From:	Brandon Orr
To:	councilmeeting; Mayor Tory; Luke Robertson
Cc:	bern@urbanroboticsfoundation.org; Adam Bell
Subject:	My comments for 2021.IE26.12 on December 15, 2021 City Council
Date:	December 16, 2021 6:37:58 PM
Attachments:	2021-12-16_MUD_Commentary_TMIG_URF.pdf

To the City Clerk:

Please add my comments to the agenda for the December 15, 2021 City Council meeting on item 2021.IE26.12, Automated Micro-Utility Devices - Accessibility Feedback

I understand that my comments and the personal information in this email will form part of the public record and that my name will be listed as a correspondent on agendas and minutes of City Council or its committees. Also, I understand that agendas and minutes are posted online and my name may be indexed by search engines like Google.

Comments: I am Brandon Orr and I am the mobility planning lead for the Municipal Infrastructure Group (TMIG) which is a local engineering consulting firm in the GTA. I have previous experience managing pedestrian modelling guidelines for Metrolinx, as well as have contributed to micromobility and transportation master plans across North America. I am submitting a commentary on Urban Robotics in Toronto based on our ongoing mobility planning work and industry observations. The slides were prepared in collaboration with the Urban Robotics Foundation (URF) which is currently working on the ISO 4448 standards for Micromobility Utility-Devices (MUDs). We believe there is a pathway that can foster a positive collaboration between current MUD operators so that the issue can be effectively studied, and policy developed to balance public concerns related to MUDs today and in the future. Our attached slides provide a high-level commentary on current opportunities, trends, and some recommendations on how the city could navigate the concerns and opportunities while avoiding a ban.

TMIG
A T·Y·LIN INTERNATIONAL COMPANY

URF Urban Robotics Foundation

Commentary on Urban Robotics in Toronto

City of Toronto

DECEMBER 17, 2021

TMIG
A T·Y·LIN INTERNATIONAL COMPANY

URF Urban Robotics Foundation

- The Municipal Infrastructure Group Ltd. (TMIG), was established in 2003 and has more than 120 local professionals and staff in Ontario. TMIG is now part of T.Y. Lin International (TYLI) which is a top 35 globally recognized full-service infrastructure consulting firm committed to providing innovative, cost effective, constructible designs. With more than 3,000 employees working in offices throughout the Americas, Europe and Asia, the firm leads projects of varying size and complexity.

- The Urban Robotics Foundation brings together municipal, accessibility, planning, logistics, and robotics experts to create standards, guidelines, and certification methods to ensure that robotic passenger and goods systems are creating value for cities and their people. Currently, URF is developing the ISO 4448 series, a standard that sets the parameters and procedures for automated motor vehicles at the curbside, and the movement of robotic service vehicles within pedestrian spaces.

AGENDA

1 // DEFINING THE CONCERN

2 // ABOUT TINY MILE

3 // CURRENT OPERATING SPECS

4 // OPPORTUNITIES & TRENDS

5 // RECOMMENDATIONS

1

DEFINING THE CONCERN

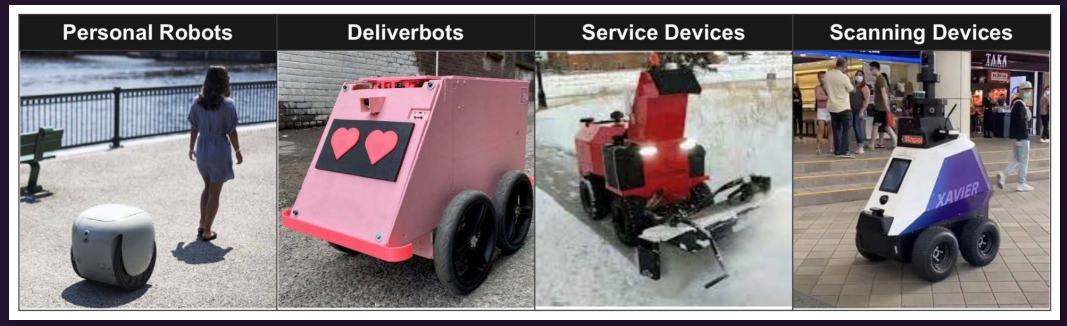
DEFINING THE CONCERN

1. What is happening? - Toronto City Council will be voting on whether to prohibit the use of automated micro-utility devices on sidewalks and cycle tracks, prohibit the parking, storing, or leaving of automated micro-utility devices on highways or sidewalks, and prohibit the stopping of automated micro-utility devices in a cycle track.

2. What is being recommended? - This recommendation comes from the Infrastructure and Environment Committee meeting on December 2 that made the recommendation based on *concerns related to the safety impacts of automated micro-utility devices on sidewalks and cycle tracks*, particularly for residents with accessibility needs. However, no staff report has been provided and reviewed.

CURRENT REGULATIONS

- Province: The Ministry of Transportation, Ontario (MTO) is proposing a Provincial Pilot Program under the *Highway Traffic Act* for automated Micro Utility-Device (MUDs).
- Impacts of Provincial Pilot: The regulatory framework limits weight, width, speed, and mandates signals, lights, brakes, and operator oversight. This will help inform the international standards currently being developed for MUDs (ISO 4448).
- Impact of a local City of Toronto ban: Limits the ability to study and assess how to best use the technology to serve Torontonians in collaboration with citizens so that the benefits and disbenefits can be quantified to mould policy.



Source: City of Toronto

2

ABOUT TINY MILE

TINY MILE // ABOUT

AREA OF OPERATIONS:

- Downtown Toronto - From Bathurst St to Broadview Ave and from Bloor St to Lake Shore Blvd.
- No history of collision/accidents reported within the 100,000km+ covered to date

PRICING:

- $1 per kilometer
- Lower commission than other local food delivery companies (UberEats, DoorDash etc.) which contribute to vehicular traffic and cycling incidents on our local roads

ADVANCING CLIMATE CHANGE OBJECTIVES:

- Tiny Mile delivery robots are powered by electric batteries reducing the amount of GHGs emitted per delivery compared to vehicular courier.

3

CURRENT OPERATING SPECS

CURRENT OPERATING SPECS (Deliveries)

CONTROL

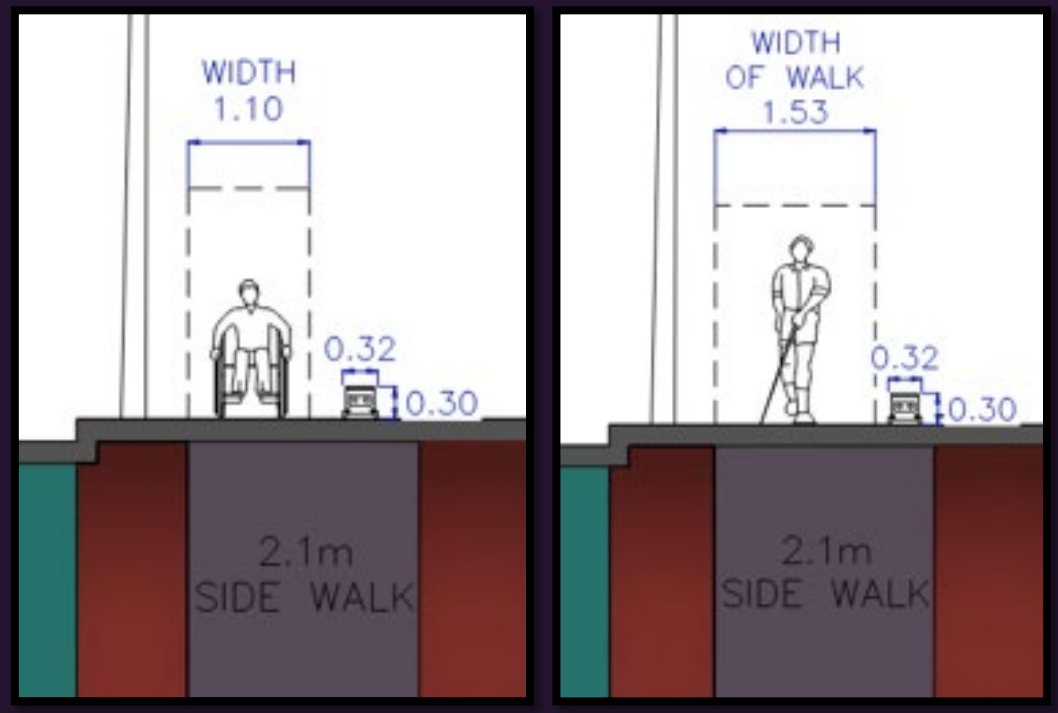
- Controlled by a human operator under strict supervision to ensure maximum safety

SPEED

- The robot can cover 1.0 km in 15 minutes, or approx. 4.0 km/h
    - Avg. walk speed is approx. 4.3 km/h

SIZE

- Cargo dimensions are:
    - Length = 36cm
    - Width = 32cm
    - Height = 30cm
    - Weight limit of 5kg



- Minimum Pedestrian Clearway Width on sidewalk from City of Toronto Engineering & Construction Services Standard Drawing T-310.010-10
  - Minimum dimensions for person with a disability as per Toronto Accessibility Design Guidelines
- ***sidewalk robot added by TMIG for visual comparison purposes**

VISIONZERO

- The City of Toronto's **Vision Zero** goal is to:

> "Eliminate all fatalities and serious injuries on city streets to create a safe and healthy city"

- The Tiny Mile robots have covered over *100,000 kilometers* with no collisions, accidents or complaints reported.

COLLISIONS IN 2020

0

268

Vehicular (fatalities and serious injuries)

32

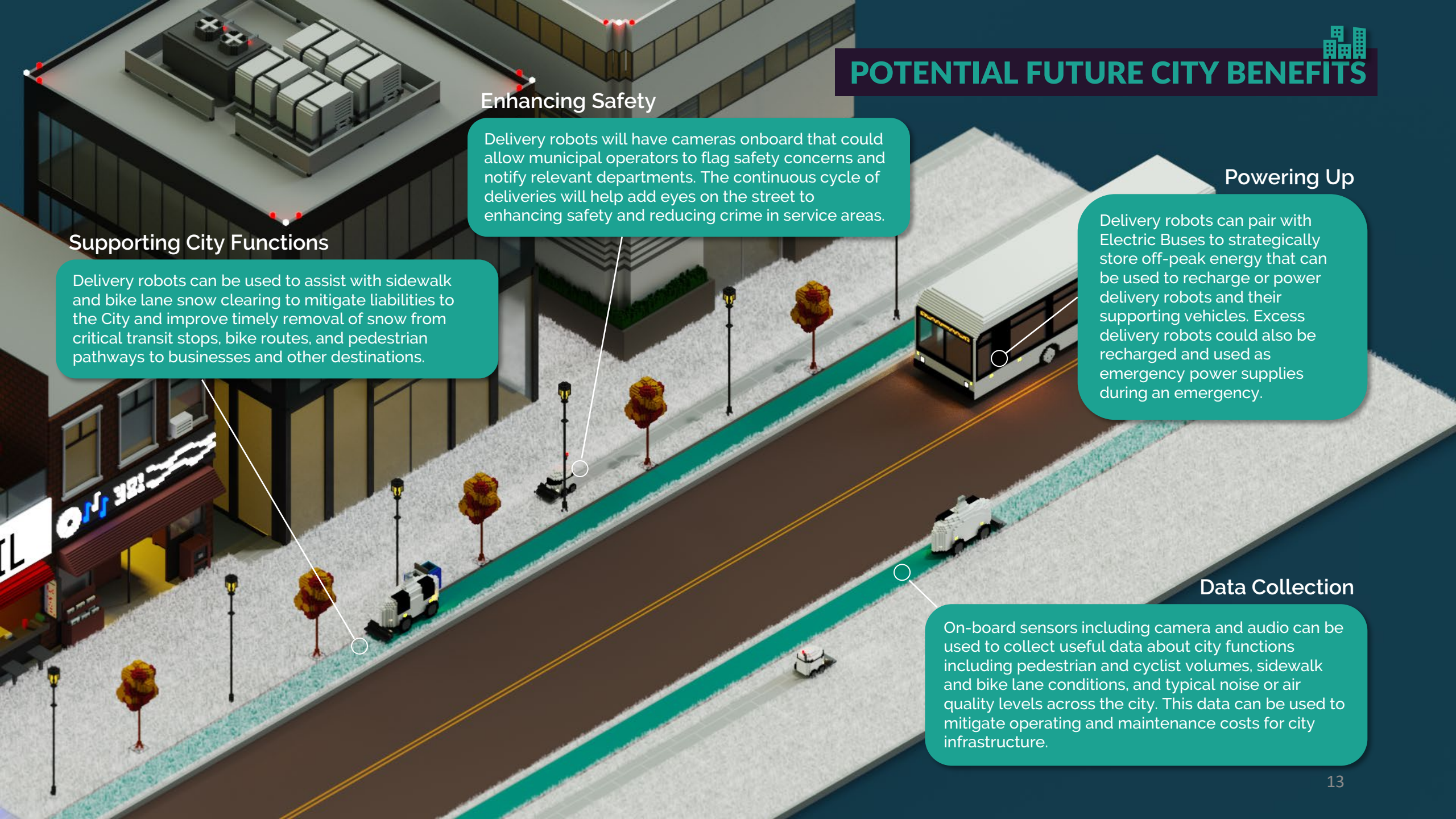
Collisions

Sources:
https://tinymile.ai/
https://data.torontopolice.on.ca/pages/ksi

4

OPPORTUNITIES & TRENDS

POTENTIAL FUTURE CITY BENEFITS



Enhancing Safety

Delivery robots will have cameras onboard that could allow municipal operators to flag safety concerns and notify relevant departments. The continuous cycle of deliveries will help add eyes on the street to enhancing safety and reducing crime in service areas.

Supporting City Functions

Delivery robots can be used to assist with sidewalk and bike lane snow clearing to mitigate liabilities to the City and improve timely removal of snow from critical transit stops, bike routes, and pedestrian pathways to businesses and other destinations.

Powering Up

Delivery robots can pair with Electric Buses to strategically store off-peak energy that can be used to recharge or power delivery robots and their supporting vehicles. Excess delivery robots could also be recharged and used as emergency power supplies during an emergency.

Data Collection

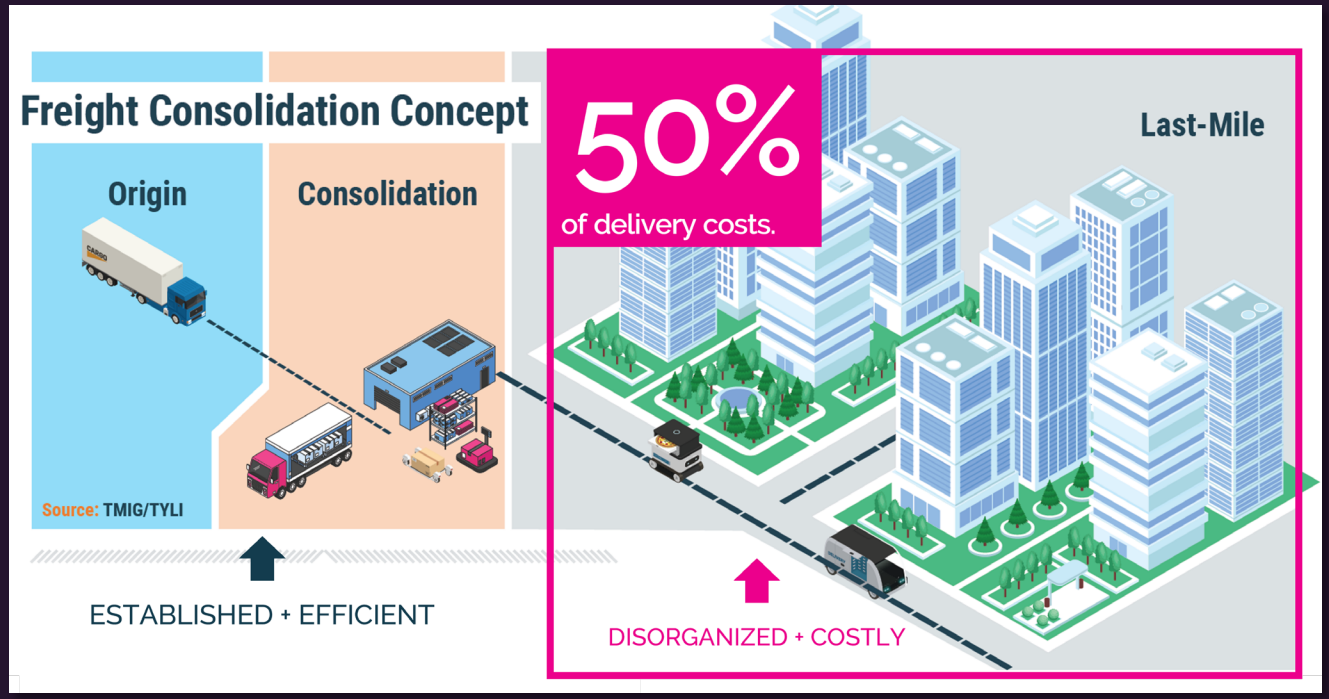
On-board sensors including camera and audio can be used to collect useful data about city functions including pedestrian and cyclist volumes, sidewalk and bike lane conditions, and typical noise or air quality levels across the city. This data can be used to mitigate operating and maintenance costs for city infrastructure.

POTENTIAL BENEFITS TO GOODS MOVEMENT

Most goods movement and deliveries in Downtown Toronto typically take place by one of two modes:

- Delivery Vans/Trucks, which occupy road space, emit greenhouse gases (GHGs), and pose hazards to pedestrians and cyclists – particularly by blocking sidewalks and bike lanes;
- Bicycle Couriers, which pose hazards to pedestrians and vulnerable road users when they use sidewalk infrastructure and ride at high speeds.

SIDEWALK DELIVERY ROBOTS offer the opportunity to decrease congestion, reduce GHG emissions, and make roads and sidewalks safer for all users, but particularly for the first/last-mile of a delivery which is estimated to account for **50%** a shipped good's cost.



First/Last-Mile

Transport Industry Trends

- Despite an increased need for transport during the pandemic, companies lost even more drivers resulting in a 71,000-employee shortage by September 2020. The average age of transport drivers are 46 and on the verge of retirement. There is a labour shortage in this market.
- According to BI Intelligence the last mile accounts for >50% of overall shipping costs and is estimated to grow by 36% by 2030.
- 31% of Canadian retailers already offer Buy Online Pick Up in Stores (BOPIS) – bolstered by the pandemic and a desire to support local
- 78% of transportation and logistics companies in Canada believe that last-mile delivery is the most inefficient process of the entire supply chain according to a study commissioned by SOTI, a provider of mobile and IoT management solutions. It is 59% in the U.S.
- The hub & spoke nature of distribution models are setup for long-distance delivery and result in significant added cost, delay, and emissions to small businesses who are just a stone's throw away from their customers like in a BIA.

Cost to ship a new cell phone from a store

Source: https://www.canadapost-postescanada.ca/cpc/en/business/small-business/shipping-discounts.page

DATA COLLECTION & INNOVATION OPPORTUNITIES

Sidewalk robots can be used to measure pedestrian flows and volumes on the sidewalks that they operate on. This data is traditionally time-consuming and difficult to collect, particularly in dense environments like Downtown Toronto.

Other data that sidewalk robots can be equipped to collect includes air quality and sidewalk conditions.

Data collected by sidewalk robots is:

- Anonymous, to address privacy concerns;
- Dynamic, allowing sidewalk robots to update their routing to avoid routes which pose pedestrian conflicts.

Sidewalk robots present an opportunity to address active transportation gaps by quantifying the economic value of active infrastructure.

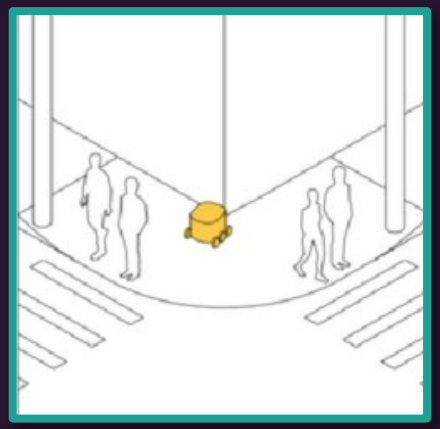
Robots can provide data about active transportation trends and can inform opportunities to generate revenue from underutilized infrastructure, more equitably amortizing the value of public infrastructure.

Data collected by sidewalk robots can be provided to relevant city departments to inform plans, and anonymous data can be made public to support industry innovation. Current couriers do not provide this data freely.

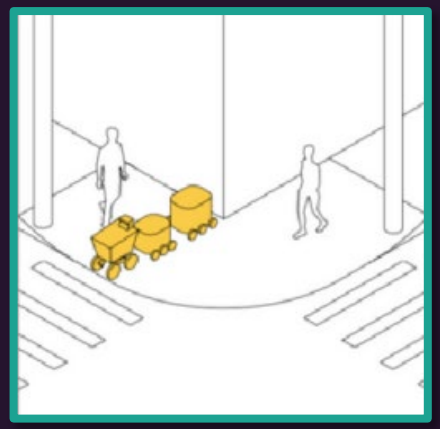
SCALABILITY AND FLEXIBILITY

Better data on active mobility such as pedestrian and cyclist flows will be necessary to tailor delivery robot services that prioritize the movement of people rather than robots.

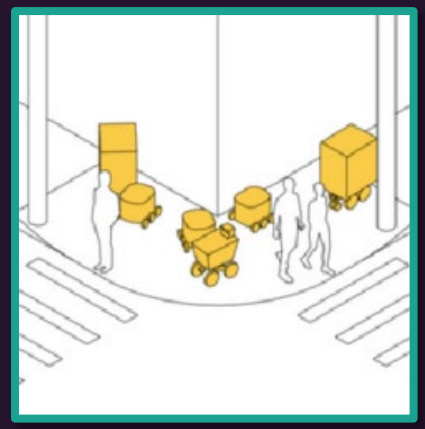
Shy?



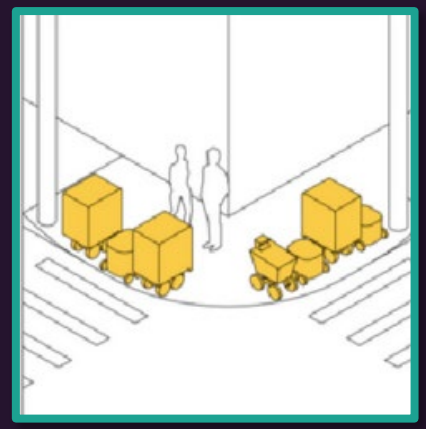
Orderly?



Congested?



Competitive?



Bespoke

Delivery services can be developed in collaboration with BIAs to ensure that synergies can be achieved. For instance, perhaps it is preferable to provide elevated delivery service in the winters when there are less shop walk-ins, whereas in summers it may be the inverse needing to prioritize pedestrian movements. Perhaps in summers service can be shifted to off-peak only to reduce potential conflicts between pedestrians and robots.

Valuing the Sidewalk

Delivery robots present an opportunity to price your sidewalks and bike lanes to place an economic value on active infrastructure. Our cities have an active transportation data gap that makes it difficult to quantify the economic value they provide to transit and the city. Delivery robots can both provide elevated data about these trends while also generating revenue off of underutilized infrastructure. This helps amortize the cost of public infrastructure more equitably based on their usage and value to the city.

5

RECOMMENDATIONS

RECOMMENDATIONS

1. **VOTE AGAINST A BAN** on micro-utility devices on city streets and continue the city's contribution and involvement in the provincial pilot program to mitigate adverse impacts to employment and market advantages that have been developed by operators within Toronto.

2. **COLLABORATE WITH MUD OPERATORS AND THE CITY'S BIG DATA** team to collect information related to pedestrian density and walking speeds to inform a better understanding of sidewalk activity and to quantify the impacts and appropriate usage of MUDs within the City. This will also benefit the City's ongoing Vision Zero initiative through a better understanding of the vulnerable road user environment.

3. **COLLABORATE WITH PUBLIC STAKEHOLDERS** to assess and navigate accessibility concerns.

4. **LEVERAGE DATA TO COLLABORATE AND CONSULT WITH OPERATORS TO MODIFY THEIR SERVICES** additional measures can be considered based on quantitative data to determine whether certain corridors are too busy with pedestrians to allow MUD operations and consider modifications to a geofenced boundary to ensure MUDs operate on wide sidewalks to allow safe cross travel

5. **REVIEW SPEED LIMITS AND PEDESTRIAN-YIELD OPERATIONS**

6. **WORK WITH OPERATORS TO ENHANCE ACCESSIBILITY TRAINING FOR OPERATORS**

7. **STUDY FEASIBILITY OF LEVERAGING MUDS FOR OTHER CITY NEEDS** such as snow on narrow city streets, to improve community mobility for persons living with disabilities.