ensure that they could understand the principles of the new DSS but also and more importantly, so that they could input their expert knowledge, particularly about how the brewing process is represented in the DSS. Initial results were discussed at inter-divisional meetings and input parameters adjusted if necessary. Results from the DSS could be seen to be an improvement compared to the

previous system, which aided acceptance.

Local staff were able to advise on the balance between the level of simplification of the process, as represented in the DSS, versus solution quality and accepted longer computing times so as to achieve better solutions. Thus critical processes are modelled in more detail. The jointly devised and easy to use UI also aided local acceptance and encouraged full use of the DSS. Experience has shown that visualization and validation encourage planners use the new planning system.

The authors continue to work with Feldschlösschen to improve the DSS. For example, a software extension to further improve operational planning level decisions is under development. Also training sessions and workshops for local planners and managers continue to be held, so as to exploit the DSS's potential.

### Impact

Feldschlösschen applies the DSS to support decision making related to top management issues, such as beer variety strategies, investment decisions, and capacity development. The DSS quantifies the effect on the production process of strategic decisions such as changes in the product portfolio. Additionally, the efficiency of investments in new equipment on the remaining production system can be evaluated. The new DSS has been shown to reduce operating costs by around 5% whilst reducing planning effort by as much as 40%.

### Endorsement

"The software supports strategic and tactical planning decisions in standardized reports. The most significant value added is the analysis of the interactions between production stages as the consequence of decisions. This enables us to better quantify investment requirements and evaluate future strategies. It reduces investment costs by identifying actual need and realizes operational cost savings by analysing strategic scenarios in a holistic manner. Furthermore, it improves decision communication to the relevant departments." (Head of Supply Chain Planning & Product Change Management, Feldschlösschen Supply Company AG)

### Reference

Markus Mickein, Matthes Koch, Knut Haase (2021) A Decision Support System for Brewery Production Planning at Feldschlösschen. *INFORMS Journal of Applied Analytics* 52(2):158-172. <https://doi.org/10.1287/inte.2021.1101>

**Acknowledgement:** The editors are grateful to Michael Gorman, the editor of *INFORMS' Journal of Applied Analytics*, for permission to run this abbreviated article in *IFORS News*. 

## Highlights of EURO2022 @ Aalto University - A sunny return to face-to-face dissemination and networking

**Dolores Romero Morales** <drm.eco@cbs.dk> **Antti Punkka** <antti.punkka@aalto.fi> **Juuso Liesiö** <juuso.liesio@aalto.fi>



▲ After a long break, face-to-face conferences are back and the city of Espoo warmly welcomed the nearly 2000 EURO2022 delegates at the Aalto University Otaniemi Campus.

The 32nd European Conference on Operational Research, EURO XXXII, was held in Aalto University, Espoo, Finland, from 3rd to 6th July, 2022.

It took several people and organizations to make the 32nd EURO conference a big success, including the Programme Committee chaired by Dolores Romero Morales, the Organising Committee chaired by Antti Punkka with his co-chairs Juuso Liesiö and Eeva Viikkumaa, Abbey Conference & Events, Aalto University, the Association of European Operational Research Societies (EURO), and the Finnish Operations Research Society (FORS). We present here a few highlights. For more information about the conference please visit <https://euro2022espoo.com/>.

The conference was organized at Aalto University Campus in Otaniemi, Espoo, about 6 km from Helsinki city centre. The scientific programme took place in two buildings. The approximately 1900 conference delegates from approximately 70 countries had the opportunity to follow about 40 concurrent parallel sessions.

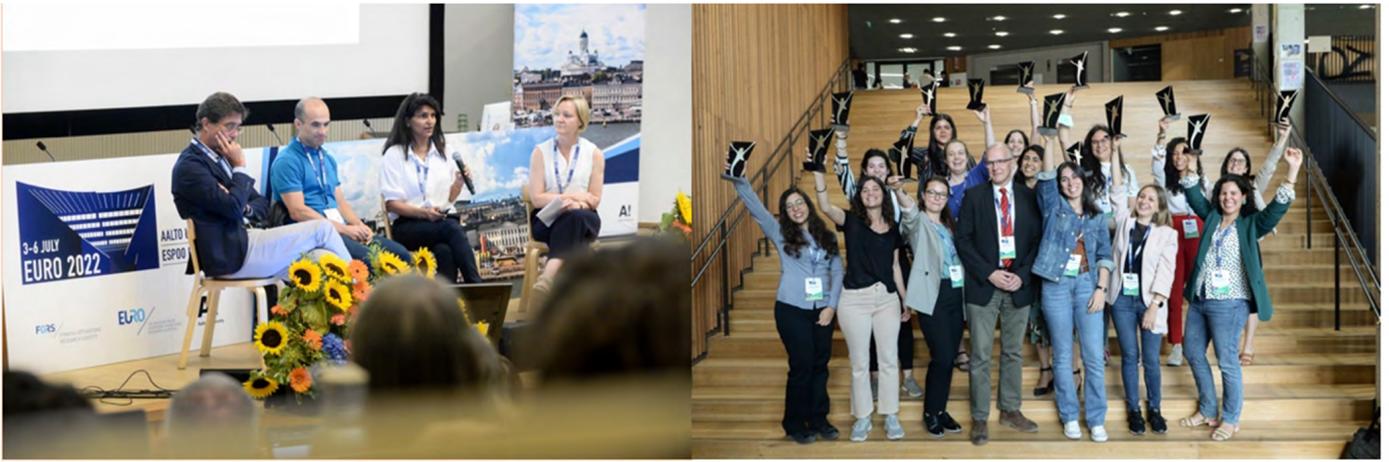
The EURO2022 participants enjoyed the conference social

programme which – for many – offered the first international face-to-face networking possibility in a long time. In the opening and closing parties on Sunday July 3 and Wednesday July 6 the delegates got to taste local craft beers and a buffet of Finnish cuisine in a sunny weather at the campus. The gala dinner was organized on Tuesday July 5 in the brand new Little Finlandia in downtown Helsinki next to the Baltic Sea and under the midnight sun. The demand for live conferences that had accumulated over the past years was clearly visible when the band started playing after the dinner. The dance floor was full midway through the first song. Parallel to the scientific programme, the accompanying persons had the possibility to participate in walking tours of the top attractions in Helsinki.

The scientific programme of EURO2022 started on July 3 with the opening ceremony. Dolores Romero Morales thanked the colleagues at the Programme Committee, the stream organizers, the EURO Working Groups and the EURO Forums for putting together a very attractive scientific programme. She moved on to describe the great collaboration with the Organising Committee. >>



▲ Cathal MacSwiney Brugha, EURO Distinguished Service Award, and EURO Gold Medallist, Gilbert Laporte, at the opening ceremony on July 3 talking about their extensive careers in Operational Research.



▲ The EURO Forums Roundtable (left) and the EURO WISDOM YoungWomen4OR Awardees with Marc Sevaux (right).

>> She briefly went through the highlights of the programme, including the invited speakers, the *EURO Forums Roundtable* exploring the opportunities and challenges of conducting research in our area, the *Making and Impact Stream* organized and led by the *Practitioners Forum*, the *YoungWomen4OR Stream* led by the *WISDOM Forum*, and the *EURO Young Invited Keynote*.

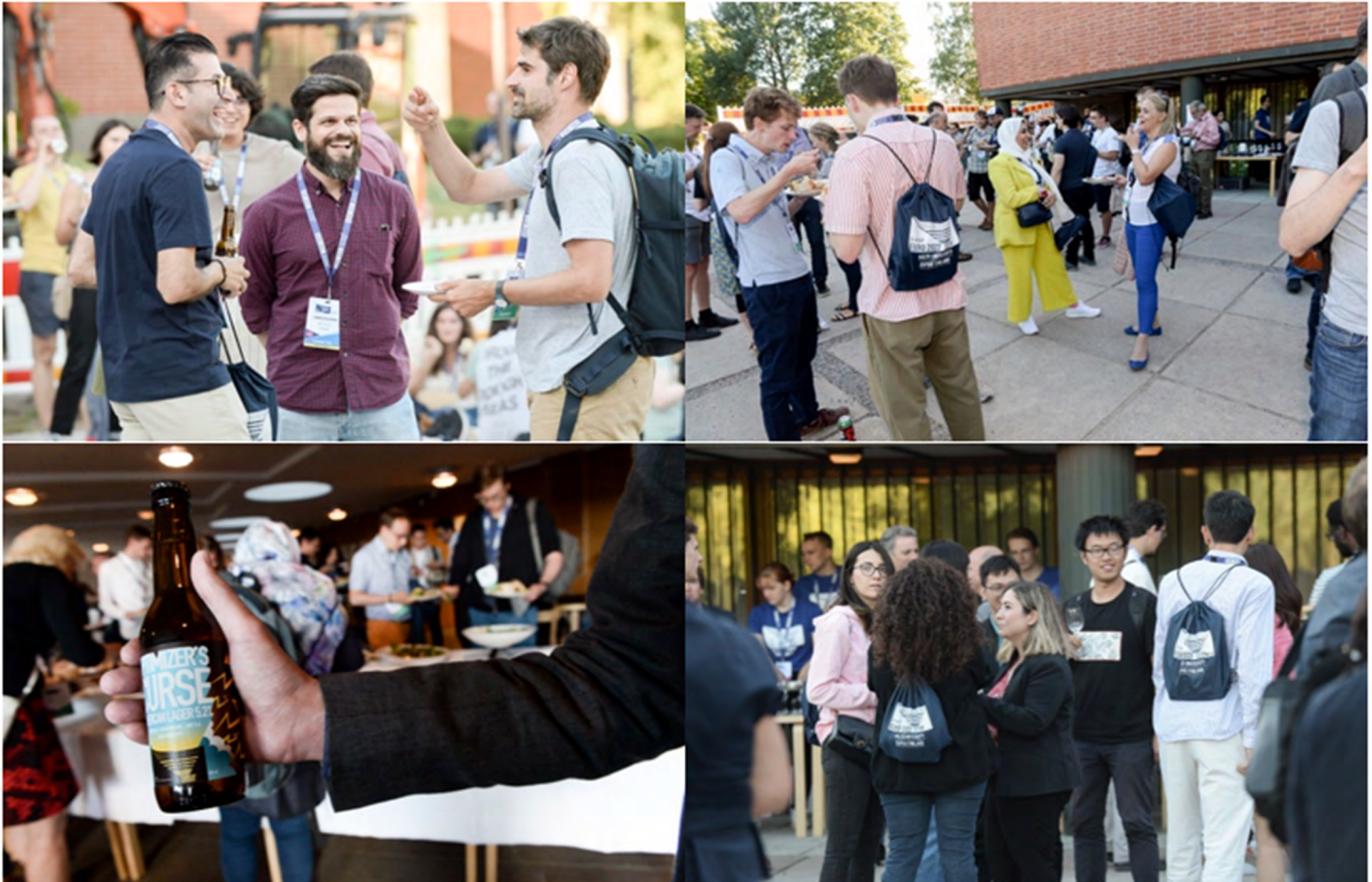
The opening ceremony included the presentation from the *President of FORS, Tommi Ekholm*, and from the *President of EURO, Marc Sevaux*. Following the tradition, the *EURO Distinguished Service Award* was announced, that went to *Cathal MacSwiney Brugha* (University College Dublin, Ireland), as well as the *EURO Gold Medal Award*, that went to *Gilbert Laporte* (HEC Montréal, Canada).

In addition to approximately 1600 talks, the conference

counted with 3 plenary speakers, namely *Andrea Lodi* (Cornell University, USA), the *IFORS Distinguished Lecturer, Christina Pagel* (University College London, UK) and *Marja-Liisa Siikonen* (MLS Lift Consulting Ltd, Finland), and 12 keynote speakers, namely, *Fran Ackermann* (Curtin University, Australia), *Claudia Archetti* (ESSEC Business School, France) – *EURO Young Invited Keynote*, *Burcu Balcik* (Özyeğin University, Turkey), *Krzysztof Burnecki* (Wroclaw University of Science and Technology, Poland), *Emilio Carrizosa* (Universidad de Sevilla, Spain), *James Cochran* (University of Alabama, USA), *Antonio J. Conejo* (Ohio State University, USA), *Jacek Gondzio* (The University of Edinburgh, UK), *Daniel Kuhn* (Ecole Polytechnique Fédérale de Lausanne, Switzerland), *Martin Schmidt* (Trier University, Germany), *Grit Walther* (RWTH Aachen University, Germany), and *Athanasios Yannacopoulos* (Athens University of Economics and Business, Greece). >>



▲ (left to right and top to bottom): *Marja-Liisa Siikonen* (MLS Lift Consulting Ltd, Finland), *Andrea Lodi* (Cornell University, USA; IFORS Distinguished Lecturer) and *Christina Pagel* (University College London, UK).



▲ A relaxed atmosphere at the welcome party on July 3, with a record number of registrations, and the closing party on July 6.

>>The invited speakers touched on some of the latest advances in continuous, discrete, bilevel and robust optimization and their relevance to tackling grand challenges such as COVID-19, humanitarian decision making and collaboration, catastrophe risk management, fairness in resource allocation, and the transformation of our energy, industrial, and mobility systems.

EURO2022 had its closing ceremony on July 6 with the presentation of the *EURO Award for the Best EJOR Paper* in the modalities of Innovative applications of OR (*Deep learning models for bankruptcy prediction using textual disclosures by Mai et al.*), Review (*Warehousing in the e-commerce era: A survey by Boysen et al.*), and Theory and Methodology (*Predicting customer demand for remanufactured products: A data-mining approach by Van Nguyen et al.*); the presentation of the *EURO Doctoral Dissertation Award* to Daniel Rehfeldt, and the presentation of the *EURO Prize for OR for the Common Good* to *Supporting Brazilian smallholder farmers decision making in supplying institutional market by Tuni et al.*

Before the closing party started, Jorge Vera Andreo (Pontificia Universidad Católica de Chile) presented the *IFORS 2023* conference, that will take place in Santiago de Chile in July 2023, and Dario Pacino (Technical University of Denmark) did the same for the next

*EURO-k* conference that will take place in Copenhagen at the end of June and beginning of July of 2024.

To end, there were farewell addresses from Joanna Jozefowska (*EURO Vice President 1*), Dolores Romero Morales (Programme Committee chair), and from the Organising committee Antti Punkka (chair), Ahti Salo and Raimo P. Hämmäläinen who put in pictures the years of preparations, the wonderful facilities and even better weather, the excellent dedication of the volunteers, and the support of the sponsors to have our first in-person *EURO-k* conference since the pandemic started. 🍷



▲ On July 5 the accompanying persons enjoyed a guided walking tour through the World Heritage Site Suomenlinna.

# 7th ICOSC Conference in Mongolia: a Showcase for Optimization, Simulation and Control

Milagros R. Baldemor <milagros\_baldemor@yahoo.com.ph> Enkhbat Rentsen <renkhbat46@yahoo.com>



▲ ICOSC 2022: With the Conference Organizers and Members of the International and Local Committees, and Participants.

The 7th International Conference on Optimization, Simulation and Control (ICOSC) 2022 was an international event held in Ulaanbaatar, Mongolia, last June 20-22, 2022. The primary purpose of the event is to bring together international researchers in the field of optimization, simulation and control. The conference is done in the capital city of Mongolia every three (3) years. The first ICOSC was held in 2002.

In the advent of pandemic, it was originally planned as a face-to-face conference but due to the demand of participating researchers, it was done in a *hybrid* (physical and virtual) format.

The international conference gathered together more than 100 participants from 16 countries, namely, USA, Russia, China, Saudi Arabia, Egypt, South Korea, Austria, UK, Netherlands, India, Canada, Mongolia, Philippines, South Africa, France and Japan. There was a total of 103 presentations broken down as follows: 44 oral presentations and 59 poster presentations. It also featured outstanding plenary speakers namely: *Prof. Panos M. Pardalos* (University of Florida, USA), *Prof. Alexander Strelakovsky* (Institute for System Dynamics and Control Theory, Russia), *Prof. Biswa Nath Datta* (Northern Illinois University, USA), *Prof. Sergiy Butenko* (Texas A & M University, USA), *Prof. Hexi Baoyin* (Tsinghua University, China) and *Prof. Rado Ioan Bot* (University of Vienna, Austria), and several invited speakers like the main author of this article who is also a member of the international committee. The conference also served as a springboard for neophyte researchers from the host country.

The event was a very successful one with the leadership of the General Chairman, *Prof. Enkhbat Rentsen* (Mongolian Academy of Sciences), together with the combined effort of the Program Chairs - *Prof. Panos M. Pardalos* (University of Florida) and *Assoc. Prof. Altannar Chinchuluun* (National University of Mongolia), the International Committee Members, the Secretariat and their Local Committee counterparts. It was also initiated by the organizing

institutes - *Mongolian Academy of Sciences (MAS)*, *National University of Mongolia (NUM)*, *German-Mongolian Institute for Resources and Technology (GMIT)* and the *University of Humanities, Mongolia (UHM)*.

Conference proceedings of high quality researches will be published at the "Springer Proceedings in Mathematics and Statistics" series (edited by the general chairman and program chairs). For more information about the conference, please visit <https://www.icosc2022.org>.

As a wrap-up of the conference, the researchers were invited to visit the countryside of Mongolia on the 3rd day to witness the rich culture and beautiful sceneries of the country. The Rector of the *German Mongolian Institute for Resources and Technology (GMIT)*, *Prof. Battsengel Baatar*, also joined the group. 🌍



▲ At ICOSC 2022 (from left to right): *Prof. Enkhbat Rentsen* (General Organizer), *Prof. Milagros Baldemor* and *Prof. Alexander Strelakovsky* (members of the International Committee and speakers), and *Dr. Altannar Chinchuluun* (Program Chair).

# RL4OR: A hackathon-like PhD School on “Reinforcement Learning Applied to Operations Research”

**Peter Jacko** <p.jacko@lancaster.ac.uk> **Odysseas Kanavetas** <o.kanavetas@math.leidenuniv.nl>

**Ger Koole** <ger.koole@vu.nl> **Raik Stolletz** <raik.stolletz@uni-mannheim.de>

The EURO PhD School “Reinforcement Learning Applied to Operations Research” (RL4OR) made students in stochastic modelling familiar with several Reinforcement Learning (RL) techniques. The participants applied these concepts to solve Operational Research problems through a hackathon-like workshop. 23 participants from 9 countries and 19 universities joined the PhD school. It is organized by Peter Jacko (Lancaster University, UK), Odysseas Kanavetas (Leiden University, the Netherlands), Ger Koole (VU University Amsterdam, the Netherlands), and Raik Stolletz (University of Mannheim, Germany). The school took place from 17th to 24th of July in Castle Gimborn, Germany, and is funded by the Association of European Operational Research Societies (EURO), the EURO working group on Stochastic Modelling, and the German Operations Research Society (GOR e.V.).

Markov decision processes are a familiar technique in stochastic modeling. Variants of many stochastic models of decision-making problems lend themselves for an analysis using RL (In the operational research and control literature, RL is often called *Approximate Dynamic Programming*). Examples are inventory and controlled queueing models with unknown arrivals distribution, or high-dimensional revenue management and pricing problems with unknown demand function. By learning the Reinforcement Learning techniques and applying them directly to simple problems we hope that participants obtained hands-on knowledge of RL in the context of stochastic modeling problems.



▲ RL4OR Venue: Castle Gimborn.

(DRL) where supervised machine learning techniques are used to approximate for example the value function;

• Online learning problems with incomplete (state) information requiring exploration next to exploitation to *gather information* (i.e., learn). Stateless and contextual bandits are a good example.



RL4OR Sponsor: EWG STOCHMOD



RL4OR Sponsor: GOR



RL4OR Sponsor: EURO

The school contained *lectures* from specialists, both at the location and online, and time to work on various problems. Participants were divided into groups with respect to their preferred application area: inventory management, queueing systems, and pricing. After a brief introduction to Markovian Decision Processes, the participants had to find appropriate problems to solve with Temporal Difference Learning, Deep Reinforcement Learning, and Multi-Armed Bandits. After learning about different algorithms in tutorials, students implemented these and compared them with each other. Analyzed problems and results are presented and discussed with experts.

In general, *Reinforcement Learning* can roughly be split in 3 areas:

- Low-dimensional full information problems that can be solved exactly using recursion such as value iteration. These are traditional Markov decision problems, in the RL community called *planning*;
- High-dimensional problems that cannot directly be solved by recursion due to the curse of dimensionality. This is the area of *Approximate Dynamic Programming (ADP)* and *Deep RL*

Based on that classification the school was split in three streams. During the first stream the students studied tabular methods (planning) and recursive methods for partial information models. The second stream focused on Deep RL and the third one was a study on the multi-armed bandit algorithms.

The first day the students started with an introductory tutorial on Markov Decision Processes, online learning algorithms and bounds for the loss function based on multi-armed bandit techniques. This tutorial was given by Shipra Agrawal, Columbia University. In the afternoon, Pierre-Luc Bacon, Université de Montréal, gave a tutorial focused on Stochastic Approximation. He introduced the participants to the first learning methods, called *Value-based*, such as *Temporal Difference* and *Q learning*. During the second day we continued on the Value-based methods and the participants learnt about Policy Gradient Theorem, Actor-critic algorithms and trust-region algorithms. This tutorial was given by Gerhard Neumann, Karlsruhe Institute of Technology. The rest of the day the participants worked in groups and implemented the Value-based methods with the help of our specialists.



▲ Speakers and organizers of the RL4OR (from left to right and top-down): Joren Gijsbrechts, Gerhard Neumann, Shipra Agrawal, Odysseas Kanavetas, Raik Stolletz, Peter Jacko, Tor Lattimore, Emilie Kaufmann, Pierre-Luc Bacon, Ger Koole, Vincent François-Lavet.

The third day the school focused on Deep RL having two tutorials given by Vincent-Francois Lavet from VU Amsterdam. Vincent started by illustrating the Q learning algorithm and the Q learning with deep learning as a function approximator. Then he went through the different techniques of Deep RL and taught the participants the generalization from limited data in supervised learning and RL. Finally, he touched upon some challenges in Deep RL. During the third day we also had a tutorial given by Joren Gijsbrechts, Universidade Católica Portuguesa. Joren gave to the students a roadmap for DRL in inventory management. The participants also had the opportunity to work and implement these techniques on a Python code prepared by Joren. The fourth day, Vincent introduced the students to Monte Carlo Tree search algorithms and some more advanced topics such as Upper Confidence Trees. Then, the groups worked on the implementation, prepared some codes and presented their work.

During the fifth day the school focused on multi-armed bandit problems. Emilie Kaufmann, Université de Lille, presented the problem and gave two tutorials where she covered the two approaches for the solution of the multi-armed bandit problem. In the first approach, the so-called frequentist approach, she described the frequentist techniques one can use and solve optimally the problem,

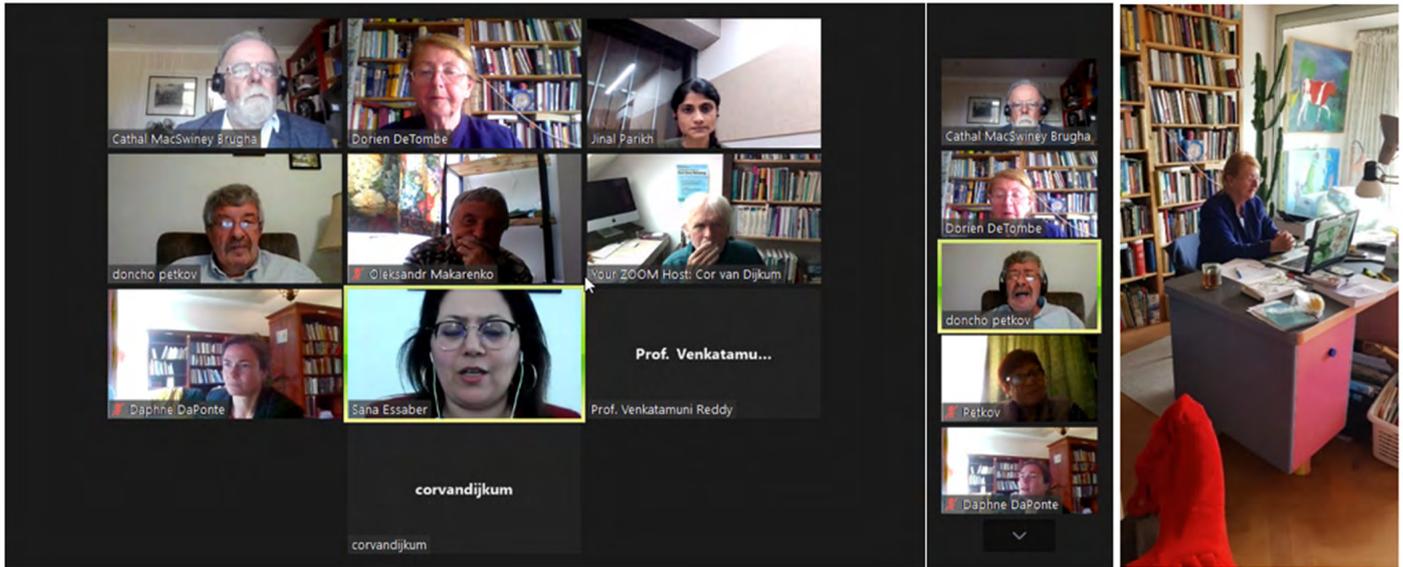
such as the greedy algorithm and more advanced ones like the Upper Confidence Bound (UCB) algorithms. During the second tutorial she introduced the Bayesian framework by presenting the Bayes-UCB algorithm, Gittins indexes and Thompson sampling. The sixth day Tor Lattimore, Scientist at DeepMind, introduced the students to contextual bandits. The algorithms he presented can solve a more general problem than the original multi-armed problem because the environment where the problem falls in can change during the horizon many times (even infinitely many times), so it is a challenging topic. In the afternoon, Tor continued on more advanced topics in non-stationary problems and went through the geometric representation, robustness of algorithms and sparsity. Then the participants implemented the above techniques, also extended the sampling codes that our experts prepared for them.

The final day there was an evaluation meeting where the students presented what they studied and what they learnt during the school.

The venue Castle Gimborn allowed for concentrated work, fruitful discussions and nice get togethers beside the official program. We are looking forward to seeing some of the participants of RL4OR presenting results related to the school in upcoming conferences. 🌐

# 3rd International e-Conference Societal Complexity Amsterdam successfully celebrated Online

**Dorien DeTombe** <detombe@nosmo.nl> **Cor van Dijkum** <c.j.vandijkum@nosmo.nl>  
**Gerhard-Wilhelm Weber** <gerhard-wilhelm.weber@put.poznan>



▲ Impressions from e-Conference Societal Complexity Amsterdam, and its chair Prof. Dr. Dorien De Tombe.

This 3rd “e-conference” of 2022, after the previous issues of 2020 and 2021 when we were still under lock-down due to the pandemics COVID-19 and held the conference *online*, we still continued in *virtual* mode. That decision was also due to the ongoing duties of many participants in the middle of the spring term and as they could hardly travel to the Netherlands from far countries for an intense 1-day event. This event (cf. <http://www.complexitycourse.org/DeTombeagenda2022.html>) was another element in the conference series organized by Prof. Dr. Dorien DeTombe and her colleagues from around the globe. Again she was the initiator and driving force, and her team supported her on scientific and organizational issues. We gathered some distinguished scholars worldwide, created an *online* conferencing network with ZOOM by the help of Prof. Dr. Cor van Dijkum (Amsterdam University), edited and arranged abstracts and small papers, and made another booklet, as we did since many years. Indeed, since 1993 *International Research Society on Methodology of Societal Complexity (MSC)* and the former *EURO* working group *Methodology of Societal Complexity (EWG MSC)* organized numerous events in all continents, and published various books and articles in scientific journals (cf. <http://www.complexitycourse.org>).

*International Research Society* and the former *EWG* organizes invited sessions at annual *EURO* or *IFORS* conferences together with *EWG on Ethics and OR. Methodology of Societal Complexity* works on and with methods, techniques and instruments to analyze and structure, guide and evaluate complex societal problems. Respected *EURO Working Groups* related to societal complexity include *EWG “OR for Development”*, *EWG “OR and Ethics and OR”* and *EWG EUROPT*.

The program of our 2022 e-conference showed 12 invited speakers with their lectures: Prof. Dr. R. Venkatamuni Reddy (Manipal Academy of Higher Education, Manipal, Karnataka, India): “Impact of COVID-19 pandemic on leading NSE listed

pharmaceutical stocks in India”, Prof. Dr. Akaki Arsenashvili (Tbilisi State University, Tbilisi, Georgia): “Variable structure economical-mathematical problem of optimal distribution of investments”, Prof. Dr. Alexander Makarenko (National Technical University of Ukraine - Igor Sikorsky Kyiv Polytechnic Institute, Kyiv - Kiev, Ukraine): “Toward the investigation of international migration process in education and science”, Prof. Dr. Cor van Dijkum (Nosmo Sokrates Consultancy, Amsterdam University, The Netherlands): “For the future of our society. The importance for education in advanced system theory”, Drs. Daphne D. DaPonte (University of Applied Sciences The Hague, the Netherlands): “Cyberwarfare and the theory and methodology of societal complexity”, Prof. Dr. Gerhard-Wilhelm (Willi) Weber (Poznan University of Technology, Poland): “Kerkenes eco-center project in Anatolia - future chances by Operational Research”, Prof. Dr. Dorien DeTombe (Sichuan University, Chengdu, China): “Better policy for a pandemic”, Prof. Dr. Cathal Brugha (University College Dublin, Ireland): “Time to confront bad governance”, Dr. Sana Essaber (University of Carthage, Tunisia): “The impact of COVID-19 on Tunisian universities’ teaching digitalisation strategy: Opportunities and challenges”, Prof. Dr. Olga Petkova (Central Connecticut State University, New Britain, Connecticut, USA) along with Prof. Dr. Don Petkov (ECSU, Willimantic, Connecticut, USA): “On the relationship of systems thinking and information systems in 2022”, Prof. Dr. Stuart Umpleby (George Washington University, Washington, D.C., USA): “System dynamic modelling”, and Dr. Jinal Parikh (Ahmedabad University, Ahmedabad, India): “Energy efficiency & sustainability: a behavioural OR approach”.

The presentations received lively responses and led to fruitful discussions. With own gaining words to the participants of the e-conference, Prof. Dorien DeTombe and Dr. Jinal Parikh conveyed Willi’s invitation to attend the *OR highlights of EURO 2022* in Espoo, Finland, July 3-6, 2022 (<https://euro2022 espoo.com>) and *IFORS 2023* in Santiago, Chile, July 10-14, 2023 (<https://ifors2023.com>). 🌐

# CORS-INFORMS International Conference

## - Celebrated in Vancouver, Canada

Taraneh Sowlati <taraneh.sowlati@ubc.ca>



▲ Banner and webpage motive of CORS-INFORMS 2022 in Vancouver.

The CORS-INFORMS International Conference was held in Vancouver, Canada, from June 5 to June 8, 2022 (<https://meetings.informs.org/wordpress/2022international/>). It was among the first *in-person* international conferences after more than two years of COVID-pandemic. While the entire planning and organization of the conference were done virtually and there were times during the spike of the COVID variants that the prospects of an in-person conference were not promising, the Organizing Committee managed to deliver a rich program and a successful in-person conference. The conference theme, “Disruptions, Risks and Recoveries”, was on a relevant and timely subject matter to the pandemic, and the program covered sessions, plenary and tutorials related to the theme. The program included a total of 163 sessions (119 invited and 44 contributed sessions), 9 plenaries and 8 tutorials.

Dr. Taraneh Sowlati, University of British Columbia, was the conference Chair and the Program Co-Chairs were Dr. Chris Ryan, University of British Columbia (Canada), and Dr. Marina Epelman, University of Michigan (USA). The list of the Organizing Committee members can be found here: <https://meetings.informs.org/wordpress/2022international/organizing-committee/>.

More than 620 professionals and scholars attended the conference over the 3.5 days. The conference started on Sunday morning (June 5th) with the INFORMS Executive Director’s, Elena Gerstmann, and Chair’s welcome messages followed by a Plenary talk given by Dr. Hau Lee from Stanford University (USA) on “Supply Chains in Turbulent Times”. Dr. Lee’s research interests are on global supply chain management and sustainability. In his talk, Dr. Lee explained “the new Triple-A for supply chains” in today’s world, which is faced with disasters, disruptions and technological advances. In his article titled “The Triple-A Supply Chains” published in Harvard Business Review in 2004, he discussed agility, adaptability and alignment as three pillars of supply chain management. In his plenary talk he described how agility turned into super-agility, adaptability into resilience, and alignment with suppliers and customers into alignment with bigger ecosystem. The Sunday afternoon plenary was given by Dr. Ravi Ahuja, Founder and CEO of Optym (USA) and Former Professor at MIT, University of Florida and

IIT Kanpur, who received Harold Larnder Prize. As the prize winner, he delivered the plenary talk during the conference on “Creating Success Stories of Operations Research”. In his talk, he explained how to use models and algorithms to solve real-world problems in transportation and logistics. He emphasized that models that are intuitive and use common sense are more successful in practice. In his work, Dr. Ahuja has used the latest advancements in research and development to solve practical problems faced by the transportation industry. Dr. Renata Konrad, Associate Professor at Worcester Polytechnic Institute (USA), gave the plenary talk on “Anti-Human Trafficking Efforts and the Potential of Operations Research” on Monday morning (June 6th). She explained how she has used analytical studies and statistical analysis to address the challenges facing anti-human trafficking efforts. >>



Dr. Taraneh Sowlati, University of British Columbia, Conference Chair of CORS-INFORMS 2022.



Dr. Chris Ryan, University of British Columbia



Dr. Marina Epelman, University of Michigan

Program Co-Chairs of CORS-INFORMS 2022.



▲ Downtown Vancouver, Canada: home of *CORS-INFORMS 2022*  
 (Source: <https://www.treksplor.com/where-to-stay-in-vancouver-canada/>).

>>The focus of her research is on the applications of operations research in social justice and healthcare. A panel of experts from academia discussed the *“Role of Operations Research in Pandemic Preparedness: Lessons Learned from COVID-19”*. Dr. Tinglong Dai, Professor at Johns Hopkins University (USA), was the moderator, and the three panelists included Dr. John Birge, University of Chicago (USA), Dr. Margaret Brandeau (USA), Stanford University, and Dr. Mahesh Nagarajan, University of British Columbia (Canada). On Tuesday morning (June 7th), Dr. Elise Miller-Hooks, George Mason University (USA), discussed the role of mathematical models in quantifying the infrastructure resiliency and determining mitigation measures for recovery after major disasters in her plenary talk titled *“Mathematical Perspectives in Infrastructure Resilience Modeling”*. The future of Quantum Computing was the topic of Tuesday afternoon (June 7th) panel discussion. Dr. David Bernal, Associate Scientist in Quantum Computing at Universities Space Research Association and NASA (USA), was the moderator and the panelists included Dr. Daniel Higginbottom, Director at Photonic (Canada), Catherine McGeoch, Senior Scientist at D-Wave Systems (USA), Dr. Giacomo Nannicini, Research Staff at IBM (USA), and Elisabetta Valiante, Scientist at 1QBIT (Canada). The last plenary was delivered by Dr. Bistra Dilkina, Associate Professor at the University of Southern California (USA), on Wednesday morning (June 8th). The focus of Dr. Dilkina’s research is on AI applications in sustainability and social good. The title of her talk was *“AI and OR for Environmental Sustainability”*. She explained the integration of machine learning and operations research in her work to understand and mitigate climate change.

A wide range of topics were covered in tutorials to provide in-depth understanding of relevant *OR and analytics* fields. The topics covered in the conference tutorials ranged from wildfire management, to analytics for public policy, inverse

optimization, Markov Decision Process in health care, and so on. The tutorials were given by experts/academics in Canada and the USA.

The conference participants also had the opportunity to attend numerous presentation sessions. The sessions were related to the theory and applications of *OR and analytics* and covered different areas such as post-pandemic logistics, COVID-19 models, big data analytics, optimization under uncertainty, machine learning to name a few. *More than 540 presentations* were delivered during the conference. The conference detailed *program* can be found at: <https://www.abstractsonline.com/pp8/#!/9314>.

The international conference was held at *Hyatt Regency Hotel*, located in the heart of downtown Vancouver that provided easy access to public transport, tourist attractions, bars and restaurants. The attendees enjoyed the beautiful and vibrant city, amazing views of mountains and ocean, and the mild weather during the conference. To ensure the health and safety of all participants, *INFORMS* followed the guidelines of CDC, Health Canada and WHO, and restricted the conference attendance to fully vaccinated individuals. The conference provided ample opportunity for attendees to socialize and network during *morning and afternoon coffee gatherings, welcome reception, Chair’s reception, conference dinner, CORS Luncheon, and CORS Banquet*. The networking opportunities were specially appreciated by participants after the pandemic. An interesting fact was that students accounted for 35% of the attendees. The active and curious groups of students made the sessions and social gatherings more vibrant and livelier. All and all, the conference was a great success providing a rich program covering the latest research and developments in *OR and analytics*, a safe and healthy environment, and a wonderful networking experience for attendees. 🌍

## ECCO XXXV – CO 2022:

# In wartime, European Combinatorialists Meet Online

**Bo Chen** <b.chen@warwick.ac.uk> **Alexander S. Kulikov** <alexander.s.kulikov@gmail.com>

**Silvano Martello** <silvano.martello@unibo.it>



▲ Participants of ECCO XXXV-CO 2022.

In 2020, ECCO (the *European Chapter on Combinatorial Optimization*) was forced to cancel its annual conference, ECCO XXXIII, scheduled in Saint Petersburg (Russia), due to the COVID-19 emergency. In 2021, due to the persistent emergency, the ECCO conference was held online in Madrid, and it was decided, together with the CO Conference series, to hold a joint conference, ECCO XXXV - CO 2022, in Saint Petersburg in Spring 2022. Unlucky decision!

In March 2022, due to the war situation between Russia and Ukraine, it was clear that the possibility of going to Saint Petersburg was ruled out. In addition, in that period the Chair of the Program Committee and of the Organizing Committee, Alexander Kulikov, had left Russia with his family, and had moved to Istanbul. The Board of ECCO and the Steering Committee of CO Conferences decided then to confirm the PC and OC Chair and to organize the conference online, from outside Russia. The decision was approved by EURO. It is worth mentioning that the same decision was taken by the International Mathematical Union, whose conference ICM 2022 (of which the ECCO - CO conference was a satellite event) was scheduled to take place in Saint Petersburg in July.

On June 9-11, 2022, almost 200 participants from Algeria, Austria, Belgium, Brazil, Canada, China, France, Germany, Greece, Hungary, India, Israel, Italy, Mexico, Norway, Philippines, Poland, Portugal, Slovenia, Spain, Sweden, Tunisia, Turkey, United Kingdom, United States, and Vietnam finally got together online for ECCO XXXV - CO 2022 (<https://ecco2022.euro-online.org/>).

The scientific program included 99 talks on several aspects of combinatorial optimization, covering its main theoretical and application aspects. Thanks to the financial support of EURO, there were no registration fees. A booklet containing one-page abstract of every presentation is available at the conference webpage: [https://ecco2022.euro-online.org/abstract\\_book.pdf](https://ecco2022.euro-online.org/abstract_book.pdf).

ECCO XXXV - CO 2022 was a true success. The numbers of talks and participants were both the highest in the last ten years, and the conference was honored by the presence of four past EURO and IFORS Presidents (Laureano Escudero, Nelson Maculan, Maria Grazia Speranza, and Paolo Toth) as well as by the participation of many high-class researchers (see the picture for a partial overview).

Three plenary lectures were delivered by

- *Andrea Lodi* (Jacobs Technion-Cornell Institute at Cornell Tech and Technion) on *Mathematical Programming Games: motivation, algorithms and challenges*;
- *Nikolaos Matsatsinis* (Technical University of Crete) on *Evolutionary and Swarm Intelligence Algorithms for Combinatorial Optimization Problems*;
- *Ulrich Pferschy* (University of Graz) on *Fairness and Conflicts: Allocating Items and Resources*.

These lectures were recorded and are available online from the conference web page.

The *EURO Working Group on Combinatorial Optimization, ECCO* (see [https://en.wikipedia.org/wiki/European\\_Chapter\\_on\\_Combinatorial\\_Optimization](https://en.wikipedia.org/wiki/European_Chapter_on_Combinatorial_Optimization) or the group home page <http://ecco.grenoble-inp.fr>) was created in 1987 by *C. Roucairol, A. Rinnooy Kan, and D. de Werra*. For the first ten years it was chaired by *Catherine Roucairol*. Since 1987, it has been chaired by *Silvano Martello*. *ECCO* has since then gathered researchers working in different fields of operations management, logistics, production scheduling, location and distribution problems, resource allocation, flexible manufacturing, metaheuristics, to name a few. Since 1988, the group has been bringing researchers together each year to discuss the latest advances in combinatorial optimization, with only two exceptions: *ECCO IV*, Dubrovnik 1991 (canceled due to war situation) and *ECCO XXXIII*, St. Petersburg (see above). With over 1600 members, *ECCO* is currently one of the largest working groups of *EURO*.

Every fourth year the conference is held as a joint meeting with *CO Conferences* (see <https://warwick.ac.uk/CO-symposia>), a series of biennial Combinatorial Optimization Conferences, which started in 1977 with meeting venues alternated between the UK and continental Europe. It is the longest running conference series related to combinatorial

optimization in the world. The Steering Committee of the *CO Conferences* is currently chaired by *Bo Chen*.

A special issue of *Journal of Combinatorial Optimization* (open to all *ECCO* and *CO* members) was launched, with a submission deadline of December 1, 2022.

*ECCO* has a tradition of conferences held in charming locations: The latest conferences (2000-) were held in Capri, Bonn, Lugano, Molde, Beirut, Minsk, Porto, Limassol, Dubrovnik, Jerusalem, Malaga, Amsterdam, Antalya, Paris, Munich, Catania, Budapest, Koper, Fribourg, Malta, and Madrid (online).

The next *ECCO* meeting, *ECCO XXXVI*, organized by *Nikolaos Matsatsinis*, will take place in Spring 2023 (hopefully on site) in the beautiful city of *Chania* (Crete, Greece). Chania, surrounded by wonderful beaches, is famous for its Venetian harbor and the old town with its winding alleys filled with bougainvillea and jasmine.

The next *CO* Conference, *CO2024*, is planned to take place in September 2024 in *Southampton*, a port city on England's south coast. 🌍

## A Return to In-Person Meetings at the University of Edinburgh: Modern Techniques of Very Large Scale Optimization

**Stefano Cipolla** <scipolla@ed.ac.uk> **Jacek Gondzio** <j.gondzio@ed.ac.uk>  
**Filippo Zanetti** <f.zanetti@sms.ed.ac.uk>

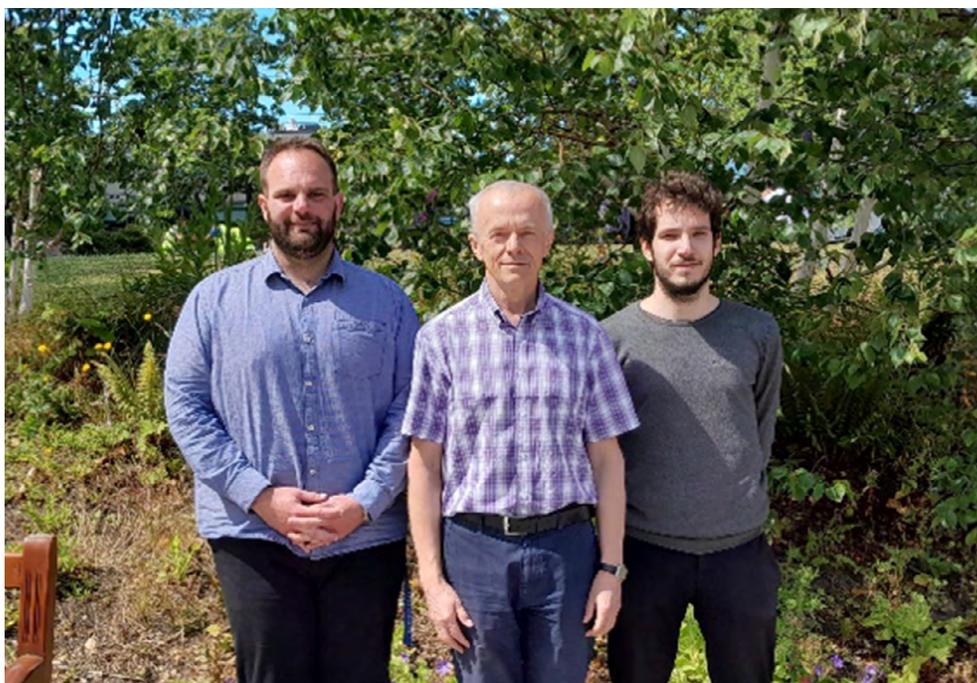
On May 19-20th 2022, the *School of Mathematics of the University of Edinburgh* hosted an international workshop dedicated to recent developments in optimization techniques for very large scale problems, with a specific focus on the *alternating direction method of multipliers (ADMM)*. The workshop took place in the *James Clerk Maxwell* building and saw the participation of leading experts in the field.

There were two keynote speakers:

- o *Jonathan Eckstein* (Rutgers University, USA), "*The ADMM: Past, Present, and Future*";
- o *Yinyu Ye* (Stanford University, USA), "*Randomized ADMM and its applications*";

and six invited speakers:

- o *Ewa Bednarczuk* (Polish Academy of Sciences), "*On dynamical system related to a primal-dual scheme for finding zeros of the sum of maximally monotone operators*";
- o *Stefania Bellavia* (University of Florence, Italy), "*Optimization Methods based on Random Models and Examples from Machine Learning*";
- o *Raymond Chan* (City University of Hong Kong), "*A 3-stage*



▲ The workshop organizers (from left to right): Dr Stefano Cipolla, Prof Jacek Gondzio and Filippo Zanetti.

- Spectral-spatial Method for Hyperspectral Image Classification*";
- o *Daniela di Serafino* (University of Naples Federico II, Italy), "*Efficient Solution of Sparse Optimization Problems via Interior Point Methods*";
- o *Mario Figueiredo* (University of Lisbon, Portugal), "*ADMM in Imaging Inverse Problems: Review of a Line of Work*";
- o *Henry Wolkowicz* (University of Waterloo, Canada), "*A Restricted Dual Peaceman-Rachford Splitting Method for a Strengthened DNN Relaxation for QAP*".

Seven more contributed talks were accepted for presentation, bringing the total to 15 talks over the two days of the workshop. Despite the main focus on ADMM, a series of talks were given about interior point methods, imaging applications and randomized approaches. The full program, the book of abstracts and the slides of the presentations are available at the workshop website <https://www.maths.ed.ac.uk/~gondzio/admm2020/home.html>.

The workshop, which was originally scheduled for June 2020, took place in a *hybrid* format: most of the talks were given *in presence*, with few exceptions for the invited speakers. More than 30 people attended in person and over 100 people registered for online participation. Coffee, lunch breaks and a social dinner were organized in order to promote networking and social interactions, a pleasant return to normality after two years of remote research activities. Indeed, for many participants, this was the first occasion of an in-person meeting since 2019.

The workshop was made possible by the engagement of the *School of Mathematics of The University of Edinburgh* and the financial support of Google Research through the project “Fast  $(1+x)$ -order methods for linear programming problems (2020-2021)”.

The workshop run smoothly and the participants seemed very involved thanks to the program proposed, which mixed various topics of optimization having as a main *fil rouge* the ADMM theme. In particular, the proposed programme attracted both academics and industry related experts confirming the fact that the involved topics represent an extremely timely and attractive subject. The two days format of the workshop proved to be effective, since it allowed to mix invited and contributed talks, without resulting in an excessively long and dense conference.

Overall, the workshop was a successful experience: the



Prof. Jonathan Eckstein



Prof. Yinyu Ye



Prof. Ewa Bednarczuk



Prof. Stefania Bellavia



Prof. Raymond Chan



Prof. Daniela di Serafino



Prof. Mario Figueiredo



Prof. Henry Wolkowicz

▲ “Modern Techniques of Very Large Scale Optimization”: the invited speakers.

online format brought in far more people than a full in-person probably would but, at the same time, the in person participants enjoyed meaningful interactions beyond the pure scientific framework. In person meetings helped giving birth to and cementing long-time collaborations.

It is important to note, moreover, that the workshop was organized during the visit of *Prof. Eckstein* to the School of Mathematics. Here many of our colleagues had the opportunity to start fruitful discussions and scientific interactions with him. 🌐

## XXIV Latin-American Summer School in Operational Research - Successfully Celebrated, presential

José Fernando Camacho Vallejo <jose.camachovl@uanl.edu.mx> Yasmín A. Ríos-Solís <yasmin.riosolis@tec.mx>

The *XXIV Latin-American Summer School in Operational Research (ELAVIO 2022)*, by its acronym in Spanish) was held at the Tecnológico de Monterrey, which is located in Monterrey, Nuevo León, México, from June 13 to 17, 2022.

The *ELAVIO* is a summer school promoted by the *Asociación Latino-Ibero-Americana de Investigación Operativa (ALIO)* and supported by *IFORS (International Federation of Operational Research Societies)*, aimed mainly at young researchers and graduate students (doctorate and master) from Latin-Iberian-American countries, with exceptional performance and interested in the areas of Operational Research, Systems Engineering and Applied Mathematics.

This edition was inaugurated by *José Fernando Camacho Vallejo*, President of the *Mexican Society of Operations Research (SMIO)*, and by *Valentina Gutiérrez*, Vice President of *ALIO*. The organizers of *ELAVIO 2022* were *Yasmín A. Ríos-*

*Solís* (Tecnológico de Monterrey, México), *José Luis González-Velarde* (Tecnológico de Monterrey, México), *Juan G. Villegas* (Universidad de Antioquia, Colombia), and *José-Fernando Camacho-Vallejo* (UANL, México). *Salvador de Jesús Vicencio*, *Saúl Domínguez*, *Carlos Corpus*, and *Yulitza Jacobo* were local students, part of the local organizing committee, that made the event memorable.

The *program* included:

- Five *plenary lectures*, given by *Rosiane de Freitas* (Institute of Computing of the Federal University of Amazonas, Brazil), *Antonio Alonso-Ayuso* (Universidad Rey Juan Carlos, Spain), *Elena Valentina Gutiérrez* (School of Industrial Engineering in Universidad del Valle, Colombia), *Roberto Wolfler Calvo* (Laboratoire d'Informatique de Paris Nord, France), and *Juan G. Villegas* (Department of Industrial Engineering at Universidad de Antioquia, Colombia).



▲ ELAVIO 2022 – Some Organizers, Representatives and Plenary Speakers (from left to right): Roberto Wolfler Calvo (Laboratoire d'Informatique de Paris Nord, France), Rosiane de Freitas (Federal University of Amazonas, Brazil), Juan G. Villegas (Universidad de Antioquia, Colombia), Elena Valentina Gutiérrez (Universidad del Valle, Colombia), Yasmín A. Ríos-Solís (Tecnológico de Monterrey, México), Antonio Alonso-Ayuso (Universidad Rey Juan Carlos, Spain), José-Fernando Camacho-Vallejo (UANL, México), Salvador de Jesús Vicencio (Tecnológico de Monterrey, México), and José Luis González-Velarde (Tecnológico de Monterrey, México).

- Four mini-courses of four hours each, which were taught by Marta Cabo (Instituto Tecnológico Autónomo de México, México), Víctor Blanco (Universidad de Granada, Spain), Roger Z. Ríos-Mercado (Universidad Autónoma de Nuevo León, México), and Cipriano Santos (Tecnológico de Monterrey, México). Also, we had an interesting exposition by Thaylon Nogueira (FICO Xpress).
- Student presentations were classified into eight sessions: (1) Production planning and scheduling, (2) Transportation, (3) Vehicle routing, (4) Agribusiness applications, (5) Supply chain and urban logistics, (6) Services: health care and humanitarian logistics, (7) Simulation and stochastic modeling, machine learning, and reinforcement learning, and (8) Related works in optimization. The sessions were full of discussions and enriching comments regarding the presentations.

This ELAVIO edition had 50 attendees from Latin-Iberian-American countries: Argentina, Brazil, Chile, Colombia, México, Perú, Spain, and Uruguay. We also had students sponsored by EURO and IFORS that came from Belgium, Australia, Norway, and the UK.

ELAVIO 2022 had a charged but truly enjoyable social program where the participants enjoyed Mexican food and local activities.

Finally, Dr. José Fernando Camacho Vallejo, President of SMIO, closed the event with a cordial invitation to participate in activities that SMIO has scheduled (<http://www.smio.org/>) and also to participate in ALIO activities: CLAIO 2022 in Buenos Aires, Argentina (<https://clai02022.dc.uba.ar/>), and IFORS 2023 in Santiago, Chile (<https://ifors2023.com/>). 🌐



▲ "Family Photo" at ELAVIO 2022, Monterrey, Nuevo León, México.

# Developing Countries Workshop and Stream at EURO 2022: Promoting Sustainable Economies Worldwide

**Nina Kajiji** <nina@nkd-group.com> **Gordon H. Dash** <ghdash@uri.edu>  
**Gerhard-Wilhelm Weber** <gerhard.weber@put.poznan.pl>

Historically, the *European Working Group on Operational Research for Development (EWG-ORD)*, (<http://bit.ly/EWG-ORD>) conducts its annual workshop to support regional and international OR conference meetings. For 2022, the EWG-ORD steering committee was assigned a stream in the program of the 32<sup>nd</sup> European Conference on Operational Research (EURO 2022; <https://euro2022espool.com>). The OR for development and developing countries stream consisted of three sessions supported by the membership group of EWG-ORD. These sessions were labelled as follows: a) *AI in South African Economic Development*, b) *EWG-ORD Workshop*, and c) *OR for Developing Countries*. The session on *AI in South African Economic Development* was organized as a continuous extension of the topics and themes introduced during the pandemic year of 2020. Meetings organized in 2020 by EWG-ORD, the *Operations Research Society of South Africa (ORSSA)*, and the *International Federation of Operational Research Societies (IFORS)* all contributed to the 2022 research selections.



▲ Presenters at the “AI in South African Economic Development” session (from left to right): Nina Kajiji, Helper Zhou, Gordon Dash, and Louisa Mupauri.

## Session one: AI in South African Economic Development.

Interestingly, we note that each research study in the session utilized a *cloud-hosted shallow-learning radial basis function neural network (K4-RANN)* to investigate recent trends in South African economic development (for information on the RANN, see: <https://www.nkd-group.global>). The *A. Mpfou et al.* study provided a flowchart and a live presentation of the *Exponento* SME performance valuation system. *Exponento* is constructed on a Python foundation with APIs to a prediction model estimated in real-time by the K4-RANN. The *Exponento* FinTech platform aims to achieve real-time robo-advising on micro-enterprise sustainability for over one million South African SMEs. The second sub-topic presentation by *L. Mupauri et al.* demonstrated the effective use of the K4-RANN to model corporate financial distress in Zimbabwe. The study sought to uncover the probability of traded firms entering financial distress after controlling for drought conditions and the economic restrictions imposed to combat COVID-19 effects. Feature variables consisted of orthogonalized financial ratio data. After applying various econometric models to a sovereign listing of Zimbabwe firms, the study produced accurate distress prediction probabilities. The third presentation by *H. Zhou et al.* deployed the K4-RANN to model the production-theoretic factor elasticities governing changes in output within the sovereign network of South African small-to-medium enterprises (SMEs). Notably,

the factor elasticities identified by *Zhuo* contributed to the *Mpfou Exponento* application described above. The session concluded with a fourth presentation by *G. Dash et al.* Models estimated by the K4-RANN identified the role of bi-directional volatility spillovers between the South African government bond market and municipal bond trades in the U.S. states most affected by the *2017 Tax Cuts and Jobs Act* (i.e., SALT states). With U.S. bond trades exceeding 3.5 million observations, the findings highlighted the negative volatility spillover from South Africa into the SALT states.

## Session two: The 2022 EWG-ORD Workshop.

Although this EWG-ORD session was not presented in the traditional format of a stand-alone workshop, the session attempted to honor the established tradition of past EWG-ORD meetings. For the 2022 workshop, the theme focus was “using OR methods to improve the measurement and operational efficiency of Italian, Latin American, and Caribbean educational systems.” The first presentation by *Mergoni et al.* explored the theme with an exciting presentation highlighting the Italian education system. The research methodology focused on uncovering how the management style of a school principal can impact institutional and individual performance gains (losses). The analysis compared two alternate approaches: a) robust conditional order-m estimation, and b) two-stage data envelopment (DEA). The second presentation by *R. Fernández et al.* discussed a quantitative framework to prioritize school infrastructure investment in a severely resource-constrained society. The findings identified practical approaches for measuring the effect of improving school infrastructure and academic performance gains at the individual and institutional levels. The comprehensive modeling approach explored best deployment practices for infrastructure advances (e.g., lowering student crowding, installing proper lighting/ventilation, increasing digital connectivity, etc.) to affect aggregate and individualized comparative analytics metrics.

### Session three: OR for Developing Countries.

The vibrant discussions continued through the stream's last session. The *O. Adewoye* presentation led the session discussion by examining the impact of e-currency and financial investment in a developing country (i.e., Nigeria). Evidence was provided to show how the slow pace of adopting OR methods (including financial engineering methods) in developing countries is tied to the strong (weak) currency valuation. The next talk by *V. Stienen* introduced a stimulating discussion on the digital representation of road networks. Road networks are essential for routing optimization and optimal resource allocation. The presenter noted how the quality of data sets tends to be under-represented in lower-income regions, thereby dampening country-wide economic development. With this context established, the authors constructed a novel and efficient approach to digital mapping to extend and combine existing road network representations. The mapping approach was validated through two case studies based on network data from Indonesia and Timor Leste. The session concluded with a presentation by *A. Sharma et al.* The authors presented a constrained optimization model of the supply chain problem for India's excess food grain. Currently, the transportation and distribution plan for Indian-grown grain is very inefficiently guided by a purely manual system (aka, a series of phone calls). The authors' approach considers local regulations, warehouse storage capacity, transportation alternatives, mandatory state buffer requirements, and more. The impact of their analytical structure has noted how well-meaning policy changes do not always produce optimal system responses. While not fully implemented, the proposed model has already led to policy



▲ Anna Mergoni presenting at the EWG-ORD Workshop session.

and decision-making changes at the national level.

The research efforts presented addressed a number of the critical topics outlined in the UN's SDG 17 goals. From quality education (goal 4), decent work, and economic growth (goal 8) to industry, innovation, and infrastructure (goal 9) and more, the session achieved its aim of presenting the latest findings in development across nine different economies – eight of which are classified as developing economies. EWG-ORD looks forward to collaboration with APORS 2022 (<http://apors.org/>) in November 2022. For additional information about the EWG-ORD, their upcoming workshops, or how you can get involved, please email [info@ewgord.org](mailto:info@ewgord.org). 🌐



▲ Rafael Fernández presenting at the EWG-ORD Workshop session.





## 2<sup>nd</sup> Healthcare Systems Seminar

### ONLINE FREE SEMINAR

February 1, 2022, 5:00-7:00 pm Tunis/ 11:00-1:00 pm Eastern

**Analytics to Promote an Efficient, Effective, and Equitable Response to the Covid-19 Pandemic**



**Julie Swann**  
Department head and A. Doug Allison Distinguished Professor of the Edward P. Fitts Department of Industrial and Systems Engineering at NC State University, USA

**Operational research for process optimization in health systems**



**Sondes Hammami**  
Doctor of Industrial Engineering Assistant professor, University of Carthage Research Team on LR-ACS, University of El Manar TUNISIA

Q&A Session and Open Debate

Zoom Webinar : <https://stevens.zoom.us/j/95550367032>  
 Attendance certificate could be delivered upon request at [awg.healthcare.systems@gmail.com](mailto:awg.healthcare.systems@gmail.com)

Supported by 



## 3<sup>rd</sup> Healthcare Systems Seminar

### ONLINE FREE SEMINAR

July 1, 2022, 5:30-7:00 pm Tunis / 4:30-6:00 pm GMT

**OR Saves Lives!**



**Pr. Paul HARPER**  
Chair in Operational Research School of Mathematics Cardiff University, United Kingdom

**Experience of a hospital biochemistry laboratory in the implementation of quality in face to challenges**



**Pr. Kahena Bouzid Ghazzi**  
Head of the clinical biochemistry laboratory, Charles Nicolle Hospital, Tunisia

Q&A Session and Open Debate

The seminar is free but the registration is mandatory via <https://forms.gle/z790Yz7VGIAdQIUw>  
 The zoom link will be sent by email after the registration.  
 Attendance certificate could be delivered upon request at [awg.healthcare.systems@gmail.com](mailto:awg.healthcare.systems@gmail.com)

Supported by   

▲ Posters of the Second and Third Healthcare System Seminars

>> However, the audience is not necessarily restricted to the official members' list of the AWG. Special attention was paid to the events' format so they are not just another online seminar, but rather a real space for exchange and sharing of experiences. At each seminar, one of the two speakers (a member of the AWG), shares his/her experience and takes this opportunity to suggest collaborations. Due to the large

number of francophones in the AWG, naturally one of the talks is conducted in French.

The latest organized event was the third Healthcare System Seminar held online on July 1st, 2022. The event featured two outstanding speakers: *Professor Paul Harper* (Cardiff University, United Kingdom) and *Professor Kahena Bouzid Ghazzi* (head of the Clinical Biochemistry Laboratory, Charles Nicolle Hospital, Tunisia). The event gathered over 120 registered participants from 9 countries: Tunisia, Algeria, Morocco, Egypt, UK, France, Canada, Philippines and South Africa.

We are most grateful to all our speakers and trainers for supporting the healthcare group so well, and look forward to many more such events in future!

For more information please see:

Website: <http://afrosocieties.org/african-working-group/awg-healthcare-systems/>,  
 Facebook: <https://www.facebook.com/African-Working-Group-in-Healthcare-Systems-108566548210402>,  
 YouTube Channel: <https://www.youtube.com/channel/UCaaJzRrhNp0KUm90-vzRRXw>. 



▲ *Safa Elkefi and Elyes Manai:*  
 Trainers at the Online Winter School on Data Analytics

# Social Entrepreneurship Conferences: OR-bridge for the youth to global social ventures - in Middle East, North Africa, and the USA, Online

**Berat Kjamili** <beratkjamili@gmail.com> **Gerhard-Wilhelm Weber** <gerhard.weber@put.poznan.pl>  
**Eric Davis** <davis@polisci.rutgers.edu>

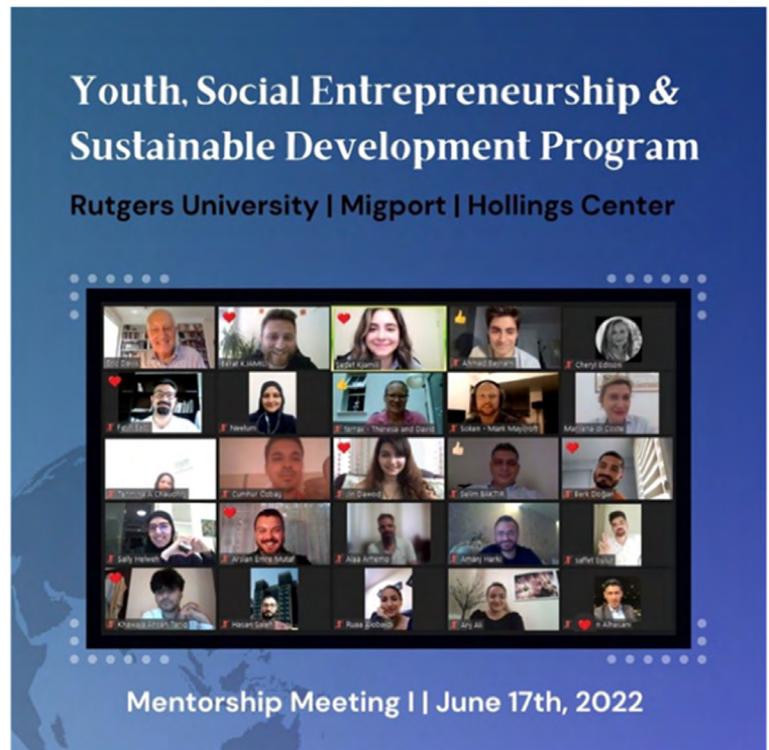
With slow economic growth, many countries face the problem that many young people enter the labor market every year only to find that there are no jobs. In countries where young people form a large population, in some cases 70% of the population under the age of 30, this presents a critical situation. What can be done to address the problem of young people who see few opportunities for a meaningful career to develop?

*Migport* ([www.migport.org](http://www.migport.org)) has been designed to decently impact the world by aggregating anonymized information of refugees regarding skills, needs, and preferences that can connect refugees and locals. *Migport* organizes international conferences to highlight big-data usage for the humanitarian sector and importance of social entrepreneurship. It also teaches refugees in Turkey how to become successful social entrepreneurs. One of the programs is *YSESD*.

The goal of *YSESD* ([www.youthsocialpreneurs.org](http://www.youthsocialpreneurs.org)) is to establish an international network of youth social entrepreneurs who will have access to a "talent platform" where they will be able to exchange ideas about potential start-ups or established social entrepreneurial ventures with colleagues, receive mentoring from successful social entrepreneurs, and pitch their projects to potential investors through "competition" style of activities. 40 social entrepreneurs from Iraq, Pakistan and Turkey attended the 4-month long *YSESD Conferences* which was held between December 2020 and March 2021. The core Team is comprised of *Dr. Eric Davis*, *YSESD* PI, Director, and *Mr. Berat Kjamili*, co-PI.

*YSESD* is now entering *YSESD Phase 2* where it will complete the building of its platform – both a public information site and a "talent" platform where youth social entrepreneurs can benefit from the services described above. Most important will be the *YSESD's* efforts to obtain investment funds for project start-ups and established ventures which seek to scale up their efforts. As the *YSESD* moves forward, it is working to attract a larger number of youth social entrepreneurs to join the project. Focus will be given to the *MENA* region - Iraq, Jordan, Lebanon, Pakistan, Turkey, UAE - and the USA. *YSESD* participants worked in teams to develop social entrepreneurial ideas on five thematic foci such as civic engagement and leadership, gender empowerment, environmental sustainability, public health and energy and climate change.

The workshop was run by *Rutgers University*, NJ, USA, and co-implemented by *Migport*. The *YSESD* project was supported by the *Hollings Center for International Dialogue* ([www.hollingscenter.org](http://www.hollingscenter.org)), a nonprofit, nongovernmental organization dedicated to fostering dialogue between the United States and Muslim-majority countries.



▲ *YSESD Phase 2, Mentorship Meeting, June 17, 2022.*

The workshops culminated into the final "Demo Day" which was held on March 6, 2021. These included social entrepreneurship ideas such as: Innovative recycling ventures; Ventures to reduce food waste and convert it to fertilizer; Public health assessments in urban and rural areas which lack adequate access to health care; Electric waste reduction in homes; An employment agency to place women university graduates in private sector firms; A venture which offers psychological services to refugee families and their children, and a venture which reduces agricultural product loss through air drying fruits and vegetables.

*Migport* also delivered a keynote speech at *ICCESEN 2019 - 6th International Conference on Computational and Experimental Science and Engineering*, Kemer, Antalya, Turkey, October 23-27, 2019 (<http://2019.iccesen.org>). On the other hand, *Migport* aims to bring the experiences and methods of OR, its activities and events such as at *EURO*, *IFORS* and *INFORMS* conferences, into the world of entrepreneurship and startups.

In most "developing countries", a social entrepreneurship has been uncommon. We introduce a mid-way as *LiBeraled Social Entrepreneur*, where social businesses should be sustainable [1]. "LiBeraled Social Entrepreneurship" in Developing and Emerging Countries consists of a social entrepreneur using business metrics, to sustain social impact. We study differences between developing and developed countries, introducing a new OR approach to development.

Commercial entrepreneurs are generally oriented to business metrics like profit, revenues, and return. Instead, social entrepreneurs are non-profits or a blend with for-profit goals, generating *Return to Society*. We discuss and apply, e.g., *Game theory* and *Max-Flow - Min-Cut theorems*, *Joseph Schumpeter's* creative destruction theory and *Adam Smith's diversification model* for our business plan. As a result, *Berat Kjamili* started *Migport* - a mobile application that runs as a "refugee portal", supported by *Refugee Big-Data Analytics* - refugees submit data to the application via "questionnaire" and search for opportunities, verified news privatized based on their answers. The business model was build based on the idea of a *liberated social entrepreneur*. It provides guidance and enables social entrepreneurs to behave like commercial entrepreneurs, while overall acting as "LiBerated Social Entrepreneurs" [2].



▲ *Migport Presentation team at EURO 2019, Dublin, Ireland (from left to right): G.W. Weber, B. Gürbüz, B. Kjamili, M.R. Baldemor and E. Sadanoglu.*

Multivariate Adaptive Regression Splines (*MARS*), *Conic MARS (CMARS)* and their robust versions of *RMARS* and *RCMARS* have shown their potential for Big-Data, but also Small-Data. With that toolbox, we aim to further support our joint and novel project. *B. Kjamili* has also started the digital residence permit appointment system "e-residency" in Turkey that over 10 million foreigners used so far with *METU International Student Association* in Ankara, Turkey [3].

#### References

[1] Kjamili, B., Weber, G.W., The Role of LiBerated Social Entrepreneur

in *Developing Countries: A mid-way, in Societal Complexity, Data Mining and Gaming; State-of-the-Art 2017*, Greenhill & Waterfront, Europe: Amsterdam, The Netherlands; Guilford, UK, North-America: Montreal, Canada, 2017, 59-67, ISBN /EAN 978-90-77171-54-7.

[2] Czerkawski, D., Małecka, J., Weber, G.W., Kjamili, B. (2021). Social Entrepreneurship Business Models for Handicapped People - Polish & Turkish Case Study of Sharing Public Goods by Doing Business. In: Pinto, A., Zilberman, D. (eds) *Modeling, Dynamics, Optimization and Bioeconomics IV*. Springer Proceedings in Mathematics & Statistics, vol 365. Springer, Cham, 163-186, [https://doi.org/10.1007/978-3-030-78163-7\\_7](https://doi.org/10.1007/978-3-030-78163-7_7).

[3] Kjamili, B., Weber, G.W., Opening Doors to International Students, *IFORS News* 8, 4 (December 2014) 15. 🌐

## XIV Chilean Conference on Operations Research

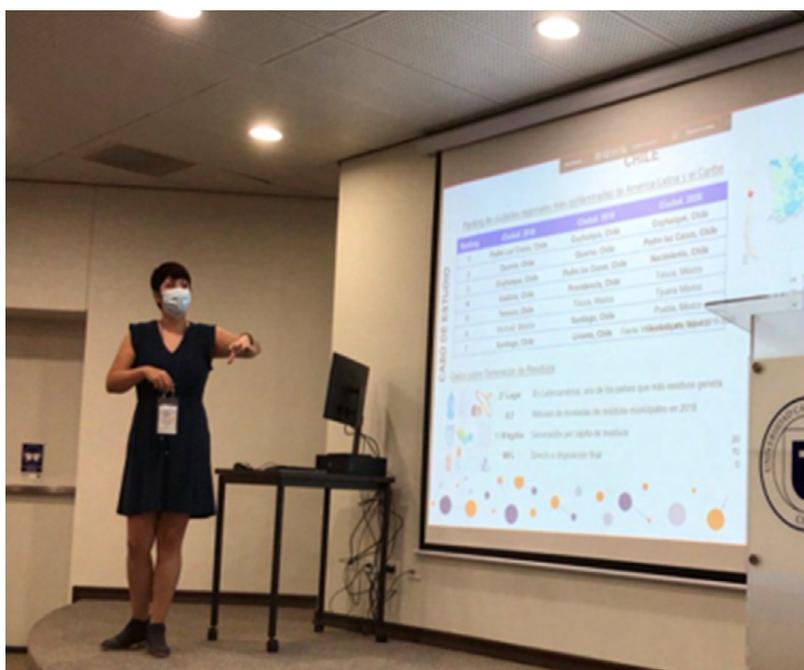
### -Celebrated in Talca and worldwide

**Víctor M. Albornoz** <victor.albornoz@usm.cl>

**Wladimir Soto Silva** <wsoto@ucm.cl>

The 14th Chilean Conference on Operations Research (*OPTIMA 2021*) was held in *Talca* from 6th to 8th of March 2022. The conference was organised by the *Engineering Faculty of the Catholic University of Maule* and by the *Chilean Institute of Operational Research (ICHIO)*.

*OPTIMA* is the biennial conference that aims to meet mainly the Chilean academics, practitioners and students interested in the different areas of *Operational Research (OR)* since it started in 1995. Due to the current pandemic, the initial date of the event at the end of September 2021 had to be moved to promote face-to-face participation and thus stimulate the research activities and the networking as well as the social interaction into the Chilean community. More than 110 registered attendees from 6 countries and around 98 contributions dealing with theoretical research, algorithm development and practical applications presented in different paralel sessions at this fruitful *hybrid conference*, provided a strong motivation after two years into *COVID-19* pandemic.



▲ A researcher presenting her contribution at *OPTIMA 2021*.



▲ OPTIMA 2021: Closing Ceremony.

The conference program covered a wide range of topics in areas such as Big Data, Data Mining, Facility Location, Healthcare, Inventory Management, Metaheuristics, Optimization under Uncertainty, OR in Agriculture, Production Planning, Project Management, Supply Chain Management and Vehicle Routing, Transportation and Logistic presented in 3 plenary lectures and nineteen sessions of contributed papers. Tremendous effort and care were spent by the Program Committee together with the Organizing Committee and his conference chair *Wladimir Soto Silva* to offer an attractive conference schedule over the three days of the conference.

Prestigious *Plenary Speakers* gave their online talks at OPTIMA 2021: *Prof. Maria Grazia Speranza* (Department of Economics and Management, University of Brescia, Italy) with the talk "Optimization in transportation and logistics", *Prof. James Cochran* (Department of Information Systems, Statistics, and Management Science, University of Alabama, USA) with the talk

"A Big Data Taxonomy: Helping the General Public Understand" and *Prof. Mauricio G. C. Resende* (Principal Research Scientist, Amazon.com, Seattle, Washington, USA) presented "Logistics Optimization at Amazon: Big Data & operations Research in Action".

During the *opening ceremony*, *Prof. Speranza* presented the main trends in transportation and logistics and discussed some research directions with examples of integrated and collaborative problems in logistics and traffic assignment models. Next, at the end of the second day of the conference *Prof. Cochran* presented a framework for big data that provides a foundation for dealing with this topic, discussed the definition of big data he uses, the big data taxonomy he has developed, and the ways he demonstrates ramifications of big data in his statistics courses.

During the *closing ceremony*, *Prof. Resende* presented the optimization problems that they solve at Amazon Logistics that require the solution of many complex and classical operational research problems in a stimulating environment for research in optimization and algorithms. Then, two prizes were awarded. *The prize for the Best Undergraduate Student Contributed Talk* were granted to *Pablo Carrasco* (Universidad de O'Higgins, Chile) with the talk "Rank pump: a primal heuristic for polynomial optimization", and *The prize for the Best Postgraduate Student Contributed Talk* were granted to *Cristian Ausin* (Universidad Adolfo Ibañez, Chile) with the talk "Prescriptive analysis to optimize the audit of inventory breaks using LSTM".



▲ *James Cochran* (University of Alabama, USA) presents his online plenary talk at OPTIMA 2021: "A Big Data Taxonomy: Helping the General Public Understand".

Furthermore, *OPTIMA 2021* also considered three social events: a welcome reception, a closing reception and a conference banquet in a restaurant near San Clemente, a small town located 20 km west of Talca, where a dinner and a typical rural barbecue were carried out. All social events were successful, especially the social banquet in San Clemente, an exceptional meeting point where professional and human relationships of *OR* community were established into a very nice environment, knowing that the next opportunity to meet will be already in July 2023 on occasion of the *IFORS 2023 International Conference* also organized by *ICHIO*. 🌍

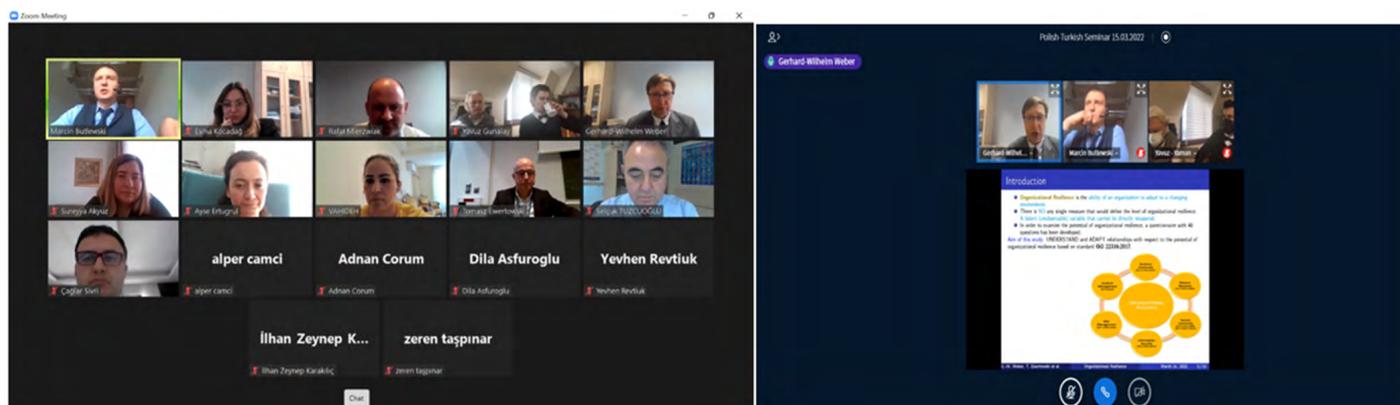


▲ *OPTIMA 2021*: conference banquet with rural barbecue.

## A fresh Polish-Turkish Online Roundtable on (Operational) Research Opportunities in OR/MS

### – Faculties from 2 universities became friends

**Marcin Butlewski** <marcin.butlewski@put.poznan.pl> **Esmannur Kocadag** <esmanur.kocadag00@gmail.com>  
**Gerhard-Wilhelm Weber** <gerhard-wilhelm.weber@put.poznan.pl>



▲ Impressions from the Roundtable on Research Opportunities in OR/MS for Poland, Turkey and beyond.

On March 15, 2022, exchange on *Polish-Turkish Research Opportunities in Management Studies* was organized and celebrated in a form of an *online round table*. It was an international meeting for sharing experience and research opportunities in *OR/MS* and their applications. It has been a first stage to offer a forum for researchers, educators, and practitioners, from academia from Poland and Turkey to gather and discuss cutting-edge evolvments of management and engineering, mathematics and educational research in these areas.

The speeches and conversations connected researchers from *Poznan University of Technology*, Poznan, Poland, and *Bahçeşehir Üniversitesi*, *Bahcesehir University* or *BAU*, Turkey, at a roundtable. This event aimed at (1) bringing together scientists, engineers, researchers, practitioners, academicians, and representatives of civil society organizations within a scientific forum; (2) sharing and discussing theoretical and practical knowledge about innovations in applied management, statistics, fuzzy logic, finance, economics and

sustainability education. Therefore, respected professors and researchers were chosen as invited speakers and participants. A majority of the presentations by the invited speakers focused on applied mathematics, management science (*MS*), *operational research (OR)*, business, economics and finance. The attendees also talked about the scope, definition and introduction of new projects, each with a promise to open or emerging issues, about gray systems, fuzzy logic, meta-analysis, metaverse experience in customer service, big data analysis, machine learning, artificial intelligence and robust optimization in management, sustainable development and macroeconomics.

The introductory words were delivered by *Prof. Dr. Marcin Butlewski* (Vice Dean for International Collaboration and the Business Environment of Faculty of Engineering Management – FEM at PUT, Poznan, Poland; cf. <https://www.fem.put.poznan.pl/en>), researcher involved in human factor and engineering topics. He warmly welcomed all the participants, presenters, listeners and discussants, from Poland & Turkey.

There were four keynote speakers at the roundtable. Prof. Dr. Gerhard-Wilhelm Weber (FEM at PUT, Poznan, Poland) discussed the topic of "An Analysis on the Potential of Organizational Resilience". Then, Dr. Rafal Mierzwik (FEM at PUT, Poznan, Poland) who specializes in marketing as well as modeling of and decision making under uncertainty, discussed his group's learning methodology and spoke about the important calculus and instruments of "Fuzzy Logic and Gray Systems". Prof. Dr. Yavuz Gunalay (Associate Dean of FEAS, Chair of Department of Logistics Management of BAU, Istanbul, Turkey) elaborated on "Logistics", introducing newest research trends and their advancements made at his university and faculty. Following a similar approach, Prof. Dr. Yaman Ömer Erzurumlu (Department of Engineering Management, Professor of Finance, BAU, Istanbul, Turkey) referred to the likewise broad area of "Finance".

After the introductory session and the session with the invited speakers, the roundtable consisted of some further presentations, Prof. Dr. G.-W. (Willi) Weber, PUT, reported the results on "Knowledge Acceleration by Competences and Multivariate Adaptive Regression Splines". Prof. Dr. Sureyya Akyuz, Dean of Department of Mathematics at BAU, Istanbul, Turkey, discussed about "Optimization for Machine Learning" and talked about new EU projects, and past projects of her department. Dr. Caglar Sivri of BAU presented "Recent Studies in Biomimetics". Prof. Dr. Sait Gul of BAU talked about "Linguistic Modeling and Fuzzy Logic Applications". Dr. Tomasz Ewertowski of PUT addressed his new Polish-Turkish project on Organizational Resilience. Dr. Ayse Ertugrul from BAU reflected about her research areas such as microeconomics

and time-series economy. Dr. Alper Camci of BAU mentioned complex systems and raised the question: "Which areas can we address in new projects?" The last communication was held by Prof. Dr. Yaman Omer Erzurumlu, BAU, to calculate strategies for getting clarity about the continuation of projects in a wider frame, research implementation and project development practice. As the host of this novel event, Professor Marcin Butlewski managed this roundtable with a great support of his assistant - Ms. Esmenur Kocadag (at FEM, PUT).

The interdisciplinary roundtable was planned with the vision of encouraging interaction of researchers of different but similar fields and the creation of new projects. Hopefully this event will be a start to a long-ranging collaboration between Poland, Turkey and beyond. In the weeks following our "roundtable", several international research teams were already formed on diverse OR-related topics, and held their first online meetings.

At this beautiful event, OR itself, its research traditions, powerful tools, emerging challenges, community dynamics and future promises were clearly understood as a "key" to future collaboration, success at all levels and friendship between our peoples in Europe and the world.

During the "roundtable" Willi together with the organizers gave important information about EURO and IFORS and invited the participants to EURO 2022 in Espoo, Finland, July 3-6, 2022 (<https://euro2022 espoo.com>), and IFORS 2023 in Santiago de Chile, July 10-14, 2023 (<https://ifors2023.com>). 🌐

## Record participation in the first face-to-face conference of statisticians and operational researchers in Spain: 2022 Spanish Conference on Statistics and OR

Ana M. Aguilera <aaguiler@ugr.es> Juan E. Ruiz-Castro <jeloy@ugr.es>

After three years since the last conference of the Spanish Statistical and Operational Research Society, the 39<sup>th</sup> Spanish Conference on Statistics and Operational Research (OR) and the 13<sup>th</sup> Days of Official Statistics (SEIO 2022) were held in Granada from June 7 to 10, 2022, [www.seio2022.com](http://www.seio2022.com). The conference was organized by the Department of Statistics and OR and the Institute of Mathematics of the University of Granada, jointly with the Society for Statistics and Operational Research (SEIO: [www.seio.es](http://www.seio.es))

In today's society that generates huge amounts of data, its analysis, interpretation, and optimal decision-making are essential not only in the world of education, scientific research, public statistics and business, but in all areas of life, with the benefits that this entails for society in general. Currently, many of the Statistics and OR methods are the foundations of Data Science and Artificial Intelligence algorithms, based on the large amounts of data generated by new technologies. In addition, the Covid19 pandemic has highlighted the vital role of mathematical models of Statistics and Operational Research to help predict



▲ SEIO 2022: Round table on official statistics and universities.

its evolution and optimize available resources. More than ever, this event has been a unique opportunity as a forum in which academicians, researchers and experts in Statistics and OR meet to exchange ideas and knowledge, and show their importance for the progress of the 21st century society.



▲ Colloquium on research projects from the Government of Spain.

The conference had to be delayed a year due to the Covid-19 pandemic and fortunately it was held in-person with great success in terms of participation. The extensive and high-level scientific program has brought together more than 600 national and international experts from the academic world, industry, public health and administration at the *Faculty of Sciences of the University of Granada*. There were 5 plenary talks with outstanding national and international speakers, among which were the two *SEIO-FBBVA 2021 Medals*. The program also consisted of 105 parallel sessions with a total of 451 oral communications, 4 poster sessions with 33 papers, 2 colloquia and 6 round tables. The 491 research papers presented were both methodological and applied, encompassing all topics related to *Statistics and OR* and *Official Statistics*. The *SEIO Working Groups* were highly involved in the organization of sessions, with 21 groups making proposals with a total of 53 organized sessions and 229 papers.

In the round tables, different topics related to *Statistics and OR* were discussed, such as dissemination, knowledge transfer to the business sector, its importance in the management of the Covid-19 pandemic, connection between official statistics and universities, the sustainable development goals and statistics on causes of death. Very relevant professionals from the academic and business fields, as well as from public health and statistics, participated in these round tables.

In the first colloquium, the President of the *Federation of European National Statistical Societies (FENSTAT)* spoke about the new European Statistician Accreditation System. In the second colloquium, the President of the scientific management area in Mathematical Sciences at the *State Research Agency (AEI)* reported on the different calls for research projects from the *Government of Spain*.

As in all the editions of the *SEIO* conferences, the *Statistics and OR Society*, in collaboration with the *Ramiro Melendreras Foundation*, awarded the Ramiro Melendreras Award to the *best paper* presented by a young researcher, for which 7 candidates were submitted.

For the first time in *SEIO* conferences, the most outstanding activities such as inaugurations, plenary sessions, round tables, and closing, were broadcast live through the YouTube channel *SEIO2022 Granada*.

The conference also had an exciting social program with a welcome drink and a choral concert by the *ARRS 21 Choir* at the *Royal Monastery of San Jerónimo*; a private visit to the *Alhambra* followed by a cocktail at *Carmen de los Mártires*, and the traditional closing Gala Dinner at *La Mamunia*. The central location of the venue on the *Campus de Fuentenueva* allowed the participants to comfortably enjoy all the attractions and services offered by historic and ancient city of *Granada*.



▲ Private visit to the Alhambra.



▲ Family photo at the closing ceremony of SEIO 2022.

More information and full program at [www.seio2022.com](http://www.seio2022.com) or by contacting the presidents of the Organizing Committee *Ana M. Aguilera* ([aaguiler@ugr.es](mailto:aaguiler@ugr.es)) and *Juan E. Ruiz-Castro* ([jeloy@ugr.es](mailto:jeloy@ugr.es)). 🌐

## Enjoying two days full of optimization at the 2022 Stockholm Optimization Days

**Milan Hladík** <[hladik@kam.mff.cuni.cz](mailto:hladik@kam.mff.cuni.cz)> **Martin Černý** <[cerny@kam.mff.cuni.cz](mailto:cerny@kam.mff.cuni.cz)>

The 10<sup>th</sup> Stockholm Optimization Days (<https://www.kth.se/math/stockholm-optimization-days-2022>) were organized on June 16-17, 2022, by the Optimization and Systems Theory Division at KTH Royal Institute of Technology. Recall that KTH is the Swedish largest technical university with about 17,500 students (one third of which are women). The history of Stockholm Optimization Days goes back to 1990, when the first meeting was organized. The conference was organized annually, however, there was a big gap between 2000 and 2022. As the tradition was reinitiated this year, the organizers promise to host the event every two or three years. Let us hope they build on the success of their predecessors.

The conference topics include the traditional optimization areas such as optimization theory, discrete and continuous optimization, applications, algorithms, and software development. Thanks to the financial support of several sponsors, the registration was free of charge. As a result, many students from KTH and other institutions were able to attend the conference. Indeed, there were 156 registered participants, however, only 9 gave a plenary talk, 16 a contributed talk and 18 presented their results by means of a poster. The relatively small number of speakers aimed to make the event more social. Discussions arose during breaks, the poster session and the conference dinner. It also helped that there were just two parallel sessions



▲ The invited speaker *Ann-Brith Strömberg* from the Chalmers University of Technology just at the beginning of her impressive presentation on Lagrangean dual methods for the evaluation of multi-object tracking algorithms.

and that all speakers were intentionally external to KTH.

As we mentioned, there were nine invited speakers. Namely, *Ambros Geixner* (Zuse Institute Berlin, Germany), *Ann-Brith Strömberg* (Chalmers University of Technology, Sweden), *Claudia D'Ambrosio* (CNRS & Ecole Polytechnique, France), *Elena Rönnberg* (Linköping University, Sweden), >>

>> *Joey Huchette* (Google Research, USA), *Pontus Giselsson* (Lund University, Sweden), *Robert Weismantel* (ETH Zürich, Switzerland), *Stephen Boyd* (Stanford University, USA) and *Thiago Serra* (Bucknell University, USA). Unfortunately, *Stephen Boyd* was not able to attend the conference in person, and the talk had to be changed to the online form. Nevertheless, all of us were happy even with the possibility to see the online presentation of this “convex optimization” man. Now, he introduced CVXPY, a tool for generating custom C code for solving a parametrized class of convex optimization problems. After the presentation, an interesting situation occurred when *Stephen Boyd* was not able to hear questions from the audience, however, he managed to guess their meaning based on what he heard. In several occasions, this led to answering completely different questions, which were relevant and nobody would have thought of asking them.

As a new feature of the conference, the organizers decided to include an *industry session* in the program. Thus, we could learn the experience of the real optimization practitioners. In particular, the session consisted of three speakers, *Ulf Brännlund* from *Volue*, *Albin Fredriksson* from *RaySearch Laboratories* and *Marco Trincavelli* from *H&M Group*. It was interesting to view the contrast between their strive for knowledge and theoretical results and the demands of real world problems and the companies.

Eventually, we wish to express our warm thanks to *Jan Kronqvist* and his colleagues *Anders Forsgren* and *Per Enqvist* for the lovely, inspiring, and well-organized event! They were always eager to help with any problem or question we had. 🌍



▲ *10th Stockholm Optimization Days*: a lovely campus of KTH and an excited poster-maker.



▲ The poster section hosted 18 posters and highly attracted attention of the community.



▲ *The Winner Takes It All*. This is maybe true in the pop music, but not in science! All of the posters presented at the conference were enjoyable and valuable, but five of them achieved a special award. The winners stand on the right, while the left position is held by *Jan Kronqvist*, head of the OC.

# VOCAL Optimization Conference: Advanced Algorithms celebrated in beautiful Hungary

**Tibor Illés** <tibor.illes@uni-corvinus.hu> **Tamás Terlaky** <terlaky@lehigh.edu>

The *VOCAL Optimization Conference* (<http://vocal.p-graph.org/venue.html>) has been restarted on May 25-27, 2022, after the 2020 break caused by COVID-19 pandemic in the *VOCAL* series.

The *VOCAL conference series* started in 2004 as a bi-annual conference at Pannon University (PU), Veszprém, Hungary. The key figures of launching the conference were *Ferenc Friedler* (Chair of the Local Organizing Committee) and *Tamás Terlaky* (Chair of the Organizing Committee of the first 4 editions). In excellently equipped lecture rooms, with fantastic arrangements – mainly due to *Botond Bertók* and his team – and plenary speakers belonging to the international forefront of operational research.

Until the 6<sup>th</sup> *VOCAL Conference* in 2014, the conference was organized in Veszprém where the PU was the host and *VOCAL* was organized in partnership with the *Hungarian Operation Research Society (HORS)*. In the 2010's *István Maros* assumed increasing responsibilities in the organization. In 2016 and 2018, *Pázmány Péter Catholic University* became the host of the conference, so the *VOCAL* conferences moved to Esztergom, Hungary. The 9<sup>th</sup> *VOCAL Conference* was supposed to take place in 2020, but the coronavirus epidemic made this impossible.

Thus, after a four-year hiatus, in the shadow of the fading pandemic, many difficulties had to overcome for the *VOCAL* conference series to continue with the 9th edition. At the initiative of *Botond Bertók* (PU), *Tibor Illés* (CUB), *Miklós Pintér* (HORS, CUB) and with the help of *Ferenc Friedler*, the organization begun in 2021.

There were several necessary basic conditions for the restart of the *VOCAL* conference series, among others finding new



▲ Flyer of the first *VOCAL Conference*, 2004.

venue of the conference, rebuild the organizer community and using their international scientific networks to attract colleagues from abroad and Hungary as well. Two important facts helped the efforts of restarting the

conference series. The first is that the *Corvinus Centre for Operations Research (CCOR)* was established at *Corvinus University of Budapest (CUB)* in September 2020 under the leadership of *T. Illés*. The goal of *CCOR*, among others, is to become a meeting point of researchers in operational research, optimization, and game theory. Organizing international conferences is a natural tool to reach this goal. The second important fact was that the current president of *HORS*, *M. Pintér* (member of *CCOR*), as well as the leadership of *CUB*, was very enthusiastic in relaunching the *VOCAL* conference series at *CUB*.



▲ The *VOCAL Conference* venue at *Corvinus University of Budapest*, May 2022.

Relaunching the *VOCAL* conference series gave some new opportunities, as well. Namely, the organizers put more emphasis on the local, central European research networks and strengthening cooperation of operations researchers of this region. The main organizing team of the *VOCAL* conference identified colleagues from neighbouring Central European countries, including Romania, Serbia, Croatia, Slovenia, and Austria, who represent their national and international scientific communities, and help organize the renewed *VOCAL* conference series as a major scientific event. We are planning to continue this process of expanding the *VOCAL* network regionally and beyond.



Another issue was to move the date of the conference from the earlier used December schedule to the last week of May, when Budapest is in its most beautiful period of the year. Although this change significantly shortened the period we could use for advertising and organizing the conference this year, but we hope that this was a right step for the forthcoming *VOCAL* conferences.

▲ Professor Lešaja presents his plenary lecture at VOCAL 2022 (photo by T. Illés).

The Conference Program (<http://vocal.p-graph.org/program.html>) contained many interesting streams of sessions on computational optimization, game theory, novel applications of *OR*, and invited sessions on linear and nonlinear optimization, integer- and combinatorial optimization, stochastic programming, decision theory, among others.

Another tradition of the *VOCAL* conference has been renewed, namely the Egerváry Prize (<http://www.mot.org.hu/egervary>) of the HORS was presented at the Conference Dinner that took place in the Vak Varjú Restaurant (<https://pest.vakvarju.com/?lang=en>). The recipient of the Egerváry Prize for 2022 was Professor Tibor Csendes ([http://www.inf.u-szeged.hu/~csendes/index\\_en.html](http://www.inf.u-szeged.hu/~csendes/index_en.html)) from the University of Szeged.



▲ M. Dür, plenary speaker, and T. Illés (OC chair) at the conference dinner (photo by P.R. Rigó).

During the 3-day conference we had three prominent plenary speakers Professor Goran Lešaja (Georgia Southern University, US, on the photo to the left), Professor Mirjam Dür (University of Augsburg, Germany) and Professor Michel Grabisch (Paris School of Economics, France) followed by an enthusiastic audience of nearly 70 researchers from 10 countries and 2 continents in the lecture room, C VII, of the newest building of the CUB campus in the downtown area of Budapest. At the 9<sup>th</sup> *VOCAL* Conference there were two parallel sessions, with 57 talks, and one of the largest foreign delegations comes from Slovenia, from two universities, with 6 researchers.



▲ T. Csendes recipient of the Egerváry Prize, behind M. Pintér, president of HORS (photo by T. Illés).

We had a formal celebratory opening session of the *VOCAL 2022* conference. *Professor Tamara Keszey*, the Vice-Rector of Research of the CUB and *Professor Ferenc Friedler*, one of the founders of the *VOCAL* conference series welcomed the audience. On the other hand, the closing session was a working session with more than 40 participants. The President of the HORS, *Miklós Pintér* initiated a discussion on the future of the *VOCAL* conference series, asking opinion of the participants. One of the participants said: "look, usually on the closing session of smaller conferences, you could not see this number of colleagues, everyone is running home, we loved this event and

will come back in 2024". *Professor Lešaja*, one of the plenary speakers, very much unexpectedly, with a bottle of Croatian wine thanked *T. Illés* (chair of OC) for restarting and organizing the *VOCAL* conference. He added: "it is very good to meet again friends and colleagues in person after that much of years and difficulties caused by Covid." Finally, *T. Illés* asked participants do not forget to put a reminder into their calendar for the last week of May, in 2024: *VOCAL*, Budapest.

We hope to see many of you, who are reading this short note, in Budapest at the 10<sup>th</sup> *VOCAL* Conference in May 2024. 🌍

## News from the EURO WISDOM Forum: Spring/Summer Events 2022 and EURO 2022

**Annunziata Esposito Amideo** <annunziata.espositoamideo@ucd.ie> **Tatiana Tchemisova** <tatiana@ua.pt>  
**Ozgen Karaer** <okaraer@metu.edu.tr> **Paula Carroll** <paula.carroll@ucd.ie>



WOMEN IN SOCIETY:  
DOING OPERATIONAL RESEARCH  
AND MANAGEMENT SCIENCE

The *EURO WISDOM Forum* (Women In Society: Doing Operational Research and Management Science) was launched in January 2020 and since that time it is actively working on promoting gender equality in OR.

In this paper, we present the most important events organized by *WISDOM* in 2022 so far.

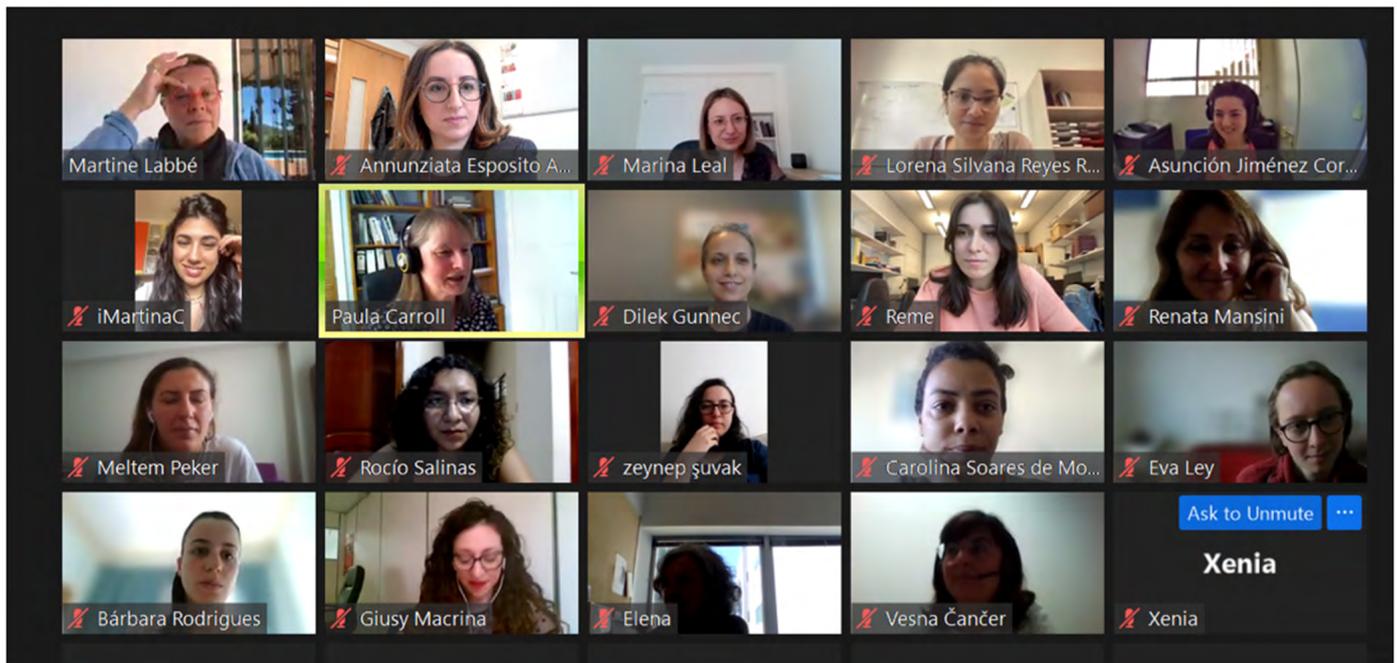
### **EURO WISDOM Webinar on Data Science and Optimization**

The aim of this webinar was to give a platform to some of the *WISDOM* initiative Young Women for OR (YW4OR) whose research is on the intersection of Data Science and Optimization. The webinar on March 24, 2022 on Zoom was

opened by *Prof. Dolores Romero Morales* from the Copenhagen Business School, Denmark who presented the subject matter expert, the speakers and moderated the following discussion. The subject matter expert was *Prof. Ilker Birbil* from the University of Amsterdam (Netherlands). The YW4OR speakers were: *Dr Cristina Molero-Rio* presented her work entitled "On fair and explainable optimal regression trees", *Dr. M. Remedios Sillero-Denamiel* presented a talk "Dealing with complex data: a tree-based linear regression model for hierarchical categorical variables", and *Dr. Sandra Benitez-Pena* had a talk on "New models and methods for data science in a nutshell". The presentations were followed by a moderated open discussion and networking.



▲ A screenshot from the *WISDOM Webinar on Data Science and Optimization*.



▲ A screenshot from the *WISDOM Webinar on Bilevel Optimization*.

### **EURO WISDOM Webinar on “Bilevel Optimization”**

On May 27, 2022, *WISDOM* held a *YW4OR* webinar on “Bilevel Optimization”. The webinar was moderated by the *WISDOM* chair, *Dr. Paula Carroll*. The webinar’s program consisted of three 10-minute talks. *Dr. Asuncion Jimenez-Cordero* presented her work “On selecting features in (functional) SVM with bilevel optimization tools,” *Dr. Marina Leal Palazon’s* talk was entitled “Bilevel optimization for feature selection in hierarchical clustering”, and *Dr. Martina Cerulli* delivered a talk “A pricing and routing problem for last-mile delivery.” The presentations were followed by a short discussion by the subject matter expert *Professor Martine Labbe* (Université Libre de Bruxelles, Belgium) who made an overview of current challenges within bilevel optimization and highlighted possibilities for potential synergies with the speakers’ existing work.

All *WISDOM* webinars are recorded and available on the *EURO* site <https://www.euro-online.org/web/pages/1654/wisdom>.

### **WISDOM at EURO 2022**

The most important event for *WISDOM* in 2022 was, for sure, participation in the 32<sup>nd</sup> *EURO Conference* in Aalto University, Helsinki, Finland (July 3-6, 2022). This conference was a great opportunity to present *WISDOM* to the *EURO OR society*. Many members of *WISDOM* for the first time had a chance to meet face

to face after several difficult years marked by the Covid-19 pandemic, and to participate in many interesting meetings and activities organized by *WISDOM*.

The *WISDOM workshop* took place on July 3<sup>rd</sup>. It involved networking, progress on achieving the *WISDOM* objectives, updates from the Events, PR, and Research sub-committees of *WISDOM*, and a session on writing for *OR* journals with a panel discussion from *Prof José Fernando Oliveira*, Editor of the *European Journal of Operational Research - EJOR*, *Professors Ana Póvoa* and *Claudia Archetti* from the *EJOR* editorial board, and *Prof Immanuel Bomze* who is actually the Editor-in-Chief of the *EURO Journal on Computational Optimization – EJCO*.



▲ *EURO President Marc Sevaux*, and the participants of the *YW4OR award ceremony*.



▲ WISDOM Chair Paula Carroll and WISDOM Secretary Annunziata Esposito Amideo with some of the awardees of YW4OR: Dr Martina Fischetti in the photo on the left and Dr Lavinia Amorosi in the photo on the right.

On Monday, July 4<sup>th</sup>, WISDOM, jointly with the EUROYoung and Practitioners' Forums, contributed to the organization of the **Roundtable on Research Funding**. The ERC Gender Action plan 2021-2027 states that it will "Continue making targeted visits to scientific meetings and workshops addressing gender topics, to inform about open ERC calls. Also promoting the importance of taking into consideration gender differences from the earliest stages of the research project". Dr Anne Pépin (Senior Policy Officer, Gender Sector, Unit Democracy and European values, DG Research and Innovation, European Commission)

touched upon how to address the gender dimension of research in ERC Starting, Consolidator or Advanced funded proposals, or other EU funding calls, presented examples of "good" gender statements from EU funded (i.e., successful) research proposals; and informed how gender research statements are assessed. The above and other related topics were discussed with three other panellists: Prof. Giovanni Felici (Director of the Institute for Computer and System Science of the Italian National Research Council), ERC awardee Dr. Juan Miguel Morales Gonzalez (Universidad de Málaga), and Ms. Nidhi Sawhney (Principal Data Scientist with the Global Center of Excellence for Platform & Technology at SAP).



▲ Annunziata Esposito Amideo presenting her talk "Gender insights within the EURO OR community".

WISDOM organized three YoungWomen4OR sessions at EURO 2022, which we are happy to mention were fully attended! The sessions provide a platform to the YW4OR awardees to present an overview of their research and plans and were as follows: YW4OR Data Science and Optimization – Chair: Paula Carroll, UCD, Ireland, YW4OR Bi-level Optimization – Chair: Annunziata Esposito Amideo, UCD, Ireland, and YW4OR Logistics – Chair: Dilek Gunec, Ozyegin University, Turkey.

A YW4OR award ceremony took place on July 6<sup>th</sup> with EURO President Marc Sevaux, presenting a prize to the YW4OR 2020 and 2021 awardees. Awardees who could not attend nominated a representative to collect the prize on their behalf. At the last day of the conference, July 6<sup>th</sup>, Annunziata Esposito Amideo, WISDOM Secretary presented a talk "Gender insights within the EURO OR community", Dr. Esposito Amideo presented analysis of the survey data collected at EURO 2021 to investigate the gender dimensions within the EURO community.

#### WISDOM future plans

Linking the YoungWomen4OR with subject matter experts in the OR community, we plan to hold webinars in September and November. You can find more information on our website at <https://www.euro-online.org/web/pages/1654/wisdom>, and can support the WISDOM initiative by becoming an ordinary member. 🌐

## Productivity-Concepts, Measurement, Aggregation and Decomposition

by Bert M. Balk

Springer Nature Switzerland AG 2021, Contributions to Economics  
ISSN 1431-1933, ISSN 2197-7178 (electronic)  
ISBN 978-3-030-75447-1, ISBN 978-3-030-75448-8 (eBook)  
<https://doi.org/10.1007/978-3-030-75448-8>

### OR-Analytics – An Interdisciplinary Perspective

Jinal Parikh <jinal.parikh@ahduni.edu.in>

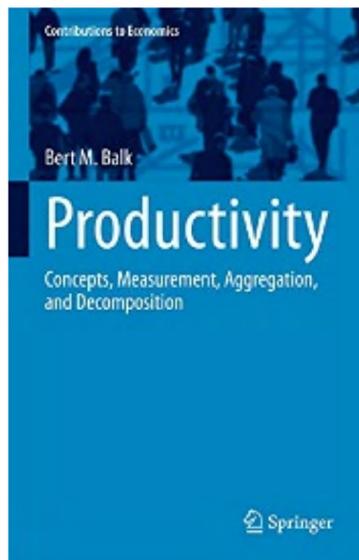
Gerhard-Wilhelm Weber <gerhard-wilhelm.weber@put.poznan.pl>

This new monograph by Bert M. Balk is a valuable seminal collection of theoretically and methodologically rigorous and promising contributions to research and application. It is an interface between (i) *Economics* to discuss: a. the theory of (intertemporal) productivity measurement by dispensing the usual neo-classical assumptions, like the existence of a production function characterized by constant returns to scale, b. applications at all the usual levels of aggregation (micro, meso, and macro), and c. to account for the links existing between the various levels, (ii) *Statistics*: with an emphasis on measuring productivity change (e.g., in national or international statistical agencies), and (iii) *Operational Research, Mathematical Modeling, Data Envelopment Analysis* and further applied areas to optimize the behavior of economic agents. It deftly guides textbook-oriented theorists through a toolbox full of instruments on one hand, and enables practice-oriented policy developers to understand the nuances of productivity change on the other.

The fundamental equivalence of multiplicative and additive models using (multiplicative) indices and (additive) indicators as main instruments has been explicitly highlighted throughout the book. A part of the book is devoted to the concept of decomposition of productivity change into the contributions of efficiency change, technological change, scale effects and input-output mix effects with an application to a real-life dataset that exhibits the empirical feasibility of the theory.

Given its interdisciplinary perspective, this book can cater to a diverse set of audiences which include business analysts involved in performance measurement; statisticians interested in measuring productivity change; economists involved in growth accounting; researchers connecting macro-economic productivity change to its industrial resources; and micro-data researchers.

Throughout this book, the concept of measurement of productivity change has been considered to be based on models relying on strong assumptions such as competitive behavior and constant returns to scale. A brief overview of



▲ *OR-Analytics* for Management of Tomorrow.

the highlights of the chapters in this book follows. (Due to the limited size of this report, not all abbreviations can be explained here. However, some abbreviations may already give us a first impression.)

*Chapter 1 - Introduction* introduces the readers to the concept of productivity measurement and analysis by citing scholarly classics like Copeland (1937), Abramowitz (1956), Solow (1957), Domar (1961), Griliches (1967), etc., and by adding some recent developments like Griliches (1996, 2001), Hulten (2001), Grifell-Tatje and Lovell (2015), Grifell-Tatje et al. (2018), Banerjee and Duflo (2019), Madsen et al. (2010), Ghosh and Parab (2021). The neo-classical approach and its underlying assumptions that equate *Total Factor Productivity (TFP)* change (the Solow residual) on the left-hand side to the technology change (minimum cost decrease with the passage of time) on the right are discussed next.

*Chapter 2 - A Framework Without Assumptions* discusses the basics of (intertemporal) productivity measurement through various models including the basic input-output, KL-VA, K-CF, growth accounting, etc., by dispensing neo-classical assumptions at both the individual and aggregate levels for measuring productivity change. It highlights the equivalence of multiplicative and additive models, and that of productivity measurement and growth accounting models. It exhibits that the measurement of TFP change depends on the measurement and decomposition of capital input cost. Appendices A, B and C cover indices and indicators, decompositions of the value-added ratio and *Domar* factor, respectively.

*Chapter 3 - Capital Input Cost* discusses several models and alternatives for measuring and decomposing the “rate of return” for capital input cost. Given the various measurement issues pertaining to the models, the particular rate that must be used remains at the discretion of the researcher or the statistical agency. Appendices A and B describe decompositions of time-series depreciation and geometric profiles respectively.

Chapter 4 - *Annual and Quarterly Measures* explores consistency issues in the construction of annual and quarterly productivity measures from a theoretical perspective.

Chapter 5 - *Dynamics: The Bottom-Up Approach* investigates the dynamics of productivity change through a bottom-up approach in addition to various approaches on decompositions like *TRAD*, *CSLS*, and *GEAD*, *log-mean*, *geometric* and *harmonic*, the *monotonicity paradox*, etc. Appendices A (*Reinsdorf's* expansion of the GR method), B (*Exercises on the Netherlands' manufacturing industry, 1984-1999*), and C (*Generalization of the OP decomposition*) add value to the chapter.

Chapter 6 - *The Top-Down Approach 1: Aggregate Output and Simple Labour Productivity Indices* takes a theoretical top-down approach to explain aggregate output and labor productivity change through conventional and symmetric decompositions. Appendix A (*The Tang and Wang method*), B (*Dumagan's Decomposition*), and C (*Proof of Expression - 6.13*) supplement it.

Chapter 7 - *The Top-Down Approach 2: Aggregate Total Factor Productivity Index* advances the top-down approach by measuring and relating aggregate and sub-aggregate productivity change without neoclassical assumptions by taking into consideration first, second, third and asymmetric decompositions, followed by a case discussion of a dynamic ensemble and ends with growth accounting.

Chapter 8 - *The Top-Down Approach 3: Aggregate Total Factor Productivity Level* is based on a novel decomposition of



Book author: Professor Bert M. Balk  
(Source: <https://www.rsm.nl/people/bert-balk/>).

aggregate TFP change which is cast in terms of levels rather than indices. Appendix A, analyzing *Baumol's "growth disease"*, complements the concepts.

Chapter 9 - *Connecting the Two Approaches* links aggregate productivity and productivity of the aggregate by connecting the bottom-up and top-down approaches at the micro and macro levels.

Chapter 10 - *The Components of Total Productivity Change* is based on the many decompositions of TFP change. Using a unified and unique approach of applying all the decompositions (i.e., *Malmquist*, *Moorsteen-Bjurek*, *Lowe* and *Cobb*

*Douglas* productivity indices) to the same dataset, a real-life panel of decision-making units, it exhibits those meaningful decompositions of productivity indices can only be obtained for indices that are transitive in the main variables.

While this book beautifully presents *OR-analytics through an interdisciplinary perspective* under the series titled *Contributions to Economics*, many further scientific, practical and real-world applications may be further explored.

For future *OR-analytics*, we recommend the inclusion of "human factors" in *aggregate production planning*, using "matrix questionnaires".

**Reference**

S. Gütmen, G.-W. Weber, A. Goli and E. Babae Tirkolae, Human paradigm and reliability for aggregate production planning under uncertainty, in: *Advances of Artificial Intelligence in a Green Energy Environment*, Elsevier, Amsterdam, the Netherlands (April 2022), ISBN: 978-0-323-89785-3, 193-201. 🌐

Regional Correspondents	
ALIO	Rosiane de Freitas
APORS	Degang Liu
EURO	Gerhard Wilhelm Weber, Sarah Fores
NORAM	Grace Lin, Melissa Moore

Section Editors	
OR Impact	Sue Merchant/John Ranyard
OR for Devt	Rosiane de Freitas Rodrigues
Tutorial	Javier Marengo
Conferences	Gerhard Wilhelm Weber

Country Correspondents	
Argentina	Javier Marengo
Australia	Erhan Kozan
Austria	Karl Doerner
Belarus	Vladimir Golovko

Brazil	Caroline Mota
Canada	Dionne Aleman
Chile	Victor Albornoz
China	Degang Liu
Colombia	Elena Valentina Gutierrez
Croatia	Snjezana Pivac
Czech Republic	Jaroslav Ramik
Denmark	Sanne Wohlk
Finland	Jussi Hakanen
France	Luce Brotcorne
Germany	Sebastian Rachuba
Greece	Evangelos Grigoroudis
Hungary	József Temesi
India	N.M. Ganguli
Iran	Nezam Mahdavi-Amiri
Ireland	Cathal Brugha
Israel	Michal Tzur
Japan	Jun-ya Gotoh
Korea	Chang Won Lee

Lithuania	Leonidas Sakalauskas
Malaysia	Ilias Mamat
Mexico	Yasmin Rios
Nepal	Sunity Shrestha Hada
New Zealand	Andy Philpott
Norway	Marielle Christiansen
Netherlands	LCM Kallenberg
Peru	Orestes Cachay Bosa
Philippines	Elise del Rosario
Poland	Jan W. Owsinski
Portugal	Ana Carvalho, Tânia Ramos
Slovenia	Lidija Zadnik-Stirn
South Africa	Martin Kidd
Spain	Juan-José Salazar-González
Sweden	Tomas Gustafsson
Tunisia	Taicir Loukil
UK	John Hopes
USA	Jim Cochran
Uruguay	Carlos Testuri

# XXI LATIN-IBEROAMERICAN CONFERENCE ON OPERATIONS RESEARCH

## CLAIO 2022

December 12-15, 2022 - Buenos Aires, Argentina  
<https://clai2022.dc.uba.ar>



Operations Research  
Society of the Philippines  
A Member of IFORS

## Onwards to Recovery through Operations Research

13th Triennial International Conference of the Association of Asia Pacific Operational Research Societies (APORS)

November 9-12, 2022 | Eastwood Richmond Hotel, Manila, Philippines (Hybrid)

<http://apors.org/13th-triennial-international-conference-of-the-association-of-asia-pacific-operational-research-societies-apors/>

While the massive negative short-term impact caused by the pandemic has been widely felt, the long-term impact brought about by border restrictions and lockdown measures remains uncertain. This conference will provide a forum to discuss the role that Operations Research (OR) has played or could play on the path to Asia-Pacific regional and world recovery. How has the experience affected organizational decision-making process? Has the adoption of OR techniques impacted operations and business resilience?

With the theme Onwards to Recovery through OR, the conference seeks to bring together OR researchers, academicians and practitioners, whose collective work has sustained OR contribution to decision-making and whose current work is expected to play a vital role in surmounting challenges on the road to recovery from the global pandemic.

### Keynote and Invited Speakers

Prominent OR practitioners, academicians, and businessmen have been invited to deliver keynote speeches. Speakers and delegates from different parts of the world will share their work in the parallel sessions.

### Abstract Submission (Feb 1 to Aug 15)

Each attendee is allowed to present one paper. The abstract should be typed in English, should not include mathematical notations.

- Paper/proposal title;
- Abstract of not more than 500 words
- Author(s) name(s), organization, full mailing address, email address,
  - with an indication of author(s) presenting the paper; and
- Topic (at most three, chosen from the Conference Topics List)

Email abstracts to

<https://easychair.org/conferences/?conf=apors2022>

Please direct all other inquiries to [secretariat@orsp.org.ph](mailto:secretariat@orsp.org.ph)

### Registration Dates and Fees

Registration Opens: Apr 01, 2022 | Early Bird Deadline: Aug 20, 2022

Speaker Registration and Payment Deadline: Sep 15, 2022

	Participant	Early	Regular
On-site Participants	Regular	\$200	\$250
	Students	\$100	\$150
	Accompanying Person	\$180	\$250
Virtual Participants	Regular	\$100	\$120
	Students	\$50	\$60

### Scientific Advisory Board:

#### Chair:

Francis Miranda, Operations Research Society of the Philippines (ORSP)

#### Members:

**Simon Dunstall**, Australian Society for Operations Research (ASOR)

**Yu-Hong Dai**, Operations Research Society of China (ORSC)

**Yong-Hong Kuo**, Operational Research Society of Hong Kong (ORSHK)

**Jai Kishore Sharma**, Operational Research Society of India (ORSI)

**Nezam Mahdavi-Amiri**, Iranian Operations Research Society (IORS)

**Takamori Ukai**, Operations Research Society of Japan (ORSJ)

**Jong Woo Kim**, Korean Operations Research and Management Science Society (KORMS)

**Adibah Shuib**, Management Science/Operations Research Society of Malaysia (MSORSM)

**Govinda Tamang**, Operational Research Society of Nepal (ORSN)

**Mike O'Sullivan**, Operations Research Society of New Zealand (ORSNZ)

**Marie Shella T. Mariscal**, Operations Research Society of the Philippines (ORSP)

**Kok Choon Tan**, Operational Research Society of Singapore (ORSS)

# IFORS PRIZE FOR OR IN DEVELOPMENT 2023

IFORS PRIZE COMPETITION 2023 | 23RD TRIENNIAL CONFERENCE | JULY 10 TO 14, 2023 | SANTIAGO, CHILE

The competition aims at promoting the practice of OR for development. Past Winners and finalists include works that have improved health, wellness, education, public investments and other issues in Africa, Asia and Latin America. The submission process consists of two stages:

– First stage. Entries should be submitted by email to the Chair of Judges by 24th October 2022. Each entry should comprise a maximum 5-page summary of the work.

– Second stage. Entrants who are successful in the first evaluation will be invited to submit, by the 19th December 2022, a full-length manuscript.

After these two stages, the panel of judges will select the finalists who will present their work in a special session of the competition at the 2023 IFORS Triennial conference. The winner will receive a grand prize of US \$4,000 and the runner-up a prize of US \$2,000.

## INQUIRIES AND SUBMISSIONS

Inquiries and submissions should be sent by email to the Prize Chair: Mario Guajardo  
Professor at the Department of Business and Management Science, NHH Norwegian School of Economics, Bergen, Norway.  
Email: [mario.guajardo@nhh.no](mailto:mario.guajardo@nhh.no)

Indoor email submission please add in Cc' the chair of the IFORS' OR for Development committee:

Francis Miranda  
Email: [franzmiranda@yahoo.com](mailto:franzmiranda@yahoo.com)

## IMPORTANT DATES

Submission deadline summary (first stage): October 24, 2022  
Submission deadline full paper (second stage): December 19, 2022  
Finalists will be notified by: January 31, 2023  
Date of oral presentation: July 10-14, 2023

Submission guidelines and more information about the competition can be found here: <https://ifors2023.com/prizes>



The 23rd Conference of the International Federation of Operational Research Societies (IFORS 2023) is locally organized by ICHIO, the Chilean Institute for Operations Research, together with ISCI, the Institute of Engineering Complex Systems, and with the support of the University of Chile and the Pontifical Catholic University of Chile.

The conference will highlight global developments in Operations Research (OR) and Analytics and show how these tools are expanding their impact on society, health, science, and industry. It will be a platform for experts from around the world to showcase the diverse potential of state-of-the-art Operations Research techniques and technologies. IFORS 2023 offers a unique opportunity to network with expert colleagues in academia and industry, and graduate students, from all parts of the globe. It is, also, an opportunity to visit Chile and explore its culture and diverse nature and landscapes, which range from the driest desert in the world to the windy and cold climate of Patagonia.

We are excited to have the following confirmed plenary

speakers:

- Margaret Brandeau, Stanford University
- Juan Carlos Muñoz, Pontificia Universidad Católica de Chile
- Paolo Toth, Università di Bologna
- Andrés Weintraub, University of Chile

In addition to the plenaries, there will be a number invited keynote talks covering a wide range of Operational Research and Analytics subjects as well as tutorials.

The call for papers will be made public by November with further information on the important dates.

Please visit <https://ifors2023.com> for more information and to keep in contact.

We look forward to seeing all of you in person in Santiago in July 2023!

IFORS 2023 Organizing and Program Committees 