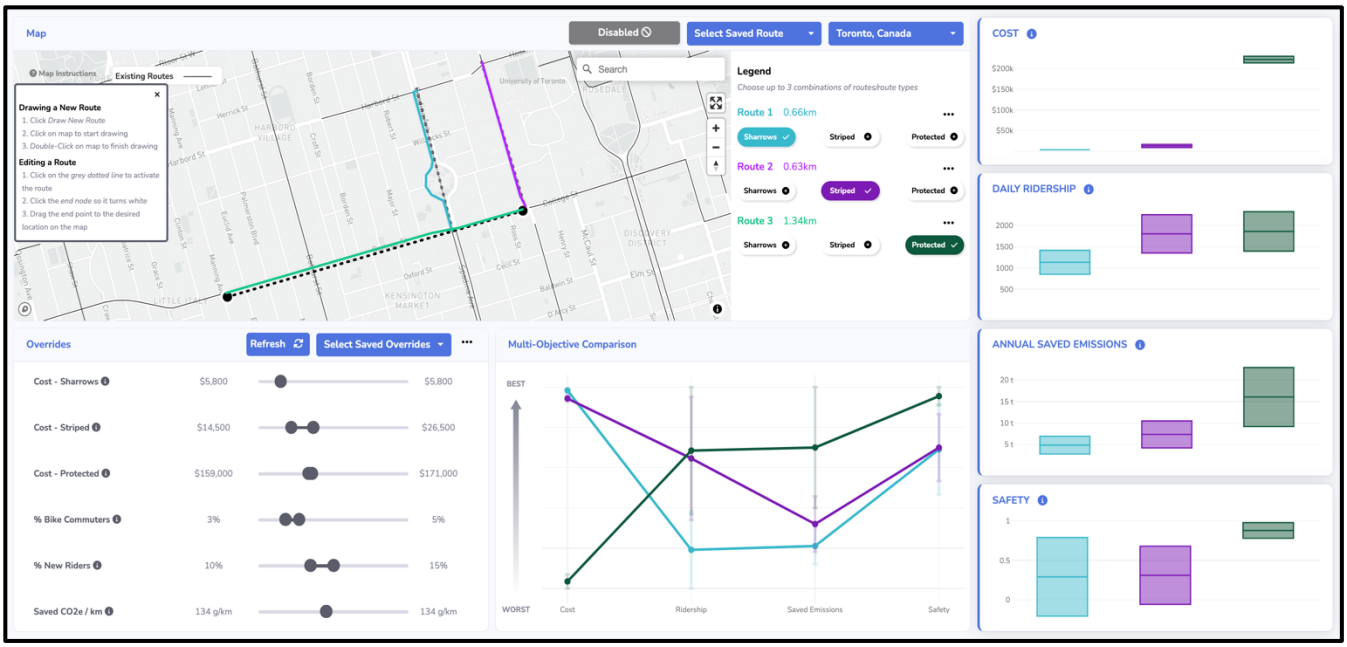

Switching Gears: A Comparison Tool Reshaping How Cities Plan Bike Routes

Client: Mott MacDonald
Team Members: Maria Papadimitriou, Danielle Page, Margaret Tkatchenko, John Volpatti
Supervisor: Professor Scott Sanner

Need for a Decision Support System to Plan Future Bike Lanes in Toronto

Mott MacDonald advises the City of Toronto on various infrastructure projects, including the planning and construction of new bike lanes. Currently, comparing potential bike lanes is a manual, time-consuming and un-standardized process. Mott MacDonald was looking for a tool that will allow them to compare various lane locations and types and make decisions under uncertainty. One of the primary motivators for building bike lanes is to decrease the carbon footprint by reducing the reliance on cars, however, there is a multi-objective trade-off to consider between reduction of emissions, cost, potential future ridership and rider safety.

Interactive Tool for Multi-Objective Comparison Between Potential Bike Lanes

The Bike Route Comparison Tool is a web-based application built in JavaScript, HTML, CSS and Python. It uses Mapbox and OpenStreetMaps APIs for the display map where users can view current bike lanes in Toronto and draw potential bike lanes for comparison. Once a user draws bike lanes and selects the type (sharrows, stripped or protected), the tool calculates the length, cost, projected ridership, saved emissions and estimated safety of the lanes to inform the user's decision. These values, along with their systematic uncertainty, are generated based on models developed with guidance from Mott MacDonald and displayed in interval plots. In addition, users can override any of the constants, such as unit prices or percent ridership, used in the models if more accurate data becomes available to them. Finally, a multi-objective graph provides users with a holistic comparison amongst bike lanes across all metrics, supporting them to make a more informed decision. Through iterative usability testing, the interface was developed to optimize the user's experience based on human factors design principles. In comparison to the current methods used by Mott MacDonald, this tool allows for faster, more efficient comparison through a standardized process supported with visual aids and information about uncertainty.