

GEOTAB[®]

Unlocking the Value in Vehicular Data Using Analytics

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12th of November 2019

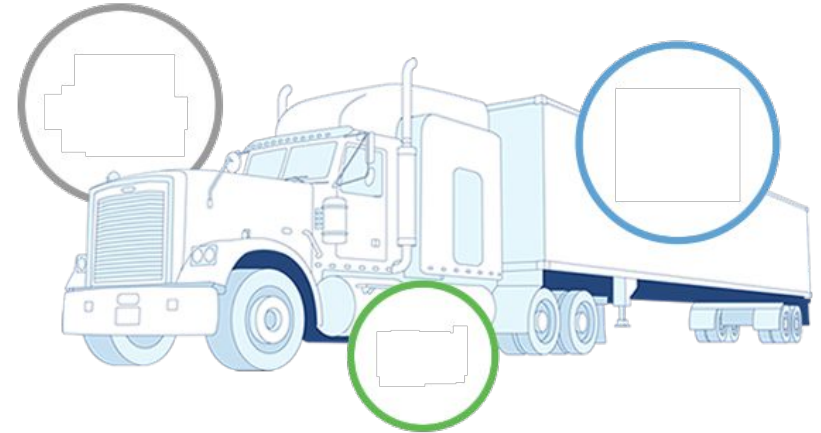


Executive Summary

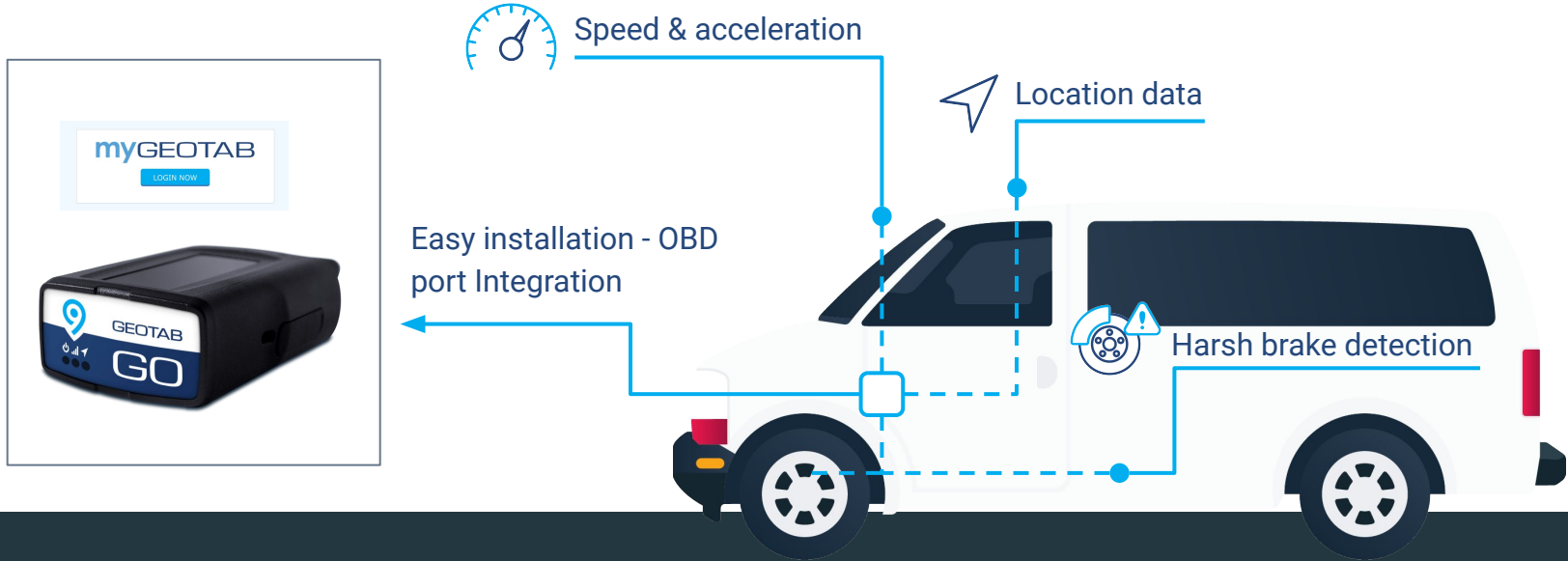
- Who is Geotab?
- Big Data at Geotab
- Big Data & Safety
- Current Challenges
 - Data Accessibility Index Project
- Call for Action

A World Leader in GPS Fleet Management

- Engineering company building analytics, telematics & IoT solutions
- #1 Telematics company in World
- Started in North America in 2000, Geotab now has:
 - More than 400 partners and a flourishing ecosystem
 - Over 1000 Employees and offices in Toronto, Las Vegas, Mexico City, London, Madrid, Munich, Aachen, Hong Kong & Adelaide

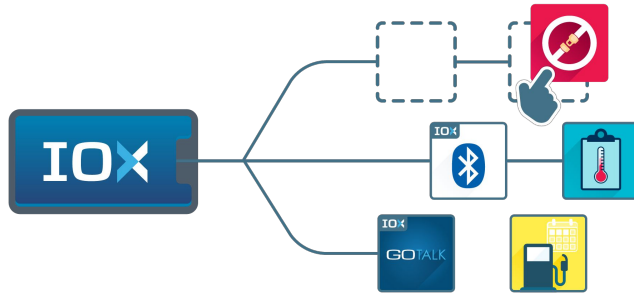


Geotab Technology



The Geotab technology stack empowers fleet management

Open Platform



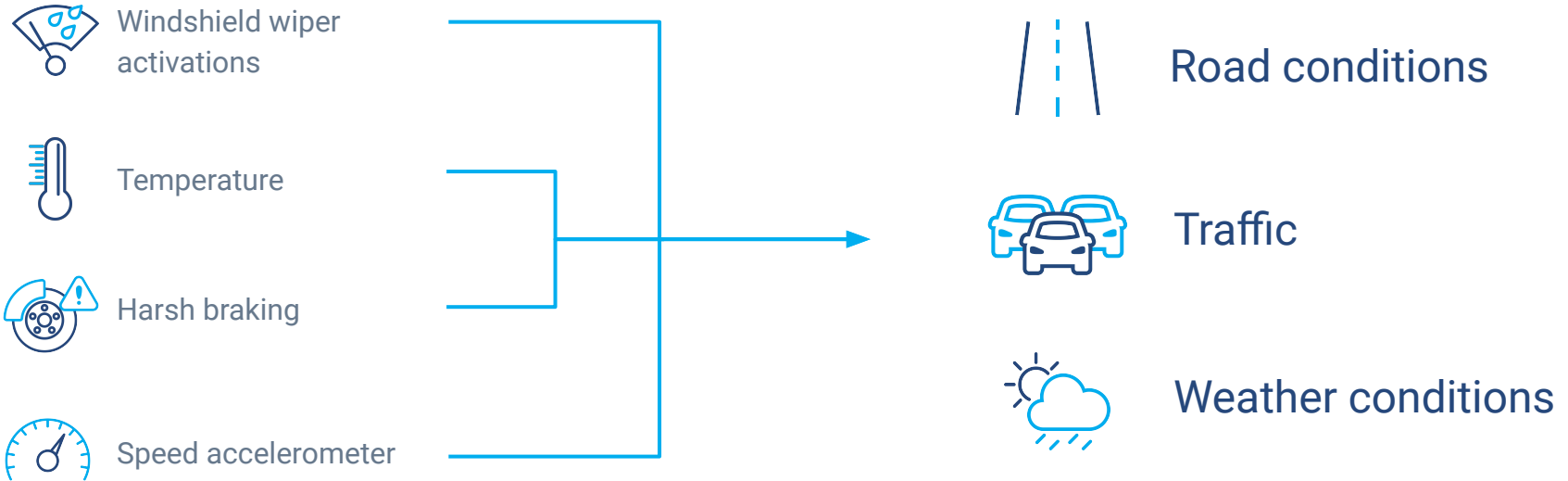
IOX



Marketplace

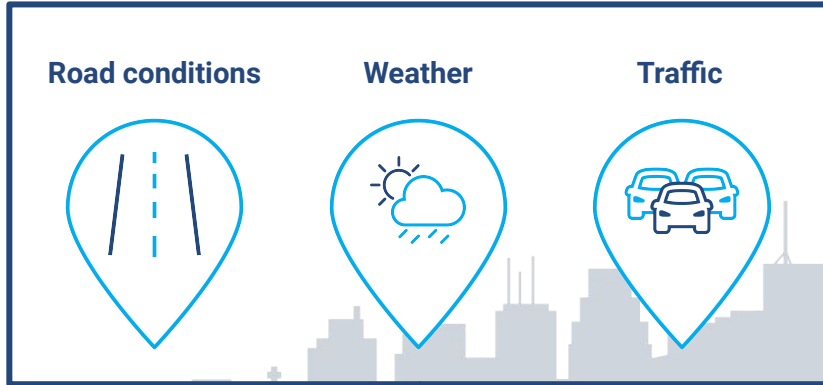
Enabling 3P data collection and development of data-driven apps

Turning Raw Data into 'Sensed Data'



Leveraging power of big data

Vehicles Become Sensors on Wheels



Big Data at Geotab

GEOTAB[®]
management by measurement

>1.8 M

connected vehicles,
globally

>40 B

data records
processed daily

Richest telematics dataset in the world:
GPS, traffic, accelerometer, engine data,
weather, driver behaviour

<https://cloud.google.com/customers/geotab/>

Point cloud image of 1-day data density from Geotab's database

Innovating with Big Data

- Allows us to aggregate data and provide global insights for both fleets and smart cities
- Sharing aggregated insights via data.geotab.com
 - 12 public datasets
 - Weather, safety, points of interest



Hazardous Driving Areas



Searching for Parking



Areas of Idling



Cell Coverage Dark Spots



Hyper-local Precipitation



Intersection Metrics



Road Impediments



Hyper-local Temperature



Hyper-local Barometric Pressure

Telematics Data can Transform the Community

- **Traffic + Safety**

- Intersection Insights
- Spot speed/virtual pneumatic tubes
- ...

- **Environmental impact**

- Air Quality assessment
- Emissions modeling
- EV Suitability + EVSE Location
- ...

- **More efficient communities**

- Maintenance
- Ride-sharing
- ...



...while Respecting Privacy and Ethics

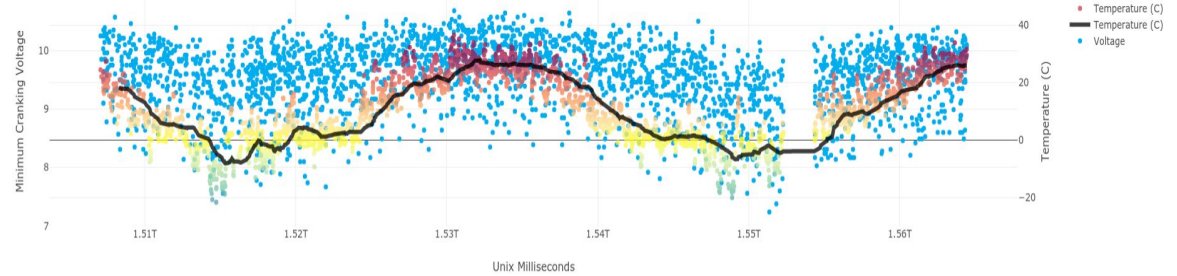
At Geotab, we make sure our Big Data innovations always **RESPECT**:

- Delivery of value to our Customers;
- Use is compliant with our Customers' instructions;
- Data is protected from unauthorized access, use and reconstitution;
- Ethically sourced;
- Doesn't compromise end users, natural persons or society; and
- Respects data subjects autonomy and their right to make their own decisions.

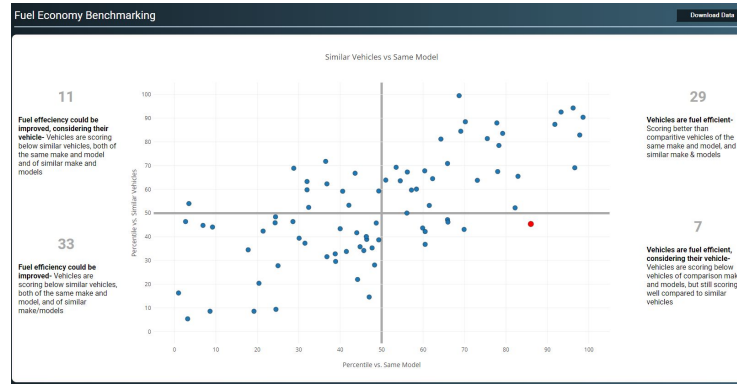


Fleet Insights Through MVP Program

Predicting battery failures

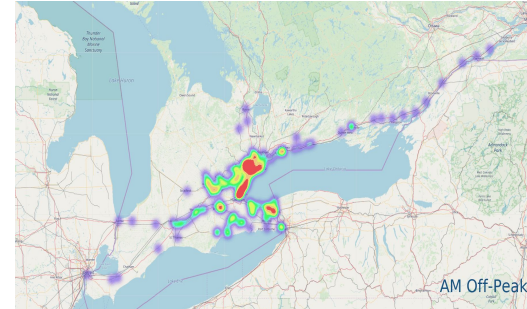


Fuel economy benchmarking

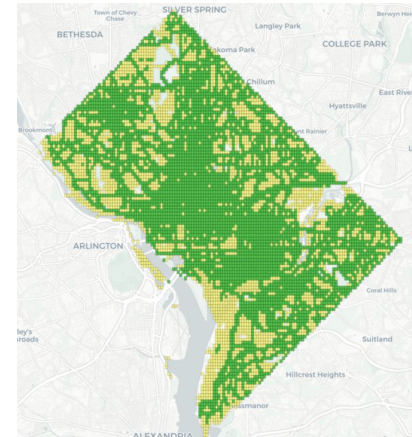


Smart City Insights Through MVP Program

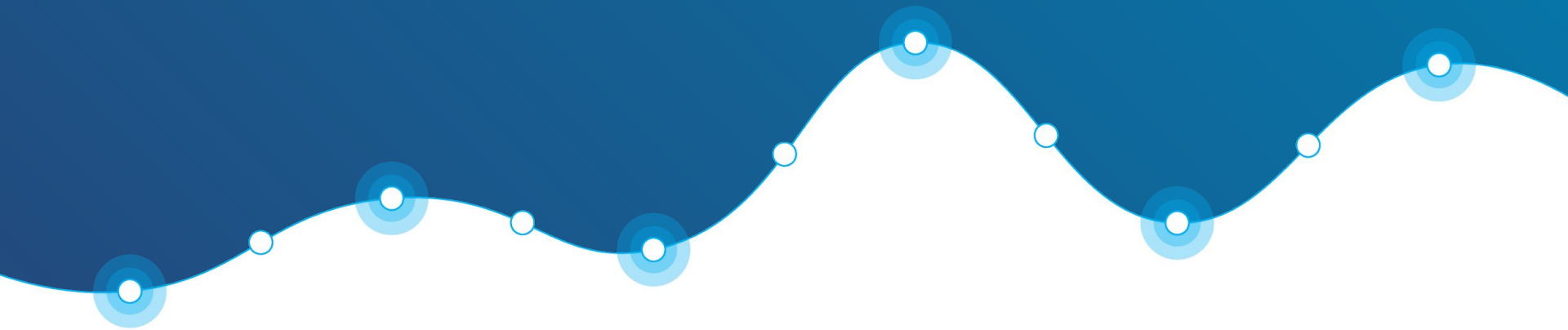
Empowering smart traffic decisions



Air quality sensor optimization



Safety Using Big Data



Data Enables Safety Understanding and Informs Policy

Helps Fleets, Drivers, Cities Become Safer



Internal Data

- Vehicle
- Telematics
- Mobile app
- Maintenance
- Routing
- Driver
- Demographics

External Data

- Open data
- Research reports
- Industry trends
- Speed limits

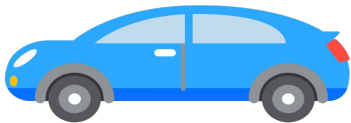
Contextual Data

- Weather
- Dangerous neighborhoods
- Intersection insights
- Vocation

Data from different sources is multiplicative in value

Vehicle & Telematics Data

Real-time and historical data can help predict and prevent crashes



Vehicle Data

- Seatbelt
- Speed
- Odometer
- Turn signals
- Engine faults
- Headlights
-
- 4 way flashers
- Seat sensors
- Volume of sound
- Driver distraction
- Driver assistance systems
- TPMS
-



Telematics Data

- Accident reconstruction
- Trip data, speeding profile
- Speeding
- Seatbelt compliance
- Harsh activity (accel., braking, cornering)
- Crashes
-

Vehicle and telematics data are vital to understand the “why”

Example: Fleet Safety Policy Design

Insights

- Driver behavior profiling- Speeding, harsh braking, harsh acceleration, etc
- Impacts of demographics on safety/performance- Ex: tenure
- Most efficient scheduling practices
- Trip optimization – real time routing based on time/distance/outside factors
- Accident predictions- costs, type, fault type
- Collision- both predictive as well as collision reconstruction
- Maintenance and roadside assistance analysis



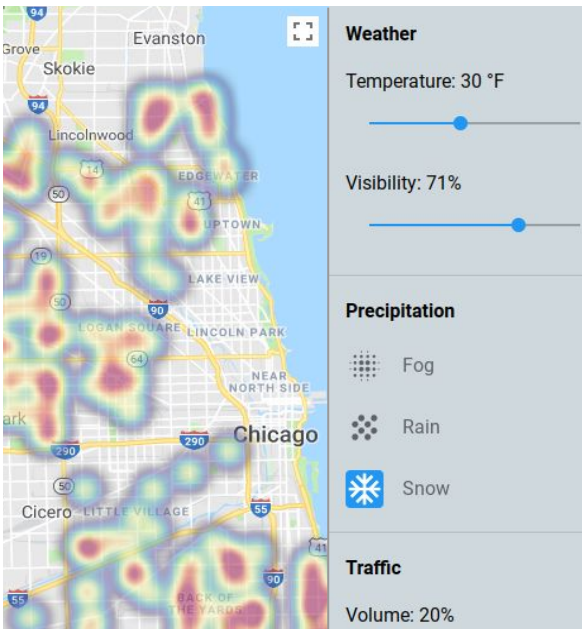
Fleet Policy Design

- Routing
- Coaching
- Exception rules
- Driver Risk scoring
- Proactive maintenance
- Shift schedule re-design

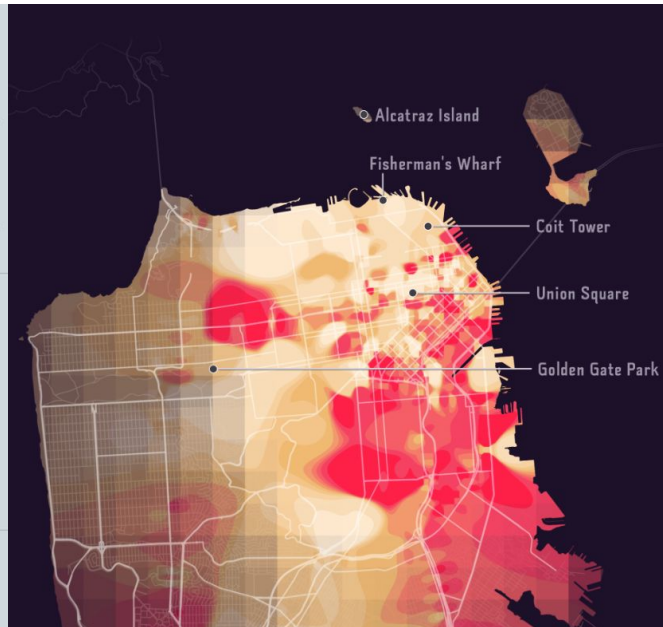
Using big data, we can benchmark fleets, drivers, and detect issues in real-time

Sensor Data + Big Data + AI = Safer Cities

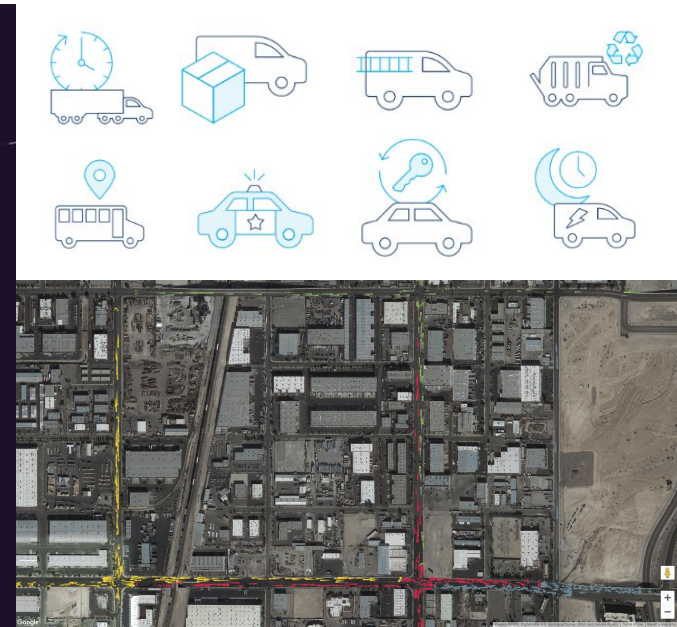
Machine Learning - Predict Dangerous Driving



Predict Hyper Local Weather Down to 150m

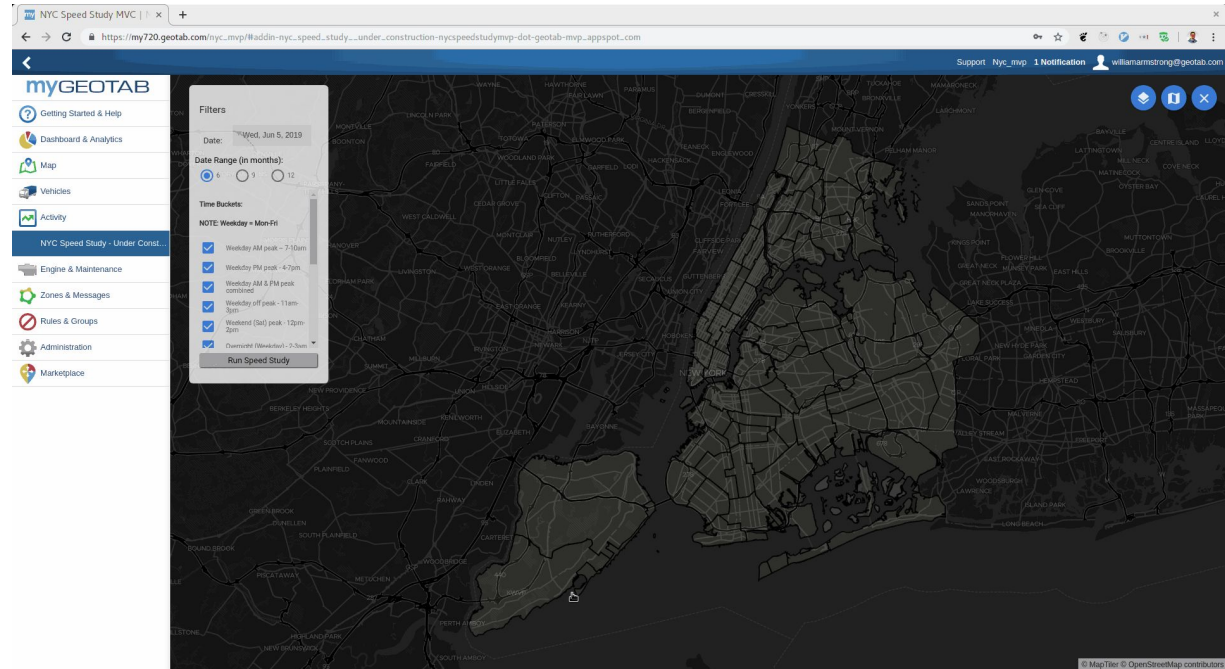


Predict Vehicle Movement and Traffic Patterns

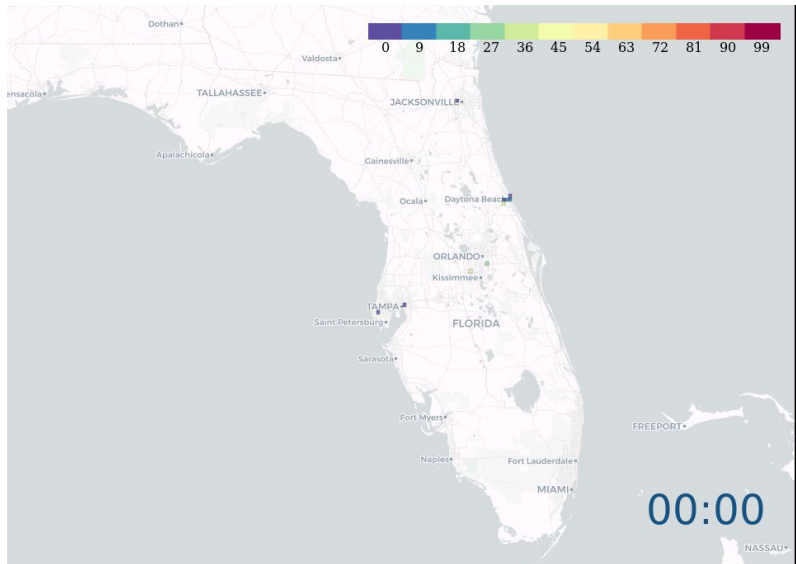


Supporting NYC Vision Zero

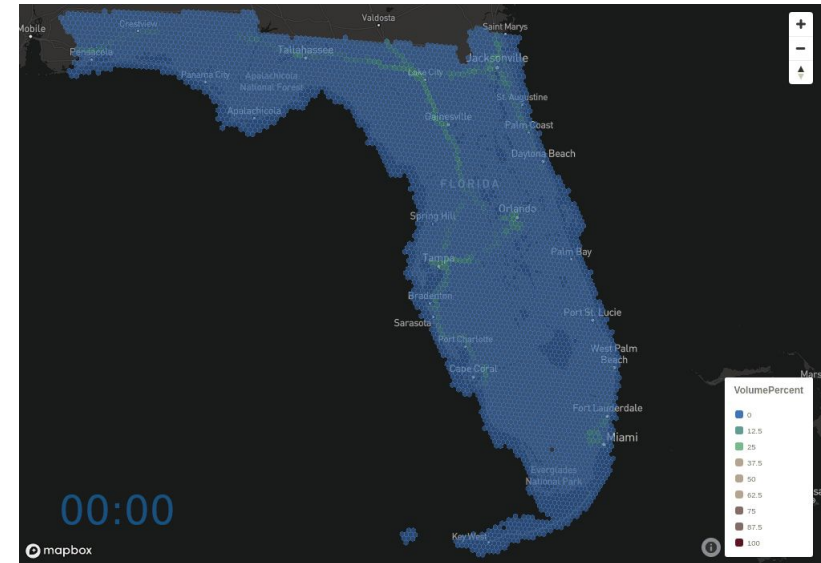
- Measure spot speeds and travel times in NYC
- Use the tool to make data-driven safety decisions
 - Road redesigns
 - Traffic calming
 - Lane narrowing
 - Siting speed cameras and humps



Public Safety- Hurricane Dorian Impact



Time-lapse ground-truth probability of precipitation over the last 24 hours



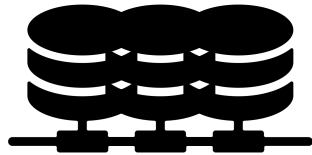
Time-lapse commercial traffic over the last 24 hours

Current Data Challenges



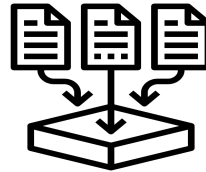
Current Data Challenges

Key Concern: Ongoing real-time access, expressed by major private/govt fleets, leasing companies, etc



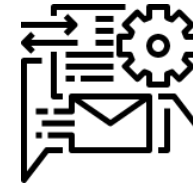
Data Silos

- Data is being collected by different stakeholders
- No method for sharing
- No 'will' to share



Data Access

- Data access restrictions
- Not all data collected
- Not all data stored
- Different sampling methods



Data Formats

- Different data formats
- Differ by manufacturer

Only 'hack' today is reverse engineering; concerns loom over reduced access

Current Work by Geotab: Data Accessibility Index Project

- Current concerns from customers about data access going forward
- The Data Accessibility Index Project is designed to bring reliable data, analytic rigor, and transparency to the vehicular data access debate.
- Empower car owners, car buyers, commercial & public service fleets, mobility providers & innovators, public authorities, service providers



“You cannot manage what you cannot measure.”

The 5 Step Methodology

1. Identify manufacturer

- Make, Manufacturer, and group

2. Vehicle stats

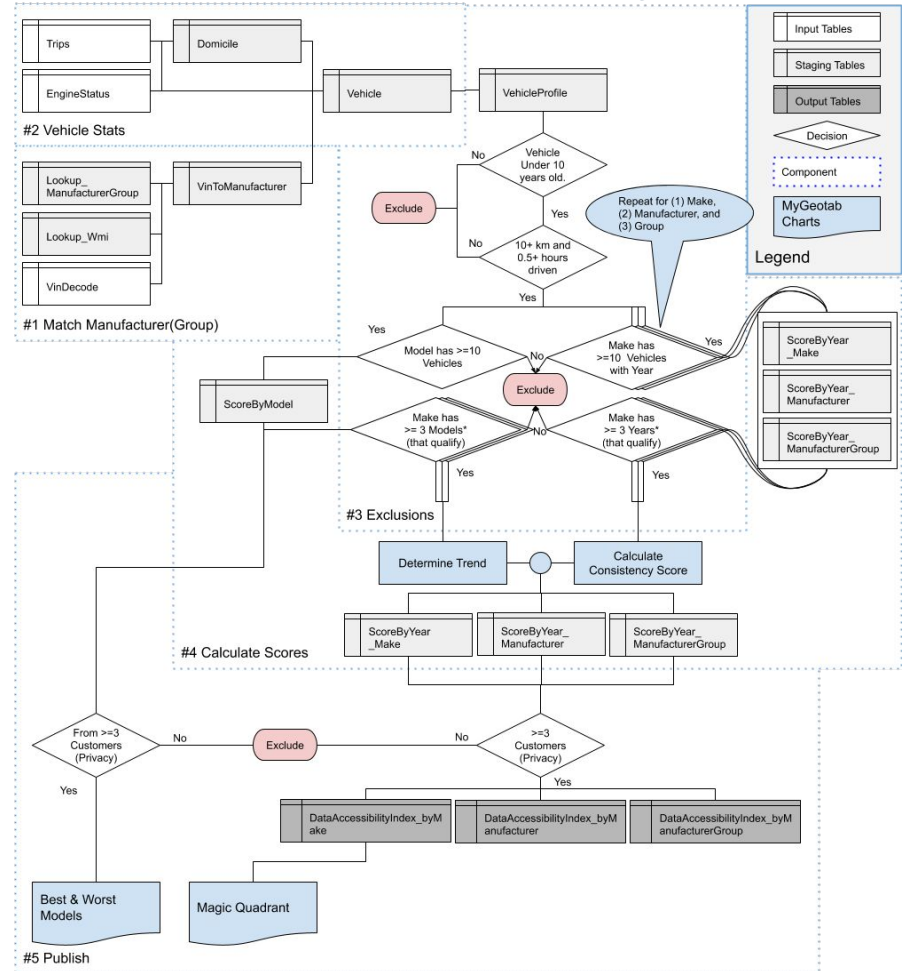
- Region of domicile
- Distance and time driven
- Odometer, fuel and ,seat belt support

3. Apply Exclusions

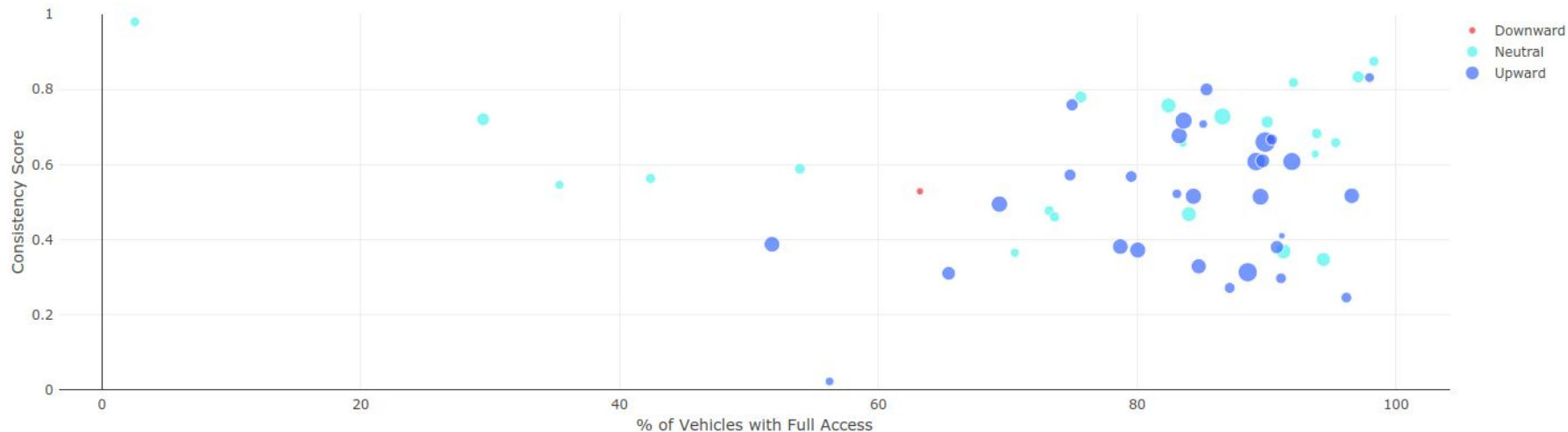
- Vehicle age
- Usage requirement, etc

4. Calculate metrics

5. Privacy filter



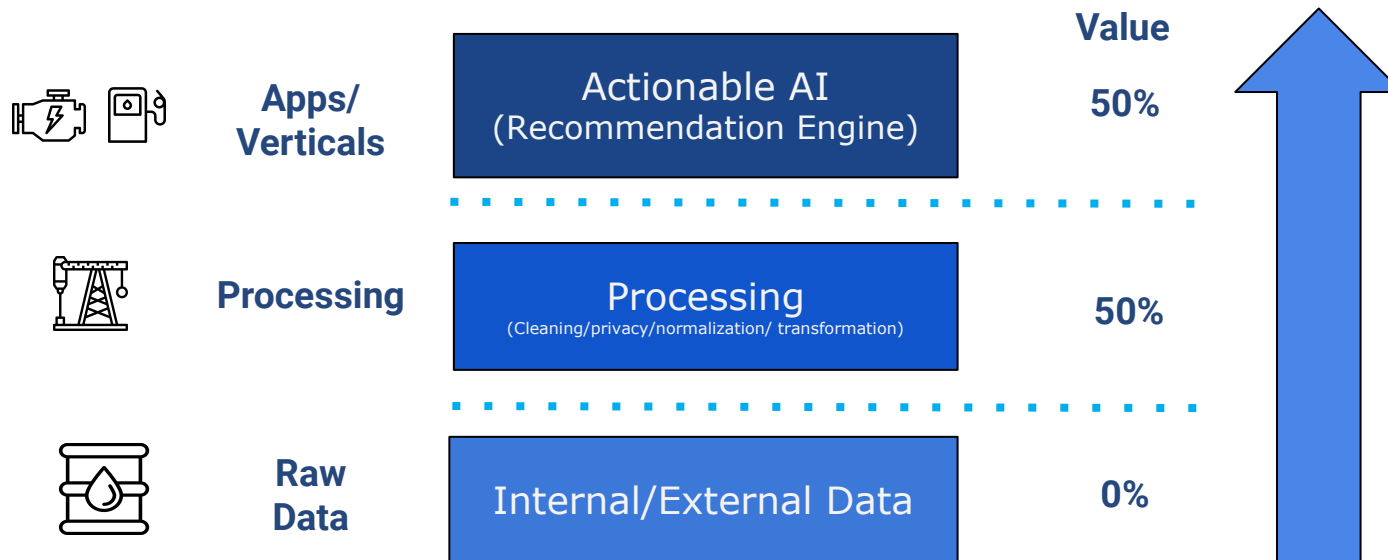
Current Output (Sep 2019)



Of the 1M+ vehicles considered:

- **94%** have access to **3** basic parameters
 - odometer, fuel, and seatbelt
- average consistency score = **0.6**

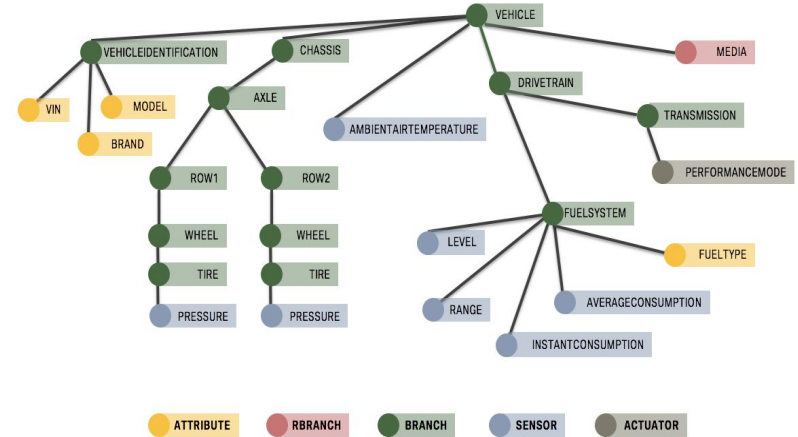
A Final Note: Data 'Value Chain'



Data is necessary but not sufficient; simply amassing it does not generate value

Call For Action!

- Drive a culture shift around openness of data
 - Recall: Data has no 'value'
 - Recall: Multiplicative value of data
- Create a data trust
 - Privacy and ethics first
- Standardize data collection and storage
 - Use VSS standard as basis
 - Standardize cloud to cloud sharing
- Work with fleets, governments, citizens
- Build research testbeds
- Open sourcing of safety algorithms





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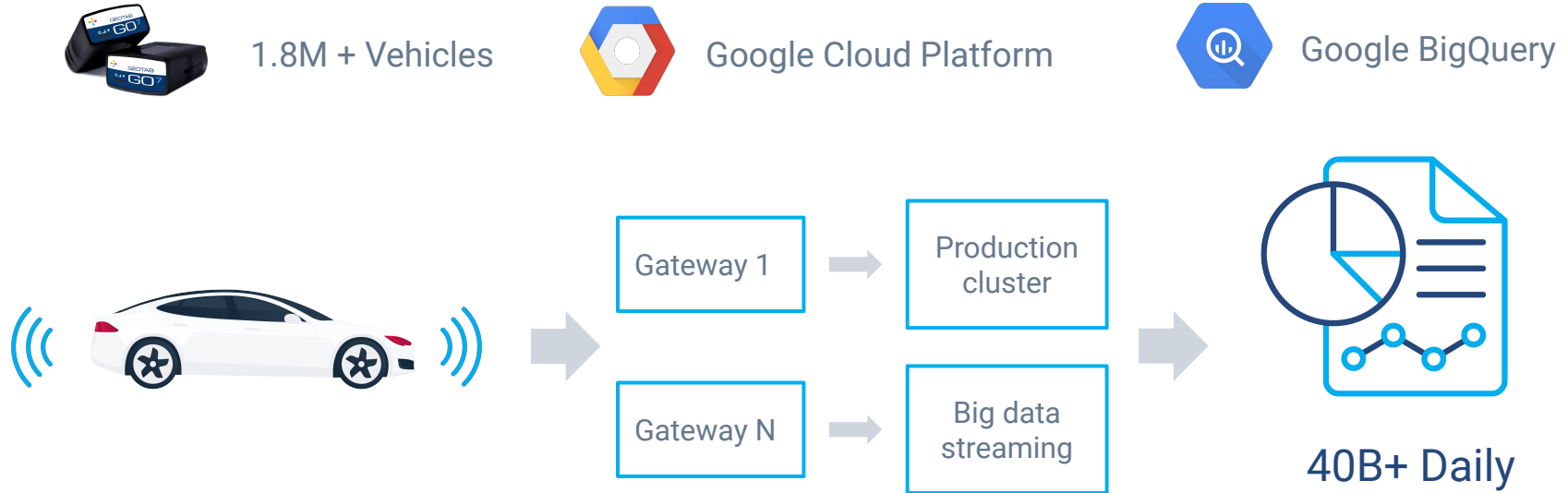
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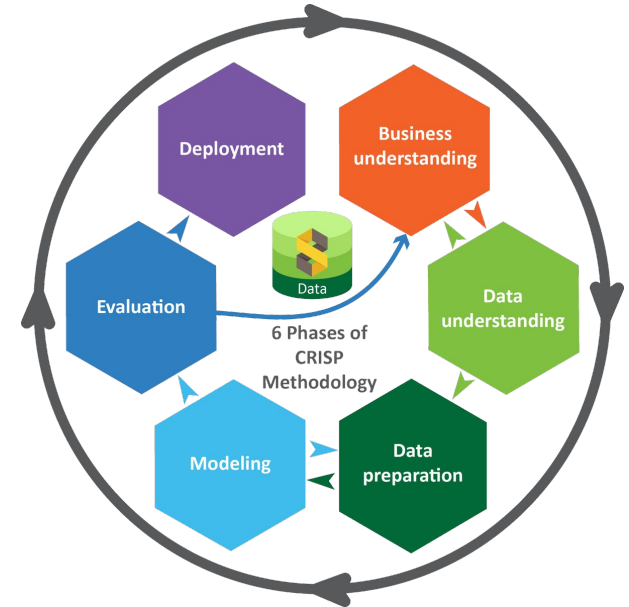
How is this made possible?



Near real-time big data cloud ingestion

Professional Services Offering

- Rapid prototyping service
 - Minimum Viable Product (MVP)
- Leverage our Data Science, Data Engineering, and Data Visualization teams to develop high impact solutions that marries Geotab data together with line-of-business data and other 3P sources
- Project based:
 - High Impact
 - Engaged Customer
 - Scalable



Data innovation through 'learning by doing'

The Importance of Contextual Data...What is it?



Weather



Hazardous Areas



Zoning



Roadway Info



Time of Day

Examples

Temperature

Precipitation

Visibility

Historical Incidents

Abnormal
Intersections

Construction

Residential

Industrial

Rural

Highway

Intersection

On/Off Ramp

Day

Night

Weekend

Maria and David drive similarly

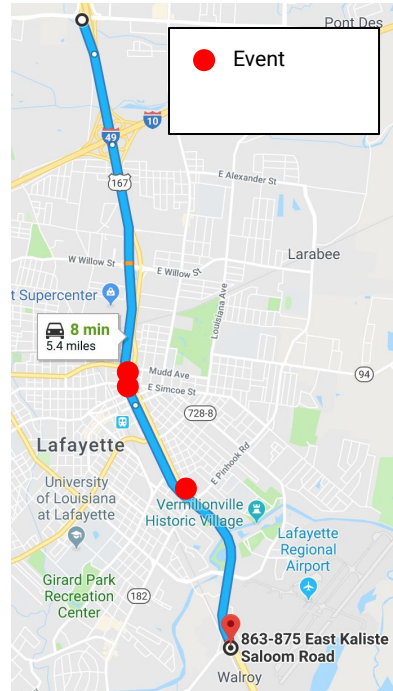


Maria

Miles Driven – 5.4 km

Hard Braking – 2

Hard Acceleration – 1

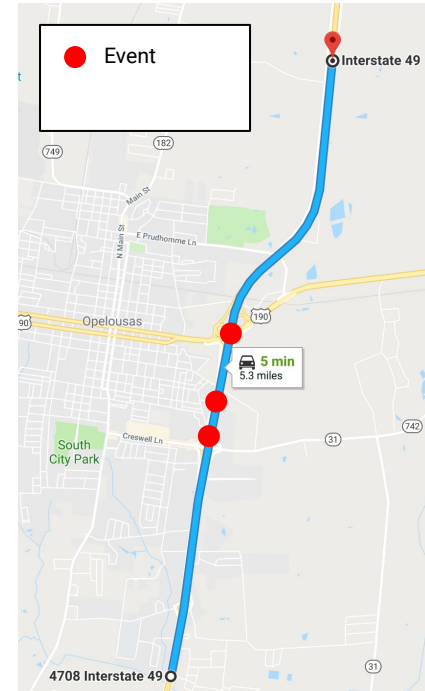


David

Miles Driven – 5.3 km

Hard Braking – 2

Hard Acceleration – 1

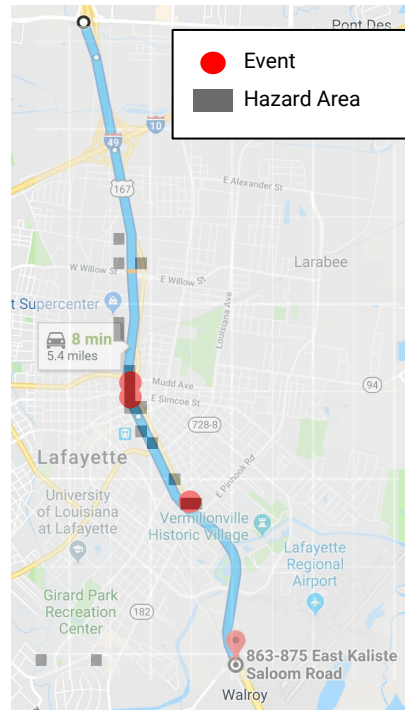


But they have very different routes



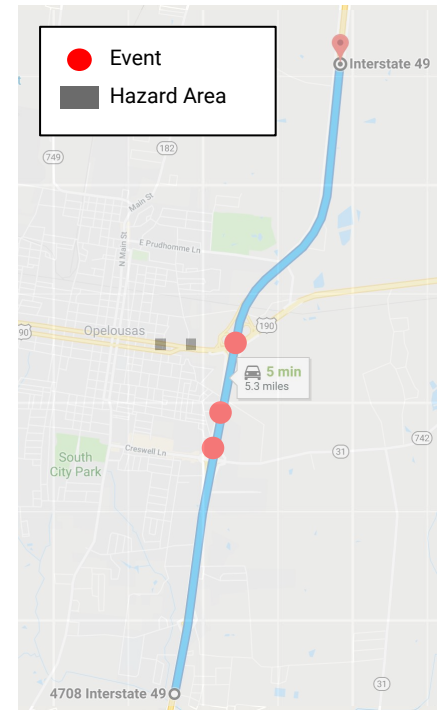
Maria

Miles Driven – 5.4 km
Hard Braking – 2
Hard Acceleration – 1
Hazard Area Events – 3



David

Miles Driven – 5.3 km
Hard Braking – 2
Hard Acceleration – 1
Hazard Area Events – 0

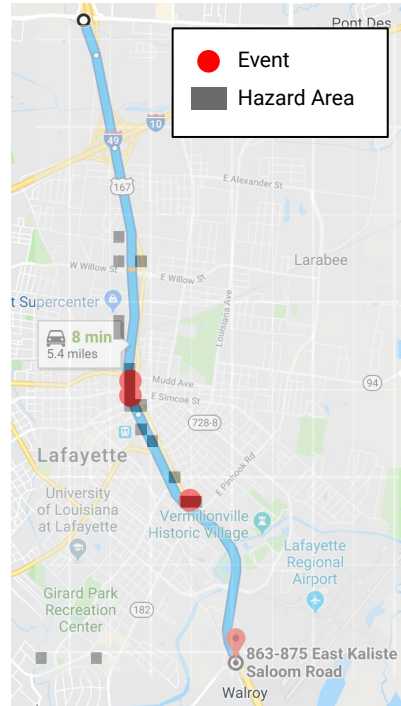


Different feedback is required...smarter policy



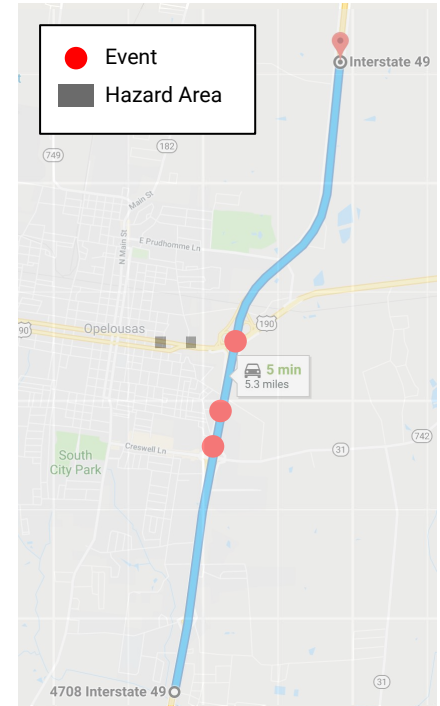
Maria

Maria drives well in hazardous areas compared to peers



David

David drives poorly when driving on the highway



Let's Stay Connected:

@GEOTAB

