Crowdsourcing Cycling Safety and Route Data with the “ORcycle” Smartphone App

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ORcycle: Crowd-Sourcing Data Collection Improve Bicycle Transportation Planning and Safety

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ORcycle: Crowd-Sourcing Data Collection Improve Bicycle Transportation Planning and Safety

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Advantages Smartphone Apps

- Cost per respondent
  - Fixed and variable costs
  - Cost per record
- Data precision and quality
  - GPS
  - Q/A
- Revealed preference
- Panel data potential
Research Project Goals

- Pilot a cheaper and easier method to collect bicycle data
- Understand impacts of riding skills and personal characteristics on choices
- Quantify the underreporting of safety data (crashes & near-misses)
- Learn where cyclists travel and their level of traffic and cycling stress
More context

- Oregon is the first state DOT to pilot a bicycle app

- Lane County utilizes a slightly modified version of CycleTracks (LaneTracks)
Related Apps Timeline

Infrastructure Crowdsourcing Apps

- Citizens Connect (City of Boston)
- PDX Reporter
- iBikeEugene
- Find it, Fix it

Transportation Planning Apps and Recreational Apps

- MapMyRide
- Strava
- CycleTracks
- Cycle Atlanta
- Montréal RésoVélo
- RenoTracks

TTP Lab

Maseeh College of Engineering and Computer Science
PORTLAND STATE UNIVERSITY
Why a new app?

- **Emphasis on safety and infrastructure aspects**
  - New questionnaires and features
- **Emphasis on cyclists’ types**
  - New questionnaires
- **Answers with multiple choices and/or selections.**
- **Focus on new trip purposes and routes.**
- **Add reminders, useful info, and tutorials**
  - Encourage utilization
  - More user friendly
ORcycle: 4 basic parts

- Record Trips
- Report Safety Issues
  - Crash or near-miss
  - Safety problem (e.g. uneven pavement)
- User Data
  - Biking habits and socio-demographic (optional)
- Links to maps and to report to ODOT
  - ORcycle is not a substitute for reporting to the agency that has jurisdiction
ORcycle Development – Part I

- Conceptual ideas and features
- Coding (iOS and Android)
  - Testing, feedback...
  - Coding back-end (server)
- Pilot testing (potential users)
  - Features, questionnaire
- Many Iterations
  - Data quality?
- Website development
We have the app... now, how do we reach users?
ORcycle is a smartphone app designed to provide feedback about bicycle routes, infrastructure and crashes/accidents. Your data and feedback will help improve bicycling in Oregon.

Who should participate? Everybody! Families, commuters, recreational, casual, and everyday riders.
ORcycle is a smartphone app designed to provide feedback about bicycle routes, infrastructure and crashes/accidents. Your data and feedback will help improve bicycling in Oregon.

Who should participate? Everybody! Families, commuters, recreational, casual, and everyday riders.

More info http://www.pdx.edu/transportation-lab/orcycle

The app is easy to use and can be downloaded from GooglePlay (Android) and Apple's iTunes (iOS).
ORcycle Development – Part II

- Pilot Study: November and December 2014
- Users have questions and feedback
  - Respond to questions
- Website development and improvement
- Data validation and cleaning
- Mapping results
- Data analysis
- New version!
Questions after completing a trip:
- Purpose
- Frequency
- Route choice factors
- Comfort level
- Safety concerns? (optional)
- Additional comments? (optional)
Trips

Route Stressors (# Trips = 618)

- Other: 5%
- Pedestrians: 15%
- Other cyclists: 15%
- Parked vehicles (being doored): 25%
- Public transport (buses, light rail, streetcar): 20%
- Large commercial vehicles (trucks): 30%
- Auto traffic: 50%
- Not concerned: 7%
- No data: 10%
Tutorial

Questions after completing a crash report:
- Severity
- Object (vehicle)
- Actions that led to the event
- What contributed to the event
- Date
- Additional comments?

Questions after completing a safety report:
- Urgency
- Type of problem
- Date
- Additional comments?

Report crashes, near-misses, and other safety issues by pressing “Report”
Tutorial

User can review trips:
- Map
- Time, distance
- Questionnaire
Tutorial

Added feature:
- Go back to your trip and select points along the route
- Only available for Android version
Tutorial

Color and shape coded
- safety/infrastructure issues (a star)
- crash or near-miss (a triangle)

User can review report:
- Map
- Questionnaire
Safety/Infrastructure Reports

Location specific safety/infrastructure issues (# Issue Reports = 124)

- Other (specify)
- Pavement condition
- Parked vehicles
- Bus traffic/stop
- Truck traffic
- No push button or detection (traffic signal)
- Long wait time (traffic signal)
- Short green time (traffic signal)
- Left-turning vehicles
- Right-turning vehicles
- High traffic volume
- High traffic speed
- No bike lane or shoulder
- Narrow bike lane
- No data

Response frequency among issue reports
Crash Reports

Vehicle or object related to event (# Crash Reports = 43)

- Other
- Cyclist fell (or almost fell)
- Pole or fixed object
- Pedestrian
- Another bicycle
- Public transport (buses, light rail, streetcar)
- Large commercial vehicles (trucks)
- Pickup truck
- Large car/Van/SUV
- Small/medium car
- No data

Response frequency among crash reports

[Bar chart showing the frequency of different objects or vehicles involved in crash reports.

- No car... 30%
- Large car... 20%
- Pickup truck... 10%
- Other... 5%
- Pedestrian... 5%
- Public transport... 5%
- Another bicycle... 5%
- Pole or fixed object... 5%
- Cyclist fell... 5%
- Other... 5%
]
Crash Reports

Actions related to the crash event (# Crash Reports = 43)

- Other (specify)
- Cyclist lost control of the bike
- Driver did not stop
- Cyclist did not stop
- Vehicle changed lane or direction of travel
- Cyclist changed lane or direction of travel
- Person exiting a vehicle
- Parking or backing up vehicle
- Left-turning vehicle
- Right-turning vehicle
- No data

Response frequency among crash reports

0% 10% 20% 30%
Tutorial

Added feature:
- Reminders!
Tutorial

Added feature:
- Links to maps and to report to transportation agencies

To ensure a prompt response to a road hazard, please do contact the agency that has jurisdiction over the facility.
ORcycle Report Map

• Go to http://www.pdx.edu/transportation-lab/orcycle-maps

• Two layers: crash data and safety issues

• Show maps with trips: LINK
“Drivers use the bike lane as a right hand turn lane before entering the highway during morning rush hour (8-9 am). Makes it extremely dangerous for cyclists to pass, as they either are dodging traffic last minute or duking it out in the lane with angry reactions...”
Value of comments and location
Value of comments and photos

North of Medford
Crater Lake Highway close to I-5 interchange
Value of comments and photos

Right Turn Problems
Value of comments and photos

Blocked bike lanes or paths
Value of comments and photos

Infrastructure Issues