Better Data for Better Cities
Metro Washington COG

Sept 19, 2017

Kevin Mabey: Account Executive
kmabey@strava.com

Overview

- Strava and Strava Metro Overview
  - Background
- Strava Metro Products
  - How it works
  - Uses
- Strava Metro Use Cases
  - How are other cities using Metro?
  - Partner Organizations
- Questions

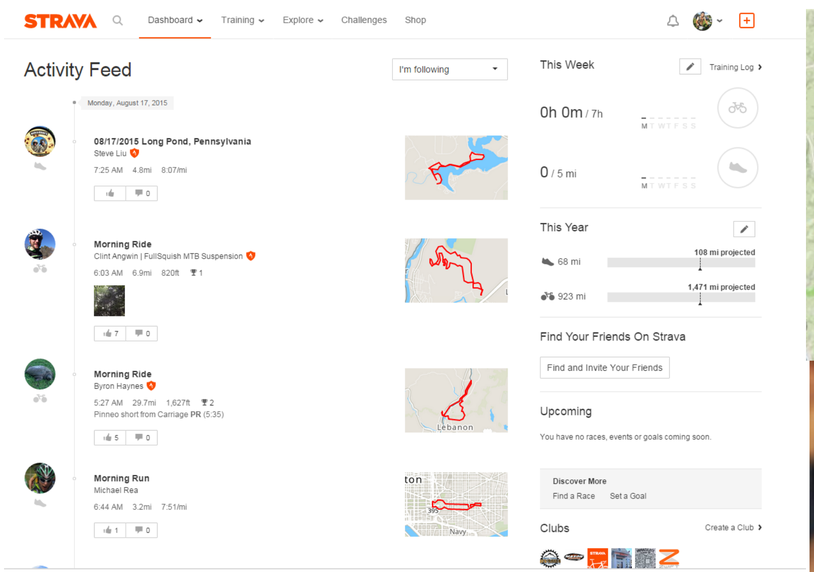
STRAVA | METRO

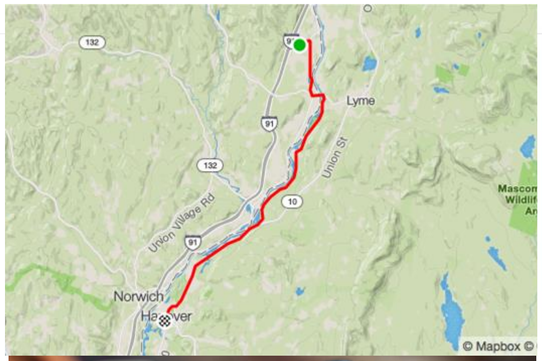

What and Who is Strava?
STRAVA | METRO

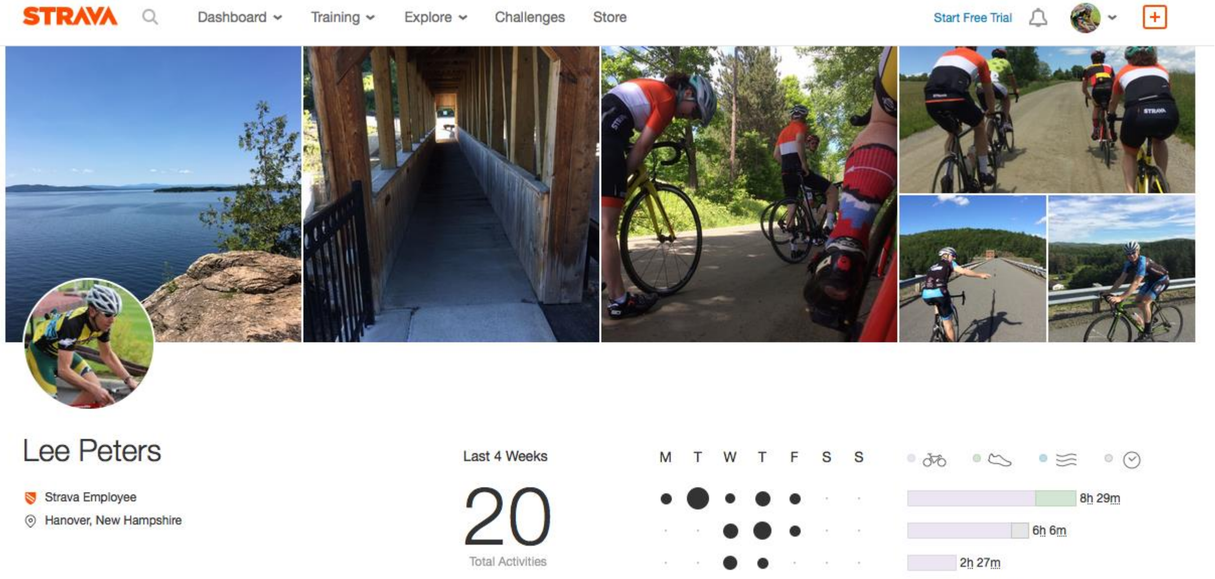
What is Strava?

The Social Network for Cyclists and Runners

- Activity tracking via GPS
- Mobile & Web Interface
- Over 20 million global users
- 11 million uploads per week
- San Francisco based, 140 employees
- Growing at 25% annually

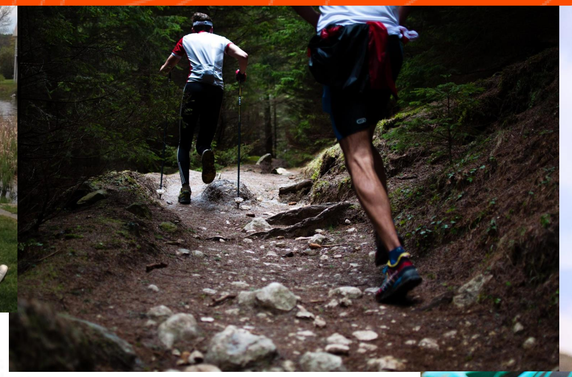


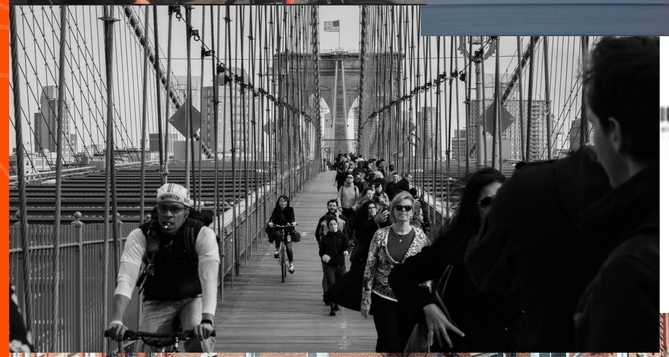
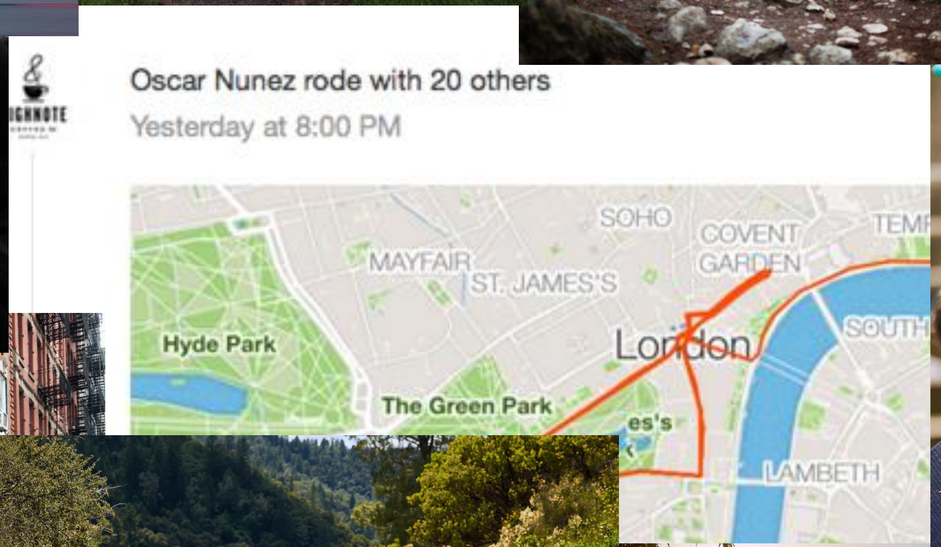


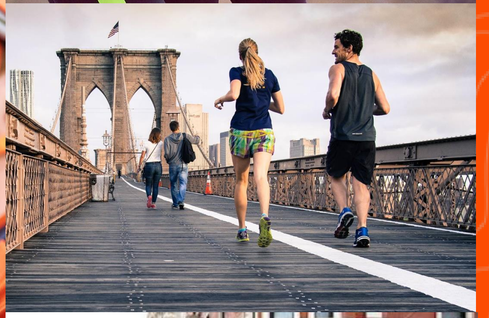


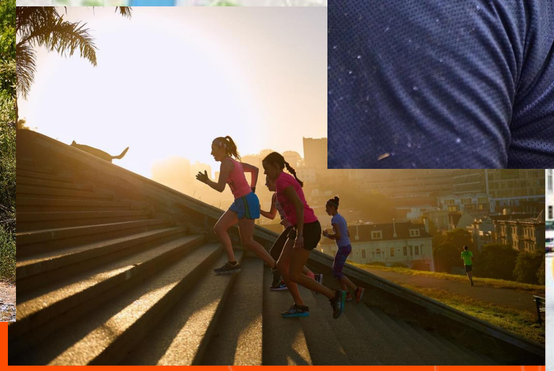
The Heart of Strava: Community



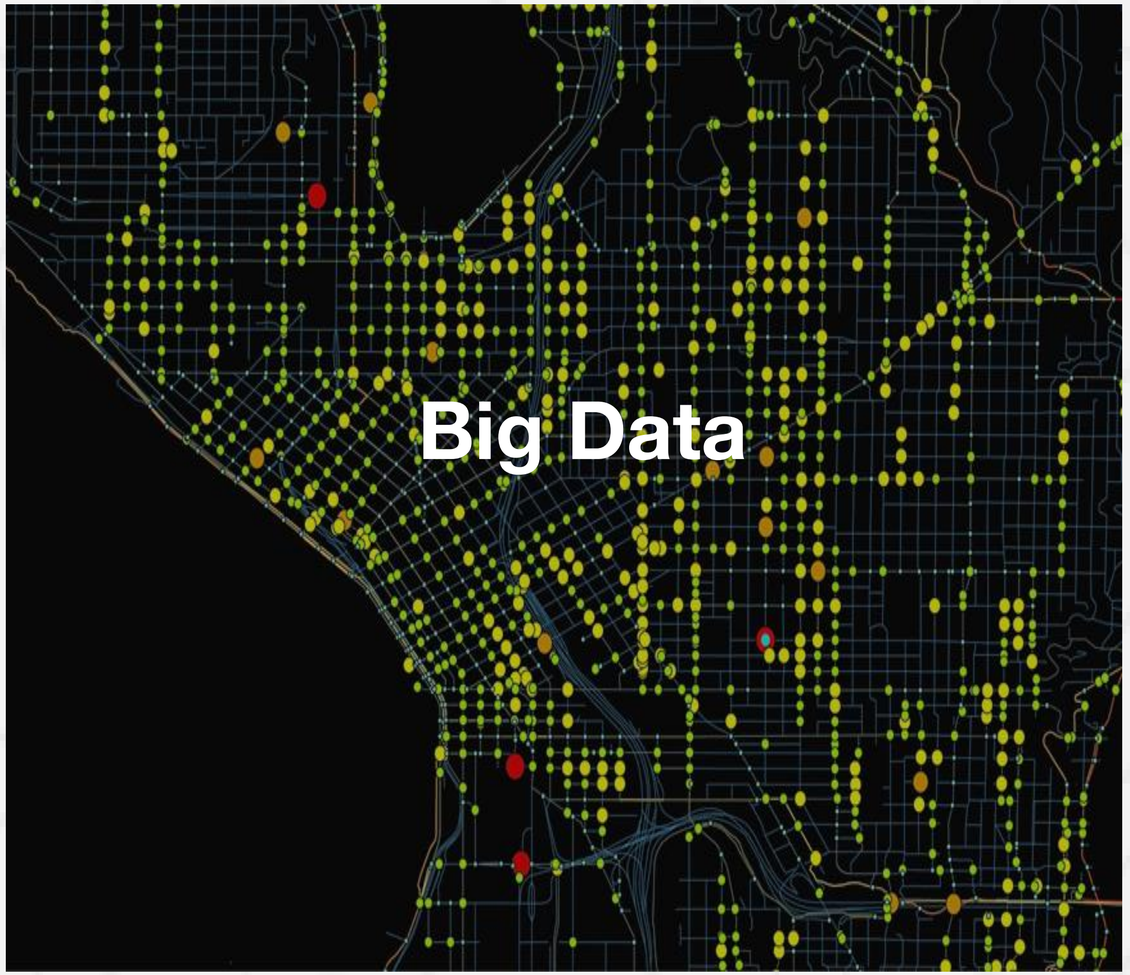




STRAVA | METRO

Strava by the Numbers

- 6.3 activities uploaded per second
- 4 Trillion+ second by second GPS points globally
- 11 million+ activities uploaded per week currently
- 300 million+ activities uploaded last year
- 20 Million users – Globally
- 1 Million new users added every 12 weeks

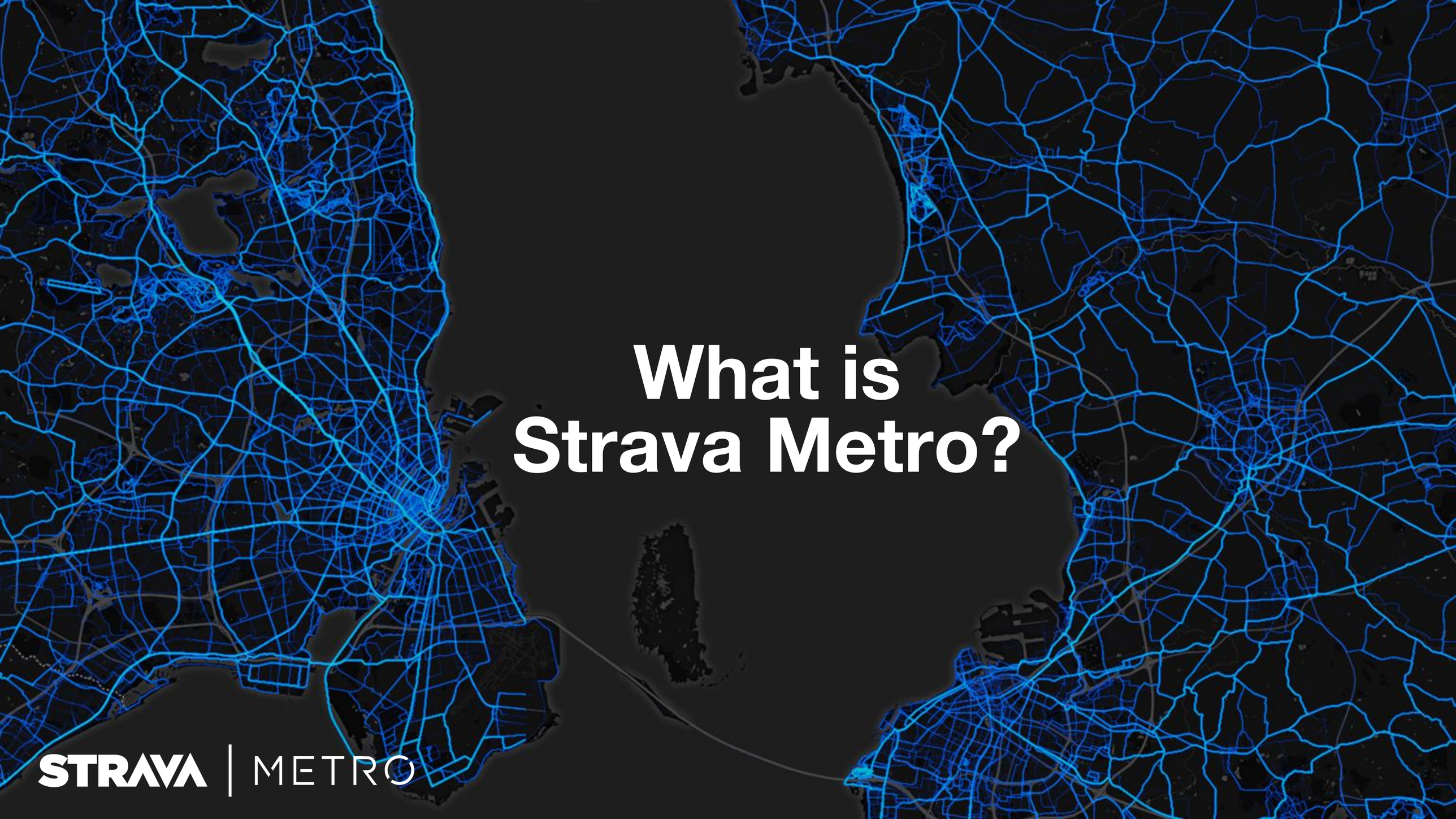


STRAVA | METRO

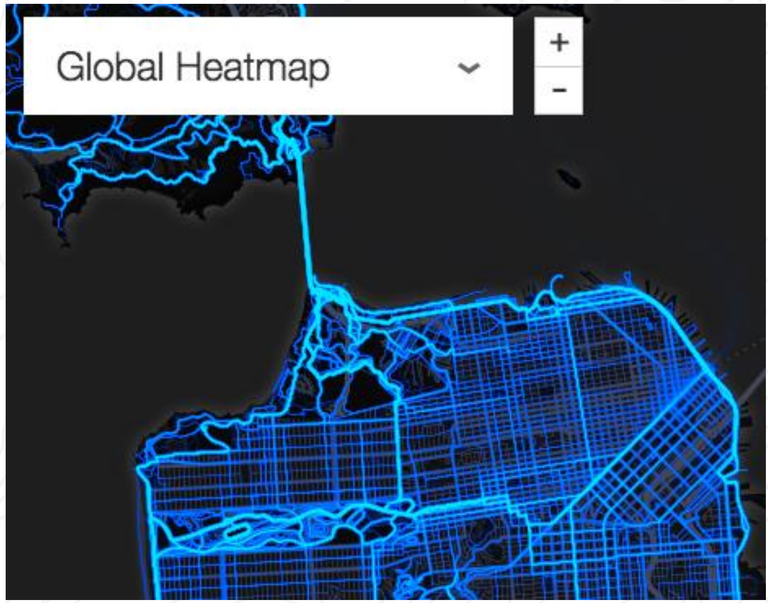
Strava by the Numbers – Washington COG 2016

County	State/Region	Country	Unique Athletes	Activities
DISTRICT OF COLUMBIA	DISTRICT OF COLUMBIA	USA	44,021	802,356
MONTGOMERY COUNTY	MARYLAND	USA	32686	585259
PRINCE GEORGE'S COUNTY	MARYLAND	USA	20285	279363
FREDERICK COUNTY	MARYLAND	USA	10147	81959
CHARLES COUNTY	MARYLAND	USA	6890	45022
ARLINGTON COUNTY	VIRGINIA	USA	41743	726703
FAIRFAX COUNTY	VIRGINIA	USA	36396	723659
LOUDOUN COUNTY	VIRGINIA	USA	16071	178043
ALEXANDRIA CITY	VIRGINIA	USA	13728	195238
FALLS CHURCH CITY	VIRGINIA	USA	9648	141015
PRINCE WILLIAM COUNTY	VIRGINIA	USA	8949	88750
FAIRFAX CITY	VIRGINIA	USA	3085	40213
MANASSAS PARK CITY	VIRGINIA	USA	1739	11453
MANASSAS CITY	VIRGINIA	USA	1690	12230
		Totals	247,078	3,911,263

STRAVA | METRO


What is
Strava Metro?
STRAVA | METRO

Strava Metro History & Background



Abbreviated Timeline

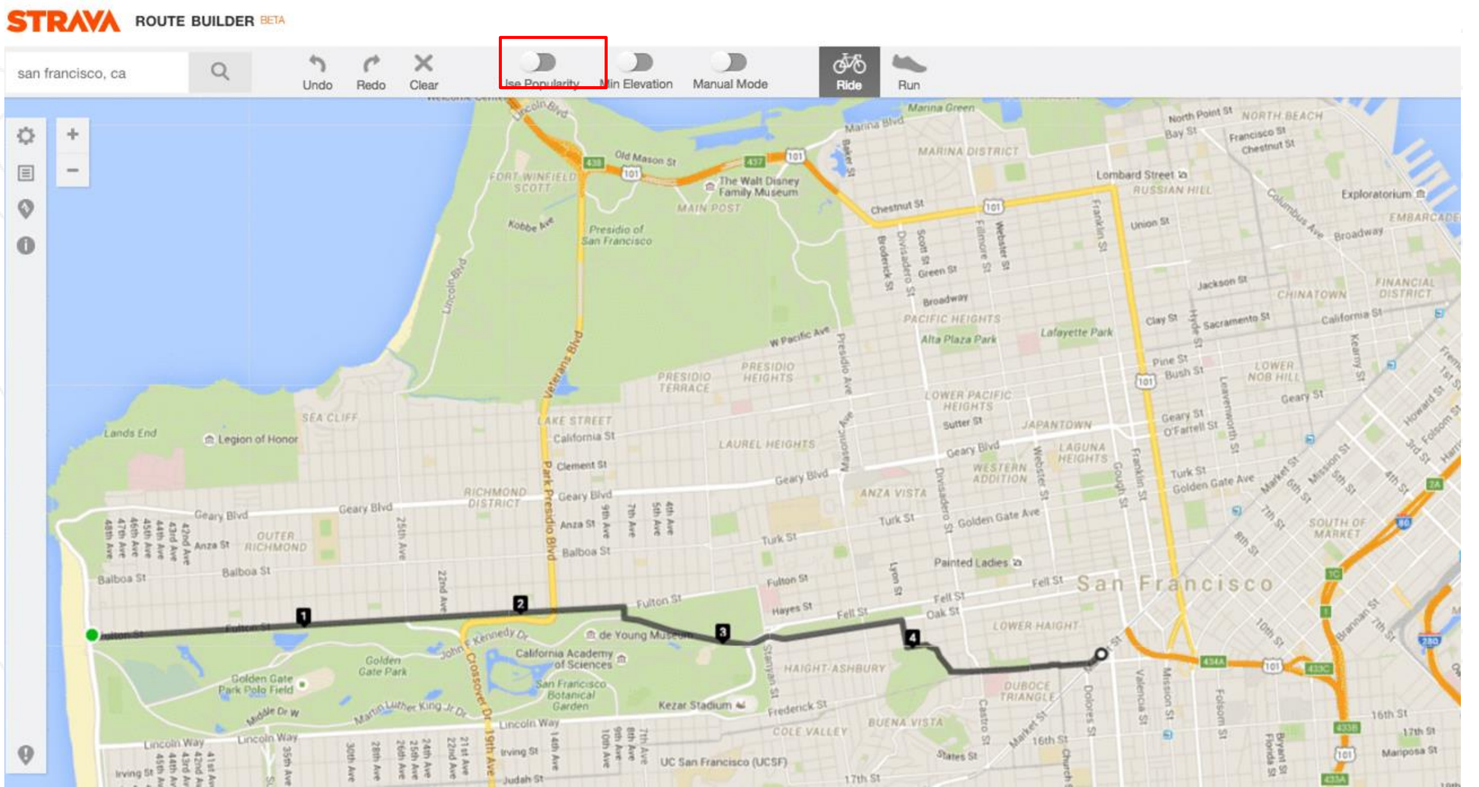
2012 / 2013
- Strava GEO group is formed out of Hanover, NH , Heat map goes viral
- Strava develops Route Builder: best route from point A to B based on user curated data
- DOTs begin contacting Strava
- Beta R&D partnership with Metro Orlando & OR-DOT

2014
- Strava Metro officially launches
- Metro Streets product delivered to Oregon DOT
- Nodes and Origin/Destination added to product

2015
- Web visualization component added to Metro
- Ended 2015 with over 70 organizations using Metro

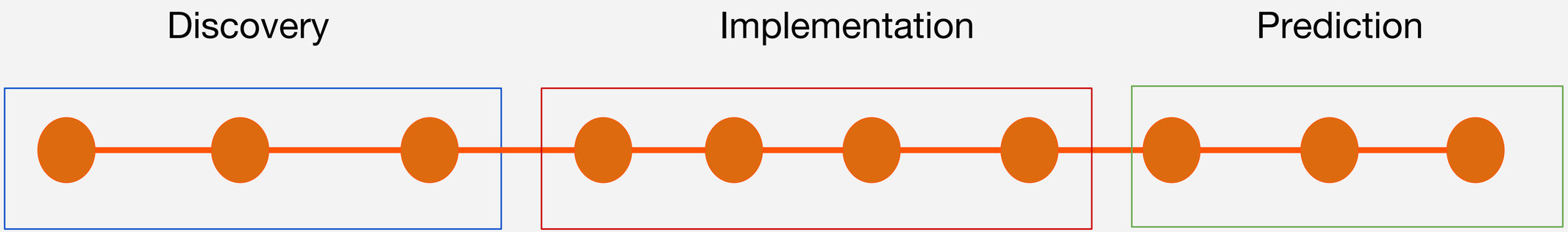
2016
- Built customer success team
- Goal: end year with over 100 partner organizations

2017
- Added 3 more States (TX, UT & CO)



STRAVA | METRO

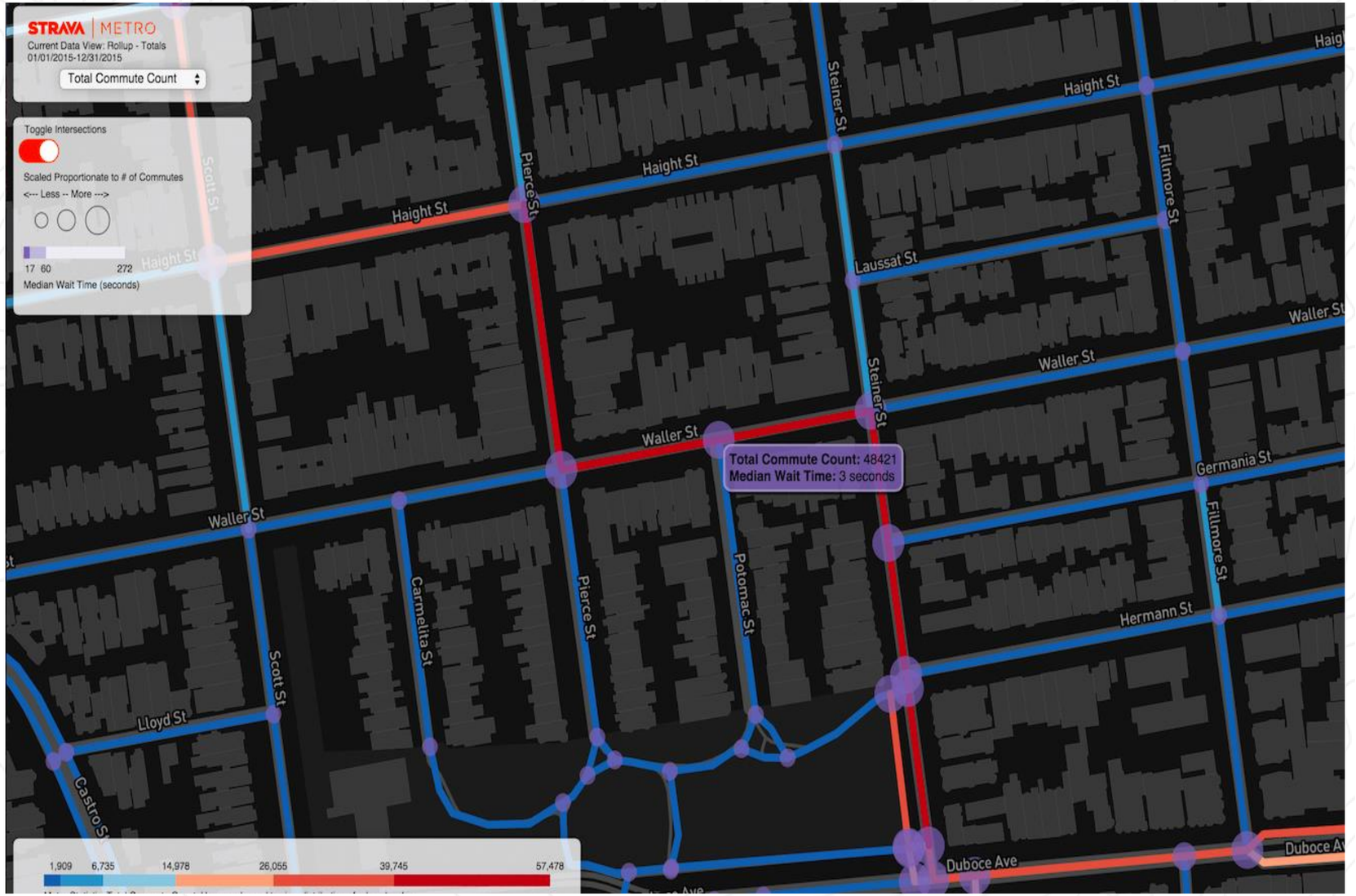
Metro Data Covers the Spectrum for Bike/Ped Planning Actions



- Justification that people ride bikes
- When and what changes riding frequency
- Locating Intersection Hot Zones and possible route conflicts
- Identify top Origin and Destination pockets
- Isolate speed and volumes to begin to locate slow down regions
- Evaluate the impact of new cycling investments
- Blending of count data with path data to correlate and extrapolate
- Safety prediction modeling
- Building routing engines to isolate cycling habitat fragmentation
- Generate cycling traffic demand models and employ ITS solutions

Data-Driven Bike and Pedestrian Planning

- Aggregated, anonymized activity data from Strava's tens of millions of users
- Allows for analysis of routes (popular or avoided), peak commute times, intersection behavior times, and origin/destination zones
- Processed for compatibility with Geographic Information System (GIS) and relational database environments
- Includes DataView for in-browser visualization

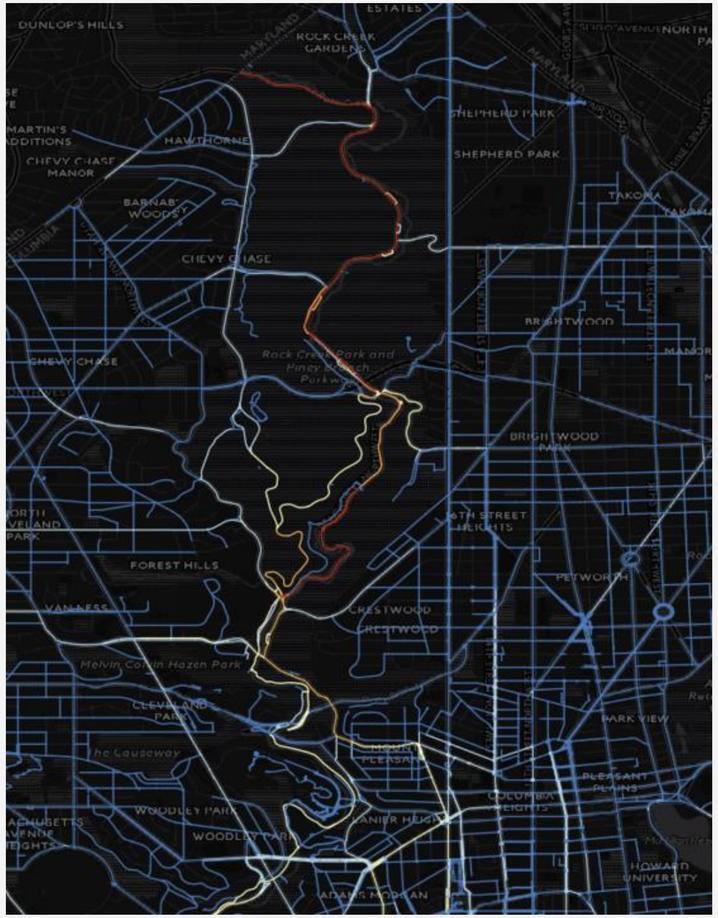


STRAVA | METRO

Identifying Core Route Choice By Temporal Choice

Rock Creek Park, Washington DC

Weekday

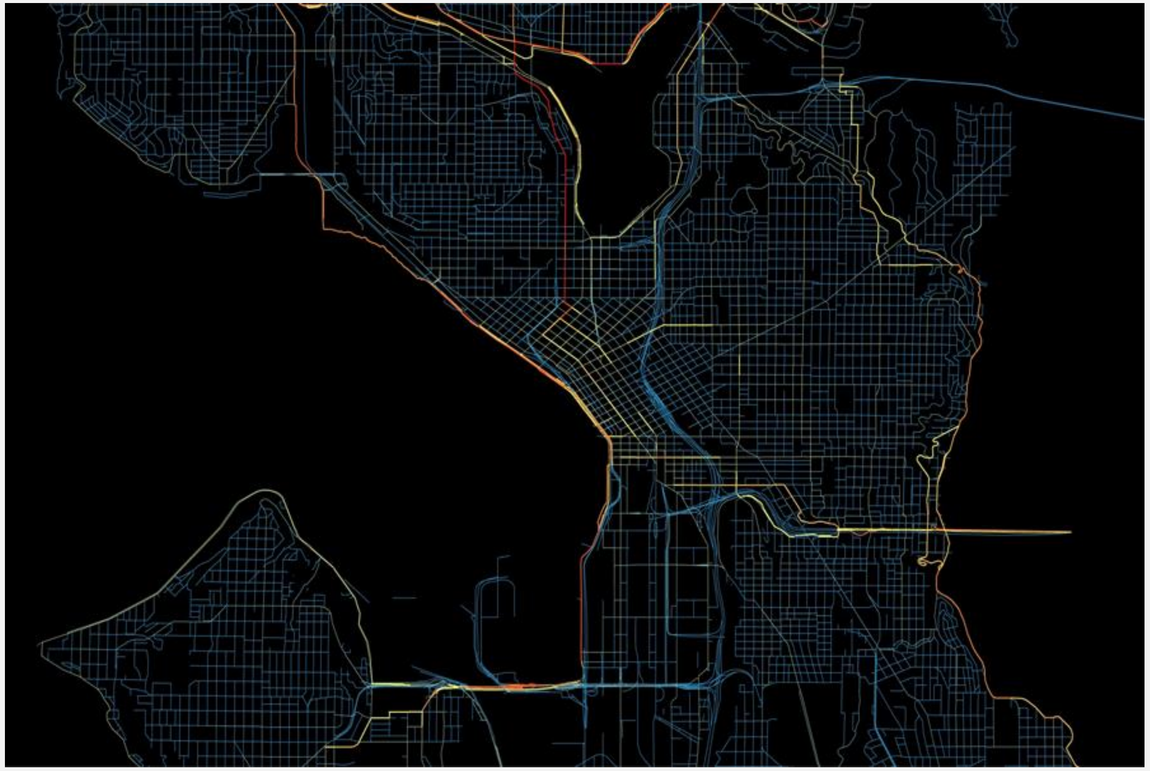


Weekend

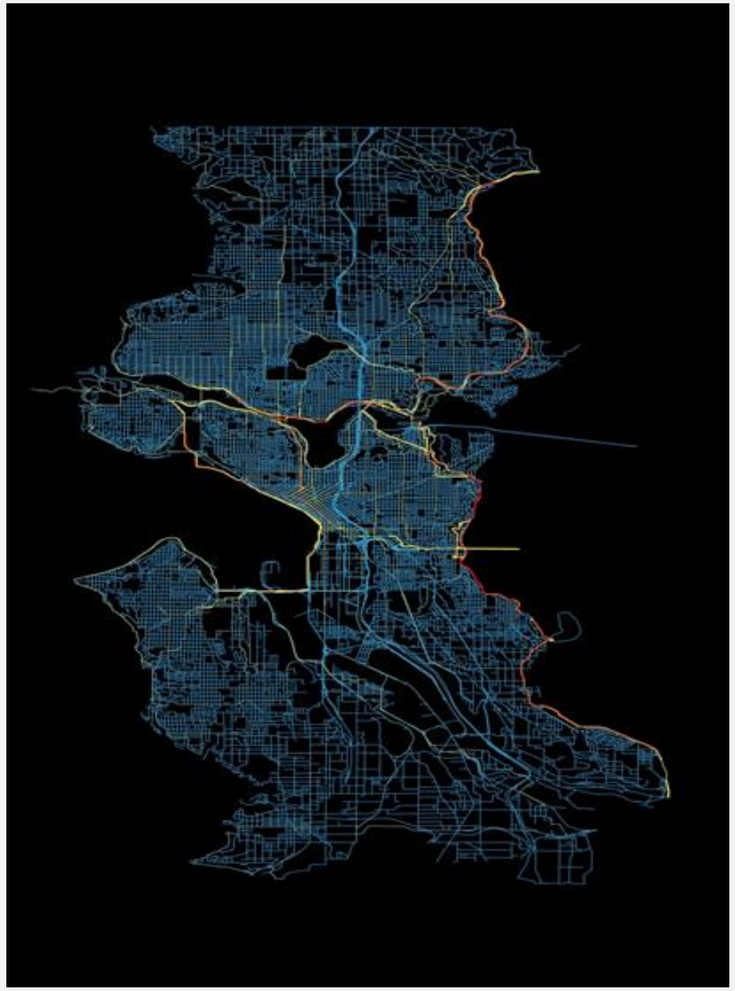
STRAVA | METRO

Locate Key Commute vs. Recreation Routes

Seattle, Washington

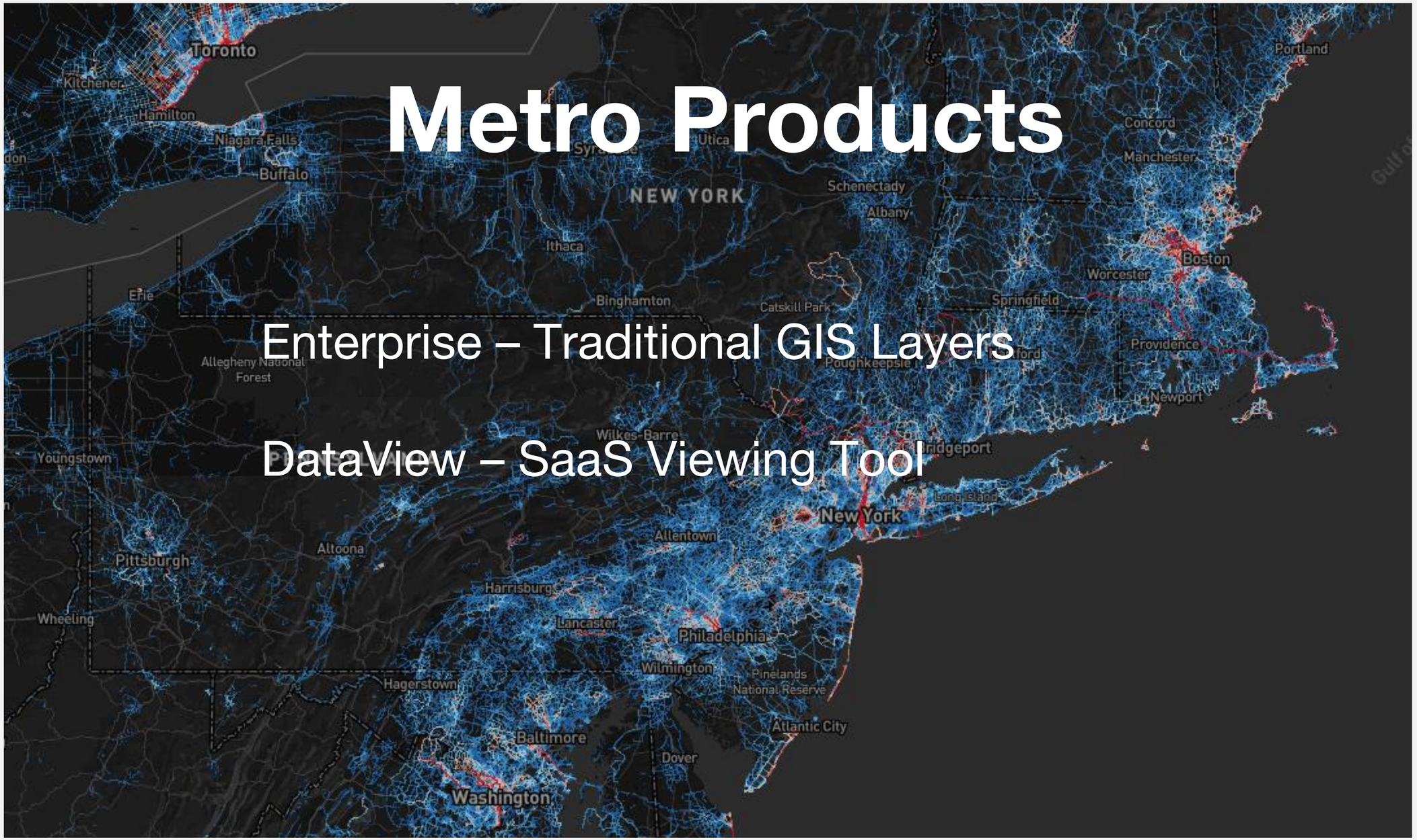


Commute



Recreation

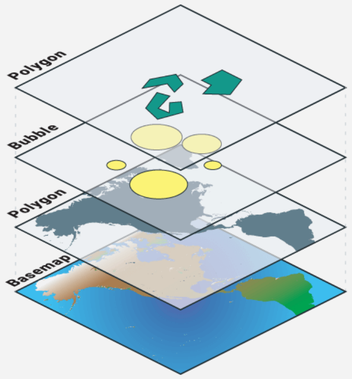
STRAVA | METRO



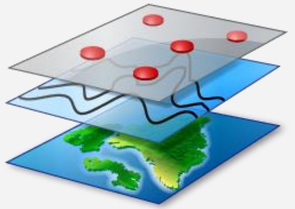
Metro Products

Enterprise – Traditional GIS Layers

DataView – SaaS Viewing Tool



Enterprise GIS Content



PRODUCT LAYERS AND CONTENTS

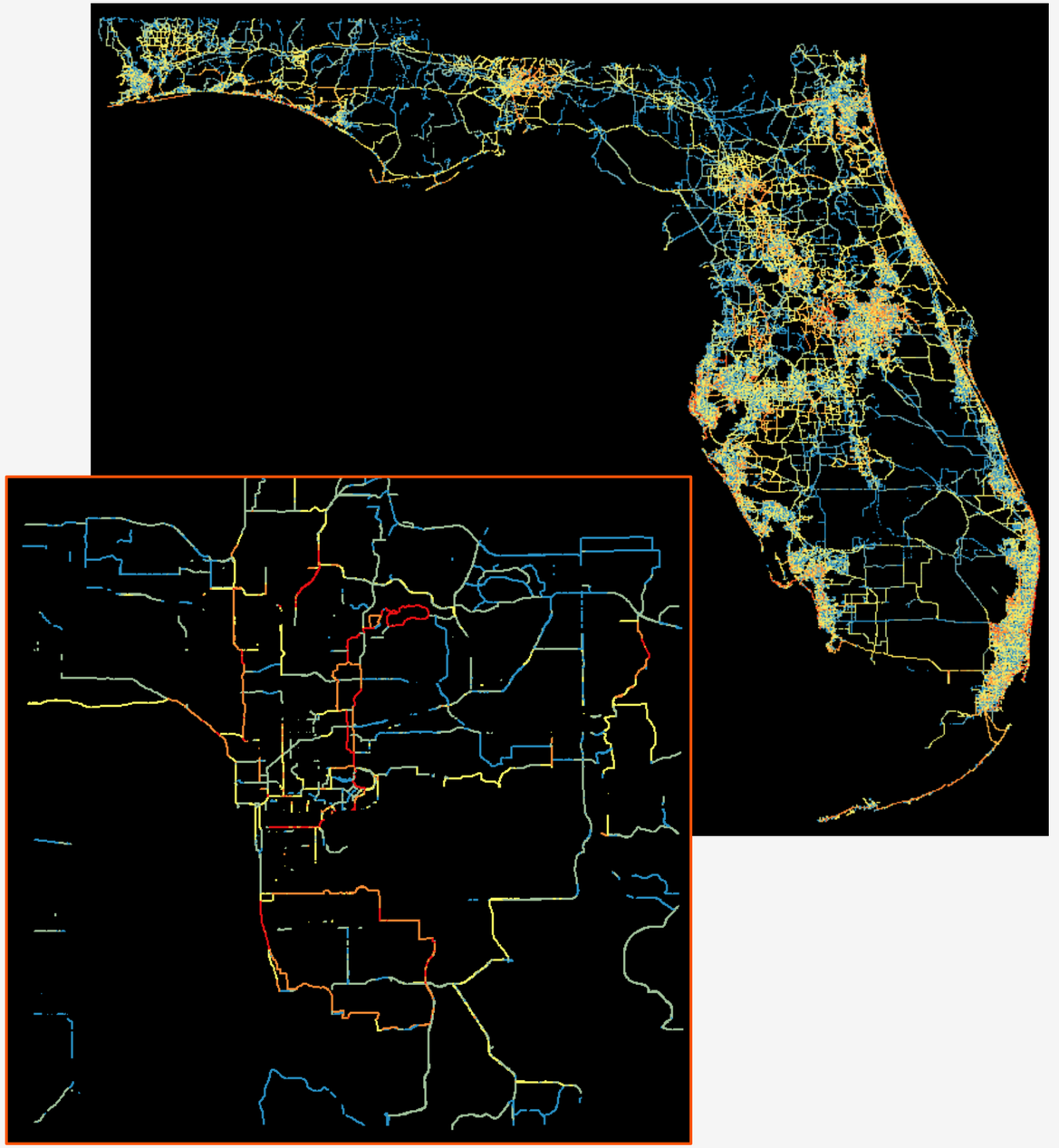
This section outlines what is contained in a delivery of Strava Metro. The Strava Metro product is evolving constantly as we locate and build in key features. The delivery contains the following data files:

- .csv/.sql raw hourly data file.
- .dbf rolled-up views in the cycling data (listed in the table on the following page).
- Streets polyline file.
- Origin/Destination data table raw.
- Origin/Destination Polygon.
- Nodes data table raw.
- Nodes point file.
- Demographics document.
- Product description document.

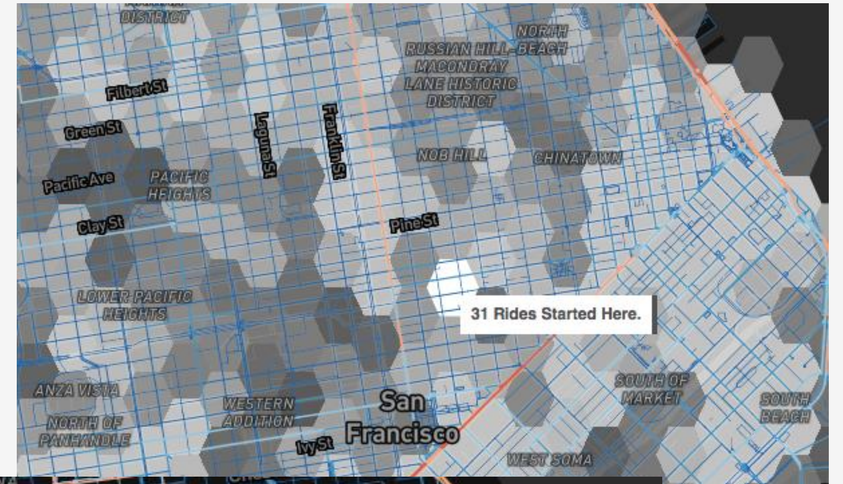
Streets

- Minute by minute reports of cycling/pedestrian data
- Preferred direction
- Unique bike/ped trips
- Unique user counts
- Trip purpose e.g. commute (AM/PM)
- Time/Date/Season/Speed

Understand how behavior changes on your entire street network by time of day, day of week, or after new infrastructure is built.



Origin and Destination



- Polygonal starting and ending points of all cycling & pedestrian trips
- Reported by the minute
- 350 meter hex ensures privacy
- Trip purpose flag
- Array of intersected polygon IDs

Strava OD Demand Modeling

DC Trips and OD migration to the city center

Starting_Polygon	Ending_Polygon	Count_Activities_Before_Noon	Count_Activities_After_Noon	Count_Total_Activities
18	146450		1	1
18	146502		4	4
24	29786		1	1
24	101268	1		1
24	151569	1	1	2
25	2739	1		1
25	15571		1	1
25	53168		1	1
25	54397		1	1
25	73827	1		1
25	75851		2	2
25	78139		1	1
25	94485	1		1
25	121738		1	1
27	15702	1		1
31	61284	1		1
42	299	2	4	6

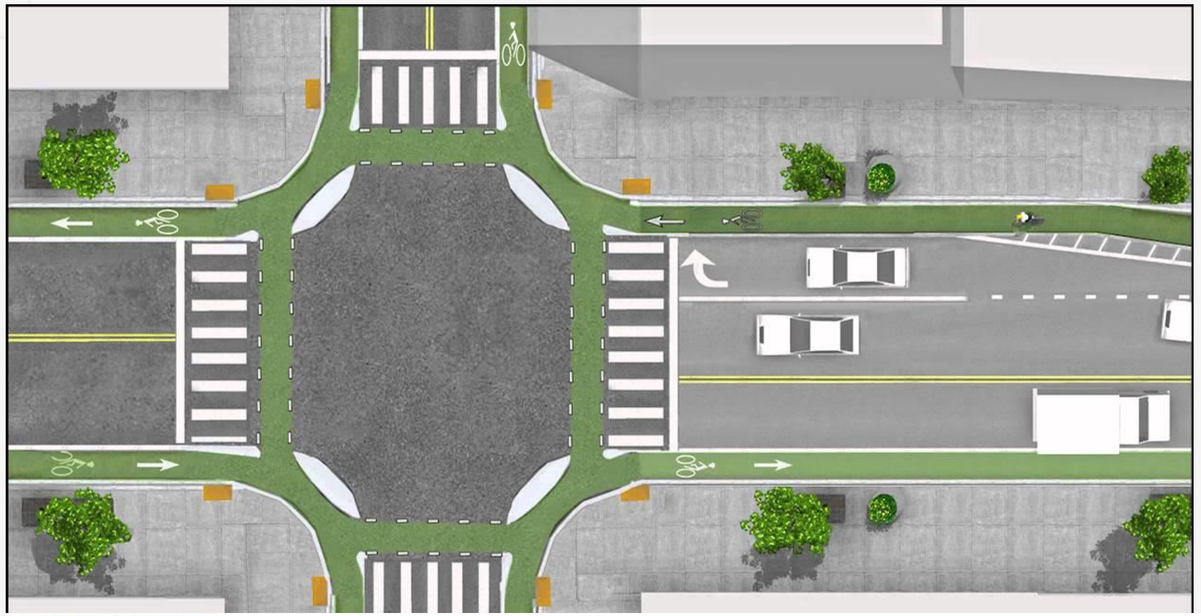
DC sample - 1 week of data - trips before noon

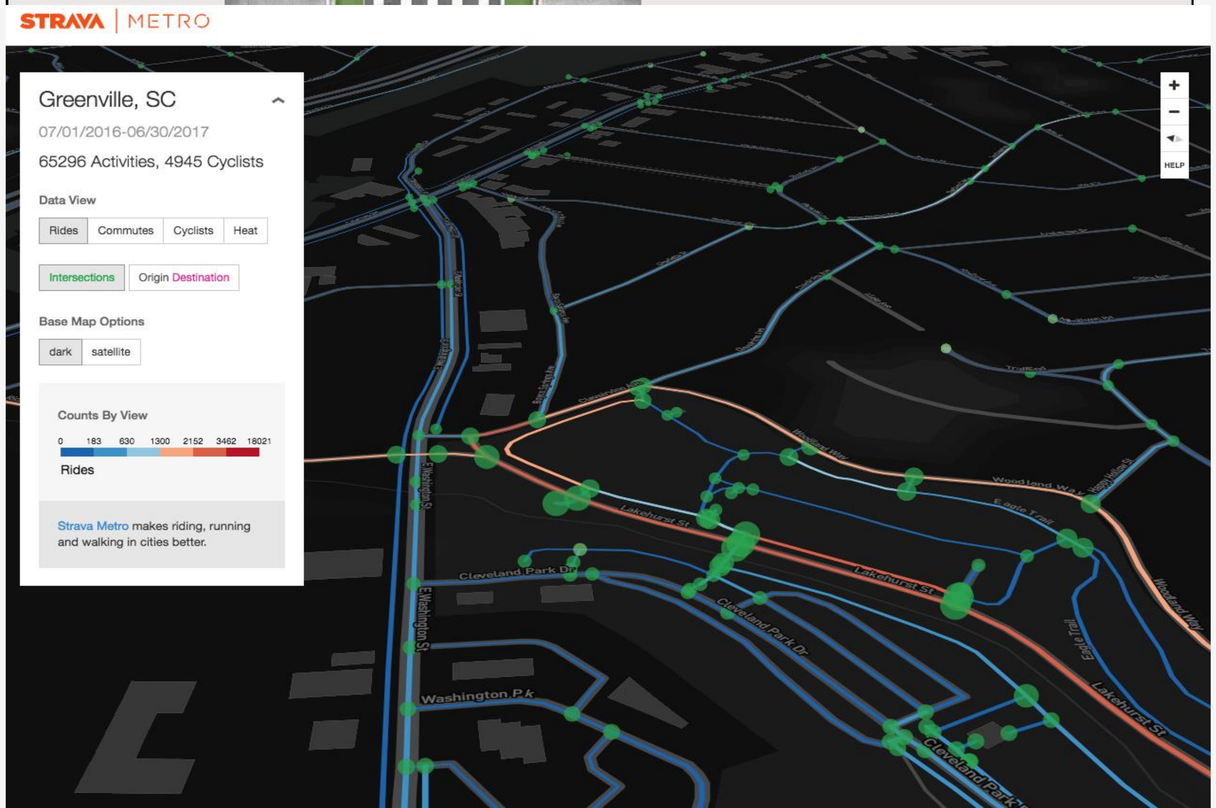
Intersections

- Crossing times at intersections
- Congregation of users at intersections
- Minute by minute w/ purpose flag

Understand which intersections have the highest cross times by:

- Time of day
- Day of week
- Overlay with weather data to see how storms alter intersection behavior.

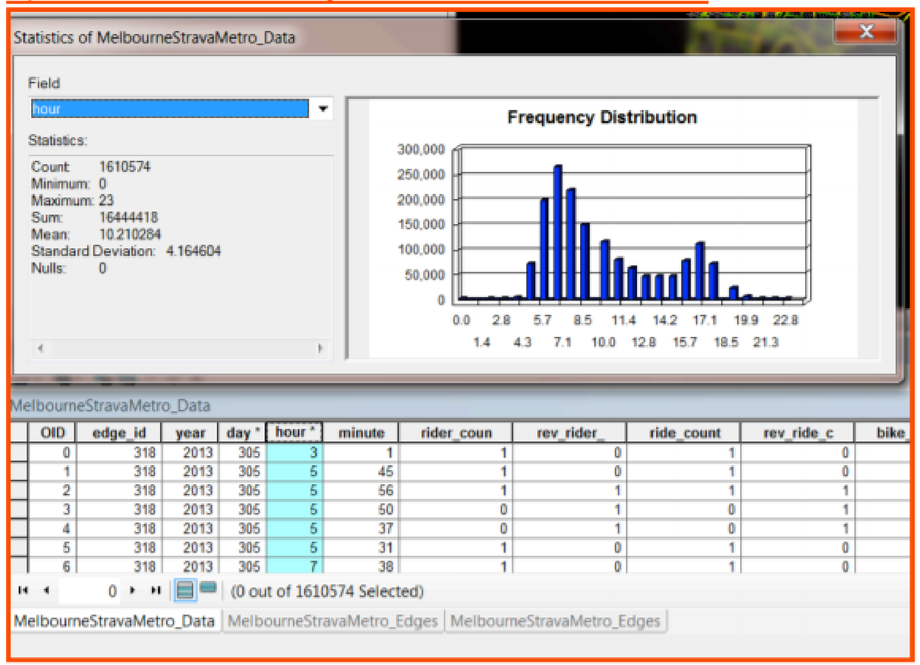




Commutes

- Commutes are the #1 requested data feature in Strava Metro.
- Activities in urban areas are commutes 40% – 60% of the time (High of 80% in London).
- Commutes and recreation rides in urban areas have very high correlation in route choice.
- Use stat tools to provide Quick Views into hourly volumes

Quick Views into AM/PM Commute Windows



Demographics Data

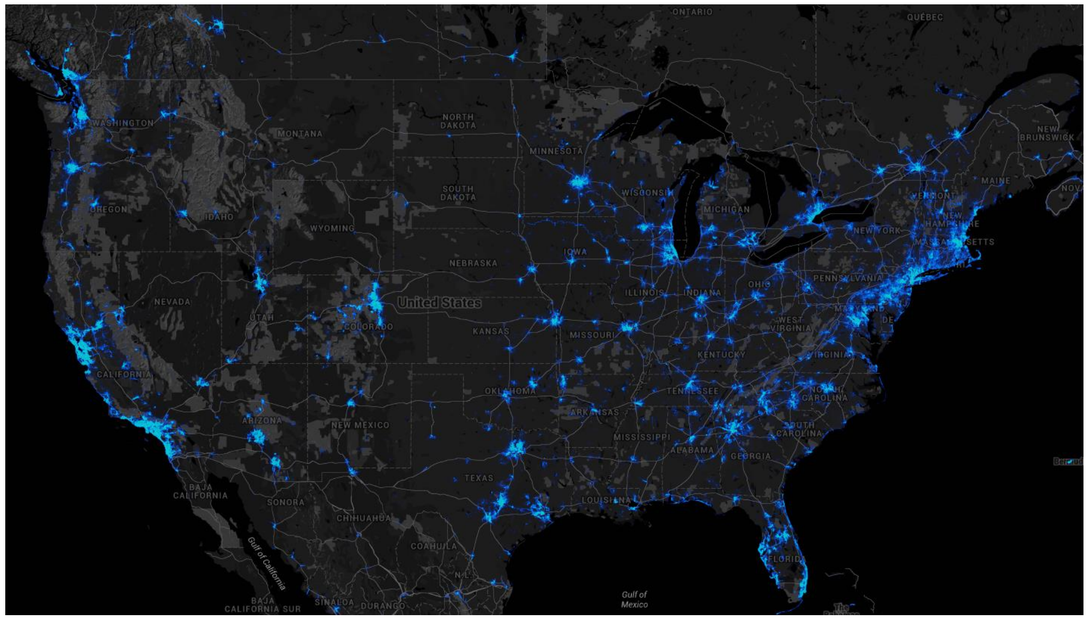
- Rolled-up counts of users in the data files
- Breakdown of age and gender from users
- Time in seconds
- Distance in meters

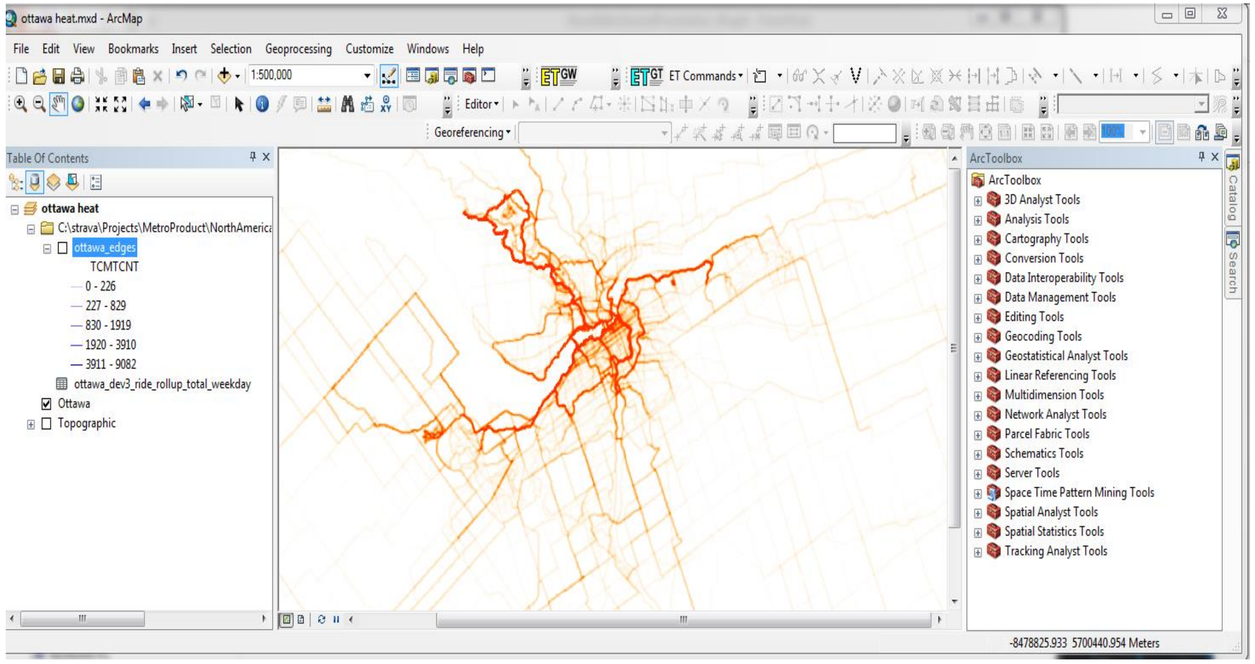
```
Metro Demographics
Date Run: 2017-05-03 05:29:26 +0000

Athlete ID Count: 55537
Activity Count: 970072
Average Distance: 27575.551311527561
Median Distance: 20716
Average Time: 6200.8644456698604070
Median Time: 5066
Male Count: 41831
Male Count Under 25: 3079
Male Count 25 - 34: 7976
Male Count 35 - 44: 10787
Male Count 45 - 54: 7602
Male Count 55 - 64: 3024
Male Count 65 - 74: 723
Male Count 75 - 84: 73
Male Count 85 - 94: 5
Male Count No Bday: 8538
Female Count: 10666
Female Count Under 25: 804
Female Count 25 - 34: 2499
Female Count 35 - 44: 2635
Female Count 45 - 54: 1510
Female Count 55 - 64: 609
Female Count 65 - 74: 100
Female Count 75 - 84: 10
Female Count 85 - 94: 0
Female Count No Bday: 2495
Blank Gender Count: 0
Average Uploads: 271.0605
Commute Counts: 252465
```

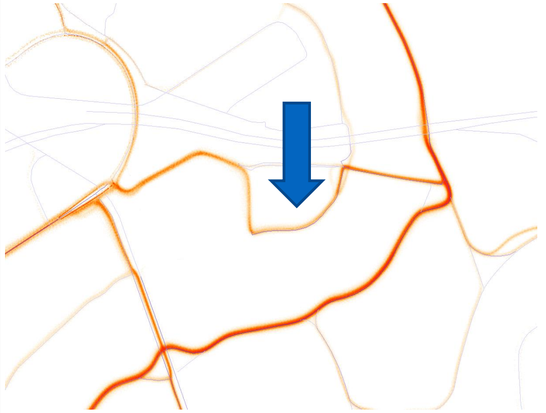
Heatmap

- The Heatmap is compatible with:
  ArcGIS Online, ArcMap, and QGIS

- Overlay with your basemap to check for missing/misaligned geometry







STRAVA | METRO

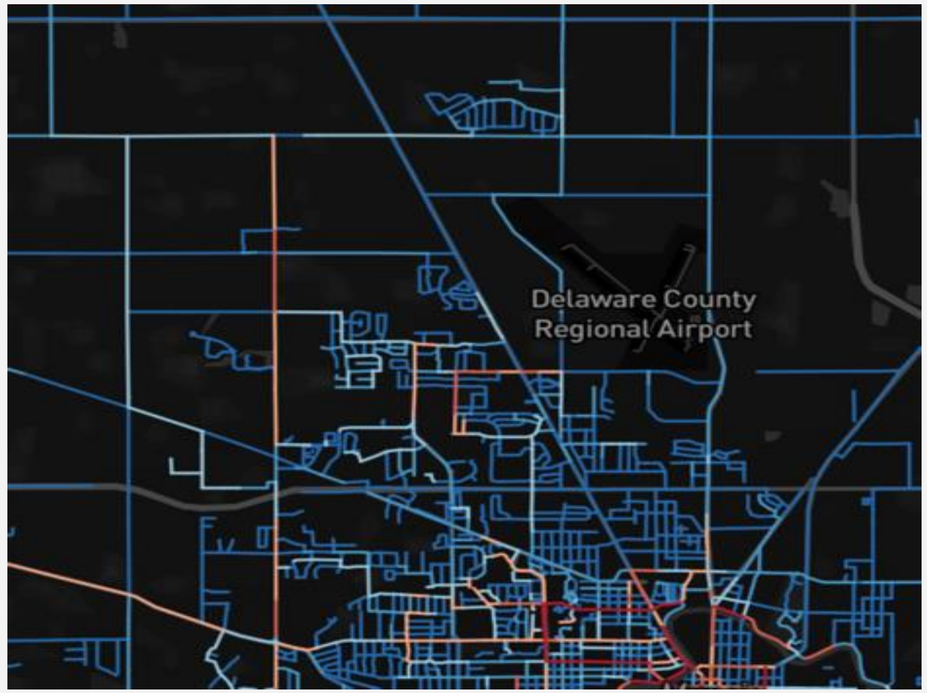
Basemap Basics

Important to think about multi-modal transportation

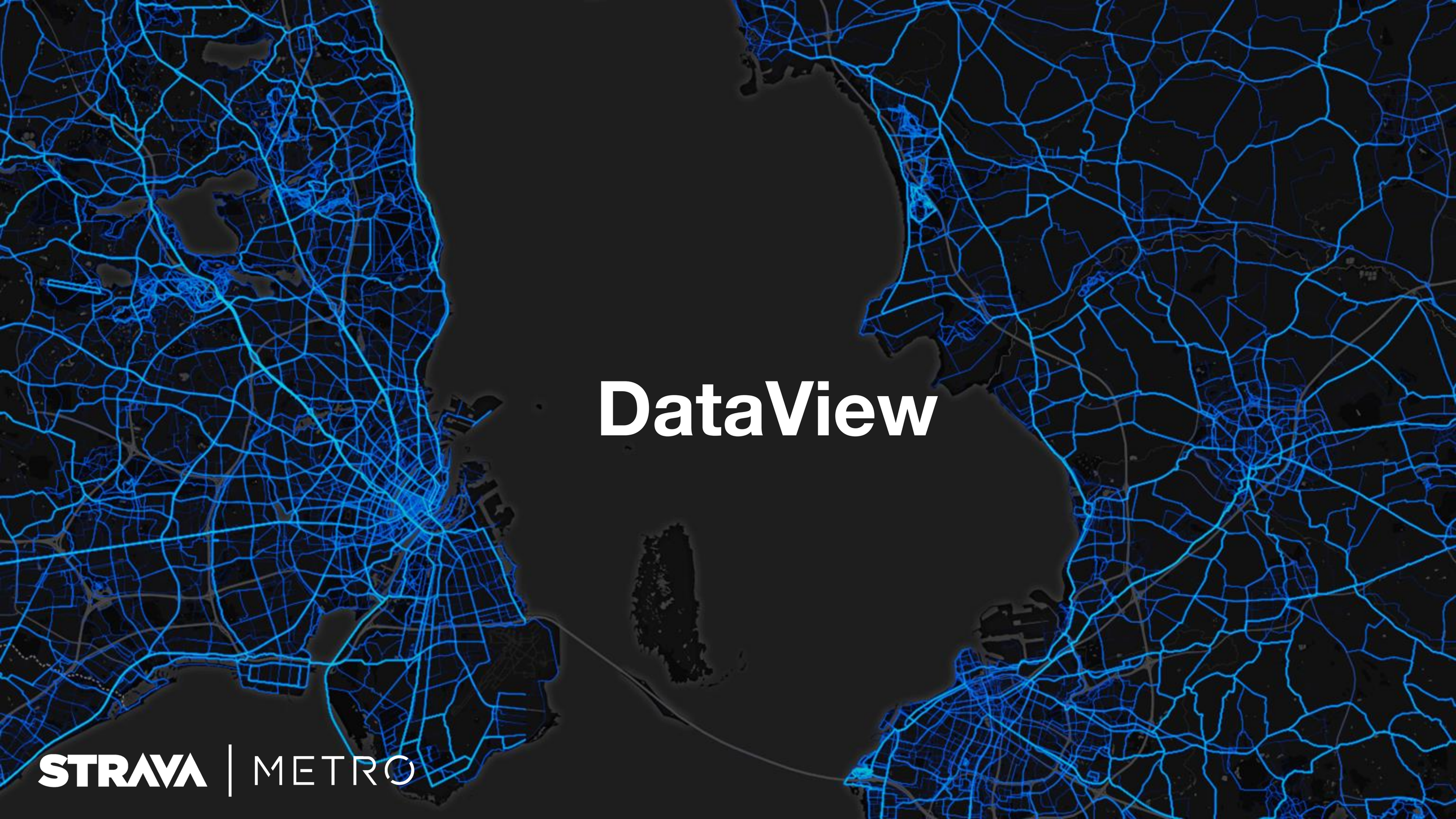
- Should include all:
  - Streets
  - Roads
  - Trails
  - Paths

- And should break at all intersections (decision points)
- We will default to Open Street Map unless a basemap is provided

Strava Heatmap

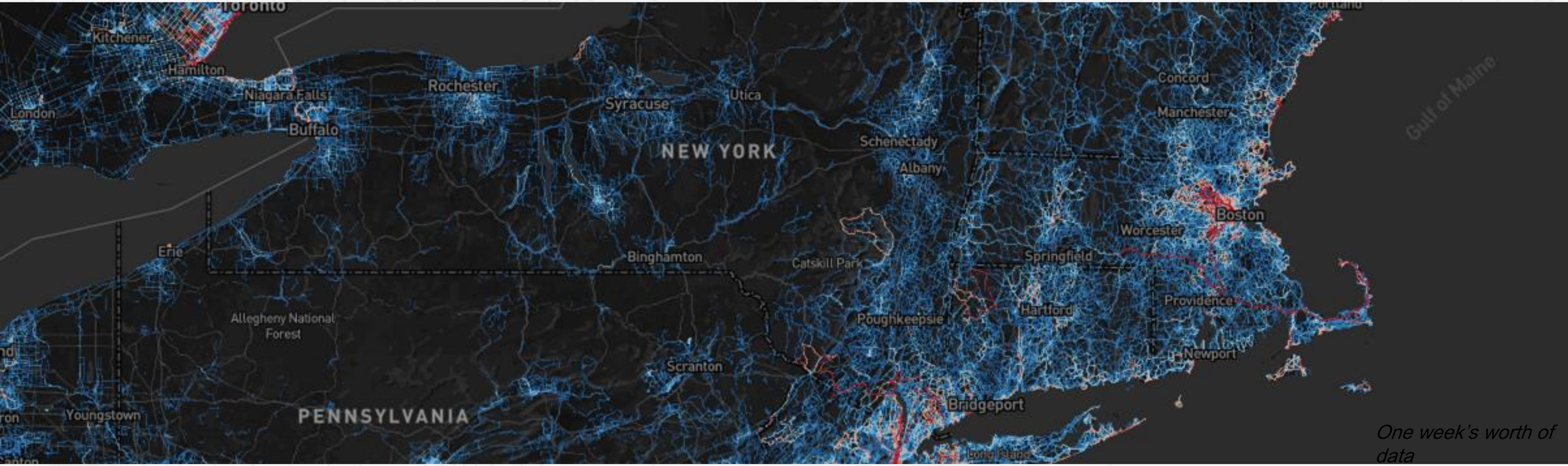


Missing trails file in the County basemap


DataView
STRAVA | METRO

DataView

Interactive SaaS based map for immediate insight into cycling behavior
….without the need for complex GIS analyses

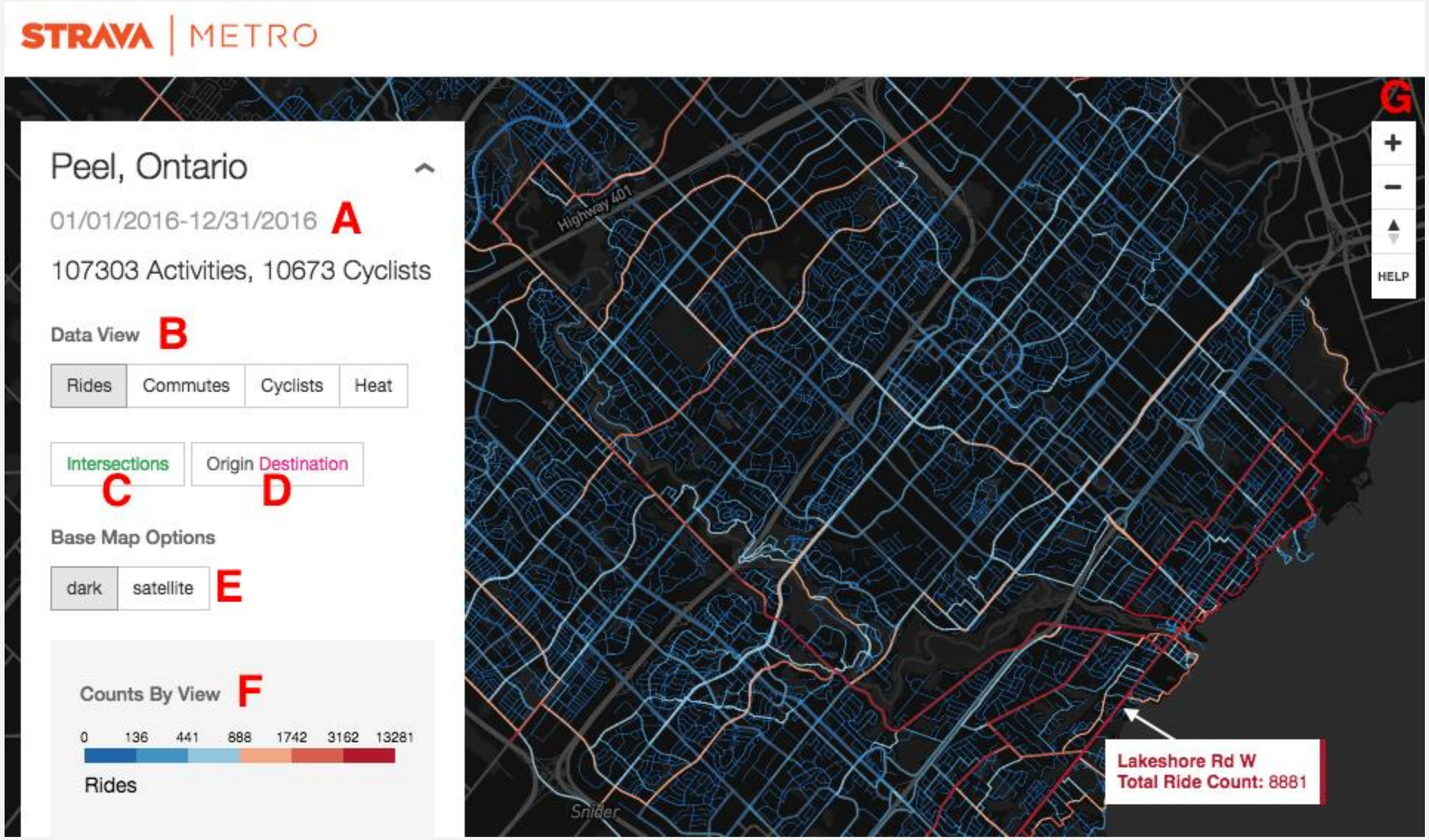


One week's worth of data

1) counts of users, activities + commutes
2) intersection pass through times
3) origin-destination polygons
4) heat map GPS traces

STRAVA | METRO

DataView - Control Panel



Legend

(A) date range and total activity counts

(B) view toggles

(C) intersections button

(D) origin/destination toggle button

(E) basemap controls

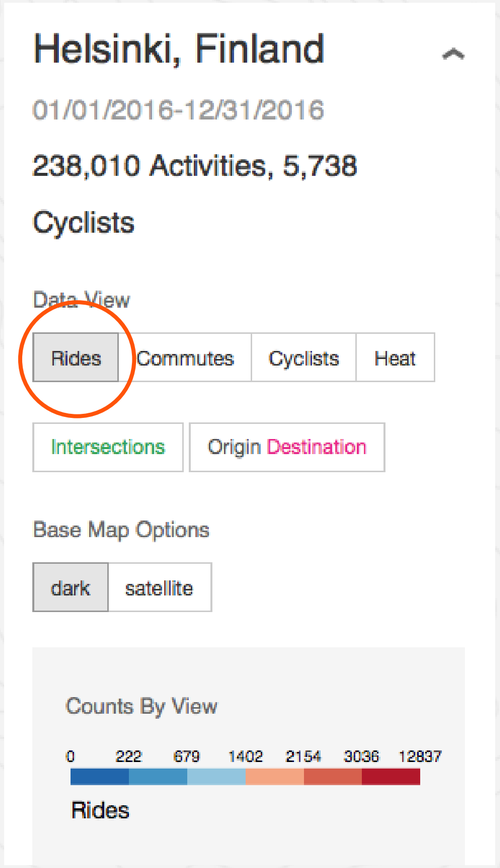
(F) street legend

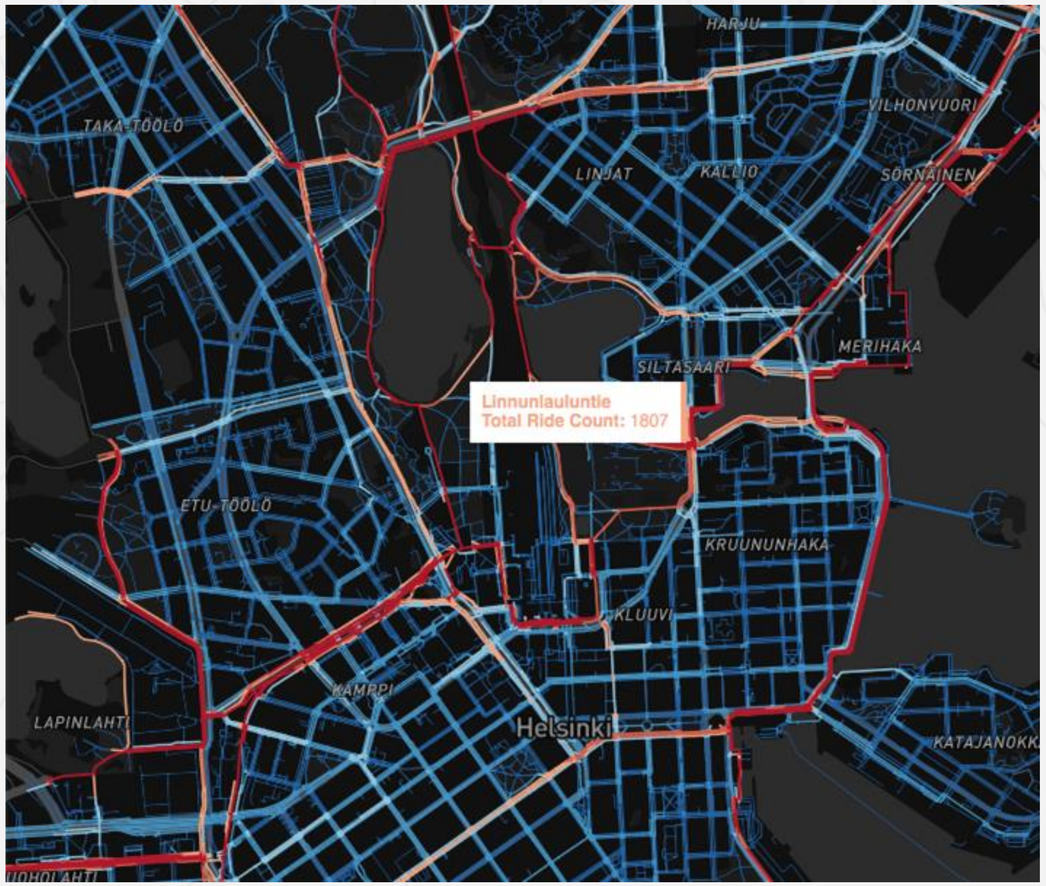
(G) Map navigation

STRAVA | METRO

DataView - Rides

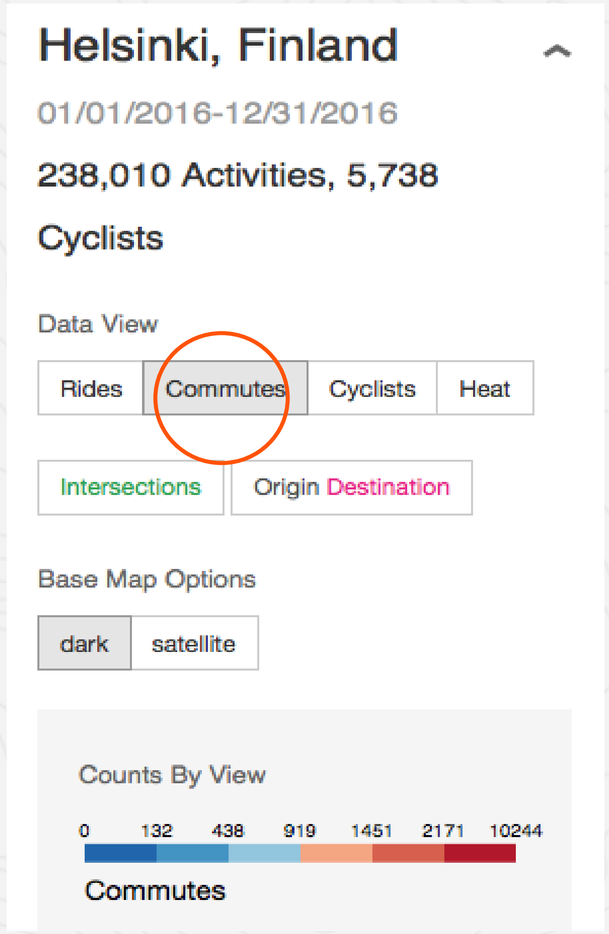
- Shows total count of *unique activities* on each road or trail segment
- Hover over a street to view counts
- Street legend updates to provide the color variances
- Dark blue signifies lowest counts and dark red signifies highest

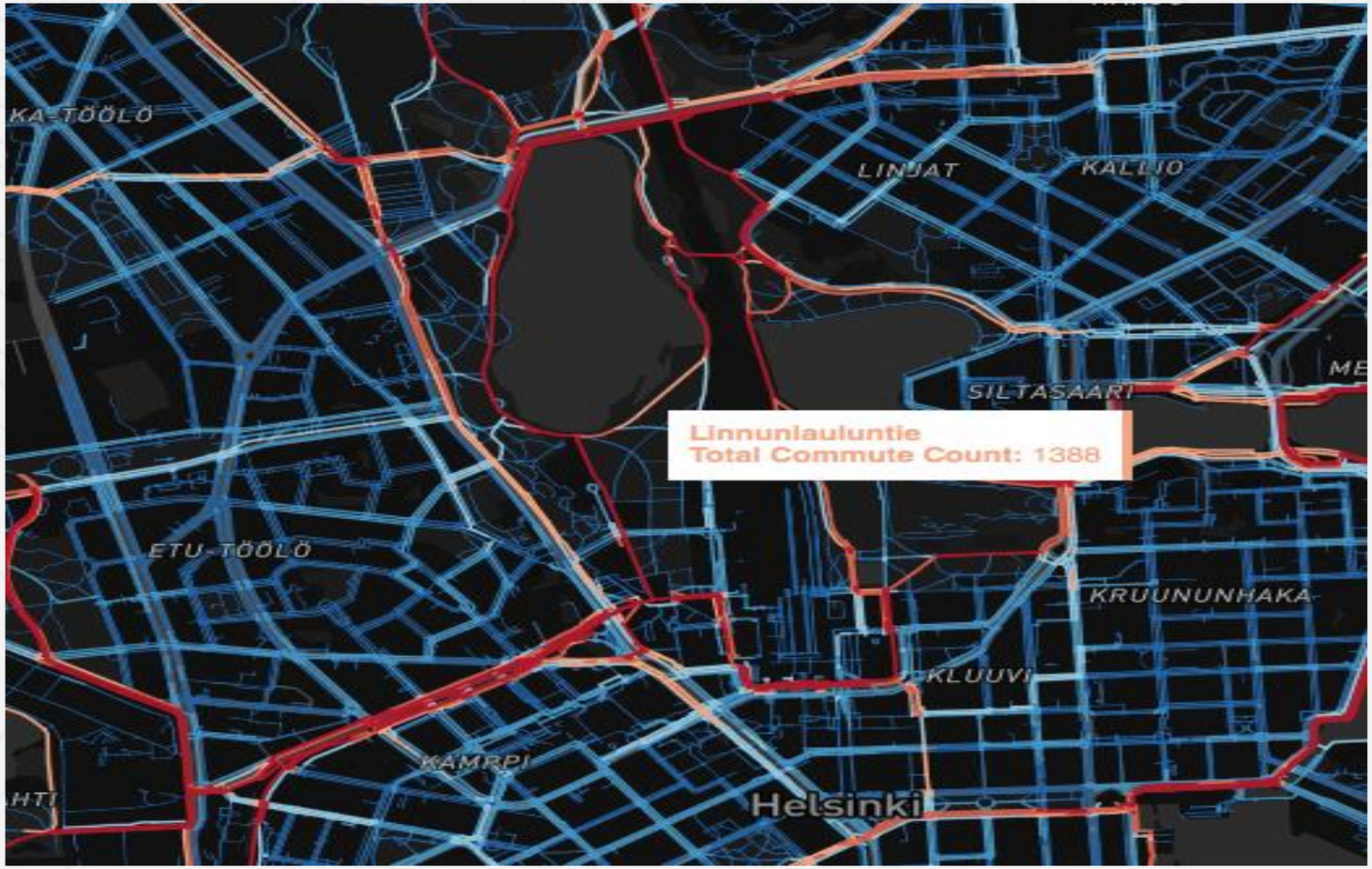




DataView - Commutes

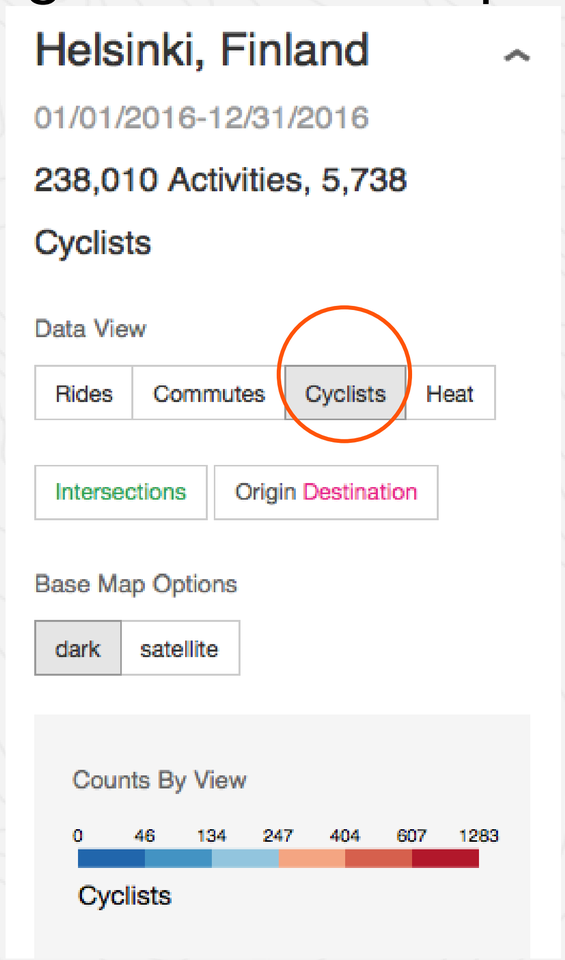
- Shows count of *unique commute activities* per road segment
- Commuter data is found through automated process that locates point-to-point cycling
- The street legend will update to reflect the counts and representing colors for this view

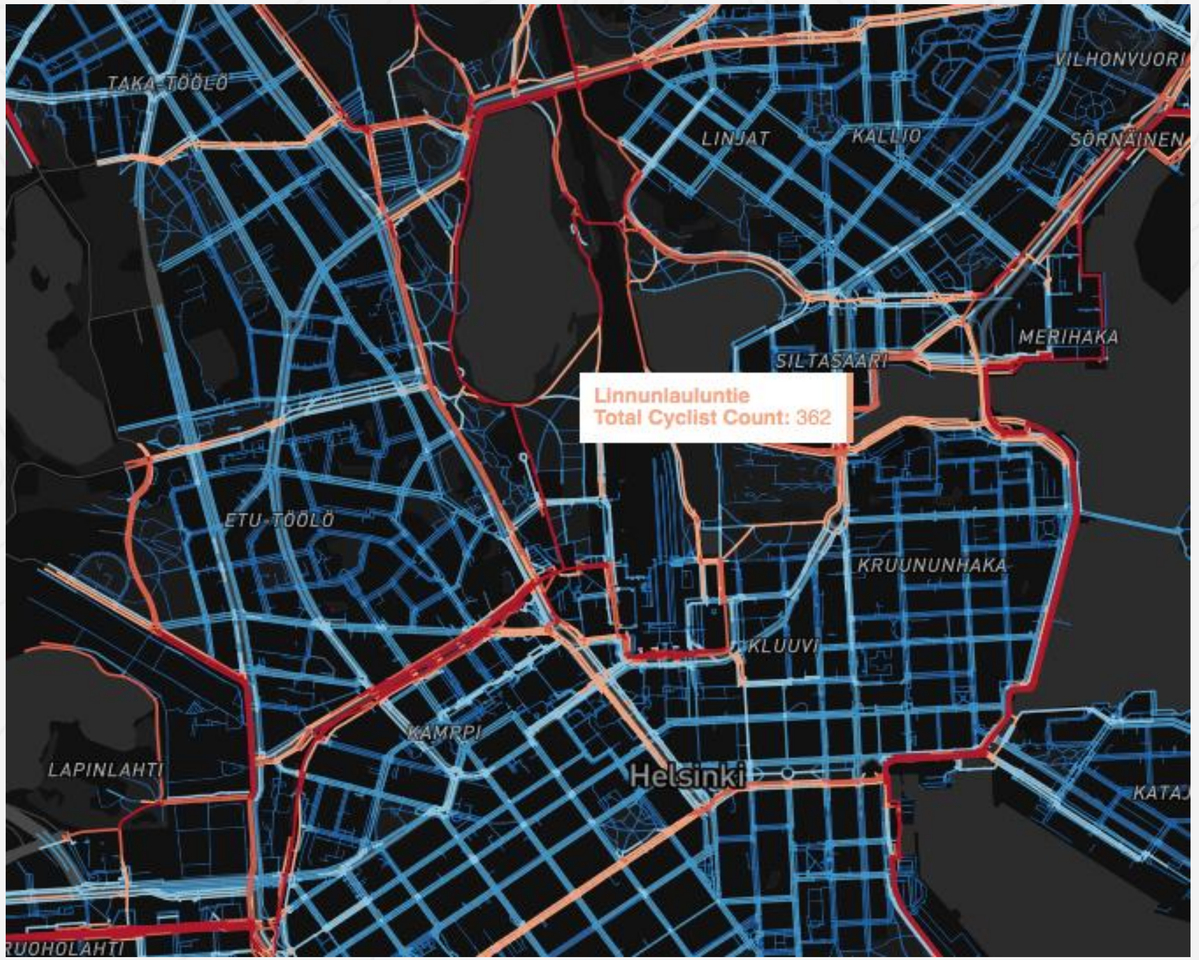




DataView - Cyclists

- Shows total count of *unique cyclists* that rode on each road or trail segment
- Legend will then update to reflect the colors for cyclists counts





Metro Use Cases

STRAVA | METRO

Evaluating investments

- ❑ Advocate for bicycling infrastructure
- ❑ Perform pre-post infrastructure delta analyses
- ❑ Prove that new infrastructure is being adopted by cyclists

Queensland, Australia
Department of Transportation

Delta Analysis

Determining Impact of New Infrastructure

September 2015, Brisbane opened a new section of the Enoggera Creek Bikeway, creating the Kelvin Grove Road Underpass

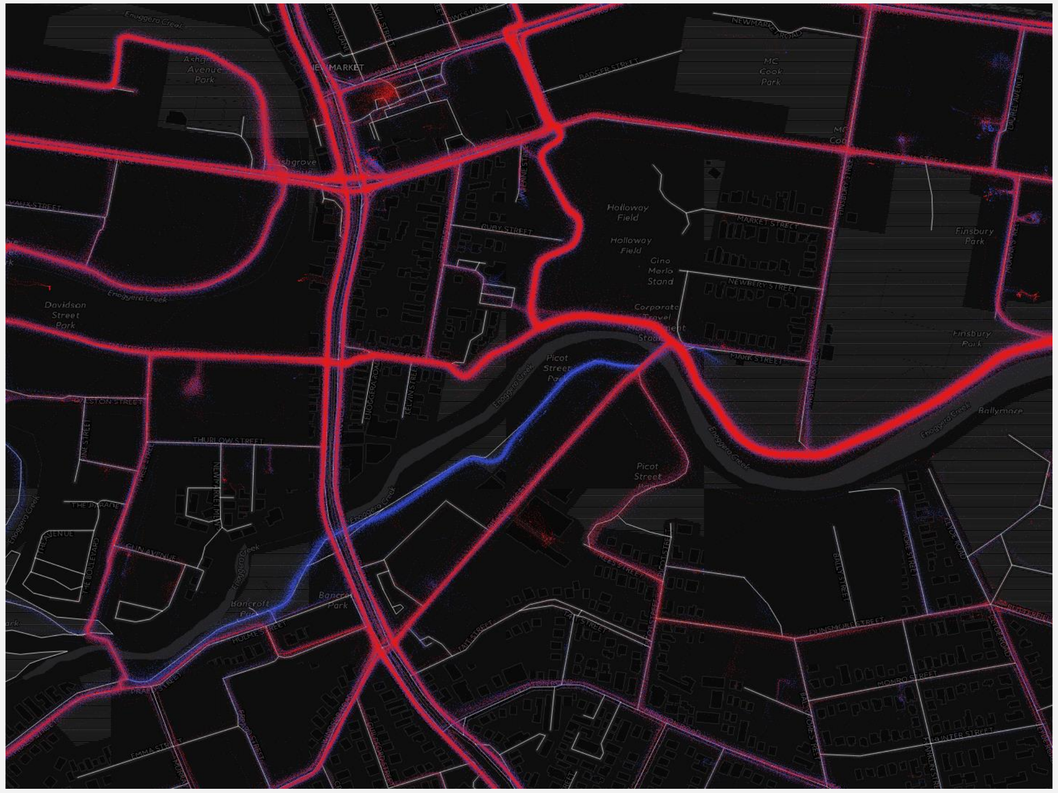
- Create a subset of the region, using a 1km buffer around the new section

- Calculate the change in number of activities from August to October
  - *((October TACTCNT - August TACTCNT) / August TACTCNT) * 100*
    - Queensland: 19% increase in activities
    - 1km buffer: 23% increase in activities

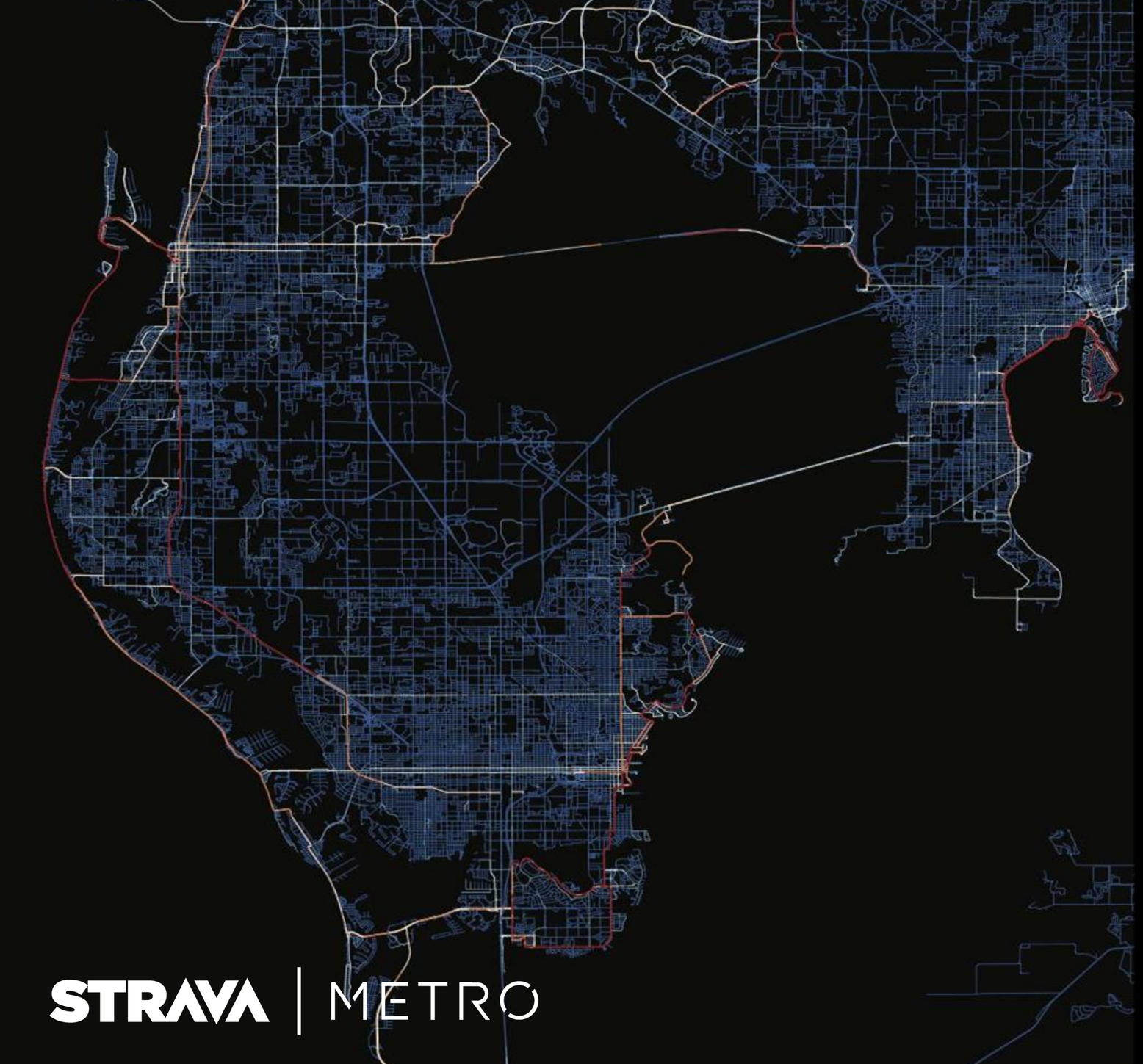
Google satellite image of the new section of the Enoggera Creek Bikeway, Kelvin Grove Rd Underpass

Delta Analysis

Case Study: Queensland, Australia



Metro provides key insights into how the cycling population is adapting to new cycleways, protected lanes and surging car populations. The left image shows the GPS points before (red) and after (blue) a new section of cycleway was opened. The Metro data on the right shows the actual change in percent with blue losing trips and red gaining trips.



Reduce Fatalities – Vision Zero

Goal:
Reduce number of bicycle and pedestrian injuries and fatalities

Use of Metro:
Determine highest bike volume streets

Outcome
Safety enhancements along main corridors, including widening and green pavement markings for bike lanes

Florida DOT

STRAVA | METRO

Predictive modeling & Correlation

- ❑ Designing safe routes and intersections
- ❑ Total miles by bike
- ❑ Predictive analyses

Seattle, WA
Department of Transportation

Strava Metro Correlation to Counting Programs

Bike/Ped counters

Pro
Excellent for counting usage at one point

Con
Results then become diluted by a factor of however many choices a rider faces after the counter

Strava Metro Data

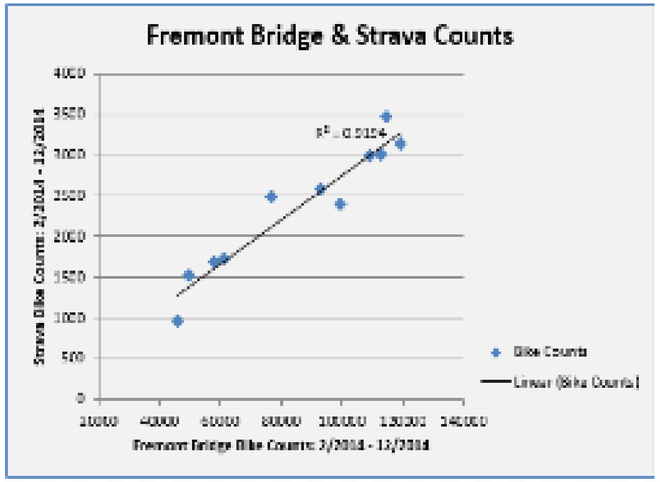
Pro
Excellent for showing entire network in real time

Con
Not everyone is a Strava user

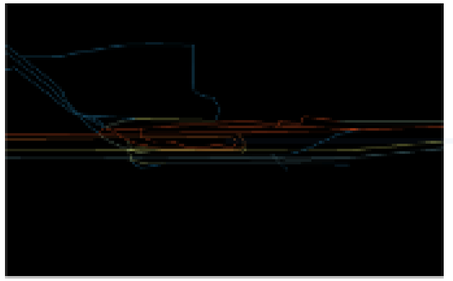
Correlating Strava to Counting Programs Cont'

Fremont Bridge Bike Counts

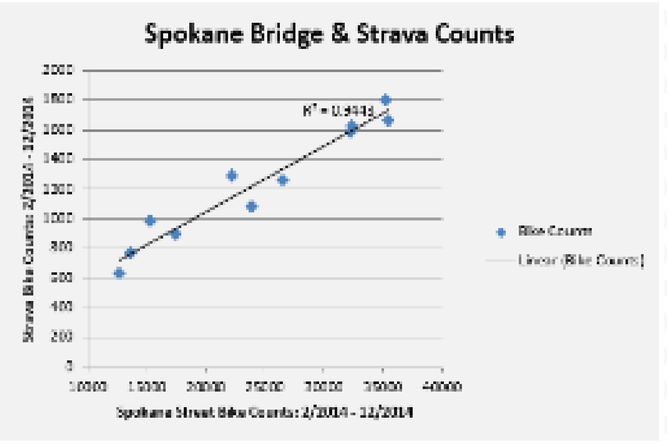
Strava: 25,980
Fremont Counter: 939,386
Percent of Strava to Population: 2.77%
R2: 0.9194



Spokane Bridge Bike Counts



Strava: 13,602
Fremont Counter: 266,850
Percent of Strava to Population: 5.10%
R2: 0.9443



Using counting programs with the Metro data allows the data to become even more useful. Strava correlation with counting programs is statistically amazing, with r-squared values typically around 0.8.

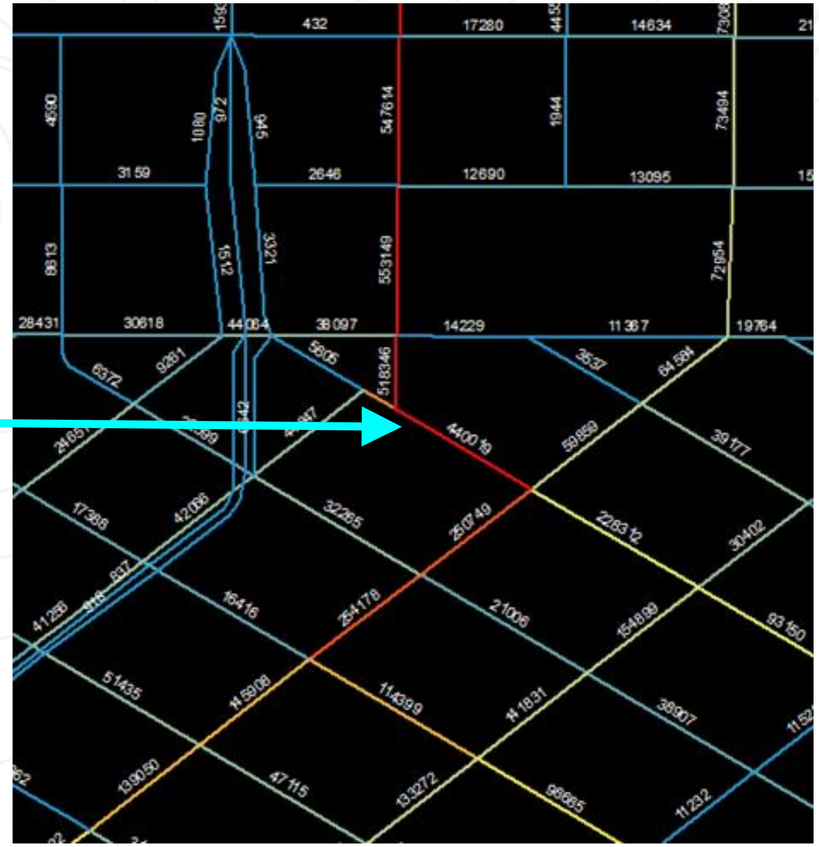
Correlating Strava to Counting Programs Cont’

16,297 Strava Bike Trips

X 27 Multiplier

= **440,019** year bike trips

(199,476 6- 9am)



Total Miles Traveled in SDOT by Bike in 2014: **63,253,198**

...how far can we push this?

Strava Metro: Correlation to Counting Programs

Case Study: Seattle, Washington

- Total Miles Ridden: 63,253,198
- Peak Commute Day: May 13th (38,154 Strava)
- Peak Month: May
- Peak Commute Hour: 7am/8am & 5pm
- Peak Weekend Hour: 9am/10am

Strava Metro: SDOT Crash Report

Case Study: Seattle, Washington

Combining bike count and collision data with Strava Metro data.

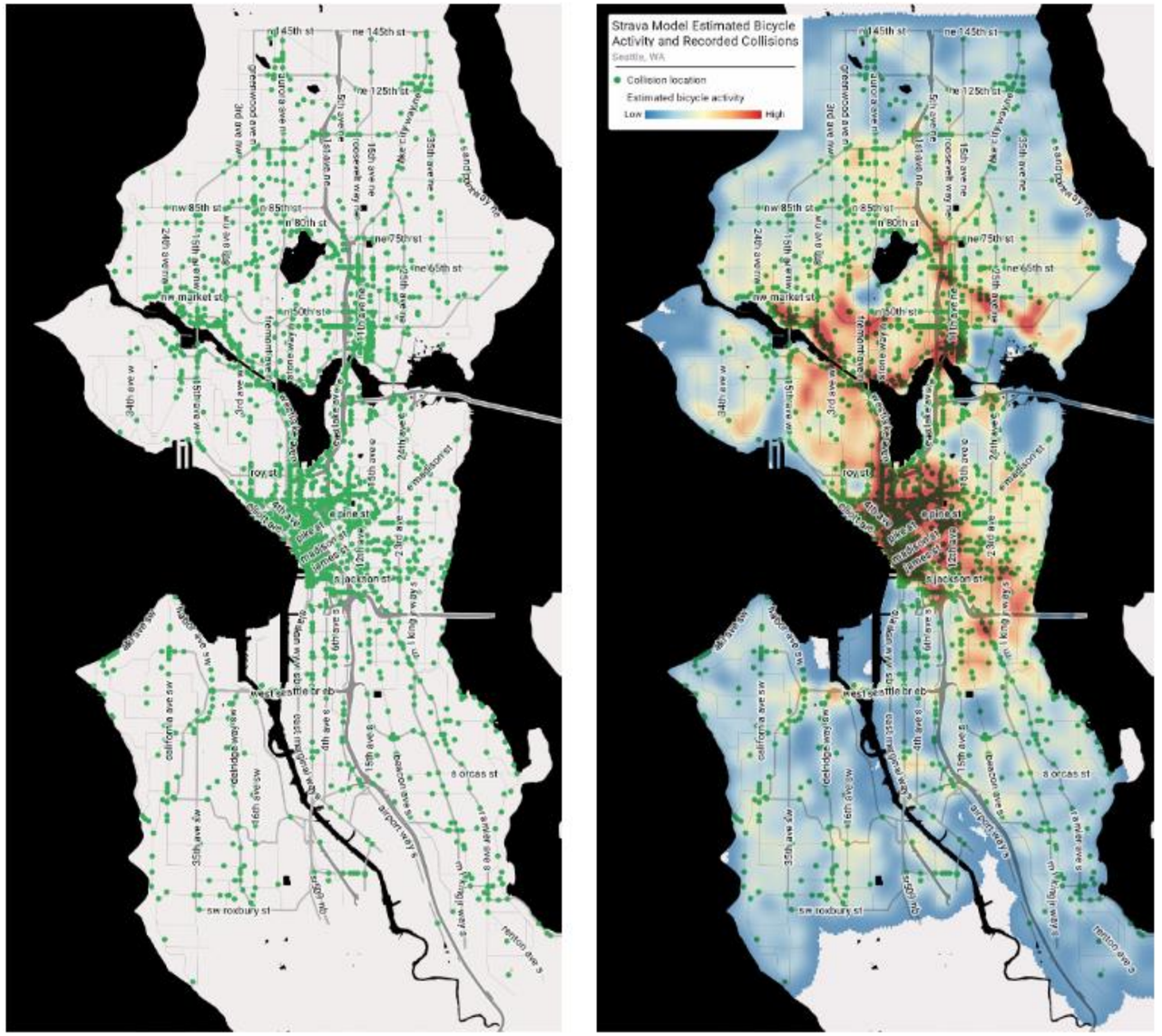
Seattle DOT uses Strava Metro to:

- Understand preferred routes
- Identify problem areas for vehicle/bicycle collisions.
- Model characteristics of dangerous roads

“What we’ve really focused on is combining our count data with Strava to give us a broader picture of what’s happening with cycling across the city. The combination has really proved valuable because it’s allowing us to say things about parts of the network we didn’t have any data on.”

- Craig Moore, SDOT traffic data and records group

FIGURE 11: BICYCLE CRASHES AND BICYCLE VOLUME ESTIMATES

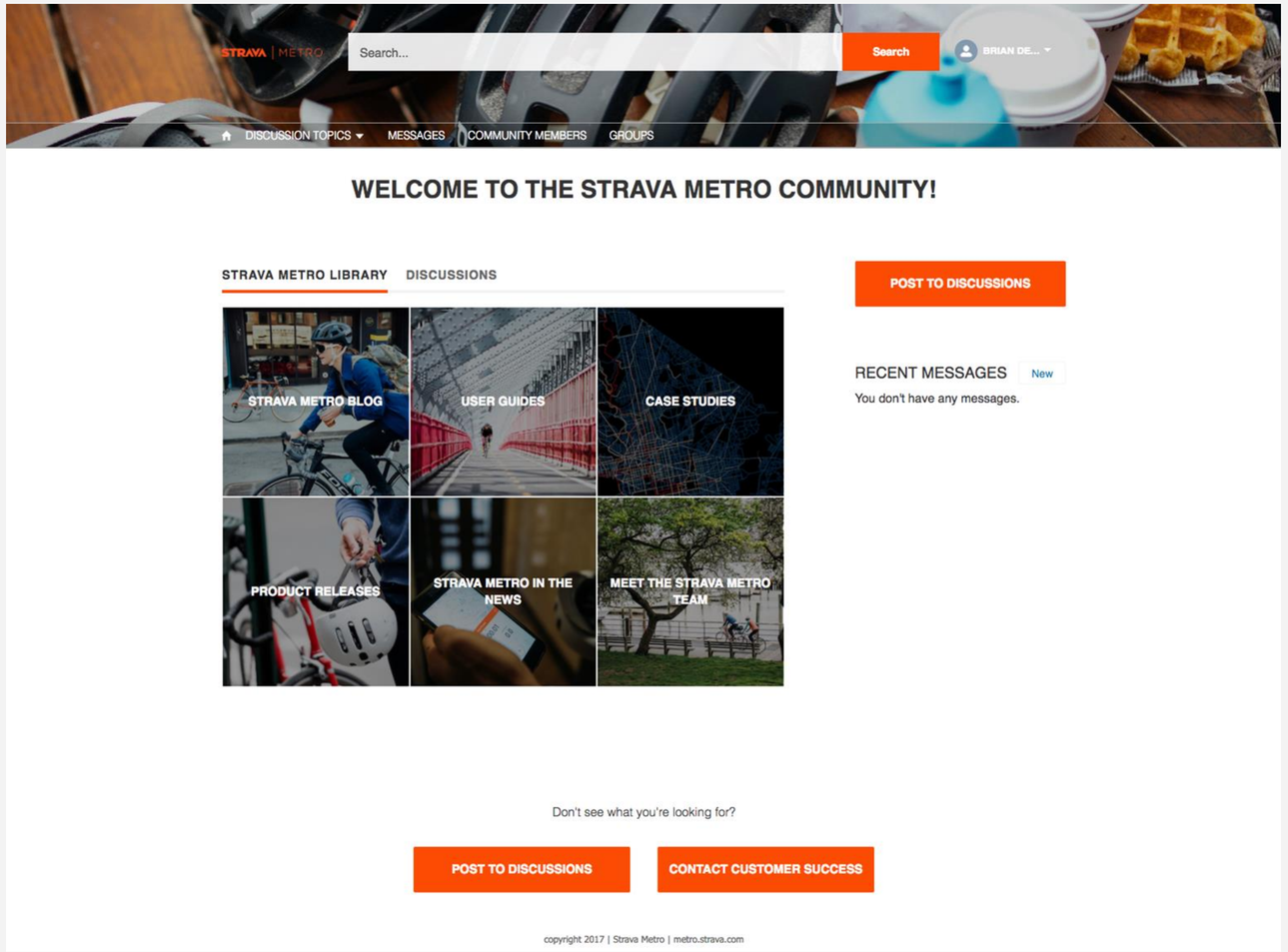


Strava Metro Online Community

Strava Metro Online Community

A new website designed to bring together Strava Metro customers from around the globe.

- Collaborative space for transportation planners, traffic modelers, GIS staff, engineers, bike advocacy groups and all others who are using the data in their bike/pedestrian work
- Connect with other customers to learn how others are using the data, ask questions of each other and push the limits of how big data can be used in Smart City planning
- Access the latest user guides, case studies and cookbooks
- stravametro.force.com/community/login



Some of Our Partner Organizations

GPCOG
GREATER PORTLAND COUNCIL OF GOVERNMENTS

COMPASS
COMMUNITY PLANNING ASSOCIATION of Southwest Idaho

Mesilla Valley MPO
Metropolitan Planning Organization

Metro
Los Angeles County Metropolitan Transportation Authority (Metro)

VERMONT
AGENCY OF TRANSPORTATION

Texas Department of Transportation

MARICOPA ASSOCIATION of GOVERNMENTS

CORPUS CHRISTI MPO
METROPOLITAN PLANNING ORGANIZATION

New Hampshire DOT
Department of Transportation

JONESBORO METROPOLITAN PLANNING ORGANIZATION

SDOT
Seattle Department of Transportation

OCTA
Orange County Transportation Authority

Contact: Kevin Mabey
kmabey@strava.com
+1 603-443-1077

STRAVA | METRO