

The Fifth Mode

Trip and System Characteristics of One-Way
Car Sharing in Metro Vancouver, BC

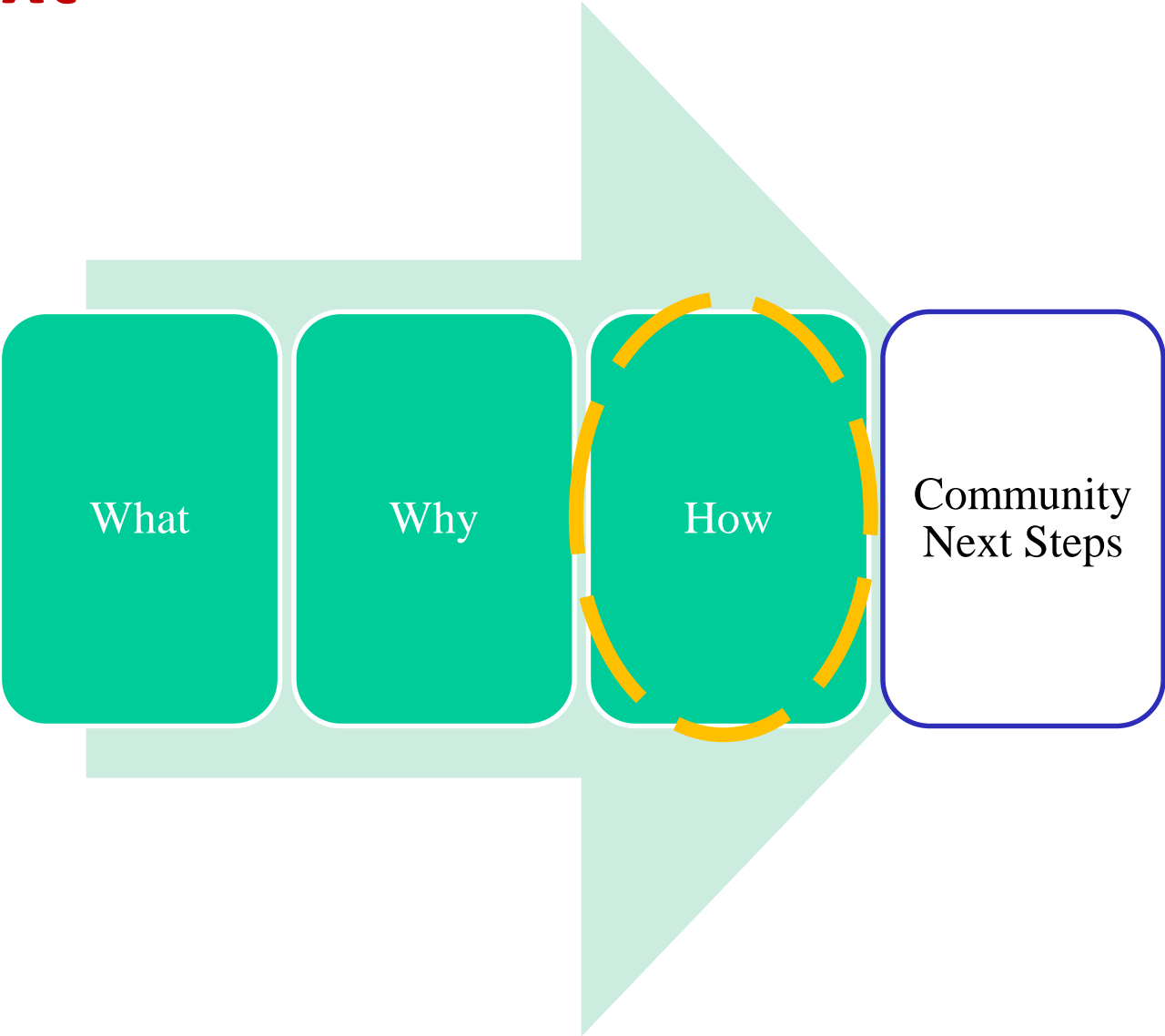


Photo: gizmag.com

URBAN
systems

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September 22, 2015
CSA Conference,
Vancouver, BC

Context



Outline

1. Why Study Car Sharing?
2. Car Sharing in Metro Vancouver
3. Car2Go One-Way Car Share
4. Study Methodology
5. Car2Go System Usage
6. Vehicle Availability and Trip Patterns by Period
7. Car Share Economic Benefits
8. Core Findings

What is Car Share?

Car share programs provide a network of passenger vehicles to members who can access them on an as-needed basis for a rate based on time and/or distance.

Car share members gain the benefits of private vehicle use without the costs and responsibilities of ownership

Car Share System Types

One-Way

- Vehicle can be picked up and dropped off in different locations
- Billing by the minute / hour / day
- Suitable for leisure + commute trips

Two-Way

- Vehicle must return to “home” parking spot to end rental
- Billing by the hour / day
- Suitable for leisure, special interest trips

Why Study Car Sharing?

Car sharing supports the broader social good

Car Sharing:

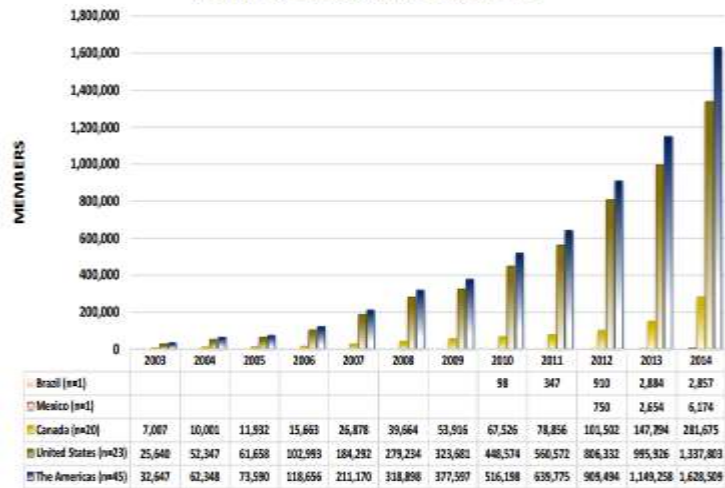
- Promotes a more efficient use of vehicles (reduce vehicle parking/dead time)
- Supports a private vehicle-free lifestyle, alongside transit and active transportation
- Increases transportation choices
- Provides access to vehicles for those who cannot afford to buy
- Can defer the purchase of a first or second vehicle
- Satisfies a variety of policy goals:
 - Reduction in # of vehicles on the road
 - Reduction in need for parking

Why Study Car Sharing?

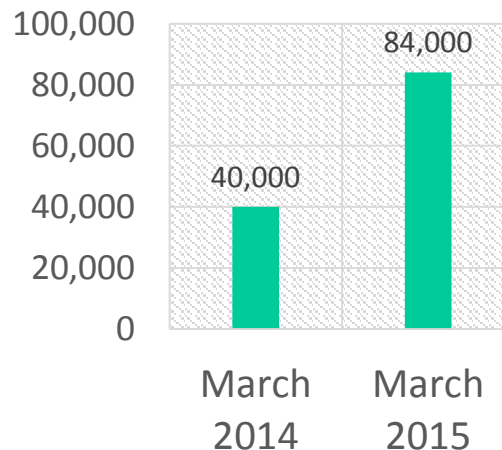
Car sharing is a rapidly expanding component of the transportation ecosystem

- Advances in technology and new business practices have taken car sharing beyond a “niche” transportation alternative

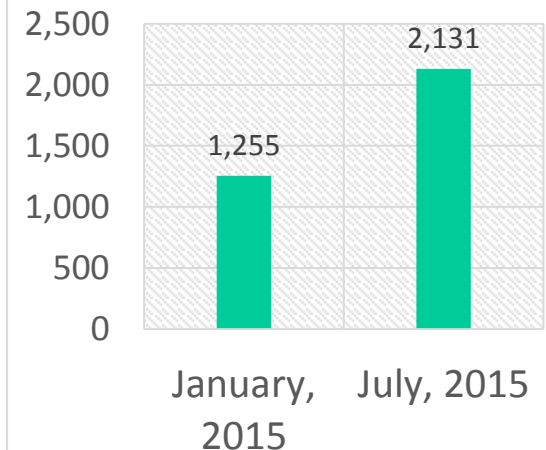
Member Growth in the Americas*



Metro Vancouver Car2Go Membership

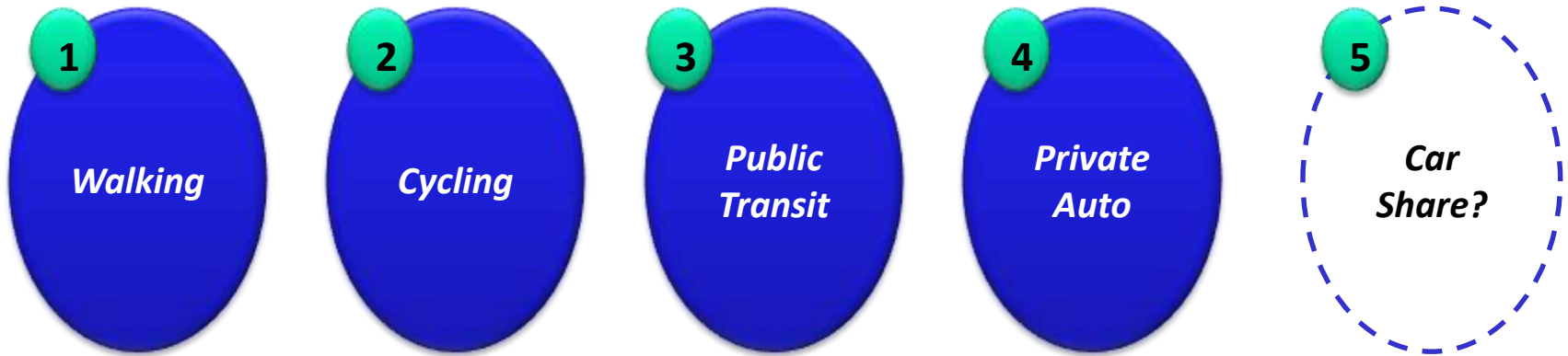


Metro Vancouver Car Share Fleet



Why Study Car Sharing?

Is Car Sharing an emerging *Fifth Mode* in Urban transportation?



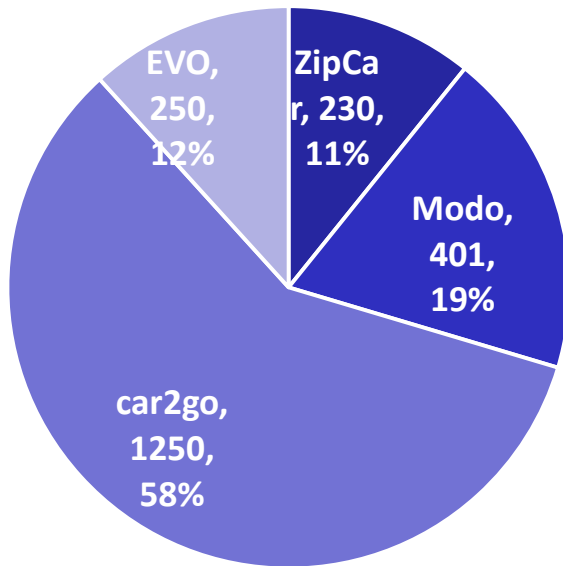
Car Sharing in Metro Vancouver

- Metro Vancouver is widely considered to be a North American leader in car sharing

Car Share Operator	System Type	Vehicle Type	Service Area
ZipCar	2-Way. Vehicle must be returned to “home” parking space.	Multiple makes and models	Vancouver, UBC, North Vancouver, Richmond, Burnaby, SFU
Modo	2-Way. Vehicle must be returned to “home” parking space.	Multiple makes and models	Vancouver, UBC, North Vancouver, Richmond, Burnaby, New West, Surrey, Coquitlam, Port Moody, SFU
Car2go	1-Way. Park in any unmetered public space.	Smart Car (2-seat)	Vancouver, UBC, North Vancouver, Richmond
EVO (BCAA)	1-Way. Park in any unmetered public space.	Toyota Prius	Central Vancouver

Car Sharing in Metro Vancouver

Car Share Vehicles in Metro Vancouver

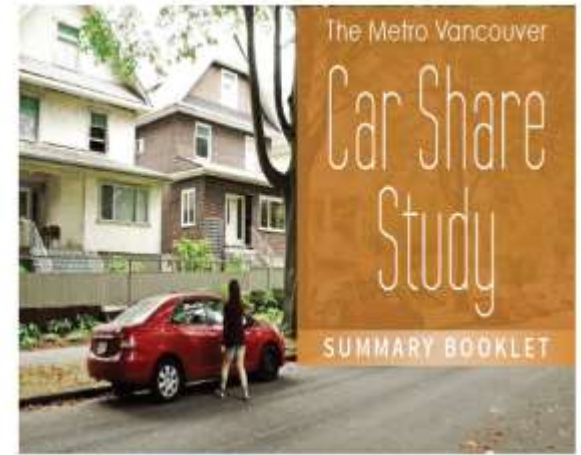
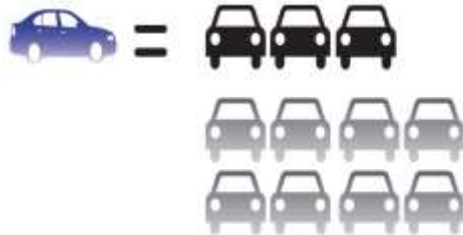


Car Share Operator	Membership
ZipCar	Unknown
Modo	11,000
Car2go	89,000
EVO (BCAA)	Unknown

Car Sharing in Metro Vanco

Metro Vancouver Car Share Study (Nov, 2014):

- First comprehensive analysis of car sharing in the region
- Evidence gathered from discussions with car share providers + two online surveys of car share households (3,405 responses) and apartment households (2,054 responses)
- Primary results:
 - Vehicle Reduction: 3 to 11 private vehicles eliminated for every car share vehicle
 - Changes in VKT
 - Key motivations for joining a car share: cost, convenience compared to transit, additional mobility, availability of car share vehicles



Car2Go One-Way Car Share

- Point-to-point travel with billing by the minute
- Cost: 41 cents per minute includes gas, insurance; negligible annual fee (\$2) + \$1 per use fee
- Served by a fleet of 1,250 2-seater Smart cars
- *Park almost anywhere* in Home Area at no additional cost (includes permit/resident only spots, designated car2go only locations Downtown/UBC)

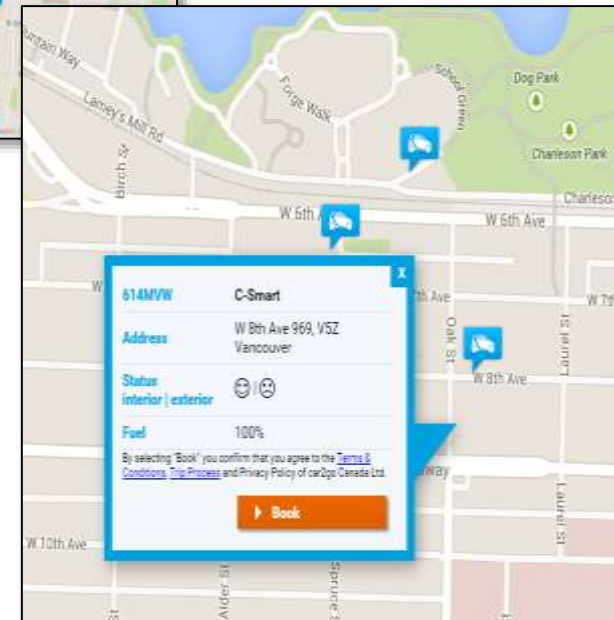
Car2Go's business model:

- Provides travellers with freedom of movement of the private automobile without the associated burden of paying for parking
- Allows for unbundling of trip segments, giving the traveller the flexibility of using a car when it is most needed, and discarding it where it is less efficient



Car2Go One-Way Car Share

- Easy to use smartphone app and website allows customers to locate and book a vehicle within seconds
- Vehicle location information updated constantly
- Vehicle reservations held for 30 minutes at no charge
- A reserved vehicle can only be unlocked by the member holding the reservation



Study Methodology

- This study uses geo-snapshots of Car2Go's publically available *real time* vehicle location information as a primary input to determine system and travel characteristics
- Snapshots record the precise lat-long location of available vehicles by license plate at various time intervals throughout the day on weekdays in kml format
- Frequent geo-snapshots are then analyzed in Excel and GIS to estimate/reveal:
 - System usage patterns
 - Average trip distance
 - Vehicle availability by period
 - O-D trip patterns by period

Study Methodology

- Snapshots taken at hourly intervals for 24 hours over 6 weekdays in January, 2015
- Hourly data is supplemented by snapshots taken every minute during the AM peak (8-9AM), midday (1-2PM), PM peak (5-6PM), and evening (7-8PM) periods

	Thursday Jan 8, 2015	Friday Jan 9, 2015	Monday Jan 12, 2015	Tuesday Jan 13, 2015	Thursday Jan 15, 2015	Wednesday Jan 21, 2015	Thursday Jan 22, 2015	Tuesday Jan 27, 2015
All Day Every Hour (for 24 hours)	✓	✓	✓	✓	✓		✓	
AM Peak Every Minute (8 – 9 AM)								✓
Midday Every Minute (1 – 2 PM)				✓				
PM Peak Every Minute (5 – 6 PM)				✓				
Evening Every Minute (7 – 8 PM)						✓		

System Usage

In **January 2015** Car2Go had a fleet of **750 vehicles**
and supported

6,400

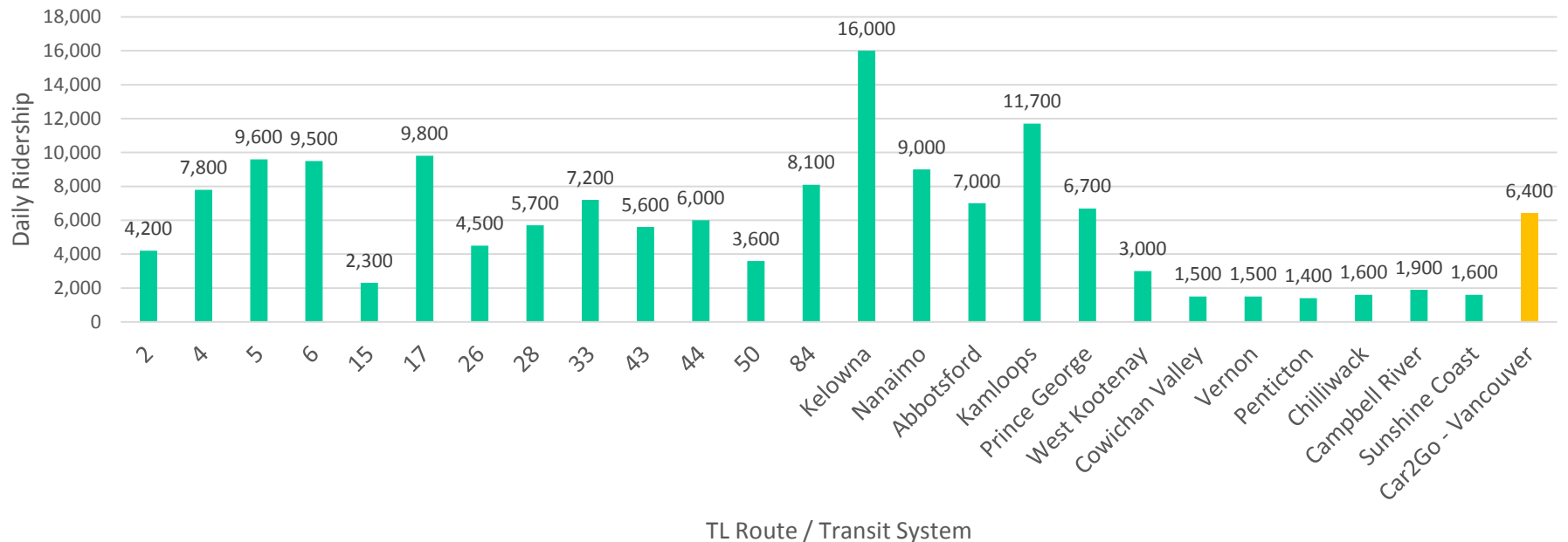
trips in Metro Vancouver each weekday

Or **9 trips per car2go vehicle**

System Usage

- Car2Go carries about as many people each day as TransLink Routes 33 or 44 or the entire Abbotsford or Prince George BC Transit systems

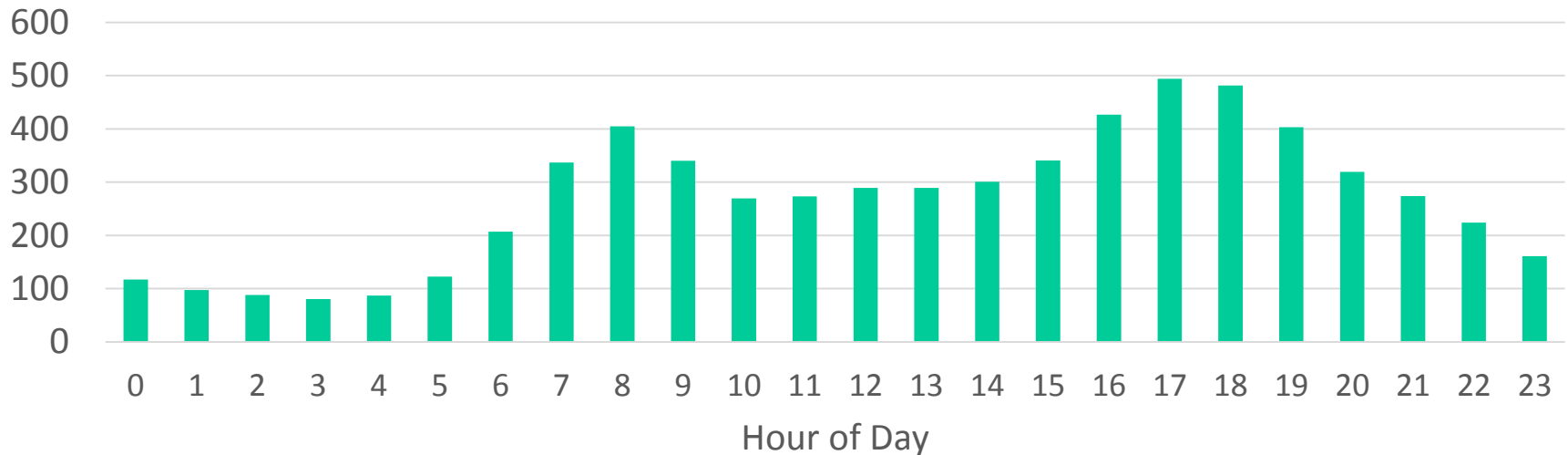
Daily Transit and Car2Go Ridership
Select TL Transit Routes / BC Transit systems



System Usage

- Car2Go system usage exhibits a typical commute-oriented bi-modal pattern with a clear AM and PM peak period
- Significant early evening usage is observed
- System usage is highest in the PM peak and early evening periods (500 trips per hour)

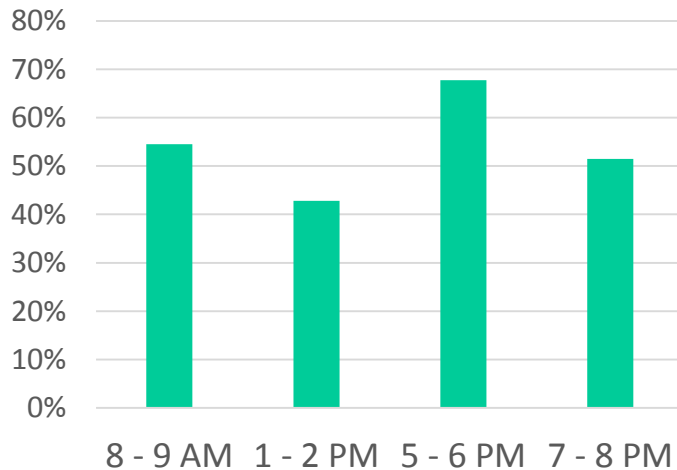
Hourly Trip Starts



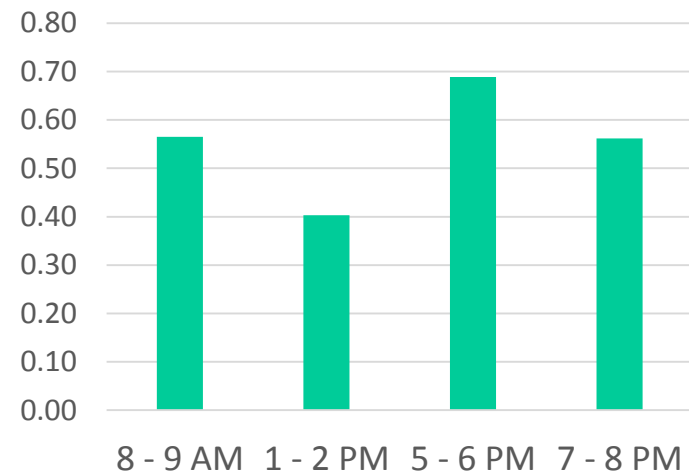
System Usage

- Fleet utilization peaks near 70% in the PM peak period at 0.7 trip per vehicle

Fleet Utilization

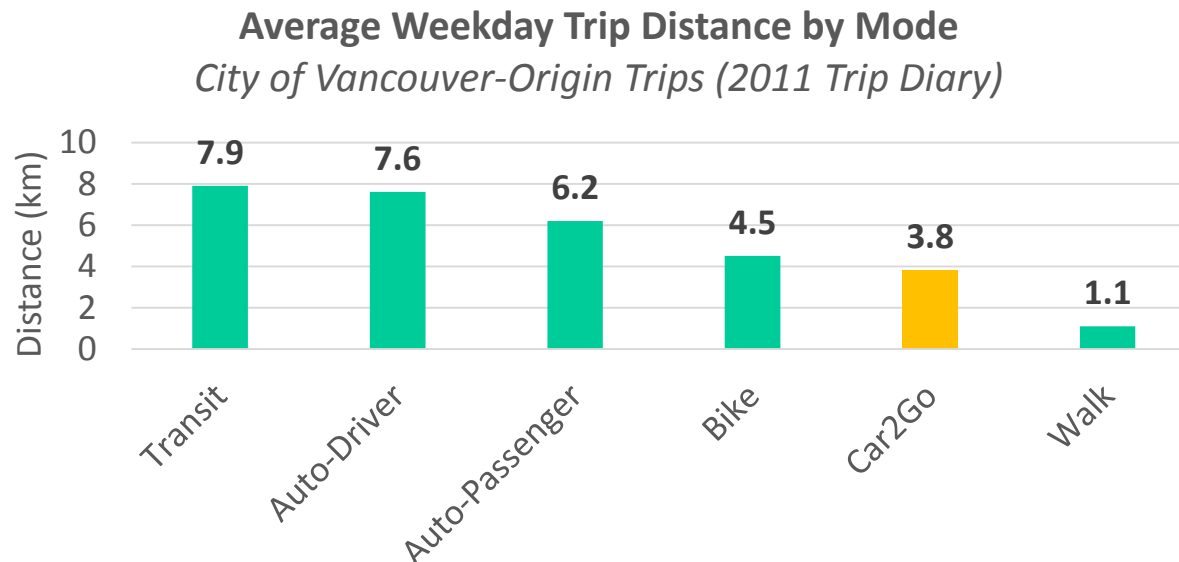


Trips per Vehicle



Average Trip Length

- Car2Go has a **3.8km average trip** length with minor variations between travel periods
- Despite the size of the service area, one-way car sharing is being used for short-distance trips
- Car2Go average trip length is comparable to bicycle trips, and significantly less than transit or auto trips

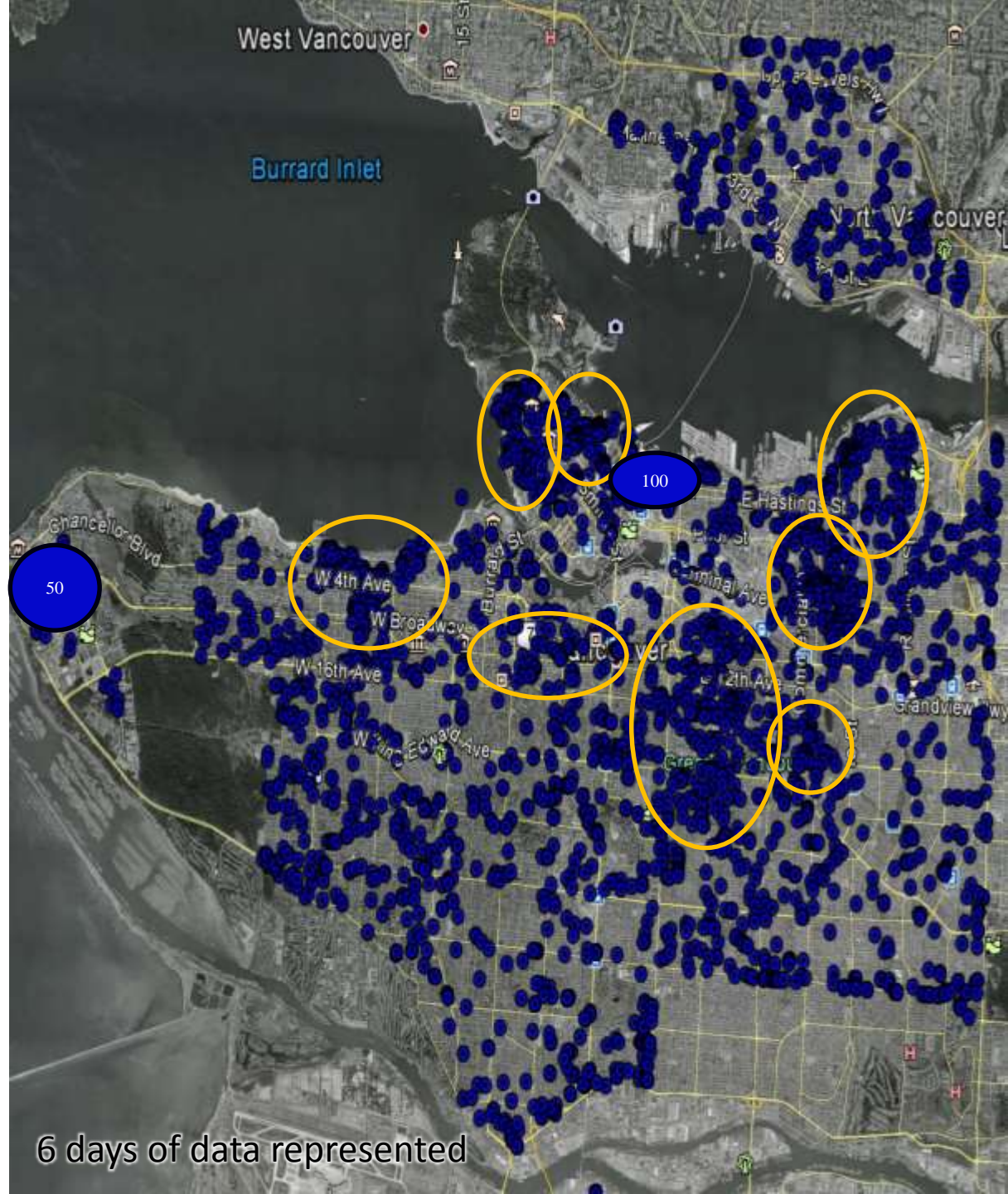


Vehicle Availability Patterns

Vehicle Availability

7 AM

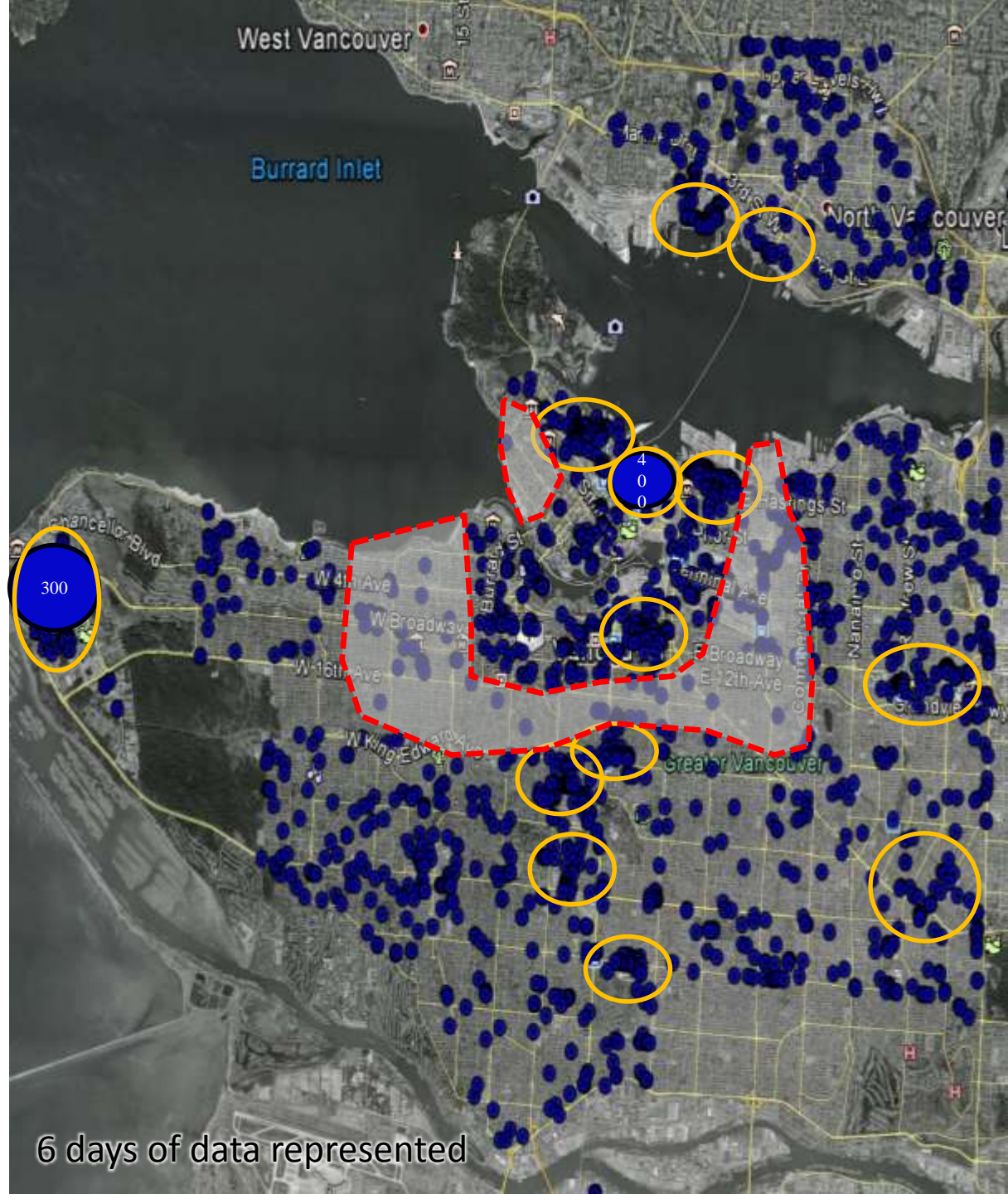
- Available vehicles distributed throughout service area
- Clusters in high density inner residential neighbourhoods:
 - the West End
 - Coal Harbour
 - Commercial Drive
 - Main / Fraser Streets (6th to 33rd)
 - Kitsilano
 - Fairview



Vehicle Availability

10 AM

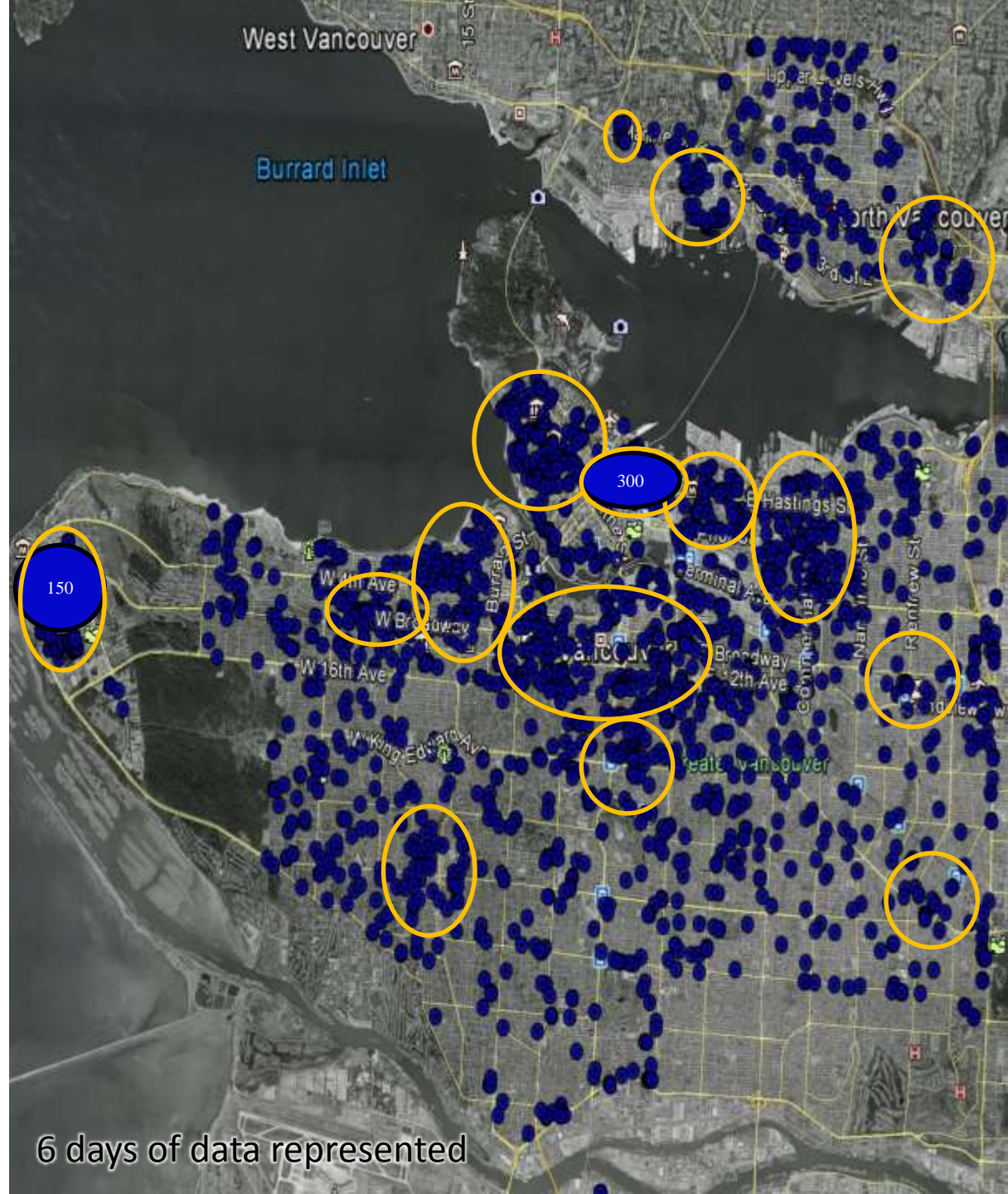
- Significant shift in availability pattern as a result of heavy AM Peak use for commute purposes
- Clustering in employment centres / universities:
 - Downtown
 - UBC
 - Langara
 - central Broadway
 - Coal Harbour
 - Gastown
 - Oak Street Hospitals
 - North Shore Auto Mall
- Evidence of clustering near select SkyTrain stations
- Limited / no availability in high density residential neighbourhoods



Vehicle Availability

4 PM

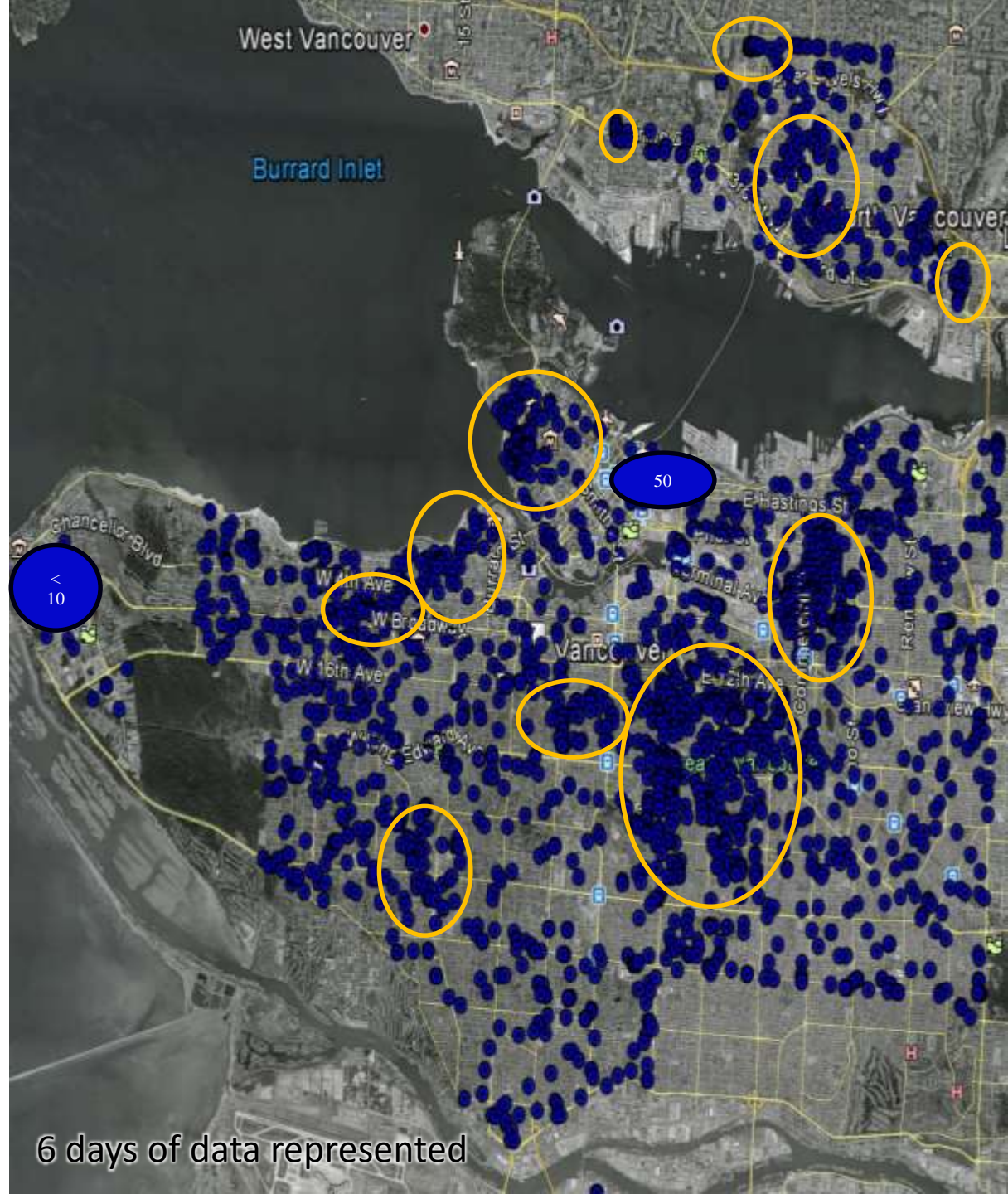
- In the midday, vehicles disperse through the central core as they're used for non-commute oriented travel
- Vehicles are well balanced between employment areas and high density inner residential neighbourhoods



Vehicle Availability

7 PM

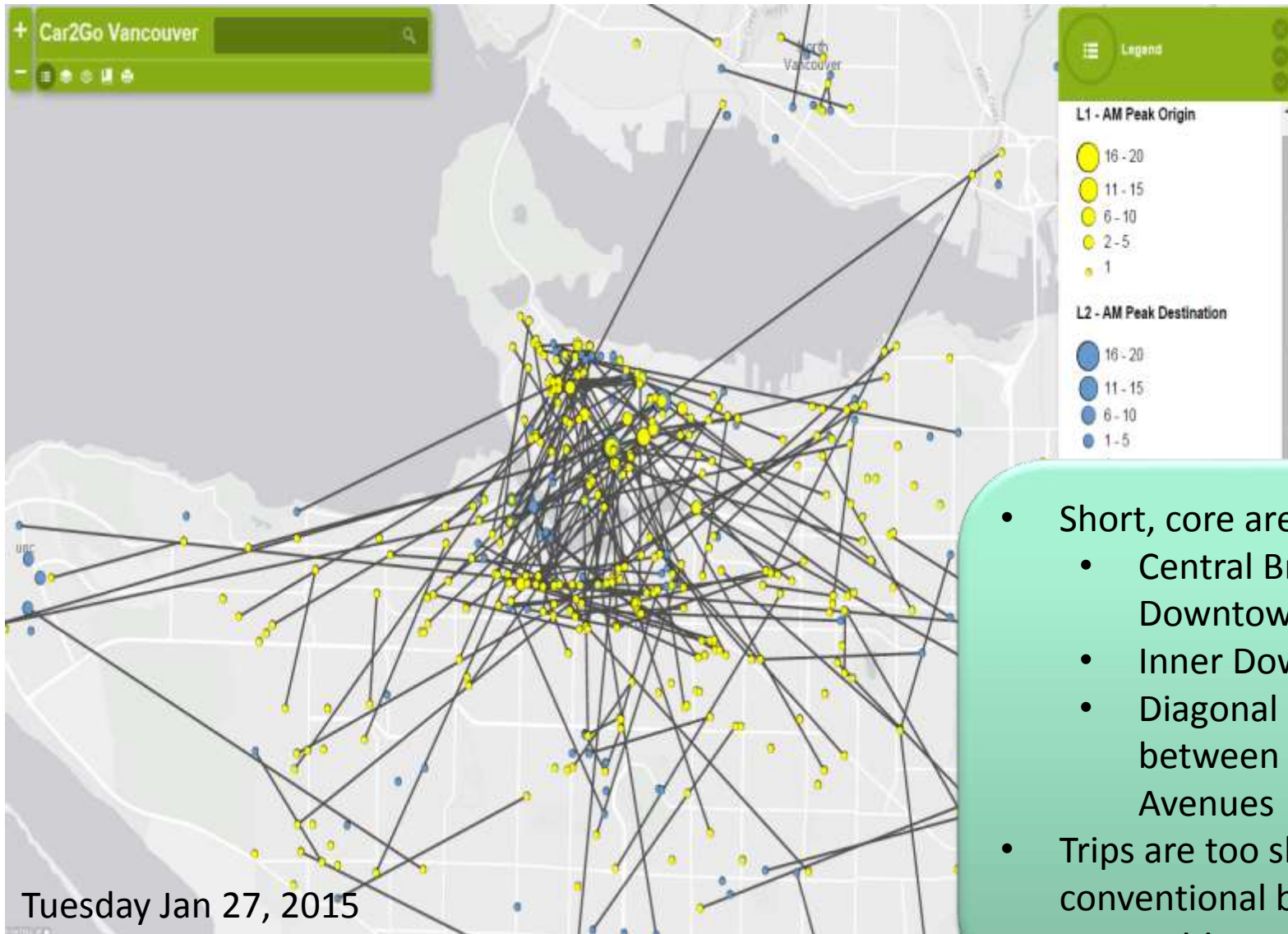
- Vehicles have largely returned to high density inner residential neighbourhoods
- Limited availability Downtown and at UBC
- Some clustering occurring at service area boundaries, particularly on the North Shore



Trip Patterns by Period

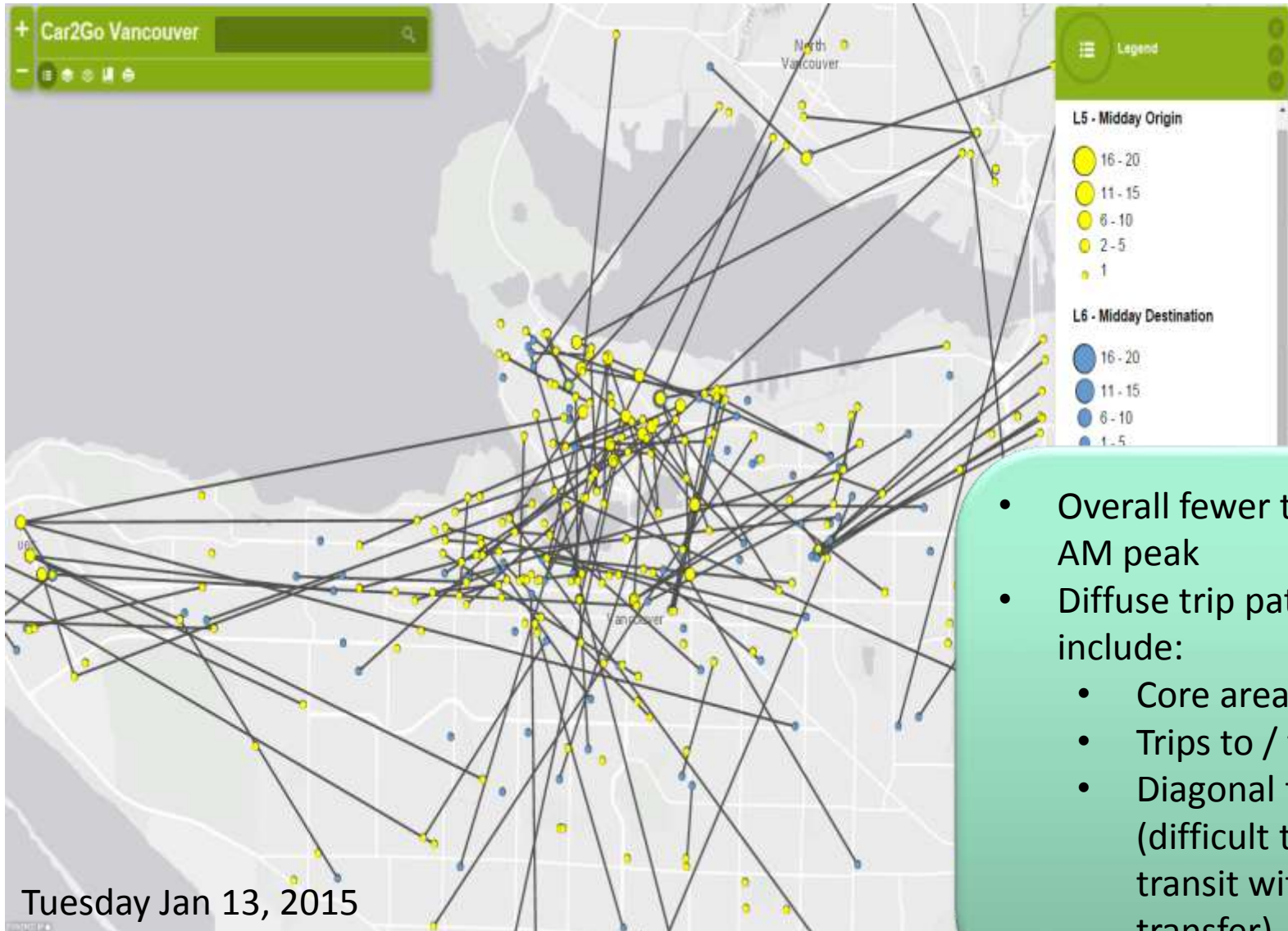
Online interactive webmaps available here: <http://arcg.is/1HhLRQ>

AM Peak (8 AM – 9 AM) O / D and Trip Patterns



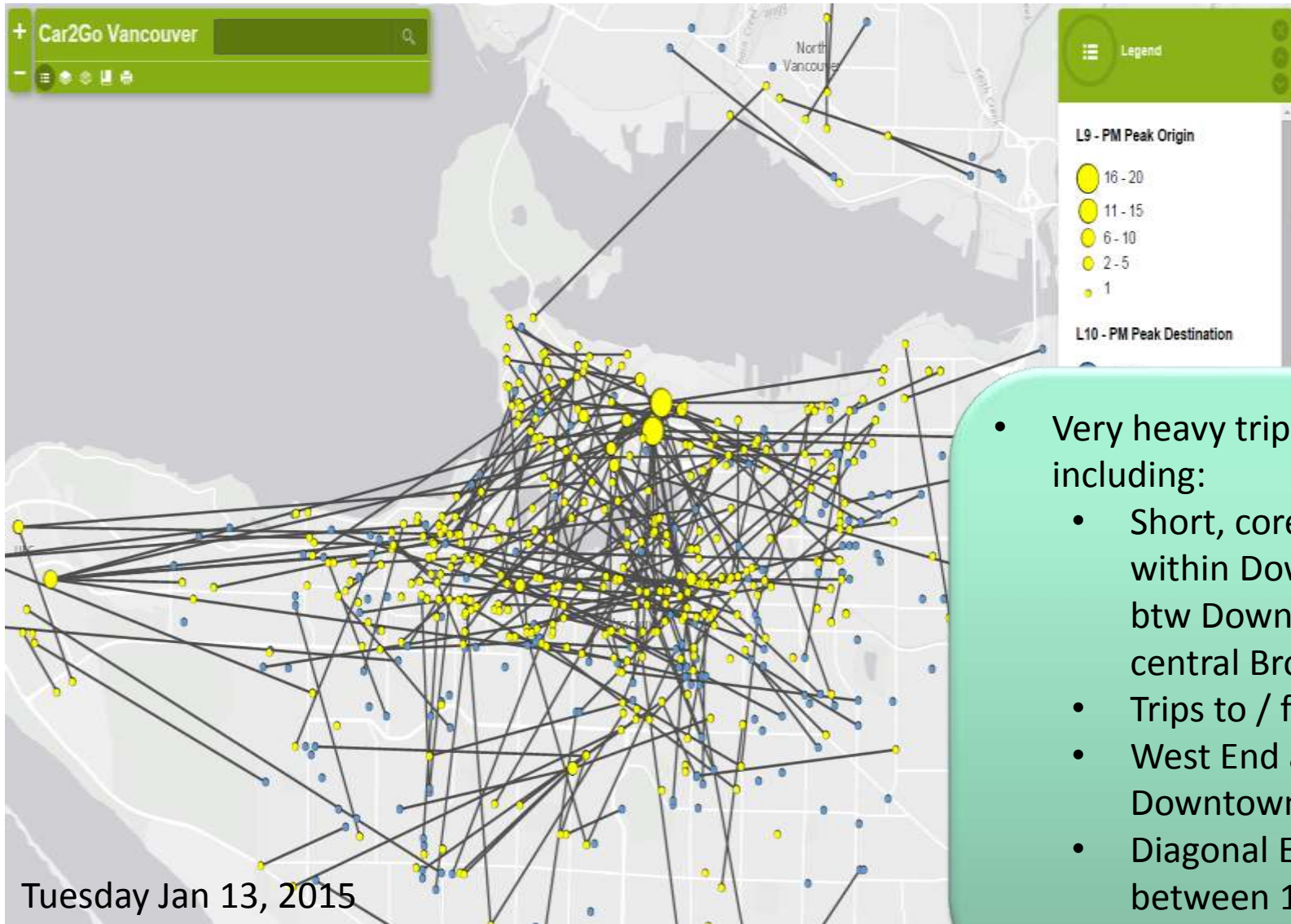
- Short, core area trips
 - Central Broadway – Downtown
 - Inner Downtown
 - Diagonal E-W trips between 16th and 4th Avenues
- Trips are too short for conventional buses to be competitive

Midday (1 PM – 2 PM) O / D and Trip Patterns



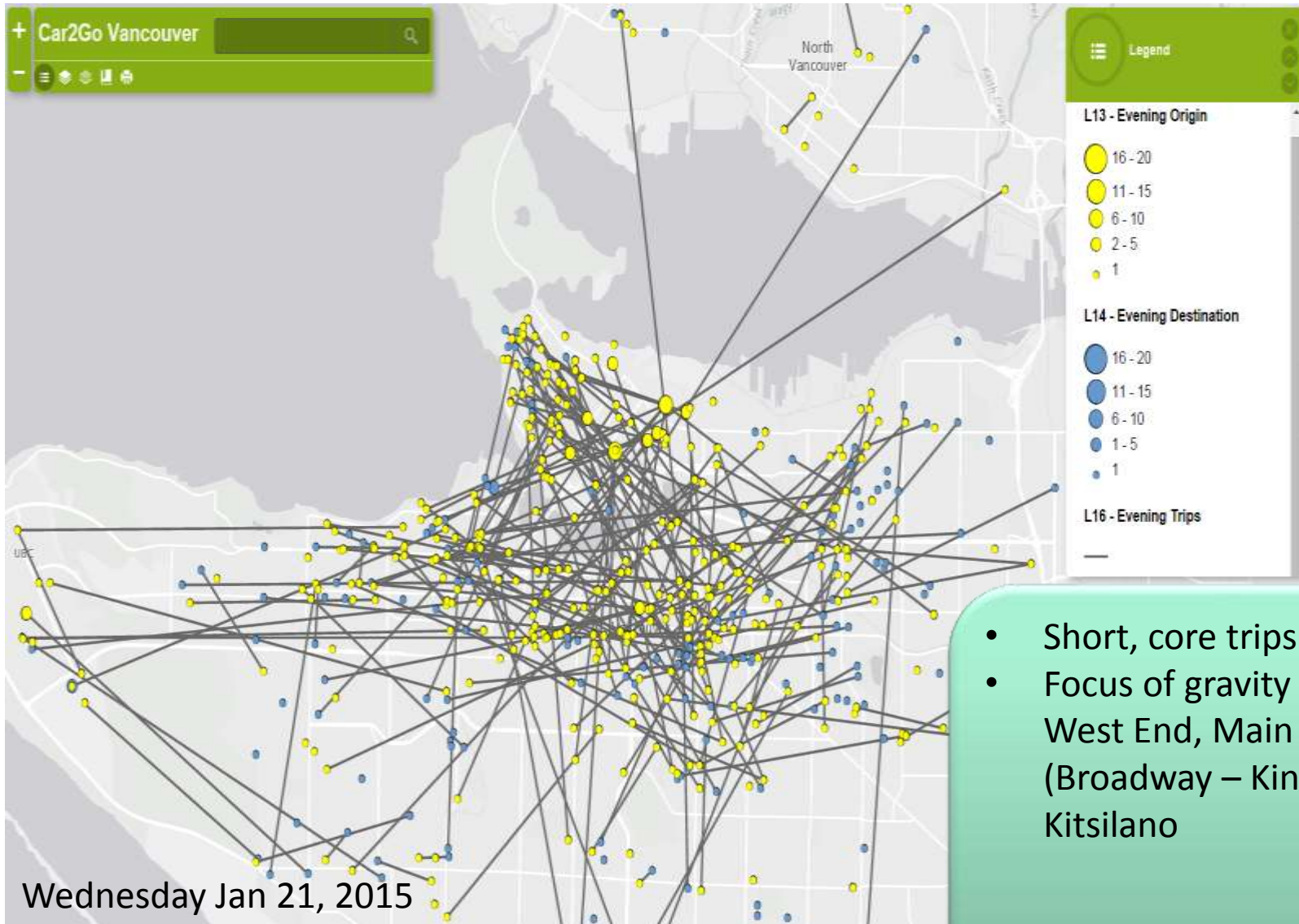
- Overall fewer trips than AM peak
- Diffuse trip patterns include:
 - Core area trips
 - Trips to / from UBC
 - Diagonal trips (difficult to satisfy on transit without a transfer)

PM Peak (5 PM – 6 PM) O / D and Trip Patterns



- Very heavy trip use including:
 - Short, core area trips within Downtown, btw Downtown and central Broadway
 - Trips to / from UBC
 - West End and Downtown to Kits
 - Diagonal E-W trips between 16th and 4th Avenues

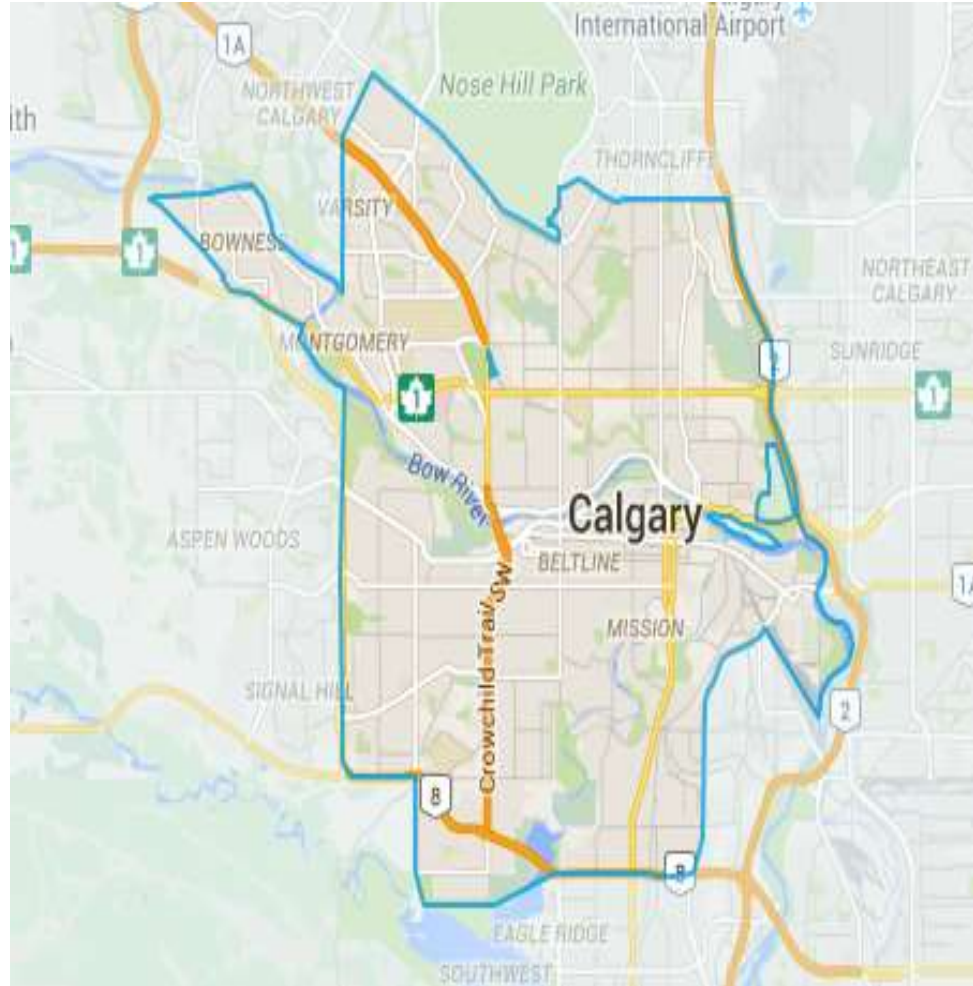
Evening (7 PM – 8 PM) O / D and Trip Patterns



- Short, core trips
- Focus of gravity changes to West End, Main Street (Broadway – King Edward), Kitsilano

Peer Comparison - Calgary

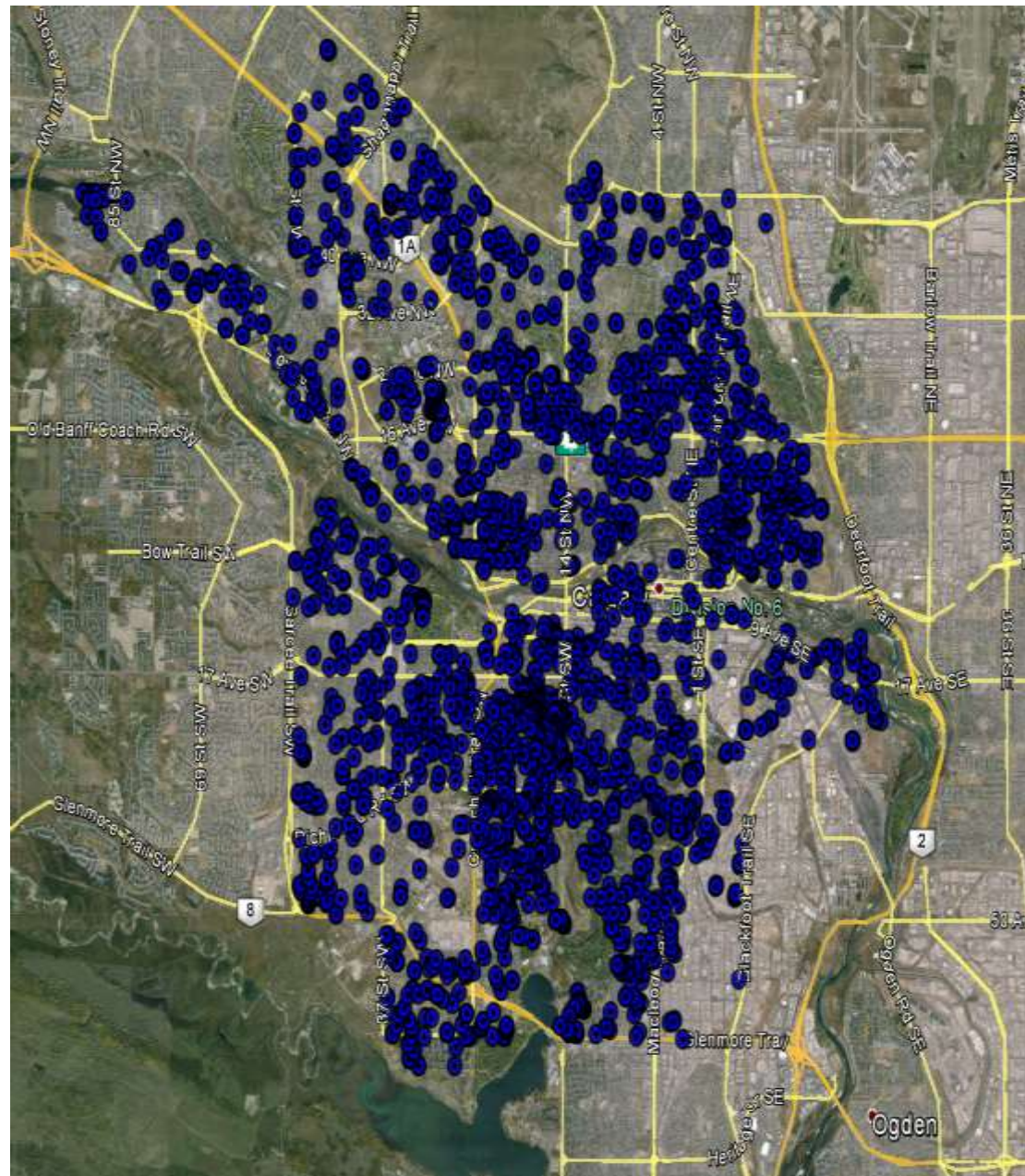
- 550 vehicles
- Park anywhere scheme (including at meters)



Calgary: Vehicle Availability

4 AM

- Clustered in inner city residential neighbourhoods 2 – 4 km from Downtown
- Limited availability Downtown

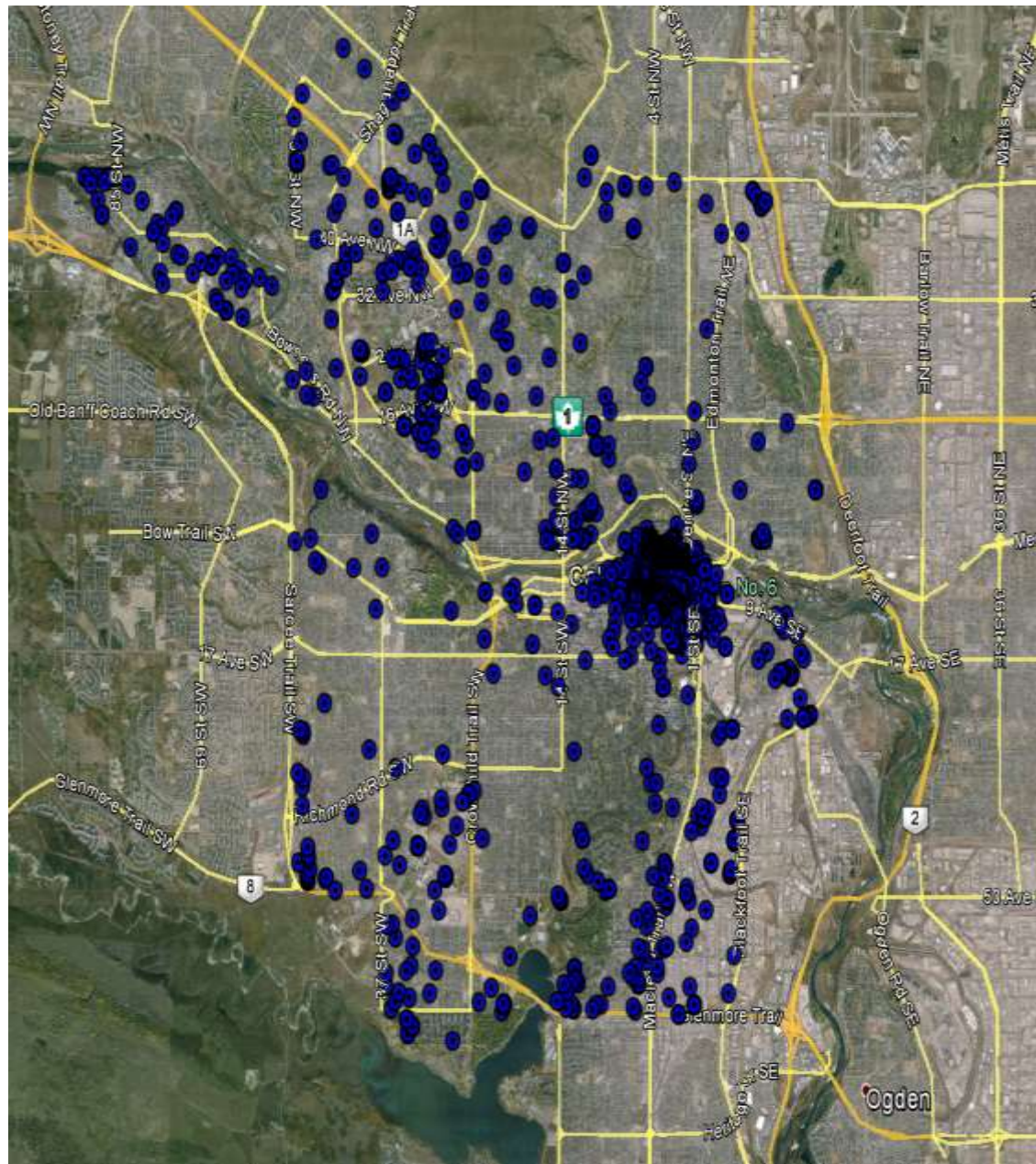


5 week days of data represented; July 2015

Calgary: Vehicle Availability

10 AM

- Almost all vehicles downtown
- Limited availability in inner city residential ring



5 week days of data represented; July 2015

Car Share Economic Benefits

- Car sharing services result in significant economic savings

Vehicle Ownership Costs (Midsize Car / Honda Civic)

Source: BCAA, 2015

Fuel	\$2,086
Insurance	\$1,529
License & Registration	\$43
Depreciation & Maintenance	\$6,729
TOTAL	\$10,343

Car Share Annual Costs

<i>Car share cost</i>	<i>\$0.50 / minute</i>
<i>Assume 2 average 4 km trips (15 mins)</i>	<i>\$15 / day</i>
Annual Car Share Cost	\$5,475 / year
TransLink 1 Zone Pass	\$1,092 / year
TOTAL	\$6,567

\$3,775 savings per person

Car Share Economic Benefits

- Car sharing services results in significant regional economic savings

Regional Benefit	
Savings per private vehicle replaced	\$3,775
Private vehicle reduction per car share vehicle (Source: Metro Vancouver Car Share Study)	4 – 10
Number of Car Share Vehicles in Metro Vancouver	2,130
TOTAL REGIONAL ECONOMIC BENEFIT	\$40 to 70 M

Core Findings

- Car2Go accommodates 6,400 discrete trips each weekday (~9 trips per vehicle per day)
- Significant traditional peak period usage
- Average trip distance: 3.8km
- Despite an extensive service area, most trips occur within central core
- Car share services result in regional savings of \$40 – 70 million per year

Core Findings

- One-way car share supports public transit by catering to short distance travel that is not well suited to transit
- One-way car share trips are occurring in areas where:

Observation	Reason
1. Pay parking policies are in effect or parking is limited	Disincentive to private auto travel
2. Neighbourhood population / employment density is high	Supports high turnover required for success
3. Neighbourhoods support a variety of land uses	Improves turnover; shorter distances to common destinations
4. The public transit network is mature	Lower vehicle ownership rates; established alternatives to driving private vehicles
5. Car share vehicles are readily available	Vehicle ubiquity ensures travel demands can be predictably satisfied; reinforces traveller preference for one-way car sharing as a mode of choice

Acknowledgements: This study would not have been possible without the hard work and ingenuity of Dillan Collins, Bill Gushue, and Jennifer Elliot

Thank you! 😊

Questions / Comments

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