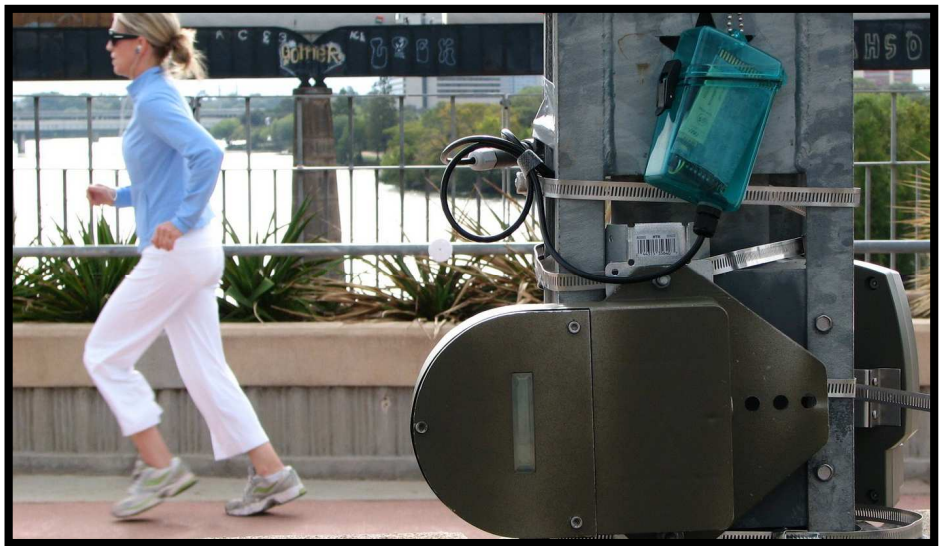
Texas A&M Transportation Institute

Lives, Time and Resources

Data Collection and Analysis for Bicyclists and Pedestrians

Shawn Turner, P.E.

Texas A&M Transportation Institute



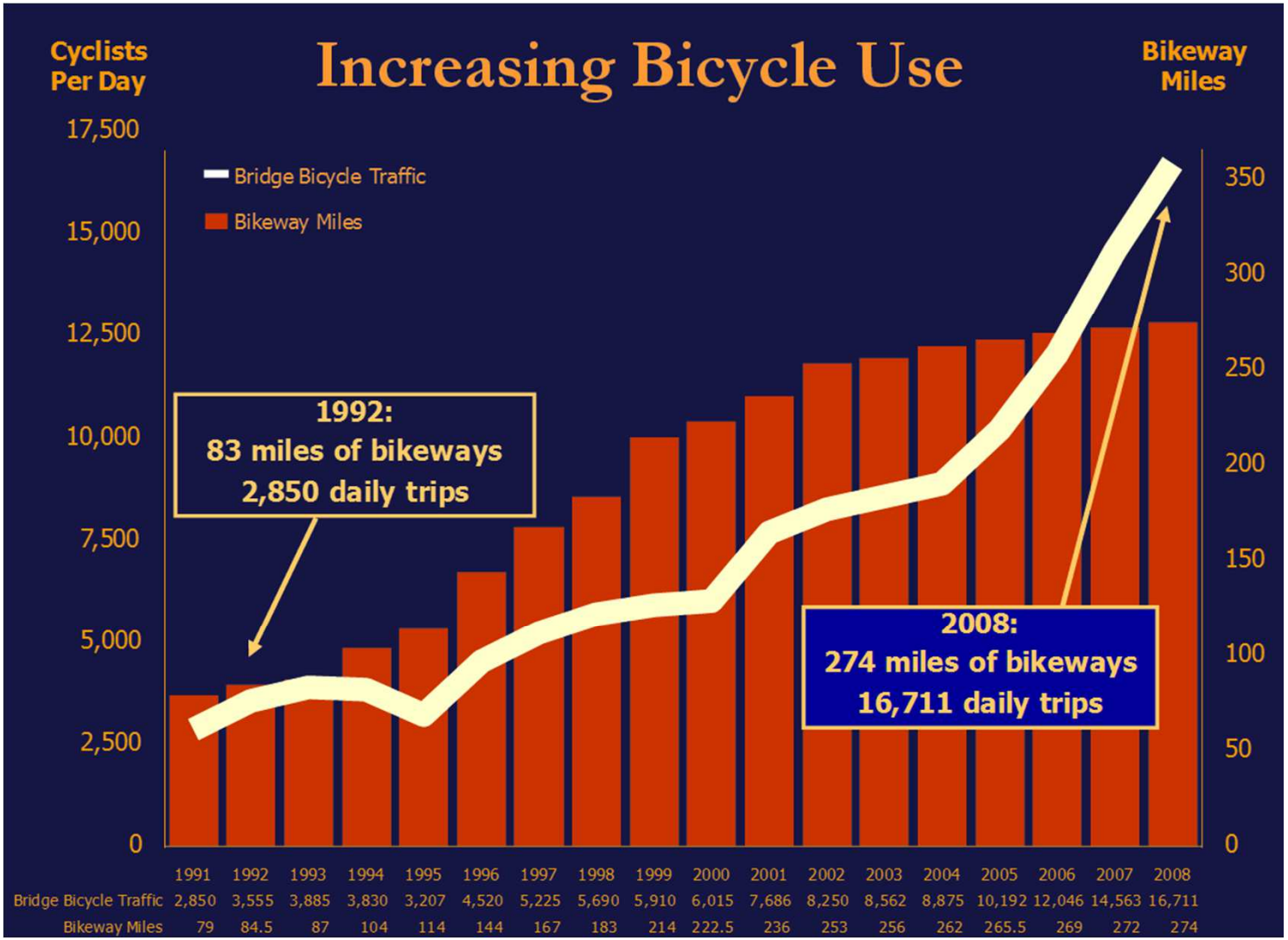
Horwood's Laws of Data*

1. Good data is the data you already have.
2. The data you have for the present crisis was collected to solve the previous crisis.
3. The respectability of existing data grows with elapsed time and distance from the data collector.
4. In complex systems, there is no relationship between information gathered and the decision made.

* As propagated and obfuscated by Mark Hallenbeck, University of Washington

Why is bicycling and walking data important?

- Same reasons as for other modes
  - Support policy decisions/changes
  - Plan for cost-effective investments
  - Design safe facilities and infrastructure
  - Measure performance and progress toward goals
- "What gets measured, gets done"
- "If you're not counted, you don't count"



Source: Roger Geller, City of Portland

Source: http://spacing.ca/montreal/2013/03/10/new-bike-counter-on-laurier-avenue/

Data Collection / Monitoring Cycle

Data Collection / Monitoring Cycle

Start here!

Start here?

Identify Uses and Users

- When collecting data, **ASK**:
  - FOR WHAT DECISIONS?
  - FOR WHOM?
- Basics of systems engineering
  - Define user requirements

Typical uses

- Policy and funding decisions
  - **Are more people biking/walking?**
  - Should we continue to fund?
  - If so, which projects?
- Demand forecasting
- Facility selection
- Facility design
- Operations and maintenance
- Safety analysis and improvement

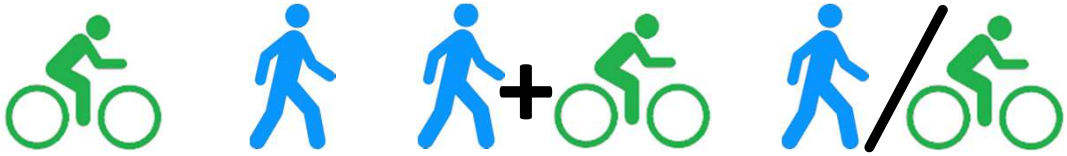
- Avoid collecting data only because:
  - "that's what our program plan lists…"
  - "that's what my boss said to do…"
  - "that's what others are doing…"

Typical users

- Traffic engineers
- Urban planners
- Department/division managers
- Elected officials
- Advocates
- General public
- Detractors

Data Collection / Monitoring Cycle

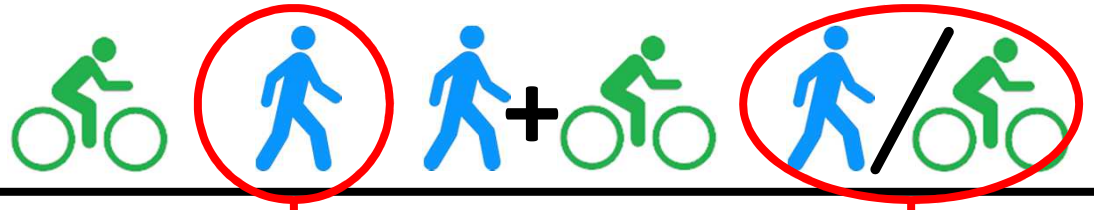
1. What Are You Counting?



	Technology	Bicyclists Only	Pedestrians Only	Pedestrians & Bicyclist Combined	Pedestrians & Bicyclist Separately	Cost
Permanent	Inductance Loops[1]	●			◐	$$
↑	Magnetometer[2]	○				$-$$
	Pressure Sensor[2]	○	○	○	○	$$
	Radar Sensor	○	○	○		$-$$
	Seismic Sensor	○	○	○		$$
2. How Long?	Video Imaging: Automated	○	○	○	○	$-$$
	Infrared Sensor (Active or Passive)	○[3]	●	●	◐	$-$$
	Pneumatic Tubes	●			◐	$-$$
↓	Video Imaging: Manual	○	○	○	●	$-$$$
Temporary/ Short Term	Manual Observers	●	●	●	●	$$-$$$

○ Indicates what is technologically possible.
● Indicates a common practice.
◐ Indicates a common practice, but must be combined with another technology to classify pedestrians and bicyclists separately.
$, $$, $$$: Indicates relative cost per data point.
[1] Typically requires a unique loop configuration separate from motor vehicle loops, especially in a traffic lane shared by bicyclists and motor vehicles.
[2] Permanent installation is typical for asphalt or concrete pavements; temporary installation is possible for unpaved, natural surface trails.
[3] Requires specific mounting configuration to avoid counting cars in main traffic lanes or counting pedestrians on the sidewalk.

1. What Are You Counting?



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Pneumatic Tubes	●			◐	$-$$
Video Imaging: Manual	○	○	○	●	$-$$$
Manual Observers	●	●	●	●	$$-$$$

Guadalupe Mountains National Park

Mission Reach Trail, San Antonio Missions NHP

Permanent

2. How Long?

Temporary/ Short Term

○ Indicates what is technologically possible.

● Indicates a common practice.

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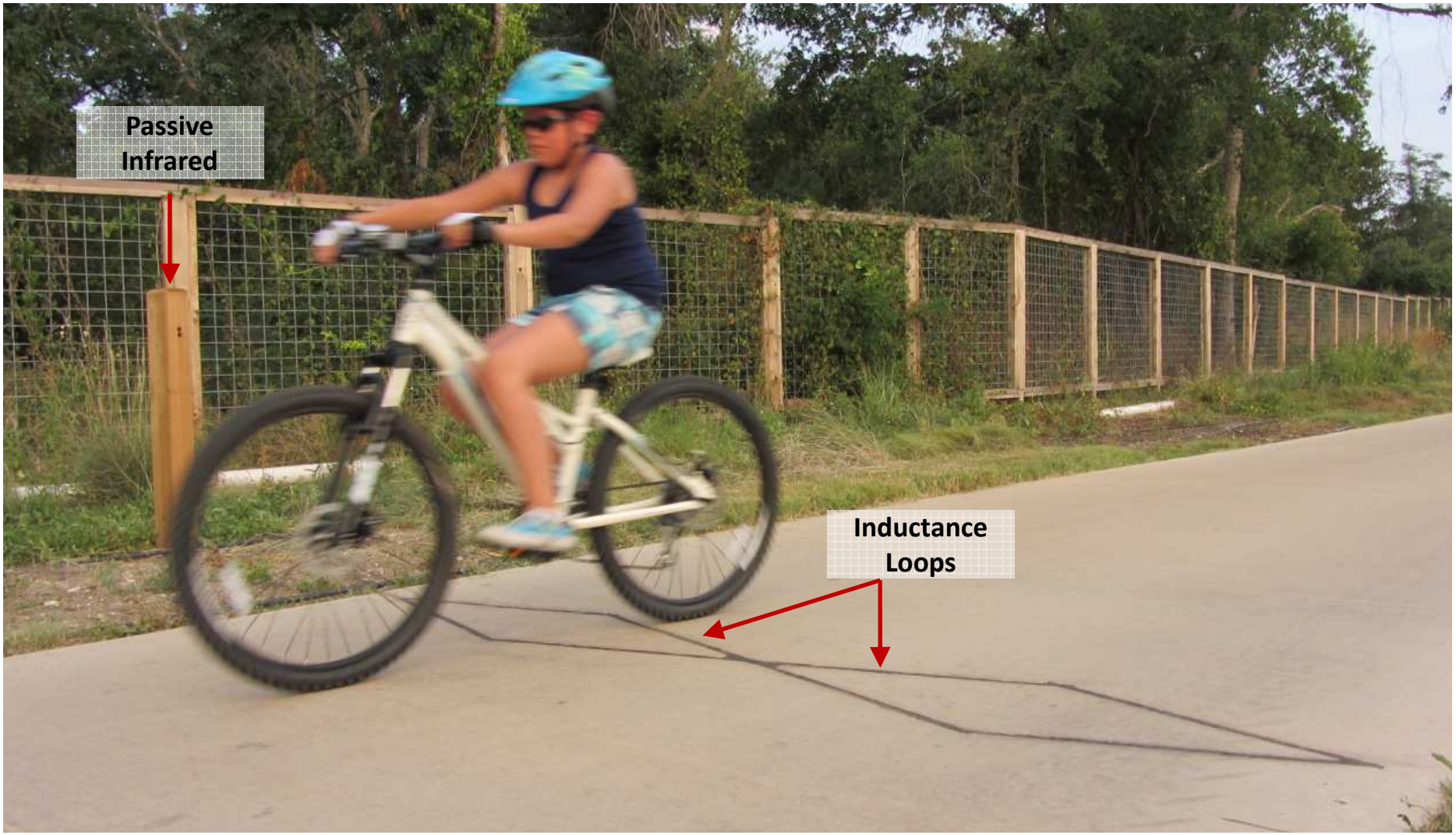
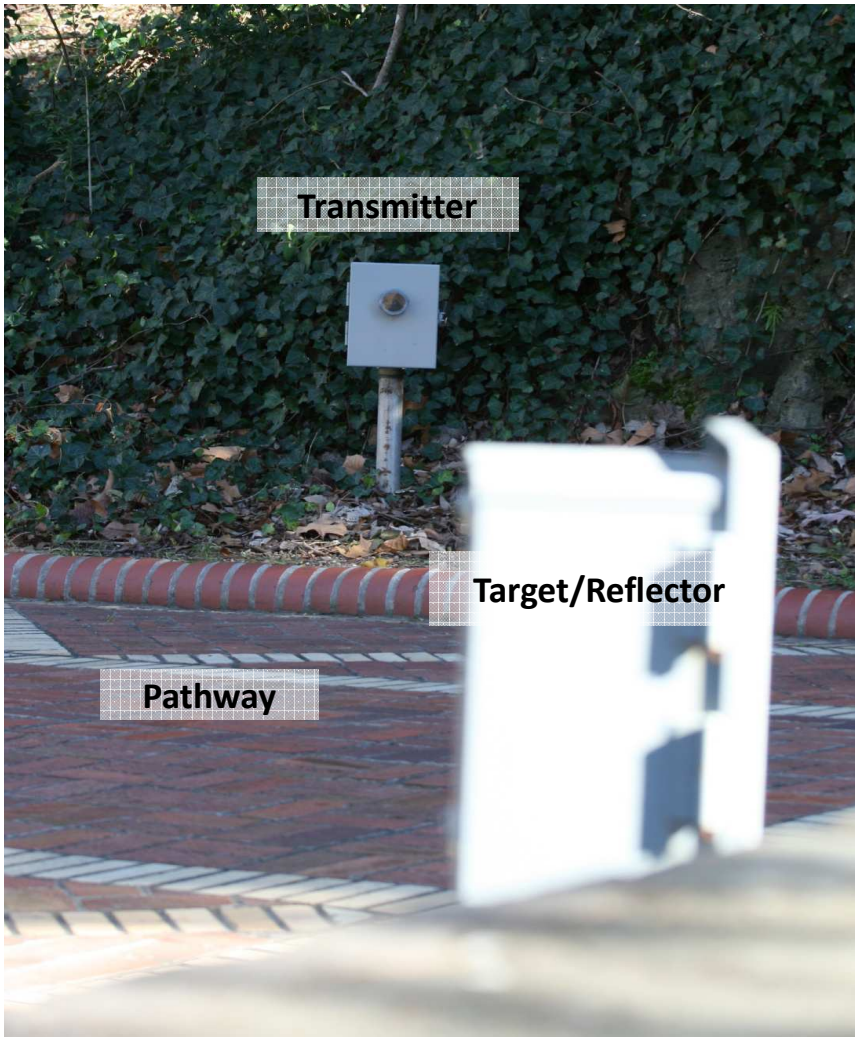
Inductance Loops

Passive Infrared

Inductance Loops + Passive Infrared



Active Infrared



Magnetometer

Pneumatic Tubes

Source: J.F. Rheault, Eco-Counter

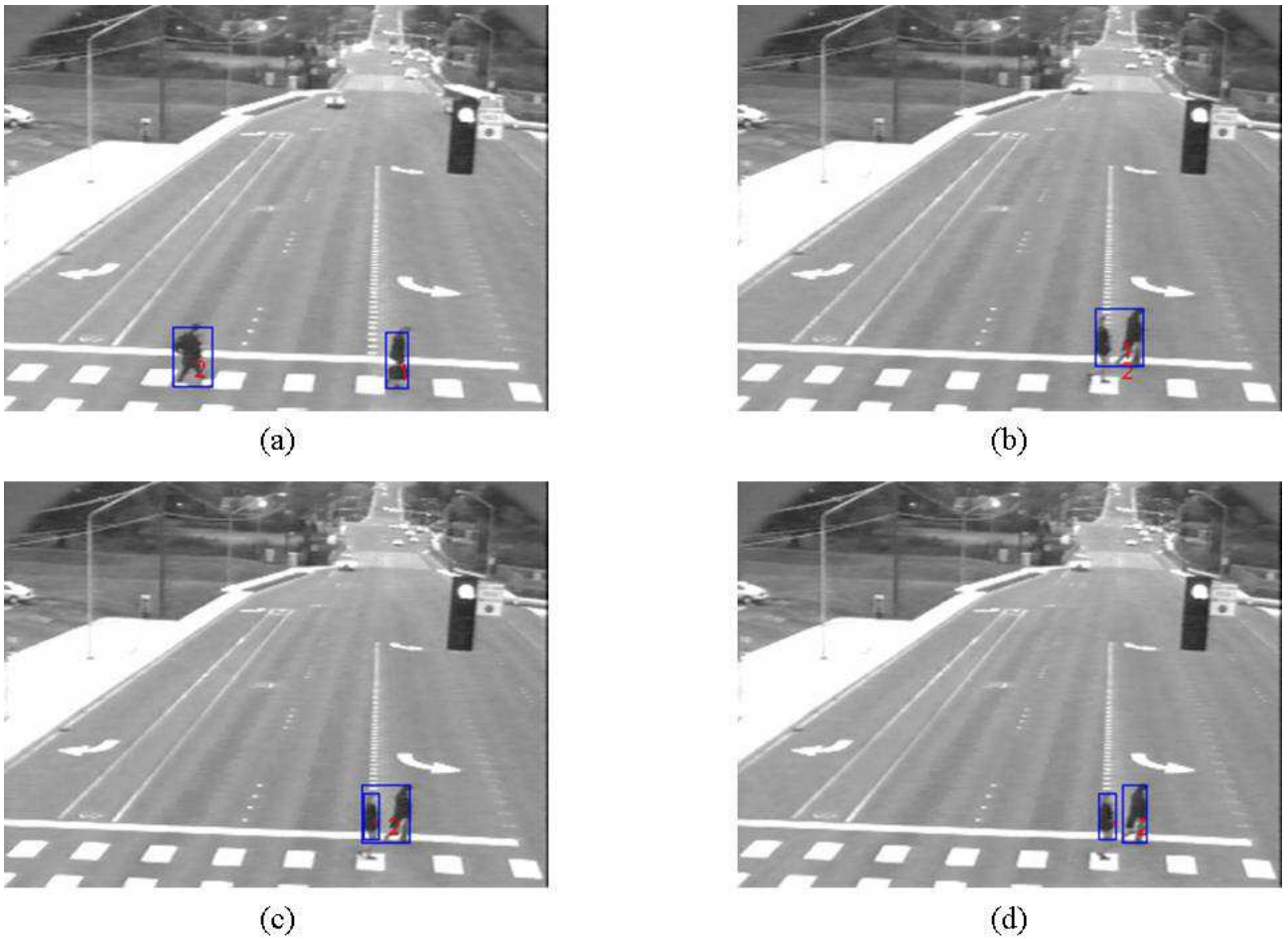
Pressure Sensor

Natural surface trail

Paved surface trail

Source: J.F. Rheault, Eco-Counter

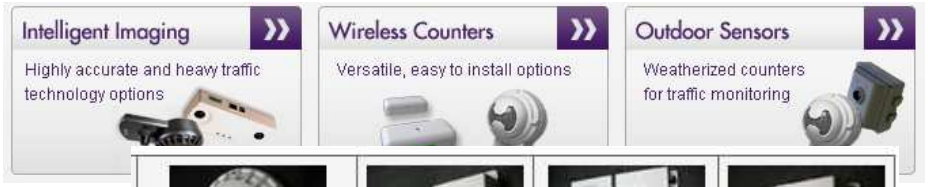
Video Image Processing

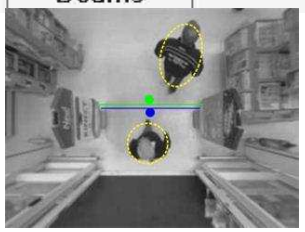


Source: Malinovskiy, Zheng, and Wang, 2009

Counting Technology from other Domains

- Retail/shopping
  - SenSource, Traf-Sys, Trax, Alpha Vision Design, etc.
- Security
  - TYZX, Cognex, Wavestore, etc.
- Automotive systems (FLIR)
  - Bosch, Raytheon, Mobileye, Omron, etc





Fundamentally Different Counting Methods

- Smart phone / mobile device
- Wide-area video/surveillance
- Remote sensing

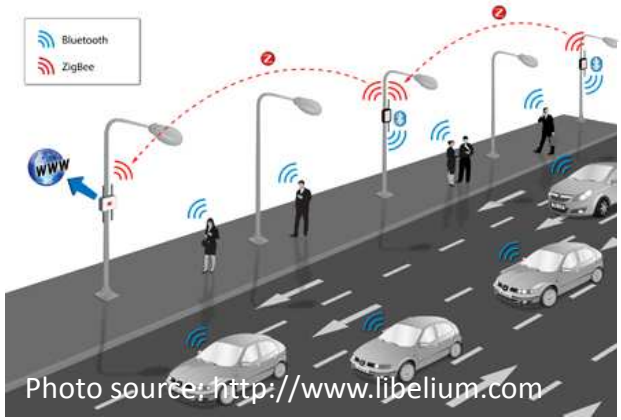


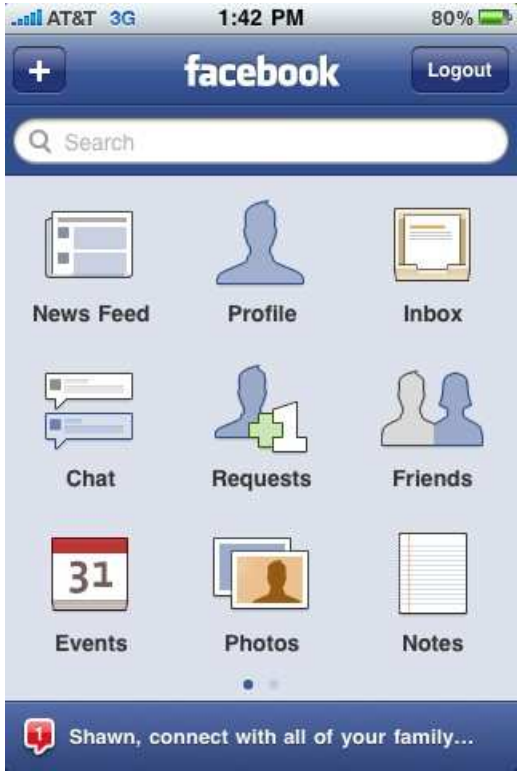
Photo source: http://www.libelium.com


Photo source: National Park Service

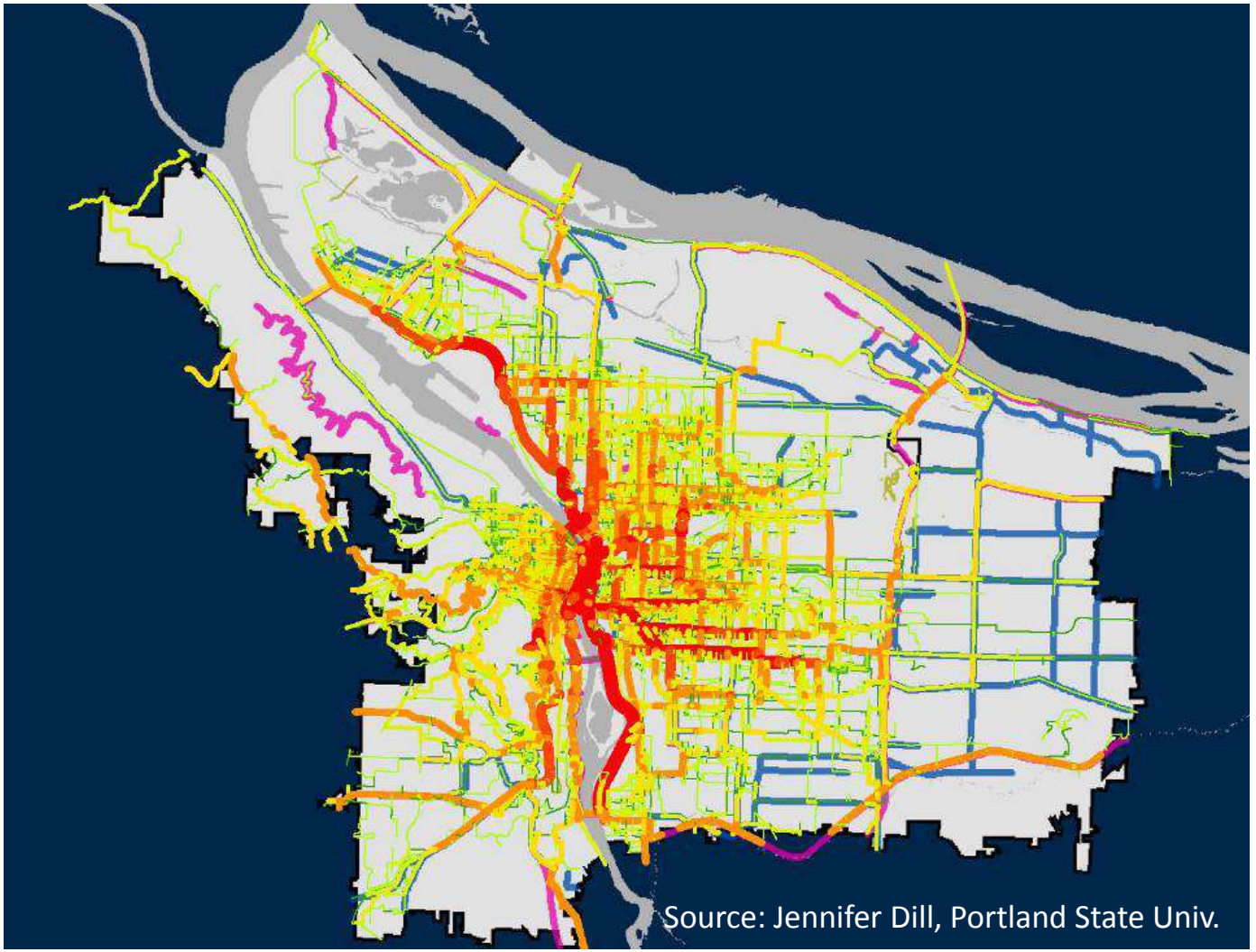
2009 Obama Inauguration: 1.5 million people (est.)

Crowd Source Data

- Pocket-sized, location-aware mobile devices + crowd sourcing and social media



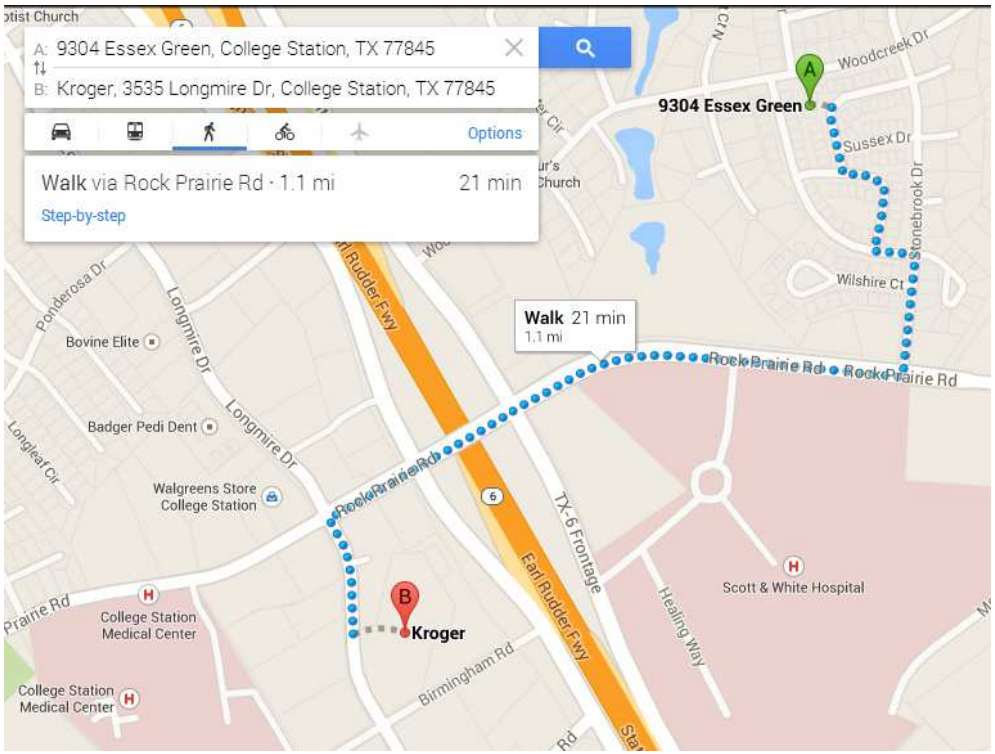
Most Popular Routes

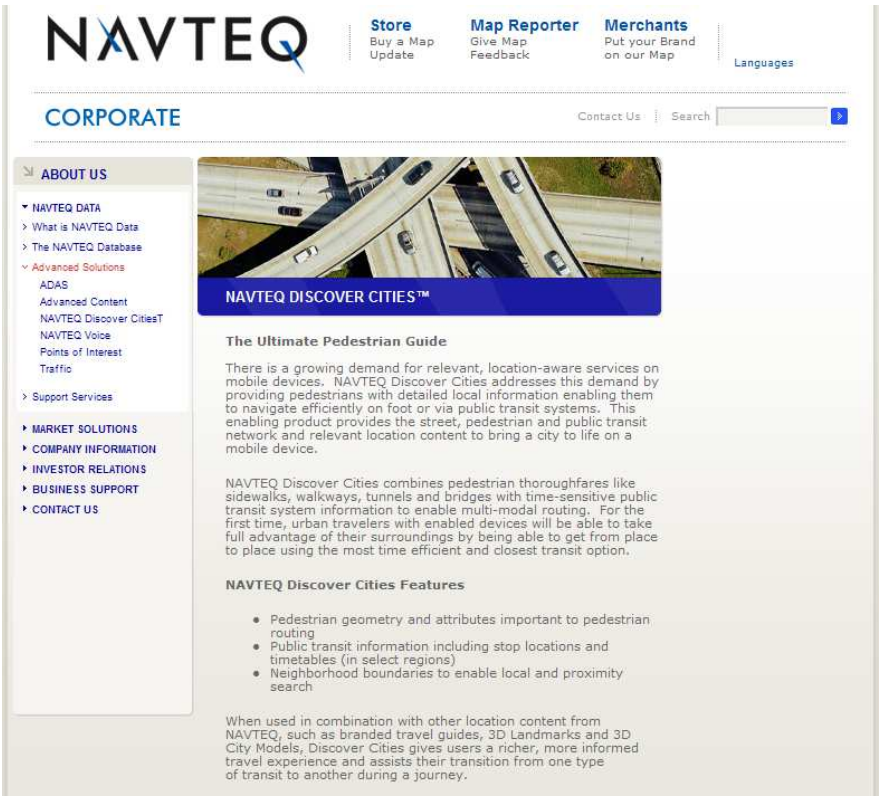


Source: Jennifer Dill, Portland State Univ.

Influence of Big Data

- Map and navigation industry efforts



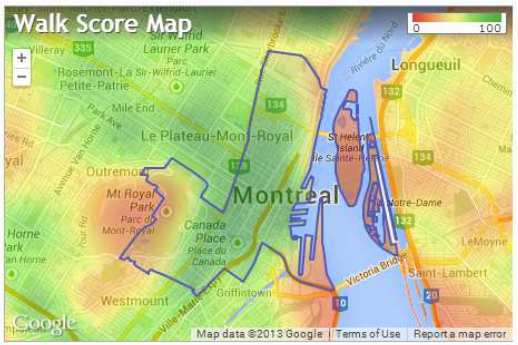


Influence of Big Data

Walk Score 91

Walker's Paradise

Daily errands do not require a car.



Daily errands do not require a car in Ville-Marie.

Ville-Marie is the 2nd most walkable neighborhood in Montréal with a Walk Score of 91.

The best Montréal neighborhoods for walkability are Plateau-Mont-Royal, Ville-Marie and Outremont.

Ville-Marie Neighborhood Ranking

Compare Ville-Marie to other Montréal neighborhoods.

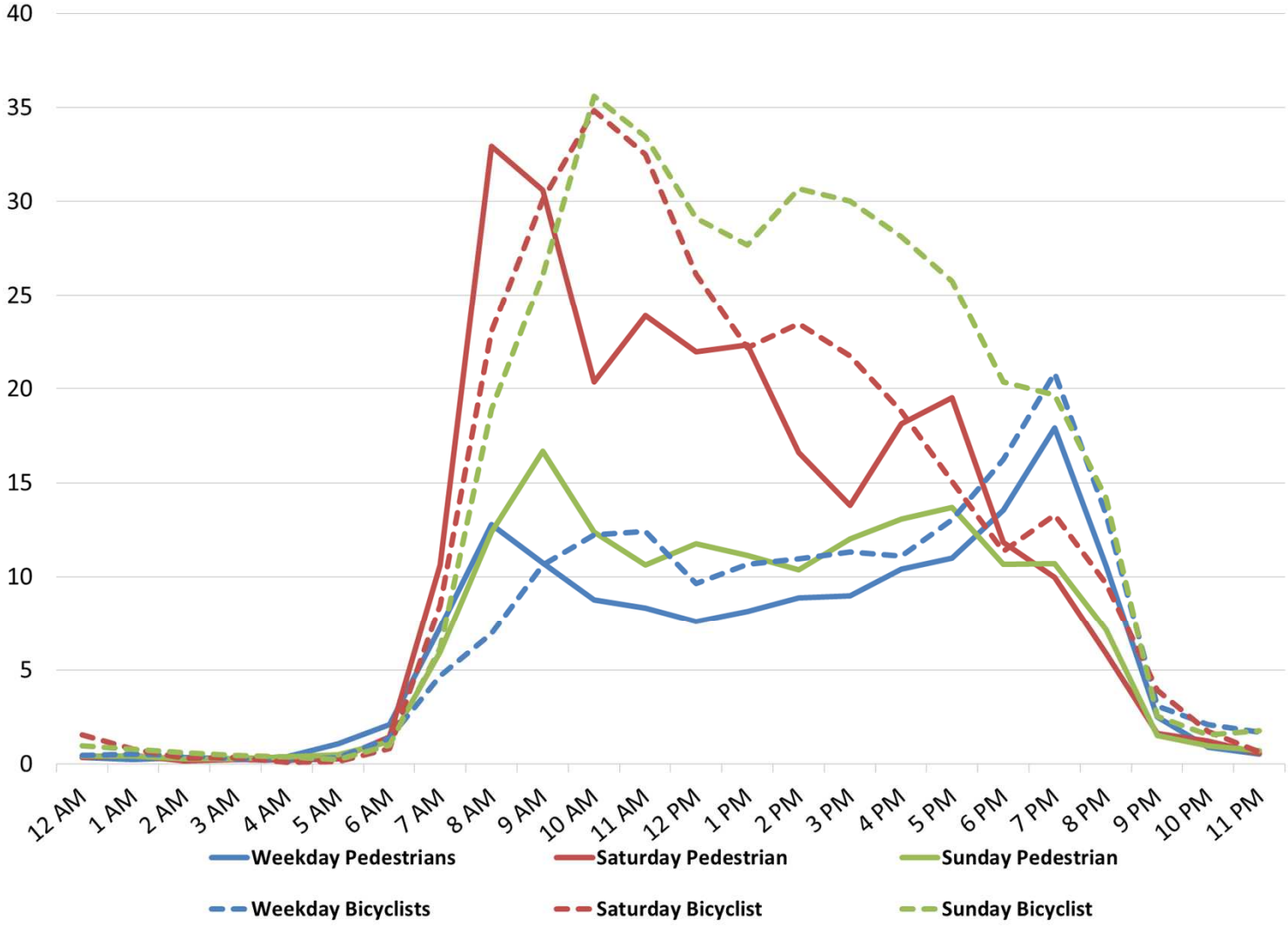
Rank	Name	Walk Score	Transit Score	Bike Score	Population
1	Plateau-Mont-Royal	93	-	-	100,741
2	**Ville-Marie**	**91**	-	-	**83,877**
3	Outremont	84	-	-	23,019
4	Cote-des-Neiges--Notre-Dame-de-Grace	82	-	-	164,446
5	Rosemont--La-Petite-Patrie	81	-	-	133,829

View all Montréal neighborhoods

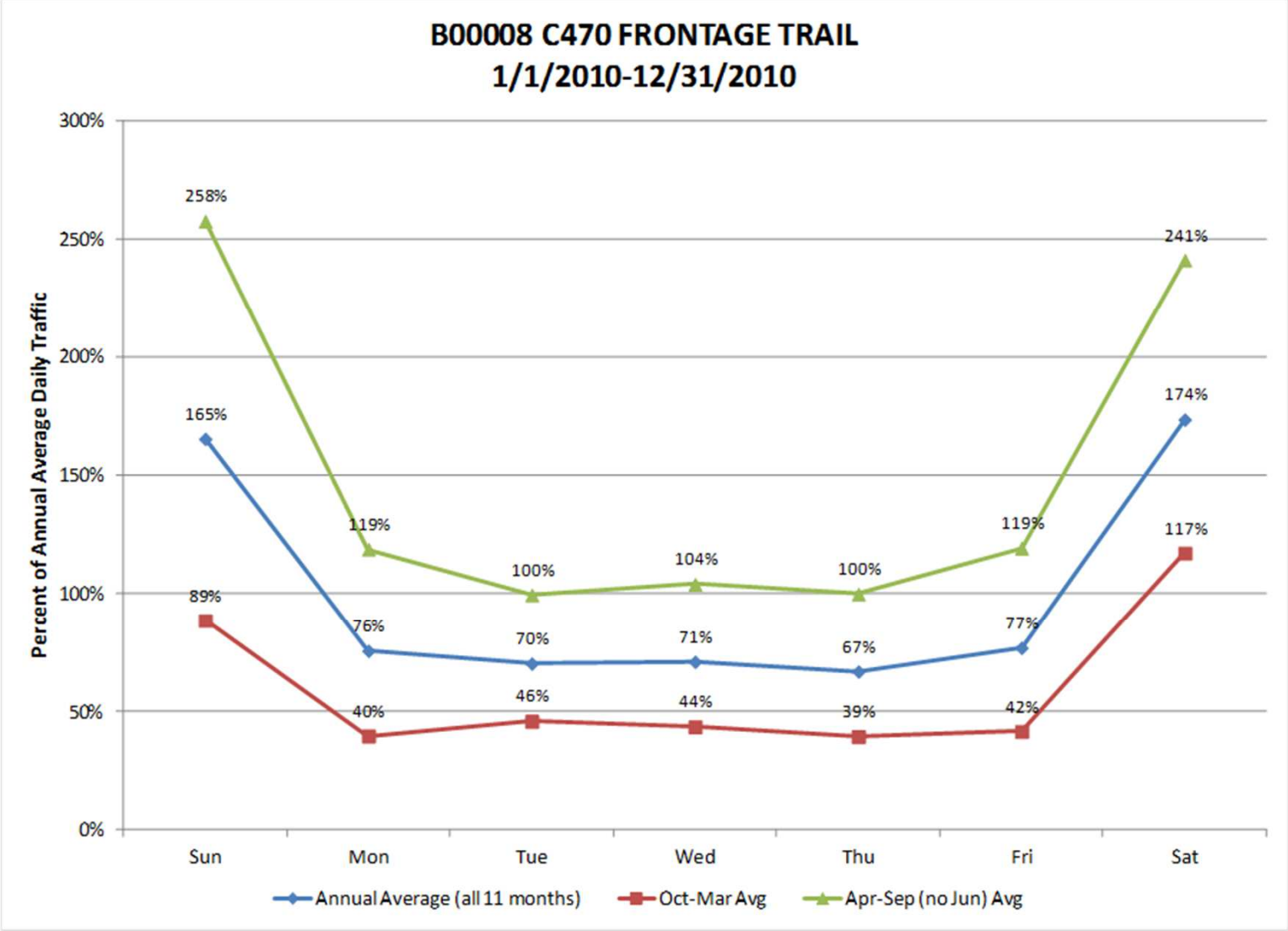
See Walk Score rankings for all cities

Data Collection / Monitoring Cycle

Counts by Time-of-Day



Counts by Day-of-Week



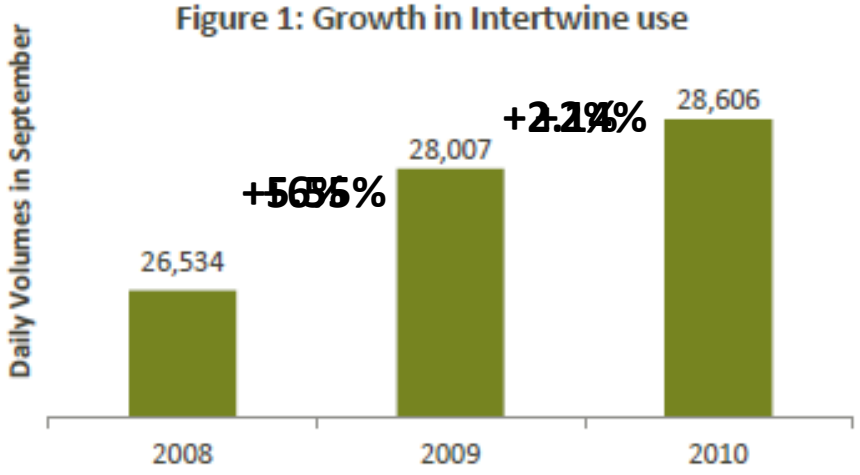
Communicate (not just Report)

Figure 1: Adjusted annual trails count

Trail/Pathway	Estimated Monthly visits/trips*	Estimated Annual visits/trips*
Burnt Bridge Creek Trail	20,316.00	**253,955.00**
Columbia River Renaissance Trail	78,932.00	**986,645.00**
Frenchman's Bar/Vancouver Lake Trail	11,046.00	**138,073.00**
I205 Pathway	10,472.00	**130,901.00**
I5 Pathway	7,056.00	**88,197.00**
Lacamas Heritage Trail	19,935.00	**249,192.00**
Padden Parkway Pathway	8,290.00	**103,622.00**
Salmon Creek Trail	48,955.00	**611,937.00**

*Data adjusted per National Bicycle & Pedestrian Documentation Project Count Adjustment Factors March 2009

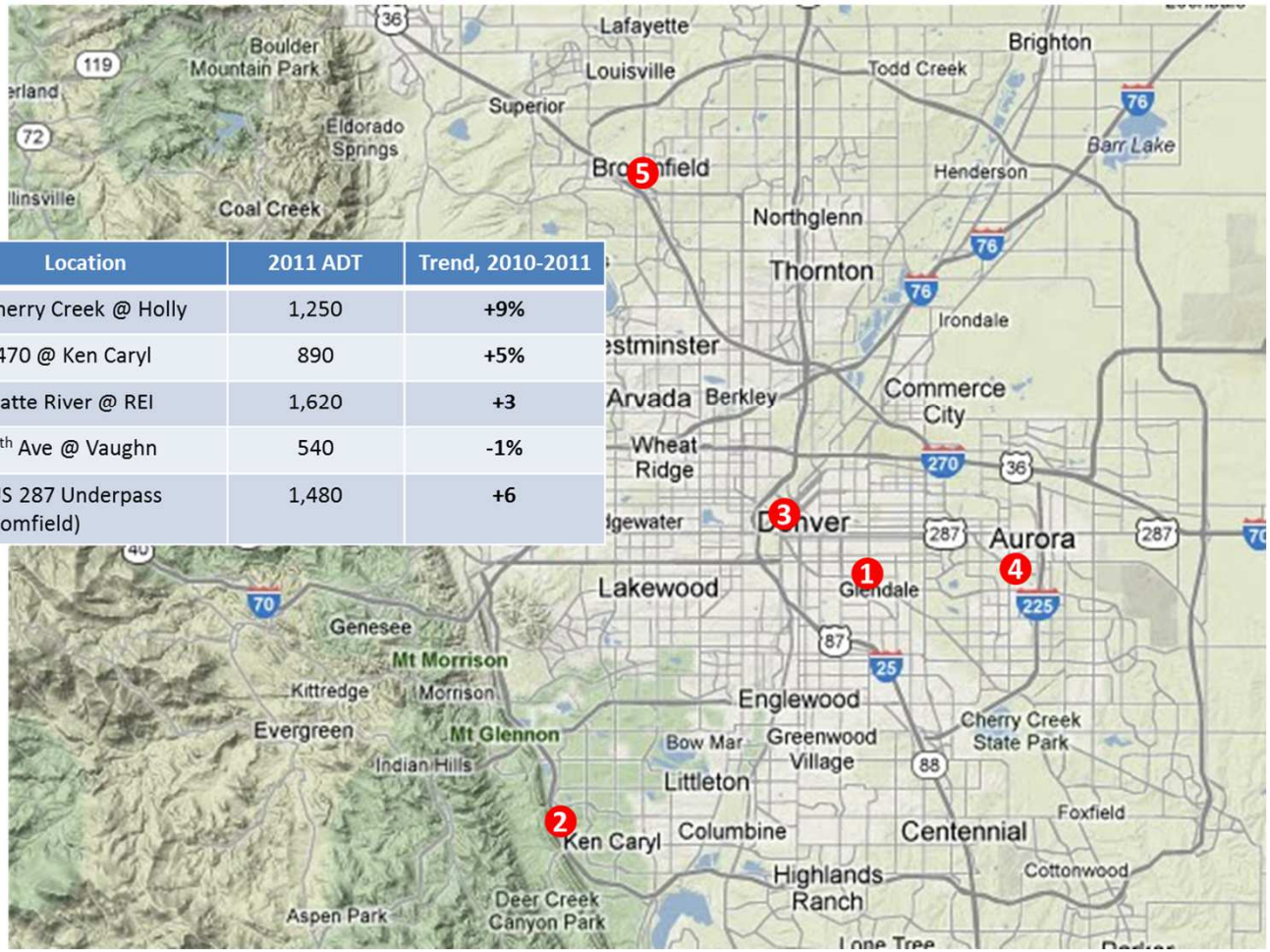
Figure 1: Growth in Intertwine use



Map-Based Trends

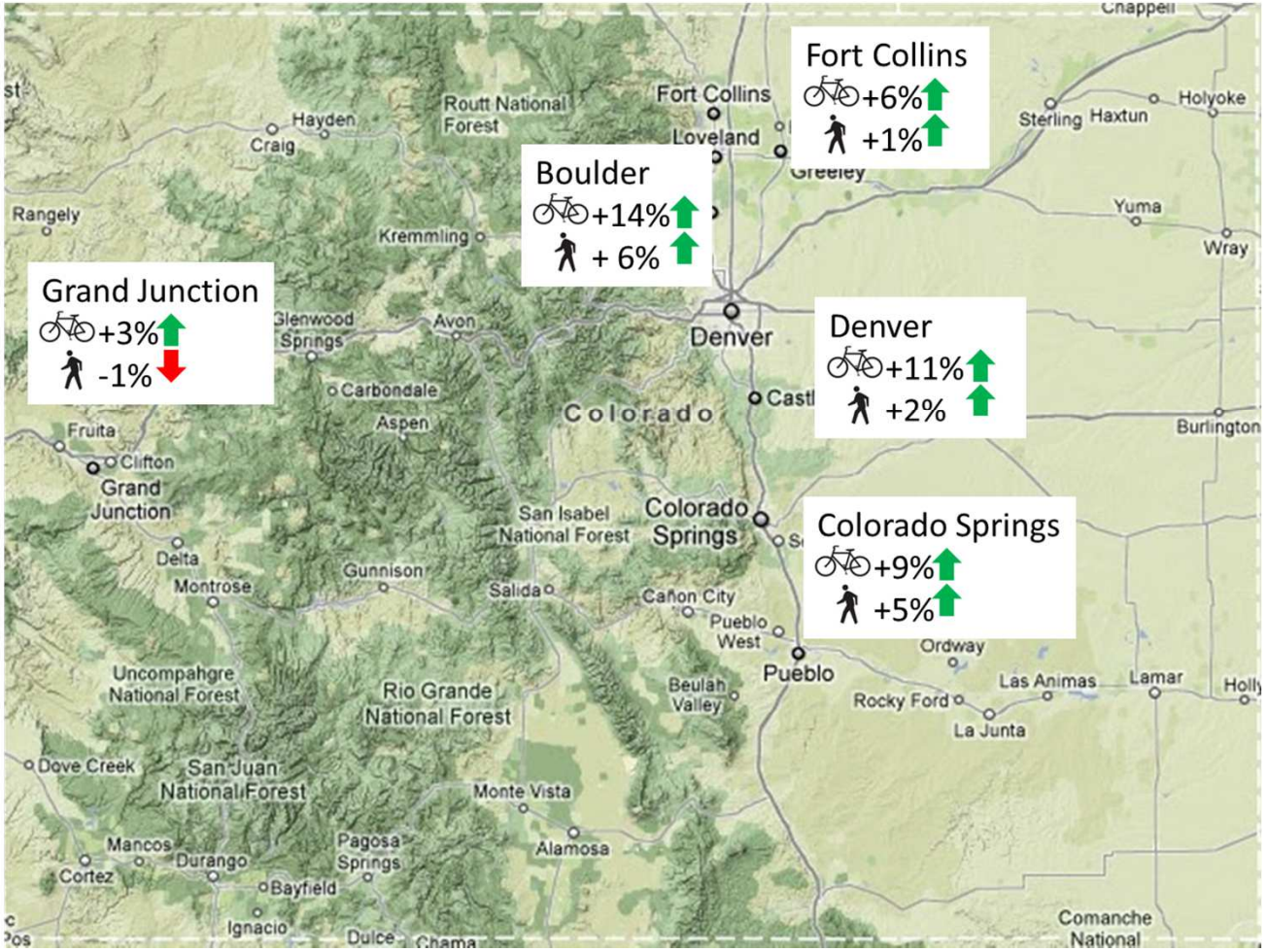
Biking and Walking in Denver

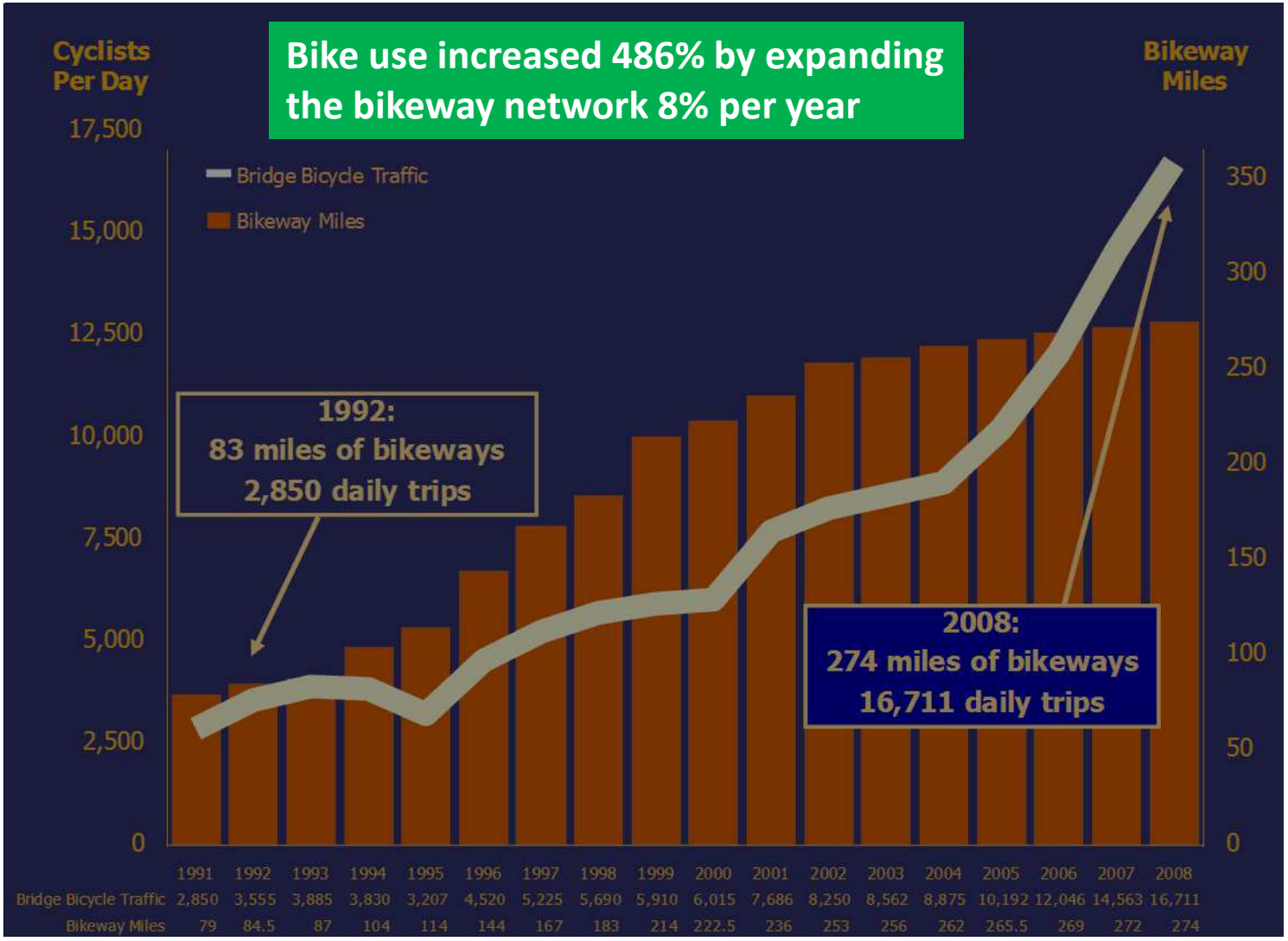
Location	2011 ADT	Trend, 2010-2011
1. Cherry Creek @ Holly	1,250	+9%
2. C470 @ Ken Caryl	890	+5%
3. Platte River @ REI	1,620	+3
4. 6th Ave @ Vaughn	540	-1%
5. US 287 Underpass (Broomfield)	1,480	+6



Map-Based Trends

The "State" of Biking and Walking in Colorado





Source: Roger Geller, City of Portland

Texas A&M Transportation Institute

Lives, Time and Resources

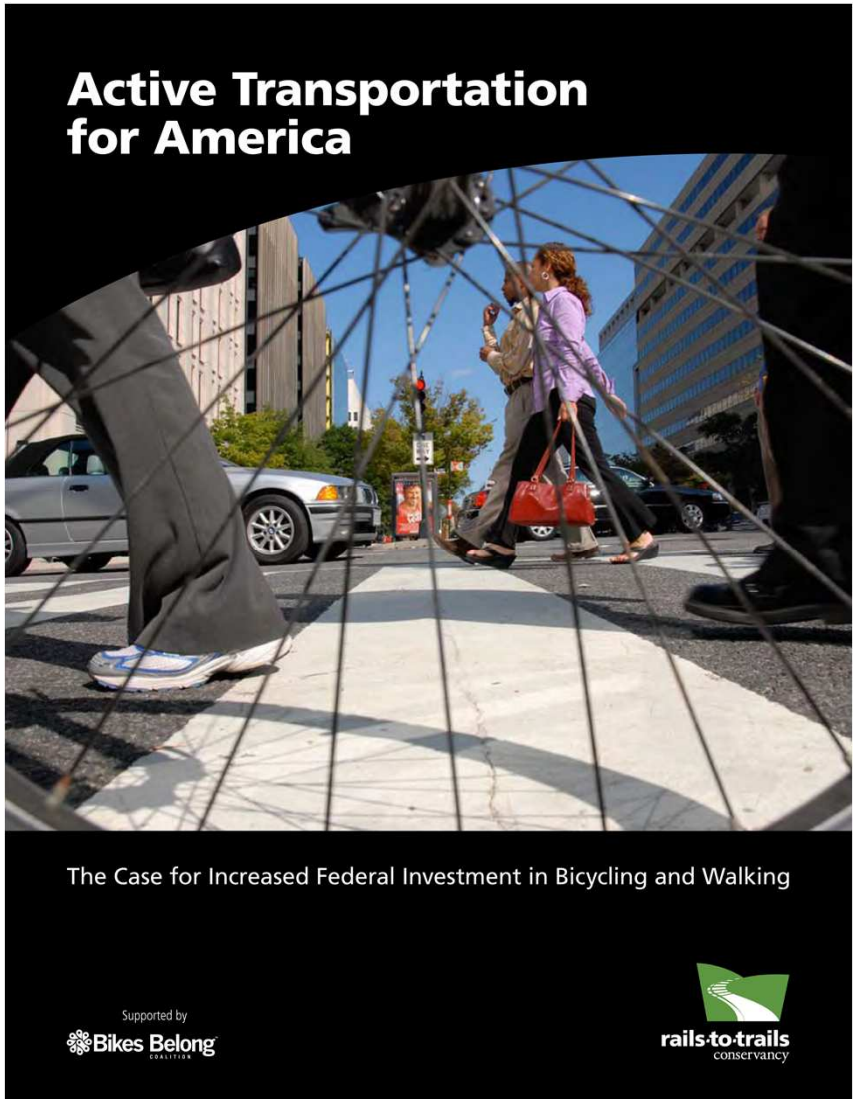
Alliance for Biking & Walking

BICYCLING AND WALKING IN THE UNITED STATES

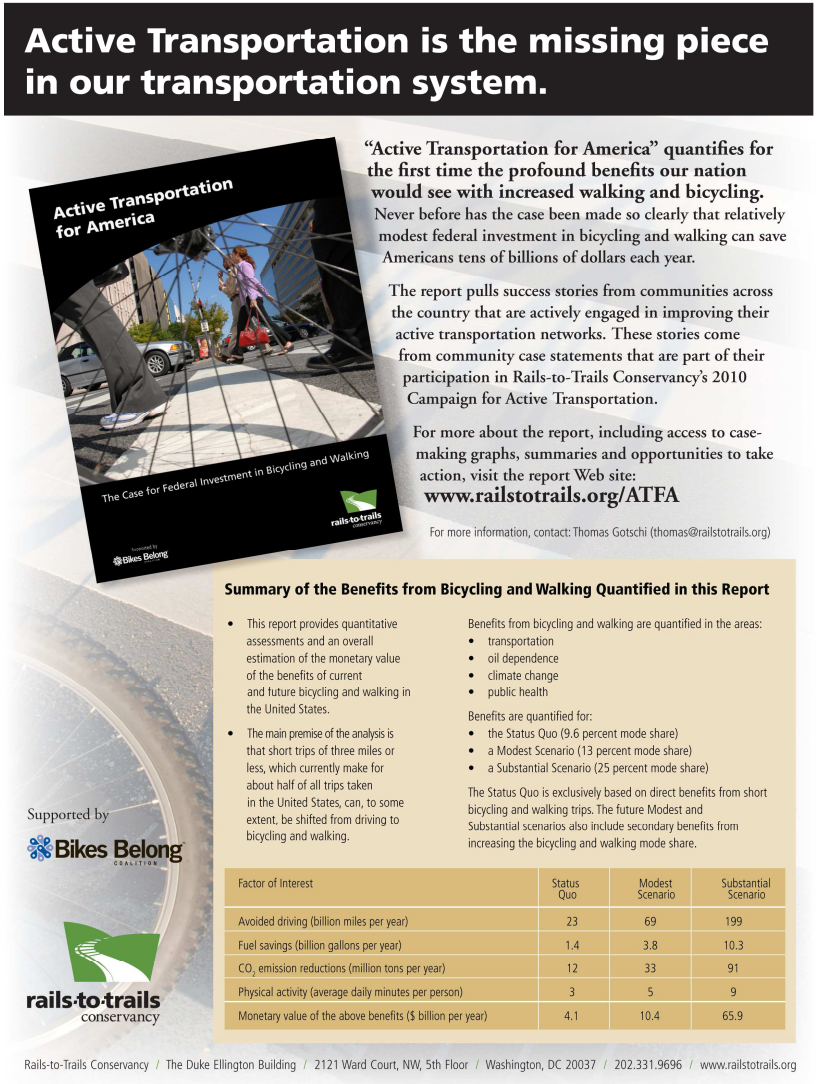
2012

BENCHMARKING REPORT

242 pages!!



48 pages



1 page

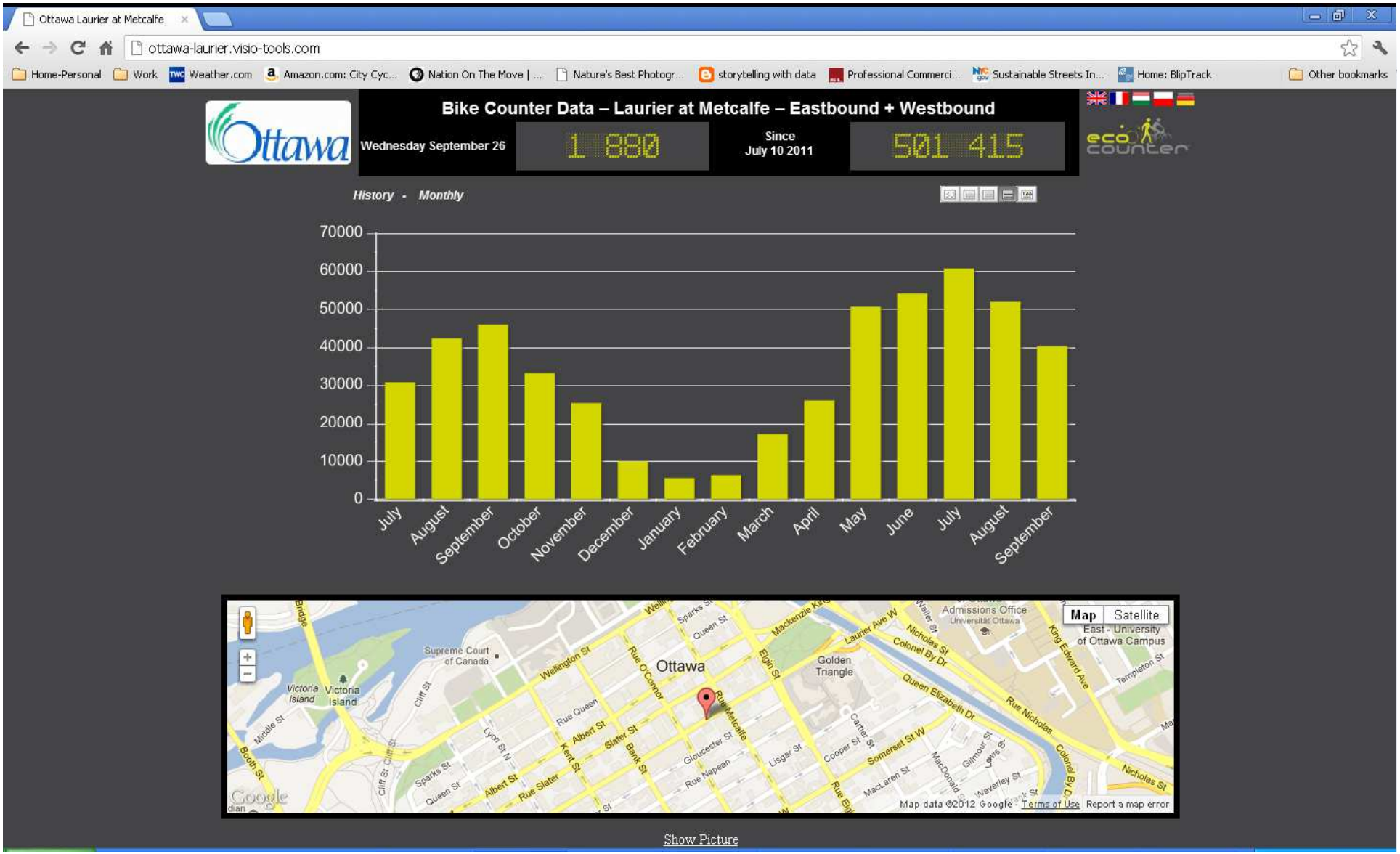
"Performance Journalism"

- Washington State DOT's Gray Notebook

Performance Dashboard

✓ Goal has been met. ↑ Performance is trending in a favorable direction. ↔ Trend is holding. ↓ Performance is trending in a unfavorable direction.

Policy goal/Performance measure	Previous reporting period	Current reporting period	Goal	Goal met	Progress	Comments
Safety						
Rate of **traffic fatalities** per 100 million vehicle miles traveled (VMT) statewide (annual measure, calendar years: 2010 & 2011)	0.80	0.80	1.00	✓	↔	The rate of highway fatalities held steady (a lower rate is better). But the total was the lowest since 1954.
Rates of **recordable incidents** and DART for every 100 WSDOT workers[1] (calendar quarterly measure: Q1/Q2 2011 & YTD 2012)	4.6 3.0	4.3 2.7	–	–	↑	The rate of worker injuries improved; and incidents requiring days away from work improved
Preservation						
Percentage of state **highway pavements** in fair or better condition (annual measure, calendar years: 2009 & 2010)	93.0%	92.7%	90.0%	✓	↔	Slight reduction from previous year, as Recovery Act projects wrap up
Percentage of **state bridges** in fair or better condition[2] (annual measure, fiscal years: 2011 & 2012)	95.0%	95.0%	97.0%	–	↔	Deck code ratings criteria continue to be a challenge.


Ottawa Laurier at Metcalfe
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Home-Personal
Work
Weather.com
Amazon.com: City Cyc...
Nation On The Move | ...
Nature's Best Photogr...
storytelling with data
Professional Commerci...
Sustainable Streets In...
Home: BlipTrack
Other bookmarks
Ottawa
Bike Counter Data – Laurier at Metcalfe – Eastbound + Westbound
Wednesday September 26
1 880
Since
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501 415
eco counter
History - Monthly
70000
60000
50000
40000
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July
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Map
Satellite
Ottawa
Golden Triangle
Admissions Office
East - University of Ottawa Campus
Supreme Court of Canada
Victoria Island
Wellington St
Rue Queen
Albert St
Slater St
Bank St
Rue O'Connor
Elgin St
Rue Metcalfe
Queen St
Sparks St
Laurier Ave W
Colonel By Dr
Queen Elizabeth Dr
Rue Nicholas
Somerset St W
Gloucester St
Rue Nepean
Lisgar St
Cooper St
Carter St
MacLaren St
Waverley St
Templeton St
King Edward Ave
Nicholas St
Cliff St
Middle St
Booth St
Lyon St N
Kent St
Rue Slater
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Show Picture

Questions or Comments?

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  979-845-8829

Resources / Additional Reading

- 2013 Traffic Monitoring Guide, Chapter 4: Non-Motorized Traffic Monitoring (forthcoming, http://www.fhwa.dot.gov/ohim/tmguide/)
- NCHRP 07-19: Collecting Pedestrian and Bicyclist Count Data (ongoing, http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3159)
- TRB Pedestrian/Bike Data Subcommittee (https://sites.google.com/site/bikepeddata/)
- ABW Benchmarking Report (http://www.peoplepoweredmovement.org/site/index.php/site/memberservices/2012_benchmarking_report/)
- National Bike/Pedestrian Documentation Project (http://bikepeddocumentation.org/)
- Examples:
  - Vélo Québec: http://www.velo.qc.ca/en/Bicycling-in-Quebec
  - Minneapolis: http://www.minneapolismn.gov/bicycles/data/WCMS1P-088370
  - New York City: http://www.nyc.gov/html/dot/html/bicyclists/bike-counts.shtml
  - Portland (OR): http://www.portlandoregon.gov/transportation/44671
  - San Francisco: http://www.mtc.ca.gov/planning/bicyclespedestrians/counts.htm