**Making It Count:**
**Collecting and Using Bicycle Data**

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THE SENSORED STREET

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## Overview

- Bike count technology and usage examples
- Data collection case study
- Conclusion



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## Why do we need better data?

- Helps to determine where investments are most needed

- Allows us to assess change, including number and rate of crashes

- Helps us quantify benefits of walking & biking

- *Ultimately, makes active transportation projects more competitive for funding*

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## National Bike and Ped Documentation Project



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## Issues with Pen & Paper Counts

- Weather & Seasonal Variations make estimating annual bicycle traffic difficult

- Bikes and peds have different travel patterns

- The "herding the cats" problem

- Pen and paper is time consuming to digitize

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## Existing Count Technology

| Technology Type | Common Manufacturers | User Type | Duration | Typical Uses | Cost |
|---|---|---|---|---|---|
| Infrared (Active and Passive) | • TRAFx<br>• EcoCounter<br>• TrailMaster | *Does not automatically distinguish between peds/bikes.* | Short or long | Sidewalk or shared-use path | $$ to $$$ |
| Pneumatic Tubes | • EcoCounter<br>• MetroCount<br>• TRAFx<br>• Road Sys | | Short | On-road | $$ to $$$ |
| Inductive Loop | • EcoCounter<br>• Road Sys | | Long | On-road or paved shared-use path | $$ to $$$ |
| Magnetometer | • TRAFx | | Long | Shared-use path | $$ to $$$ |
| Piezoelectric | • MetroCount | | Long | On-road | $$ to $$$ |
| Radar Sensors | • Sensys Networks | | Long | On-road | $$ to $$$ |
| Thermal Imaging | • FLIR | | Long | On-road | $$ to $$$ |
| Video Imaging | Miovision | | Short or long | On-road | $$ to $$$ |

New Solutions — MOBILE TECH, IMAGERY, LOW-COST HARDWARE


The Future? — THE CENSORED STREET


Mobile Tech

$ Least Expensive  $$ Moderately Expensive  $$$ Most Expensive  ? Prototype Stage

MOBILE TECH
- APP BASED COUNTING SOFTWARE — COUNTERPOINT $
- GPS ENABLED ROUTE TRACKERS — STRAVA METRO $$$, RIDE REPORT $
- ANONYMOUS DATA COLLECTION — AIR SAGE $$


Mobile Tech — Counterpoint, Strava, Ride Report, Airsage


Imagery

$ Least Expensive  $$ Moderately Expensive  $$$ Most Expensive  ? Prototype Stage

IMAGERY
- VIDEO DETECTION SYSTEMS — ITERIS $, MIOVISION SCOUT $$
- VIDEO COUNTING SOFTWARE — PLACEMETER $$
- THERMAL SENSORS — FLIR VIP BIKE SENSOR $$ to $$$


Imagery — Miovision, Iteris/Econolite, Placemeter, FLIR Thermal

Imagery



Low Cost Hardware



Low Cost Hardware



Low-Cost Hardware



Data Collection Case Study



Crash Report

Frequency throughout Grand Rapids

City of Grand Rapids Bicycle Crashes According to Frequency: 2004 - 2013

Concern about potentially higher frequency of crashes along streets in lower income, non-white neighborhoods.

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## Crash Report

Severity near schools



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## At-Risk Populations Identified

**The bike failed to yield** in 20% of reported crashes and disregarded the traffic control in 6.5% of crashes.

**Approximately 60% of crashes have a recorded hazardous bicycle action** of 'none' or 'other'.

**At-risk bicycle population groups**
- Youth (10-19)
  - Crashes peak for school-aged children (0-17) from 3-7pm
- Young adults (20-24)
- Males (80% of crashes)
- Going straight or through an intersection

**Segments of motorists most involved with crashes**
- Driver ages are representative of the general population
- Passenger cars/station wagons, pickups, vans/motorhomes
- **Right-turning vehicles (40% of crashes)**

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## Gaps in Crash Report

- Residents' points of view (and perceived safety/comfort)
- Exposure data
- "Dooring" type crashes
- Unreported crashes
- Distracted driving

Missing from analysis

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**The data is important to the project's trajectory, yet tells an incomplete story.**

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## Gaps in Crash Report

Use other resources to augment knowledge:

**100** campaigns included in the project database



Campaign Scan

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## Gaps in Crash Report

Community feedback and outreach to Spanish-speakers:



Feel Safe While Riding



What problems, if any, do you encounter with people driving motor vehicles while you are riding?

Online Survey

- Demographics
- Bicycling/driving frequency
- Reactions to existing media campaigns

## Community Survey & Focus Groups Research

- Online survey fielded for 2 weeks
- Divided respondents into bicyclists and motorists based on response to following question:
  - How often do you typically ride a bicycle in the spring, summer or fall?
    - Cyclists – anyone who indicated they typically ride a bicycle on a daily, weekly or monthly basis.
    - Motorists – anyone who indicated they typically ride a bicycle quarterly, annually or never.
- Recruited focus groups participants with incentive prize drawings

## Community Survey

- 2,208 responses (English), 39 responses (Spanish)
- 78% of respondents had a college/graduate degree, compared to 32% of the county's population
- Skewed toward higher income brackets
- Spanish-speaking respondents younger, more likely to have children at home, less likely to have completed college, lower income
- Spanish-speaking respondents showed a marked preference for messaging encouraging respect/sharing otherwise differ significantly from English-speaking respondents.

## Survey & Focus Group Findings

- Suburbanites ride farther than city dwellers.
- Riders aged 21–29 travel short distances, riders 30+ years old more diverse in their riding distances.
- Women also ride shorter distances than men.
- Men more likely than women to ride on city streets and rural roads.
- Riders in their 20s were most likely to say they typically ride on sidewalks.



Less than 1 mile 2%
20+ miles 18%
1-5 miles 32%
16-20 miles 13%
11-15 miles 12%
6-10 miles 23%

## Key Findings



- Responses by both men and women age 18–29 show significant differences in cycling behavior compared to older riders.
- Daily male riders ride on all roadways in all seasons and are significantly less likely to obey traffic signals and signs.
- Young men are significantly less likely to obey traffic signals and stops than are older or female riders.

## Key Findings

- Weekly riders are men & women riding mostly on neighborhood streets/trails for fitness/health, frequently wear a helmet, obey traffic signals and signs, signal turns, and ride with traffic.
- Monthly riders are women with children still at home, riding short distances on neighborhood streets or on sidewalks, least likely to wear a helmet, signal turns, or ride with traffic

## Key Findings

- Men are much more likely to ride more often and to ride greater distances than women.
- Women are more likely than men to report always wear a helmet and to obey traffic signals and signs.



## Key Findings

- Data would indicate that motorists treat men and women cyclists differently on the road; for example, choosing to follow female cyclists rather than passing too closely to them, which is a motorist behavior reported much more frequently by male riders.
- There is no significant difference in the feeling of safety indicated by different ages, genders, residence location or cycling frequency.



## Law Enforcement Survey



Please rank the following issues related to bicycle traffic safety from (1) the most important issue to (5) the least important issue.

CITY OF GRAND RAPIDS

RANKED MORE IMPORTANT → RANKED LESS IMPORTANT

COMMUNITIES SURROUNDING GRAND RAPIDS

RANKED MORE IMPORTANT → RANKED LESS IMPORTANT

## Law Enforcement Survey



What specific messages should be conveyed through a media campaign to reduce bicycle crashes?

- Very important
- Somewhat important
- No opinion/neutral

Note: "Not at all" was also listed as an answer choice. No respondents chose this response as an answer for the top five responses.

## What have we learned?



- Men and women behave very differently
- Men and women may be treated differently by motorists
- We do not have good data on ethnic/racial group cycling behavior
- Need more research and outreach to minority groups



Cyclists per Day — Crashes and Bicycle Crash Index

- Bridge Bicycle Traffic
- Reported Bicycle Crashes*
- Bicycle Crash Index
- Bicycle Crash Index (Trend Line)

6-fold increase in bike trips

Sharp increase in cycling safety in Portland as cycling levels rose

70% fall in crash rate

Source: City of Portland (2013)

*Extrapolated from peak period counts

For more information…

**Innovation in Bicycle and Pedestrian Counts**
*A Review of Emerging Technology*

Check out our free white paper:
**Altaplanning.com/resources**
"Innovation in Bicycle and
Pedestrian Counts" (March
2016)

Ask us about our email
newsletter and follow our latest
research project!



Thank you!

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