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IFORS NEWS
International Federation of Operational Research Societies

FROM THE PRESIDENT

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It has been several weeks since the IFORS Santiago conference, which attracted more than 900 operational researchers from all over the world. Based on the summary results of the post-conference survey, the conference had been a big success. Of course, there were some unexpected incidents: Santiago welcomed us with a magnitude 5.6 earthquake on the first day of the conference! Some of us caught Covid, some of us got pick-pocketed, some excursions were hampered by heavy snow, there were flight delays both getting to and returning from Santiago. Still, these incidents did not affect the high positive rating of the conference by the participants. Many thanks to the Local Organisers for an excellent job in managing all the contingencies throughout the week in this highly complex operation!

Many participants commented on the high quality of the scientific exchange at the sessions. Indeed, the sessions were very well-attended. I was particularly happy to see the active engagement during the Q&A at the end of the talks, and the involvement of many students in the discussions. I was also impressed by the many talks that presented applications of OR in diverse industries across the world. Even the plenary talks highlighted the practical impact of Operational Research. Andres Weintraub presented the use of OR in forestry and natural resources management in Chile, Paolo Toth discussed inventory and routing models in logistics, Margaret Brandeau addressed the use of analytics in public policy for health and social problems, and Juan Carlos Muñoz presented operational changes that improved the public transport system in Santiago. As Juan Carlos himself commented: *it is not usual to have a Minister in the host country that had attended an IFORS event before!*

From his talk, one can clearly see how having a background in operational research and transportation science has been useful to Juan Carlos Muñoz in his Ministerial position, in helping to design and devise policy and operational improvements to public transport in Santiago in Chile. Many conference participants have told me that this talk energized them to apply OR to address important problems in society. I am very heartened by this. A central goal of IFORS is to promote the use of OR to make significant impact on society. Public policy and social issues are complicated, with many stakeholders and complex considerations. It is therefore very important that we as operational researchers devote our expertise and effort to help to solve these problems. These problems may not readily fit standard models nor require intricate technical models, but clear analytic thinking and systematic OR analysis will always be helpful to illuminate the critical tradeoffs and concerns.

As we celebrate the success of the IFORS 2023 Santiago conference with its theme of "Advanced Analytics for a Better World", may I encourage all of you to devote your OR expertise to address societal problems and make a significant practical impact in your communities.

WHAT'S INSIDE

FROM THE EDITOR IN CHIEF

Antonio Mauttone <mauttone@fing.edu.uy>

Welcome to the September issue of the IFORS Newsletter!

We are still remembering the wonderful experience of attending the IFORS 2023 Conference in Santiago, Chile. The event is extensively reported in our Conferences section. It was great to meet several colleagues again, all of them at the same place. Moreover, it was rewarding to see the interaction of students and young researchers, with high level scholars and peers from all over the world. We hope to live this experience again in the next edition of the conference, to be held in Vienna, Austria, in 2026. We took the opportunity of the Santiago conference to distribute a physical version of this publication, as a means to disseminate the newsletter and attract new readers.

The September issue of the IFORS Newsletter includes content related to its regular sections. In the *OR and Development* section, colleagues from the National Tsing Hua University and the National Science and Technology Center for Disaster Reduction, Taiwan, present a bundle of methods to support decision-making in disaster preparation and response. The approach includes an agent-based simulation model which represents the evacuation process and a vehicle and inventory routing model to optimize the distribution of relief goods. In the *Tutorial* section, a colleague from Pennsylvania State University (USA) provides an overview of Robust Vehicle Routing under Uncertainty. Since uncertainty is present in many routing problems arising from real scenarios involving e.g., travel time and resource availability disruptions, deterministic solutions are not always feasible for these problem variants. Thus, both exact and heuristic resolution methods must be adapted, either by modifying existing branch-price-and-cut algorithms or using specific purpose data structures. In the *OR Impact* section, colleagues from Stanford University and University of California at Berkeley (USA), University of Hong Kong (China) and the JD.com company, report the application of analytics at a large retailer in China. The project implements an end-to-end inventory management system to strengthen supply chain capability using a deep learning model that directly develops the best replenishment plan. Results compared against a traditional predict-then-optimize approach show the advantages of the proposed methodology.

Moreover, the *Conferences* section reports 28 events worldwide on OR and related disciplines, including our flagship IFORS 2023 Conference. The *Book Review* section reports on the volume "Business Dynamics Models: Optimization-Based One Step Ahead Optimal Control". We close this issue with an article about the IFORS Fellows.

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

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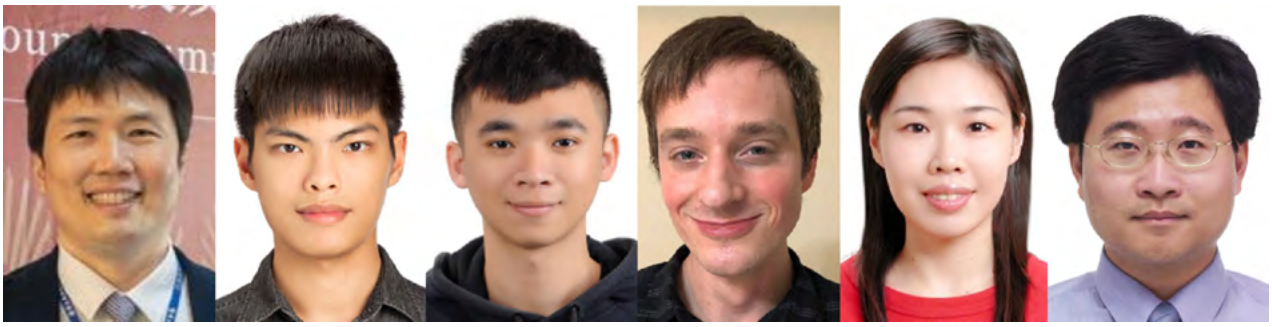
SAFER HOMELAND: DEVELOPING EVACUATION SIMULATION AND HUMANITARIAN RELIEF LOGISTICS MODELS FOR EFFECTIVE DISASTER PREPARATION AND RESPONSE IN TAIWAN



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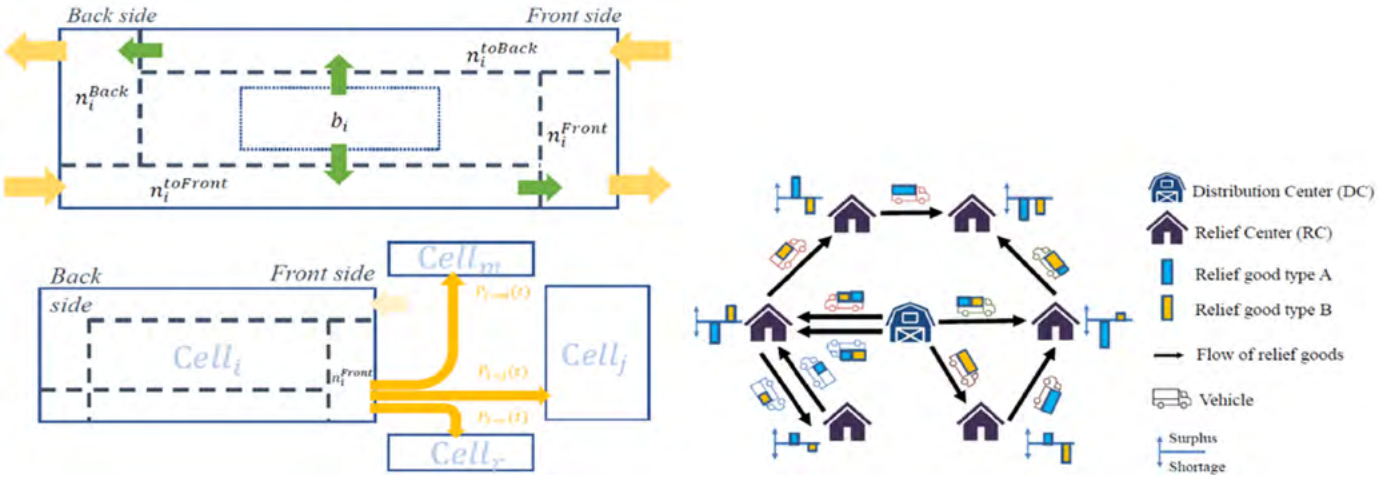
Note from the Section Editor: During the 23rd IFORS triennial conference in Santiago, July 10-14 2023, the finalists of the IFORS Prize for OR in Development 2023 presented their works. The outcome of the competition was announced during the conference dinner. The winner work, rewarded with a grand prize of US$4000, was an application of OR techniques for disaster relief and humanitarian logistics developed in Taiwan. In the following, we are delighted to offer you an extended summary of this work.

Introduction

After a destructive earthquake occurs, citizens whose residences are badly damaged or no longer habitable need to evacuate to relief centers in an efficient manner. At the same time, relief goods such as medical kits and water, prepositioned at distribution centers, must be transported as quickly as possible to the relief centers for emergency use by the evacuees. Besides the obvious uncertainty related to the timing of an earthquake strike, the severity and spatial distribution of damage across the road network following an earthquake is a major source of uncertainty in the post-disaster environment. Other sources of uncertainty which must be simultaneously considered include traffic conditions on the road network, the level of demand for relief goods, the amount and spatial distribution of residents who need to evacuate, and the level of pedestrian congestion on the network as a function of time. Owing to these multiple sources of profound stochasticity related to the post-disaster environment, executing effective and efficient logistical and evacuation operations is highly challenging yet crucial for saving lives and reducing the potential for social unrest and other secondary disasters. In an attempt to partially meet these challenges, we develop a series of highly useful and interrelated simulation models for the post-disaster evacuation of residents and humanitarian relief logistics (HRL). The evacuation simulation model (Chang et al., 2022a) and humanitarian logistics models (Chang et al., 2022b) are both data-driven and practice-based frameworks developed in collaboration with the National Science and Technology Center for Disaster Reduction (NCDR), a think-tank established to strengthen disaster management and risk reduction in Taiwan.



▲ Figure 1: (Left) A depiction of the cellular agent-based simulation evacuation framework. Agents choose their moving directions within (top) and between cells (bottom) based on the congestion levels within cells. (Right) Flow, via relief vehicles, of relief goods from DCs and RCs to RCs depending on surplus and shortage of different types of relief goods in the HRL models.

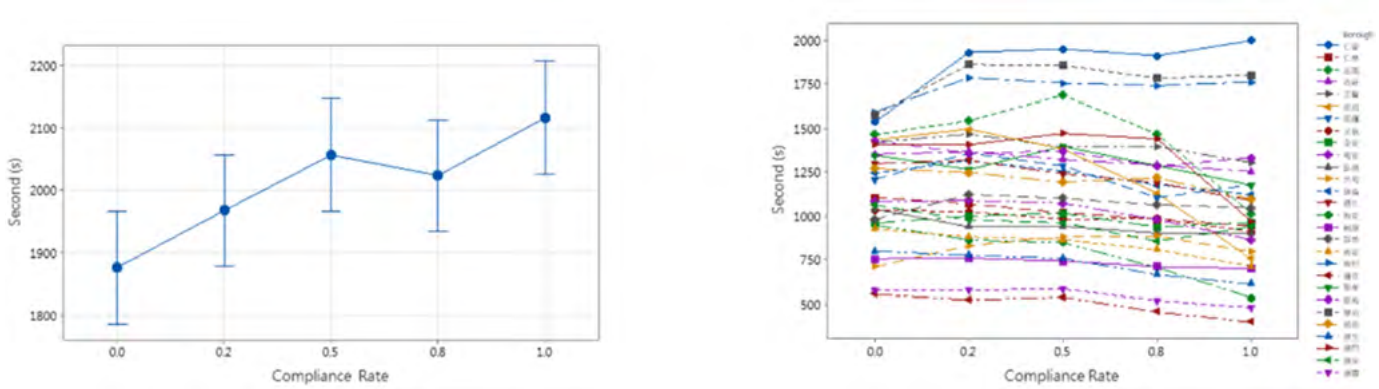


Figure 2: (Left) Evacuation completion time as a function of compliance rate for the entirity of Daan District, Taipei and (Right) Evacuation completion time as a function of compliance rate for each borough of Daan District, Taipei.

Modelling approach

The proposed simulation evacuation model is a dynamic, stochastic, and agent-based. Developed based on real data collected by Taiwan Earthquake Impact Research and Information Application platform (TERIA), a platform developed by NCDR, the proposed model allows pedestrian evacuees to individually choose their relief center (RC) destination and movement directions. In particular, at each moment of the evacuation process of each evacuee, there is a probability-based random selection of which direction to go within the current cell and which neighboring cell to move into according to the congestion levels and estimated travel time from the current cell to each of two possible RC destinations. An illustration of the cell-based structure and the moving directions within and between cells is illustrated in Figure 1. Importantly, the current government protocol is to assign each resident in a potential disaster area to a specified RC for evacuation purposes, rather than apply the dynamic, agent-based rules embedded in our model. The degree to which evacuees follow the government-sponsored policy is operationalized by a variable known as compliance rate. Thus, we can directly compare the performance (total time needed to require all evacuees following a destructive earthquake) of our natural agent-based policy with that of the current government policy following different earthquake scenarios (differences in location, depth, magnitude).

With regards to the HRL part, we develop a model for the distribution of relief goods after an earthquake. The model includes vehicle and inventory routing decision for the distribution of relief goods from distribution centers (DCs, i.e., warehouses storing an inventory of food supplies, medical goods, etc.) to local relief centers (RCs) and from RCs (where there is generally a supply of relief goods already prepositioned) to RCs in order to meet the demand of evacuees for relief goods at all RCs in minimal time after a major earthquake occurs. Among others, the constraints include vehicle capacity, conservation of vehicle flow, and relationships between inventory and demand. Note that the spatial distribution of demand for relief goods is determined based on TERIA data for a given earthquake scenario (related to the determination of the spatial distribution of evacuees for the simulation evacuation model). We implement two versions of the model, one based on current government protocol (referred to as Model 2), and the other an alternative version which we proposed (referred to as Model 1). Both are equivalent, except that Model 2 includes an extra constraint to ensure that RCs cannot support each other.

An illustrative map showing how the surplus/shortage of the initial inventory of relief goods at RCs influences the flow of commodities among the nodes (DC(s) and RCs) of the road network is shown in Figure 1. Through our framework, we can find and compare the optimal vehicle and inventory routing solutions and total time required to complete the HRL operation returned by each model resulting from different earthquake scenarios. The feasibility and usability of the developed simulation evacuation model and the HRL models have been verified through an empirical study where Taipei is used as the test city.

Results

We ran empirical studies using both the simulation evacuation framework and the HRL models based on different earthquake scenarios on the Shanchiao fault in Taipei, Taiwan. Our proposed simulation evacuation framework was used to simulate evacuation following an earthquake of magnitude 6.0 in Daan District, Taipei. Figure 2 shows that when evacuee congestion is considered by a high percentage of the agents, the total evacuation time decreases by up to 12% for Daan District as a whole. When a higher proportion of the evacuees follow the current government strategy, on the other hand, the total evacuation time is shortened for most of boroughs. Importantly, though, a few high risk boroughs have greatly increased evacuation completion times. This information can be used by government officials to prioritize road reinforcement plans and drill residents on the best evacuation protocols.

Meanwhile, we ran the two HRL models and optimization algorithm on a small network (Daan) and a large network (Daan, Zhongshan, and Zhongzheng districts) in the context of earthquakes of various magnitudes. For both the small and large networks, there is an advantage of Model 1 over Model 2 (the current practice) in terms of HRL operation completion time as earthquake magnitude increases as revealed by Figure 2. That is, the advantage of allowing RCs to support each other in supplying relief goods is greatest when the most lives are at stake. In particular, the decrease in completion time for Model 1 relative to Model 2 (the current practice) is around 10% and 5% on the small and large networks, respectively, for the highest magnitude quakes. The decrease can be even more significant when the affected area is as large as a city. Overall, these results shed some insights into that the protocol of allowing RCs to support each other is way more effective in terms of emergency response and can allow vital relief goods to reach RCs and evacuated residents significantly faster.

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ROBUST VEHICLE ROUTING UNDER UNCERTAINTY

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The Vehicle Routing Problem (VRP), a cornerstone of operations research and logistics, is centered around finding the most efficient routes for a fleet of vehicles delivering goods or services. Solutions to the VRP are indispensable in numerous sectors, ranging from commercial transportation and courier services to urban freight and more. It's a complex puzzle with multiple dimensions—vehicle capacities, customer time windows, driving time restrictions, and other factors such as multiple depots, heterogeneous fleets, and different types of drive trains [7].

Delivery services, like those for food, parcels, or mail, utilize VRP's solutions daily to minimize their operational costs and delivery times. Similarly, public utilities like waste collection and snow removal use VRP to optimize their routes and maintain efficient services. In the healthcare sector, VRP guides ambulance routing and mobile health units, while in education, it aids in designing school bus routes.

However, reality is seldom as predictable as we'd like. Traffic jams, vehicle breakdowns, or last-minute order cancellations can all disrupt the best-laid plans and challenge the ideal conditions of the classical VRP. What happens when travel times aren't precise, vehicles become unavailable, or customer orders change unpredictably? What about when service times and demands aren't known in advance? Ignoring these uncertainties can impact efficiency and potentially damage reputations, prompting customers to seek different service providers. It can also affect cost service levels and the environment. Therefore, making routing decisions with this uncertain information in mind is crucial.

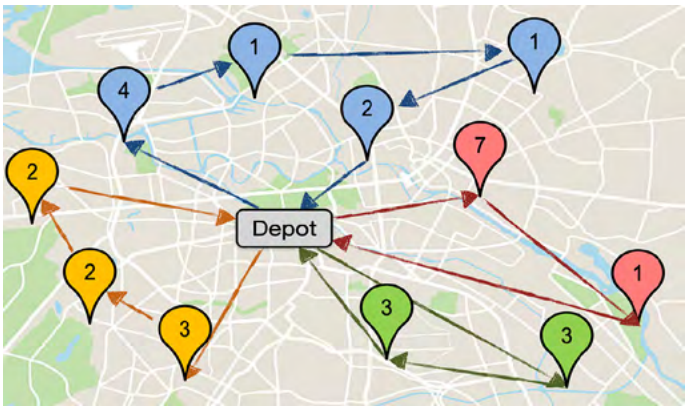
This unpredictability has led to the development of the Robust Vehicle Routing Problem (RVRP), a variant of the VRP designed to withstand disruptions and perform effectively under various scenarios. Instead of treating variables like delivery times as fixed, RVRP treats them as random variables, aiming to find routes that are feasible regardless of the exact values these variables take [3].

Key to RVRP is the concept of the 'uncertainty set', a range of possible values for each uncertain parameter. Defining this set is crucial, as it not only gauges the risk involved but also determines the complexity of problem-solving. Depending on the specifics of the problem, the definition could be as straightforward as a predefined range or involve more complex probability distributions or factor models [1]. The ultimate goal, however, remains to find 'robust' routes – ones that hold up under any uncertainties encountered (see Figure 1).

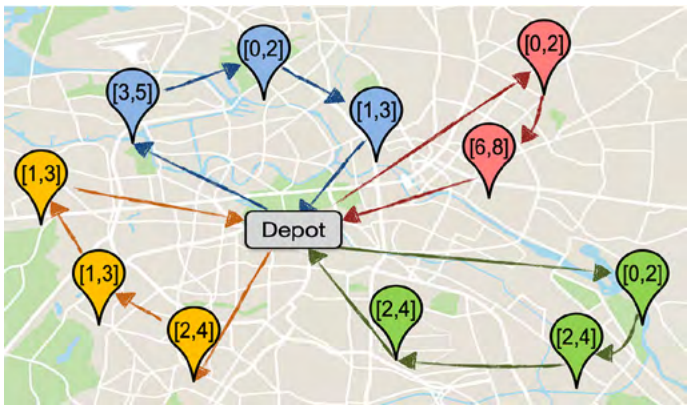
Navigating this complex landscape, the question becomes: Can we take state-of-the-art deterministic VRP codes and modify them to handle uncertainties? Over the last few years, researchers have been exploring this question, aiming to make modular changes to classical VRP algorithms without losing their key features, such as computational scalability, yet making them uncertainty-aware. Indeed, this computational tractability is a key advantage of the RVRP over traditional stochastic models, and successful algorithms for its solution typically mirror those that have been developed for the deterministic VRP.

Sometimes, the RVRP can simply be reduced to an equivalent deterministic VRP, especially when uncertainties in demands or travel times use hyper-rectangle sets. However, for most cases, exact algorithms fall into three categories: model reformulations, branch-and-cut methods, and branch-price-and-cut methods.

Model reformulations use robust optimization principles to convert the RVRP into mixed- integer programming (MIP) formulations. However, their suitability is often limited to small- sized instances due to their scale. In contrast, branch-and-cut and branch-price-and-cut methods require only minimal modifications to their classical counterparts for the deterministic VRP.



(a) Route plan corresponding to a point fore cast of customer demands.



(b) Route plan when demands may vary by up to one unit from the point forecast.

▲ Figure 1: Route plans for a fleet of four vehicles, each of capacity 10 units, delivering goods to customers whose demand quantities are indicated at their locations. The route plan on the left becomes infeasible when the forecast has large variability whereas the one on the right is relatively more robust to forecast errors.

These modifications include the addition of 'robust versions' of classical cutting planes or the pricing of 'robust routes' as columns in a Dantzig-Wolfe formulation. The challenge in these approaches lies in devising fast algorithms for cut separation or robust route pricing within each node of a tree search procedure [2, 4].

Heuristic algorithms may lack the guarantees of worst-case suboptimality provided by exact methods, but their modifications of well-known metaheuristics for deterministic VRP make them popular. The real challenge here is the efficient evaluation of potential RVRP solutions' cost and feasibility during the search process, which may involve repeatedly solving linear or convex optimization problems defined over the uncertainty sets.

To overcome this challenge, certain data structures have been proposed for swift neighborhood evaluation, even though additional memory may be required to maintain these quantities. These data structures have been effectively integrated into several metaheuristics for RVRP with demand and travel time uncertainty. Interestingly, it turns out that fast neighborhood evaluation in metaheuristic algorithms, fast heuristic separation of robust cutting planes, and fast heuristic pricing of robust vehicle routes in branch-price-and-cut algorithms, are all intimately connected to each other. They each require similar data structures that are specific to the given uncertainty set [6].

In conclusion, the RVRP offers a robust framework for tackling uncertainties in routing problems. By using predefined uncertainty sets rather than random variables, the RVRP presents computational tractability akin to deterministic VRP. This approach has had a significant impact in many real-world scenarios [5], thus showcasing the capability of the RVRP to improve operational efficiency, reduce costs, and enhance services in the face of uncertainty. The ongoing development and refinement of new data-driven uncertainty models, new exact and heuristic algorithms, their integration with machine learning, and applications to the design of sustainable supply chains, promise exciting future advances in logistics and operations research.

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OR IMPACT

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JD.COM USES ADVANCED ANALYTICS TO STRENGTHEN SUPPLY CHAIN CAPABILITY

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Introduction

JD.com, China's largest retailer by revenue, offers more than 10 million stock keeping units (SKUs) and serves about 600 million active users, achieving US$149.3 billion of net revenue in 2021. JD.com runs an omni-channel business model with multiple online and offline sales channels, while operating more than 1,400 warehouses with its own fleets for logistics. JD's supply chain management practice encompasses broad areas including inventory replenishment, warehousing operation and delivery, and achieves extreme efficiency by making use of cutting-edge intelligent technologies. Over 90% of orders can be delivered the same or the next day. The recent inventory turnover* of JD.com is 31.5 days, while keeping the stock-out rate below 3%.

A Typical JD.com Warehouse

JD.com has always been dedicated to building an intelligent, integrated and resilient supply chain to create value for consumers as well as all players within the retail ecosystem. Despite challenges in the complex and sophisticated retail supply chain, JD.com has strengthened its supply chain capability by focusing on supply chain efficiency, supply chain collaboration, and customer demands intelligence.

In this article, we describe a project that JD.com has implemented to strengthen supply chain capability. By implementing an end-to-end (E2E) inventory management system, JD.com has significantly reduced the stock costs and improved operational efficiency.

Inventory Management: the Traditional Approach, Predict then Optimize (PTO)

Inventory optimization under demand uncertainty is the core of supply chain management to enhance efficiency, reduce operational cost and better fulfill customer demands. The uncertainty of consumer demands, the fact that the supply chain is long and contains many nodes and links, and the vast volume of SKUs make inventory management a tremendously challenging task. The traditional replenishment approach is based on using data to estimate future sales and then to develop the replenishment strategy considering vendor lead time (VLT). This predict-then-optimize (PTO) solution framework decouples the prediction and optimization stages. Consequently, the optimization step does not use the input data in an optimized manner, and useful information can be lost in the PTO process. As for the operational practice of e-commerce retailers, the large number of SKU types, the highly uncertain nature of demands, and unforeseen occurrences (e.g. Covid-19 pandemic), all contribute to substantial forecast errors, which increase supply chain costs and decrease customer satisfaction.

A New Improved Approach

A team from within JD.com set out to seek improvements to the existing approach by first of all carrying out a comprehensive literature review. This indicated that the end to end (E2E) approach to inventory management had great potential for improvement and top management gave support for it to be tested on a sample of JD.com's products, with positive results (ref 1).

JD.com's E2E inventory management is based on a deep learning model that directly develops the best replenishment plan. The model first uses historical data to determine the optimal replenishment quantity based on dynamic programming, and then builds a feature library and generates training samples based on historical sales information, VLT information, initial inventory, and optimal replenishment quantity. A recurrent neural network[a] (RNN) module is used to train the model. Finally, the model provides a replenishment recommendation and predicts the sales and VLT. By shortening the decision-making process and reducing the accumulation of prediction errors in intermediate links via the E2E approach, JD.com anticipated improvements to the effectiveness of replenishment and consequently reduced costs.

The Neural Network Structure is shown in Fig. 1 below

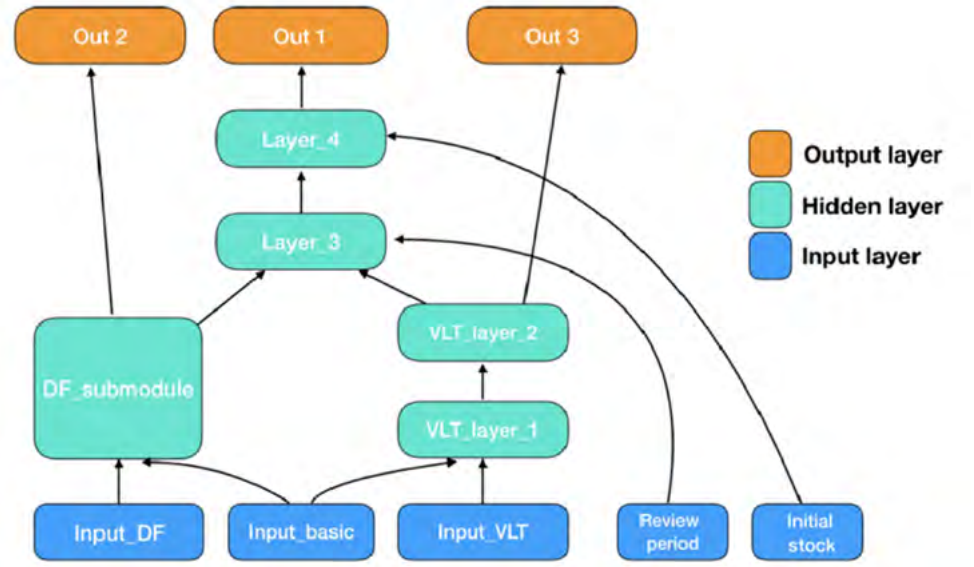

Fig 1. Neural Network Structure of the End-to-End Model

The inputs of the E2E model include five parts:
Input DF (Demand Forecast) and **Input VLT** represent features related to demand and Vendor Lead Time.
Input basic is the set of general item-level features, such as product, categories, warehouse locations, and brand names.
Review period and **initial stock level,** are directly fed into one of the hidden layers because they are not intended to generate any cross terms with other features.

The E2E model has three outputs:
Out1 represents the main output, the final replenishment decision.
In addition, there are two accessory outputs: **Out2** is the demand forecast and **Out3** is the VLT forecast. Based on data analysis using the neural network, the model can come up with more accurate forecasts of demand and VLT than the inputs.

All hidden layers, except for the DF submodule, are fully connected layers with rectified linear unit (ReLU) activation function and dropout layers (ref 2) so as to prevent overfitting. The DF submodule is designed as a multi-quantile RNN (MQRNN), which receives multiple time series (e.g., demand time series, promotion time series) as inputs and produces a daily demand prediction over a set of quantiles as outputs. MQRNN is used because of its demonstrated performance in demand forecasting in the e-commerce industry (ref 3).

Testing and Implementation of E2E at JD.com

The performance of the one-step E2E model with MQRNN was compared to several common two-step PTO models, using real-world data from JD.com. The results are shown in Fig 2.

E2E-RNN refers to the novel algorithm proposed by JD.com, which adopts one-step decision framework and uses MQRNN network to solve the replenishment problem.

Method[b]	Total Cost	Holding Cost	Stockout Cost
Optimum	3022.60	1925.7	1096.91
E2E-RNN	**3766.52 (+24.6%)**	**2689.02**	**1077.50**
BM1	4207.09 (+39.2%)	2502.55	1704.54
BM2	4157.63 (+37.5%)	2254.99	1902.04
Normal	4576.05 (+51.4%)	3369.21	1206.84
Gamma	4476.17 (+48.1%)	2821.87	1654.30
E2E-GBM	4017.82 (+32.9%)	2109.93	1907.89

▲ Fig. 2 Performance of E2E Model with MQR

BM1 and BM2 are two benchmarks using the same deep learning structure as E2E_RNN for demand and VLT prediction in two-step framework. BM1 can be considered as a PTO method with point prediction of VLT and distributional forecasting of demand. BM2 can be viewed as a PTO method with point prediction for both VLT and demand, but in optimization stage, the multi-period problem setting is kept. Normal and Gamma are two base stock policies, where the daily demand is assumed to be independent and identically distributed (i.i.d.), and follows Normal and Gamma distribution, respectively.

E2E-GBM denotes the performance of the end-to-end Light-GBM model, which is a decision tree-based algorithm widely used in industry.

(Note: Due to the sensitive information protection required by the company, the numbers related to costs have been normalized and adjusted by the same multiple.)

The results show the benefits of both the one-step decision framework provided by the E2E models and the deep learning architecture involved.

The test results convinced senior management to implement the new E2E approach. Initially, top-selling SKUs from 162 categories were chosen. Both the stock-out rate and the inventory turnover decreased by 1% and 1.9 days respectively, generating incremental annual net revenues of $41 million. Thanks to this application and other intelligent techniques, the amount of JD.com's automatic replenishment has reached hundreds of billions of RMB (tens of billions of dollars) over a year and the automation rate measured by replenishment entries has reached 85%. In July 2021, the E2E framework was named among the top six supply chain technology innovations for 2021 by Gartner.

Endorsement

"JD.com aims to build an intelligent, integrated supply chain that not only benefits its own company but also the partners, consumers and the whole eco system. JD.com has implemented the end-to-end inventory management method to reduce the inventory cost and improve the efficiency with which the automatic replenishment system is built. Since 2020 the system has saved the inventory cost of 660 million RMB yuan ($94 million)". Senior Director, JD.com

Summary

Grounded in advanced analytical techniques, JD.com has built an intelligent, integrated and resilient supply chain to create value for consumers and all participants within the retail ecosystem. Further analytical studies by the inventory management team have also contributed to significant improvements in the supply chain, including Intelligent Risk Management and a Consumer-to-Manufacturer (C2M) System. More details about these two topics can be found in (ref 4).

Despite challenges in the complex and sophisticated retail supply chain, JD.com has strengthened its supply chain agility, and attained shared value by focusing on supply chain efficiency, supply chain resilience, and customer-demand intelligence. With its advanced technologies, JD.com's supply chain aspires to be the best in the industry, enhancing the welfare of all ecosystem participants and consumers.

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* The inventory turnover is calculated by dividing the average inventory level of each day by the average demand.

[a] A recurrent neural network is one where connections between nodes can create a cycle, allowing output from some nodes to affect subsequent input to the same nodes, allowing temporal dynamic behaviou

[b] Optimum refers to the optimal replenishment decisions obtained by solving the replenishment problem with known demand and VLT.

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CONFERENCES

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IFORS 2023 IN SANTIAGO, CHILE: AN UNFORGETTABLE EXPERIENCE IN OPERATIONAL RESEARCH!

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▲ *IFORS 2023* attendants say hello to the rest of the world!

***IFORS 2023* was a resounding success!** More than 950 persons attended the conference in Santiago, Chile, coming form 60 countries around the world. During the five days of the conference, attendees participated in a high-quality scientific program as well as other activities. The technical program had 946 submissions with 726 presentations actually given at the conference. Authors of submissions came from 55 countries. There were 36 clusters/streams headed by 55 cluster chairs. The program spanned four days with many parallel tracks spread over two nearby venues at *Pontifical Catholic University of Chile and University of Chile*. Presenters ranged from students enjoying their first international conference experience to seasoned veterans with many past *IFORS* experiences. There were plenty of opportunities for discussion about the research presented, during the coffee breaks and lunches, which also took place at the venues, promoting interaction.

The inaugural ceremony took place early Monday, with the presence of representatives from the two organizing universities and from the *OR* communities around the world. *Susana Mondschein*, president of the *Chilean Institute for Operations Research* (*ICHIO*) and *Janny Leung*, president of *IFORS*, greeted attendees and opened the conference. The Co-Chairs extended their gratitude to all persons and organizations supporting the event and *Alice Smith*, Chair of the Program Committee thanked all the cluster chairs and other people that helped create the scientific program.

A plenary occurred each day of the technical program. The four plenary speakers were the current Minister of Transportation of Chile and Professor at Pontifical Catholic University of Chile, *Juan Carlos Muñoz*, *Margaret Brandeau* of Stanford University, *Paolo Toth* of University of Bologna (giving the *EURO Plenary*), and *Andres Weintraub* of the University of Chile. Each of these speakers spoke on the variety of important work that they have led which applied *OR* to solve difficult problems arising in diverse sectors including healthcare, natural resources, urban mobility, and logistics. These talks were inspiring and informative.

▲ *Janny Leung* (IFORS President), *Susana Mondschein* (ICHIO President) and *Alice Smith* (PC Chair) greet attendants at inaugural session.

▲ *J.C. Muñoz* and *Paolo Toth*, two of the excellent plenaries.

Six keynote speakers strongly added to the quality of the technical program - these were *Dolores Romero Morales* of Copenhagen Business School, *Andrea Lodi* of Cornell Tech and the Technion, *Tava Olsen* of University of Melbourne, Brian Denton of University of Michigan, *Rene de Koster* of Erasmus University, and *Anna Nagurney* of University of Massachusetts. As is the tradition at *IFORS*, the keynotes occurred two at a time with no other sessions overlapping. This gave attendees a chance to choose from the two keynotes offered, a choice that proved difficult for many as each talk was a topic of timely interest and delivered by a titan of the field. These topics spanned from machine learning to agricultural supply chains to robotics to healthcare analytics.

Tutorials are a critical part of any conference and *IFORS* had six 90-minute tutorials available to all attendees. *Kate Smith-Miles* of University of Melbourne led a session on stress-testing algorithms and *Andres Gomez* of University of California led one on machine learning. *Eduardo Lalla Ruiz* and *Rosa Gonzalez Ramirez* taught two tutorials on seaside planning. *Nesim Erkip* of Bilkent University was the tutor for inventory problems and the team of *Carleton Coffrin* of Los Alamos National Laboratory, *Fred Glover* of Entanglement Inc. and *Gary Kochenberger* also of Entanglement, Inc. led a session on quantum computing.

▲ Many sessions were given as well as various keynotes and tutorials.

Some special events in the program included a session on Chile's Franz Edelman Prize winning *OR* efforts during the pandemic led by *Leonardo Basso*. Another interesting session was given by *Sheldon Jacobson* on communicating research to the public. A panel on *AI* and *OR* was organized by *Laura Albert* with four distinguished panelists (*Michael Fu, Lavanya Maria, David Shmoys,* and *Ahmed Abbasi*). An industry perspective session organized by *CMPC*, a large pulp and paper corporation based in Chile, was an interesting counterpoint to the scholarly work at the conference. Another panel gave attendees the opportunity to meet the editors of a flagship journal, *ITOR*, and this was arranged by editor in chief *Celso Ribeiro*.

All plenaries and keynotes were extremely well attended and the pdf versions of each of these ten presentations are now available for download on the following link: https://drive.google.com/drive/folders/1q6RdNHcjtwnTqr8zxe785qhf_J0Wj8mu?usp=sharing.

▲ *IFORS 2023* attendees enjoyed the get together on Sunday.

▲ *EURO* journal prize recipients and the student support group receive greetings from the public.

An online volume of the abstracts presented at the conference will be available and will be referenced with an ISBN number. Finally, there are five special issues of journals ongoing that are related to the *IFORS 2023* conference and information about this has been made available to attendees.

All participants in the technical program of *IFOR 2023*, did a great job and we are grateful to them. These include the authors, presenters, session chairs, cluster chairs, plenary and keynote speakers, and tutorial leaders. And, of course, to *Bernard Fortz* of Université Libre de Bruxelles who orchestrated the submission and program building software. We can all be proud of the breadth and rigor of the work presented and the many conversations stimulated at the conference and going forward which will no doubt enrich our operations research community and its work.

In addition to the technical sessions and keynotes and plenaries, some special events took place during the conference. On Tuesday, *IFORS* conducted the Ceremony of induction to the *Operations Research Hall of Fame*. The inductees were *Ailsa Lang, Nelson Maculan, Paolo Toth, Clovis Gonzaga, Tom Magnanti* and *Frederick Hillier*. On Thursday, the *IFORS Fellow ceremony* took place before the plenary and awards and recognition diplomas were given to the new fellows. But there were many other activities in addition to the scientific program. Sunday was an arrival day for most, with a welcome reception very well attended in which people shared their travel experience to Chile and greeted colleagues long time not seen due to the restrictions generated by the pandemic.

The tour day was Wednesday, and people had the opportunity to visit several places around Santiago de Chile, especially in the wine country and the coast. Valparaiso, the port city that is a UNESCO Heritage Site, was one of those places. Another group headed to the ski centers, in the *Andes* mountains, near Santiago. It had snowed in the previous hours, so it was a great experience for everyone.

The conference banquet was held on Thursday evening at an event center in the eastern part of Santiago, close to the mountains. More than 700 persons attended the banquet and had the opportunity to share experiences with old and new friends. The Chilean traditional music group *Quilapayún* was present to entertain the presents with great music. After the dinner dancing was the main activity, with music from the DJ.

Friday's closing ceremony, after the plenary by *Andrés Weintraub*, was very well attended. It was great to see that most people stayed up to the last day of the conference. At the ceremony, *EURO* announced the *Best papers Award* in the *EJOR* journal in various categories.

▲ The conference dinner on Thursday was a great event (on the right: *Andrés Weintraub*).

Various conferences were also announced. *EURO 2024* will be held in Copenhagen in July next year, and everyone expects it to be a great event. *ALIO*, the Latin-Ibero American Association also presented the next *CLAIO* conference, which will take place in late October 2024, in Guadalajara, México. Finally, the next *IFORS 2026* was presented, and we are all looking forward to a great conference in Vienna.

Jorge Vera, Co-Chair of the Organizing Committee, thanked all attendants as well as all the organizing team and, specially, the group of students that helped and were present during all days of the event and at the airport, guiding attendees and supporting in an invaluable way the working of the conference.

After the *Closing Ceremony*, attendees enjoyed a *farewell reception* with hot dogs and hamburgers, made in the Chilean way.

IFORS 2023 was a great experience which has not been possible without the help of many people. Everyone that participated in the scientific program, led by *Alice Smith*, made this a great conference but also everyone that helped in the organization. The *Chilean Operations Research* and *Industrial Engineering* community as well as *ICHIO*, the *Chilean Institute for Operations Research*, were central in this effort, with their support in the Organizing Committee as well as attending the conference. *ISCI*, the *Institute for Complex Engineering Systems*, a research initiative of the Chilean government, took responsibility for all the details of the organization and produced a great event. *ALIO*, the Latin Ibero-American Operations Research Association also supported the conference as well as the *IFORS AC* with constant advice and guidance, led by *Janny Leung* and also with the support of *Maria Grazia Speranza*. Many people helped us in many ways, and we thank all of them, but special mention deserve *Jaime Miranda* from the Business School at University of Chile and *Víctor Albornoz* from Santa María University in Santiago, they provided constant help and fresh ideas, and also *Gerhard-Wilhelm (Willi) Weber* whose constant advice and generosity was central on navigating the complexities of a large meeting. Last, but not least, the sponsors that supported *IFORS 2023* provided the necessary help to guarantee success as well as being present in the conference, both with stands and some of them actively in the program.

As a closing remark, the Organizing and Program Committees are very happy that *IFORS 2023* was such a great conference, that allowed us to be back to normal after the years of pandemic. We look forward to seeing everyone again in Vienna for *IFORS 2026*!

Professor Alice Smith served as *PC Chair* of *IFORS 2023*, while *Professor Rafael Epstein* and *Professor Jorge Vera* were the *Co-Chairs* of the *OC*.

3RD EUROYOUNG WORKSHOP 2023 CELEBRATED IN CERGY, FRANCE

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EUROYoung celebrated its 3rd Workshop in Cergy (Paris), France, on June 5-6, 2023. ESSEC Business School hosted the event, bringing together 44 young *O.R.* scientists from 9 *EURO* member countries.

▲ *EUROYoung Workshop 2023* special group photo: about to depart for the boat tour on the river *Oise*.

EUROYoung is a forum within *EURO* (the *Association of European OR Societies*) that aims to provide training, dissemination, and networking opportunities to young *Operational Researchers*.

The annual workshops are one of *EUROYoung*'s main tools to create a bond between young researchers going through a delicate career phase and preparing themselves to be the faculty and practitioners of tomorrow. These events promote peer education, allow young researchers to teach their colleagues what they have learnt, and facilitate sharing knowledge from established O.R. "seniors" to the new generations. The workshops strive to provide affordable opportunities for young researchers to present their work, learn, and network.

This year, the workshop accomplished its scientific objectives through 29 student presentations of remarkable quality (including one delivered in rhyming couplets!) and two inspiring *plenary talks* by *Prof. Ivana Ljubić* (ESSEC) and *Prof. Leo Liberti* (CNRS LIX, École Polytechnique). The presentation topics covered a broad spectrum of subjects, such as optimisation methodology and decompositions, multi-objective optimisation, scheduling problems, routing problems, interactions with Machine Learning, and stochastic optimisation.

Ivana Ljubić's plenary talk was a beautiful primer on Benders decomposition for two-stage adaptive problems. The participants particularly appreciated that it was accessible, without renouncing to dive deeper, and that it presented insightful results.

Leo Liberti shared invaluable career advice for early-stage academics, from choosing a research topic to building professional networks!

And, indeed, there were plenty of opportunities to network at the workshop, thanks to a rich social agenda, including a boat tour of the river *Oise*, a walking tour of the historical town of *Pontoise*, a *Social Dinner* and a *Farewell Barbecue*.

The generosity of *EURO*, *ESSEC Business School* and *DecisionBrain* made this workshop possible, including offering all participants free accommodation and meals.

6TH ICO-2023 HUA HIN IN BEAUTIFUL THAILAND - OR CREATIVITY, EXCELLENCE AND PASSION

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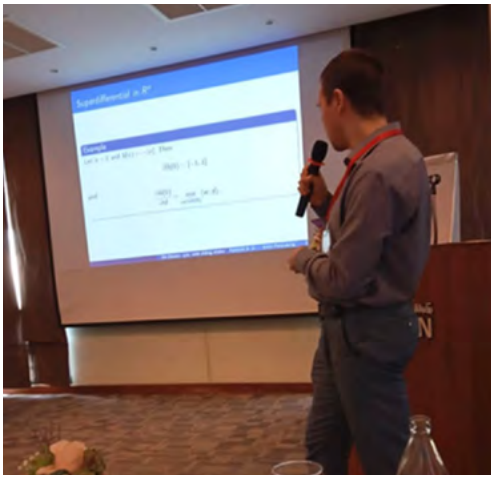
The *6th edition* of the *International Conference on Intelligent Computing and Optimization* (*ICO*), *ICO 2023*, was held during April 27-28, 2023, at G Hua Hin Resort Mall, Hua Hin, Thailand. The objective of the international conference is to bring the international research scholars, experts and scientist in the research areas of *Intelligent Computing, Optimization* and *Operational Research* from all over the world to share their knowledge and experiences on the current research achievements in these fields.

The opening ceremony was started with *Dr. Pandian Vasant* (Chair) and continued with the presentation of the papers by the conference participants. The following are some of the activities took place on the 1st day and 2nd day of the conference at G Hua Hin Resort Mall, Thailand.

▲ Group photo of the presenters on 27th April 2023 at G Hua Hin Resort Mall, Thailand.



▲ *Alexander Fominyh* (Russia) delivering his talk on discontinuous systems with sliding modes.

▲ *Prof. Margaret Wiecek* (Poland and USA) and *Prof. Elias Munapo* (South Africa).

▲ *Dr. Pandian Vasant* delivering his Opening Ceremony talk on 27th April 2023 at G Hua Hin Resort Mall, Thailand.

▲ *6th ICO-2023* Conference delegates enjoying their Gala Dinner at G Hua Hin Resort Mall on 27th April 2023.

▲ *Dea Angelia Kamil* (Universitas Gadjah Mada, Indonesia) is receiving the Best Presenter Certificate from Session Chairs *Dr. Girish G P* (India) and *Dr. Nguyen Tan Cam* (Vietnam).

▲ *Assoc. Professor Dr. Deepanjal Shrestha* (Pokhara University, Nepal) delivering his keynote talk on 28th April 2023 on *"Digital Tourism Business Ecosystem: Trends and Future Demands"*.

▲ Gala Dinner on the night of 27th April 2023 at G Hua Hin Resort Mall, Thailand.

▲ Participants are at the closing ceremony session on 28th April 2023 at G Hua Hin Resort Mall, Thailand.

▲ *Prof. Sunarin Chanta* (King Mongkut's University of Technology North Bangkok, Thailand) receiving the certificate of appreciation for her keynote talk on *"Applications of Optimization in Locating Emergency Medical Service Facilities"* from *Dr. Deepanjal Shrestha* (Nepal, Session Chair).

▲ *Dr. Girish G P* (India) receiving the certificate of appreciation from Session Chairs *Dr. Ranjan Kumar Ghadai* (India) and *Elizaveta Tarasova* (Russia).

About 50 attendees attended the gala of this two-day on-site event *ICO 2023* at G Hua Hin Resort Mall, Hua Hin, Thailand. With great interest and care the Session Chairs carryied out their duties while participants presented their papers with great passion. The young researches from across the globe gave their level best to exhibit and advance their skills and talents in presenting novel results and findings. The Q&A sessions went on very well during the 2 days. All the papers were successfully presented by the authors. The *7th ICO Conference* will be held *on-site* on 26th-27th October 2023 at *Baitong Hotel & Resort Phnom Penh, Cambodia*; paper submission is already open at the weblinks https://easychair.org/cfp/ico-2023 and https://www.icico.info/paper-submission.

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9TH SEAMS-UGM 2023 CELEBRATED IN UNIQUE YOGYAKARTA: INTEGRATING MATHEMATICS WITH AI AND OR FOR INDUSTRIAL COLLABORATIONS

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The *9th SEAMS-UGM 2023 - International Conference on Mathematics and Its Applications*, Yogyakarta, 25-28 July 2023, officially opened on Tuesday, July 25, 2023. The event is a quadrennial event, which was first organized in 1989. The *9th SEAMS-UGM 2023* aimed to provide a forum for researchers, lecturers, educators, industry, and students to exchange ideas; to enhance collaboration between researchers from countries in the Southeast Asian region and researchers from abroad.

▲ *9th SEAMS-UGM 2023*: the poster.

▲ *Opening words: Dr. Nanang Susyanto, M.Sc., M.Act.Sc.*

The conference was held for four consecutive days on July 25 - 28, 2023. During these four days, the conference featured presentations from keynote speakers, *Paolo Giordano*, Ph.D. from the University of Vienna, and *Aditya Karnik*, Ph.D., the VP of Data Science at Gojek. Additionally, there were plenary sessions with 18 invited speakers delivering inspirational presentations on crucial issues in mathematics and its applications in various industries. Moreover, during the parallel sessions, participants will present their research in classes focusing on statistics, analysis, algebra, applied mathematics, computational mathematics, operational research (*OR*), and mathematics education.

The event included various *satellite events*, such as the Algebra Mini Symposium, Third Southeast Asian Women Mathematicians Meeting 2023, Summer School on Number Theory and Cryptography, International Actuarial Research Conference, and Workshop on Earthquake Catastrophe Risk Modeling. The *9th SEAMS-UGM 2023* provided in-depth and comprehensive insights, enriched knowledge, and inspired new ideas in the fields of mathematics and its applications.

▲ Striking the gong as a symbol of *opening* by the *Vice Rector* of *Universitas Gadjah Mada*.

▲ *Keynote Speaker* at *9th SEAMS-UGM 2023*: *Paolo Giordiano, Ph.D.*

Halle Bata and *Maj Victoria*, participants from Ateneo de Manila, Philippines, shared their experiences during the four-day series of The *9th SEAMS-UGM* events. Initially, they felt apprehensive about attending this international conference, but thanks to the friendliness and warmth of everyone participating in the event, they managed to overcome their fears. Additionally, they learned a lot from the plenary session speakers. They expressed hopes for more international mathematics conferences in the future, which would offer opportunities for research collaborations.

▲ *9th SEAMS-UGM 2023*: at the *Closing Ceremony.*

As well as the sentiments of the participants, *Dr. Nanang Susyanto*, S.Si., M.Sc., The Chair of the Organizing Committee, also remarked, *"The 9th SEAMS-UGM is not an end but a beginning of an academic journey and the opening of doors for research collaborations in the field of mathematics."*

With this lively conclusion, The *9th SEAMS-UGM 2023 - International Conference on Mathematics and Its Applications* left a strong mark in the academic, mathematical and *OR* world. The conference has proven itself as a world-class meeting that inspires scientists and fosters collaborations to enhance the understanding and application of mathematics and *OR* in various aspects of life. The positive spirit and enthusiasm of the participants marked the end of this grand event, while the hope for future similar gatherings remains alive.

19TH MEETING OF THE EURO SPECIAL INTEREST GROUP ON CUTTING AND PACKING: ESICUP 2023 - CELEBRATED IN BOLOGNA, ITALY

Tony Wauters <tony.wauters@kuleuven.be>

On May 3rd-5th, 2023, the *19th ESICUP Meeting* was held in the *Aula Giorgio Prodi, University of Bologna*, Italy. *Michele Monaci* (University of Bologna) led the Organizing Committee and was supported by members of the Program Committee: *Julia Bennell* (University of Leeds), *José Fernando Oliveira* (University of Porto), *Ramón Alvarez-Valdes* (University of Valencia), *François Clautiaux* (Université de Bordeaux), *Tony Wauters* (KU Leuven) and *Antonio Martinez* (University of Southampton). The conference also enjoyed the support of *AFOSR* (Air Force European Office of Aerospace Research and Development), *AIRO* (Italian Association of Operations Research) and *DEI* (Department of Electrical, Electronic, and Information Engineering of the University of Bologna).

ESICUP brings together practitioners, researchers and educators with an interest in all topics related to Cutting and Packing. Just like previous years, *ESICUP*'s 19th meeting featured an exciting and diverse program. In total there were 52 participants who delivered 34 interesting and insightful presentations. The talks were divided across 7 sessions, with the full scientific programme and book of abstracts available online the conference website: www.euro-online.org/websites/esicup/19th-esicup-meeting.

Attendees of *ESICUP*'s *19th meeting* were treated to a plenary talk given by *EURO Gold Medal* winner *Professor Silvano Martello* (University of Bologna) entitled *"Quadratic Knapsack Problems"*. Those in attendance were given the opportunity to network and continue their discussions during coffee breaks and lunches. The conference dinner held on Thursday, May 4th, also provided a welcome opportunity to socialize with old friends as well as new. The dinner was held in the renowned *Cantina Bentivoglio*, a beautiful restaurant located in Bologna's historical city center. Many *ESICUP* participants joined for the meal, which resulted in a lively and enjoyable evening for all. The conference concluded on the afternoon of Friday, May 5th, with a guided tour of the center of Bologna. The tour started from *Piazza Maggiore* and included visits to the old market in the *Quadrilatero* as well as the city's famous clock tower, *Torre dell'Orologio*, which offered an unparalleled 360-degree panoramic view of the city.

At the conference *Tony Wauters* (KU Leuven) took over the role of coordinator of EWG ESICUP from *Julia Bennell* (University of Leeds). >>

>> In addition, some distinguished program committee members are stepping down, while other new members are added to the program committee of *ESICUP*. Special thanks to *Julia Bennell, José Fernando Oliveira,* and *Ramón Alvarez-Valdes* for many years of service and coordination within the *ESICUP* working group. After enjoying yet another successful *ESICUP* conference we are confident that those who attended are already looking forward to next year's meeting, which will be held in *Guimarães*, Portugal!

▲ Attendees of the *19th ESICUP Meeting* in Bologna.

22ND ECMI CONFERENCE 2023 ON INDUSTRIAL AND APPLIED MATHEMATICS IN WROCŁAW, POLAND

Audrius Kabašinskas <audrius.kabasinskas@ktu.lt>

On 26-30 June 2023 the *22nd ECMI Conference on Industrial and Applied Mathematics* (*ECMI 2023*) took place at Wrocaw University of Science and Technology (Poland). *The European Consortium for Mathematics in Industry* (ECMI, https://ecmiindmath.org) is a consortium of academic institutions and industrial companies that cooperate in the field of mathematical modelling, simulation, and optimisation in any activity of social or economic importance. The *ECMI* conferences are designed to enforce the interaction between academia and industry, leading to innovations in both fields. These events have attracted leading experts from business, science, and academia and have promoted the application of novel mathematical technologies to industry. The *ECMI 2023* covered fields of applied physics, biology and medicine, ecology, cybersecurity, data science, economy, finance and insurance, energy production systems, social challenges, and transportation challenges.

▲ *ECMI 2023:* Opening ceremony by *Krzysztof Burnecki* (keynote speaker at EURO 2022).

Two honorable *ECMI prizes* (the *Anile-ECMI Prize for Mathematics in Industry* and the *Hansjörg Wacker Memorial Prize*) were correspondingly awarded to *Marco Tezzele* (The University of Texas at Austin, on the topic *"Data-driven parameter and model order reduction for industrial optimisation problems with applications in naval engineering"*) and *Michael Wiesheu* (Technische Universität Darmstadt, on the topic *"Shape optimisation of a magnetocaloric cooling system with isogeometric finite elements"*) during the opening ceremony. On the same day, *Professor Aleksander Weron* (Hugo Steinhaus Center, Wrocław University of Science and Technology) was awarded *honorary ECMI membership* in recognition of his contributions to applied and industrial mathematics.

One of the conference days was devoted to the Industry. During *Industry Day*, companies (KGHM, BNY Mellon, Santander Consumer Bank, Nokia, Sun Cable, Saule Technologies, SatRev) introduced how they apply modern mathematical tools in their business.

The *ECMI 2023* conference brought together 300 participants from 37 countries around the world. They gave 9 plenary lectures, 239 scientific presentations, and 8 industrial talks.

The *23rd ECMI conference* will be held in 2026. Please visit https://ecmiindmath.org/conference/ for more details.

▲ *ECMI 2023*: Closing ceremony of the conference.

MODELLING AND SOCIETAL IMPACT OF LONGEVITY AND AGEING:
RCLR2023 - A NEW WORKSHOP SERIES IN AMSTERDAM, PROMOTED BY OR

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

To this first and "kick-off" annual workshop *"Modelling and Societal Impact of Longevity and Ageing"*, the participants were kindly welcomed at the Opening Session on March 25, 2023, at the *Research Centre for Longevity Risk* (*RCLR*) by its Director *Prof. Dr. Torsten Kleinow*. *RCLR* is a part of *Faculty of Economics and Business, University of Amsterdam* (https://rclr.nl/events/conference-registration-modelling-and-societal-impact-of-longevity-and-ageing/). For closer information about the members of *RCLR*, please visit https://rclr.nl/our-people/. This team was closely involved in organizing and conducting the workshop. At this point, *Mr. Mike Mansfield* of UvA Economics and Business deserves a special thanks for his efforts.

▲ *RCLR 2023*: In the festive atmosphere of *"De Burcht"* in Amsterdam.

The conference venue was impressive and solemn *"De Burcht"*, the oldest trade union building in the Netherlands. It was commissioned by the *Algemeene Nederlandsche Diamantwerkers Bond* (*ANDB; Diamond Workers Union*); at the time, it was the country's largest and richest trade union. The conference attendees acknowledged that while life expectancy is steadily increasing for a significant portion of the population, there remains a considerable amount of uncertainty surrounding future advancements. The pandemic COVID-19 has amplified this uncertainty by introducing additional complexities to the underlying trends in mortality. In light of these challenges, this conference served as a platform for fruitful discussions and the exchange of ideas on how to effectively address related issues. Furthermore, the conference community aimed to enhance understanding of the implications these challenges pose for the pensions and insurance industry, as well as for society at large. During the meeting, the participants gained insights into the latest advancements in product development, models, and projections. Many of the sessions included lively discussions after the talks. The cross-relations with *OR* and their potentials in research and application were a very important area of exchange among the conference participants. The *Keynote Speakers of RCLR 2023* were *Prof. Dr Saul Newman* (University of Oxford with the Leverhulme Center for Demographic Science, member of University College and a visiting fellow at Research School of Biology, Australian National University): *"The inescapable accumulation of errors: how bias and nonlinear error patterns arise in old age"*, *Prof. Dr. An Chen* (Institute of Insurance Science, Ulm University, Germany): *"Tontines in retirement decumulation"*, and *Mr. Wilbert Ouburg* (MSc, AAG and FRM; CRO of Nationale Nederlanden Life & Pensions): *"A Journey through Dutch mortality modelling"*. I myself gave the talk *"Optimal management of defined contribution pension funds under the effect of inflation, mortality and uncertainty"* on behalf of a Polish-Greek research team (about future pension fund systems, including aspects of longevity) of which I am a member, and promoted by *OR*.

▲ *RCLR 2023*: Happy boat ride through the canals of Amsterdam on the way to the conference dinner (from left to right): *Prof. Dr. Torsten Kleinow* (Director of *RCLR*), *Prof. Dr. Katrien Antonio* (Co-Director of *RCLR*), *Prof. Dr. An Chen* (Keynote Speaker at *RCLR 2023* and kind donor of these two photos; many thanks to her).

On the evening of March 25, the *Conference Dinner* took place in *"Café In de Waag"*, where the conference participants essentially got by a 1-hour boat cruise through the canals of Amsterdam. That famous restaurant is located in an old city gate, named the "St. Anthonis Gate", in the center of the lively "Nieuwmarkt" which belongs to the historical city center of Amsterdam. It was built during 1425-1488, functioned as a city gate and later as a "Waag" (weighing house). During the scientific and the social programs of conference and at its Closing Session on March 26, 2023, I informed about *EURO* and *IFORS* and warmly welcomed the participants of *RCLR 2023* to two highlights of our *OR* calendar: *IFORS 2023* in Santiago, Chile (https://ifors2023.com), and *EURO 2024* in Copenhagen, Denmark (https://euro2024cph.dk).

BENICÀSSIM TECH 2022 ARTIFICIAL INTELLIGENCE & OPTIMIZATION WORKSHOP: OR CELEBRATED IN BEAUTIFUL BENICASSIM - AND LLEIDA TECH 2023 TO BE HELD NEXT OCTOBER

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The *Benicassim Tech 2022 Workshop on Artificial Intelligence & Optimization* took place on October 20-21, 2022, in the charming Mediterranean city of Benicàssim, Spain. This workshop, jointly organized by the *Universitat Politècnica de València*, the *Universitat Jaume I*, and the *Benicàssim City Council*, served as a significant meeting point for academic and industrial partners in the fields of *hybrid Operational Research* (*OR*) and *Artificial Intelligence* (*AI*). The workshop gathered over 65 experts in *OR* and *AI*, creating a vibrant atmosphere for knowledge sharing and collaboration. Held in a beautiful house overlooking the beach, participants had the opportunity to engage in insightful discussions and learn from one another's experiences.

▲ *Benicassim Tech 2022* homepage and banner.

In addition to the technical discussions, the workshop fostered networking and collaboration among academic and industrial partners. Examples of that were for instance the talks of *Jorge Mateu* about *"AI with control of uncertainty. Stochastic methods and applications"*, *Erika Herrera* about *"Intelligent algorithms and data analytics"* or *David López* presenting the *"The four axes for digital transformation based on data"* under a business perspective. More information on this event can found at: https://baio.webs.upv.es/baio2022.

▲ *Round table debate* about *Data Science and AI* in our daily life and businesses (left to right): *Paolo Marone, Silvia Terrasa, Fatos Xafa, Eva Vallada, David Lopez, Josefa Mula, Xavi Domènech* and *Antonio Falco*.

Given the success of the initiative lead by *Dr. Angel Juan*, a new edition is in preparation. *Lleida Tech 2023 will be held next October in the city of Lleida, Catalonia* (*Spain*), 26-27 of October 2023. It will have a similar program structure to that of the first edition in Benicassim, powering networking between enterprises and academia. People interested in the workshop, please contact *Angel Juan* (ajuanp@gmail.com) or *Lluís M. Plà* (lluismiquel.pla@udl.cat).

The workshop's central focus was on the development and application of *hybrid OR and AI* methods to address optimization challenges in various sectors, including smart cities, transportation and logistics, agriculture and farming, finance and insurance, manufacturing and production, and many more.

Throughout the event, participants presented ongoing research projects and recent advancements in *hybrid OR and AI* methods, showcasing their practical applications in optimizing complex systems. The sessions highlighted the significant impact that these advancements in *AI* and *OR* can have on various industries and society as a whole.

▲ View of *Cappont Campus* of *University of Lleida*.

FORUM DEVOTED TO THE FUTURE OF INTERACTIVE MULTIOBJECTIVE OPTIMIZATION FESTIVELY PRESENTED AND CELEBRATED IN JYVÄSKYLA, FINLAND

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The very first *Forum devoted* to the *Future of Interactive Multiobjective Optimization* (https://jyu.fi/desdeo23) was organized at the *University of Jyväskyla* (Finland) on June 19-20, 2023. The Multiobjective Optimization Group (http://www.mit.jyu.fi/optgroup) headed by *Prof. Kaisa Miettinen* was the organizer. The two-day event consisted of tutorials, invited and contributed talks, panel discussions and a bring-your-problem session. The event attracted 44 participants from 11 countries.

▲ Participants of the *Forum on the Future of Interactive Multiobjective Optimization* organized at the University of Jyväskylä, Finland.

As the title suggests, the event was devoted to interactive multiobjective optimization methods and software. Five invited speakers gave different perspectives to the topic. In addition, the open-source software framework *DESDEO* (desdeo.it.jyu.fi) [1] developed in the Multiobjective Optimization Group was introduced in tutorials and its applicability demonstrated in various talks and in the bring-your-problem session. There were also some contributed talks. The program of the Forum can be found at the website of the event, https://jyu.fi/desdeo23.

▲ Logo of *DESDEO*: The Modular and Open Source Software Framework for Interactive Multiobjective Optimization.

The panel discussions were divided to seven different perspectives to sketch directions for the future: problem formulation, interactive methods, software implementing interactive methods, development challenges, wider adoption, awareness & education, future perspectives and what else would you like to say about the future of interactive methods.

The motivation for developing and applying interactive multiobjective optimization methods is supporting a domain expert, a decision maker, in learning about the trade-offs and interdependencies among the conflicting objective functions. In the iterative solution process, the decision maker gets some information and solution(s) to consider, provides preference information (in a form that is meaningful and understandable) and directs the solution process towards more preferred solutions until the most preferred one is found. Interactive methods differ from each other, e.g., in terms of how new solutions are generated, what type of preference information is expected from the decision maker and what information is provided to the decision maker.

DESDEO is a modular, open-source software framework that contains many scalarization-based and evolutionary interactive methods as well as supporting tools. It also has graphical user interfaces for the interactive methods. Because of the modular structure of *DESDEO*, it is convenient to be tailored to different needs. It contains also some readily implemented benchmark and engineering problems and visualizations and can be extended openly to further problems. It can be applied to solve both simulation based and data-driven problems.

The *invited speakers* were *Prof. Juergen Branke* (University of Warwick, UK), *Assoc. Prof. Michael Emmerich* (Leiden University, the Netherlands), *Prof. Ignacy Kaliszewski* (Polish Academy of Sciences, Poland), *Dr. Kresimir Matkovic* (VRVis Research Center, Vienna, Austria) and *Prof. Francisco Ruiz* (University of Malaga, Spain). They as well as *Prof. Jan Kwakkel* (Delft University of Technology, the Netherlands) were the panelists and their views of the future of the field triggered a vivid discussion.

The participants could bring their own problems to see how *DESDEO* could be applied to address them. This opportunity attracted a lot of attention.

▲ Logo of the organizing Multiobjective Optimization Group.

Many participants hoped for a follow-up event in the future. Besides interesting talks and insightful discussions, they also enjoyed a boat cruise on lake Päijänne at the time when the days are the longest in Finland.

Reference

[1] G. Misitano, B. S. Saini, B. Afsar, B. Shavazipour and K. Miettinen, "DESDEO: The Modular and Open Source Framework for Interactive Multiobjective Optimization", IEEE Access, vol. 9, pp. 148277-148295, 2021.

DSSGXUK SUMMER FELLOWSHIP 2023 IN WARWICK: 5TH EDITION OF DATA SCIENCE FOR SOCIAL GOOD DELIVERS PRACTICAL TOOLS FOR NONPROFITS AND GOVERNMENT ORGANISATIONS

Miguel Haro Ruiz <m.haroruiz@gmail.com>

16 young data scientists from all over the world worked on 4 different projects that will support organisations in the fields of education, the environment and OR.

Data Science for Social (DSSG) is an initiative to push data science as a driver for positive social impact. Every year, the *DSSG summer fellowship* trains and supports the next generation of data scientists across different programs in the US, the UK and Germany. Fellows build software tools to support nonprofits make better use of their data, often tasked with overcoming some of the biases in machine learning and artificial intelligence.

Since 2019, the *University of Warwick* has hosted its own *DSSGx summer fellowship*. This year's edition brought together 16 fellows from 9 different countries between June and August. Their academic backgrounds vary greatly to ensure that the challenges they face are tackled from different perspectives.

▲ Participants at this year's edition of the *DSSGxUK summer fellowship* at the University of Warwick including fellows, technical mentors, and project managers.

Over the twelve weeks of the program, the fellows work closely with project managers and technical mentors, who support them in making industry-tier software products for their partners. In addition, weekly seminars with scholars and practitioners encourage discussion on topics such as fairness in medical machine learning, and artificial intelligence approaches to detecting misinformation.

For the *UN-REDD*, a group of fellows was tasked with forecasting deforestation in the Amazonian region of Brazil. *"Modelling deforestation is a big challenge because the data is very imbalanced. We are not only solving a classification problem but trying to predict an outcome,"* says *Dmytro* (20), a software engineering student from Ukraine working on this project. *"60% of the Amazonian Forest is in Brazil; if things go bad there, they go bad everywhere. Hopefully, we can help win the battle against deforestation."* This team has developed a data visualisation tool to help policymakers fight the loss of the Amazonian Forest more effectively.

The *EY Foundation*, which supports young people from low-income backgrounds, is working with a group of fellows to identify students at risk of becoming NEET (not in education, employment, or training). The team has developed a machine learning algorithm that flags students at risk early on so that the five local authorities involved in the project can provide additional support for them. *Nazeefa*, (22) an electrical engineer from Pakistan, describes the impact they hope to have: *"If you can predict [NEET outcomes] as early as possible, you can intervene and mitigate some of the mental health issues associated with it. That is the most important outcome of this project."* The team has developed a dashboard that can be deployed by the councils and used as a tool to identify young people at risk of becoming NEET.

Another team of fellows partnered with the *Algorithmic Transparency Institute* with the challenge of classifying social media posts from carbon-intensive companies using language and image recognition models. *Allassan* (26), a machine intelligence researcher from Cameroon, shares that *"the goal was to automatically label social media posts by how strongly they emphasise environmental activities."* Their tool is designed to support the detection of green washing by firms in the aviation, automation, and fossil-fuel sectors.

United Learning is a multi-academy trust overseeing around 100 schools in the UK. Their goal is to help their students make full use of their academic potential. Another group of fellows was prompted with detecting pupils at risk of not fulfilling their higher education potential. *"We are hoping to help schools in supporting students, but also making sure that their academic staff can make data-informed decisions"*, says *Kirtana* (21), a social data scientist from India and the US. *"Our biggest challenge was figuring out how we can maximize our use of the data United Learning provided, to produce the best possible result we can get, but without it being biased, which is a difficult balance to achieve."*

In addition to working on pressing social issues, the fellows get to develop new skills and get to know potential career paths; *"I haven't done much data science, as my background is mainly in software engineering. Doing this project was very fun and reassured me to pursue a career in machine learning,"* says *Dmytro*. >>

>> *Nazeefa* believes that this experience *"is all about the people. All the diverse backgrounds, the different experiences… it's the best part about DSSG."*

Allassan explains that *"before, I wasn't sure I was following best software developing practices. Through this project, and my technical mentors, I could learn about and apply best practices to my code."* For *Kirtana*, the collaborative aspect of this experience is the biggest takeaway: *"DSSG has fully built from scratch my ability to work with Git to collaborate with others and make sure that the versions of what we're coding are consistent".*

Students who have a passion for data science, care about the social good and love to work in an international team of top talent, are encouraged to look out for next year's application deadline at our website, https://warwick.ac.uk/dssgx.

Charities or government organisations who would like to benefit from and work with *DSSGxUK* may contact the programme by writing to dssg@wbs.ac.uk.

Cordially thanks to dear ***Prof. Juergen Branke*** for the communication help that made this report possible. *G.-W. Weber*

ECCO XXXVI 2023: EUROPEAN COMBINATORIALISTS CAN FINALLY MEET IN PRESENCE IN CHANIA, CRETE, GREECE

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▲ *Chania*: the ancient Venetian port.

Due to a string of unfortunate coincidences, the members of *ECCO* (the *European Chapter on Combinatorial Optimization*) have not been able to meet physically for the past three years. In 2020, the annual conference, *ECCO XXXIII*, scheduled in Saint Petersburg (Russia), was canceled due to the Covid-19 emergency. In 2021, due to the persistent emergency, *ECCO XXXIV* 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. Unfortunately, due to the war situation between Russia and Ukraine, this conference too had to be held online.

On May 11-14, 2023, the *ECCO* members could meet in presence in the breathtaking city of *Chania* on the island Crete (Greece). The conference, *ECCO XXXVI* (https://ecco2023.euro-online.org/), was attended by more than 80 participants from Albania, Austria, Belarus, Belgium, Brazil, Canada, Colombia, France, Germany, Greece, Hungary, India, Israel, Italy, Poland, Portugal, Russian Federation, Spain, Sweden, Turkey and United Kingdom. Thanks to the financial support of *EURO* the registration fees were waived to all PhD students.

The conference program included 66 talks on several aspects of combinatorial optimization, covering its main theoretical and application aspects: Routing, Scheduling, Facility Location, Graphs, Bioinformatics, Logistics, Multi-Objective Problems, Supply Chain Management. A booklet containing one-page abstracts of all presentations can be downloaded from https://ecco2023.euro-online.org/ECCO_2023_BOOK_OF_ABSTRACTS.pdf.

A special issue of the *Journal of Combinatorial Optimization* (open to all *ECCO* and *CO* members) was launched, with submission deadline of November 30, 2023.

Three plenary lectures were delivered by:

o *Bo Chen* (University of Warwick, United Kingdom) on *"Auctions and Bidding"*;
o *Nelson Maculan* (Federal University of Rio de Janeiro, Brazil) on *"Euclidean Steiner Tree Problem in Rn: Optimization Models and New Heuristics"*;
o *Greet Vanden Berghe* (KU Leuven, Belgium) on *"Personnel Rostering: Trends and Challenges in Theory and Practice"*.

▲ Plenary speakers at *ECCO XXXVI* (left to right): *Bo Chen, Nelson Maculan, Greet Vanden Berghe.*

The Program Committee and the Organizing Committee were chaired by *Nikolaos Matsatsinis* and co-chaired by *Yannis Marinakis* and *Magdalene Marinaki*. The social program included a guided tour of the old Chania, a dinner in a typical restaurant of the ancient Venetian port, and two optional tours to *Theriso* village and lake Kournas.

▲ *ECCO XXXVI*: Conference photo.

The *EURO Working Group on Combinatorial Optimization, ECCO* (see https://en.wikipedia.org/wiki/European_Chapter_on_Combinatorial_Optimization) 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 is 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 1700 members, *ECCO* is currently one of the largest working groups of *EURO*.

Every fourth year the annual conference is held as a joint meeting with *CO*, a series of combinatorial optimization conferences that started in the UK in 1977, currently coordinated by *Bo Chen* (see https://warwick.ac.uk/fac/soc/wbs/conf/co/).

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, Madrid (online), St Petersburg (online), and Chania.

▲ Venue of *ECCO XXXVII* in 2024: *KU Leuven*, Belgium.

The next *ECCO* meeting, *ECCO XXXVII*, organized by *Greet Vanden Berghe*, will take place on 6-8 June, 2024, at KU Leuven. The beautiful city of Leuven, in Flemish Brabant (Belgium), is home to one of Europe's oldest universities, where centuries-old heritage and beer, education and youth sum up nicely.

EURO WORKING GROUP ON SUSTAINABLE SUPPLY CHAINS: 2023 PHD SCHOOL AND CONFERENCE CELEBRATED TOGETHER IN HAGEN

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The *2023 EURO PhD School on Sustainable Supply Chains* (https://e.feu.de/epsinssc), a joint event of the *EURO Working Group on Sustainable Supply Chains* (*EWG-SSC*) and the *German OR Society* (*GOR*), and the *4th EWG-SSC Conference* (https://e.feu.de/sustsc2023) took place from June 25 to July 1 at the *FernUniversität in Hagen*, Germany's only state distance learning university. The events were organized in cooperation with the Chair of Production and Logistics Management at the FernUniversität in Hagen, led by *Karsten Kieckhäfer*. We are very grateful to the team members of the chair for their support in organizing the PhD school and the conference. Moreover, we appreciate the financial support of *EURO, GOR,* and the FernUniversität in Hagen.

▲ Group picture of the conference participants on the campus of the *FernUniversität* in Hagen.

PhD School on Sustainable Supply Chains

The school consisted of in-class lectures, tutorials, and supervised trainings on the following topics: Assessing Sustainability in Supply Chains, Designing Sustainable Supply Chains, Benchmarking Sustainable Supply Chains with DEA, and Supply Chain Management in the Circular Economy. In addition, the students had the opportunity to discuss their own research with peers and expert (guest) lecturers from the field, work on case studies provided by cooperating companies, and connect with other students who share their passion for sustainable supply chain management. As part of the social program, the students took a guided tour of the Koepchenwerk, a decommissioned pumped storage power plant now used as a cultural venue, exploring the industrial heritage, learning about power generation, and admiring the architectural beauty of the site.

▲ On the first day of the *2023 EURO PhD School on Sustainable Supply Chains, Christian Thies* gave a tutorial on how to conduct a life cycle assessment with the Brightway2 Framework.

▲ The *2023 EURO PhD School on Sustainable Supply Chains* participants on their field trip to a decommissioned pumped storage power plant, Koepchenwerk, in Herdecke, Germany.

A total of 25 doctoral students from 10 countries joined the *PhD school*. The students were also invited to participate in the *4th EGW-SSC Conference*, which immediately followed the *PhD school*, and to present posters on their PhD projects. Thanks to the generous financial support of the *EURO* General Support Fund, the conference registration fees of the PhD students could be waived.

4th Conference on Sustainable Supply Chains

The participants of the conference had the opportunity to attend and discuss presentations on state-of-the-art developments and current research challenges related to sustainable supply chain management. The presentations covered both *OR* methodologies and applications to sustainable supply chains, amongst others on the design of sustainable supply chains, food logistics and the distribution of perishables, the assessment of sustainability and resilience in supply chains, repair and reverse logistics, material flow analysis, and closed-loop supply chains.

▲ Local organizer *Karsten Kieckhäfer* (left) and keynote speaker *Carsten Gerhardt* (right) kicked off the *4th Conference of the EURO Working Group on Sustainable Supply Chains.*

Overall, 54 participants from 14 countries came to Hagen and attended the conference. The program contained 29 talks organized in 8 sessions. Two keynotes and the *Jacqueline Bloemhof PhD Thesis Award* ceremony were the highlights of the conference.

A practical keynote was given by *Carsten Gerhardt*, Chairman of the Circular Valley Foundation, who presented his ideas on how to transform Germany's wider Rhine-Ruhr region into a global hotspot for the circular economy. In the second keynote, *Athanasios Rentizelas*, Assistant Professor in Sustainable Supply Chains at the National Technical University of Athens, presented optimization models supporting the decision-making of Brazilian smallholder farmers to access institutional markets. During the *EURO 2022 conference* in Finland, this work was awarded the *"Prize for OR for the common good" by EURO.*

▲ Keynote speaker *Athanasios Rentizelas* kicked off the second day of the *4th Conference of the EURO Working Group on Sustainable Supply Chains.*

The *2023 Jacqueline Bloemhof PhD Thesis Award* was presented by *Renzo Akkerman* from Wageningen University. As the chairman of the jury (which also included *Athanasios Rentizelas* from the National Technical University of Athens in Greece and *Özgen Karaer* from the Middle East Technical University in Turkey), he announced that this year's edition had two winners, due to the high quality of submissions. >>

>> *Arne Heinold* from the University of Kiel in Germany and *Lukas Meßmann* from the University of Augsburg in Germany were announced as the winners. Both winners gave short presentations on their impressive work in the fields of emission-oriented management of land-based freight transportation (*Arne Heinold*) and strategic design of environmentally and socially sustainable supply networks (*Lukas Meßmann*).

A social dinner was held on the evening of the first day of the conference. The participants enjoyed a wonderful BBQ in a relaxed atmosphere at the Faculty Club of the *FernUniversität*.

We would like to thank all the participants of the *PhD School* and the *Conference* who came to Hagen and made both events very special for all of us!

▲ Congratulations to *Arne Heinold* and *Lukas Meßmann* for winning the *2023 Jacqueline Bloemhof PhD Thesis Award*.

▲ Attendees enjoying the social dinner at the end of the first day of the conference.

DEVELOPING COUNTRIES WORKSHOP AND CLUSTER IN IFORS 2023: PROMOTING SUSTAINABLE ECONOMIES WORLDWIDE

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Continuing its scintillating efforts at *EURO 2022*, *IFORS 2023* witnessed another round of fascinating presentations by the *EURO Working Group on Operations Research for Development* (*EWG-ORD*, http://bit.ly/EWG-ORD) for providing impactful *OR* solutions for development in developing countries. *EWG-ORD* with its current *Co-Chairs*, *Professors Nina Kajiji* and *Gordon Dash* (who have also co-invented and elaborated the event format of *EWG-ORD workshops* in *EURO* and *IFORS* Conferences), has been predominantly constituted to support regional and international *OR conference* meetings, and conducts its annual workshops to that aim therein. For 2023, the *EWG-ORD* steering committee was assigned a cluster in the program of the *23rd Triennial Conference on Operational Research of the IFORS* (*IFORS 2023*; https://ifors2023.com/). This *OR for Development and Developing countries* cluster consisted of two sessions supported by the membership group of *EWG-ORD*. The two sessions were labelled as *EWG-ORD Workshop 1* and *EWG-ORD Workshop 2* respectively under the cluster. The second session was marked by the august presence of *Dr. Elise Del Rosario* (Past President of *IFORS* and Honorary Chair of *EWG-ORD*), who has been instrumental in the formation and the development of this group whereas *Prof. Gerhard-Wilhelm Weber* (Honorary Chair of *EWG-ORD*) presided over and shared his valuable insights in both the sessions.

▲ Impression of the 2023 *EWG-ORD* Co-Chairs (left to right): *Prof. Nina Kajiji* and *Prof. Gordon H. Dash*; and *EWG-ORD* Honorary Chairs *Dr. Elise Del Rosario* and *Prof. Gerhard-Wilhelm Weber*.

▲ Impression from *Session 1* of the *EWG-ORD*: session chairs (*Prof. G.-W. Weber*, fourth from left, and *Dr. Jinal Parikh*, in the middle), speakers and attendees in *IFORS 2023*.

Session 1: This session commenced with the presentation titled *"An optimization model for a real-life single-track train timetabling problem"* by *Renata Mendes, Anand Subramanian, Teobaldo Bulhões* and *Bruno Bruck*. >>

>> This work addresses a train timetabling problem arising at the Companhia Brasileira de Trens Urbanos (CBTU), a Brazilian state-owned railway company. The main goal of this work was to assign routes and timings for the trains, to better satisfy the customers of the railway, considering a series of operational constraints, such as distance between stopping points, station demands, and security rules. The second presentation titled *"Carbon Pricing under Competition and Regulation"* by *Bruno Kamdem* illustrated how policies intended to reduce CO^2 emissions must integrate competition within commodity extracting and commodity utility companies to effectively cut down greenhouse gas emissions. The study formulated and priced a new carbon auction derivative which is simultaneously a put and a call option while handling the competition-regulation dichotomy in carbon markets as also by complying with the dynamics of both the commodity price and the carbon auction quote. This session concluded with the presentation titled *"Total Factor Energy Efficiency in Developing countries with specific reference to India: An Empirical Analysis using the SBM-DEA Model"* by *Jinal Parikh* and *G.-W. Weber*. This study investigates Total Factor Energy Efficiency (TFEE) using the SBM-DEA model in the context of India which is characterized by largest increase in energy demand and considerable differences in energy efficiency in its different regions arising out of differences in their economic and demographic trends, resource availability and industrial profiles.

▲ Impression from *Session 2* of the *EWG-ORD*: session chairs (*Dr. Elise Del Rosario*, in the middle, *Prof. G.-W. Weber* and *Dr. Jinal Parikh*), *Francis Miranda* (*IFORS* Vice President; second from left), speakers and attendees in *IFORS 2023*.

▲ Impressions of *Dr. Elise Del Rosario* and *Prof. G.-W. Weber* (left to right) during *Session 2* of the *EWG-ORD workshop* in *IFORS 2023*.

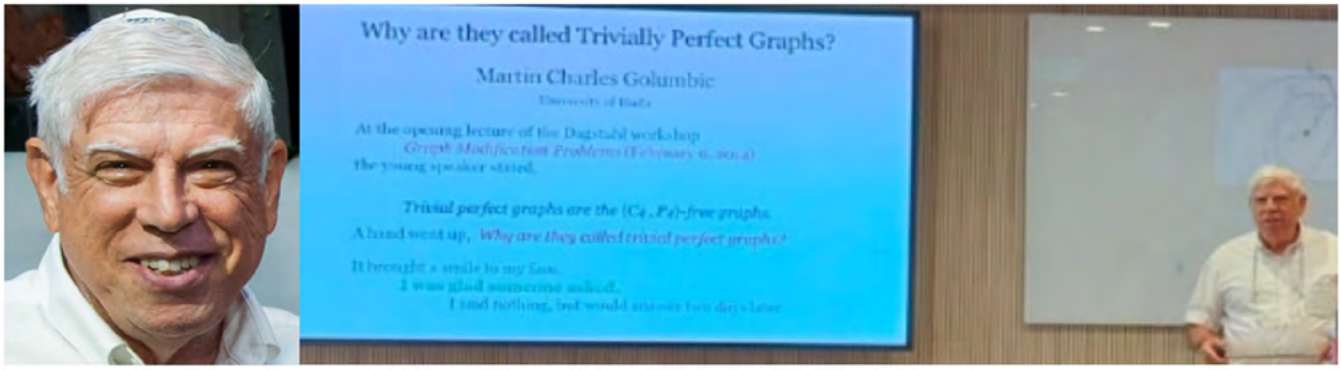
Session 2: This session began with a presentation titled *"Kerkenes Eco-Center Project in Anatolia and future chances by OR"* by *G.-W. Weber*. Through this paper, co-authored with *Geoffrey Summers, Francois Summers,* and *Soofia Tahira Elias-Ozkan*, he exhibited through the example of Kerkenes Eco-center project, how *OR for Development* applications are highly interdisciplinary in character, and how *OR*, together with state-of-the-art tools and devices from engineering, natural and social sciences, could serve projects of architecture, history, water management, agriculture, and education, with the goal of improving living conditions. In the second presentation titled *"IFORS Focus on Developing Countries Through the Years," Elise Del Rosario* presented an interesting narrative about the origin and evolution of various activities of *IFORS* since its first involvement with development issues dating back to the 70's. She beautifully articulated the formation of the *Developing Countries Committee* which was constituted in 1990 by *IFORS* to apply *OR in developing countries and for development*. *Elise* spoke about the remarkable contribution of *IFORS* and *EURO* towards the advancement of the *EWG-ORD* as well as about the support it received from regional groupings. She also acknowledged the initiatives of each of the *IFORS* presidents, academicians, and researchers for their contributions to this group. Being actively involved in the activities of the group since its inception, she reminisced the efforts expended and the challenges faced by it in order to bring it to its current level. While this revisit by *Elise* stimulated the discussion on where *IFORS* is now with respect to its *OR for Development* focus, it also threw an interesting question as to what should be its future direction. This session concluded with a presentation of the paper titled *"Comparing the predictive performance of Shallow and Deep Learning techniques in predicting South African SMEs' growth during COVID-19"* by *Helper Zhou* co-authored with *Gordon Dash*. This study compares and evaluates the predictive performance of two popular machine learning algorithms, CatBoost and enhanced Radial Basis Artificial Neural Networks (K4-RANN) in forecasting the growth of small-and-medium-sized enterprises (SMEs) in South Africa during the COVID-19 pandemic.

The presentations made during the two sessions addressed several critical issues outlined in the UN's SDG17 goals framework. From climate action (Goal-13), to affordable and clean energy (Goal-7), decent work, and economic growth (Goal-8) to industry, innovation, and infrastructure (Goal-9), to making cities and human settlements, safe, resilient, and sustainable (Goal-11) and more, the sessions achieved their aim of presenting the latest findings in development across five different economies – four of which are classified as developing economies. For additional information about the *EWG-ORD*, their upcoming *workshops*, or how you can get involved, please email to info@ewgord.org

▲ Impression of deliberations during *Session 2* of the *EWG-ORD workshop* in *IFORS 2023*.

THE THIRD DECADE OF GRAPHS AND ALGORITHMS IN HAIFA -THE 2023 HAIFA WORKSHOP ON INTERDISCIPLINARY APPLICATIONS OF GRAPH THEORY, COMBINATORICS, AND ALGORITHMS

Martin Golumbic <golumbic@cs.haifa.ac.il>



▲ The *Chair of the Haifa Workshop 2023, Professor Martin Golumbic*, delivering his speech.

After three and a half years of pandemic with its increased workload in academia, reduced conference participation, and uncertainty in travel, the *Haifa Workshop on Interdisciplinary Applications of Graph Theory, Combinatorics, and Algorithms* resumed in-person meetings. For twenty years (2001-2020) the workshop, founded and chaired by *Prof. Martin Golumbic*, and sponsored by the *Caesarea Rothschild Institute* at the *University of Haifa* in Israel, hosted over 150 plenary speakers from around the globe, complemented by hundreds of contributed lectures by Israeli researchers.

This year 2023 was no exception. We were able to resume hosting receptions and lunches in person with participants being able to attend and travel to Haifa. Invited speakers from France, India, Brazil, Hungary, and Canada together with colleagues from the University of Haifa, Hebrew University, Ben Gurion, Bar-Ilan University, Tel-Aviv University, Sami Shamoon College of Engineering, Academic College of Tel Aviv-Yaffo, and the Technion shared their recent research results through lectures and informal discussions.

In memory of Uri Natan Peled, ז"ל
September 5, 2009 at the age of 65.

Uri N. Peled Memorial Lecture
Caesarea Rothschild Institute, University of Haifa

2010	Bill Cunningham (Canada)
	Gyorgy Turan (USA and Hungary)
2011	Jayme Luiz Szwarcfiter (Brazil)
2012	Amitava Bhattacharya (India)
2013	Annegret Wagler (France)
2014	Edward Scheinerman (USA)
2015	Andreas Brandstadt (Germany)
2016	Jian Li (China)
2017	Bernard Ries (Switzerland)
2018	Pavol Hell (Canada)
2019	Vadim Lozin (UK)
2020	Ignasi Sau (France)
2021	Alain Hertz (Canada)
2022	Martin Milanič (Slovenia)
2023	Abraham Berman (Israel)

▲ At the *Haifa Workshop 2023* (left to right): *Martin Golumbic, Juhi Chaudhary, Dalu Jacob, Vincent Limouzy, Mathew Francis.*

The workshop emphasizes the diversity of the use of combinatorial algorithms and graph theory in various application areas. Such areas of interest include randomized algorithms, networking, graph algorithms, internet congestion and patterns, computational biology, applied combinatorics, web applications, geometric graphs and computation, optimization and graph theoretic models.

A starking highlight of the Workshop, since 2010, has been the annual *Uri N. Peled Memorial Lecture*, together with prizes awarded to outstanding Haifa graduate students who published research papers. *Uri Peled* was a frequent visitor to the University of Haifa, and contributed much to the academic atmosphere at the Caesarea Rothschild Institute. By this annual Lecture, we honor his memory and his research contributions in graph theory, Boolean functions, polyhedral combinatorics, information theory and discrete mathematics.

Prof. Abraham Berman from the Technion gave this year's Memorial Lecture on the topic *"Line perfect graphs, triangle- free graphs and completely positive matrices"*. *Prof. Mathew Francis* from the Indian Statistical Institute, Chennai, India gave the second plenary talk entitled *"Variants of the Gyarfas-Sumner conjecture"*. The third plenary talk was delivered by *Dr. Michal Dory* from the University of Haifa on *"Approximate all-pairs shortest paths: recent advances and open questions"*. There was also a fine line up of 20 contributed talks. The full program and abstract book for the 2023 workshop and for previous years are available at the website https://cri.hevra.haifa.ac.il/2021/2019/19th-haifa-workshop-on-interdisciplinary-applications-of-graphs-c-and-alg.

At the *Haifa Workshop 2023* (clockwise; from left, 2nd person): *Mathew, Vincent, Marty* and *Lynn, Jayme* and *Christina Szwarcfiter, Dalu Jacob, Gyorgy Turan, Shmuel Onn*.

We want to thank *Mrs. Michal Ada-Portnov, Mrs. Oshrat Abarbanel* and *Dr. S. Venkitesh* for the excellent organization, running the technical challenges of this year's workshop. We are pleased to have served the Algorithmic Graph Theory community over these years, welcoming researchers from all corners of the academic world. Wishing you good health and continued research accomplishments.

OPTIMIZATION AND OR IN VIETNAM, CHERISHED AT ICOVAA-2023 IN VIBRANT HANOI

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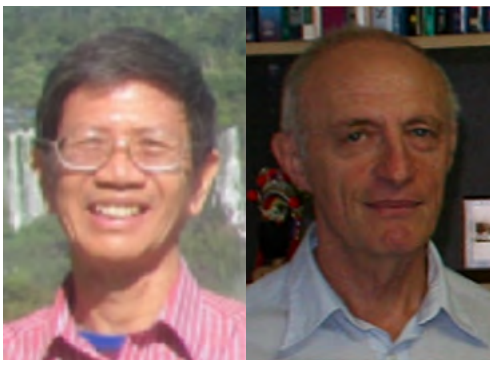
Alexander Kruger <akrugeremail@gmail.com>

From July 12-15, 2023, Vietnam Institute for Advanced Study in Mathematics (VIASM) held the International Conference on Optimization and Variational Analysis with Applications (ICOVAA-2023) at the new building of VIASM in Hanoi.

The organising team was composed of *Lê Minh Ha* (VIASM), *Phan Quoc Khanh* (Ton Duc Thang University), *Nguyen Ngoc Luan* (Hanoi National University of Education), *Nguyen Minh Tung* (Banking University of Ho Chi Minh City) and *Nguyen Dong Yen* (Institute of Mathematics, Vietnam Academy of Science and Technology).



The conference created opportunities for young researchers to communicate and learn directly from experts in the field. It was sponsored by VinGroup's Innovation Foundation (VinIF/Vietnam) and Hanoi National University of Education 2.

For more details about the conference, visit https://viasm.edu.vn/en/scientific-activities/news-and-events/detail/international-conference-on-optimization-and-variational-analysis-with-applications-2023-icovaa-2023.

Participants of *ICOVAA-2023*, July 12-15, 2023, VIASM, Hanoi.

The conference participants presented and discussed the latest research in Optimization, Operations Research and Variational Analysis along with their applications. These are important directions in Applied Mathematics and are among the fastest growing areas of mathematics in Vietnam. The conference was jointly organized by many strong groups in the country and brought together about 130 researchers from across Vietnam as well as the US, Germany, Austria, Australia, Spain, Romania, China, India, Poland, Korea, and Thailand.

On behalf of the Program Committee, *Prof. Phan Quoc Khanh*, talked about the conference content and introduced Vietnamese and international guests.

▲ *Prof. Hong-Kun Xu* (Hangzhou University, China) talked on the *Halpern iterative method for solving fixed point and optimization problems, and its applications in machine learning theory.*

▲ *Prof. Boris Mordukhovich* (Wayne State University, USA) talked on *Variational Convexity of Functions and Variational Sufficiency in Optimization.*

▲ *Prof. Alexander Kruger* (Ton Duc Thang University, Vietnam) gave *an overview of metric regularity theory with the emphasis on determining radii of regularity.*

INFORMS HEALTHCARE CONFERENCE 2023 EQUITY AND RESILIENCE IN A POST-PANDEMIC WORLD

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* This article originally appeared in OR/MS Today magazine and is being reprinted with the permission of INFORMS.

▲ Plenary Speakers at *INFORMS Healthcare Conference 2023*:

As we emerge from the COVID-19 pandemic, we look at the world of healthcare in a new lens. Issues of data availability, system resiliency, and equity and access have become new focal points in real-world healthcare and public health decision-making. In turn, the world of operations research (O.R.) has grown to respond to these pressing real-world concerns.

Data mining, machine learning and advanced analytics have taken the O.R. world by storm, and we have done tremendous things with the vast amounts of data available across numerous fields, from healthcare to finance to inventory management. But what do we do when data is not readily available, or the quality of the data is poor, as we saw throughout the COVID-19 pandemic? What do we do when solutions and analyses are needed immediately, and there isn't time to develop novel methodologies or let algorithms churn until they achieve a small optimality gap? What do we do when mathematically optimal solutions aren't easily implementable? Or when those solutions fail to address important concerns of equity and access? Looking to the future, what lessons have we learned that allow us to respond faster and better to the next emergent health crisis? How can we design our healthcare systems to be more resilient to uncertain but potentially catastrophic future events, such as another pandemic? Can we be strategic now to give room to respond to significant events?

All of these questions and more were addressed at the *INFORMS Healthcare Conference 2023*, hosted by the University of Toronto, July 26-28, in Toronto, Canada.

The conference theme, *"Equity and resiliency in a post-pandemic world"*, highlighted how academic achievements have been adapted to real-world practice, with particular emphasis on public health and pandemic preparedness. In addition to hosting sessions in the well-known tracks of personalized medicine, medical decision-making and healthcare operations management, the conference featured theme-specific clusters on COVID-19, public health policy, global health, health information technology and much more. Plenaries featured experts from both academia and healthcare practice, broadening the reach of the *INFORMS* community and connecting researchers with the healthcare industry.

Plenary Speakers

Three plenary speakers addressed attendees on each day of the Healthcare Conference 2023. *Matthew Anderson*, president and CEO of Ontario Health, gave the opening plenary on healthcare in Ontario, *"Using Quantitative Decision Tools to Achieve Goals"*. *Timothy Chan* gave a talk titled, *"Got (Optimal) Milk?" Chan* is the associate vice president and vice provost of Strategic Initiatives, Canada Research Chair in novel optimization and analytics in health, and professor of mechanical and industrial engineering, all at the University of Toronto. His talk proposed a data-driven framework combining machine learning and optimization to predict macronutrient content of human donor milk deposits to optimally combine them into pools. In collaboration with a partner milk bank, they collect a data set of milk to train predictive models. Finally, *Muhammad Mamdani*, PharmD, MA, MPH, vice president of data science and advanced analytics at Unity Health Toronto, and director of Faculty of Medicine Centre for Artificial Intelligence Research and Education in Medicine (T-CAIREM), University of Toronto, discussed *"The Application of Artificial Intelligence in Healthcare"*. AI has transformed numerous sectors but it's application to health has so far been limited. The Toronto community is well positioned to advance AI research and application given its strengths in relevant disciplines such as medicine, allied health, computer science, mathematics, engineering, and statistics. *Mamdani*'s plenary will present examples of applied AI research, with a particular focus on AI translation.

▲ Attendees of the *INFORMS Healthcare Conference 2023* had the opportunity to attend *pre-conference tours* at four local hospitals in Toronto.

Toronto, Ontario, Canada

The conference venue, Hilton Toronto, was centrally located downtown, a stone's throw from multiple world-renowned hospitals and the University of Toronto. Toronto is famous for its wide variety of food and culture, and you could easily walk from the hotel to world-class restaurants and entertainment. TTC, the public transit system, was also steps away. There were also a number of sporting events and other entertainment opportunities in the same timeframe as the conference, so there was plenty to keep attendees busy during any conference down time

Pre-conference tours of four local hospitals showcased how operations research and management science are used on the ground in Toronto, which is home to some of the top-ranked hospitals in the world.

For more information about the 2023 conference, visit https://meetings.informs.org/wordpress/healthcare2023/.

Prof. Dionne Aleman and ***Prof. Mike Carter*** were the Conference Co-Chairs of INFORMS Healthcare Conference 2023.

Cordially thanks to dear ***Ashley Kilgore***, for communication and help to make this particular reprint possible.
G.-W. Weber

INTERNATIONAL SYMPOSIUM ON LOCATIONAL DECISIONS: ISOLDE XVI 2023 - SUCCESSFULLY HELD IN KAISERSLAUTERN AND BADEN-BADEN

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The recent edition of *ISOLDE XVI* was held concurrently with the *XXVIII meeting of the EURO Working Group on Locational Analysis* (*EWGLA*) in *Kaiserslautern* and *Baden-Baden*, Germany, June 26-30, 2023. This event brought together around 100 researchers from the fields of mathematics, operations research, management science, geography, economics, and engineering who shared and discussed the latest developments in modeling, theory, and applications of a wide range of topics in Location Science.

After the welcome address by the conference chair, *Prof. Anita Schöbel* (University of Kaiserslautern-Landau and Fraunhofer ITWM, Germany), the conference kicked off with the keynote speaker, *Prof. Emeritus Horst Hamacher* (University of Kaiserslautern-Landau). In his talk, *Horst Hamacher* took a journey through his 30-year experience in the field of *Location Science*, recounting the numerous problems that he and his co-authors have studied. The first conference day (June 26) also included six (parallel) sessions on various subjects.

The second conference day (June 27) was dedicated to contributed presentations over eight sessions and ended with a get-together dinner, during which the participants enjoyed a breathtaking panoramic view of Kaiserslautern.

The next day (June 28), and following a long tradition at *ISOLDE* meetings, the participants traveled to the second conference location. On their way to Baden-Baden, they visited *Hambach Castle*, which is considered a symbol of the German democracy movement. Lunch was followed by a tasting of Palatinate wine during a ride on a historic steam train.

The second part of the conference featured two intensive days (June 29-30) of presentations and discussions in Baden-Baden, as well as a second keynote by *Prof. Elena Fernández* (University of Cádiz, Spain). In her talk, *Elena Fernández* revisited many of the *facility location* problems that she and her co-authors have investigated over the years and offered a personal view on future research directions.

Keynote speaker *ISOLDE XVI, Horst Hamacher.*

The symposium closed on Friday evening (June 30) with the traditional conference dinner and the selection of the next venue.

In total, *ISOLDE XVI* included 78 presentations in 21 sessions given by researchers from 18 countries. The conference provided an exceptional opportunity for exchanging research results, both at the theoretical and practical levels, as well as for sharing experiences. In addition, this event also strengthened the bond among the members of the community and stimulated future collaboration on research activities.


Skyline of *Kaiserslautern* at night.

A special issue of *Computers & Operations Research* will be dedicated to *ISOLDE XVI* under the theme *"Challenges and Perspectives in Location Science"*. Submission starts in September 2023 and ends on December 15, 2023. For more information, please visit the journal's website or contact the guest editors: *Teresa Melo* (teresa.melo@htwsaar.de), *Stefan Nickel* (stefan.nickel@kit.edu) and *Anita Schöbel* (schoebel@mathematik.uni-kl.de). The special issue is also open to contributions that were not presented at the conference.


Hambach Castle.


Historical steam train *"Kuckucksbähnel".*

ISOLDE XVII will be held in 2026 in the United States, hosted by Loyola University Chicago and the State University of New York at Buffalo - many thanks to *Gita Taherkhani* and *Diana Ramirez-Rios* for organizing this triennial event. We look forward to seeing the attendees again and to welcoming new participants in 2026!

Keynote speaker at *ISOLDE XVI, Elena Fernández.*

IN THE SPIRIT OF INTERNATIONAL WORKSHOPS ON DYNAMIC SCHEDULING PROBLEMS: IWDSP 2023 SUCCESSFULLY CONDUCTED IN WINTERTHUR, SWITZERLAND

Stanisław Gawiejnowicz <stgawiej@amu.edu.pl>

▲ The venue of *IWDSP 2023*.

The vast majority of scheduling literature concerns the problems formulated only by number parameters [5,6]. In some scheduling problems, however, job processing times, machine speeds or other parameters are variable and dynamically change in time. These *dynamic scheduling problems* are formulated using not only number parameters, but also by intervals, functions and matrices. Dynamic scheduling research became popular, and has earned its own place in the literature (cf. monographs [2,4,13] and reviews [1,3,7]). Despite this, it rarely appears on scientific events. In this report, we describe a new workshop series, *International Workshops on Dynamic Scheduling Problems* (*IWDSP*), entirely devoted to dynamic scheduling research.

▲ Group photo of *IWDSP 2023* participants.

The aim of the *IWDSP* workshops is to present new results related to the theory and practice of dynamic scheduling problems. The list of relevant topics includes, among others, scheduling with variable job processing times, scheduling with factors affecting job execution, scheduling on variable speed machines, scheduling with rate-modifying activities, scheduling with constraints on machine availability, scheduling under uncertainty, and online scheduling of jobs with variable processing times.

The fourth event in the series, *IWDSP 2023 workshop*, was held during June 5-6, 2023, at the School of Engineering, Zurich University of Applied Sciences (ZHAW), in Winterthur, Switzerland. The workshop was organized jointly by Algorithmics Research Unit, AMU, and the ZHAW Institute of Data Analysis and Process Design, Zurich University of Applied Sciences, Winterthur, Switzerland.

Twelve papers accepted for presentation at the *IWDSP 2023* workshop, written by the authors from Australia, Brazil, China, Colombia, France, Germany, Israel, Italy, Poland, Switzerland and USA, concerned scheduling in data gathering networks, time-dependent scheduling, position-dependent scheduling, robust scheduling, scheduling under uncertainty, modeling the work of emergency teams, scheduling with fatigue/learning effects, and scheduling with machine non-availability periods.

Plenary lecture on scheduling over scenarios was given by *Leen Stougie* (CWI and Vrije Universiteit, The Netherlands). Book of extended abstracts of the papers presented at the workshop was published by the PTM [12], e-book of the abstracts will be published soon by the PTM.

▲ The venue of the *IWDSP 2016*, *IWDSP 2018* and *IWDSP 2021* workshops.

The previous three *IWDSP* workshops were organized by Algorithmics Research Unit, and held at the Faculty of Mathematics and Computer Science, Adam Mickiewicz University (AMU), Poznań, Poland.

IWDSP 2016 workshop was held during June 30-31, 2016. Twelve papers accepted for presentation were written by the authors from Australia, Belarus, Canada, China, France, Poland, Russian Federation, Taiwan and the United Kingdom, and devoted to time-dependent scheduling, energy efficient scheduling, scheduling with financial constraints, scheduling with job rejection, position-dependent scheduling, scheduling in data gathering networks, resource-dependent scheduling, and cyclic scheduling.

Group photo of *IWDSP 2016* participants.

Plenary lecture on approximation algorithms for scheduling under uncertainty was given by *Marc Uetz* (Universiteit Twente, The Netherlands). The e-book of extended abstracts of the papers presented at the *IWDSP 2016* was published by the Polish Mathematical Society (PTM) [9] and is available on the website https://iwdsp2016.wmi.amu.edu.pl.

IWDSP 2018 workshop was held from June 26-28, 2018. Thirteen papers accepted for presentation, written by the authors from Belarus, Belgium, France, Germany, Israel, Poland, Russian Federation and the United Kingdom, concerned time-dependent scheduling, energy efficient scheduling, preemptive and non-preemptive position-dependent scheduling, scheduling in data gathering networks, dynamic scheduling in medical care logistic systems, and scheduling with job rejection.

Group photo of *IWDSP 2018* participants.

Tutorial on mechanism design in scheduling was conducted by *Ruben Hoeksma* (University of Bremen, Germany). Plenary lecture on algorithms for energy-efficient scheduling was given by *Evripidis Bampis* (Sorbonne Université, France). Book and e-book of extended abstracts of the *IWDSP 2018* workshop were published by the PTM [10], the e-book is available on the website https://iwdsp2018.wmi.amu.edu.pl. Selected papers presented at the workshop were published in a special issue of the Journal of Scheduling [7].

IWDSP 2021 workshop was held during July 5-6, 2021. The workshop, originally planned to be held in June 2020, in view of the COVID-19 pandemic was postponed for a year and organized as a hybrid event. Twelve papers accepted for presentation at the workshop, written by the authors from Egypt, Germany, India, Israel, Italy, the Netherlands, Poland, Switzerland and USA concerned scheduling in data gathering networks, time-dependent scheduling, conditional DAG scheduling, modeling intermittent production, dual-criticality scheduling, modeling assembly line manufacturing, scheduling controllable jobs, robust scheduling and agent scheduling of position-dependent jobs.

Screenshot with a "group photo" of *IWDSP 2021* participants.

Plenary lecture on dynamic opponent choice in tournaments was given by *Nicholas G. Hall* (Ohio State University, USA). Book and e-book of extended abstracts of the *IWDSP 2021* workshop were published by the PTM [11], the e-book is available on the website https://iwdsp2021.wmi.amu.edu.pl/. A special issue of the Journal of Scheduling, including selected papers presented at the workshop, is currently in press.

The atmosphere at the *IWDSP 2023* workshop, similarly as at its predecessors, was very relaxing, and coffee breaks were full of scientific discussions.

Ápero at the *IWDSP 2023* workshop dinner.

The social side of the workshop, as it seems, also was at the appropriate level, since the participants attending the *IWDSP 2023* dinner unanimously confirmed the high quality of Swiss wine and food.

The *IWDSP 2023* workshop dinner.

More details on the *IWDSP 2023*, including the list of accepted papers, the current list of topics related to the IWDSP scope and photos made at the event, are given on the website https://iwdsp2023.wmi.amu.edu.pl.

The four completed *IWDSP* workshops have shown that many dynamic scheduling problems still await solution. We hope that this report will encourage the reader to start a research in that domain and attend the future events in the *IWDSP* series. So, see you on the next *IWDSP* workshop!

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KOÇ UNIVERSITY HEALTHCARE OPERATIONS WORKSHOP - 9TH ANNUAL KU-HOW 2023 SUCCESSFULLY HELD IN ISTANBUL

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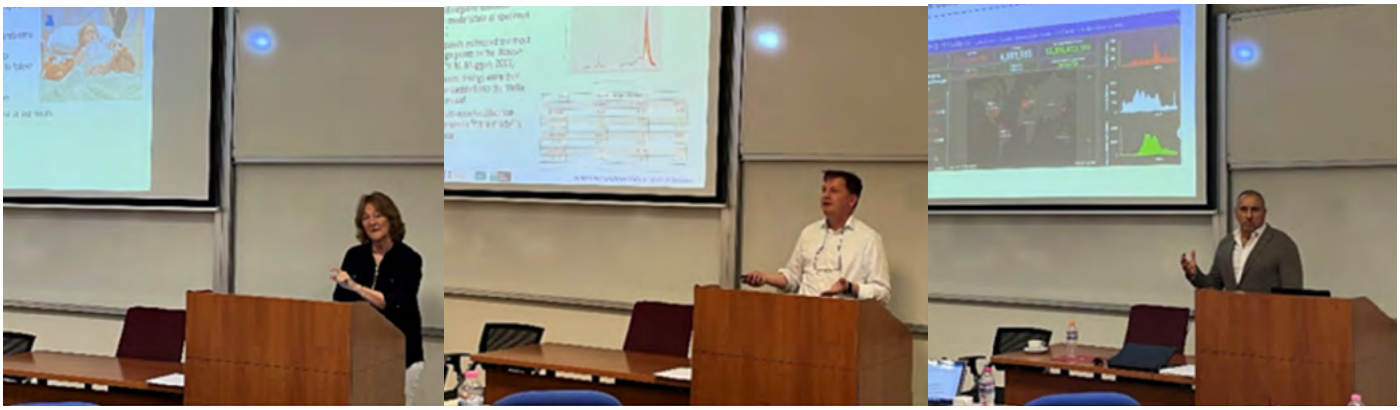
Koç University Healthcare Operations Workshop has been organized annually since 2011 with the exception of 2020-2022 during the Covid period. We organizers are pursuing interdisciplinary research that focuses on problems related with healthcare services delivery from public health, medical decision making, operations management and data analytics perspectives. Typically, it has been a one-day event with a single stream, but due to the increasing number of presenters, the duration was extended to 1.5 days this year, still with a single stream. On June 9, 2023, it was held at the main campus of Koç University, located in the outskirts of İstanbul, whereas it was hosted by Koç University Hospital (closer to the city center) on June 10, 2023.

▲ About the above: *Main Campus of Koç University.* About the lower: *Koç University Hospital.*

There were a total of 17 presentations with three invited talks: *Professor Margaret Brandeau* gave a presentation titled as *"Advanced Analytics in Health Care: Promise Meets Reality"*, where she discussed the potential of advanced analytic techniques such as artificial intelligence (AI) to transform health care systems. She explained why this potential has not been fully realized through a number of projects carried out at Lucile Packard Hospital Stanford and concluded with thoughts on possible actions for successful AI implementations. *Professor Jim Duggan* talked on the topic *"An Age-Cohort Simulation Model for Generating COVID-19 Scenarios"*. He presented a modular simulation design developed by the Irish Epidemiological Modelling Advisory Group for assisting the Irish Government on COVID-19 responses during the pandemic. The design managed to simplify the disease transmission structure, while providing a practical workflow to coordinate activities. >>



▲ Invited Talks in *KU-HOW 2023* (From left to right)*: Professor Margaret Brandeau* (from Stanford University), *Professor Jim Duggan* (from University of Galway), *Professor Paulo Gonçalves* (from Università della Svizzera italiana).

>> Moreover, it could generate different scenarios rapidly to provide the requirements in a timely and effective way. *Professor Paulo Gonçalves* also talked about their contributions on COVID-19 responses in the East of England (EoE) with a title *"Model-informed health system reorganization during emergencies"*. Their research involved teamwork that consisted of academics, public health officials, and clinical decision makers. They were able to receive frequent data input as well as consultations from the healthcare team, which resulted in time-series and system dynamics models to predict epidemiological state and bed capacity demand in both short-term (a few weeks) and medium-term (several months). All three talks showed the importance of collaboration between the academics and the practitioners when operations aims to make an impact in healthcare systems.

The workshop had a nice mixture of presenters, some with backgrounds on operations and some on medicine. Consequently, the topics of the workshop covered a wide range, such as evidence-based medicine, telemedicine, relief and resilience plans for disaster situations, circadian rhythms in medicine. The full program with abstracts can be found here: https://healthcare.ku.edu.tr/2023-program/.

The workshop brought different groups of researchers together in a friendly environment. The researchers had the opportunity of discussing different topics and possible collaborations.

The workshop was sponsored by BIDEB 2232 International Fellowship for Outstanding Researchers Program of TÜBİTAK and Koç University College of Administrative Sciences and Economics.

▲ *KU-HOW 2023* Participants.

THE 4TH IMA AND OR SOCIETY CONFERENCE ON THE MATHEMATICS OF OPERATIONAL RESEARCH: THOUGHTS FROM THE COMMITTEE

Daniel Tilley <daniel.tilley@dtas.uk>

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The *4th IMA and OR Society Conference on the Mathematics of Operational Research* (*"Maths of OR"* for short) took place at the Aston Conference Centre, Birmingham on the 26th-28th April 2023.[1] The conference is a biennial event that has taken place since 2017. It is organized by the *Institute of Mathematics and its Applications* (*IMA*), with support from the *Operational Research* (*OR*) *Society*. The stated aim of the conference is to "draw together the considerable community of researchers and practitioners who use/develop innovative mathematics, relevant to the applications and theory of Operational Research".

The first step in organizing such a conference is putting the right *committee* together! A picture of the committee for the 2023 edition is given below.

Throughout the organisation process, the committee paid particular attention to the issue of Equality, Diversity, and Inclusion, wishing for the conference to appeal to as wide an audience as possible. To this end, we took great care to invite a diverse set of plenary and after-dinner speakers. The conference also included a workshop by the *Women in OR & Analytics Network* (*WORAN*)[2]. The committee then reached out to a diverse set of academics and practitioners, inviting them to organize sessions on specific topics and/or submit papers or posters. We were very pleased with the outcome, and we wish to thank everyone who helped us along the way.

The conference officially opened on the morning of the 27th, with an inspiring plenary by *Professor Paul Harper*. *Paul*'s work has always been underlined by both theoretical rigour and practical applicability, and the presentation covered many of *Paul*'s latest contributions to *OR in Healthcare*, including a project concerned with identifying optimal locations for emergency response vehicles.

The *Forecasting and Retailing* session, that also took place on the 27th, included an examination of two very important and notoriously difficult problems: how to optimise price reductions in retailing, and how to optimise the last-time buying decisions. The day also included a Defence talk on historical analysis, which included some new and surprising results on the benefits of different defensive postures.

Professor Nira Chamberlain gave the second plenary on the 27th. *Nira*, a previous president of the *IMA*, is well known for his informative and entertaining talks, and this was no exception. Nira bounded across the stage, talking about the challenges to *OR* posed by Machine Learning (ML), which is now doing what many mathematicians used to do. *Nira* told us that a couple of Machine Learning experts once said to him that Mathematicians would one day be extinct, but *Nira* argued that Mathematicians will remain essential, even if it just to understand the working of the ML and interpret the results.

Another highlight on the first day was the extremely informative and interesting *WORAN* session organised by *Dr Antuela Tako*. It included a discussion on the importance of mentoring, by a panel of experts (with questions from the audience). The session, which was sponsored by *Simul8*, concluded with a "Speed Dating" mentoring session (the audience split into Mentors and Mentees), so that everyone got the chance to act in each role and understand their importance.

This was all followed by the *Poster Session*, which offered a chance to network and read some stunning posters on topics as diverse as "restaurant meal delivery problems", "educational timetabling", and "return-risk optimization models". Virtually everyone at the conference took the time to read posters, get to know each other, and have a glass of wine before dinner.

A formal *Dinner* concluded the first day of the conference. The food was excellent (many of the participants claimed it was top restaurant food). The main course consisted of Baked Cod (or Seabass), with Gnocchi as the Vegetarian option. As a special treat, the Presidents of the *IMA* (*Professor Paul Glendinning*), and the *OR Society* (*Dr Gilbert Owusu*) each gave a talk between the first and second courses about the current status of Mathematics, *OR*, and the two societies. This was important, as it allowed the attendees to get an understanding of how the *Mathematics of OR* is developing and is expected to develop over the coming years. One of the key aspects mentioned was the new Academy of Mathematical Sciences that is being developed, but more on that later.

The 28th started with a plenary talk by *Professor Corina Constantinescu*. *Corina*'s talk covered mathematical perspectives of microinsurance. This was a fascinating talk about the importance of microinsurance for third-world countries (and specifically poverty dynamics), showing that subsidised schemes can provide social benefit while reducing costs.

▲ The *Maths of OR 2023* committee from left to right: *Aris Syntetos, Adam Letchford, Daniel Tilley, Karrie Liu, Ruth Miesner* (with added thanks to *Maya Everson, Pam Bye, Ella Dixon* from the *IMA Conference department* and *Caitlin Griffiths* and The *OR Society* team - not pictured).

Leading members of the *Academy of Mathematical Sciences*[3] also attended, to give a brief about the Academy (which is in its early stages of development), to ask for feedback from attendees, and to ask for ideas. The Academy is looking to be the authoritative voice for all mathematical sciences across the UK. This was an enjoyable session (lasting 1.5 hours) with a frank discussion from all participants, all of whom felt this Academy is an important step but needs to be developed correctly.

The plenary talk by *Professor Joerg Fliege* (who had been the co-chair on the first two *Maths of OR Conferences*) was concerned with the real-time routing of unmanned aerial vehicles (a.k.a. drones). *Joerg* began by defining the problem and describing some of its applications in disaster management and defence. After that, he considered several possible mathematical models and argued in favour of a mixed-integer nonlinear programming approach in which time is discretised. The talk was fascinating and very timely, given the ever-increasing number of drones in use across the world. This was followed in the afternoon by a talk from one of *Joerg*'s students, which expanded on the plenary and allowed attendees to get a wider knowledge of this fascinating area that uses the best of academic research and applies it to a practical problem space.

As in the past, *Combinatorial Optimisation* was especially well represented, with no fewer than five dedicated sessions. The talks covered a wide variety of topics, including theory, algorithms and applications. It was clear that Combinatorial Optimisation remains an area of major strength in the UK OR community.

The conference came to a conclusion with a plenary by *Professor Julia Bennell* on problems involving the packing of irregular shapes. *Julia* ended the conference in style, talking in an engaging fashion about what has been done and what lies ahead in this fascinating problem space. As the final talk of the conference, at a time when many participants were tired, this proved just the ticket to reinvigorate the audience.

The conference ended with the chair thanking everyone and noting that creating a wonderful conference requires three ingredients "a supportive and hard-working committee", "headlining events that draw people from the community to attend", and "a wonderful community (particularly the session organisers and presenters) who attend and make the conference what it is". All feedback has indicated this was a superb conference and we thank all participants for making it so.

The Maths of OR Conference will Return

[1]https://ima.org.uk/20140/4thmathsofor/

[2]https://www.theorsociety.com/get-involved/society-groups/special-interest-groups-and-networks/women-in-or-analytics-network/

[3]https://www.acadmathsci.org.uk/

2023 MIXED-INTEGER PROGRAMMING WORKSHOP – THE 20TH ANNIVERSARY OF A BELOVED EVENT

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The *Mixed Integer Programming* (*MIP*) *Workshop* is a single-track workshop series highlighting the latest trends in integer programming and discrete optimization, with speakers chosen by invitation. Some of the qualities that make this workshop unique is that it has always focused on providing a strong platform for young researchers (both as speakers and as organizers), while keeping an important presence of active senior researchers, and always fostering a friendly atmosphere to encourage interaction among faculty members, students, and non-academic participants. This was a special year for the *Mixed-Integer Programming Workshop:* this edition marked the 20th anniversary of what has become one of the most important events in the integer programming and discrete optimization community.

▲ *2023 MIP Workshop:* Poster Session.

The *2023 MIP Workshop* was held on May 22-25 at the University of Southern California, and covered a wide array of topics, including theory of integer programming, combinatorial optimization, non-linear optimization, and applications. The workshop had 22 invited experts from around the world presenting state-of-the-art research in these areas. As customary, *MIP* had a strong presence of junior researchers among its presenters (63%) and, as part of steady efforts from the community to increase women representativity, *MIP* had its largest ever women presence among its speakers (41%). The list of *invited speakers* was the following:

Alfredo Torrico (Cornell): *"Two-sided assortment optimization for matching markets"*, *Alper Atamtürk* (UC Berkeley): *"MIP for hybrid MPC"*, *Bartolomeo Stellato* (Princeton):*"Learning for decision-making under uncertainty"*, *Bistra Dilkina* (USC): *"Searching large neighborhoods for integer linear programs with contrastive learning"*, *Cheng Guo* (Clemson): *"Copositive duality for discrete energy markets"*, *Christian Tjandraatmadja* (Google): *"Network-aware scheduling of large ML workloads"*, *Dabeen Lee* (KAIST): *"Non-smooth and robust submodular maximization"*, *Ed Klotz* (Gurobi): *"Graph-based approaches to solving binary quadratic programs"*, *Igor Pak* (UCLA): *"Integer points in polytopes are hard to find"*, *Jan Kronqvist* (KTH): *"Strong and computationally efficient formulations of disjunctive constraints"*, *Jeff Linderoth* (U Wisconsin-Madison): *"Matrix completion over GF(2)"*, *Ksenia Bestuzheva* (ZIB): *"Perspective cuts for generalized on/off constraints"*, *Margarita Castro* (PUC Chile): *"Markov chain-based policies for multi-stage stochastic integer linear programming with an application to disaster relief logistics"*, *Matthias Walter* (U Twente): *"Hypergraphs, polyhedra and algorithms for polynomial optimization"*, *Mohit Singh* (GATech): *"Determinant maximization and matroid intersection"*, *Nick Sahinidis* (GATech): *"A combined linear and nonlinear presolve algorithm for integer optimization problems"*, *Phebe Vayanos* (USC): *"Learning optimal classification trees robust to distribution shifts"*, *Ryan Cory-Wright* (IBM and Imperial College): *"Optimal low-rank matrix completion: Semidefinite relaxations and eigenvector disjunctions"*, *Saumya Sinha* (U Minnesota): *"Relaxation and duality for multiobjective integer programming"*, *Silvia Di Gregorio* (TU Dresden): *"Partial optimality in cubic correlation clustering"*, *Sophie Huiberts* (Columbia): *"Smoothed analysis of the simplex method"*, *Sourour Elloumi* (ENSTA Paris): *"Solving polynomial unconstrained binary optimization problems through reformulation"*.

▲ *2023 MIP Workshop* (left to right): *Dr. Thiago Serra* (Poster Competition Jury Chair) and *Noah Weninger* (Most Popular Poster and Best Poster Winner).

In addition to the invited presentations, the workshop hosted two competitions: a *poster competition* and the second annual computational competition. The poster competition has been mainly dedicated to exhibiting and recognizing the work of current PhD students in the field. Selected from a large competitive pool of applicants, 30 posters were presented in person at the conference. In total, four awards were given this year to: *Kristin Braun* (Fraunhofer Institute for Integrated Circuits, Honorable Mention), *Angela Morrison* (University of Colorado Denver, Honorable Mention) and *Noah Weninger* (University of Waterloo, Most Popular Poster and Best Poster).

▲ *2023 MIP Workshop* (left to right): *Dr. Suresh Bolusani* (Computational Competition Committee) and *Krunal Patel* (Computational Competition Winner)

For the *computational competition*, the topic of its second edition has been *MIP Reoptimization*, where participants were asked to design methods for reusing information from one *MIP* to solve a similar one. In this edition, two awards were given: *Paul Strang et al.* (ISAE-SUPAERO, Honorable Mention) and *Krunal Patel* (Polytechnique Montréal, Competition Winner). The winner of the computational competition will receive an expedited review process in Mathematical Programming Computation.

▲ *2023 MIP Workshop*: *Dr. Suresh Bolusani* presenting the MIP Computational Competition.

As the cherry on top, to celebrate the 20th anniversary, we had a special contribution from some of the first organizers of the *MIP series*, who are still highly active members of our community. The 2023 organizing committee interviewed them to hear their thoughts about many aspects of the *MIP workshop:* how was its beginning, how it has changed, what are their best memories, etc. We invite everyone to visit https://www.mixedinteger.org/2023/ to see the list of presenters, slides, more event photos, and interview videos.

Beyond the workshop, this past year was quite eventful for the *MIP* community. The Mixed-Integer Programming Society (*MIPS*) (a section of the Mathematical Optimization Society) was founded in order to promote the continuity of the *MIP* community and events within it. In particular, it supports the organization of the annual *MIP* Workshops, and assists in the dissemination of online seminars such as the Discrete Optimization Talks. We invite everyone to visit https://www.mixedinteger.org/ for more details on *MIPS*. One important highlight is that, for the first time ever, an additional *MIP* event will be organized: a workshop in IIT Bombay during December 2024. Stay tuned for these announcements.

We look forward to seeing you at a future *MIP* event!

▲ *MIP 2023* logo.

▲ *MIP 2023* Group photo.

A NICE EVENT : OPTIMIZATION AND ALGORITHMS (OPAL 2023) – SEMI ONLINE 25 – INTERNATIONAL CONFERENCE IN HUNGARY

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▲ A view of Veszprém, taken form the castle, made by *Nir Halman*.

The conference was held between 5-9 of June 2023, in Veszprém, Hungary. It was dedicated to celebrate the past 25 years of *Semi Online Scheduling*, and also, for celebrating the 70th birthday of *Zsolt Tuza*.

First note, that in 2023 Veszprém is the Cultural Capital of Europe. This Summer the town has many cultural events (even more than otherwise), and our conference nicely fits into the list of cultural and scientific events of the town. The host university was *University of Pannonia* (Faculty of Information Technology). Our Rector, *András Gelencsér*, opened the conference and then the dean of the faculty, *Zoltán Süle*, gave a short welcome speech to the participants.

Veszprém is one of the most historic city in Hungary, also called as "town of queens", as for a long time, the bishop of Veszprém had the right to crown the queen of Hungary. The first queen of Hungary was Gizella, a Bavarian princess, she was crowned in about 1000. Some more info about Veszprém is at https://www.veszpreminfo.hu/en/veszprem-the-city-of-queens.

25 years: a good occasion to celebrate. The first semi online scheduling paper is the following: *H. Kellerer, V. Kotov, M.G. Speranza and Zs. Tuza, Semi on-line algorithms for the partition problem, Operations Research Letters, 21 (1997), pp. 235-242*.

▲ *Professor Tuza*, the celebrated person.

This is the paper where the "semi-online" phrase appears, (possibly) first in the literature. What is the meaning of "semi online"? In the offline setting of a combinatorial optimization problem we know "everything" about the input before the optimization, while in the online setting (in the mostly considered online model) the items/jobs come one by one, and the optimizer must make an irrevocably decision about handling the current part of the input. But, in the - semi online - setting, the case is somehow in between. We do not know all the data, but we know in advance at least "something" about the data. This additional information can be, e.g., the sum of sizes of all jobs, the length of the sequence of the input, or we do have a small (bounded) opportunity to change the schedule, packing, etc., for which we already made our decisions. The cited paper investigates three of such semi online settings, and proves that in all of these three cases the worst case ratio of the best (optimal) online algorithm reduces from 3/2 to 4/3. In this sense, the paper proves that obvious thing, that if we have more information, it helps us to make better decisions. We also had a nice talk by *Professor M. Grazia Speranza*, who recalled the circumstances of writing the first paper on this topic.

There is also a paper by *Guochuan Zhang* from 1997, which considers one setting from the three ones. And note, that *Gábor Galambos* was also present at the conference as an invited speaker, who wrote possibly the first paper in history about some semi online model, namely in case of bin packing. His paper have been published in 1985.

On 10.06.2023, the number of hits that are found by Google, searching for key words "semi online" is 2,130 million! Let us be more realistic. Let us repeat the search by Google Scholar. Here the number of hits is 7,100,000. Still not too few. For "semi online scheduling" the Google Scholar finds more than 1500 papers. Although possibly not all of these hits are relevant, one can see that from the introduction of the "semi online" phenomenon, many researchers considered this topic.

M. Grazia Speranza and *Hans Kellerer* were present at the conference, together with the celebrated *Zsolt Tuza*. Only *Vladimir Kotov* (from Belarus) could not come (for obvious reasons) from the four authors of this seminal paper.

Broader focus: But the focus of the conference was quite broader: many kinds of Optimization (and Algorithms) were considered. This was a hybrid conference, the number of participants were about 100, from which, about one third of the participants took part online, and the other two third attendees were present personally.

We had 5 invited speakers, so for each day we had an invited talk of 50+10 minutes. The speakers and the titles are as below: *Magnús Halldórsson* (Reykjavik University, Iceland): *"Graph coloring: Connecting semi-online algorithms to new algorithmic paradigms"*; *Gábor Galambos* (University of Szeged, Hungary): *"On couple of task scheduling"*; *Vitaly Strusevich* (UK): *"Models of Scheduling on Parallel Machines under Resource Constraints"*; *Nir Halman* (Bar-Ilan University, Israel): *"Monotone Dynamic Programming: From Theory to Approximation Schemes"*; and *Jiri Sgall* (Charles University, Prague, Czech Republic): *"Online Packet Scheduling"*.

The participants were from about almost 20 countries, we had 5 invited talks, plus 40 further talks (online and on-site talks). Abstracts of the conference (and other information) can be found on the homepage: https://mik.uni-pannon.hu/en/research-development/conferences/semi-online/home.

The celebrated person. Let us say some words also about the celebrated person, *Zsolt Tuza*. *Zsolt* has 300 journal publications according to DBLP (in fact he has much more, over 450). the number of his co-authors at moment is 296. His main research topic is coloring graphs and hypergraphs. His Erdős-Bacon number is 5 (for definition see: https://en.wikipedia.org/wiki/Erd%C5%91s%E2%80%93Bacon_number). For having a so small such number, of course, it is a big help that his Erdős-number is just 1, he has 11 joint publications with *Paul Erdős*. We know all these facts also from the quiz that that attendees could fill. From 25 questions the most correct answers (18) were given by *Professor Jan Kratochvil*. This is not so strange, *Prof. Kratochvil* has many joint papers and nice and strong joint contribution with *Professor Tuza*.

▲ *OPAL 2023*: Some part of the participants in Balatonfüred.

Finally, about our excursion. Our excursion started in Balatonfüred. This is some bigger town at lake Balaton, which is a well-known lake in Middle Europe. We had some walk at Tagore promenade. The promenade on the shores of Balaton was named after a Nobel Prize-winning Indian poet, *Rabindranath Tagore*, who - after he was cured in the State Heart Hospital in 1926 - planted the first tree on the boardwalk. The town is also famous from a regatta: Kékszalag or the Blue Ribbon Round the Lake Balaton Race is an international sports event held in Hungary every year. The regatta starts and finishes in Balatonfüred, after going all around the 155+km of the Lake Balaton. Today the regatta became Europe's most prestigious and oldest existing round a lake competition. After Balatonfüred we went to Tihany. Here is our oldest church. Also famous the echo, that we tried: it worked.

Our excursion is finished in Laci Pince (Cellar of Laci): here after having dinner, the participants could examine some interesting questions of the local wine - industry.

▲ The place from which one can try the echo.

▲ Local wine tasting.

Our great PC members: *M. Grazia Speranza* (University of Brescia, Italy) and *Hans Kellerer* (University of Graz, Austria) helped much in the organizing. *Grazia* played also important role in some of the conference events.

▲ PC members at *OPAL 2023*: *M. Grazia Speranza* and *Hans Kellerer*.

And finally the PC chair (and author of this note), *Gyorgy Dosa* (University of Pannonia, Hungary), standing at the shore of lake Balaton, thinking on whether somebody has lost in the excursion.

▲ *Gyorgy Dosa*, the PC chair.

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INTERNATIONAL CONFERENCE OPTIMIZATION 2023 CELEBRATED IN BEAUTIFUL AVEIRO, PORTUGAL

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The international conference *Optimization 2023* (https://optimization2023.web.ua.pt/) took place at the *University of Aveiro*, on July 24-26, 2023. The *Optimization 2023* conference brought together leading researchers, practitioners, and experts from various fields to discuss and share their latest research advancements and featured a wide range of topics within the realm of *Optimization*. The conference aimed to foster collaboration, knowledge exchange, and innovative solutions to real-world problems using optimization techniques. This event has international recognition as an important forum for discussion and exchange of ideas. It is the 10th edition of a series of international conferences in optimization organized in Portugal under the auspices of *APDIO - Portuguese Operations Research Society* (http://apdio.pt/home).

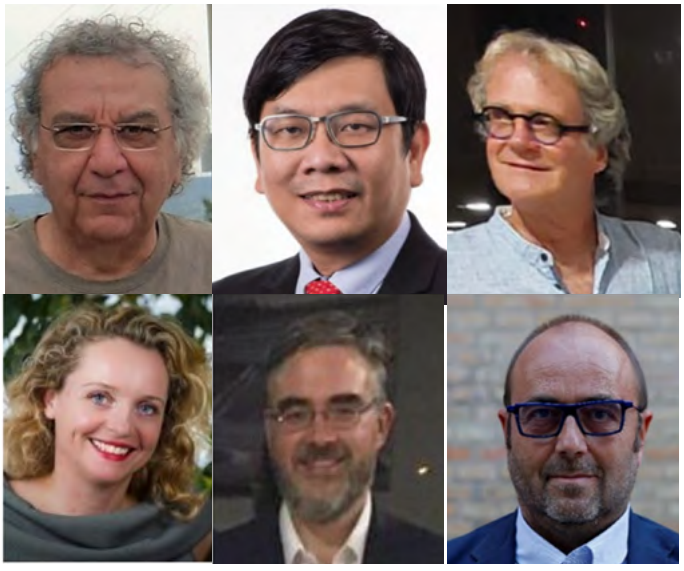
▲ *Opening Session of Optimization 2023* (From left to right): *Prof. Delfim Torres, Prof. Carlos Henggeler Antunes, Prof. Paulo Jorge Ferreira, Prof. Luis Gouveia* and *Dr. Agostinho Agra.*

Optimization 2023 was organized by the University of Aveiro (https://www.ua.pt/en/). The Chair of the *Program Committee* was *Prof. Luis Gouveia* from the University of Lisbon. The Chairs of the *Organizing Committee* were *Dr. Agostinho Agra* and *Dr. Cristina Requejo*, both from the University of Aveiro, Portugal. The international conference accounted for special scientific sponsors such as the FCT - Fundação para a Ciência e a Tecnologia (https://www.fct.pt/en/), within Research Unit CIDMA - Center for Research & Development in Mathematics and Applications (https://cidma.ua.pt/) and Research Unit CMAFcIO - Center of Mathematics, Fundamental Applications and Operations Research (https://cmafcio.campus.ciencias.ulisboa.pt/).

The program of the three-day event included six plenary lectures given by internationally recognized speakers and 34 parallel sessions, which consisted of 122 communications of more than 150 participants from 22 countries. The main topics included Stochastic Optimization, Robust Optimization, Multi-objective Optimization, Global Optimization, Machine Learning and Optimization, and many application-oriented studies were presented at the conference.

On the first day, the *Opening Session of Optimization 2023* had welcome words by *Prof. Paulo Jorge Ferreira*, Rector of the University of Aveiro, *Prof. Delfim Torres*, Coordinator of CIDMA, *Prof. Carlos Henggeler Antunes*, president of APDIO (Portuguese Association of Operations Research), *Prof. Luis Gouveia*, Chair of the Program Committee and *Dr. Agostinho Agra*, Chair of the Organizing Committee.

The scientific program included six *Invited Lectures* in which prominent researchers shared their latest advancements on hot topics in the field of optimization. Their talks addressed emerging trends, challenges, and opportunities, inspiring the attendees to explore new avenues in their research and applications. Specifically, the following keynote lectures were given during the three-day event: Plenary I titled *"Lagrangian based methods for nonsmooth composite minimization"* by *Prof. Marc Teboulle*, from the School of Mathematical Sciences, Tel Aviv University; Plenary II titled *"The analytics of robust satisficing: predict, optimize, satisfice, then fortify"* by *Prof. Melvyn Sim* from the National University of Singapore (NUS), NUS Business School; Plenary III titled *"Cycles, pricing, and pivots"* by *Prof. Jacques Desrosiers* from GERAD and Department of Decision Sciences, HEC Montréal; Plenary IV titled *"Bilevel optimization under uncertainty: challenges and opportunities"* by *Prof. Ivana Ljubic* from the ESSEC Business School of Paris; Plenary V titled *"Optimal deployment of electric vehicle charging infrastructure"* by *Prof. Miguel Anjos* from the School of Mathematics, University of Edinburgh; and Plenary VI titled *"Counterfactural explanation models: a class of Mathematical optimization problems in (fair) Machine Learning"* by *Prof. Emilio Carrizosa* from the IMUS and Faculty of Mathematics, University of Sevilla.



▲ The *Plenary Speakers of Optimization 2023;* Top row left to right: *Prof. Marc Teboulle, Prof. Melvyn Sim* and *Prof. Jacques Desrosiers;* Bottom row left to right: *Prof. Ivana Ljubic, Prof. Miguel Anjos* and *Prof. Emilio Carrizosa.*

The contributions within the parallel sessions covered theoretical developments, innovative methodologies, and practical applications of optimization techniques. It was found that through an engaged audience and lively discussions, it was a great opportunity for researchers to present their work and get valuable feedback and suggestions for further improvement or future research directions.

Additionally, to promote networking among the participants, the *Organizing Committee* prepared social events such as a welcome reception, gala dinner, and city tours, which have deepened informal interactions and opportunities for collaboration.

▲ The *Closing Session of Optimization 2023: Dr. Cristina Requejo* summarizing the results of the conference.

In the *Closing Session*, key insights and highlights from the various invited lectures, presentations, and discussions followed from the conference were mentioned, along with a special thanks. The *Organizing Committee of Optimization 2023* expressed their recognition to all invited speakers and session speakers for all their valuable contributions, which were relevant to enrich the event and strengthening connections within the Optimization Community. Fruitful discussions on cutting-edge research topics, sharing practical applications, and exploring the potential of optimization significantly contributed to the advancement of optimization techniques and their integration into real-world problem-solving.

The success of the conference *Optimization 2023* in promoting collaboration and knowledge sharing ensures that future editions will continue to reinforce that *Optimization* is one of the key disciplines in addressing global challenges.

NONSMOOTH AND VARIATIONAL ANALYSIS: CONFERENCE NAVAL 2023 CELEBRATED IN BEAUTIFUL DIJON, FRANCE

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The international conference *"Nonsmooth and Variational Analysis 2023"* (*NAVAL 2023*) was organized in honour of *Professor Lionel Thibault* of the University of Montpellier 2, France, (http://jourani.perso.math.cnrs.fr/Colloque_Thibault/).

It took place from June 26th to 28th, 2023 at *University of Burgundy* in Dijon, France.

▲ *Professor Lionel Thibault*: A recognized scholar in modern convex analysis, variational analysis, optimization, differential inclusions, optimal control, celebrated at NAVAL 2023 (photo source: https://thibault.xyz/about/).

The objectives of *NAVAL 2023* were to gather eminent experts from different countries (Australia, Austria, Bulgaria, Czech Republic, Chile, France, Germany, Israel, Italy, Saudi Arabia, Poland, Romania, Senegal, Spain, USA and many others) - well achieved with about 80 participants - to exchange on the latest contributions and to present the state-of-the-art in the fields of nonsmooth and variational analysis, vector optimization, optimal control, operations research and nonlinear dynamics.

The *Scientific Committee of NAVAL 2023* consisted of *S. Adly* (University of Limoges, France), *A. Hantoute* (Universidad de Alicante, Spain), *R. Henrion* (Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany), *A. Jourani* (University of Bourgogne, France) and *D. Zagrodny* (University of Lódź, Poland). The members of the *Local Organizing Committee* were *A. Barbara, A. Cabot, X. Dupuis, A. Jourani, P. Tardivel* and *E. Vilches*. *Administrative support* was provided by *L. El-Bekhti* and *M. Crochot*.

The development of nonsmooth analysis tools has led to important advances in optimization, optimal control, and nonlinear dynamics. These theories have gained tremendous traction due to diverse applications in business, engineering, mechanics, and many other fields. Because of these important applications, these topics are vibrant areas of research and expanding branches of applied mathematics. The participants of *NAVAL 2023* discussed new results, developed new ideas and encouraged cooperation among themselves, which will be useful in solving practical problems. A special issue of the trade journal "Optimization" is going to be dedicated to *NAVAL 2023*.

▲ *Sparkling Dijon*: city of the solemn and successful NAVAL 2023 conference.

Cordially thanks to dear ***Prof. Alexander Kruger*** for communication and support of this report publication.
G.-W. Weber

A SUCCESSFUL TWO-DAY CONFERENCE OF THE OR SOCIETY OF ISRAEL - ORSIS 2023 ENJOYED IN TEL-AVIV

Yael Perlman <Yael.Perlman@biu.ac.il>

▲ Some of the 130 conference attendees (Photo credit: *Shlomi Mizrahi*).

The *Israeli Operations Research Society* (*ORSIS*) successfully held the *ORSIS 2023* conference in *Tel Aviv*, Israel, last May 1-2 (https://www.orsis.org.il/conferences/recent-orsis-conferences). The conference, hosted by Bar Ilan University, gathered 130 leading researchers, professionals, and students in the field of Operations Research (*OR*) to discuss cutting-edge developments, share insights, and foster collaborations. The conference took place in the *Crown Plaza Hotel* in the vibrant city of Tel Aviv. This venue was an ideal choice for the conference, offering a magnificent sea view, modern facilities, and ample space for various sessions and activities. The city's unique blend of history, culture, and innovation provided an inspiring backdrop for the attendees to engage in meaningful discussions and networking.

▲ *Conference venue of ORSIS 2023* with a view: The *Crown Plaza hotel* on the beach of Tel-Aviv.

ORSIS 2023 featured a diverse program that catered to the interests of attendees from different *OR*-related disciplines. The event included plenary lectures, semi-plenary lectures, prize ceremony and session, and numerous parallel sessions. These sessions covered a wide range of topics, including stochastic *OR*, continuous and combinatorial optimization, operations and supply chain management, game theory, applied *OR*, and more. Renowned speakers from over twenty different institutions, both in academia and industry, from Israel, Europe, and the US, shared their knowledge, research findings, and practical applications of *OR* principles.

Three impactful plenary lectures were held during the two-day conference. These lectures addressed current challenges and future trends in *OR*, providing valuable insights to the audience. *Mark Ferguson* from the University of South Carolina explored *"Why any problem starting with the term "assume demand is" gives a false sense of accuracy"*, cautioning against over-reliance on assumptions regarding the demand in inventory and revenue management models.

▲ *Prof. Mark Ferguson* in his plenary lecture.

Opher Baron from the University of Toronto delivered a captivating talk titled *"ServiceMiner"*. It dealt with automating data-driven business analytics in congested systems, with the use-case being a single stage infinite server queueing models with state-dependent service durations and data-driven arrivals.

▲ *Prof. Opher Baron* speaks to the conference attendees.

Naor Lecture: Tamás Terlaky from Lehigh University in Pennsylvania, gave an inspiring lecture on the *quantum computing revolution*, focusing mainly on its impact on optimization sciences, and the potential of making optimized decisions faster and better.

▲ *Prof. Tamás Terlaky* talks about using quantum computing in optimization.

In addition, *ORSIS 2023* featured four engaging semi-plenary lectures, each focusing on specific subdomains within OR. *Danny Hermelin* from Ben Gurion University of the Negev presented *"New algorithms for minimizing the weighted number of tardy jobs"*. *Igal Milchtaich* from Bar-Ilan University discussed *"Quantum advantage in Bayesian games"*. *Yale Herer* from the Technion explored *"An asymptotic perspective on risk pooling: Limitations and relationship to transshipments"*. And *Dany Segev* from Tel-Aviv University presented *"The joint replenishment problem: Classical results and some recent Progress"*. These lectures presented new methodologies for dealing with classic *OR* problems, and inspired the attendees to explore new possibilities within their respective areas of interest.

ORSIS 2023 acknowledged exceptional contributions to the field of *OR* through a *prize ceremony and session*. Two individuals were honored for their impactful work.

Loay Mualem, a Ph.D. candidate from the University of Haifa, received the *Mehrez Prize* for excellent work of a graduate student in operations research, recognizing his paper *"Using Partial Monotonicity in Submodular Maximization"* (joint with *Moran Feldman*). This work contributes in improving approximation ratios for common machine learning applications, such as movie recommendation, quadratic programming, image summarization, and ride-share optimization.

▲ *Congrats! Loay Mualem* is receiving the prize from the committee members; from left to right: *Prof. Dvir Shabtay, Prof. Yael Perlman, Loay Mualem,* and *Prof. Gad Rabinowitz.*

Nicol Adler from the Hebrew University of Jerusalem was awarded the *Rothblum Prize* for an excellent work in operations research for her research *"Identifying Merger Opportunities: The case of Air Traffic Control"* (joint with *Ole Bent Olesen* and *Nicola Volta*). An application of the suggested model to the European air traffic control market is likely to lead to overall savings of around 3.3 billion dollars annually, of which approximately 82% is directly attributable to merger synergies!

▲ *Congrats! Prof. Nicol Adler* is receiving the prize and presenting her award winning research; from left to right: *Prof. Yael Perlman, Prof. Nicol Adler, Prof. Gad Rabinowitz*, and *Prof. David Perry.*

Apart from the plenary sessions, *ORSIS 2023* featured an exciting and diverse program through numerous *parallel sessions*. In total, 82 talks were given, divided across 23 parallel sessions, accommodating a wide range of topics and research interests. These sessions allowed researchers to present their latest findings, exchange ideas, and engage in constructive discussions. Such an inclusive approach ensured that the conference catered to the diverse needs of its participants.

The full two-day program and book of abstracts remains available at the conference website: https://www.orsis.org.il/conferences/recent-orsis-conferences

The first evening of *ORSIS 2023* featured a delightful social event that provided attendees with the opportunity to explore the charm of Tel Aviv. Participants enjoyed a guided city tour, immersing themselves in the local culture and history, followed by a delightful dinner at *Regina* restaurant, set in a breathtaking 19th-century Mediterranean building.

▲ Attendees enjoying the *city tour* during the evening event, and the *conference dinner venue* (*Regina* restaurant).

The Bar Ilan University organizing committee included *Prof. Yael Perlman* (Chair) together with *Prof. Tal Avinadav* and *Prof. Konstantin Kogan*.

SIAM CONFERENCE ON OPTIMIZATION SUCCESSFULLY HELD IN SEATTLE

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The *2023 SIAM Conference on Optimization* was held from May 31 to June 3 at *The Sheraton Grand Seattle* in Seattle, Washington, U.S. The conference was co-located with the *SIAM Conference on Applied and Computational Discrete Algorithms* (*ACDA23*). The conference was organized by a committee of renowned experts in the field of optimization: *Coralia Cartis* from the University of Oxford, UK, *Jeffrey Linderoth* from the University of Wisconsin, U.S., and *Katya Scheinberg* from Cornell University, U.S. The organizing committee members included *Amitabh Basu* (Johns Hopkins University, U.S.), *Güzin Bayraksan* (Ohio State University, U.S.), *Stefania Bellavia* (University of Florence, Italy), *Yu-Hong Dai* (AMSS, Chinese Academy of Sciences, PR China), *Dmitriy Drusvyatskiy* (University of Washington, U.S.), *Dorit Hochbaum* (University of California, Berkeley, U.S.), *Ruth Misener* (Imperial College London, UK), *Ali Pinar* (Sandia National Laboratories, U.S.), *Fred Roosta* (University of Queensland, Australia), *Johannes O. Royset* 9Naval Postgraduate School, U.S.), *Mikhail V. Solodov* (IMPA-Instituto de Matematica Pura e Aplicada, Brazil), and *Kim-Chuan Toh* (National University of Singapore, Singapore). The conference was sponsored by *Mosek, IBM* and *GUROBI Optimization*.

▲ Organizing Committee Co-chairs: *Jeffrey Linderoth, Coralia Cartis* and *Katya Scheinberg*, from left to right.

Participants could choose from a rich conference program that included more than 1000 contributions in 336 mini-symposiums and 108 contributions in 28 contributed presentation sessions, covering a wide range of foundational themes, such as conic and linear optimization, derivative-free optimization, game theory, and equilibrium problems, geometric perspectives in optimization, graphs and network optimization, integer optimization, nonlinear optimization, PDE-constrained optimization, polynomial and global optimization, stochastic and robust optimization, and variational inequalities and nonsmooth optimization. The application themes included optimization in machine learning, data science, health care, energy, control systems, quantum computing and imaging. Moreover, the conference offered eight plenary presentations, two minitutorials, one workshop, and two special events.

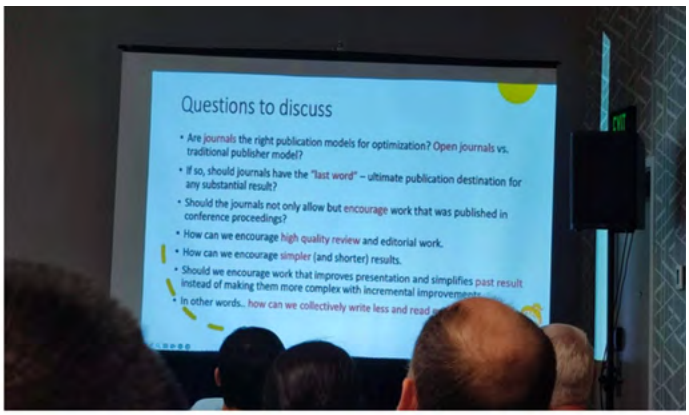
On the first day, the conference featured a joint plenary session with the *ACDA23* conference on the topic *"On the Optimization of Nonsmooth Problem without Generalized Derivatives"* delivered by *Andrea Walther* from Humboldt University Berlin, Germany. The talk was also an homage to *Andreas Griewank* who passed away in 2021. Seven plenary presentations were released from that day to June 3rd: *"Acceleration of First-order Optimization Algorithms via Damped Inertial Dynamics"* by *Hedy Attouch* from Université Montpellier II, France; *"Convex-Composite Optimization"* by *James V. Burke* from the University of Washington, U.S.; *"Towards a Taxonomy of All Pivot Rules for the Simplex Method"* by *Jesús A. De Loera* from the University of California, Davis, U.S; *"Exactness in Semidefinite Program Relaxations and Its Implications"* by *Fatma Kilinc-Karzan* from Carnegie Mellon University, U.S.; *"Optimization Over Probability Distributions"* by *Tong Zhang* from The Hong Kong University of Science and Technology, Hong Kong; *"Large-Scale and Data-Driven Markov Decision Processes"* by *Wolfram Wiesemann* from Imperial College London, UK; and *"Optimization Applications and Challenges across Amazon Operations"* by *Russell Allgor* from Amazon, U.S.

The two special events consisted of the award ceremonies of *2023 SIAG/OPT Best Paper Prize* and the *2023 SIAG/OPT Test of Time Award*. *Damek Davis* from Cornell University, U.S., and *Dmitriy Drusvyatskiy* from the University of Washington, U.S., were awarded by the *SIAM Activity Group on Optimization Best Paper Prize* for their paper, *"Stochastic Model-Based Minimization of Weakly Convex Functions"*, SIAM Journal on Optimization, Vol. 29, No. 1, pp. 207–239 (2019), which established convergence rates of a broad family of algorithms for the stochastic optimization of weakly convex functions. *Samuel Burer* from the University of Iowa, U.S., and *Renato D.C. Monteiro* from Georgia Institute of Technology, U.S., were awarded by the *SIAM Activity Group on Optimization Test of Time Award* for their paper, *"A nonlinear programming algorithm for solving semidefinite programs via low-rank factorization"*, Mathematical Programming Series B, No. 95, pp. 329-357 (2003), for its revolutionized computational methods for solving certain classes of large scale semidefinite programming problems.

▲ *2023 SIAG/OPT Best Paper Prize Award* to *Dmitriy Drusvyatskiy* and *Damek Davis* (left to right).

The conference also offered four minitutorials, including two parts on *"On the Role of Circuits in Linear Programming"* organized by *Daniel Dadush* from Centrum Wiskunde & Informatica, Netherlands, and *Bento Natura* from Georgia Institute of Technology, U.S., and two parts organized by Nicolas Boumal from EPFL, Switzerland on *"Optimization on Manifolds"*.

In addition, there was the workshop *"Women in Inverse Problems"* and a poster session organized by the *Association of Women in Mathematics* (*AWM*) aimed at facilitating professional networking and creating mentoring opportunities for women researchers. We also mention that there were three sessions *"Kurt-Fest!"* in honor of *Kurt Anstreicher*'s many contributions to the field of optimization and the *Optimization Community Discussion on the Future of Publication* whose purpose was to voice common issues related to the publication process in the optimization community.



Optimization Community Discussion on the future of publications.

Jacek Gondzio's talk. This slide is in memory of *Daniela di Serafino* who left us so early.

The full program with abstracts can be found here https://www.siam.org/conferences/cm/program/program-and-abstracts/op23-program-abstracts.

SIAG/OPT Test of Time Award to *Samuel Burer* and *Renato Monteiro* (left to right).

Overall, the *2023 SIAM Conference on Optimization* was a huge success, bringing together professionals and scholars from different areas to discuss in a friendly environment the most recent advancements and research in the optimization field. The conference offered a venue for networking, teamwork, and education in addition to presenting the most recent developments in optimization theory, algorithms, software, and applications.

The conference also offered opportunities for professional growth through mini-tutorials and seminars, as well as recognizing significant contributions to the area with the *Best Paper Prize* and *Test of Time Award*. In particular, we would like to express our gratitude to the entire Organizing Committee and Program Committee, and the entire on-site organization team for the superb and smooth organization of the conference. We anticipate equally enjoyable conference days in *OP26!*

TAKEAWAYS FROM CP, AI AND OR AND COMMUNITY FROM ENJOYABLE CPAIOR'23 CELEBRATED IN BEAUTIFUL NICE, FRANCE

Andre Cire <andre.cire@rotman.utoronto.ca>

The 20th anniversary edition of *CPAIOR*, the *International Conference on the Integration of Constraint Programming, Artificial Intelligence, and Operations Research*, was held from May 29th to June 1st, 2023, as an in-person event in Nice, France, at the Université Côte d'Azur, campus of Saint Jean d'Angely. The local organization was managed by *Prof. Jean-Charles Régin*, our conference chair.

Participants at *CPAIOR'2023*. This year the conference received more than 100 attendees from a large array of areas in artificial intelligence, machine learning, optimization, and constraint programming.

The aim of the conference is to promote a space where researchers from Constraint Programming (CP), Artificial Intelligence (AI), and Operations Research (OR) present innovative techniques, new applications, and original cutting-edge ideas, encouraging experts from one area to learn from the others.

Of particular interest to the conference are papers that integrate concepts and methodologies from these different fields, either proposing interesting new techniques for complex/practical problems or expanding our theoretical insights and cross-field understanding.

>> CPAIOR also welcomes high-quality original papers from a single area, strongly encouraging regular papers or experience reports showcasing CP/AI/OR techniques on challenging real-world applications.

The conference received a total of 95 submissions, including 71 regular papers and 24 extended abstracts. The regular papers reflect original unpublished work, whereas the extended abstracts contain either original unpublished work or a summary of work that was published in another venue. Each regular paper was reviewed by at least three Program Committee members in a single-blind process. The reviewing phase was followed by an author response period and an extensive discussion period carried out by the Program Committee. The extended abstracts were reviewed for appropriateness for the conference.

From left to right: *Jean-Charles Régin, J. Christopher Beck, Anton Korikov,* and *Andre Cire. Prof. Beck* and *Dr. Korikov* were the winners of the *Best Paper Award* at *CPAIOR'23*.

At the end of the review period, 32 high-quality regular papers were accepted for presentation during the conference and publication in this volume, and 11 abstracts were accepted for a short presentation at the conference. Examples of areas covered by *CPAIOR'23* papers included new methodologies in the interface between predictive and prescriptive pipelines, such as machine learning techniques applied to tackle optimization problems or smart predict-then-optimize approaches; novel relaxation and inference methods based on constraint propagation, mathematical optimization, dynamic programming, and decision diagrams for optimization; and new search perspectives involving branch-and-bound and decomposition strategies, such as sophisticated methods based on column generation and Benders.

In addition to the regular papers and extended abstracts, three invited talks were given by *Ivana Ljubić* (ESSEC Business School) on *"Bilevel Optimization Under Uncertainty: Challenges and Opportunities"*; *John Paul Dickerson* (University of Maryland, Arthur) on *"Robustness, Privacy, Fairness, and Credibility? Pushing the Boundaries of Economic Design with Deep Learning"*; and by *Rodrigo Acuna Agost* (Amadeus) on *"OR and AI Applications in the Travel Industry"*.

The conference program also included a Master Class on the topic of *"Transportation: New Frontiers in Practice and Theory*, organized by *Jean-Charles Régin*. The Master Class included invited talks by *Nicolas Isoart* (Zeloce), *Willem-Jan van Hoeve* (Carnegie Mellon University), *Arthur Finkelstein* (Instant System France), *Steven Gay* (Google Paris), and myself. The topics of the master class involved both theory of transportation and their applications in large-scale domains.

From left to right: *Jean-Charles Régin, Willem-Jan van Hoeve, Anthony Karahalios,* and *Andre Cire. Anthony* was the winner of the *Best Student Paper Award* at the conference, supervised by *Prof. van Hoeve*.

Of the regular papers accepted to the conference, the paper *"Objective-Based Counterfactual Explanations for Linear Discrete Optimization"* by *Anton Korikov* and *J. Christopher Beck* was selected for the Best Paper Award, and the paper *"Column Elimination for Capacitated Vehicle Routing Problems"* by *Anthony Karahalios* and *Willem-Jan van Hoeve* was selected for the Best Student Paper Award. The selection process was based on ranking and voting by the Program Committee members, paper scores, and extensive consultation with reviewers.

We acknowledge the local organizer, *Jean-Charles Régin*, and the generous support of our sponsors: Artificial Intelligence Journal (AIJ), Springer, Université Côte d'Azur, Laboratory I3S, Gurobi Optimization, Association for Constraint Programming (ACP), COPT GmbH, Groupe de Recherche Raisonnement, Apprentissage et Décision en Intelligence Artificielle (GRD RADIA), and Groupe de Recherche - Recherche Opérationnelle et Décision (GRD ROD).

The author, ***Prof. Andre Cire*** (University of Toronto), served as the Program Chair at *CPAIOR'23*.

NEWS FROM THE EURO WISDOM FORUM: SPRING/SUMMER EVENTS 2023

Annunziata Esposito Amideo <annunziata.espositoamideo@ucd.ie>, **Tatiana Tchemisova** <tatiana@ua.pt>
Paula Carroll <paula.carroll@ucd.ie>, **Dilek Gunnec** <dilek.gunnec@ozyegin.edu.tr>

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*.

Here, the members of the *WISDOM* board present the most important events organized by *WISDOM* during the first half of 2023.

EURO WISDOM Webinars

The main purpose of the *WISDOM* virtual webinars is to present the awardees of the *WISDOM Young Women for OR initiative* (*YW4OR*) and their research work to the *OR* community, and to use these thematic meetings to discuss the state of research in relevant areas of *OR*. As a rule, webinars are held via Zoom, and a subject matter expert is invited to comment on the *YW4OR* presentations and reflect on potential future research directions. Webinars are planned by the Events subcommittee under the guidance of the *WISDOM* chairs.

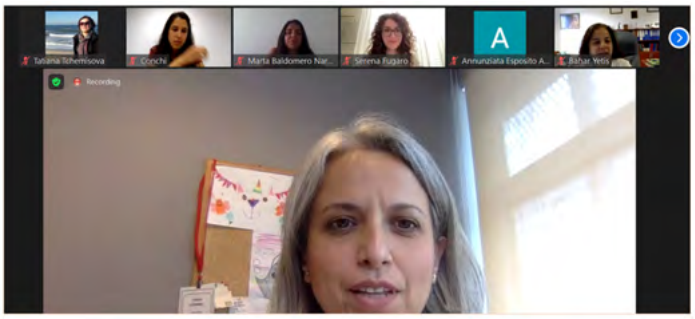
Game Theory Webinar

WISDOM hosted a webinar on Stochastic Optimisation and Game Theory on 25th April 2023. 40 participants heard short talks from *YW4OR* awardees *Dr Mirjam Mejer* (The value of supplier flexibility for single-sourced components in the high-tech industry), *Dr Ninja Soeffker* (Anticipatory decision making for stochastic dynamic vehicle routing) and *Dr Laura Davila Pena* (A Shapley value-based influence measure for classification problems). The webinar was moderated by *WISDOM* chair *Paula Carroll*, University College Dublin, Ireland. *Prof Immanuel M. Bomze*, University of Vienna, Austria gave an insightful overview on meeting the challenges in stochastic optimisation and game theory, and highlighted interesting future research directions related to the *YW4OR* talks.

Top row left to right: *Immanuel Bomze, Paula Carroll, Ninja Soeffker*; Bottom row left to right: *Mirjam Mejer, Laura Davila Pena*.

Location Webinar

WISDOM hosted a webinar on Location on 13th June 2023. Three *YW4OR* awardees *Dr. Marta Baldomero-Naranjo* (*"Upgrading edges in the maximal covering location problem"*), *Dr. Concepcion Dominguez* (*"The Cooperative Maximum Capture Facility Location Problem"*) and *Dr. Serena Fugaro* (*"Multi-Objective Covering Location Problems with advanced connectivity features and zonal requirements: Exact and Matheuristic approaches"*) presented their work. The webinar was moderated by *Dr. Dilek Gunnec* from Ozyegin University. *Prof. Bahar Yetis Kara* from Bilkent University stimulated thoughtful discussions and offered valuable insights to the awardees and the audience. Two of the *YW4OR* awardees (*Serena* and *Marta*) and *Prof. Yetis* met at the *ISOLDE XVI* and *EWGLA XXVII conference* in July 2023.



A screenshot of the Webinar. *Dr. Dilek Gunnec* moderating the webinar on Location on 13th June 2023.

YW4OR initiative and 2022 awardees

The YoungWomen4OR (YW4OR) initiative has arrived at its third occurrence in 2022-2023. The 2022 awardees are:

- *Marta Baldomero-Naranjo*, Universidad Complutense de Madrid, Spain,
- *Consuelo Parreño-Torres*, Valencia University, Spain,
- *Dang Thu Huong*, Lancaster University, The UK,
- *Maryam Karimi Mamaghan*, Vrije University of Amsterdam, The Netherlands,
- *Concepcion Dominguez*, Malaga University, Spain,
- *Serena Fugaro*, Institute for Applications of Calculus Mario Picone, Italy,
- *Mirna Gržanić*, University of Zagreb, Croatia,
- *Mariana Oliveira*, IST - University of Lisbon, Portugal,
- *Xishu Li*, Lancaster University, The UK,
- *Ninja Söffker*, University of Vienna, Austria,
- *Mirjam Meijer*, Kuhne Logistics University, Germany,
- *Laura Davila Pena*, University of Santiago de Compostela, Spain.

Their expertise is quite varied and ranges across: stochastic optimization and game theory, location analysis, routing and scheduling as well as sustainability and fairness. These macro-categories help in grouping the *YW4OR* as well as organizing dedicated webinars where they can showcase their research to the *OR* community while supported by a subject matter expert.

WISDOM at IFORS 2023

The *23rd Conference of the International Federation of Operational Research Societies*, *IFORS 2023*, took place at Santiago city, Chile from 10 to 14 of July 2023. Several *WISDOM* committee members participated in the conference, among them *Dolores Romero Morales* who presented the keynote lecture *"OR and the fight against biases in Machine Learning"*.

All *WISDOM* members, both those who were present at *IFORS 2023* and those who could not attend, are proud of the success of *Dolores*, as well as of *Ana Paula Barbosa-Póvoa*, who, together with her five co-authors, received the *2023 Best EJOR Paper Award* (*EABEP*) under the Innovative Applications of *OR* category for the paper *"Building disaster preparedness and response capacity in humanitarian supply chains using the Social Vulnerability Index"* (https://www.sciencedirect.com/science/article/abs/pii/S0377221720308924).

WISDOM member *Dr. Margaretha Gansterer* announcing the next *IFORS* conference in Austria in 2026.

On the last day of the conference, *Margaretha Gansterer* announced that the next *IFORS* meeting will take place in Austria in 2026.

Summer activities of WISDOM members

This summer, the members of the *WISDOM* forum actively participate in scientific meetings and conferences in different parts of the world, among them *IFORS 2023*, Santiago, Chile; *TSL Conference 2023* (*Transportation and Logistics Society Conference*), Illinois, USA; *Optimization 2023*, Aveiro, Portugal; *EUROPT 2023 Workshop* in Budapest.

Future events

By the end of the year, *WISDOM* plans to organize two further webinars to celebrate the *YW4OR* awardees, in September and November 2023. Keep an eye on the website for updates! The traditional virtual Winter Event this year will be a collaboration with other women in *OR* networks: The UK *OR* Society *WORAN* network, and the *INFORMS WORMS* group. It's on 15th December 2023 at 16:00 CET. Hold the date!

Join us at WISDOM

You can become a WISDOM ordinary member to hear more about the Forum's activities, and to support the WISDOM aims.

To become an ordinary *WISDOM* member, please complete this Google Form <https://docs.google.com/forms/d/e/1FAIpQLSeTWXBYSuCnMinDjhXu1g3aAphgSCBtWvAWFgAhiZ66URPWrQ/viewform>.

Keep in touch and follow EURO WISDOM via:
o Web: https://www.euro-online.org/web/pages/1654/wisdom,
o LinkedIn: https://www.linkedin.com/groups/12400031/,
o Twitter: https://twitter.com/euro_wisdom,
o Youtube: https://www.youtube.com/@euroWISDOMforum.

BOOK REVIEW

"BUSINESS DYNAMICS MODELS: OPTIMIZATION-BASED ONE STEP AHEAD OPTIMAL CONTROL"

By Eugenius Kaszkurewicz and Amit Bhaya

Advances in Design and Control,
Society for Industrial and Applied Mathematics, Philadelphia,
ISBN 978-1-611-97730-1 (paperback), ISBN 978-1-611-97731-8 (eBook),
https://doi.org/10.1137/1.9781611977318

OR - BUSINESS ANALYTICS – AN OPTIMIZATION-BASED OPTIMAL CONTROL APPROACH

Jinal Parikh <jinal.parikh@ahduni.edu.in>
Gerhard-Wilhelm Weber <gerhard-wilhelm.weber@put.poznan.pl>

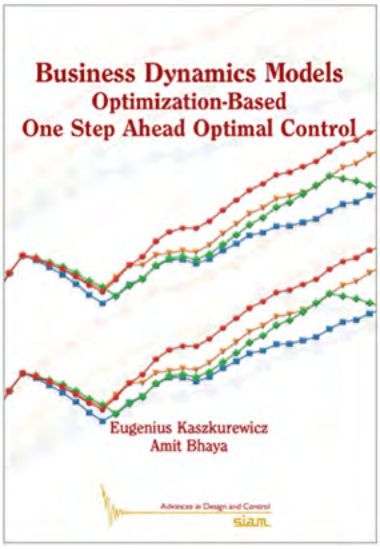
This book by *Eugenius Kaszkurewicz* and *Amit Bhaya* on the interface between (*i*) Business Dynamics and Control wherein business dynamics refers to a combination of business management and financial objectives embedded in a dynamical system model subject to a control, and (*ii*) *Optimization* by proposing an index (to be optimized in the short term [one step ahead]) which combines both management and financial concerns and, is computationally tractable at the same time, is an adroit attempt by its authors to weave the two strands of control and optimization into a systematic approach. It is written around a collection of examples that are illustrative and characteristic of the area of business dynamics, in which the control action and its effects are emphasized.

This book makes an extensive use of optimization and control tools, presenting one unifying idea or method, namely, one step ahead optimal control. More specifically, the central idea of this book is the concept of one step ahead optimal control and its global version, which is referred to as omniscient control and can be explained as follows. Given a performance criterion, myopic or greedy decisions are those taken on a short horizon, using the current value of the state and exogenous inputs to compute the best or optimal control with respect to the given performance criterion. The shortest horizon, in discrete time, is exactly one step ahead of current time and is the one that is used in this book. The computed control, which maximizes the objective function one step ahead, is then plugged into the dynamics to determine the next state. In the next step, the updated state, and the new exogenous input, which has just become available, are used to determine the new optimal control. This continues, step by step, until the final time is reached. One advantage of this repeated online optimization is its use of feedback, unlike conventional optimal control over a given horizon, which is peculiarly open loop. Dynamic programming-based solutions of optimal control problems can be put into feedback form in some cases but they otherwise suffer from dimensionality. Hence another significant advantage of the proposed one step ahead optimal approach is that it always has low computational complexity.

The solutions presented in this book are intended to provide a rationale for the use of optimal control and guidelines for further investigation into models which are more complex, have more parameters, and include more constraints. In this context, it is also possible to use the formulations presented in a so-called "flight simulator mode" to investigate different complex scenarios.

The examples presented in this book favor models that contain some realistic features, even if they are not conducive to the application of theoretical tools in order to establish analytical results.

Thus, the examples rely on an appropriate problem formulation and efficient modern optimization software to obtain numerical solutions, rather than analytical ones. Consequently, a suitable control or management philosophy is extracted from them wherever possible. The numerical examples are supplemented by numerous graphs so that the readers can easily comprehend and interpret the different dynamics and strategies described in this book.



▲ *OR - Business Analytics* - Optimization-based optimal control approach.

The book provides a modern programming environment (Jupyter notebooks in JuMP/Julia) for modeling, simulation, and optimization. Julia code and notebooks are offered on a website for readers to experiment with their own examples. The authors have also posted the code for all the examples in the book at https://bookstore.siam.org/dc40/bonus.

Though the models considered in this book are not intended to be fully realistic, they contain enough elements of the corresponding real-world problems which capture both their essential dynamics as also their important behavioral features. The authors use a formulation-algorithm-example approach, rather than the classical definition-theorem-proof approach, to make the material more understandable for its readers. The authors have graciously cited various scholarly research contributions in the "Notes and References" sections at the end of each chapter to provide to its readers, an in-depth review of the problems addressed in this book. This work is intended to cater to a diverse interdisciplinary audience having an interest in applied mathematics, business, and engineering.

A brief overview of the highlights of the chapters in this book follows:

Chapter 1 – An overview of some models in business dynamics gives brief verbal descriptions of the business dynamics models viz. - debt amortization, cash balance, dynamic trading, inventory control and management and market share dynamics under advertising, that have been described in the subsequent chapters and have been represented by discrete-time dynamical systems (also referred to as ordinary difference equations or recurrences).

▲ *Book authors* (left to right): *Professor Eugenius Kaszkurewicz* (Source: https://ieeexplore.ieee.org/author/37300748700) and Professor Amit Bhaya (Source: https://ieeexplore.ieee.org/author/37300745600).

Chapter 2 – Omniscient and one step ahead optimal control provides a formal description of the central idea of this book, explaining the concept of one step ahead optimal control and its global version, which is referred to as omniscient control.

Chapter 3 – The debt amortization problem with wealth maximization demonstrates the application of the one step ahead optimal control approach to various models of the debt amortization problem. It shows how the debt amortization problem can be formulated as an optimization problem, with a natural linear performance index, which is the total debt at any given instance. It typically shows that omniscient and one step ahead optimal control problems are both linear programming problems and therefore can be used by a decision maker who desires to drive a given debt to zero over a specified horizon and simultaneously has the objective of maximizing wealth over the same horizon made from one or more investment accounts.

Chapter 4 – The cash balance problem discusses the application of the one step ahead optimal control approach to determine the optimal way to make cash transfers to make negative current account balances positive, or transfer excess positive balances in the current accounts to investment accounts to obtain better returns, given an unknown cashflow sequence using mixed integer linear programming.

Chapter 5 – Dynamic trading demonstrates the application of the one step ahead optimal control approach using a simple model of the trading problem to address the basic question that – "At any given instant, since future asset prices are unknown, what decision making procedure should guide the trader in buying and selling assets?"

Chapter 6 – The inventory control and management problem formulates the inventory control and management problem for a single echelon supply chain as an omniscient optimal control problem, in which the demand is assumed to be known over the entire planning horizon. It goes on to formulate one step ahead optimal control version, which is realistic, in the sense that it does not assume that future demand is known. In both optimal control formulations, the objective is to maximize economic value added, which is a comprehensive performance index commonly used in business management.

Chapter 7 – Market share dynamics under advertising in monopolies examines business models that originate in the field of marketing science. This chapter revisits the Vidale-Wolfe model and a recent variant, in the context of achieving a target market share using one step ahead optimal control, which constitutes a closed-loop control in the context of the market share dynamics which are non-linear. >>

Chapter 8 – Competitive duopolies: market share dynamics under advertising shows that the one step ahead optimal control is applicable, and easily computable, in the discrete-time context, provided that the competition is assumed to occur according to a given procedure: for example, with firms alternating in the computation of their optimal actions. This chapter studies the Vidale-Wolfe-Deal model, as well as three more general models, in which advertising effort can affect both customers who are undecided as well as those who patronize the competing brand, using the one step ahead optimal control approach. The sections that follow describe the main ingredients of a discrete-time dynamic game.

Chapter 9 – Conclusions concludes with the authors' rationale behind writing this book, their detailed explanation of using the "one step ahead optimization-based optimal control" approach, followed by its advantages and applicability to various complex situations.

While this book vividly describes *OR Analytics through an optimization based one step ahead optimal control approach to business dynamic models* many further scientific, practical, and real-world applications may be further explored.

MISCELLANEOUS

IFORS FELLOWS

M. Grazia Speranza <grazia.speranza@unibs.it>

During the IFORS 2023 conference a number of exceptional events took place. One of these was the announcement and awarding of the IFORS Fellows.

The IFORS Fellows Award serves to recognize a distinguished individual's contribution to international operational research and its communities, and was established in 2020. Details about the nomination and selection process can be found on the IFORS web site.

An initial group of IFORS Fellows were chosen by the IFORS Administrative Committee and include the IFORS Presidents who led IFORS before 2020. Their names can be found on the IFORS web site.

In 2021, a committee, composed by the three former IFORS Presidents: Michael Trick (chair), Nelson Maculan and Dominique de Werra, identified the 2021 inductees and provided the motivation for the Award.

2021 inductees

Graham Rand: For transformational service to the international OR community, particularly in his role as Editor in Chief of International Abstracts in OR, in guiding IFORS in publication strategy as long-time chair of the publication committee, and in forming the initial IFORS Hall of Fame, and for developing the practical training of hundreds of students.

Tamás Terlaky: For his contributions to research in optimization and engineering applications and its dissemination throughout the world, particularly in Canada, the United States, and Hungary through conferences such as VOCAL and MOPTA.

Gerhard-Wilhelm Weber: For his tireless support of IFORS and its regional groupings through countless program committees, newsletters, and website and social media contributions and for his research contributions in optimization and finance.

Xiang-Sun Zhang: For his research in optimization and applications in biology, his role in the development of operations research in China and for his work in uniting China with the international OR community, most notably with his role in bringing the IFORS International Conference to China for the first time.

Ya-Xiang Yuan: For his research in numerical optimization and for his role in advancing the theory and practice of operational research in China and the international dissemination of that work particularly in linking China to Latin America.

M. Grazia Speranza: For her research in portfolio and transportation optimization and her significant roles as President of EURO and President of IFORS, with significant advances in both of those organizations during those terms.

A different committee, composed by M. Grazia Speranza (chair), Michael Trick and Nelson Maculan, identified the 2022 and the 2023 inductees.

2022 inductees

Hugh Bradley: For 40 years service to IFORS, in particular for the role of Editor of International Abstracts in OR, for the work as IFORS Treasurer and then IFORS Publications chief, and for the outstanding career as a practitioner and manager.

Jean-Pierre Brans: For the organization of the first European OR conference in Belgium, for having created new important EURO instruments as EURO President, for his service to IFORS as vice-president, and for his contributions to multicriteria optimization.

Michel Gendreau: For the service as vice-president of IFORS, for the international network of collaborations across the Americas, Europe, Asia and Oceania, and for the outstanding contributions to the theory and practice of OR.

Hans Ittmann: For the involvement in a variety of IFORS events, such as running the 2008 IFORS conference in South Africa, for being the IFORS News first editor and the many articles for it, and the work behind the scenes to spread OR round the world, especially across Africa.

David Schrady: For the exceptional contributions to IFORS in the role of Treasurer, for guaranteeing a secure financial future to IFORS and supporting the IFORS activities, and for the contributions to military operations research.

Roman Slowinski: For the role of coordinating Editor-in-Chief of the European Journal of Operational Research, the flagship journal of EURO, and for his outstanding scientific contributions to multicriteria decision making.

Helle Welling: For being engaged in the IFORS activities since 1970, for being IFORS Secretary from 1976 until 1997, for the valuable role at the Triennial Conference in Beijing in 1999, for always being there for the IFORS member societies and officers.

2023 inductees

Yu-Hong Dai: For the development of OR in the Asia-Pacific region, for the work as President of APORS and of the Operations Research Society of China, and for being an internationally outstanding scientist in the field of continuous optimization.

Karla Hoffman: For being a key member of the IFORS Administrative Committee for 10 years, for being involved in the organization of IFORS conferences, and for her scientific contributions to computational optimization.

Sue Merchant: For her strong commitment to the development of international OR, for being a former President of the OR Society of the United Kingdom, a former Vice President of IFORS, a key person for the advancement of AFROS (the African Federation of OR Societies).

The IFORS Fellow Award is a way for IFORS to express the gratitude of our community to the friends and colleagues who gave an exceptional contribution to the development of international operations research. On behalf of IFORS, thank you!

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