WCTR2023: 16th World Conference on Transport Research
Montreal, Canada, from July 17 to 21.

Summary Report

By Keren-Or Grinberg-Rosenbaum

In July 2023, I had the honor of presenting my paper at 16th World Conference on Transport Research, held in Montreal, Canada, from July 17 to 21. The paper titled "Best Of Both Worlds: System Thinking Approach for Transportation Data-Driven Decision-Making" was co-authored along with my PhD supervisors: Prof. Yoram Shiftan (TECHNION - Israel Institute of Technology, Israel) Prof. Francisco Camara Pereira (Technical University of Denmark, Denmark) and Dr. Bat Hen Nahmias-Biran (Ariel University, Israel). I presented the article in a 20min presentation as part of Session G3-S8: Public Transport, chaired by Silvio Nocera IUAV University of Venice, Italy.

Our paper presented the Hybrid Dynamical Systems Thinking Approach (HDSTA) we developed, using systems thinking for causality interface implementation for data-driven decisions in transportation. HDSTA provide guidelines on how different parties as experts, data scientists, and Transport Management Centers (TMCs), can work together to define a knowledge graph for the transportation system model. The outputs, a graphical and text description, serve (1) experts in choosing and defining the variables' cause-effect relationship; (2) ML modelers in defining a causal function; (3) TMCs in making data-driven decisions for the benefit of the public.

This application of system thinking is of great interest of Smart Transportation System operators that want to use data to understand its complex dynamics and make their decisions accordingly. While there is an increase in accessible data, current methods suffer from various gaps: traditional statistical methods are limited in processing new types of data, and often impose strong constraints (e.g., parametric function form, linearity); traditional transportation engineering methods (as simulation models) often come with heavy computational complexity; and Machine Learning (ML) tools tend to rely on statistical associations. Defining causal knowledge from the transportation domain for ML models can potentially overcome those gaps; however, it is done implicitly without a formal framework.

For a first-time attendee, WCTR2023: 16th World Conference on Transport Research was a great opportunity for me to both be exposed to fellow researchers from dozens of countries worldwide, and to understand the challenges they face focusing on my research topics. The conference guests of honor stated the important need for data, knowledge, and interdisciplinary decision-making tools to build the world of tomorrow, which were addressed in my article.

During the conference I attended many lectures, and participated a walking tour of Montreal's Saint-Henri neighborhood discovering projects and infrastructures that promote pedestrians' accessibility. Starting at the Lionel-Groulx Metro station, this immersive tour took us through the vibrant streets, back alleys and parks of this lively and surprising community, where we witness the transformation of urban spaces, encouraging a more active and engaging way of experiencing the surroundings while improving people's overall.

The WCTR2023 was inspiring for me. The session gave me the opportunity to present my approach to dozens of researchers worldwide giving me both feedback and ideas for study-cases to apply it. I connected with fellow PhD scholars for future research collaborations.

I am grateful to the Israeli Smart Transportation Research Center for supporting my participation in WCTR2023 conference and highly recommend applying the next one held in 3 years.