



CORS • SCRO

Canadian Operational Research Society

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## IN THIS ISSUE

Dear CORS members,

This is the last bulletin before the annual CORS conference in London, Ontario. Organizers Fredrik and Tiffany have some great things in store for attendees and their final conference promo is certainly worth the read. I look forward to seeing many of you in person in June.

You will also find details about this year's Harold Lardner award winner and a peek into the topic of her conference presentation.

We are fortunate to have a lot of interest in the CORS Council this year. This issue features the biographies and background of all 2024-2025 nominees.

Lastly there is some news from our Special Interest Groups and some insight into what's in store for them at the 2024 conference.

Cheers,

*Andrea*

### CORS Council

President  
Vice-President  
Secretary  
Treasurer  
Past President  
Councillors

Student Councillor  
Standing Committee Chairs

### Standing Committees

Awards  
Equity, Diversity, Inclusivity

Education and Student Affairs  
Membership  
Past Presidents Advisory Board

Program

Public Relations  
Publications

SIG Relations

### Ad-Hoc Committees

Practice Prize Competition  
Student Paper Competition

Award of Merit

Execution of Accounting System

Financial Planning

Industry

Micro Events

Nominating  
Students

Traveling Speaker Program

### Appointed Positions

INFOR Editor  
Bulletin Editor  
IFORS Representative

Samira Abbasgholizadeh-Rahimi  
Anjali Awasthi  
Majid Taghavi  
Gregory Paradis  
Peter Vanberkel  
Sibel Alumur Alev (22–24)  
Houra Mahmoudzadeh (22–24)  
Masoud Chitsaz (23–25)  
Saied Samiedaluie (23–25)  
Moirra MacNeil  
Nadia Lahrichi, Joe Naoum-Sawaya

Anjali Awasthi  
Samira Abbasgholizadeh-Rahimi  
Peter Vanberkel (co-chairs)  
Moirra MacNeil, Anjali Awasthi  
Nadia Lahrichi  
Saied Samiedaluie  
Peter Vanberkel  
Samira Abbasgholizadeh-Rahimi  
Anjali Awasthi  
Nadia Lahrichi, Fredrik Odegaard  
Sibel Alumur Alev, Felipe Rodrigues  
Joe Naoum-Sawaya, Andrea Friars  
Sibel Alumur Alev  
Sibel Alumur Alev, Saied Samiedaluie  
Houra Mahmoudzadeh  
Samira Abbasgholizadeh-Rahimi

Antoine Legrain  
Andre Ciré (Open)  
Fatma Gzara (Undergraduate)  
Peter Vanberkel, Taraneh Sowlati  
Louis-Martin Rousseau  
Jules Comeau, Gregory Paradis  
Peter Vanberkel  
Gregory Paradis, Peter Vanberkel  
Samira Abbasgholizadeh-Rahimi  
Anjali Awasthi  
Masoud Chitsaz  
Samira Abbasgholizadeh-Rahimi  
Majid Taghavi  
Houra Mahmoudzadeh, Masoud Chitsaz  
Saied Samiedaluie, Sibel Alumur Alev  
Peter Vanberkel  
Houra Mahmoudzadeh  
Samira Abbasgholizadeh-Rahimi  
Nadia Lahrichi, Moirra MacNeil  
Peter Vanberkel

Joe Naoum-Sawaya  
Andrea Friars  
Majid Taghavi

## CORS COUNCIL

CORS Council consists of the officers of the society, four councillors, the immediate past president, and the standing committee chairs. Contact information for council representatives is below. See the CORS website for a complete listing.

President	Samira Abbasgholizadeh-Rahimi, McGill University, <a href="mailto:president@cors.ca">president@cors.ca</a>
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Standing Committee Chair	Joe Naoum-Sawaya, Ivey Business School, <a href="mailto:jnaoum-sawaya@ivey.ca">jnaoum-sawaya@ivey.ca</a>

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## PRESIDENT'S MESSAGE

Dear CORS Members,

This is my last bulletin message as President as my term is nearing its end. I am proud of our achievements over the past year. We've had a transformative year in advancing Equity, Diversity, and Inclusion (EDI) within our society, establishing and launching the first EDI survey, award and fund within CORS. As we move forward, I remain confident in our society's dedication to deepening these initiatives, ensuring that excellence, equity, diversity, and inclusion continue to be the bedrock of our society's growth and evolution. Our journey is far from over, and I am excited to see how much further we can go together.

I am very excited about our CORS annual conference which will take place in a few weeks in London, Ontario. The conference organizing committee has put together a fantastic program and are tirelessly working to make sure everything runs smoothly, aiming for a successful conference.

We'll have a fantastic plenary talk on various topics including AI and applied OR in healthcare, many competitions, and events such as student events (including NextGen CORS!), CORS+Industry Day, the Canadian Healthcare Optimization Workshop (CHOW), and Grants and Funding Information Sessions that will be presented by NSERC and Mitacs representatives. As announced previously, Professor Pinar Keskinocak will be giving the Harold Larnder Memorial Lecture this year. In brief, lots of new and exciting initiatives planned for CORS 2024 and do not forget to register if you have not done so!

I am also happy to share that our CORS 2025 conference will take place in Edmonton, Alberta. The Organizing Committee includes Saied Samiedaluie, Borzou Rostami and Armann Ingolfsson. If you are interested in being involved in CORS 2025, please reach out to the organizing committee.

Lastly, I would like to thank CORS Council members, competition chairs and judges, conference organizers, SIGs/sections/chapters, INFOR editors/reviewers, volunteers, and all who have been involved in CORS activities, for their tremendous efforts, commitment and making it all happen.

Looking forward to seeing you all at the CORS 2024 in London, Ontario, in just a few weeks!

Best,  
Samira A. Rahimi





## CORS 2024 London, June 3–5, 2024

DoubleTree Hilton Hotel, London, Ontario

[CORS2024London.ca](https://CORS2024London.ca)

### An Interview with the CORS 2024 London local organizers Fredrik Odegaard (General Chair) and Tiffany Bayley (Program Chair)

[Andrea Friars, Editor CORS Bulletin; AF] — So, Fredrik and Tiffany, we are mid-April now, and less than two months to the CORS conference, how is the planning coming along?

[Fredrik Odegaard; FO] — Yeah, good, good. We have most things lined up but still a million loose things to get sorted and settled. All major things are taken care of, like the venue, the tracks, AV, food, the program schedule. Right Tiffany?!

[Tiffany Bayley, TB] — Yes, by and large the schedule is under control. We received over 250 abstract submissions. In addition, we have several standing sessions, such as the various student paper competitions, the practice prize competition, the plenary, and so on. We are still making some adjustments, but I would say we are 97+ percent there.

[AF] — That is great to hear. What are you two most excited about?

[TB] — Ah, for me, I am really looking forward to the various teaching sessions and student events. We have some really cool student and Post-Doc focused events which I hope people will appreciate. For instance, we are hosting **academic and industry job market panels** and **several networking opportunities** for students and Post-Docs. We also have the **Master Class on Case Teaching**, hosted by our great colleagues Kyle Maclean and Scott Loveland, which I am positive people will get lots out of. In addition, I believe for the first time, we are hosting a **High-School event aimed at grade 11 and 12 students**. So, lots of cool and interesting student- and teaching-focused activities. Check out the details on the conference website.

[FO] — Yeah, I also think those sessions and events are going to be fantastic. While I am excited about, basically, everything, I guess the two things that I am two epsilon more excited about are the plenary talks and — of course — the Tuesday banquet. We have some **really, really great plenary speakers lined up**, which I strongly encourage everyone to attend. And then, what would a CORS conference be without the Banquet? **The Tuesday banquet** is for me always the highlight, where we get to celebrate the various award recipients and competition winners, but also more generally get together and celebrate the end of yet another academic year and, after some impromptu and stochastic pub visits, bid each other “great-to-see-you-again-have-a-fantastic-summer-and-see-you-next-year-in\_\_\_\_\_”. However, don’t forget we still have an entire day left of the conference which people should definitely not miss out on. **The Wednesday program is fully stacked**.

[AF] — Yes, I have heard that there might be some early morning physical activities planned for Wednesday morning?!



[FO] — Indeed! Last year in Quebec, as you know since you were there, a group of us went on a morning run-jog together. And so, Tiffany and I thought we would extend the “**CORS Running Club**” and organize a run on the Wednesday morning. We will meet in front of the hotel at 7:00am’ish and go for a leisurely 5km run along the Thames River.



***Fredrik Odegaard trialing menus for the CORS banquet.***

[TB] — London actually has some really nice trails, so for those who are into running, definitely bring your sneakers and we can give suggestions on where to go. Some are a bit of a trek from the hotel but there are lots of walking and bike paths up and down the Thames that are nice too.

[AF] — Speaking of London, what hidden gems do you have to share?

[TB] — Oh, lots of different and fun things. There are **cafes and plenty of microbreweries**. I would just encourage everyone to venture out on a random walk and see what they find. The main “pub street” is called **Richmond Row** and is basically just a few blocks from the conference hotel. But there are also other fun “watering holes” scattered around.

[FO] — London actually has quite the **vibrant music and art scene**. There are lots of music venues like **London Music Hall and the Aeolian Hall**, and of course pubs will have live music. If you are into local and “unknown” music, then I would recommend you search what is going on and, as Tiffany said, venture out. In addition, there is the **Museum London** which has cool exhibitions (and where Steve Martin has been known to visit to get his Group of Seven fix). There are also quirky murals all over town. But one hidden, and definitely oversights, gem, would be the Hockey Hall of Fame affiliate.



There is actually a free — free as in free beer — **local Hockey Hall of Fame exhibition**. It is located inside the Via Rail train station, which is a 10-minute walk from the conference venue. Do make sure to check it out!

[TB] — And of course, London is where Sir Frederick Banting perceived the idea for insulin. The house where he lived and the bed where he dreamed up the incredible notion is located about 20-minute walk from the conference hotel. It is now a museum and open to the public. Just search up **Banting House**. If you are a Healthcare researcher, then this arguably is a must-visit.

[AF] — Well, it all sounds great, and I look forward to seeing you both in person again. Thank you so much for your time and good luck wrapping it all up.

[TB] — Thanks, can't wait to see you in June!

[FO] — Yes, likewise Andrea. Lastly, I want to give a shout-out to all CORS members who have registered. And to those that still have not, do not miss out on the OR event of the year! **Register at: [CORS2024London.ca](https://cors2024london.ca)**



*Tiffany Bayley exploring options for a CORS social event.*

## HAROLD LARNDER PRIZE

### Pinar Keskinocak

#### Georgia Institute of Technology



Pinar Keskinocak is the William W. George Chair and Professor in the School of Industrial and Systems Engineering and the co-founder and Director of the Center for Health and Humanitarian Systems at Georgia Institute of Technology. Dr. Keskinocak's research is focused on the applications of quantitative methods and analytics to improve health and humanitarian systems. Her team has extensive experiences in disease modeling (including malaria, polio, Guinea Worm disease, Covid-19, pandemic flu, depression, asthma), evaluating intervention strategies, resource allocation, and collaborations with a variety of governmental and non-governmental organizations and healthcare providers, including American Red Cross, CARE, Carter Center, CDC, Children's Healthcare of Atlanta, Emory Healthcare, Grady Hospital, and Task Force for Global Health. Dr. Keskinocak is a Fellow of INFORMS (The Institute for

Operations Research and Management Sciences) and served in various service roles, including as the 2020 president of INFORMS.

### Operations Research for Infectious Disease Prevention, Control, and Eradication

Advances in medicine and public health contributed significantly to infectious disease prevention and control; however, infectious diseases still continue to pose a significant risk to human health and wellbeing, impacting millions of people around the world with adverse outcomes. Operations researchers can play a significant role in combatting infectious diseases, especially when interventions need to be planned and deployed under limited resources and other constraints. Examples of how operations research and analytics can be used in infectious disease prevention, control, and support efforts towards eradication will be presented.





## CORS Membership

***It's time to renew your CORS membership for the period 1 April 2024 to 31 March 2025.***

***Renewal notices were emailed to members. Fees are due now.***

You may be able to use an NSERC grant to pay membership dues for yourself and your graduate students.

Please renew your membership on the CORS website.

For more information, email [members@cors.ca](mailto:members@cors.ca)

## CORS DIPLOMA

The CORS Diploma is awarded by the Canadian Operational Research Society, in association with participating Canadian universities, to recognize CORS members who have successfully completed a program of study which has included significant exposure to operational research in the following areas: OR techniques, probability and statistics, computers and systems, and applications of OR. The objective of the Diploma is to encourage students to pursue an educational program in the field of operational research and to recognize their achievement in successfully completing such a program. It benefits the university by highlighting the fact that a student can gain significant exposure to operational research through a particular course of study offered at that university. It benefits CORS by encouraging students to pursue a career in OR and by attracting new members.

**For more information, see the CORS website.**

## FUNDING OPPORTUNITIES

### Traveling Speaker Program (TSP)

The Traveling Speaker Program enables local sections to bring OR practitioners and researchers in Canada as speakers to their local events. To keep costs in line while maximizing the CORS national profile, CORS sponsorship will be limited to 50% of the total expenses, up to a maximum of \$500 per speaker or \$1000 for a single event (conference, workshop). Other expenses can be covered by the local section. The program of the event must acknowledge the contribution of CORS. The president of the local section must contact the TSP Coordinator to obtain approval for funding at least one month in advance of the event date. Payment will be made by the CORS Treasurer upon receipt of the Expense Form.

The president of the local section fills out the application form on the CORS website and submits the form to the TSP Coordinator Peter Vanberkel ([pastpresident@cors.ca](mailto:pastpresident@cors.ca))



## NOMINEES FOR 2024–2025 CORS COUNCIL

### President

#### **Anjali Awasthi**

Concordia University

Dr. Anjali Awasthi is Full Professor and Concordia University Research Chair (Tier-II) in Connected Sustainable Mobility Systems at Concordia Institute for Information Systems Engineering (CIISE), in Concordia University, Montreal. She received a PhD in industrial engineering and automation from INRIA Rocquencourt and University of Metz, France and a Masters in Industrial and Management Engineering from IIT Kanpur, India. Prior to Concordia, Dr. Awasthi worked at University of British Columbia and University of Laval where she was involved in several projects on industrial applications of operations research. In France, she was involved in many European projects aimed at improving urban mobility in cities, city logistics and on cybernetic transportation systems. Her areas of research are modeling and simulation, data mining, Information Technology and decision making, sustainable logistics planning, quality assurance in supply chain management and sustainable supply chain management. She is the author of several books, journal and conference papers on these topics. Dr. Awasthi has served as the Education Chair for CORS (Canadian Operations Research Society) and a senior member of ASQ (American Society for Quality). Presently, she is the Vice President of CORS, an associate of LSRC (Loyola Sustainability Research Center), a regular member of CIRRELT (Centre Interuniversitaire de Recherche sur les Reseaux d'Entreprise, la Logistique et le Transport), and a member of applied AI (Artificial Intelligence) Institute. She received the newsmaker of the week award in 2019. She is also the recipient of Eldon Gunn service award (CORS 2018, Halifax) and IEOM Special Recognition Award (4th North American Conference on Industrial Engineering and Operations Management, Toronto, 2019).



### Treasurer

#### **Kent J. Kostuk**

Engcomp

Kent J. Kostuk is a Senior Business Consult with Engcomp. He is a civil engineer with interest in decision analysis, sports analytics, logistics, simulation, and project management. He has over 20 years of hands-on experience working in logistics operations and has taught undergraduate classes in engineer economics and operations management and graduate classes in Decision Analysis. Kent has an MSc and PhD in Civil Engineering from the University of Saskatchewan and MS in Engineering-Economic Systems from Stanford. He was the conference co-chair for CORS 2019 in Saskatoon and co-founded the Saskatoon Chapter of CORS with Winfried Grassmann.





**Councillor (2024–2026)**

**Ana Maria Anaya-Arenas**

Université du Québec à Montréal

Ana María Anaya-Arenas is an associate professor in Operations Management at the Université du Québec à Montréal Business School (ESG-UQAM). She obtained her PhD from Université Laval in Québec (Canada), her MSc Recherche is in Industrial Engineering from the École Nationale d'Ingénieurs de Metz (France) and her BSc in Industrial Engineering is from the Universidad Industrial de Santander (Colombia). She is mainly concerned about the planning, design and optimisation of the logistic networks and distribution decisions in humanitarian and healthcare settings. Ana María's latest work focuses on fairness in distribution, network design with time dependencies, as well as efficient modelling and resolution approaches for real-life distribution challenges. Her research has been funded by various organizations including Fonds de recherche du Québec — Sciences Nature et technologie (FRQNT), the Natural Sciences and Engineering Research Council (NSERC) and the Ministère de l'Économie, de l'Innovation et de l'Énergie du Québec (MEIE). Ana María leads a research group in Optimization for Healthcare (Opt-Santé), and she is an active member of the Centre de recherche sur l'intelligence<sup>2</sup> en gestion de systèmes complexes (CRI2GS) and the Centre interuniversitaire de recherche sur les réseaux d'entreprise, la logistique et le transport (CIRRELT). She has served CORS as a member of the EDI Committee since 2023.



**Councillor (2024–2026)**

**Salimur Choudhury**

Queen's University

Dr. Salimur Choudhury leads the GOAL (Global Optimization, Analytics, and Learning) Research Group. He joined Queen's University in January 2023. His primary research interest is designing algorithms (Classical, AI, and Quantum Algorithms) for optimization problems in networking, health care, and natural resource management. Manuscripts based on his research work have been published in several top-tier conferences and journals. He has received several research grants from government agencies (NSERC-DG, NSERC Alliance, MITACS Accelerate, NOHFC, NOAMA, NRCan, etc.), not-for-profit, and private industries (a few of them are based in Kingston, ON). Several solutions proposed by his research group have already been adopted by industries and government agencies. Dr. Choudhury is the recipient of the Lakehead University Research Excellence Award (2021) for his research and scholarly contributions in the area of combinatorial optimization.





**Councillor (2024–2026)**  
**Eman Almehdawe**  
University of Regina

Eman Almehdawe is an Associate Professor of Operations Management at the Hill-Levene Schools of Business at the University of Regina. She has been serving as the Associate Dean of Research and Graduate Programs since 2022. She earned her B.Sc. in Industrial Engineering from the University of Jordan and her Masters and PhD in Management Sciences from the University of Waterloo, Canada. Dr. Almehdawe's research interests include management sciences and operations management, supply chain management, healthcare decision models, decision support systems, and queueing theory. She has published research papers in Operations Research journals such as the European Journal of Operational Research, International Journal of Operational Research, and Omega, among others. She is a professional engineer in Saskatchewan (APEGS) and a member of INFORMS, CORS, and MSOM. Her current research projects are funded by the Natural Sciences and Engineering Research Council of Canada (NSERC) and Mitacs.



**Student Councillor (2024–2025)**  
**Danielle Ripsman**  
University of Waterloo

Danielle Ripsman is a Ph.D. Candidate in the Department of Management Science & Engineering at the University of Waterloo, studying under Dr. Houra Mahmoudzadeh. She obtained her MASc at the University of Waterloo in Management Sciences (2018) and BASc at the University of Toronto in Industrial Engineering (2016). She intends to graduate and attend Rotman as a Post Doc in the fall. From a research perspective, Danielle is interested in the intersection of large-scale optimization and visualization methods. She has mostly focused on healthcare applications, particularly focusing on radiation therapy treatment planning. Danielle enjoys spreading the word about OR to anyone that will listen, from high school students to fellow colleagues. She has held leadership positions in the Operations Research Challenge (TORCH) — a competition for high school students — as well as numerous local CORS/SCRO student chapter roles, ranging from web developer to student chapter president. She is looking forward to taking on her new role as the 2024/25 CORS/SCRO Student Councillor.





## 2024 PRACTICE PRIZE COMPETITION FINALIST PROJETS

### Efficiency Gains in the Health Sector Through Data-Driven Patient Scheduling: The Case of Paediatric Rehabilitation Services

Pervasive capacity issues plague pediatric speech-language therapy globally, causing long wait times. Delayed treatment impacts learning and social skills. Partnering with KidsAbility, we focus on operational strategies to increase throughput, such as reducing cancellation rates, to mitigate wait times. We show that reducing the booking horizon from 12 to 3 weeks decreases last-minute cancellations by 8% and increases resource utilization by 7.5%, equivalent to 22,000 extra visits annually. Reductions in cancellation variability also enable the exploration of strategies such as overbooking.

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Director of Research and Innovation  
KidsAbility Centre for Child Development

#### Summary:

This study examines the impact of data-driven patient scheduling on the efficiency of pediatric rehabilitation services, focusing on the speech-language therapy (SLT) program at KidsAbility.

KidsAbility is the largest Children's Treatment Centre in the Region of Waterloo and County of Wellington, serving approximately 17,000 children annually. With the high prevalence of speech-language disorders (SLDs) in Canadian children (7-10%), early treatment is crucial to ensure positive long-term outcomes relating to learning and social skill development. However, long wait times are endemic in publicly funded health services. This research investigates operational modifications that can increase effective treatment capacity within existing resource constraints. Specifically, we show



how the appointment booking window can be leveraged to reduce last-minute cancellations and no-shows, increasing total system throughput. The booking window refers to the organization- established horizon over which clinicians can book appointments, whereas an appointment's lead time is the actual gap between when it was booked and when it occurs.

Firstly, the positive correlation between appointment lead time and cancellation likelihood is investigated and established. Descriptive statistics are used to develop a general understanding of the relationships between lead time, temporal and geographic factors, and last-minute cancellation rates. These descriptive statistics informed subsequent econometric modelling of appointment cancellation probabilities using probit models. We use the results of these models, specifically the established positive association between lead times and cancellation probability, to inform subsequent analytical work.

A queueing control model is developed to understand the impact of lead time and booking window, on system throughput. We note, analytically, that for different cancellation probabilities (as a function of booking window shapes), the optimal booking window changes significantly. Based on the empirical results, we estimate that the likelihood of cancellation is concave in relation to lead time (and thus the booking window). Applying this observation to the proposed queueing model, we estimate that the optimal booking window is roughly four weeks.

Based on the aforementioned analytical and numerical results, a reduction of the booking window from 12 to 4 weeks was proposed and implemented. This policy change resulted in an absolute decrease in the weekly last-minute cancellation rate of 3.052%, which is a relative reduction of 23.172%.

Extrapolating the results across the range of pediatric services the organization offers demonstrates an increase in effective treatment capacity equivalent to hiring four full-time clinicians, which would incur annual operating costs of \$240,000 to \$445,000. These findings suggest that operational adjustments to scheduling can yield substantial gains in service capacity in publicly funded health organizations.



## Scheduling and routing of home care services with periodic visits and time windows – A case study

This study addresses the scheduling and routing problem faced by Personal Support Workers (PSWs) at Nucleus Independent Living, a service provider in Toronto. The objectives were to minimize travel and idle times, reliance on outsourced PSWs, discontinuity of care, and maximize adherence to clients' preferred visit times. We employed an efficient multi-objective evolutionary algorithm to solve the problem. Validated with actual data from Nucleus, our solution approach has proven effective in optimizing the objectives, thereby offering valuable insights for the management of home care services.

### Author information

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Peyman Varshoei, PhD candidate  
Jonathan Patrick, Full Professor  
Onur Ozturk, Associate Professor

Nucleus Independent Living (Client organization)  
Oliver Blunn, Chief Operating Officer at Nucleus

### One-Page Summary:

**Project Overview:** This project addresses the complex scheduling and routing challenges faced by Personal Support Workers (PSWs) at Nucleus Independent Living, a Toronto-based home care provider. The aim was to enhance operational efficiency and care quality by optimizing PSW assignments to meet client needs while adhering to logistical constraints.

**Objectives:** The primary objectives were to minimize travel and PSW idle time, maximize continuity of care, reduce reliance on outsourced PSWs, and minimize violation of clients' preferred visit times. Achieving these objectives involved balancing conflicting requirements, such as efficiency versus personalization of care.

**Methodology:** We employed a modified version of the Non-dominated Sorting Genetic Algorithm II (NSGA-II) complemented by novel route creator procedures. This approach allowed for extensive exploration and diversity in solution generation, tackling the multi-objective, NP-hard combinatorial nature of the problem.

### Challenges and Innovations:

- **Multi-objectivity:** The conflicting nature of the objectives required a sophisticated approach to balance trade-offs, achieved through the NSGA-II algorithm.
- **Complex Constraints:** Constraints included PSWs' work hours, clients' time preferences, and continuity of care needs.
- **Algorithm Customization:** Custom modifications to the NSGA-II algorithm and the creation of a unique route generation procedure tailored the solution to the specific complexities of home care service logistics.



**Results:** Implementing our solution led to significant improvements:

- Reduction in average travel and idle times for PSWs.
- Increased continuity of care, with more consistent PSW-client pairings.
- Decreased reliance on outsourced PSWs, enhancing service continuity and reducing costs.
- Better adherence to clients' preferred visit times, improving client satisfaction.

**Best Practices:**

- **Customized Algorithmic Solutions:** Adapting the NSGA-II algorithm for PSW scheduling highlights the value of tailored solutions in managing complex logistical challenges effectively.
- **Real-World Testing:** Implementing and testing the algorithm with actual data from a home care provider ensured the solution is practical, allowing for iterative improvements based on real-world performance.
- **Managing Trade-offs:** Balancing competing objectives such as minimizing indirect times and maximizing continuity of care requires a flexible, dynamic approach to optimize multiple outcomes simultaneously.
- **Automation of Scheduling:** Automating complex scheduling tasks reduces manual labor significantly, leading to greater operational efficiency and reduced costs.
- **Enhancing Workforce Satisfaction:** Aligning work schedules with PSW availability and reducing idle time improves job satisfaction, demonstrating the importance of considerate workforce management.
- **Client-Centric Services:** Prioritizing service delivery within clients' preferred time windows and ensuring continuity of care greatly increases client satisfaction.
- **Insights for Management:** The project offers valuable operational insights, aiding data-driven decision-making and policy development to optimize resource allocation and service delivery.





## Store-specific planogram optimization

In retail, planograms are plans that indicate the placement of products on fixtures within each aisle. These are created by experts for a group of stores, and then require some adaptation in each store to account for local variations (assortment, aisle geometry, forecast). We propose a novel data-driven algorithm to create store-specific planograms. From an OR perspective, this problem belongs to the family of 2D bin packing problems with complex constraints and objectives. Deployed at Canadian Tire since 2023, the algorithm can reduce in-aisle replenishment costs between 10% and 50%.

Philippe Grangier, Louis-Philippe Bigras, Sayed Ibrahim, Nabila Remli, Adrien Rimélé, Yossiri Adulyasak, Maxime Cohen, Andréa Lodi, Louis-Martin Rousseau

### Abstract

In brick-and-mortar retail, a planogram is a diagram that indicates the placement of products on fixtures within an aisle. Planograms are key to positive customer experience (ensuring products are easy to find) and to managing operational cost (providing more space to high-selling products means less frequent in-aisles replenishment is required). In a retail chain, planograms are typically:

- Created at a group of stores level by experts called visual merchandisers,
- Used by store personnel when setting up an aisle.

Because these generic planograms are designed for a group of stores, they do not match each store's reality regarding demand, dimensions, and assortment. Thus, store personnel must interpret them, which is time-consuming, requires experience, and often leads to suboptimal aisle configurations.

In this project, conducted in partnership with Canadian Tire, a large retailer with over 500 locations, we propose a novel data-driven algorithm to create store-specific planograms starting from reference national planograms called *protopogs*. More specifically, our algorithm creates a planogram for a given store and aisle that minimizes replenishment trips by tailoring the *protopog* to the store. From an operations research perspective, this problem belongs to the family of 2D knapsack problems. Important aspects to consider include the tradeoff between operational efficiency and *merchandising rules*, ensuring that the aisle is both visually appealing and easy to navigate for customers (e.g., ensuring that the flow of products is well aligned with the shopper's decision process). Our approach is centered on dynamic programming (DP), with an a priori enumeration filtered with MIP, and a final quadratic problem to make the spacing more harmonious.

A few key learnings from this project:

1. Merchandising constraints are really key to real life shelf planning, as shown in this project and a few recent articles
2. Supporting fixtures (especially pegboards) beyond only shelves is very important in practice: about one third of the products at Canadian Tire are not being sold on shelves. Our algorithm proposed a first generic approach for shelves, baskets, crossbars, pegboards and specialty fixtures.
3. Potential savings for a metric representing replenishment effort (a partial measure of store operational cost) are above 15% on average, and up to 50% for certain aisles

This algorithm is embedded within a web application launched to the Canadian Tire network in 2023. It has seen a good adoption and is central to the future of merchandising at this retailer.



## SPECIAL INTEREST GROUPS

A SIG provides a mechanism to promote CORS, the SIG area, and the SIG members, as well as the opportunity for CORS members with common interests to interact and network.

### **Analytics SIG**

Gregory Paradis, [cors.analytics.sig@01101.io](mailto:cors.analytics.sig@01101.io)  
University of British Columbia  
[www.cors.ca/SIG/Analytics](http://www.cors.ca/SIG/Analytics)

### **Energy, Environment, and Sustainability SIG**

Fuzhan Nasiri, [fuzhan.nasiri@concordia.ca](mailto:fuzhan.nasiri@concordia.ca)  
Concordia University

### **Forestry SIG**

Krishna Teja Malladi, [malladi.kt@gmail.com](mailto:malladi.kt@gmail.com)  
University of British Columbia  
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### **Health Care Operational Research SIG**

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### **Queueing and Applied Probability SIG**

Yichuan Ding, [daniel.ding@mcgill.ca](mailto:daniel.ding@mcgill.ca)  
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### **Teaching and Learning SIG**

Tiffany Bayley, [tbayley@ivey.ca](mailto:tbayley@ivey.ca)  
Ivey Business School  
[www.cors.ca/SIG/Teaching](http://www.cors.ca/SIG/Teaching)

### **Transportation and Logistics SIG**

Sibel Alumur Alev, [sibel.alumur@uwaterloo.ca](mailto:sibel.alumur@uwaterloo.ca)  
University of Waterloo  
[www.cors.ca/SIG/Transportation](http://www.cors.ca/SIG/Transportation)

If you would like to join a SIG, contact the people listed above, or indicate when you renew your CORS membership. CORS encourages members with common interest in an area within or related to operational research to form additional SIGs. More information can be found on the CORS website.

If you are interested in forming a SIG in a particular area  
contact Anjali Awasthi ([vicepresident@cors.ca](mailto:vicepresident@cors.ca))



## SIG NEWS

### Queueing and Applied Probability SIG

The CORS Queueing and Applied Probability SIG Student Paper Competition Committee is delighted to announce the selection of three outstanding finalists, listed in alphabetical order:

1. Angela Kohlenberg, Northwestern University, "The Cost of Impatience in Dynamic Matching: Scaling Laws and Operating Regimes"
2. Shanshan Luo, University of British Columbia, "Mass Vaccination Scheduling: Trading off Infections, Throughput, and Overtime"
3. Jangwon Park, University of Toronto, "Dynamic Transfer Policies for Parallel Queues"

The winner will be revealed in the session "Queueing and Applied Probability SIG Student Paper Competition", at the CORS Annual Conference taking place in London, ON, from June 3–5, 2024. The winner will receive a \$200 prize, while the two remaining finalists will each be awarded \$25.

The 2024 CORS Queueing and Applied Probability SIG Student Paper Competition Committee consists of Prof Ming Hu (chair), Prof Yang Li and Prof Hossein Piri.

### Teaching and Learning SIG

CORS 2024 is fast approaching and we're looking forward to seeing you in London, ON!

Join us on Tuesday, June 4 for a tutorial from Matthew Drake, Associate Professor of Supply Chain Management at Duquesne University, where he'll share his insights on Developing and Publishing Effective Pedagogical Resources for Teaching Analytics.

And be sure to attend the Teaching and Learning SIG meeting where we'll announce the next Vice-President (President Elect). Voting will take place online before the conference. A link will be sent to all Teaching and Learning SIG members, with voting opening May 1, 2024, and closing on May 22, 2024.



## MEETINGS AND CONFERENCES

### Business Meetings

31 May 2023	Meeting #1, Montreal
29 Sep 2023	Meeting #2, Teleconference
24 Nov 2023	Meeting #3, Toronto
26 Jan 2024	Meeting #4, Teleconference
15 Mar 2024	Meeting #5, Teleconference
19 April 2024	Meeting #6, Teleconference, Financial Planning Committee
2 June 2024	Meeting #7, Conference
3 June 2024	Meeting #8, Conference, SIGs, Sections, Chapters
4 June 2024	Meeting #9, Conference, CORS AGM

### CORS Annual Conferences

3–5 June 2024	Annual Conference, London, Ont.
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### WWW Conference Listings

CORS: [www.cors.ca/?q=content/cors-annual-conferences](http://www.cors.ca/?q=content/cors-annual-conferences)

INFORMS: <https://www.informs.org/Meetings-Conferences>

IFORS: [www.ifors.org/web](http://www.ifors.org/web)

Netlib Conference Database: <ftp://ftp.cc.ac.cn/netlib/confdb/Conferences.html>

SIAM: [www.siam.org/meetings/calendar.php](http://www.siam.org/meetings/calendar.php)

POMS: <https://pomsmeetings.org>

EURO: [www.euro-online.org/web/pages/460/calendar](http://www.euro-online.org/web/pages/460/calendar)



## THE NEXT ISSUE

The next issue of the Bulletin will be published in **August**. Contributions to this issue, especially news on the activities of local sections or CORS members, should be submitted by **26 July 2024** to:

Andrea Friars  
Editor, CORS Bulletin  
Email: [AndreaFriars@gmail.com](mailto:AndreaFriars@gmail.com)

The preferred method of submission is by an MS Word attachment to an email.

## CORS BULLETIN TRANSLATION POLICY

Items that are CORS business will be translated into English and French. All other items will be published in the language in which they are submitted.

## CORS BULLETIN ADVERTISING POLICY

Ads cost \$120 per page, proportional for fractional pages. Logos and prepared layouts can be accommodated. This fee also includes distribution of the advertisement on the CORS Mailing List. Direct inquiries to the Editor.

## CORS MAILING LIST

As a benefit of membership, members may use the CORS Mailing List to transmit messages, announcements, and job postings to the entire membership or to a targeted subgroup such as a local section. For example:

- messages regarding the activities and business of the society
- announcements about conferences, conference sessions, special journal issues, seminars, or other activities if these are related to operational research in its broadest sense
- job postings of general interest to CORS members

The Mailing List is not used for commercial purposes, and all messages are vetted before they are sent out. To submit items to the Mailing List, please email [members@cors.ca](mailto:members@cors.ca)

For non-members, a fee of \$60 is charged for the distribution of job postings and other announcements or messages of interest to the CORS membership.



The **Canadian Operational Research Society** was founded in 1958. Its goal is to advance the theory and practice of OR and to stimulate and promote contacts between people interested in the subject.

**Publications:** A quarterly scientific journal called *INFOR* and a news *Bulletin*.

**Meetings:** An annual national conference with an award ceremony, occasionally organized jointly with an international society (IFORS, INFORMS), and numerous local events organized by local sections.

**Local Sections & Chapters:** CORS has 12 local sections located throughout Canada and six student chapters.

**Awards and Prizes:** CORS presents the following annual awards and prizes at its conference:

**Award of Merit** for significant contributions of a present or past member of CORS to the profession of OR.

**Harold Larnder Award** to an individual who has achieved international distinction in OR.

**Omond Solandt Award** to an organization, private or governmental, that is deemed to have made an outstanding contribution to OR in Canada.

**Practice Prize** for the challenging application of the OR approach to the solution of applied problems.

**Eldon Gunn Service Award** for outstanding contributions of time and service to the society.

**Student Paper Competition** to recognize the contribution of a paper either directly to the field of OR through the development of methodology or to another field through the application of OR.

**Equity, Diversity, and Inclusion Excellence Award** to recognize outstanding commitment and achievements in advancing equity, diversity, and inclusion within CORS.

**Equity, Diversity, and Inclusion Event Fund** to support initiatives that actively promote and celebrate equity, diversity, and inclusion within the CORS community.

**Student Member Leadership Award** in recognition of exemplary leadership in service to the Society as a student member.

**Graduate Student Funding:** CORS encourages attendance of graduate students at its conference by providing partial funding. Visit the CORS website for details.

**CORS Diploma:** This diploma is awarded to students graduating from a university curriculum comprising several OR courses. Criteria can be found on the CORS website.

**Membership Directory:** An online directory of CORS members is available as a membership benefit.

**To join CORS:** Go to the CORS website and join online by credit card using the form found under membership or complete the PDF application form found on the CORS website and mail it with payment to the address below.

**Fees:** Member \$110; Retired Member \$55; Student Member \$45 (including post-doctoral researchers)

**Website:** <https://www.cors.ca>

**Twitter:** [https://twitter.com/CORS\\_President](https://twitter.com/CORS_President)

**INFOR:** <https://www.tandfonline.com/loi/tinf20>

**LinkedIn:** <https://www.linkedin.com/company/canadian-operational-research-society>