



BikeMaps.org

Volunteered Geographic Information
for Cycling Safety

6 December 2016

Dr. Colin Jay Ferster
University of Victoria, Department of Geography



Outline

- 📍 Overview
- 📍 Implementation
- 📍 Reflection





BikeMaps.org

OVERVIEW



Cycling data are limited

- 📍 Safety
 - Only ~30% of bike collision data captured
 - No centralized or near miss reporting
- 📍 Response: BikeMaps.org
 - Volunteered Geographic Information



Technology



Nelson et al. (2015) BikeMaps. org: a global tool for collision and near miss mapping. *Frontiers in public health* 3.



Reporting an incident

The image shows a screenshot of the BikeMaps.org website. On the left, a map of a city street grid is visible with several colored markers (red, orange, green, blue) indicating reported incidents. The main part of the image is a white modal window titled "Submit a new report" with a close button (X) in the top right corner. The form contains the following sections:

- What kind of report is this?** with radio buttons for Collision, Near miss (selected), Hazard, and Theft.
- Collision Details** (only visible for the Collision option):
 - When was the incident?*** with a text input field and a calendar icon.
 - What type of incident was it?*** with a dropdown menu.
 - What sort of object did you collide or nearly collide with?*** with a dropdown menu.
 - Were you injured?*** with a dropdown menu.
 - How did this incident impact your bicycling?*** with a dropdown menu.

On the right side of the map, there is an "About" panel for BikeMaps.org, which describes it as a crowdsourcing tool for global mapping of cycling safety. Below the about panel is a legend for "Incidents" with checkboxes for:

- Citizen collision report
- Citizen near miss report
- Cyclist hazard
- Bike Theft
- Official report
- Filter
- Strava ridership data (with a slider from less to more)
- Alert Areas
- Infrastructure

Ethics requires data be anonymous



Data Visualization

Bikemaps Data Visualizati

https://bikemaps.org/vis/@49.1888842,-122.9569244,10z

BikeMaps.org Home Visualization Blog About Français f t Guest

Click the charts to filter the data

1,042 of 4,220 shown

Map of the Vancouver area showing incident density. Major cities labeled include Vancouver, Burnaby, Surrey, and Langley. A 'Window Snip' button is present.

reset all

Total reports by type

Report Type	Count
Collisions	200
Nearmisses	400
Hazards	350
Thefts	50

Reports summary by weekday

Weekday	Count
Mon	170
Tue	180
Wed	230
Thu	160
Fri	130
Sat	80
Sun	60

Incidents per day for the past year

Number of incident by hour of day



Data Visualization

Bikemaps Data Visualizati

https://bikemaps.org/vis/@49.1888842,-122.9569244,10z

BikeMaps.org Home Visualization Blog About Français f t Guest

Click the charts to filter the data

1,042 of 4,220 shown

MapQuest ©2016 MAPQUEST, © MAPBOX, © TOMTOM | TERMS

reset all

Total reports by type

Report Type	Count
Collisions	200
Nearmisses	400
Hazards	350
Thefts	50

Reports summary by weekday

Weekday	Count
Mon	170
Tue	180
Wed	230
Thu	160
Fri	130
Sat	80
Sun	60

Incidents per day for the past year

Number of incident by hour of day



Data Visualization

Bikemaps Data Visualiza X

https://bikemaps.org/vis/@49.2627917,-123.1162047,15z

BikeMaps.org Home Visualization Blog About Français f t Guest

Click the charts to filter the data

54 of 4,220 shown

reset all

Total reports by type

reset

Report Type	Count
Collisions	14
Nearmisses	30
Hazards	4
Thefts	5

Reports summary by weekday

Weekday	Count
Mon	7
Tue	6
Wed	14
Thu	13
Fri	8
Sat	1
Sun	3

Incidents per day for the past year

reset

Number of incident by hour of day

https://bikemaps.org/blog/



Data Visualization

The screenshot shows a web browser window displaying the BikeMaps.org data visualization interface. The browser's address bar shows the URL <https://bikemaps.org/vis/@49.2627917,-123.1162047,15z>. The website's navigation bar includes links for Home, Visualization, Blog, and About, along with a language selector set to 'Français' and a user profile labeled 'Guest'. Below the navigation bar, there is a prompt: 'Click the charts to filter the data'. The main content area features a map of an urban intersection. A popup window is open over the map, displaying the following information:

- Type:** Near collision with moving object or vehicle
- Incident with:** Vehicle, side
- Date:** 1 Jun, 2016 5:50 PM
- Details:** Same as another cyclists' October report. I was heading north on Heather. A motor vehicle (van) had signalled it was turning right, but halfway through the intersection, the van continued north instead, forcing me towards oncoming traffic.

The map shows Heather St intersecting with W 12th Ave. Two orange bicycle icons are placed at the intersection. To the right of the map, there is a 'reset all' button and a small bar chart with a legend for 'Sun' and 'day'. The URL <https://bikemaps.org/blog/> is visible at the bottom left of the browser window.



Data Visualization

Bikemaps Data Visualizati

https://bikemaps.org/vis/@49.1888842,-122.9569244,10z

BikeMaps.org Home Visualization Blog About Français f t Guest

Click the charts to filter the data

1,042 of 4,220 shown

Map of Vancouver region showing incident density. Major cities labeled include Vancouver, Burnaby, Richmond, Surrey, and Langley. Highways 1A, 7A, 7B, 91, 99, and 15 are shown.

reset all

Total reports by type

Report Type	Count
Collisions	200
Nearmisses	420
Hazards	350
Thefts	50

Reports summary by weekday

Weekday	Count
Mon	170
Tue	180
Wed	230
Thu	160
Fri	130
Sat	80
Sun	60

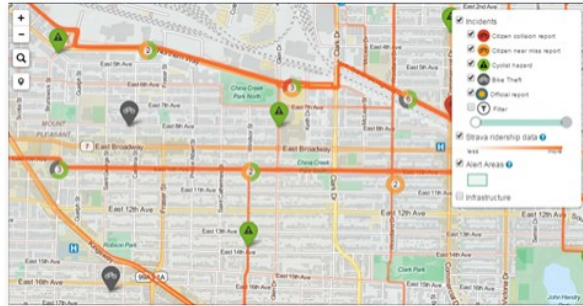
Incidents per day for the past year

Number of incident by hour of day

Hour of Day	Count
0	10
1	10
2	10
3	10
4	10
5	10
6	10
7	10
8	10
9	10
10	10
11	10
12	10
13	10
14	10
15	10
16	10
17	10
18	10
19	10
20	10
21	10
22	10
23	10
24	10



Bike Commuters: This crowdsourced map gives you info on the best routes to avoid crashes, hazards, and bike theft.



Crowdsourced tool helps bike commuters avoid danger

Map your cycling incidents, hazard, and theft locations so they can be analyzed to identify hot spots of cycling safety, risk, and crime.

BIKEMAPS.ORG

bikemapsmetrovan
Vancouver General Hospital (VGH)

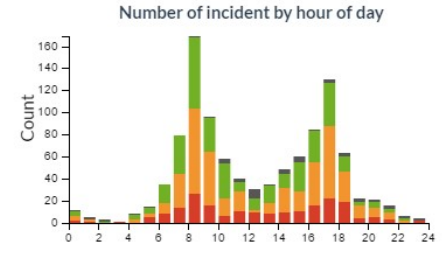
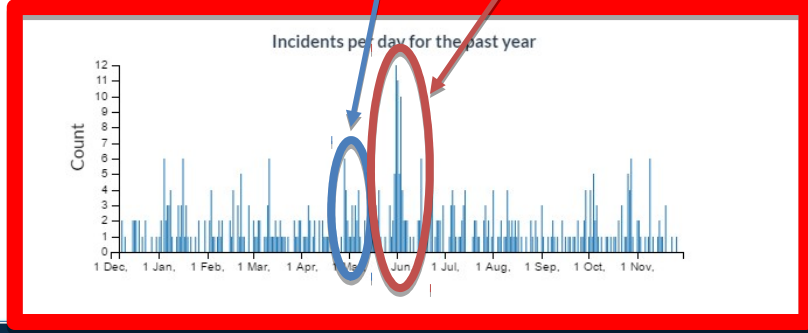
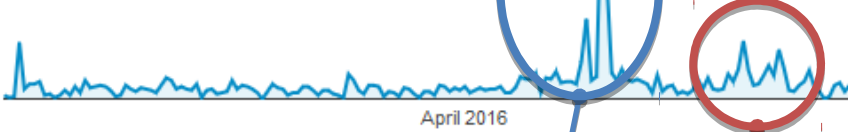
11 likes

bikemapsmetrovan We're at #btww station at the VGH Cycling Centre, 10th and Willow. Visit us!

#bikeyvr #cycleivr #bikevancouver

MAY 30

100



Data Visualization

Bikemaps Data Visualizati

https://bikemaps.org/vis/@49.1888842,-122.9569244,10z

BikeMaps.org Home Visualization Blog About Français f t Guest

Click the charts to filter the data

1,042 of 4,220 shown

Map of Vancouver area showing incident density with a heatmap overlay. Major roads like 1A, 7A, 7B, 91, 99, and 15 are visible. Locations include West Vancouver, North Vancouver, Burnaby, Coquitlam, Port Coquitlam, New Westminister, Richmond, Delta, Surrey, Langley, and White Rock.

Total reports by type

Type	Count
Collisions	200
Nearmisses	420
Hazards	350
Thefts	50

Reports summary by weekday

Weekday	Count
Mon	170
Tue	180
Wed	230
Thu	160
Fri	130
Sat	80
Sun	60

Incidents per day for the past year

Number of incident by hour of day



Data Visualization

BikeMaps Data Visualizati

https://bikemaps.org/vis/@49.1888842,-122.9569244,10z

BikeMaps.org Home Visualization Blog About Français f t Guest

Click the charts to filter the data

625 of 4,220 shown

Mapquest

©2018 MAPQUEST, © MAPBOX, © TOMTOM | TERMS

Incidents per day for the past year

Month	Count
1 Dec	1
1 Jan	2
1 Feb	3
1 Mar	2
1 Apr	1
1 May	2
1 Jun	10
1 Jul	3
1 Aug	2
1 Sep	1
1 Oct	2
1 Nov	4

Total reports by type

Type	Count
Collisions	200
Nearmisses	400
Hazards	350
Thefts	50

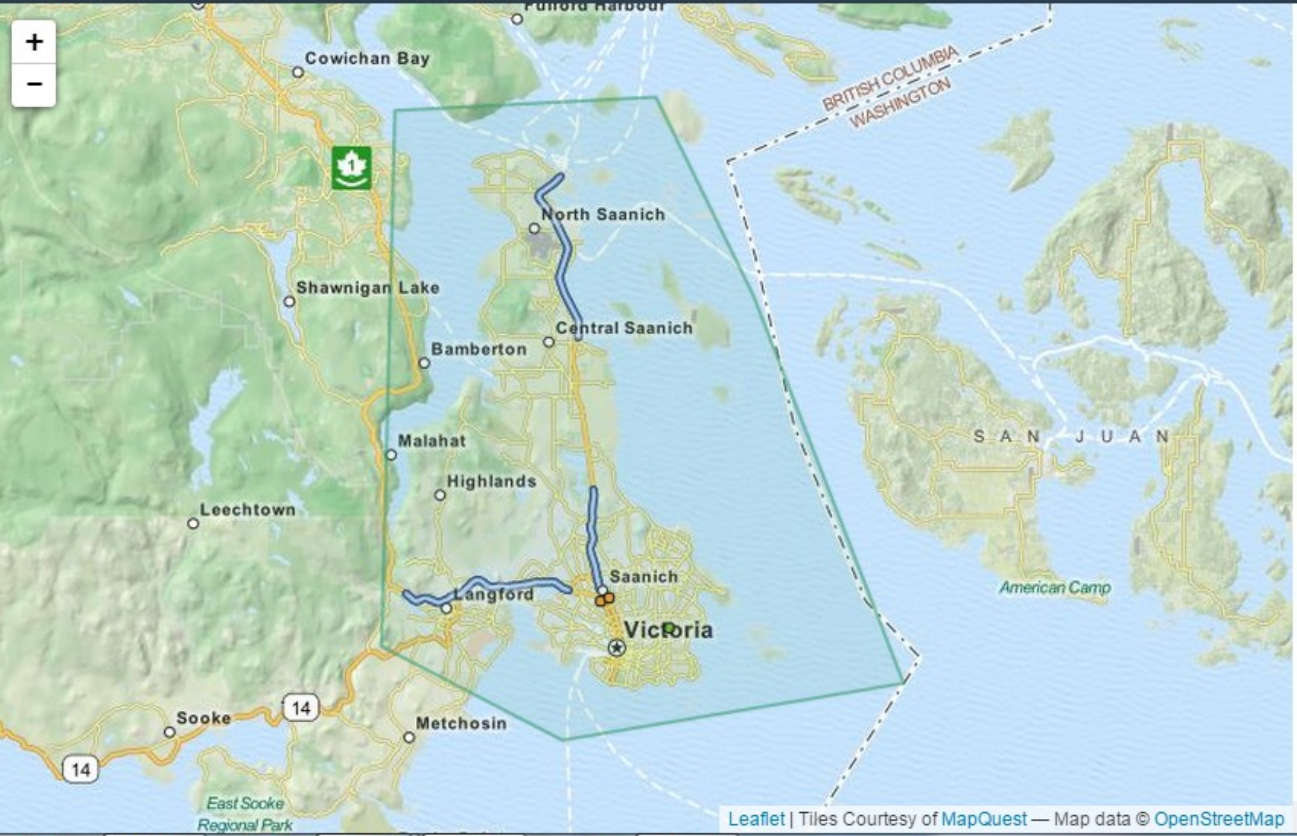
Reports summary by weekday

Weekday	Count
Mon	100
Tue	120
Wed	140
Thu	110
Fri	80
Sat	40
Sun	30

Number of incident by hour of day

Hour	Count
0	1
1	1
2	1
3	1
4	1
5	2
6	4
7	10
8	25
9	65
10	100
11	25
12	15
13	10
14	15
15	25
16	50
17	85
18	45
19	20
20	15
21	10
22	5
23	2
24	1





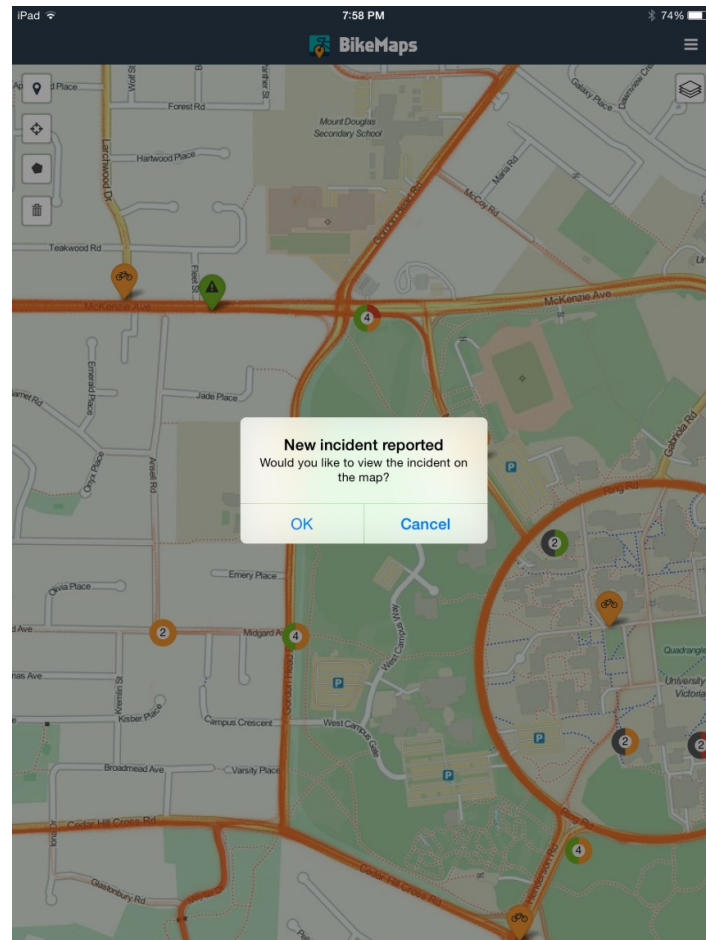
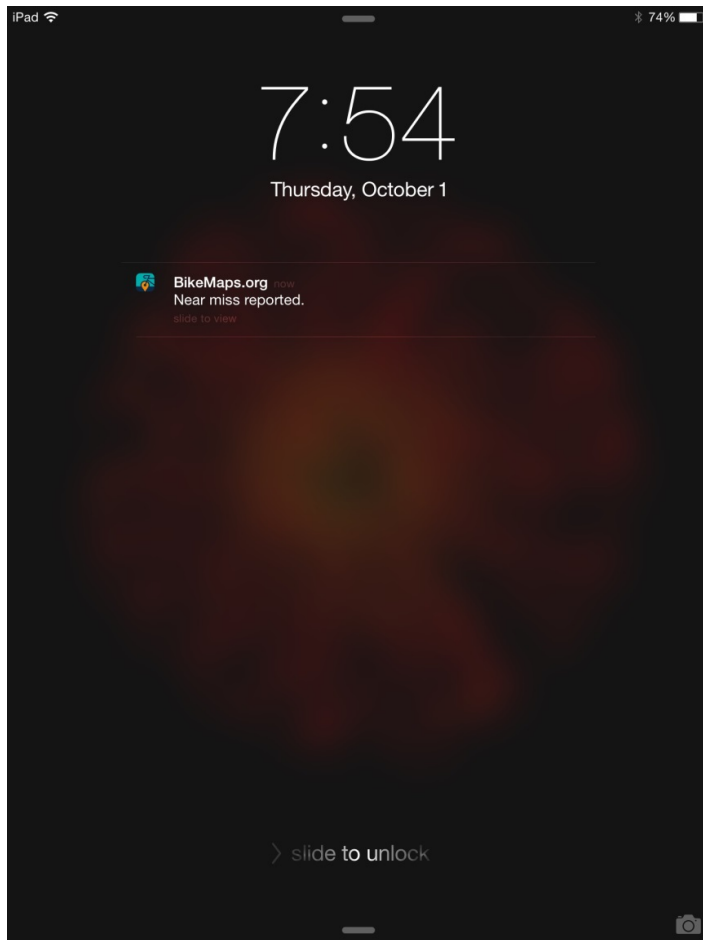
Collisions

No reports this week

Nearmisses

- Date:** Yesterday at 7:25 AM
Type: Near collision with moving object or vehicle (Vehicle, side)
Description: A driver in a grey SUV, who was on his cell phone, approached the stop sign / cross walk at a high rate of speed. He slowed, looked the opposite way, but not mine, and continued through, nearly hitting me. I avoided a collision by maneuvering around him.
- Date:** Last Tuesday at 4:20 PM
Type: Near collision with moving object or vehicle (Vehicle, head on)
Description: As the light turned green for

Receive push notifications



Promotion

Happy 1st Birthday!



BikeMaps.org

TWEETS 743 FOLLOWING 1,986 FOLLOWERS 1,057 FAVORITES 356

Edit profile

Tweets Tweets & replies Photos & videos

Who to follow Refresh View all

Search the Times Colonist



TIMES COLONIST

NEWS OPINION BUSINESS SPORTS ENTERTAINMENT LIFE DRIVING FLYERS

B.C. National World

LATEST NEWS: Two cyclists, vehicle passenger dead in crash north of Whistler

University of Victoria geographer helps track cycling hazards

KATHERINE DEDYNA / TIMES COLONIST
OCTOBER 8, 2014 10:02 PM

Email Print



Trisalyn Nelson rides with daughter Beatrice, 3, son Finn, 6, and husband Ian. Photograph By BRUCE STOTESBURY, Times Colonist



NEWS

BikeMaps charts course across the country



BikeMaps.org team member Colin Ferster, executive director Karen Laberee and intern Conner Leverett show off the new bike seat covers used to market the cycling app. — Image Credit: Travis Paterson/News Staff

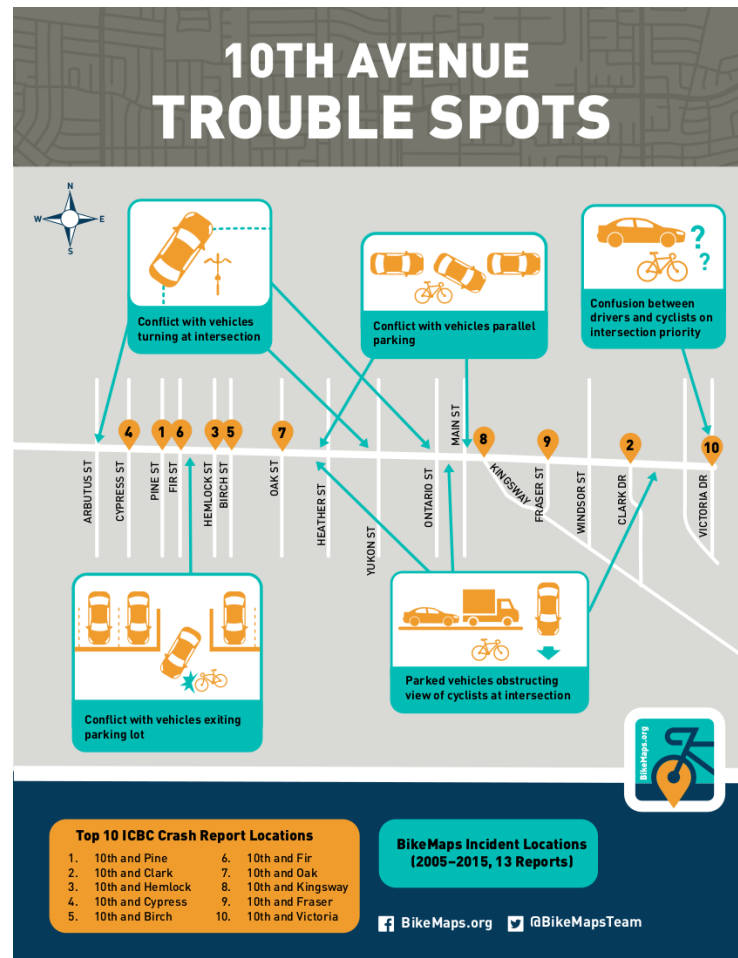


BikeMaps.org





Map data products



Media

BikeMaps.org CRD Update May 14, 2015

With Bike to Work Week approaching fast (May26-29) BikeMaps.org set out to find the top 8 problem areas in the CRD. These areas are reported most on bikemaps.org. Drivers make sure to be aware of cyclists at these locations!

Key Areas highlighted on BikeMaps.org:

- McKenzie and Hwy 1
- Galloping Goose between Ardersier Rd and Burnside Rd East
- Johnson St Bridge
- Lansdowne Rd between Richmond and Foul Bay Rd
- Fort St and Foul Bay Rd
- Quadra St between Pandora Ave and Courtney St
- Harriet Rd and Highway 1
- Cook St and Bay St

**Cycling rates were not considered. Some hotspots are an indication of higher rider volume.*

(A) Conflicts with motor vehicles turning right westbound onto Hwy1 with cyclists riding along Galloping Goose Trail.

(B) Drivers failing to yield at intersections along the Goose. Crashes with other cyclists reported in this area as well.

(C) Narrow travel lanes crossing bridge. Conflicts with motorvehicles overtaking.

(D) Conflicts with motor vehicles trying to overtake cyclists.

(E) Conflicts with motor vehicles making left hand turns onto Foul Bay. Conflicts with cyclists making lane change before /after the intersection.

(F) Conflicts with motor vehicles making right hand turn. Conflicts with buses accessing/leaving bus stops.

(G) Conflicts with motor vehicles turning right westbound onto Hwy1 from Harriet crossing Galloping Goose Trail.

(H) Conflicts with motor vehicles during turning movements.

Logos: BikeMaps.org, sparlab, NSERC CRD, CAA, University of Victoria.

Galloping Goose Trail crashes highlighted by BikeMaps website

University of Victoria professor studying factors that make certain areas more susceptible to danger

By All Points West, CBC News | Posted: Apr 20, 2015 7:19 AM PT | Last Updated: Apr 20, 2015 9:55 AM PT



The Galloping Goose Trail is 60 kilometres long and runs through Sooke, Melchosi, Colwood, Langford, View Royal, Saanich and Victoria. A new online project invites commuters to post crashes and near misses that will hopefully increase awareness about trail safety. (rpaters/Flickr)

Stay Connected with CBC News



Weather

Vancouver	Kelowna	Abbotsford	Prince George
8°C	6°C	6°C	1°C

More Weather

Latest British Columbia News

Rachel Not



BikeMaps.org Report of Saanich

What injuries are occurring? (collisions)



16 No Injury



15 Injury, no treatment



17 Saw Family Doctor



12 Emergency Room Visit



1 Overnight Stay in Hospital

What incidents are occurring?



61 Collisions



163 Near Misses

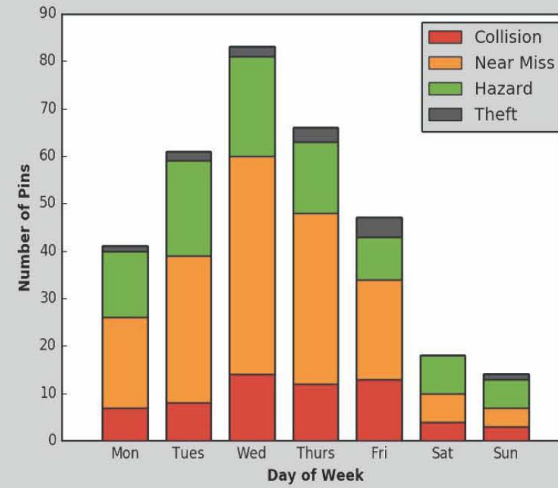


93 Hazards



13 Thefts

What day of week are incidents occurring?



Who is reporting?



53

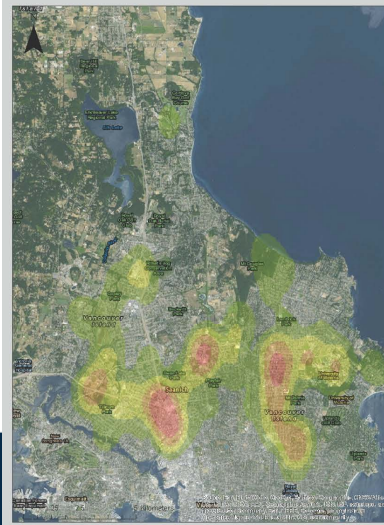


153



111

Where are incidents occurring?



CRD Data

ICBC Reports

Year	Insurance Reports
2009	112
2010	119
2011	119
2012	125
2013	134

BikeMaps.org Reports

- 927 Reports since Oct 2014
 - Crashes & Falls: 19%
 - Near-Miss: 47%
 - Hazards: 27%
 - Thefts: 7%



Citizen science

- 📍 Official credentials are not required
- 📍 Ambitious goals for growth in active transportation in cities
- 📍 Possible beneficial outcomes for (Shirk et al. 2012):
 - Individuals
 - Management
 - Science
- 📍 Citizen science is a great tool for active transportation research



Cycling data

Transport Reviews, 2016

Vol. 36, No. 1, 114–133, <http://dx.doi.org/10.1080/01441647.2015.1084067>



Big Data and Cycling

GUSTAVO ROMANILLOS*[§], MARTIN ZALTZ AUSTWICK**,
DICK ETTEMA[†] AND JOOST DE KRUIJF[‡]





BikeMaps.org

IMPLEMENTATION



BikeMaps.org application stack

Web application

- Django
 - Leaflet
 - Bootstrap
 - D3
 - Python



Database

- PostGIS



Server

- CentOS -> Redhat
- Apache



RESTful API

Mobile

- IONIC
- Leaflet
- HTML 5
- CSS
- Angular JS



Products

Web app

Mobile

Incidents

Map data products

Offline	Online
	
 	
	

Actions

Create

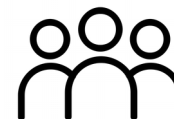
View

Share with

People



Created by Gloria Viganò from Noun Project



Created by SERICONS from Noun Project



Created by Milky - Digital Innovation from Noun Project



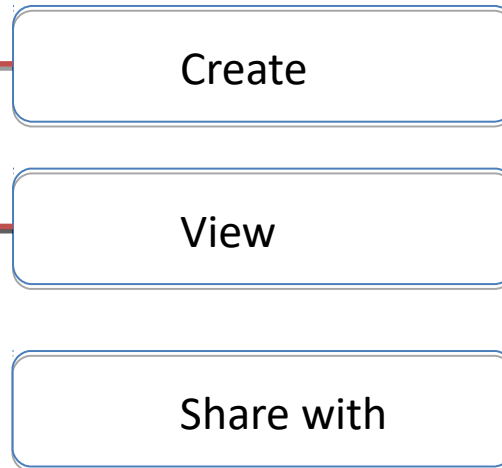
Created by nestaporn from Noun Project



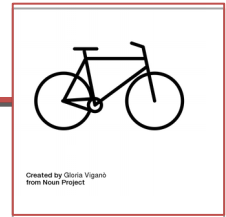
Products



Actions



People



Created by Gloria Viganò from Noun Project



Created by SERICONS from Noun Project



Created by Milky - Digital Innovation from Noun Project



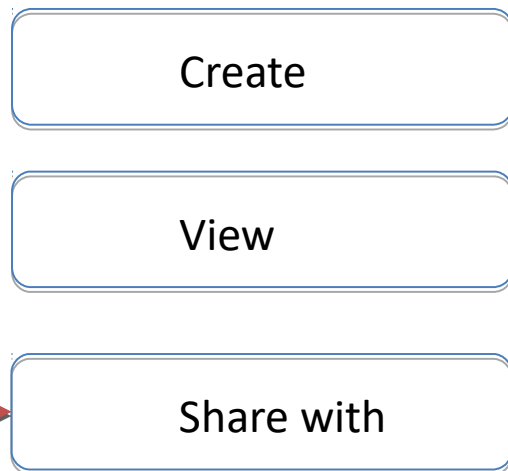
Created by nestaporn from Noun Project



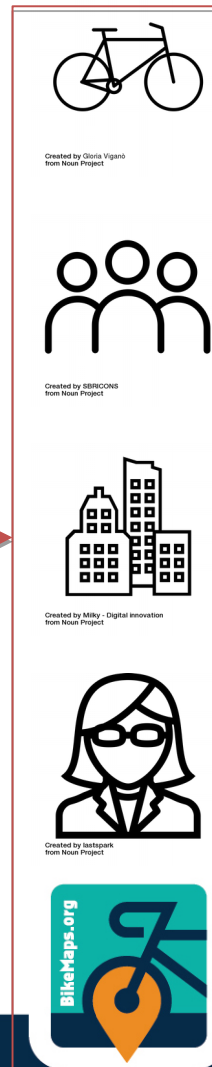
Products



Actions



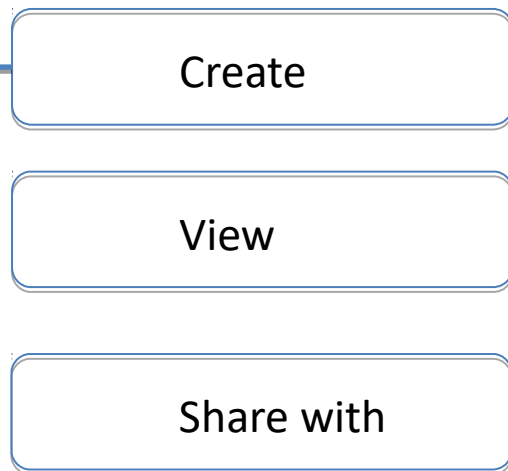
People



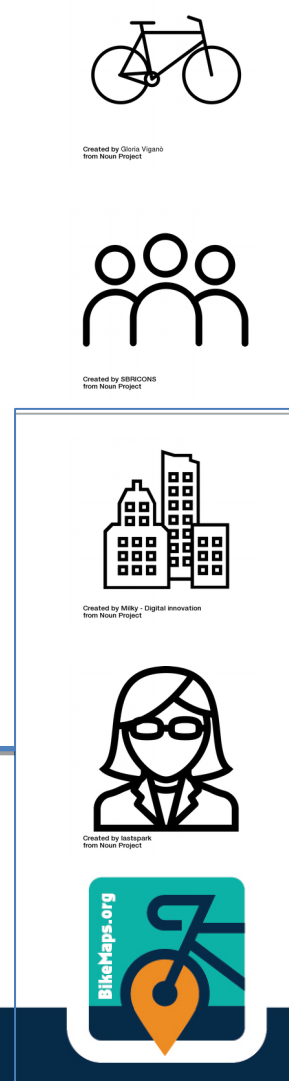
Products



Actions



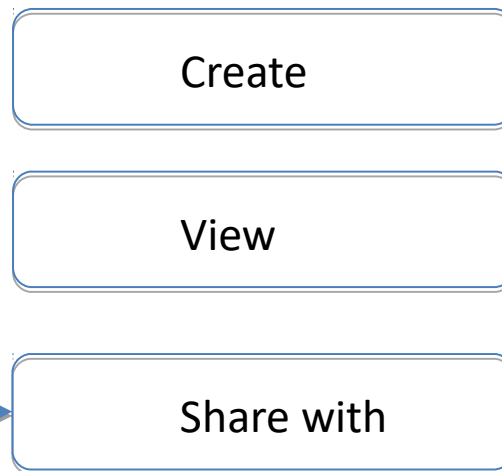
People



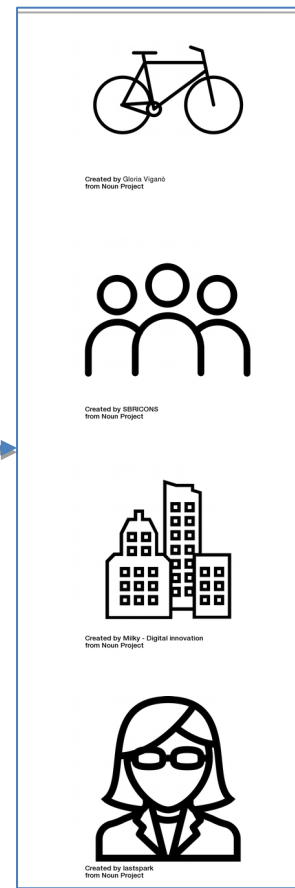
Products



Actions



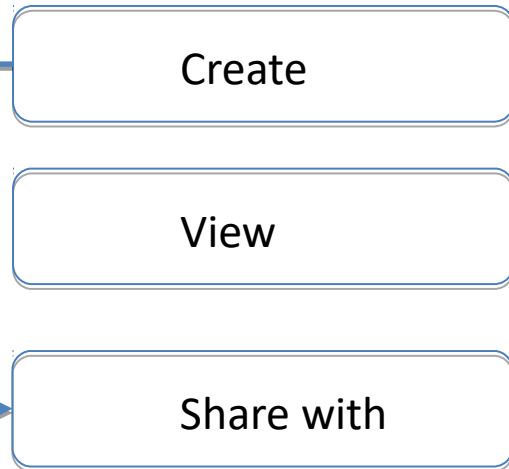
People



Products



Actions



People



Created by Gloria Viganò from Noun Project



Created by SERICONS from Noun Project



Created by Milky - Digital Innovation from Noun Project



Created by nestapark from Noun Project





BikeMaps.org

REFLECTIONS



Data and experiences

- 📍 There is a need for data
- 📍 Bike crashes are under reported
- 📍 Cities are expanding their active transportation infrastructure
 - Data are needed for monitoring and planning
 - People have experiences that we can learn from



Promotion and partnerships

- 📍 Use is closely tied to promotion
- 📍 Relationships
 - Individuals
 - Cycling groups
 - City planners
 - Other organizations
- 📍 Ongoing over time



VGI for cycling safety

- 📍 Engagement with audiences:
 - Individuals
 - Managers and organizations
 - Researchers
- 📍 Citizen science and VGI
 - A constructive way of engaging people online



Thank You

BikeMaps.org

cferster@uvic.ca

✉ info@bikemaps.org

🐦 @BikeMapsTeam

📘 BikeMaps.org

