Automated Shuttle Trial

Wednesday, July 9, 2020

Prepared for: Clean Air Partnership
Emerging Technology Webinar

Prepared by:
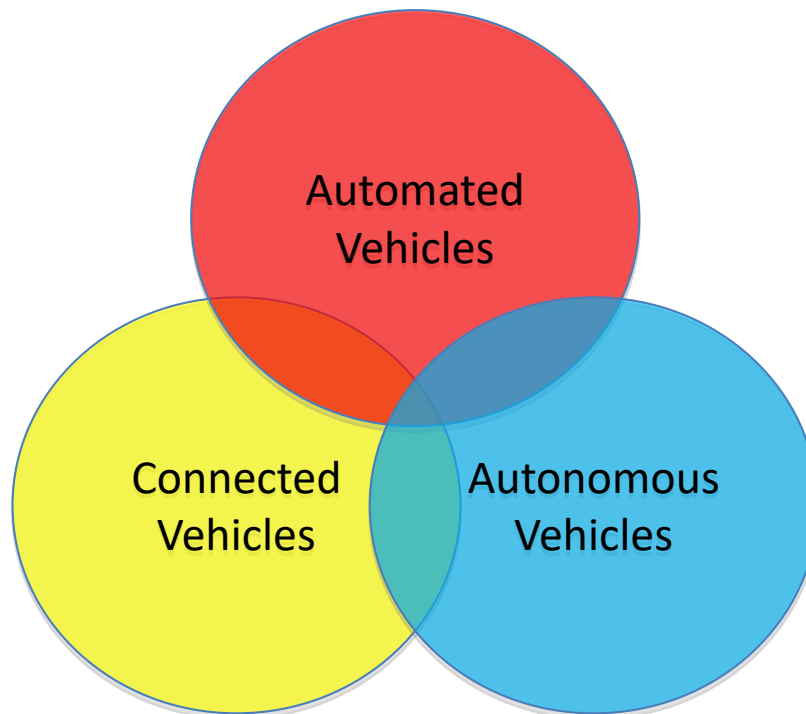
Fahad Khan
Transportation Services, City of Toronto
Fahad.Khan@Toronto.ca

What is a Connected Vehicle?

Connected vehicles communicate with other vehicles ("v2v"), infrastructure ("v2i"), or more through various technologies and networks ("v2x").

Automated Vehicles

Connected Vehicles

Autonomous Vehicles

Vehicles may be automated, connected, or autonomous, or any combination thereof.

TORONTO

streetsto
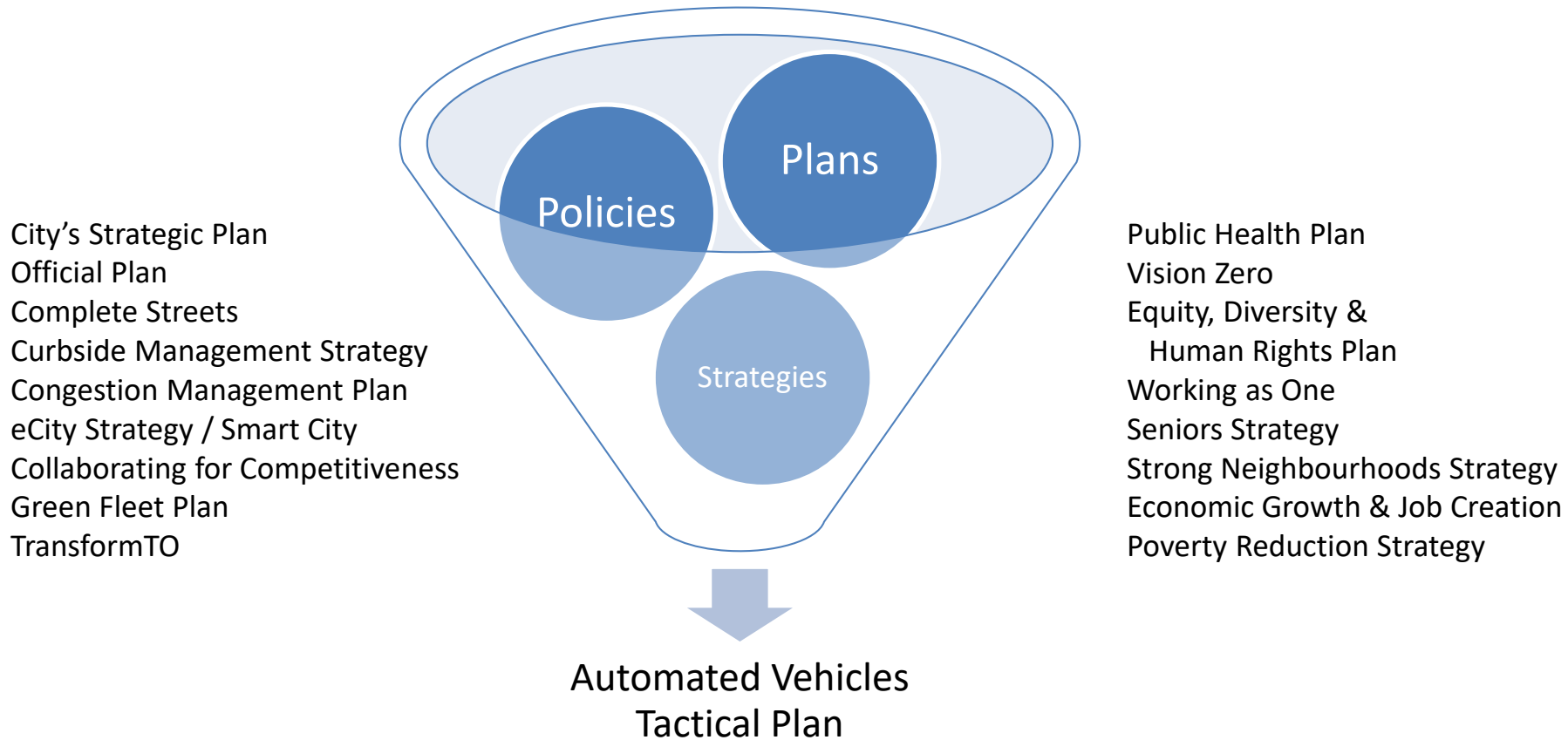
2

Evolution or Revolution?

Evolution

- An extension of early features like cruise control, lane centering; step through levels of automation
- Driven by existing automobile manufacturers
- Iterative integration of hardware and software
- Direct to consumer market
- Already here

Revolution

- Redesign of automobile control; jump to SAE automation level 4 or 5
- Driven by technology and transportation network companies; some automobile manufacturers
- Direct to consumer and service replacement markets
- A few – or many – years away

TORONTO

3

streetsto

AV Tactical Plan: Foundation

City's Strategic Plan
Official Plan
Complete Streets
Curbside Management Strategy
Congestion Management Plan
eCity Strategy / Smart City
Collaborating for Competitiveness
Green Fleet Plan
TransformTO

Policies

Plans

Strategies

Public Health Plan
Vision Zero
Equity, Diversity &
   Human Rights Plan
Working as One
Seniors Strategy
Strong Neighbourhoods Strategy
Economic Growth & Job Creation
Poverty Reduction Strategy

Automated Vehicles
Tactical Plan

AV Tactical Plan: 2. Env. Sustainability

Goals	Key Performance Indicators	Tactics
2.1 Reduce Vehicle Emissions: In 2050, the City will have harnessed the widespread adoption of automated vehicles to ensure that all vehicles use low- or zero-carbon energy sources.	City-wide GHG emissions Percentage of vehicles licensed through the City that use low- or zero-carbon energy sources Percentage of City fleet that use low- or zero-carbon energy sources	2.1.1 Low or Zero-Carbon Energy Sources 2.1.2 Low or Zero-Carbon Energy Sources for Shared AV Fleets
2.2 Reduce Vehicle Waste: In 2050, the City will have harnessed the widespread adoption of automated vehicles to minimize waste generated from vehicle upgrades and automated fleets.	Average fleet lifecycle Waste diversion rate	2.2.1 Vehicle Waste Reduction 2.2.2 Vehicle Waste Reduction for Automated Transit Vehicles 2.2.3 Vehicle Waste Reduction for Shared AV Fleets

Automation in the transit system

- Metrolinx, the Toronto Transit Commission (TTC) and the City of Toronto want to learn about the potential for automated vehicles to fill existing gaps in the transit system.

- In 2018, we secured funding from Transport Canada's Program to Advance Connectivity and Automation in the Transportation System (ACATS) to conduct a trial with an automated transit shuttle.

Example of an automated shuttle trial in Candiac, Quebec

Preliminary Preferred Route

West Rouge Neighbourhood

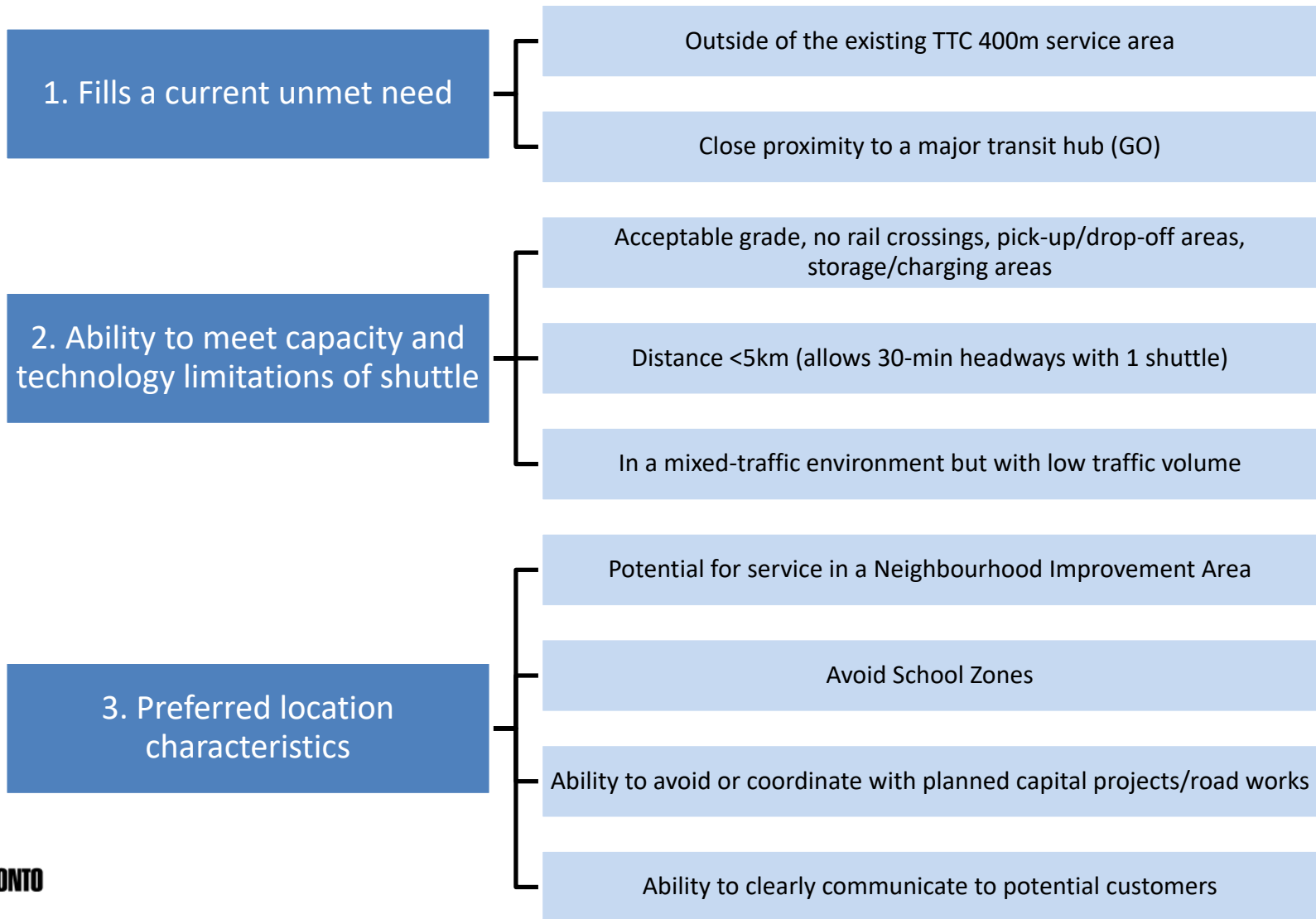- Weekday route: Rouge Hill GO to West Rouge neighbourhood

The shuttle would connect to a major transit station such as a GO station

Our goals

- Understand the potential of automated shuttles to fill gaps in the transit system in the future
  - No intent to scale up at this point in time
- Understand human interactions with automated shuttles
- Understand the technical requirements to operate an automated shuttle

Initial Route Selection Criteria

1. Fills a current unmet need

- Outside of the existing TTC 400m service area
- Close proximity to a major transit hub (GO)

2. Ability to meet capacity and technology limitations of shuttle

- Acceptable grade, no rail crossings, pick-up/drop-off areas, storage/charging areas
- Distance <5km (allows 30-min headways with 1 shuttle)
- In a mixed-traffic environment but with low traffic volume

3. Preferred location characteristics

- Potential for service in a Neighbourhood Improvement Area
- Avoid School Zones
- Ability to avoid or coordinate with planned capital projects/road works
- Ability to clearly communicate to potential customers

TORONTO

sto

Proposed trial plan

- Service to start Fall 2020 – *Changed due to COVID-19*

- Run for about 6-12 months

- Passengers ride for free

- Run only during morning and evening rush hours Loop around about every 20-30 minutes

- Fixed route with fixed stops (locations TBD)

This plan may change - feasibility to be confirmed with the vendor in 2020.

Example of an Automated shuttle demonstration in Calgary, AB

Progress update

- Call for submissions – nRFP – December 19, 2019 → February 21, 2020
- Evaluated by City, TTC, Metrolinx
  - Procurement process is underway
  - Discussions ongoing with the top Vendor
- Economic Development Strategy completed by MaRS Discovery District – more details by Shagithya

Lessons Learned

1. Nascent market requires unique procurement practices

   a) Fairness Monitor

   b) Negotiated RFP

2. Service model dictates procurement document

   a) Customer experience within the vehicle

   b) Hailing and boarding the vehicle

   c) User protections

   d) Operator protections and needs

streetsto

Lessons Learned (2)

3. Laws and regulations
    a) Accessibility
    b) Privacy regulations
    c) Camera privacy
    d) Insuring such a vehicle
    e) Data collection sensitivities
    f) Data collection and sharing between vendor and City/Project Partners
    g) Cyber security
4. Winter Operations – sensor and battery limitations
5. Import requirements and setup needs

Accessibility requirements for the automated shuttle

- The vehicle and the service will need to comply with the:

  - Accessibility for Ontarians with Disabilities Act (AODA)

  - Highway Traffic Act (HTA)

  - Metrolinx Accessibility Policy

  - TTC Accessible Customer Service Policy

- A human attendant will be in the vehicle at all times and will be available to assist passengers as required

Example of an Automated shuttle demonstration in Calgary, AB

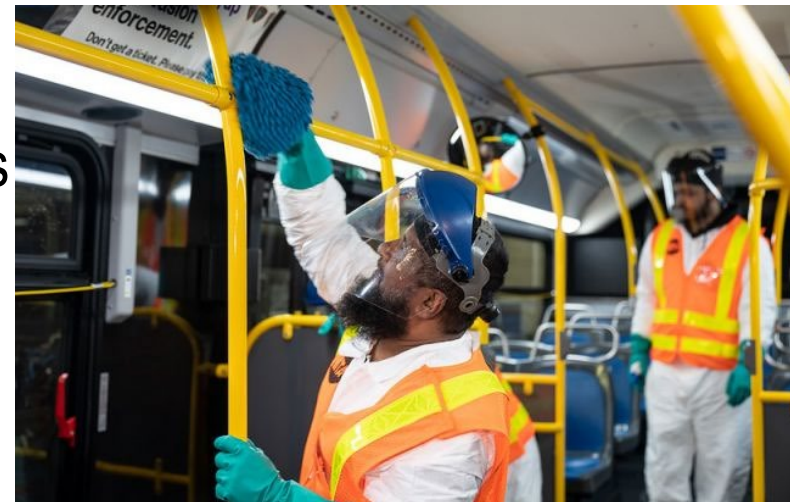# Accessibility requirements for the automated shuttle (2)

- Following the standards in the legislation, we currently anticipate having the following requirements for the potential vendors:
  - Have securement device(s)
  - Have a ramp (deployable automatically or manually by the attendant)
  - Make audible and visual next stop announcements inside and outside the vehicle
  - Facilitate use by persons with disabilities accompanied by service animals
  - Maximize interior space for persons with mobility devices
  - Follow best practices in the design of any mobile applications or websites, if applicable

TORONTO

streetsto

COVID-19 Update

Existing service model was designed pre-COVID-19

Considerations moving forward:

- Social distancing, within an 8-person shuttle?
- Demand levels from Rouge Hill GO Station
- Vendor ability to meet project needs
- State of emergency – Provincial & City
- Toronto public health recommendations
- TTC and Metrolinx protocols
- Revised project timelines

Transportation Innovation Zone Partnership

IE14.13

REPORT FOR ACTION

🏙 **TORONTO**

Transportation Innovation Zone Partnership with Exhibition Place

Date: June 24, 2020
To: Infrastructure and Environment Committee
From: General Manager, Transportation Services
Wards: 10

SUMMARY

Urban transportation is undergoing rapid change from the arrival of new, innovative mobility technologies such as micromobility, private transportation companies, as well as electric, connected, and automated vehicles. Other, less visible shifts are also underway, such as the development of smarter traffic control systems, new paving materials, and new ways of monitoring and evaluating the transportation system.

Leading up to and amidst the COVID-19 pandemic, many advanced technologies and approaches are being proposed to support the movement of people and goods. City staff need a way to transparently trial and evaluate innovations in order to understand their potential value in Toronto's unique context and plan for wider integration. New technologies need to be demonstrated and measured in a controlled, real-world environment to understand potential benefits and impacts to key variables like safety, accessibility and privacy.

Real-world test environments can also support local economic development by providing access to innovators, especially small- and medium-sized enterprises, who are developing custom solutions in the Toronto area. Further, public test environments provide an opportunity for participants to engage the public and demonstrate the potential value of their technologies. To meet these needs, the Transportation Innovation Zones program will facilitate trials of transportation approaches and technologies in the public right of way.

- Real world testing environment
- Focus on all transportation innovation, including AV and CV
- Exhibition Place will be TIZ #1

TORONTO

17

streetsto

For more information

Project website:

www.toronto.ca/AVshuttle

Fahad Khan, Project Lead, Automated Vehicles
Transportation Services, City of Toronto
Fahad.Khan@toronto.ca

TORONTO

streetsto