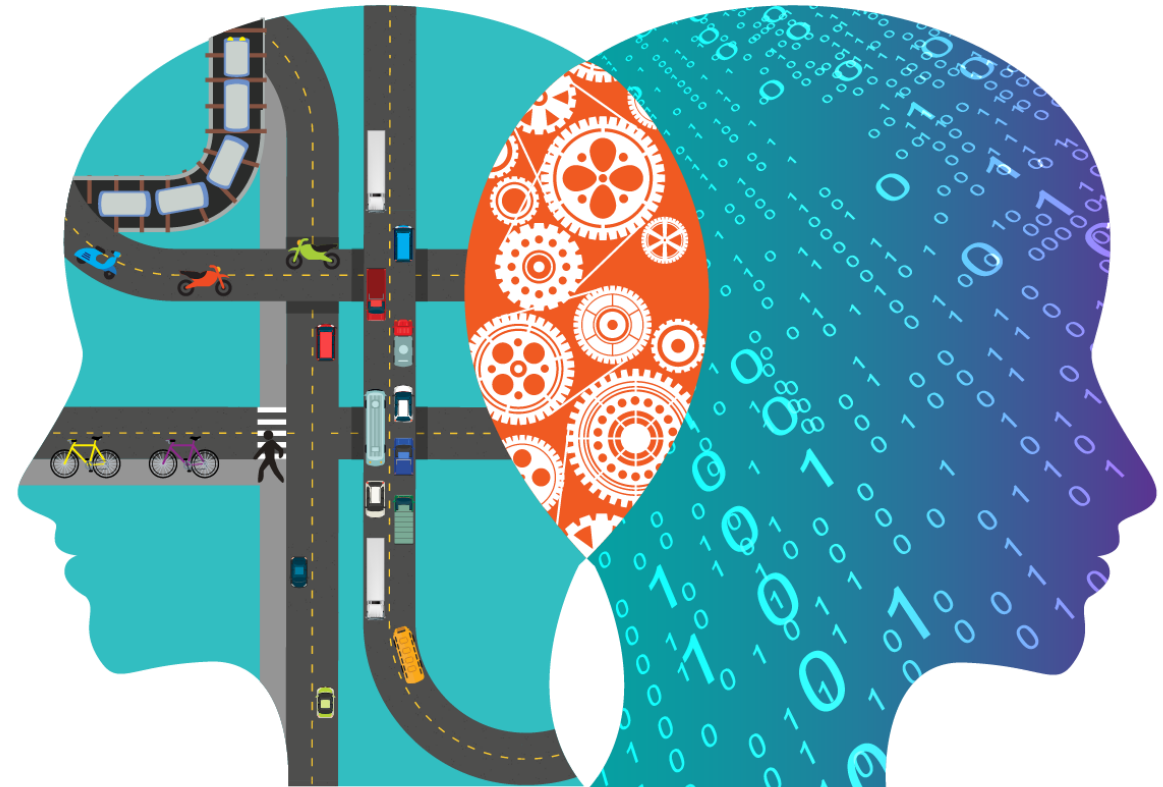




U.S. Department of Transportation

Solving for Safety

Visualization Challenge



The Challenge



Select an **ANALYTICAL VISUALIZATION TOOL** to develop:

- Discover Insights Tool
- Simulation Tool



Address one or more of the priority **SAFETY FOCUS AREAS:**

- Conflict Points Impacts
- High Risk Factors
- Vulnerable System Users



Design for one or more **USERS:**


- Policy makers and influencers
- Providers/Operators
- Public

TOTAL PRIZE: \$350,000

THE CHALLENGE

Objective | USDOT seeks tools that use innovative analytical visualizations to gain insights into reducing serious crashes.

 Select a **Tool Type** to develop

 Address one or more of the priority **Safety Focus Areas**

 Design for one or more **Users**

Challenge Opened
June 14, 2018



Stage I Due
July 31, 2018



Stage I Announcement
Mid-Oct. 2018



Stage II Due
Nov. 16, 2018



TRB Session
Jan. 14, 2019



Stage II Announcement
April 2019



Stage III Due
May 31, 2019



Stage I, Ideation

Solvers develop ideations for a tool.

Stage II, Concept

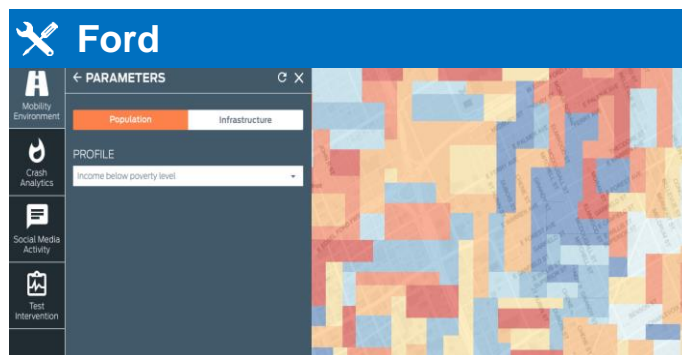
5 semi-finalists develop ideations into proofs of concept and compete for part of the \$100,000 interim prize.

Stage III, Tool

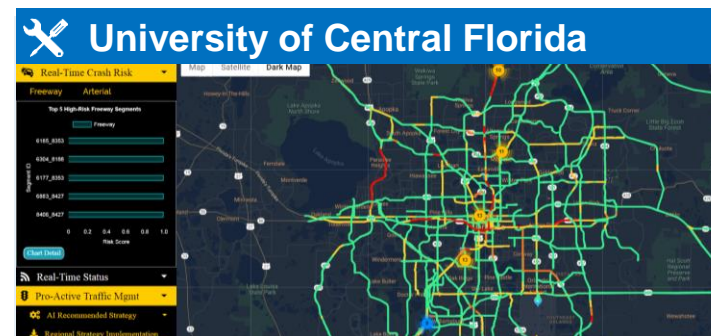
2 finalists develop proofs of concepts into working tools and compete for part of the \$250,000 final purse, with each receiving a minimum of \$50,000.

2

Finalists



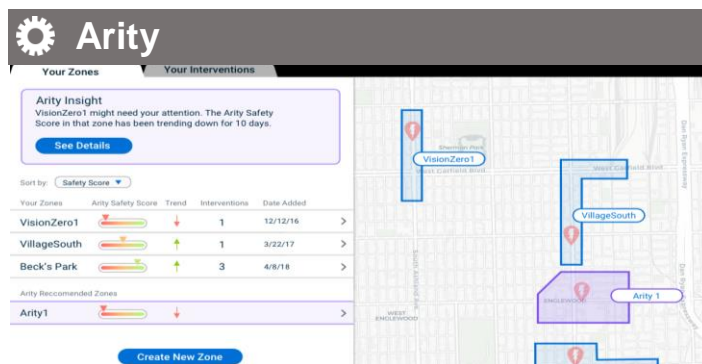
RoadCode helps users make smarter safety choices by unlocking driver behavior codes hidden in near misses and perceptions.



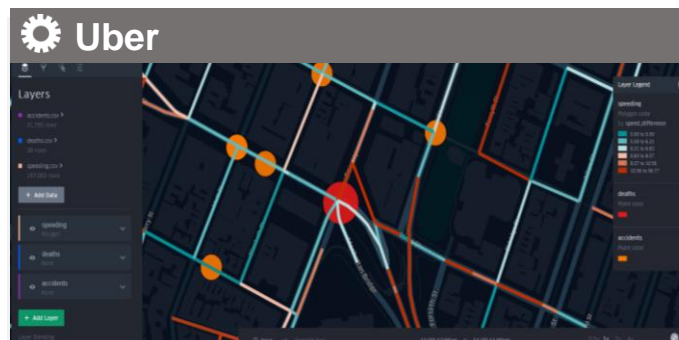
Real-Time Crash Risk Visualization Tools for Traffic Safety Mgmt. provides real-time crash risk visualizations using integrated tools for traffic safety mgmt.

5

Semi-finalists



City Data Platform incorporates Arity's safety-related driving behavior data with other contextual sources to help transportation planners and providers.



USDOT Safety with Uber's Kepler.gl combines Kepler.gl, Uber's historical speed data, and publicly available crash data to visualize traffic safety insights.



My Street is an evidence-based tool that helps decision-makers "see" safety improvements from a pedestrian's perspective.

54

Ideas



Video



UCF-SST Demo Time: 2018-03-14 08:04:00 Home Traffic Operator Decision Maker

Real-Time Crash Risk Map Satellite Dark Map

Freeway Arterial

Top 5 High-Risk Freeway Segments

| Segment ID | Risk Score |
|------------|------------|
| 6185_8353 | 0.8 |
| 6304_8188 | 0.7 |
| 6177_8353 | 0.6 |
| 6883_8427 | 0.5 |
| 8405_8427 | 0.4 |

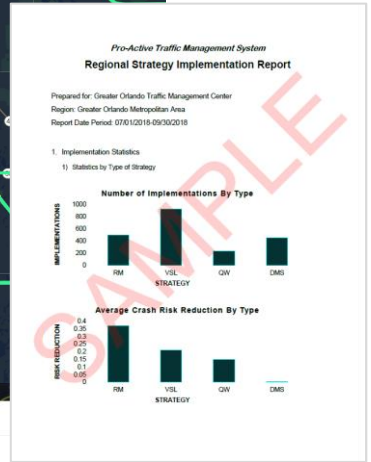
Real-Time Status

Pro-Active Traffic Mgmt

AI Recommended Strategy

Regional Strategy Implementation Report

CAV



UCF-SST System Time: 12:00 Home Traffic Operator Decision Maker

Macro Screening

Network Screening

- Freeways/Expressways
- Arterials

By Crashes Severity

- Fatal Injury (F)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- No Injury (O)

By Crash Type

- Single-Vehicle
- Rear-End
- Head On
- Angle
- Sidewipe
- Pedestrian
- Twitter Feedback
- Bike
- Strava Exposure

Heat Map

Future Adoption of CAV

UCF-SST Home About Team Contact Visualization Tool

Safety Facts Real-Time Traffic

Pedestrian Fatalities

"Be Careful at Night Time"

50%

Pedestrian fatalities between 6pm and 10pm

Crash count ranking by zip code

| Zip Code | Crash Count |
|----------|-------------|
| 34787 | ~8 |
| 32819 | ~6 |
| 32805 | ~4 |

Search by zip code: 32806

UCF-SST Home About Team Contact Visualization Tool

Real-Time Crash Risk Prediction for Next 5 Minutes

Risk Speed Volume

Crash Risk Severe Crash Risk

Pro-Active Traffic Mgmt

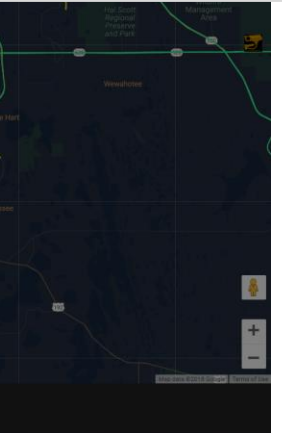
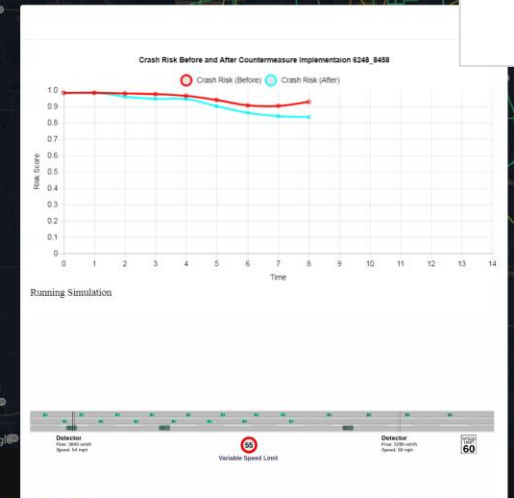
AI Recommended Strategy

Variable Speed Limit

Run Simulation

Regional Strategy Implementation Report

CAV



Ford Motor Company



Video

The screenshot displays the RoadCode application interface, which is used for analyzing road safety and social media activity. The interface is divided into several sections:

- Top Bar:** Includes the "SMART CITY ANALYTICS" logo and the "RoadCode" title.
- Left Navigation Panel:** Contains icons for Mobility Environment, Crash Analytics, Social Media Activity, and Test Intervention.
- Parameters Panel (Top Left):** Allows users to filter data by "Population" and "Infrastructure".
- Parameters Panel (Middle Left):** Shows the "PROFILE" as "Income below poverty level".
- Parameters Panel (Bottom Left):** Filters by "Connected Vehicle" and "Crash", with options for "Harsh braking" and "Months of the Year" (August, September, October, November).
- Parameters Panel (Bottom Middle):** Filters by "Predicted Crashes" and "Interventions", with options for "Crash Type" (Side swipe), "Crash Severity" (Fatal), and "Max Crashes Shown" (1 to 50).
- Parameters Panel (Bottom Right):** Filters by "TOPIC OF CONVERSATION" (Traffic congestion).
- Visualizations Panel (Middle Right):** Displays "SOCIAL MEDIA MENTIONS" with a donut chart showing 179 mentions (7 positive, 24 negative, 148 neutral) and a line chart for "MENTIONS & SENTIMENT".
- Word Cloud Panel (Bottom Right):** Shows terms like "bumper-to-bumper traffic", "road congestion", and "traffic congestion".
- Map (Center):** A map of Detroit with various colored overlays and markers indicating crash locations and intervention areas.
- Information Panel (Top Right):** Contains sections for "TEST INTERVENTIONS", "ASSUMPTIONS", and "DATA SOURCES".

TEST INTERVENTIONS
Once you understand the various factors at play regarding road safety in a particular location, test possible interventions that fit your budget. Not only can you compare the impact of different interventions, but you can also calculate the projected return on investment over time.

ASSUMPTIONS
All predictions are based on the datasets applied to descriptive analytics in other areas of the application.

DATA SOURCES
Highway Safety Manual
CMF (Crash Modification Factor)



Video



Interactions

accidents.csv
DATE TIME BOROUGH ZIP CODE LATITUDE LONGITUDE LOCATION ON STREET NAME CRO

| DATE | TIME | BOROUGH | ZIP CODE | LATITUDE | LONGITUDE | LOCATION | ON STREET NAME | CRO |
|------------|-------|-----------|----------|------------|-------------|-------------------------|-----------------------|------|
| 01/01/2017 | 0:40 | MANHATTAN | 10035 | | | | LEXINGTON AVENUE | EAST |
| 01/02/2017 | 18:00 | MANHATTAN | 10007 | 40.7141646 | -74.006309 | (40.7141646, -74.00630) | BROADWAY | CHA |
| 01/03/2017 | 10:33 | MANHATTAN | 10027 | 40.814186 | -73.95087 | (40.814186, -73.95087) | SAINT NICHOLAS TERRAC | WES |
| 01/06/2017 | 5:10 | MANHATTAN | 10011 | 40.7410799 | -74.001553 | (40.7410799, -74.00155) | 8 AVENUE | WES |
| 01/07/2017 | 23:30 | MANHATTAN | 10003 | 40.7242734 | -73.9908182 | (40.7242734, -73.99081) | 2 AVENUE | EAST |
| 01/07/2017 | 9:56 | MANHATTAN | 10065 | 40.7614858 | -73.960592 | (40.7614858, -73.96059) | EAST 62 STREET | 1 AV |
| 01/08/2017 | 0:00 | MANHATTAN | 10001 | 40.7544905 | -74.0067388 | (40.7544905, -74.00673) | WEST 30 STREET | 12 A |

Filters

- accidents.csv > 31,795 rows
- deaths.csv > 38 rows
- speeding.csv > 197,065 rows

Base map

Map Style: Dark

Map Layers: Label, Road, Border, Building, Water, Land

Layers

- accidents.csv > 31,795 rows
- deaths.csv > 38 rows
- speeding.csv > 197,065 rows

Layer Legend

speeding
Polygon color by speed_difference

- 5.00 to 5.99
- 5.99 to 6.21
- 6.21 to 6.83
- 6.83 to 6.07
- 6.07 to 10.96
- 10.96 to 96.77

deaths
Point color

- Red

accidents
Point color

- Orange

Rides

How and green taxi

San Francisco Elevation Contour

Elevation contours of San Francisco mainland and Treasure Island/Yerba Island

Add Data To Map

Load Your Data Load Map using URL

Upload data files or upload a saved map via previously exported single JSON of both config and data

Drag & Drop Your File(s) Here

*Kepler.gl is a client-side application with no server backend. Data lives only on your machine/browser. No information or map data is sent to any server.
*Chrome user: Limit file size to 250mb. If need to upload larger file, try Safari!



Video

Home | Upload | Results | Report

Upload Portal

Data Mapping

NUMBER OF LANES

SPEED LIMIT

VOLUME

DIVIDED/UNDIVIDED

SEVERITY

FUNCTIONAL CLASS

[View Your Results](#)

my street

An evidence-based tool that helps the decision-maker "see" safety issues from the perspective of the pedestrian.

Welcome to My Street

My Street is a sketch-level planning tool designed to help you explore options for pedestrian safety in your area. Based on user input, My Street conducts analysis and maps priority sites for consideration.

For each site, My Street illustrates potential countermeasures. My Street allows you to see how site-level enhancements and countermeasures impact the health of four people who live, learn, work, and travel in your area.

Steve, and Michael (the My Street avatars) respond differently to the environment based on the decisions you make for each site. My Street produces an initial Pedestrian Safety Action Plan that you can discuss with others in your community to improve pedestrian safety.

Perspectives

"Alice is a 75-year-old who enjoys being outside."

Home | Upload | Results | Report

Let's Get Started!

- Click on the **Get Started** button to upload data.
- Review the results of the systemic analysis.
- Visit selected sites and consider countermeasure options.

my street

An evidence-based tool that helps the decision-maker "see" safety issues from the perspective of the pedestrian.

Congratulations

You have identified countermeasures for each of your top sites. My Street has produced a sketch-level Pedestrian Safety Action Plan to help guide you and your agency to make decisions for improved pedestrian safety. Download the PDF to see your summary and individual site reports.

| FACILITY TYPE | SITE | LOCATION |
|-------------------------------------|------|--------------------|
| <input checked="" type="checkbox"/> | A | 1 Capital Blvd |
| <input type="checkbox"/> | A | 2 Capital Blvd |
| <input type="checkbox"/> | A | 3 Western Blvd |
| <input type="checkbox"/> | A | 4 Western Blvd |
| <input type="checkbox"/> | A | 5 Spring Forest Rd |
| <input type="checkbox"/> | B | 1 Gorman St |
| <input type="checkbox"/> | B | 2 Gorman St |
| <input type="checkbox"/> | B | 3 Lake Wheeler Rd |
| <input type="checkbox"/> | B | 4 S State St |
| <input type="checkbox"/> | B | 5 Northbrook Dr |

[Download Action Plan](#) | [Return to Results](#)

Pedestrian Safety Action Plan

Divided roadway | 4-6 lanes | 45 MPH speed limit | Sidewalks present | Not in a school zone

BEFORE

AFTER

AFTER

| Facility Type | Site | Route Name | AAADT | Roadway Configuration | Number Lanes | Speed Limit | Countermeasure Package | Cost (Total) |
|---------------|------|------------------|-------|-----------------------|--------------|-------------|---|--------------|
| B | 1 | Gorman St | 9600 | TWOWAY, UNDIVIDED | 2 | 35 | High Visibility Crosswalk / Warning Sign | \$8,000 |
| B | 2 | Gorman St | 14000 | TWOWAY, UNDIVIDED | 2 | 35 | High Visibility Crosswalk / Rectangular Rapid Flash Beacon | \$25,000 |
| B | 3 | Lake Wheeler Rd | 7500 | TWOWAY, UNDIVIDED | 2 | 35 | High Visibility Crosswalk / Rectangular Rapid Flash Beacon | \$25,000 |
| B | 4 | S State St | 1423 | TWOWAY, UNDIVIDED | 2 | 35 | High Visibility Crosswalk / Round Crosswalks | \$10,000 |
| B | 5 | Northbrook Dr | 4423 | TWOWAY, UNDIVIDED | 2 | 35 | High Visibility Crosswalk / Round Crosswalks | \$10,000 |
| A | 1 | Capital Blvd | 40000 | TWOWAY, DIVIDED | 6 | 45 | High Visibility Crosswalk / Pedestrian Refuge Island / Pedestrian Hybrid Beacon | \$25,000 |
| A | 2 | Capital Blvd | 48000 | TWOWAY, DIVIDED | 6 | 45 | High Visibility Crosswalk / Pedestrian Refuge Island / Pedestrian Hybrid Beacon | \$25,000 |
| A | 3 | Western Blvd | 33000 | TWOWAY, DIVIDED | 4 | 45 | High Visibility Crosswalk / Pedestrian Refuge Island / Pedestrian Signal | \$50,000 |
| A | 4 | Western Blvd | 5200 | TWOWAY, DIVIDED | 6 | 45 | Pedestrian Turnoff | \$0,000,000 |
| A | 5 | Spring Forest Rd | 19000 | TWOWAY, DIVIDED | 4 | 45 | High Visibility Crosswalk / Pedestrian Refuge Island / Road Diet | \$50,000 |

Summary

Based on your preferences and the results of data analysis, My Street created a list of sites where risk is high for pedestrian crashes. Following a field review of each site, you selected potential countermeasure packages to fit roadway characteristics. These countermeasures may help minimize future crash risk. My Street encourages you to research the benefits and design considerations for each of the countermeasures before refining and taking action on your action plan. Costs shown are based on national estimates, so actual costs to implement these improvements will vary.

Next Steps

- Share this initial report with fellow pedestrian safety champions.
- Research and discuss the benefits and challenges with the site and countermeasure options.
- Conduct detailed field reviews or safety assessments of these priority sites.
- Investigate opportunities for incorporating the countermeasures into local plans or transportation projects.
- Consider using My Street as a tool for educating the public about pedestrian safety.

