RESEARCH & INNOVATION
CASCON 2018 OCT 29 - 31

iCity: Urban informatics for sustainable metropolitan growth and the King Street Transit Pilot

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RESEARCH CAS 2018

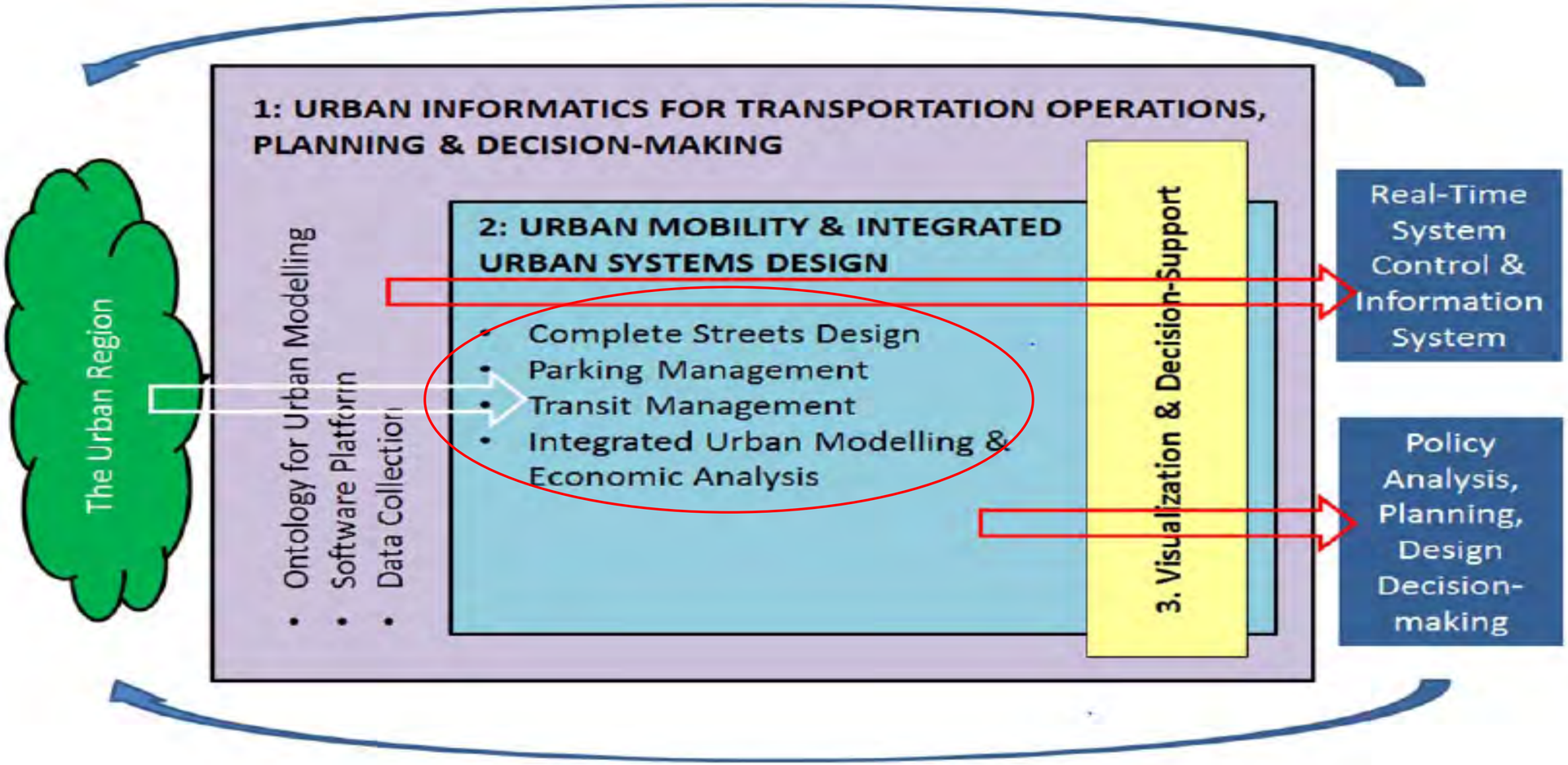
UTTRI

A centre of excellence for transportation research

A space for government/industry/ academic collaboration

Dedicated to providing evidence in support of decision making

iCity: Urban informatics for sustainable



TORONTO'S BIG DATA INNOVATION TEAM

- Data science team within the Transportation Services Division
- Focus on building **in-house** data analytics capacity
- Transportation Services is responsible for building and maintaining the City's transportation infrastructure
- Sits within Traffic Management Centre
- Unique group among peer cities

TEAM MISSION & OBJECTIVES

1 Practical and repeatable analysis of transportation data: focus on **automation**

2 Leverage:
- **Emerging data** sources
- Under-used **existing** data sources

3 Build and use free and **open source** software

TORONTO

Toronto Transit Commission Subway Map

Toronto Transit Commission Streetcar Map

Toronto Transit Commission Streetcar Map

Toronto Transit Commission Streetcar Map

Toronto Transit Commission Streetcar Map

King Street "before" November 2017

- 70,000 riders on King streetcar
- 20,000 private automobiles
- slow speeds, unreliable service, overcrowding

A PILOT HELPS THE CITY TO TRY OUT NEW IDEAS, QUICKLY AND COST-EFFECTIVELY

1. TEST

2. MEASURE

3. REFINE

Goals of the pilot study

KING STREET TRANSIT PILOT

KEY DESIGN PRIORITIES

MOVE PEOPLE MORE EFFICIENTLY ON TRANSIT

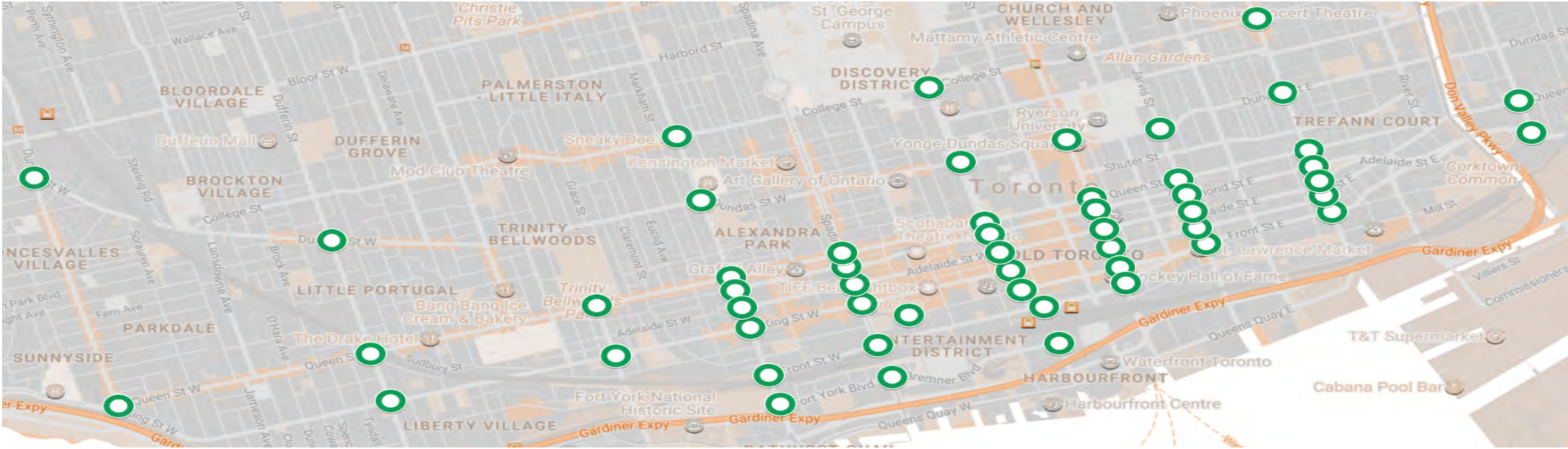
SUPPORT BUSINESS & ECONOMIC PROSPERITY

IMPROVE PUBLIC SPACE

Modern Approach to Monitoring

- Embrace new sensing technologies
- Investment that builds capability
- Pervasive and permanent data feeds
- Automated and open source
- Leverage in-house data science capability
- Share openly and actively through open data portal

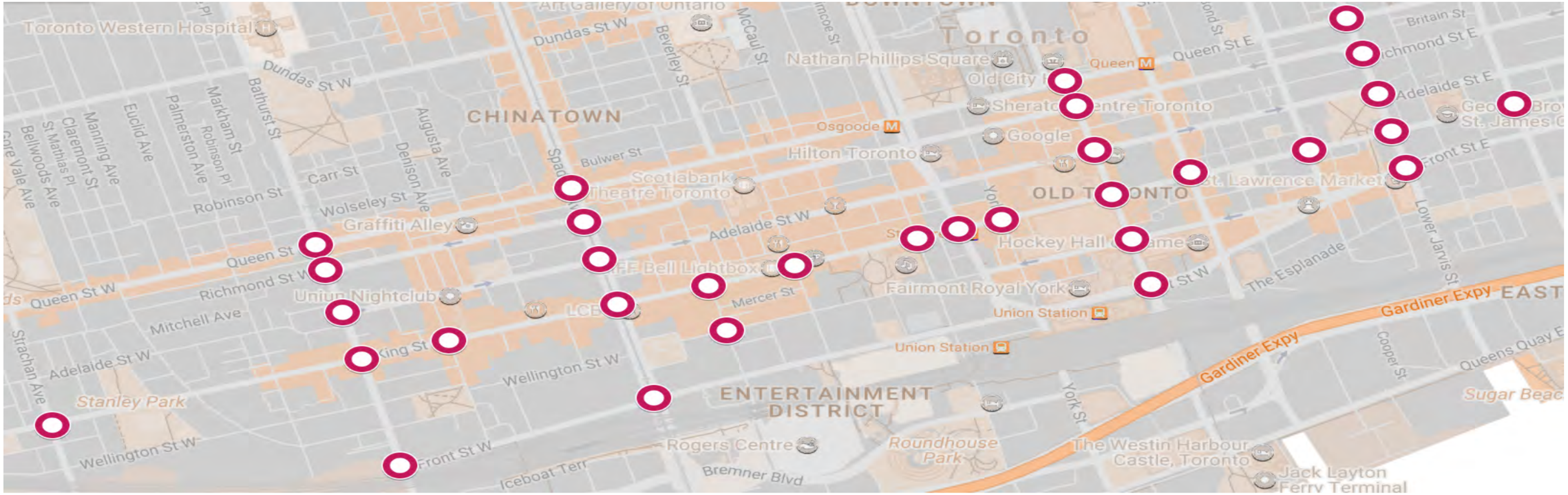
Bluetooth Reader locations



PERMANENT VIDEO-BASED COUNTING

- 360 degree cameras and video analytics units mounted in traffic signal cabinet.
- Video analyzer processes counts from video feeds in real time
- Measures pedestrians, bicycles, cars, medium trucks, heavy trucks, transit vehicles

COUNT LOCATIONS



King Street "after" November 2017

TRANSIT RELIABILITY

85%

of streetcars arriving within 4 minutes westbound during the morning commute.

TRANSIT TRAVEL TIMES

The reliability of streetcar travel times has continued to improve.

4 to 5 minute

improvement (in each direction) during the PM commute for the slowest streetcar travel time.

TRANSIT RIDERSHIP

16%

increase in all-day weekday ridership.

25%

increase in AM commute ridership (eastbound at Spadina Ave.).

27%

increase in PM commute ridership (westbound at University Ave.).

TRANSIT CAPACITY

To respond to this growth in ridership, the TTC has increased the capacity of streetcar service on routes that serve the pilot area.

Making the case to Council

University research contributions

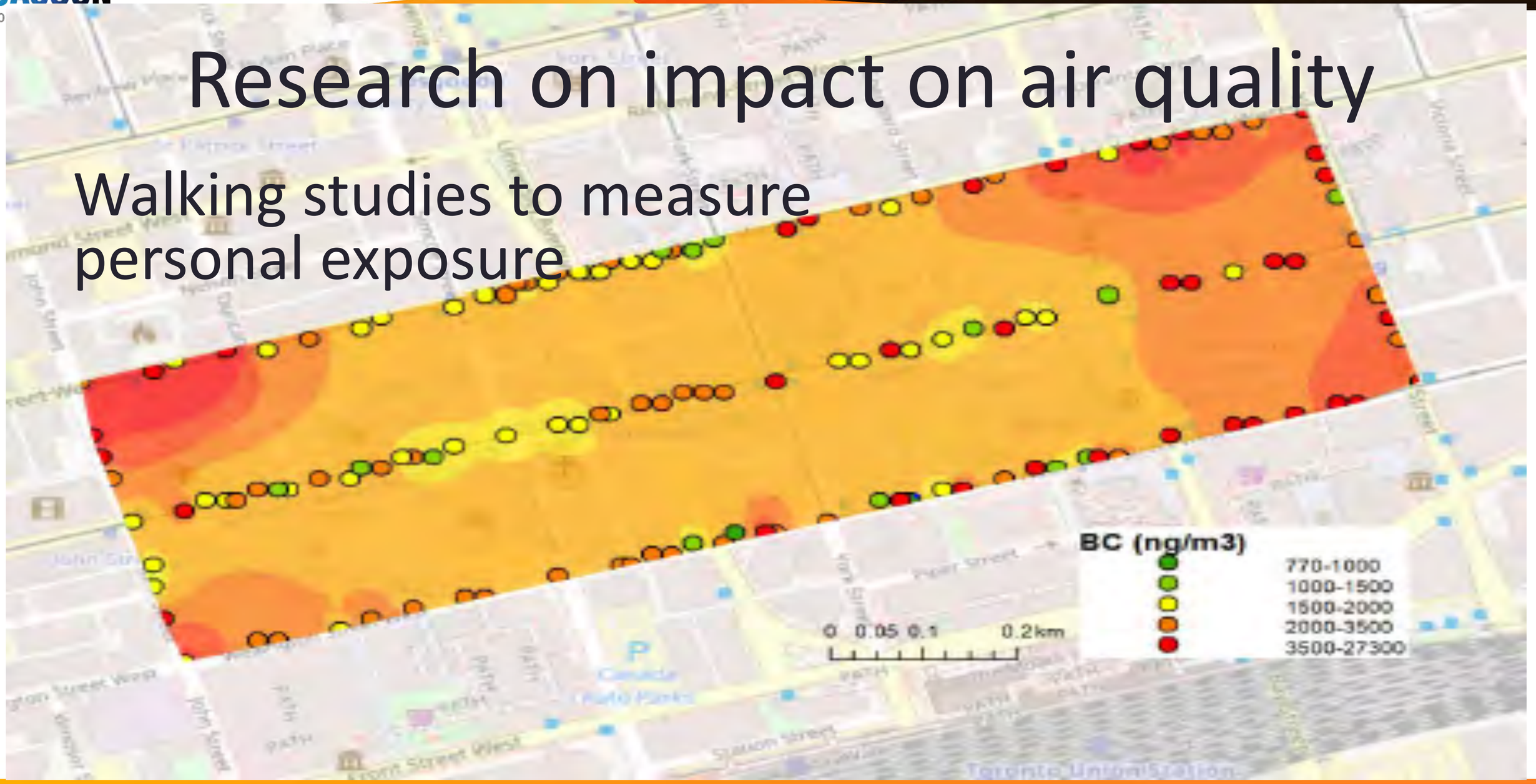
- Research contract with the City with scope of work and deliverables
  - Access research expertise, knowledge, facilities and equipment otherwise unavailable
- “Curiosity-driven” independent research
  - Professors and students posing and answering research questions, developing tools, collecting data, performing analysis...

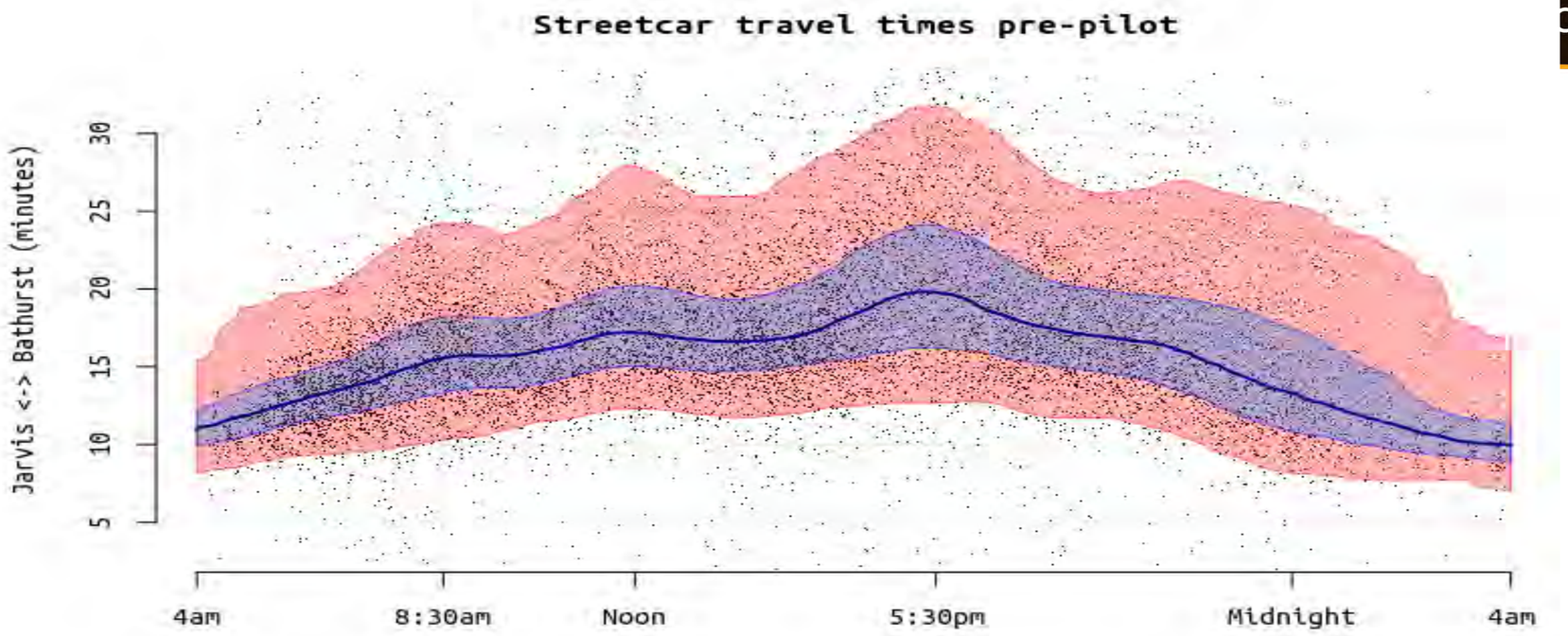
Research in impact on air quality

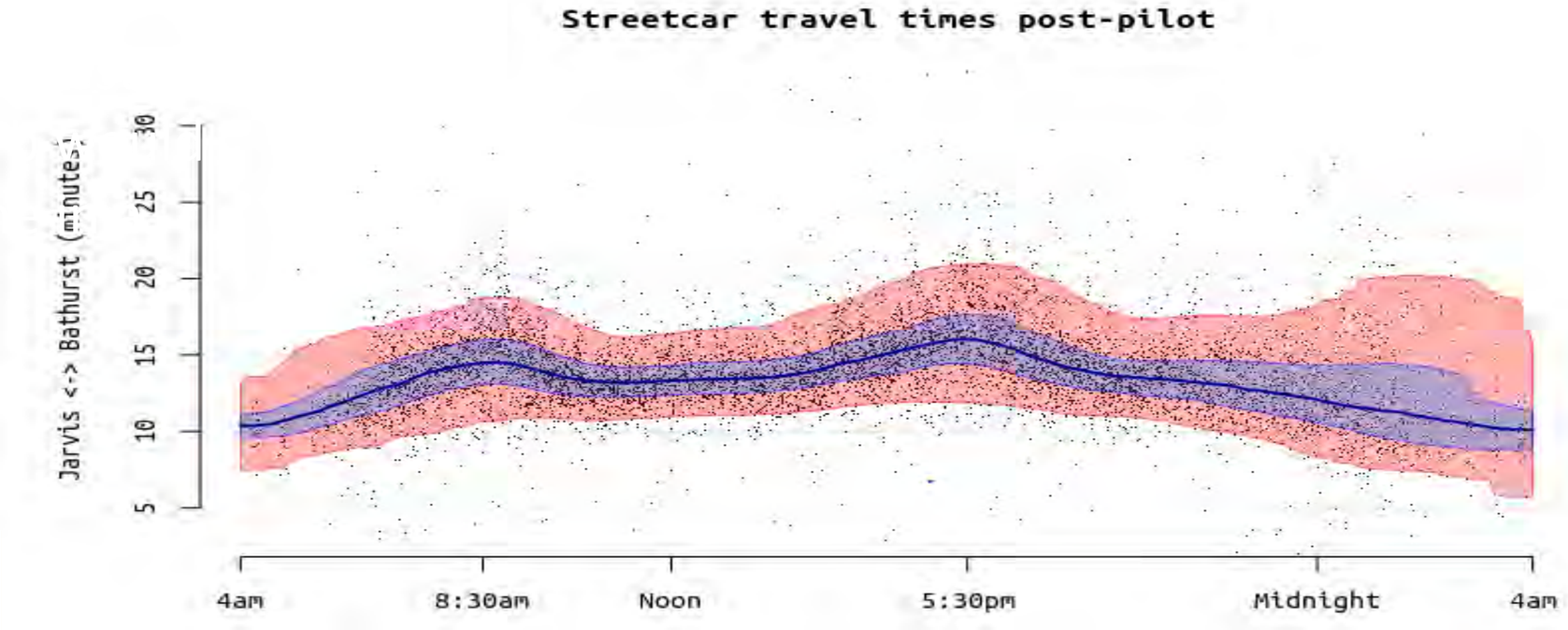
- Real-time air quality monitoring of PM2.5, O2, CO, CO2, NOx
- Mobile sensors on two streetcars
- Passive sensors at signalized intersections

Research on impact on air quality

Walking studies to measure personal exposure




Streetcar travel times pre-pilot
Jarvis <-> Bathurst (minutes)
5
10
15
20
25
30
4am
8:30am
Noon
5:30pm
Midnight
4am


Streetcar travel times post-pilot
Jarvis <-> Bathurst (minutes)
5
10
15
20
25
30
4am
8:30am
Noon
5:30pm
Midnight
4am

Compare passengers' perceptions to metrics

- Intercept and online survey
- Overall experience, Waiting time at stop, Travel time, Safety at stop, Experience on board
  - Left home later
  - Arrived late less often
  - Overall ranked their experience as 3.9/5 on a scale of Much Worse to Much Better

King Street User Experience Survey

Which of the following is most important when creating an accessible pedestrian street?

(Please rate it from 1: Dislike to 5: Very satisfied)

Access to public transit

1 - Strongly Dislike

2 - Dislike

3 - Indifferent

4- Like

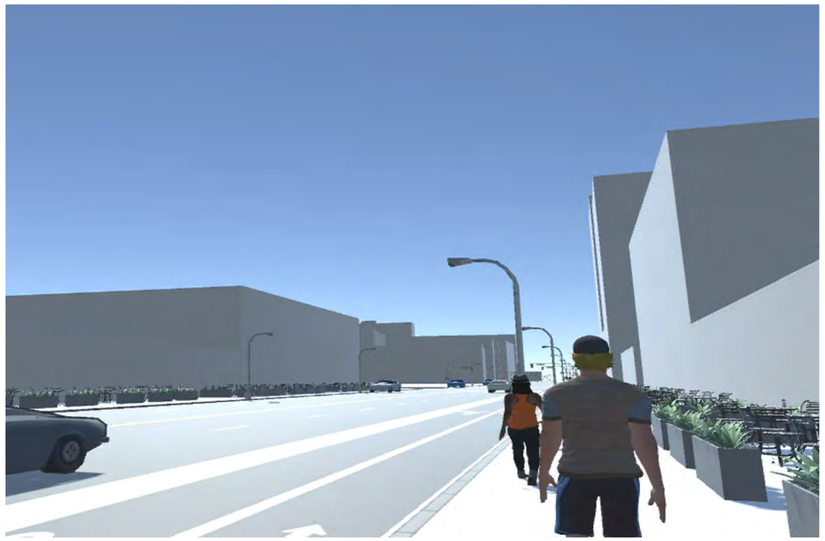
5 - Strongly Like

3D Animated Data Collection

Complete Street Survey

Scenario A

Two car lanes, two transit lanes, on-street parking, one-way bike lanes, 3.2m sidewalk



Scenario B

Four car lanes, two-way bike lane, 5.6m sidewalk with outdoor dining

Scenario C

Four car lanes, on-street parking, one-way bike lanes, 4.8m sidewalk

TRANSPORTATION

< BIG DATA /

FOR BIG CITIES CONFERENCE
JUNE 12 - 15 / TORONTO, CA

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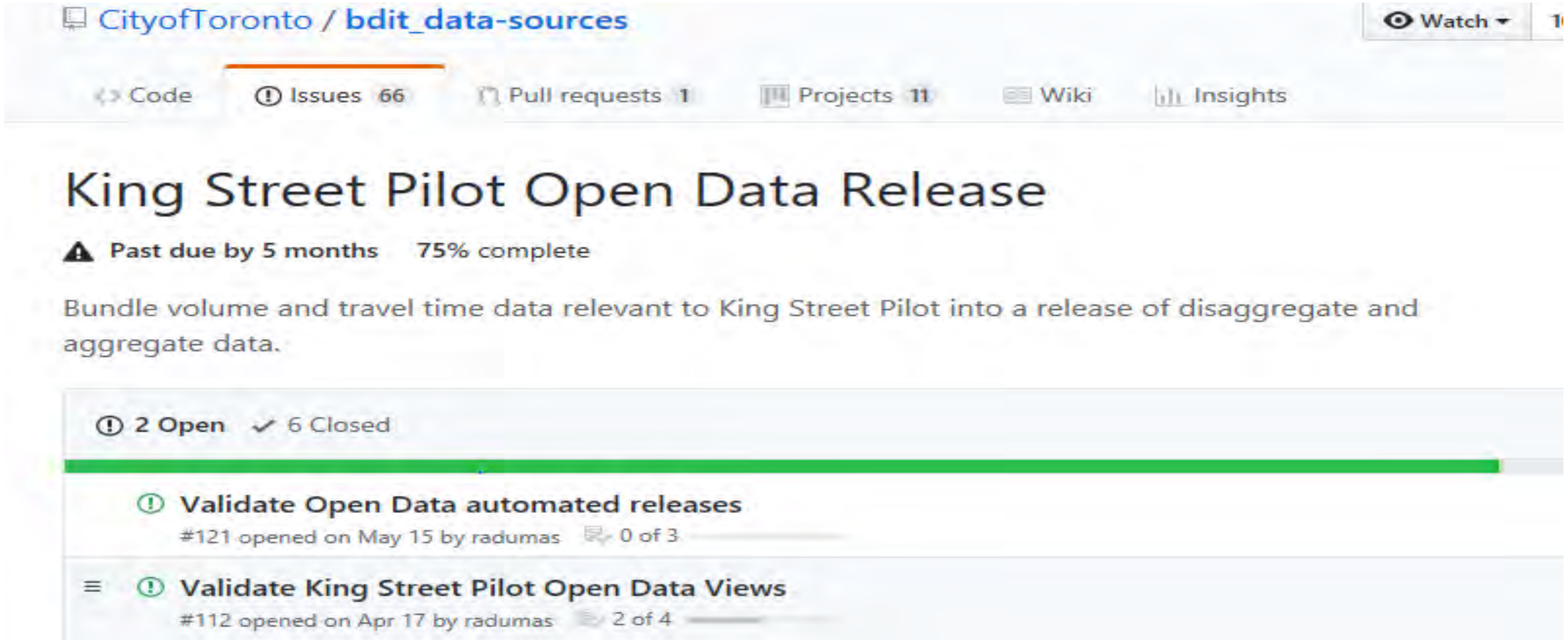
Commitment to Open Data




A dynamic urban environment is not a controlled experiment.


ROOF TOP PATIO
PEOPLE ARE
We're creating space on King Street for people,
bike parking, and more.
KING
KING
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