# MISSION BRIEF

## Context

Urban centers face increasing pressure from growing populations, rising vehicle usage, and the urgent need for sustainability. Traffic congestion in cities like Toronto affects daily lives, from the efficiency of public transportation to the environmental toll of emissions. Your challenge is analyzing and optimizing traffic flow to improve transportation efficiency, safety, and sustainability.
As future engineers, data analysts, and problem solvers, you will harness real-world traffic data and cutting-edge tools to craft innovative solutions. This isn't just about fixing traffic—it's about shaping the future of smart cities and sustainable transportation systems.

## Your Mission

Your team has been recruited to tackle one of the most pressing urban challenges: transforming Toronto's transportation system into a smarter, more efficient, and environmentally friendly network.
Working with real-world traffic datasets, you will act as data scientists, urban planners, and innovators. Your mission will be to uncover insights, identify bottlenecks, and design actionable recommendations for one or more of the following objectives:

1. Optimize bus routes:
   - Improve route performance and reduce delays using data-driven insights.
   - Identify under-performing transit corridors and propose enhancements.
2. Reduce Congestion:
   - Analyze traffic patterns to highlight peak congestion times and locations.
   - Propose solutions like traffic light retiming or alternative routes.
3. Enhance Sustainability:
   - Evaluate the environmental impact of traffic emissions.
   - Suggest sustainable measures such as integrating bike lanes or increasing public transit accessibility.
4. Improve Public Safety:
   - Assess risk areas for pedestrians and cyclists.
   - Propose safety-focused interventions such as better crosswalks or dedicated bike lanes.

## Objectives

1. Understand the Problem: Dive deep into the dataset, including traffic volumes, intersection counts, and time-based trends. Identify areas of concern such as bottlenecks, delays, or safety risks.
2. Analyze and Explore: Use Excel and other data visualization tools to uncover meaningful patterns. What are the busiest intersections? When does congestion peak? Where can the bussing routes system be optimized?
3. Design Data-Driven Solutions: Develop actionable recommendations based on your findings. Think creatively—how can you balance efficiency, safety, and sustainability?
4. Present Your Vision: Deliver your findings in a compelling presentation. Use visual aids like heat maps, flow charts, and predictive graphs to showcase the impact of your solutions.

## The Impact

Your insights have the power to transform urban transportation. Identifying and addressing inefficiencies in the bussing system and traffic flow could help reduce commute times, enhance public safety, and lower environmental impact. Imagine your recommendations influencing city planners, inspiring innovations in urban mobility, and setting a precedent for smarter, greener cities.

This is more than a competition—it's an opportunity to demonstrate how data, creativity, and teamwork can make a real difference. Are you ready to step into the role of urban innovators and take on the challenge? The future of Toronto's transportation network is in your hands. Let's make every journey smoother, safer, and smarter. The road to innovation starts now.

## Finalized Outline for the University Section of I4's Case Competition

### Competition Overview

- **Audience**: University students focused on transportation optimization.
- **Date & Time**: March 8th, 10 AM - 6 PM.
- **Objective**: Use real-world Toronto traffic data to analyze congestion patterns, optimize traffic systems, and develop actionable solutions.
- **Deliverables**:
  - Data analysis presentation with visualizations.
  - Prototype or model demonstrating the solution.
  - Recommendations addressing sustainability impacts.

### Detailed Event Timeline with Deliverables

**10:00 - 10:30 | Registration & Check-In**

- **Tasks**:
  - Teams check in and receive materials: name tags, schedules, and deliverables outline.
  - Volunteers guide participants to designated breakout rooms.

**10:30 - 11:00 | Opening Ceremony**

- **Activities**:
  - Welcome and introduction by the MC.
  - Overview of competition structure, judging criteria, and deliverables.
  - Introduction of mentors, judges, and panelists.

**11:00 - 11:30 | Challenge Release**

- **Tasks**:
  - Explanation of the university challenge:
    - Analyze and optimize traffic systems using data-driven techniques.
  - Deliverables explained:
    - Data analysis summary with charts or graphs.
    - Presentation slides detailing findings and recommendations.
    - Optional prototype (e.g., flow map, traffic tool).

**11:30 - 1:00 | Dataset Familiarization and Initial Data Analysis**

- **Objective**: Understand dataset structure and identify key focus areas.
- **Tasks**:
  - Dataset review:
    - Examine data columns (e.g., vehicle counts, time intervals, intersections).
    - Choose a focus area (e.g., congestion hotspots, emissions).
  - Initial data exploration in Python/Excel:
    - Filter data for key intersections, routes, or time intervals.
    - Visualize basic trends using tools like Pandas and Matplotlib.
- **Checkpoint**:
  - Teams finalize their project focus and present preliminary data filters.

**1:00 - 1:30 | Lunch Break**

- Networking with peers, mentors, and panelists over a catered lunch.

**1:30 - 3:30 | Advanced Data Analysis and Solution Development**

- **Objective**: Perform deeper analysis and propose data-driven solutions.
- **Tasks**:
  - **Data Analysis**:
    - Identify congestion patterns, peak traffic times, and modal differences.
    - Develop heat maps or flow diagrams for visual insights.
  - **Solution Development**:
    - Use analysis results to suggest improvements:
      - Retiming traffic signals.
      - Adding bike lanes or optimizing bus routes.
    - Integrate sustainability considerations (environmental, economic, societal impacts).
- **Checkpoint**:
  - Teams have initial recommendations with visual evidence (e.g., charts or maps).

**3:30 - 4:00 | Panel**

- **Objective**: Explore advanced strategies and innovative ideas for solution implementation.
- **Tasks**:
  - Incorporate insights into refining prototypes or models.
  - Prepare for sustainability impact assessments.

**4:00 - 5:00 | Final Touches and Presentation Preparation**

- **Objective**: Finalize all deliverables for submission.
- **Tasks**:
  - Compile findings into a cohesive presentation:
    - Key insights from data analysis.
    - Recommendations for traffic system optimization.
    - Sustainability impact assessment.
  - Rehearse for the final presentation with mentor feedback.
- **Checkpoint**:
  - Teams submit presentations.

**5:00 - 6:00 | Final Presentations**

- **Format**:
  - Each team presents for 5–7 minutes, followed by Q&A.
- **Deliverables**:
  - Key insights, visuals, and actionable recommendations in a presentation.
  - Optional: Prototype demonstration.