U.S. Department of Transportation

Office of the Under Secretary for Policy

Safety Data Forum

June 14, 2018

Summary Report

Table of Contents

Executive Summary

The U.S. Department of Transportation (DOT) hosted a one-day Safety Data Forum (Forum) to share information about its Safety Data Initiative (SDI) and to solicit input from a variety of stakeholders about opportunities to leverage data and tools to predict, mitigate, and prevent traffic crashes. Participants included representatives from Federal, State, and local government, national nonprofit organizations focused on safety, educational institutions, the private sector, and DOT.

The Forum included opening keynote addresses by Derek Kan, the Under Secretary of Transportation for Policy, and Heidi King, the Deputy Administrator of the National Highway Traffic Safety Administration (NHTSA). Their remarks presented the goals of the SDI, and the traffic safety challenges the SDI seeks to address.

Several DOT staff delivered presentations about pilot projects undertaken as part of the initiative, including:

- Estimated Traffic Crash Counts Using Crowdsourced Data
- Rural Speed Pilot Project
- The Effects of the Roadway and Built Environment Characteristics on Pedestrian Fatality Risk
- Fatality Analysis Reporting System (FARS) Data Visualization

Following these presentations, attendees participated in one of three breakout discussions and shared feedback on DOT's pilot projects and ideas for building on these projects. In the afternoon, several subject matter experts delivered brief presentations on Federal, State, and local initiatives using data integration, data visualizations, and predictive tools to gain new insights into addressing surface transportation challenges:

- Federal Highway Administration Strategic Highway Safety Program 2 (SHRP2) Naturalistic Driving Study: Safety Countermeasures from Big Data
- Partnership for Analytics Research in Traffic Safety (PARTS) Prototype
- Integration of Traffic Records Data in Maryland
- Safety Data Integration and Uses in Tennessee
- Vision Zero in San Francisco: Leading with Data to Save Lives and Advance Equity
- Analyzing Crash Data to Reduce Fatalities and Serious Injury Crashes

Following these presentations, attendees participated in one of three breakout group discussions that focused on identifying opportunities to use data integration and visualization to provide new insights for improving traffic safety.

Several key themes emerged from the Forum, which focused on opportunities to leverage data to improve traffic safety.

Theme: Establishing Data Governance

The participants highlighted the importance of data governance to ensure that data is of high quality, standardized, and available for use.

Theme: Leveraging New and Emerging Data Sources

Participants discussed opportunities presented by new and emerging data sources and how integrating these with traditional data sources could provide new insights into addressing traffic safety questions.

Theme: Data Sharing and Protections

Forum participants discussed the importance of sharing data, building trust and, protecting data to address concerns about privacy, proprietary information, and legal liability.

Theme: Utilizing Data for Policy and Decision-Making

Many participants shared an interest in accessing recent data and analyzing data frequently to inform policy and decision-making that can help address transportation safety challenges near real time.

Chapter 1. Introduction and Background

Safety is DOT's top priority, and as such, DOT initiated a Safety Data Initiative (SDI) led by the Office of the Under Secretary for Policy (OST-P). The SDI aims to evolve from retrospective safety analysis to predictive safety analysis, using compelling data visualizations to better target risk. The intent is to use new datasets and analytic tools across surface transportation modes to develop an integrated data ecosystem for rapid, rigorous, and innovative safety data analysis that support policy decisions. To support this initiative, OST-P invited stakeholders from a variety of disciplines to participate in a one-day meeting to explore opportunities to use data integration, visualization, and analytics, to predict, mitigate, and prevent traffic crashes that result in fatalities and serious injuries, and learn from each other's knowledge and experience. Participants included representatives from Federal, State, and local government, national nonprofit organizations focused on safety, educational institutions, the private sector, and DOT.

Chapter 2. Highlights of the Safety Data Forum

Welcome & Introductory Remarks

The Forum opened with introductory remarks by Finch Fulton, Deputy Assistant Secretary for Transportation Policy, who highlighted the need to integrate and visualize data to understand the increasing number of traffic fatalities in recent years and the underlying causes. He underscored that a key aim of the Forum was to facilitate relationships with stakeholders to share information and experiences about how leveraging data can help improve traffic safety.

Opening Keynote Addresses

Under Secretary of Transportation for Policy Derek Kan stated that DOT invited participants to the Forum to start an important dialogue about how to enhance safety and save lives by leveraging data to unlock insights that can predict, mitigate, and prevent traffic crashes. He emphasized the importance of building relationships and sharing best practices to improve traffic safety. Kan noted several challenges that have limited DOT's ability to fully leverage the hundreds of DOT data sets, and he described the opportunity to do much more using advanced data analytics to identify patterns of existing and emerging risk and track changes over time. He cited the data sharing, integration, and analytics approach used by the Federal Aviation Administration (FAA) and the aviation industry as contributing to the safest decade in commercial aviation since the beginning of human flight, and potentially serving as an important model for improving surface transportation safety. He identified trust as a key factor in making data sharing work in such a system.

Kan laid out his vision for improving the way DOT uses data to inform policy and decision-making to promote a safety surface transportation system, and he described the three pillars of the SDI:

1. Creating clear, compelling data **visualizations** to make data analysis and insight available to policymakers;
2. **Integrating** existing DOT databases and new private sector databases to provide new ways to answer safety questions; and
3. Using **advanced analytics**, including machine learning and artificial intelligence (AI), to identify risk patterns and develop insights that anticipate and mitigate safety risks to reduce traffic fatalities and serious injuries.

Finally, Kan announced the launch of DOT's Solving for Safety Visualization Challenge and urged Forum attendees to participate. The Challenge seeks Solvers to submit innovative data visualizations that reveal insights into serious crashes on roads and rail systems while improving our understanding of the transportation safety system.

Heidi King, Deputy Administrator of the National Highway Traffic Safety Administration (NHTSA), described the traffic safety challenge facing the U.S., which experienced 37,461 traffic fatalities in 2016. She personalized the challenge as being about the safety of friends, neighborhoods, and communities. She described NHTSA's descriptive analytics, using timely and accurate data to track, monitor and respond to risks on the roads. This work can identify higher safety risks associated with alcohol-impaired driving and unbelted vehicle occupants, and those facing pedestrians. King cited distracted driving and drug-impaired driving as emerging risks for which data is missing and said that predictive analytics can help fill these gaps. She sought to harness the skills and ideas of Forum participants to use data to identify new insights and ultimately improve traffic safety.

Overview of DOT Safety Data Initiative Projects and Findings to Date

Several DOT staff delivered presentations describing pilot projects using new data integration, analytics, and visualization to improve traffic safety. The following are highlights from those presentations.

Estimating Traffic Crash Counts Using Crowdsourced Data

Dan Flynn of the Volpe National Transportation Systems Center presented a pilot project estimating traffic crashes in Maryland in near-real time by combining crowdsourced crash data from Waze with crash data from NHTSA's Electronic Data Transfer (EDT) pilot. Waze data is available where user reported, every two minutes. EDT catalogs police crash reports nightly for nine states. In order to align data coordinates with the Federal Highway Administration's (FHWA) road networks, they were spatially aggregated to hexagonal grids with 1-mile areas. Zeros (times and places with no crashes) were defined as grid cells and time periods with 1 or more non-accident Waze events but no EDT reports. The project employed machine learning techniques to train statistical models to predict crashes. In this pilot, DOT learned these models supported with Waze data produce reasonably good estimates of police-reported crashes. This pilot has laid the foundation for a future nationwide crash count tool.

Rural Speed Pilot Project

Paul Teicher of OST-P presented on the Rural Speed Pilot Project, which integrated crash data, roadway attributes at the segment level, traffic volumes, and speed information to understand the effect of prevailing speed, speed limit, average travel speed, and speed differential (travel speed versus posted speed limit) on the prevalence and severity of crashes on rural highways. The pilot further sought to understand the relationship roadway design and traffic volumes have with speed and crash outcomes. The pilot utilized FHWA's National Performance Management Research Data Set (NPMRDS), which includes anonymized data from GPS-enabled devices and provides prevailing speeds at 5-minute intervals across the entire National Highway System. This project could be used by state and local governments as a tool for determining speed-related laws and policies.

The Effects of the Roadway and Built Environment Characteristics on Pedestrian Fatality Risk

Theodore Mansfield, an Oak Ridge Institute for Science and Education (ORISE) data fellow in OST-P, presented on a pilot project that sought to understand the relationship pedestrian fatalities may have with transportation system and built environment characteristics. Two key takeaways were discovered through analysis of data from FHWA, NHTSA, the Environmental Protection Agency (EPA), and the U.S. Census Bureau. In urban areas, traffic on non-access-controlled arterials was significantly correlated with increased pedestrian fatality risk. Traffic on other urban roadways and all roadway types in rural areas also correlated to pedestrian fatality risk but with weaker effects. Additionally, employment density in the retail sector was strongly associated with increased pedestrian fatality risk in both urban and rural areas. Lessons learned from this pilot may be used to understand location-specific risks.

Fatality Analysis Reporting System (FARS) Visualization

Rajesh Subramanian of NHTSA presented a data visualization using Fatality Analysis Reporting System (FARS) data – a nationwide census of fatal injuries suffered in motor vehicle crashes. This new, more interactive format supplemented existing data summaries on specific topical areas. NHTSA is in the process of beta testing an interactive visualization of the 2016 Traffic Fact Sheet focused on speeding. By creating more interactive information, the hope is to present the data in a new, helpful way to policy-makers and the general public. NHTSA plans to build on this initial effort by developing other innovative visualizations for other safety topic areas.

Lightning Talks

Several attendees with expertise leveraging data for transportation safety delivered brief presentations to provide a high-level overview of projects using data to improve highway safety.

Federal Highway Administration (FHWA) Strategic Highway Research Program 2 (SHRP2) Naturalistic Driving Study

James Pol of the FHWA Office of Safety Research and Development presented the Strategic Highway Research Program 2 (SHRP2), a naturalistic driving study, which recorded people as they drove. Over 3,000 participants traveled more than 30 million miles during 5.4 million trips to produce over 1 million hours of continuous video. Throughout the course of the project, 1,465 crashes were documented. Artificial intelligence techniques are being tested to analyze the recordings to detect and catalog driving behaviors such as using a turn signal or texting. Current research to analyze certain driving behaviors and factors correlated with crashes. Using this data can help inform what can be done to mitigate or modify risky driving behaviors, and what safety and operations countermeasures can mitigate such risks.

Partnership for Analytic Research in Traffic Safety (PARTS) Prototype

Cheryl Croft of the MITRE Corporation discussed PARTS, an ongoing project with the goal of convening members of the safety community to collectively identify risks and assure traffic safety, especially given rapid innovation. PARTS provides a neutral, data-sharing forum for industry partners and NHTSA to leverage data on crashes, vehicle fleet and equipage, driver experience, traffic, and weather conditions to better understand safety performance. Research questions include: How effective are vehicles equipped with advanced driver-assistance systems (ADAS) in reducing the risk of crashes? What is the driver experience with ADAS? This partnership has allowed all involved to develop new insights, aggregate industry data, and perform benchmarking, while building trust between industry and government.

Integration of Traffic Records Data in Maryland

Timothy Kerns, a researcher at the University of Maryland, presented on Maryland's efforts to integrate crash, medical, and other traffic records data, building on the Crash Outcome Data Evaluation System (CODES) approach initiated by NHTSA in the 1990s. Initially, Maryland linked police crash reports with hospital records, and ambulance and Emergency Medical Services (EMS) logs, which were crucial for creating a model that defines serious injury. The State later integrated other statewide data sources, including from emergency departments, the statewide trauma registry, toxicology reports, autopsy records, vital statistics, vehicle licensing, and driver citations. These efforts have enabled Maryland to identify countermeasures, garner support for legislation, and initiate engineering changes to vehicles and environments. Furthermore, evaluation of state programs has allowed researchers to identify best practices and policymakers to discontinue ineffective and costly programs.

Safety Data Integration and Uses in Tennessee

Patrick Dolan, a Statistical Research Manager for the Tennessee Department of Safety and Homeland Security (TDOSHS), presented on the Tennessee Highway Patrol's (THP) predictive analytics program, which has developed predictive models for crashes, impaired driving, and commercial vehicles. THP uses these models to allocate law enforcement resources, deploying officers to areas where their visibility and enforcement activities have the most impact. Since THP initiated the predictive analytics program in 2013, Tennessee has seen a declining traffic fatality rate, and the THP has decreased crash response times by 33 percent.

Vision Zero in San Francisco: Leading with Data to Save Lives and Advance Equity

Megan Wier of the San Francisco Department of Public Health presented on San Francisco's Vision Zero initiative, which is focused on creating safer streets and eliminating all traffic fatalities. San Francisco has worked with multiple agencies to create a comprehensive injury surveillance system. Police-reported injury collision data provide crash characteristics but lack information about injury severity, and they underreport injuries among some groups, including African Americans and cyclists. Hospital medical records include better injury severity assessments, detailed health outcome data, demographics, and other information but are limited in terms of cause and injury location. To address these challenges, San Francisco linked three years of hospital, EMS, and police data, which has improved the accuracy of injury severity reports; facilitated the identification, geolocation, and rationalization of unreported traffic collision injuries; and helped identify on the corridors with the most fatalities and serious injuries.

Analyzing Crash Data to Reduce Fatalities and Serious Injury Crashes

Cory Hutchinson of the Louisiana State University Highway Safety Research Group (HSRG) presented on how Louisiana uses three levels of dashboards to make the state's crash data more accessible, visual, and informative for decision-makers as part of the Strategic Highway Safety Plan (SHSP) process. Level 1 identifies the major factors contributing to traffic fatalities and serious injury crashes, and displays trends and ranks for different emphasis areas. Level 2 sets targets for reducing these crashes, including expected reduction of deaths and injuries, actual reductions, and comparisons of the expected versus actual. Level 3 focuses on addressing identified problems, including when and where fatalities and serious injury crashes occur, and the demographics of people involved in these crashes to help identify appropriate countermeasures and track progress over time.

Breakout Sessions

The Breakout Sessions were designed for participants to share relevant research and work that addresses transportation safety and to provide feedback on the pilot projects and ideas for how DOT can move forward with the SDI.

Meeting organizers assigned Forum participants to one of three breakout session groups, and they remained in the same group for two separate breakout sessions, one in the morning, and one

in the afternoon. Each breakout group included a diverse mix of stakeholders representing Federal, State, and local government, national nonprofit organizations focused on safety, educational institutions, and the private sector. DOT staff were also assigned to each room, but their role was primarily to listen to stakeholder discussion and interject with relevant information when appropriate. The discussion in each breakout session was led by a professional facilitator, using questions developed by DOT staff.

Morning Breakout Session: Feedback on DOT Pilot Project Presentations

The following questions solicited feedback on DOT pilot projects:

- Share your thoughts on the pilot project presentations. What feedback do you have for us?
- What information do you need to work effectively at the intersection of safety and data/technology?
- What types of data integration or visualization projects has your organization undertaken, and what have you learned from these?

Afternoon Breakout Session: Opportunities to Leverage Data for Safety

The following questions facilitated discussion for the future of transportation safety research:

- How can we use data to gain insights into how we can improve transportation safety?
- Which types of data can help us solve transportation safety issues?
- What role could your organization play in using data to solve transportation safety issues?
- What ideas do you have for new data integration or visualization projects that could provide new insights into addressing transportation safety problems?

A summary of key themes that emerged from these breakout session is included in Chapter 3.

Closing

The Forum concluded with all the participants reconvening. Each breakout session group shared the top takeaways from their discussions.

Barbara McCann, the Director of the Office of Policy Development, Strategic Planning and Performance, delivered final remarks, thanking attendees for participating in the Forum and sharing their expertise and ideas, and she invited them to stay involved in the SDI by participating in the Solving for Safety Visualization Challenge.

Chapter 3. Key Themes and Next Steps

Attendees shared a variety of insights and ideas during the breakout sessions. Four broad themes emerged from these discussions relating to: data governance, new and emerging data sources, data for policy and decision-making, and data sharing and protections.

Data Governance

Forum participants discussed the importance of data governance to ensure that data is of high quality, standardized, and available for use. Lacking access to trusted, high quality data in standardized formats was identified as a key challenge to data integration and analysis efforts. Various organizations collect and use data for different purposes, and these various data sources are commonly structured differently. Different data sources may be missing data or have other limitations, and in some cases, there are inconsistencies between different data sources. Some participants identified a need for a mechanism for establishing formal data standards that could help address this challenge. Several also underscored the importance of metadata dictionaries or catalogs that provide relevant information about each data source.

Participants also identified the need for data repositories where multiple data sources are publicly available to data analysts. DOT established such a public data portal with data sets organized by mode of transportation.[1] Others expressed a need for means of sharing information about data analysis and research approaches to help build a community of practice. One example cited was the National Institute of Health's (NIH) Research Portfolio Online Reporting Tools (RePORT) website, which provides access to reports, data, and analyses of NIH research activities.[2]

Leveraging New and Emerging Data Sources

Forum participants discussed the opportunities presented by new and emerging data sources and how integrating these with traditional data sources could provide new insights into traffic safety questions. Companies are making available anonymized location-based data from mobile devices that can provide information about traffic volumes, speeds and flows by time and location, and some of these companies are beginning to provide information about pedestrian and bicycle flows as well. Some companies are beginning to offer data on pedestrian and bicycle flows, which can provide important exposure data that has been lacking. Aggregated data from mobile devices together with data from telematics systems, which are used commonly in vehicle fleets, can also provide information about driver behaviors and performance, including distraction, excessive speeding, and hard braking. Connected and autonomous vehicles could potentially provide a wealth of new data to help improve traffic safety. Additional traffic and route data could be obtained from navigation application service providers and transportation network companies (TNCs), also known as ride-hailing services. In addition, rental car companies have

[1] https://data.transportation.gov/
[2] https://report.nih.gov/

data that may be valuable. More geographically specific weather data could provide better information relating to transportation safety. Mining data from social media could also provide additional information about traffic conditions and crashes. Finally, there are also opportunities to make better use of existing data sources, such as medical data from hospitals and EMS, vehicle warranty and repair data, and court data.

When using new data sources, it is important to understand how the data are collected, how frequently they are collected, and any limitations in their quality and completeness. This should include evaluating whether such data are representative of the whole population or whether they may be biased based on the method of collection, such as crowdsourced data that may over represent or under represent different demographic groups.

Data Sharing and Protections

Participants discussed the importance of sharing data, particularly for governments to obtain data from the private sector that can help answer safety questions, and the various concerns associated with sharing these data. For instance, insurance companies collect a significant amount of data on their customers' driving, traffic crashes, and claims that could be helpful in answering safety questions, but companies have concerns about sharing such data because of the needs to protect their customers' privacy and prevent its use in litigation. Medical records can provide important information about the severity of injuries resulting from traffic crashes and help identify crashes that are not included in police crash reports, but hospitals have significant concerns about protecting patients' privacy and complying with legal requirements. Autonomous vehicles collect data about vehicle performance and crashes that could be valuable in identifying safety issues, but the companies that produce them have concerns about their customers' privacy, the proprietary nature of these data, and the potential for legal liability.

Addressing such concerns requires the public and private sectors to build a foundation of trust safeguard sensitive data, and thoroughly evaluate the legal issues surrounding each type of data. One successful example is the Federal Aviation Administration's (FAA) Aviation Safety Information Analysis and Sharing (ASIAS) capability through which the aviation industry voluntarily shares a variety of operational data with a third-party organization that anonymizes and aggregates the data before making them available to government and industry partners to help proactively identify safety concerns and continuously improve aviation safety. The FAA underscores that this data sharing arrangement was founded on building trust and ensuring that the FAA, which regulates and enforces aviation safety, will only use the data to collaboratively advance aviation safety, and not for enforcement purposes.

In the traffic safety context, NHTSA is collaborating with automotive industry partners on a similar data sharing arrangement through the PARTS initiative. Industry is sharing data on crashes, vehicle fleet and equipage, driver experience, traffic, and weather conditions with a third-party organization pooling and analyzing the data to better understand the safety

performance of vehicles with ADAS. The initiative focuses on building trust between industry and government and protecting data.

Utilizing Data for Policy and Decision-Making

Forum discussions focused on how data can be used to inform policy and decision-making and improve transportation safety. The traditional use of historical data focuses on persistent problems, instead of using newer data and advanced analytics to identify emerging problems. Participants also recognized that there is a need for new and improved tools capable of performing advanced analysis, with the goal of performing predictive analysis. Predictive analytic capabilities would allow DOT and State and local transportation agencies to understand what is likely to happen based on recent available data and make more informed policy decisions in closer to real time. The ultimate goal is to develop actionable tools that can help decision-makers understand current and emerging transportation safety challenges so they can identify appropriate strategies for addressing these challenges and take action more quickly.

Participants expressed the need to focus initially on the capability to obtain more frequent analysis of recent data to provide a more dynamic interplay between data and safety activities. In order to do so, hurdles must be overcome. Currently the data is often difficult to access, siloed, not available in real time. Also, integrating data sets can be challenging. Participants indicated that data integration and analysis efforts should be driven by a clear understanding about the specific questions one is seeking to answer. Others raised the need to share information about successful data integration efforts so that others can learn from and replicate those approaches.

Participants also expressed the need to analyze interactions and linkages across the entire safety system to identify trends and risks and to gain insights. Despite the challenges, participants express optimism about the potential benefits.

Next Steps

Throughout the discussions, participants shared how their organizations can contribute to efforts to use data visualization, data integration, and advanced analytics to create a more dynamic and nuanced understanding of surface transportation safety problems. Some organizations can share their data or offer data hosting services. Others have technology platforms and staff with technical expertise and that support data visualization, data integration, and data analytics. Several organizations have deep expertise in transportation safety that can help inform the use of the data and technology to help gain new insights into transportation safety challenges. Other organizations can help identify research needs and provide funding for such efforts. The Forum facilitated information exchange about several notable projects, both through presentations and discussions. By working together, the transportation safety community can increase our knowledge and expand the possibilities of enabling new strategies to save lives.

Based on the themes that emerged from the Forum, there are several areas that are ripe for additional work, and various organizations can contribute to ongoing progress in these areas.

Index and Curation of Data Sources

Organizations that collect data can make them publicly available in a repository and publicize their availability so that researchers and data analysts can easily access them. Such repositories are of greatest use if they include metadata dictionaries, catalogs or taxonomies that provide relevant information about each data source, and allowing users to use key words to search the data repository can help identifying appropriate data sources, particularly when it includes a large number of data sources.

Sharing Best Practices

Organizations can share information about best practices or successful data visualization, data integration, and advanced analytics projects they have undertaken so other organizations can learn from and apply these analytic methods and tools elsewhere. DOT has already undertaken several efforts to share information about SDI activities by posting the presentations from the Forum on the DOT website,[3] posting the FARS speeding visualization on the NHTSA website,[4] and publishing a journal article on the pilot project focused on understanding the correlation between pedestrian fatalities and transportation system and built environment characteristics.[5]

Data Sharing

Forum participants identified several opportunities for organizations to share data, which has the potential to unlock new insights into safety challenges, but in some cases, this will require building trust, conducting necessary legal analysis, and appropriately protecting any data used to maintain individuals' privacy, safeguard companies' proprietary information, and prevent the data from being used in litigation. The collaborative data sharing relationship developed by the FAA and the aviation industry provides an important best practice and model, and trust has been the foundation of this successful effort. NHTSA's PARTS initiative is collaborating with the automotive industry to share data, which has required building trust and protecting data shared by industry.

Conclusion

The Safety Data Forum provided a venue for DOT to meet with stakeholders with expertise in transportation safety, data and technology to discuss leveraging data and tools to predict, mitigate, and prevent traffic crashes and improve transportation safety. The DOT shared information about SDI activities, solicited input from diverse stakeholders, and began building relationships and partnerships with and between stakeholders.

---

[3] https://www.transportation.gov/policy/transportation-policy/safety/safetydataforum

[4] https://icsw.nhtsa.gov/nhtsa/fars/speeding_data_visualization/

[5] Mansfield, Theodore, et. al. "The effects of roadway and built environment characteristics on pedestrian fatality risk: A national assessment at the neighborhood scale." *Accident Analysis & Prevention* 121 (December 2018): 166-176.

Key themes that emerged were data governance, leveraging new and emerging data sources, data sharing and protections, and data use for policy and decision-making. Participants discussed opportunities to make progress in each of these areas. The DOT will use the input stakeholders shared at the Forum to help inform the SDI's continuing work to develop and deploy tools that practitioners can use to save lives, and DOT looks forward to future opportunities to engage with the safety community around a shared interest in leveraging data and building trust to improve transportation safety.

Appendix A: Acronyms

Acronyms	Definition
ADAS	Advanced Driver Assistance Systems
AI	Artificial Intelligence
CODES	Crash Outcome Data Evaluation System
DOT	Department of Transportation
EDT	Electronic Data Transfer
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
HSRG	Highway Safety Research Group
IP	Intellectual Property
NEMSIS	National Emergency Medical Services Information System
NHTSA	National Highway Traffic Safety Administration
NPMRDS	National Performance Management Research Data Set
NSC	National Safety Council
OEM	Original Equipment Manufacturer
ORISE	Oak Ridge Institute for Science and Education
OST-P	Office of the Under Secretary for Policy
PARTS	Partnership for Analytics Research in Traffic Safety
SDI	Safety Data Initiative
SHRP2	Strategic Highway Research Program 2
SHSP	Strategic Highway Safety Plan
TDOSHS	Tennessee Department of Safety and Homeland Security
TDOT	Tennessee Department of Transportation
THP	Tennessee Highway Patrol
TITAN	Tennessee Integrated Traffic Analysis Network
USDOT	United States Department of Transportation
VIN	Vehicle Identification Number
VZSF	Vision Zero San Francisco

Appendix B: Safety Data Forum Agenda

Safety Data Forum
U.S. Department of Transportation
Conference Center
1200 New Jersey Avenue SE, Washington, DC 20590
June 14, 2018, 9:00 am – 4:30 pm

AGENDA

8:00 – 9:30 **Check-in & Security**

9:30 – 9:40 **Welcome & Introductory Remarks**

- Finch Fulton, Deputy Assistant Secretary for Transportation Policy

9:40 – 10:00 **Opening Keynote Addresses**

- Derek Kan, Under Secretary for Policy
- Heidi King, Deputy Administrator, National Highway Traffic Safety Administration (NHTSA)

10:00 – 10:40 **Overview of U.S. Department of Transportation Safety Data Initiative Projects and Findings to Date**

- Introduction – Barbara McCann, Office of the Under Secretary for Policy
- Estimating Traffic Crash Counts Using Crowdsourced Data – Dan Flynn, PhD, Volpe National Transportation Systems Center
- Rural Speed Pilot Project – Paul Teicher, Office of the Under Secretary for Policy
- Fatality Analysis Reporting System (FARS) Visualization – Rajesh Subramanian, NHTSA
- The Effects of Roadway and Built Environment Characteristics on Pedestrian Fatality Risk: A National Assessment at the Neighborhood Scale – Ted Mansfield, PhD, Office of the Under Secretary for Policy
- Wrap Up – Barbara McCann, Office of the Under Secretary for Policy, and Patricia Hu, Bureau of Transportation Statistics

10:40 – 11:00 **Networking Break & Transition to Breakout Session**

11:00 – 12:00 **Breakout Session 1**

- Feedback on Safety Data Initiative Projects and Ideas for the Future

12:00 – 1:00 **Lunch & Networking Session**

1:00 – 1:45 **Lightning Talks: Using Data to Improve Transportation Safety**

- SHRP2 Naturalistic Driving Study: Safety Countermeasures from Big Data – James Pol, PE, PMP, Federal Highway Administration (FHWA)
- Partnership for Analytics Research in Traffic Safety (PARTS) Prototype – Cheryl Croft, MITRE Corporation
- Integration of Traffic Records Data in Maryland – Timothy Kerns, PhD, University of Maryland School of Medicine
- Safety Data Integration and Uses in Tennessee – Patrick Dolan, Tennessee Highway Patrol
- Vision Zero in San Francisco: Leading with Data to Save Lives and Advance Equity – Megan Wier, MPH, San Francisco Department of Public Health
- Analyzing Crash Data to Reduce Fatalities and Serious Injury Crashes – Cory Hutchinson, PhD, Louisiana State University Highway Safety Research Group

1:45 – 1:50 **Transition to Breakout Session**

1:50 – 3:05 **Breakout Session 2**

- Opportunities to Use Innovative Data Analytics and Visualization to Improve Transportation Safety

3:05 – 3:20 **Networking Break**

3:20 – 4:20 **Discussion of Next Steps**

4:20 – 4:30 **Closing Remarks**

- Barbara McCann, Office of the Under Secretary for Policy

4:30 **Adjourn**

Appendix C: Safety Data Forum External Participants

Name	Title	Organization
Debra Alvarez	Senior Legislative Representative	AARP
Andrew Avery	Public Works Commissioner	Chemung County, New York / National Association of Corrosion Engineers
Linda Bailey	Executive Director	National Association of City Transportation Officials
Matt Barrett	Federal Account Manager	Qlik
Timothy Black	Data Analyst, Vision Zero Division	Los Angeles Department of Transportation
Mike Boland	Embedded Analyst	Palantir
Alec Chalmers	Director, Public Sector Industries	Amazon Web Services
Ivan Cheung	Transportation Research Analyst	National Transportation Safety Board
Jessica Cicchino	Vice President, Research	Insurance Institute for Highway Safety
Gregory Ciparelli	Transportation Planner	Connecticut Department of Transportation
Wyatt Cmar	Researcher / Writer	Harvard Kennedy School
Larry Cook	Professor	University of Utah
Cheryl Croft	Director	The MITRE Corporation
Tim Czapp	Compliance and Safety	Fiat Chrysler
Patrick Dolan	Statistical Research Manager	Tennessee Department of Safety and Homeland Security
Michael Donofrio	Director of Federal	Tyler Technologies (Socrata)
Kim Eccles	Safety Practice Leader	VHB (Vanasse Hangen Brustlin, Inc.)
Garrett Eucalitto	Transportation Program Director	National Governors Association

Name	Title	Organization
Bob Fox	Commissioner	National Associations of Counties
Dia Gainor	Executive Director	National Association of State Emergency Medical Services Officials
Chip George	Vice President, U.S. Public Sector	Alteryx
Shane Glass	Public Dataset Program Manager	Google Cloud
J.T. Griffin	Chief Government Affairs Officer	Mothers Against Drunk Driving
Loren Groff	NRS Safety Data Systems	National Transportation Safety Board
Jon Hankey	Director of Research	Virginia Tech Transportation Institute
Kelly Hardy	Program Manager for Safety	American Association of State Highway and Transportation Officials
Katy Hartnett	Director of Government Relations	PeopleForBikes
Juliet Hirni	Director, Southeast	StreetLight Data
Cory Hutchinson	Director	Highway Safety Research Group / Louisiana State University
Tim Kerns	Program Director	University of Maryland National Study Center for Trauma / EMS
Russ Klaus	Director	Tableau Software
Steve Lavrenz	Technical Programs Manager	Institute of Transportation Engineers
Chanyoung Lee	Program Director	Center for Urban Transportation Research / University of South Florida
Shoshana Lew	Chief Operating Officer	Rhode Island Department of Transportation
In-Kyu Lim	HSIP Program Manager - Data & Analysis	Virginia Department of Transportation
Hugh Malkin	Director of Business Development	Citilabs
Russ Martin	Director of Government Relations	Governors Highway Safety Association

Name	Title	Organization
Jennifer Mathieu	Principal Multi-Discipline Systems Engineer	The MITRE Corporation
Chris McCahill	Deputy Director	State Smart Transportation Initiative
Brendan McCann	USDOT Senior Account Executive	SAS Institute
Matt Miszewski	Chief Revenue Officer	Tyler Technologies (Socrata)
Kelly Nantel	Vice President	National Safety Council
Issei Nino	Deployment Strategist	Palantir
Krista Nordback	Senior Research Associate	University of North Carolina Highway Safety Research Center
Jon Nystrom	USDOT Account Manager	Esri
Brendan O'Neil	Executive Director	IHS Markit
Michael Pack	Director	Center for Advanced Transportation Technology Laboratory
Huei Peng	Director	Mcity - University of Michigan
Karim Qomi	Consultant	IHS Markit
Derik Reiser	Assistant Vice President, Information Technology	Enterprise Holdings
Rick Schuman	Vice President, Public Sector	INRIX
Kevin Sigwart	Director of Solutions	1Spatial
Heidi Simon	Communications & Partnership Director	America Walks
Michael Singleton	Assistant Professor	University of Kentucky
Dave Snyder	Vice President	Property Casualty Insurers Association of America
Jo Strang	Senior Vice President, Safety and Regulatory Policy	American Short Line and Regional Railroad Association

Name	Title	Organization
Rachel Sturm	Manager, Traffic Safety Research & Analysis	AAA National
Brian Tefft	Senior Researcher	AAA Foundation for Traffic Safety
Jane Terry	Senior Director	National Safety Council
Sophia Victor	Senior Systems Engineer	SAS Institute
Rob Viola	Director, Safety Policy & Research	New York City Department of Transportation
Cedric Ward	Director - Office of Traffic and Safety	Maryland Department of Transportation - State Highway Administration
Kevin Webb	Director	SharedStreets
Megan Wier	Director, Program on Health, Equity and Sustainability	San Francisco Department of Public Health
Carol Wright Kenderdine	Assistant Vice President, Transportation & Mobility	Easterseals, Inc.

Appendix D: Safety Data Forum USDOT Participants

Name	Title	Administration
Elizabeth Alicandri	Associate Administrator for Safety	Federal Highway Administration
Bill Bannister	Chief, Analysis Division	Federal Motor Carrier Safety Administration
Sherry Borener	Chief Data Officer	Pipeline and Hazardous Materials Safety Administration
Jason Broehm	Transportation Analyst	Office of the Under Secretary for Policy
Chou-Lin Chen	Acting Chief of Trends Analysis Division	National Highway Traffic Safety Administration
Chip Chidester	Director, Office of Data Acquisitions	National Highway Traffic Safety Administration
Kara Fischer	Senior Attorney	National Highway Traffic Safety Administration
Dan Flynn	Environmental Biologist	Volpe National Transportation Systems Center
Michael Griffith	Director, Office of Safety Technologies	Federal Highway Administration
Jed Hanson	Policy Analyst	Office of the Under Secretary for Policy
James Hove	Safety Data Fellow	Office of the Under Secretary for Policy
Patricia Hu	Director, Bureau of Transportation Statistics	Bureau of Transportation Statistics
Derek Kan	Under Secretary of Transportation for Policy	Office of the Under Secretary for Policy
Brian Kim	Policy Intern	Office of the Under Secretary for Policy
Heidi King	Deputy Administrator	National Highway Traffic Safety Administration
Aloha Ley	Chief, Office of Safety Assurance and Risk Management	Federal Transit Administration
Ted Mansfield	Data Fellow	Office of the Under Secretary for Policy
Barbara McCann	Director, Office of Policy Development, Strategic Planning & Performance	Office of the Under Secretary for Policy

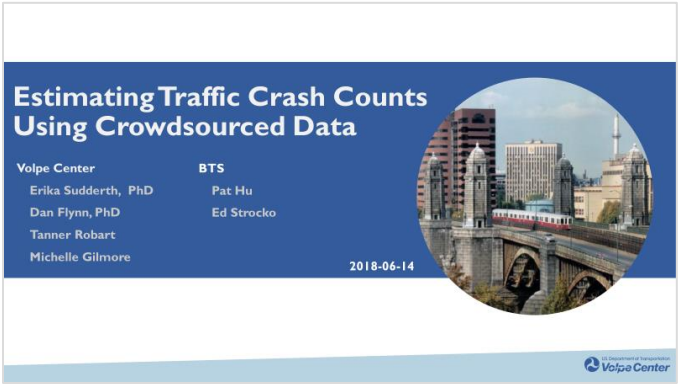
Name	Title	Administration
Jasmy Methipara	Research Analyst	Federal Highway Administration
Daniel Morgan	Chief Data Officer	Office of the Chief Information Officer
Tina Morgan	Program Coordinator	National Highway Traffic Safety Administration
James Pol	Technical Director	Federal Highway Administration
Jordan Riddle	Fellow	Bureau of Transportation Statistics
Chuck Rombro	Team Lead	Federal Highway Administration
Tim Schmidt	Senior Advisor	Federal Highway Administration
Terry Shelton	Associate Administrator of National Center for Statistics and Analysis	National Highway Traffic Safety Administration
Renee Sigel	Office Director	Federal Highway Administration
Steven Smith	Director, Analysis and Research Office	Federal Motor Carrier Safety Administration
Jo Soliman	Transportation Safety Analyst	Office of the Under Secretary for Policy
Jake Streeter	Manager, Safety Data and Analysis Team (SDAT)	Federal Aviation Administration
Ed Strocko	Director, Spatial Analysis and Visualization	Bureau of Transportation Statistics
Raj Subramanian	Mathematical Statistician	National Highway Traffic Safety Administration
Paul Teicher	Transportation Safety Analyst	Office of the Under Secretary for Policy
Alicia Wilson	Senior Attorney	Office of General Counsel
David Winter	Director, Office of Highway Policy Information	Federal Highway Administration

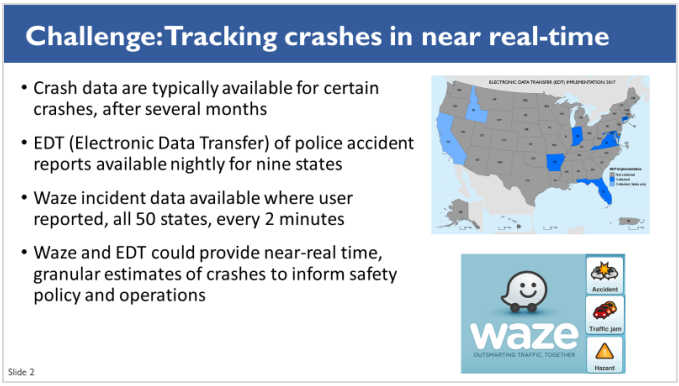
Appendix E: Presentations[6]

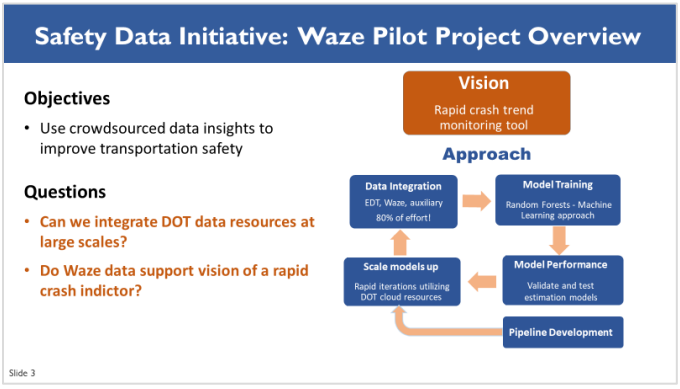
U.S. Department of Transportation Safety Data Initiative Projects

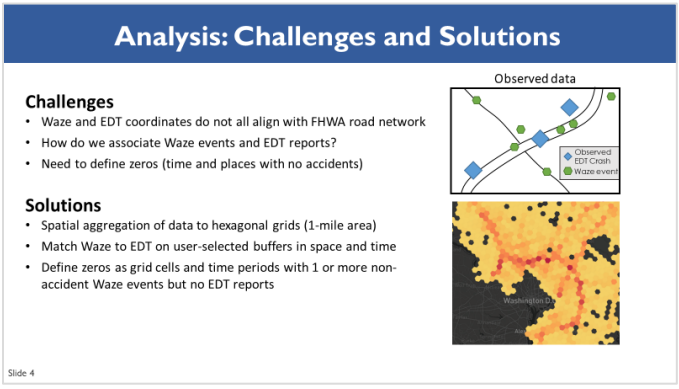
Estimating Traffic Crash Counts Using Crowdsourced Data

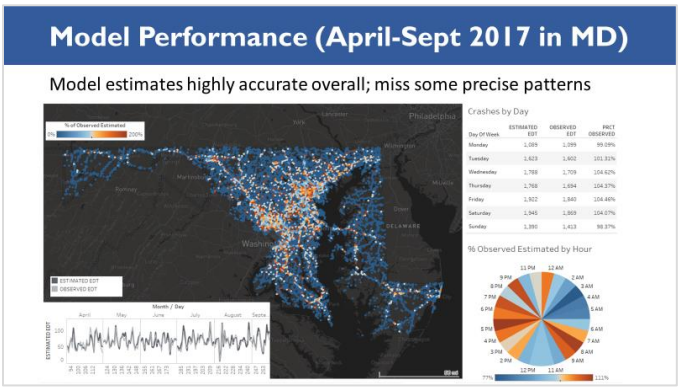
Dan Flynn, PhD, Volpe National Transportation Systems Center

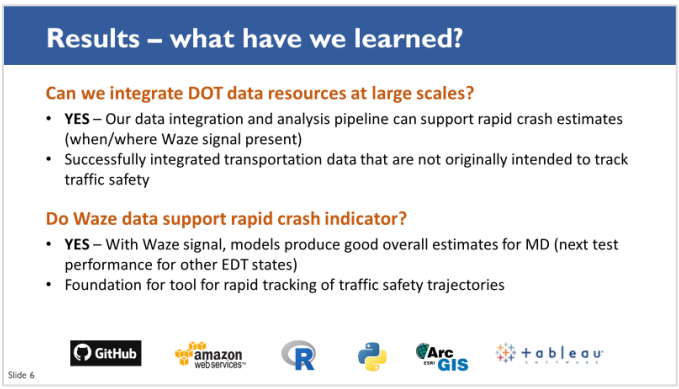












[6] A 508-compliant version of all slide presentations included in Appendix E may be found on DOT's Safety Data Forum webpage at: https://www.transportation.gov/policy/transportation-policy/safety/safetydataforum

Next Steps

- Model testing and re-training for 4-5 EDT states
- Partnerships with state or local DOTs to identify use cases
- Cross-state Waze data assessment & dashboard
- Applications of segment-based models

Potential Applications

Rapid crash trend monitoring tool

- Flag anomalies
- Short-term intervention assessment
- Cross-state comparisons
- Effectiveness models

- Incident Duration
- Clearance Times
- Secondary Crashes

Slide 7

Additional Slides

Statistical Approach: Supervised Classification

Random Forests

- Machine learning approach which minimizes overfitting
- Trained models on 70% of data using EDT reports as our labeled "ground-truth"
- Tested model performance using 30% of data to compare estimated EDT crashes with observed EDT crashes
- Rigorously trained and tested data feature combinations (50+ models)
- Best crash estimation models minimize False Positives and False Negatives

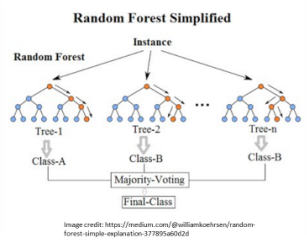
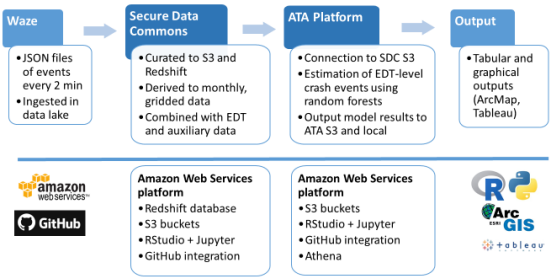


Image credit: https://medium.com/@williamkoehrsen/random-forest-simple-explanation-377895a60d2d

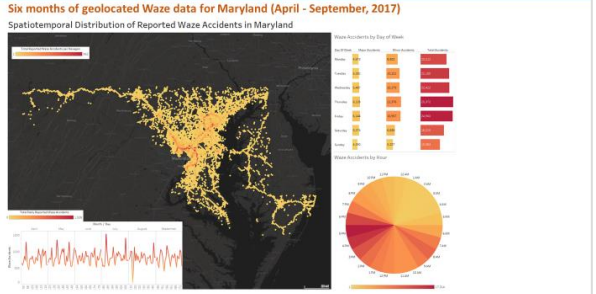
Slide 9

SDI Waze Data Pipeline Development



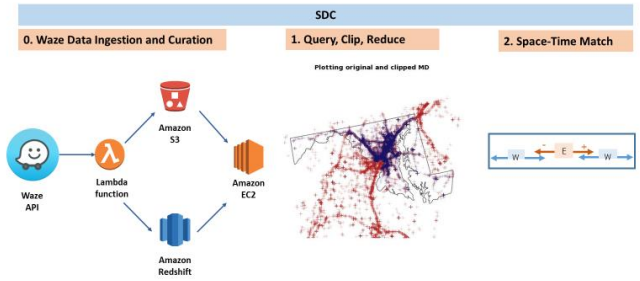
Slide 10

Waze Data: Distribution in Space and Time



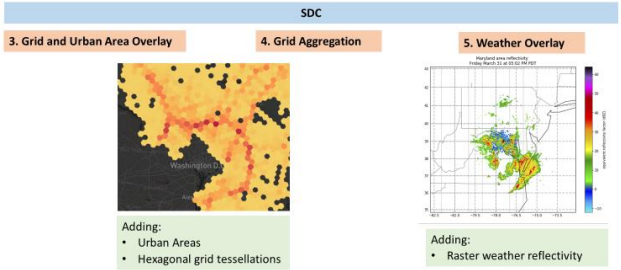
Slide 11

SDI Waze Data Pipeline Development



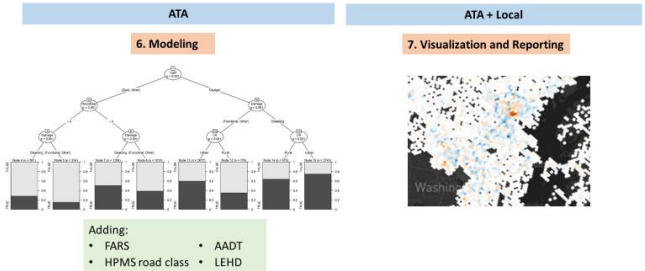
Slide 12

SDI Waze Data Pipeline Development



Slide 13

SDI Waze Data Pipeline Development



Slide 14

Evaluating Model Performance

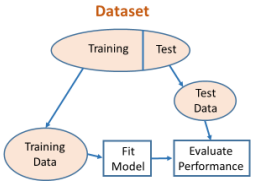
Divide data into training and testing subsets

- Training data: Select **70%** of observations (random by rows, whole days, or whole weeks)
- Test data: Remaining **30%** of observations

Training: fit model parameters with a large set of known EDT crashes, associated Waze events and other predictors

Testing: apply fitted model parameters to a new set of Waze events and other predictors to generate estimated EDT crashes

Compare estimated EDT crashes to observed EDT crashes in the test data set to evaluate model performance

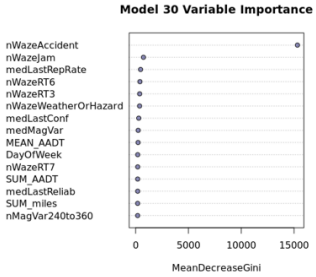


Slide 15

Variable Importance: Waze Accidents (April-Sept)

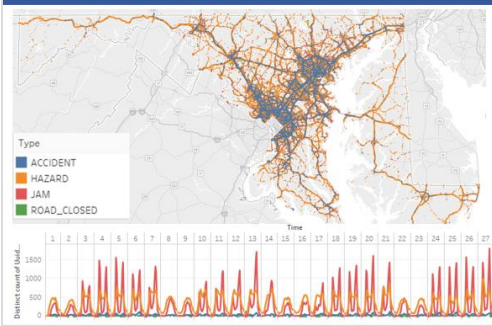
Mean decrease in Gini impurity:

- Variable is useful in separating a node of mixed classes (both 0 and 1 EDT crashes, in our case) into two nodes with pure classes (all 0 or all 1 EDT crashes).
- Across all nodes in all the trees, how much does this variable decrease node impurities, averaged over all trees?



Slide 16

Waze Data: Jams and Crash Sequence Analysis



April, 2017 MD
WazeUniqueCounts

Type	
ACCIDENT	15,139
HAZARD	242,787
JAM	180,347
ROAD_CLOSED	1,130

Potential Applications

- Incident Duration
- Clearance Times
- Secondary Crashes

Rural Speed Pilot Project
Paul Teicher, Office of the Under Secretary for Policy

U.S. Department of Transportation
Office of the Under Secretary

Rural Speed Pilot Project

Paul Teicher, OST
June 14th, 2018

Speeding is a Major Problem in Roadway Safety

- 10,111 speeding-related fatalities in 2016
- 27% of all traffic fatalities involve speeding
- Around half of all speed-related fatalities are on rural roads
- Speeding increases the likelihood of a crash, and increases its severity

Source: FHWA Website

U.S. Department of Transportation
Office of the Under Secretary
2

Project Goal - Find Patterns of Risk Using Speed Data

- Find heightened risk in traffic speed patterns to inform policy and decision making
- Dream deliverable: provide a tool to identify speed risk at the roadway segment level for State and local governments to use
- Identify where to invest in engineering, education, and/or enforcement to reduce speeding

U.S. Department of Transportation
Office of the Under Secretary
3

Probe Data Provides a New Opportunity to Better Understand Speed Safety Risk

- NPMRDS = National Performance Management Research Data Set, which is purchased by the Federal Highway Administration
- Anonymized data from GPS-enabled devices that gets average traffic speeds along the National Highway System every few minutes
- Purchased for measuring highway congestion

Source: FHWA Website

U.S. Department of Transportation
Office of the Under Secretary
4

Rural Speed Pilot Details

- Integrate crash data, roadway attributes, traffic volumes, and speed information
- Connect crashes to the traffic speeds on the roadway using time, and determine crash rates at the segment level
- New twist to prior research: NPMRDS data
- North Carolina, Ohio, and Washington State case studies
- Quantify the effects the speed differential (travel speed versus posted speed limit) and speed variation over time have on outcomes

U.S. Department of Transportation
Office of the Under Secretary

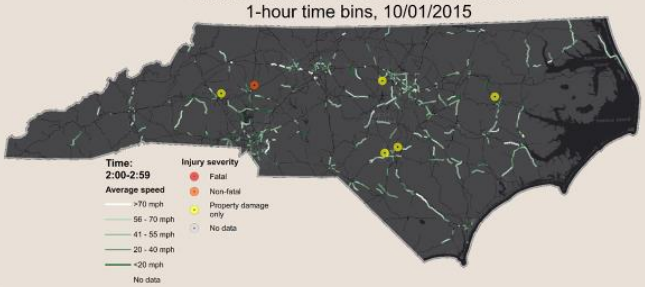
5

North Carolina NPMRDS and Crash Data,
1-hour time bins, 10/01/2015

U.S. Department of Transportation
Office of the Under Secretary

6

North Carolina NPMRDS and Crash Data,
1-hour time bins, 10/01/2015



U.S. Department of Transportation
Office of the Under Secretary

7

The Pilot Continues

- First iteration completed
- Very preliminary results show correlations between speed and crash rates
- Second iteration continues

U.S. Department of Transportation
Office of the Under Secretary

8

Fatality Analysis Reporting System (FARS) Visualization

Rajesh Subramanian, NHTSA

3

FARS Data

Fatality Analysis Reporting System

Census of all Police-reported traffic crashes in the U.S. That resulted in fatality

Available from 1975 to 2016

Hundreds of data elements coded from multiple data sources

4

NHTSA's Traffic Safety Fact Sheets

Fact Sheets contain statistics, charts and trends on high-interest areas

Sixteen fact sheets in various topics of safety

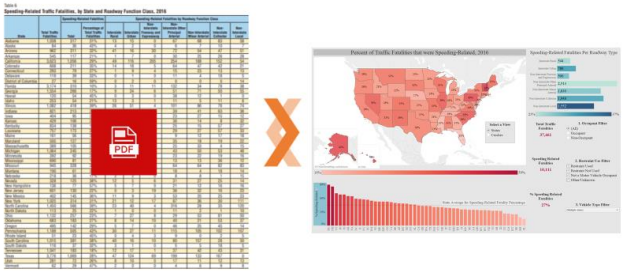
Updated annually with yearly FARS data releases

Current versions incorporate inter-departmental review team findings

5

Project Overview

Extend pdf tables in NHTSA Traffic Safety Fact Sheets to interactive dashboards and visualizations



7

Why Visualize?

- Allows for unique insights through spatial explorations
  - State county level maps
  - Crash location maps
- Insights through interactions
  - Facilitates interactions with other FARS attributes
- Interactive Dashboards
  - Refresh information for any context
  - Update other visuals for that context

8

Current and Next Steps in Visualization

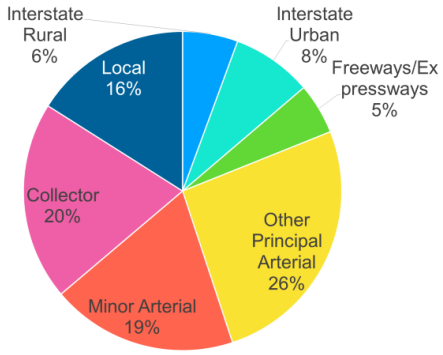
- Speeding Fact Sheet chosen as first topic
- Regional insights into speeding
- Interactions with other information
- Maps / Chart based visuals

- Deployment for public access
- Expand to other safety topic areas
- Continue to provide innovative visualizations

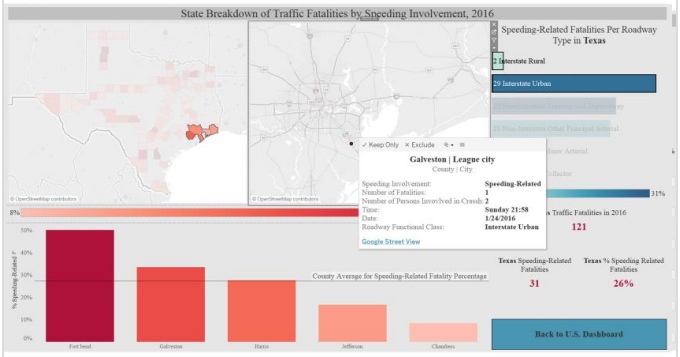
10

Fatalities in Speeding-Related Crashes

10,111 fatalities (27% of all fatalities)



Source: 2016 FARS



11

THANK YOU

12

The Effects of Roadway and Built Environment Characteristics on Pedestrian Fatality Risk: A National Assessment at the Neighborhood Scale

Ted Mansfield, PhD, Office of the Under Secretary for Policy

U.S. Department of Transportation
Office of the Under Secretary

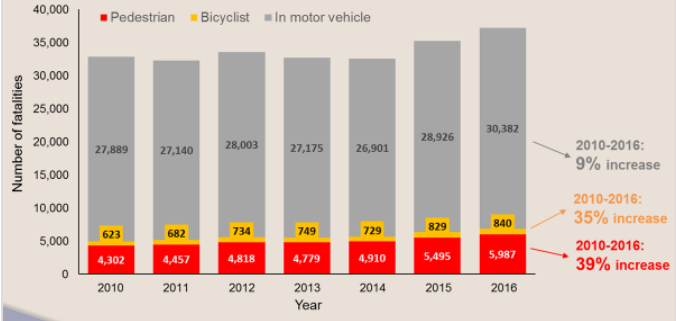
The effects of roadway and built environment characteristics on pedestrian fatality risk: a national assessment at the neighborhood scale

Office of the Assistant Secretary of Transportation for Policy

Office of Policy Development, Strategic Planning, and Performance

Theodore Mansfield, PhD
Oak Ridge Institute for Science and Education

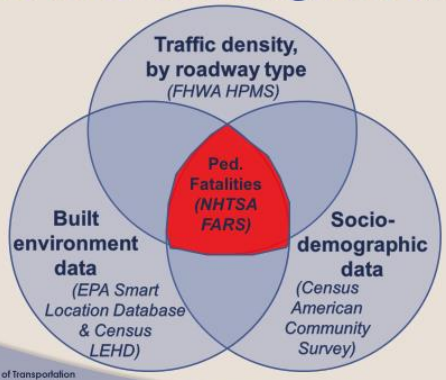
Increases in pedestrian fatalities outpace other modes



U.S. Department of Transportation
Office of the Under Secretary

2

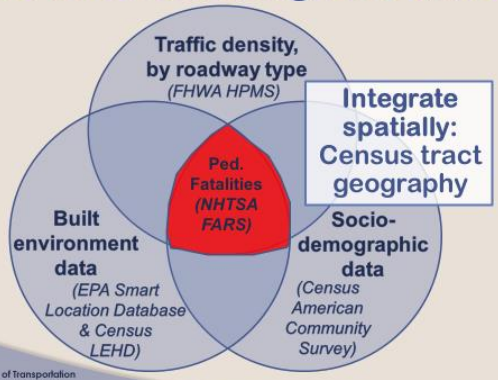
Leveraging diverse data sources tells us different things about risk



U.S. Department of Transportation
Office of the Under Secretary

3

Leveraging diverse data sources tells us different things about risk



U.S. Department of Transportation
Office of the Under Secretary

4

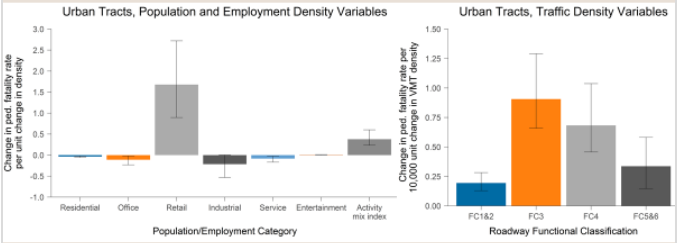
Data integration enables powerful analysis

- **Methods:** Zero-inflated negative binomial mixed effects regression models w/ random parameters
  - Offset: average daily population *(exposure proxy)*
  - Separate urban & rural models
- **Outcome:** pedestrian fatality count, 2012-2016
- **Explanatory variables** *(averaged, 2012-2016)*:
  - Traffic density, by functional class
  - Built environment (density, diversity, and design)
  - Sociodemographic factors

U.S. Department of Transportation
Office of the Under Secretary

5

Built environment, traffic density variables have significant effects

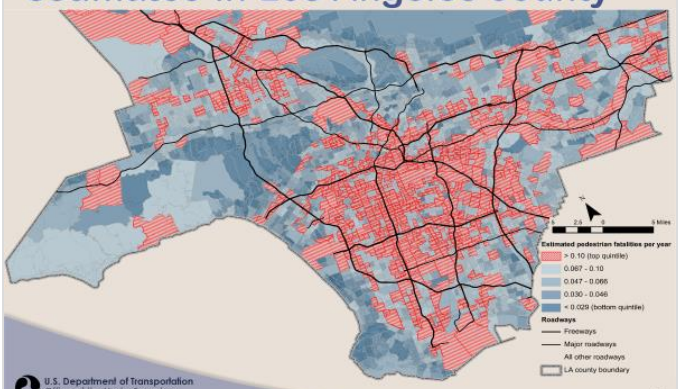


FC1 & FC2: Interstates, expressways, and other freeways
FC3: Non-access controlled principle arterials
FC4: Minor arterials
FC5: Major collectors
FC6: Minor collectors

U.S. Department of Transportation
Office of the Under Secretary

6

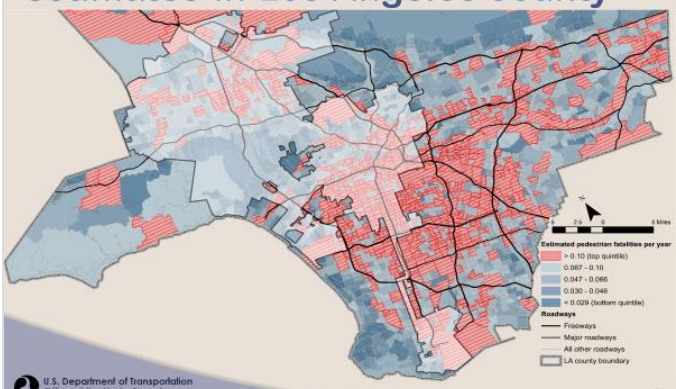
Case study application: model estimates in Los Angeles county



U.S. Department of Transportation
Office of the Under Secretary

7

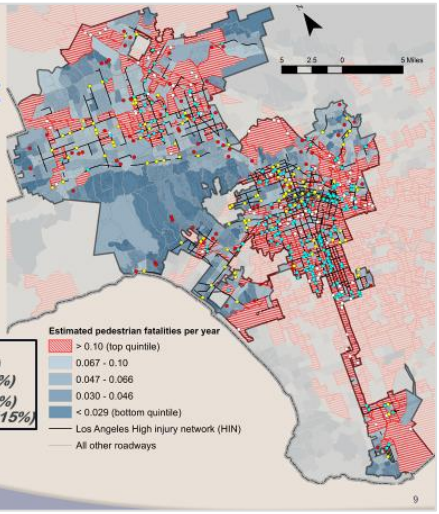
Case study application: model estimates in Los Angeles county



U.S. Department of Transportation
Office of the Under Secretary

8

Case study application: comparison to City of Los Angeles high-injury network



U.S. Department of Transportation
Office of the Under Secretary

9

Data integration can inform data-driven policy

- Prospective, risk-based framework supports systemic safety approaches
- Supports estimations of how built environment changes may affect risk
- Identifies high-risk neighborhoods; does not identify appropriate interventions

U.S. Department of Transportation
Office of the Under Secretary

10

Data integration can be challenging

- State-to-state differences can impact scalability of data transformations
- Some data are unavailable nationally
  - Robust measure of pedestrian exposure
  - Pedestrian injury data
  - Some roadway features (e.g., sidewalks)

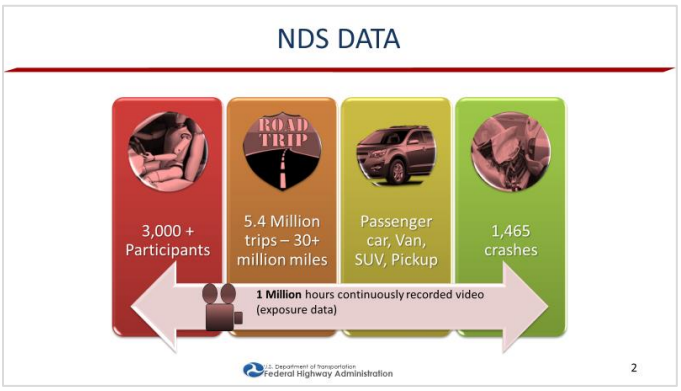
U.S. Department of Transportation
Office of the Under Secretary

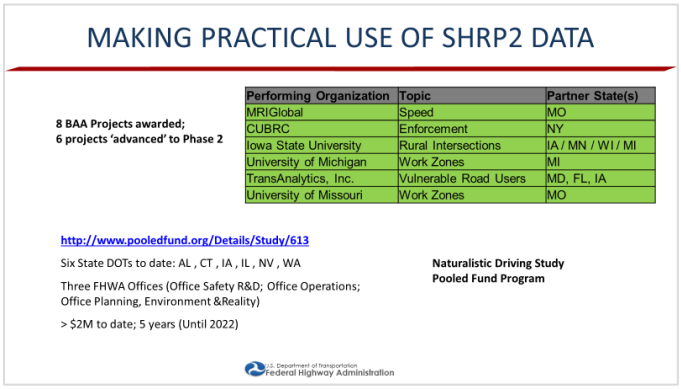
11

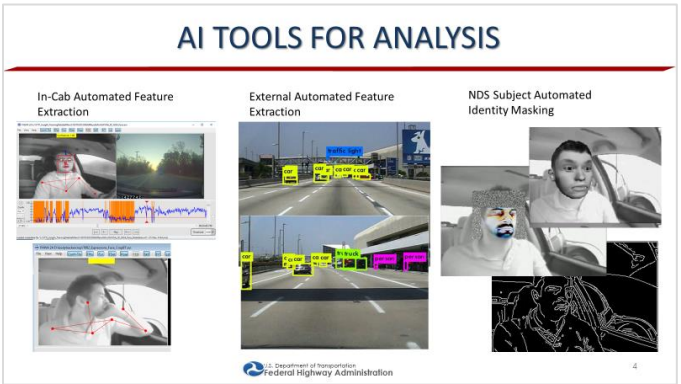
Lightning Talks

SHRP2 Naturalistic Driving Study: Safety Countermeasures from Big Data

James Pol, PE, PMP, Federal Highway Administration (FHWA)

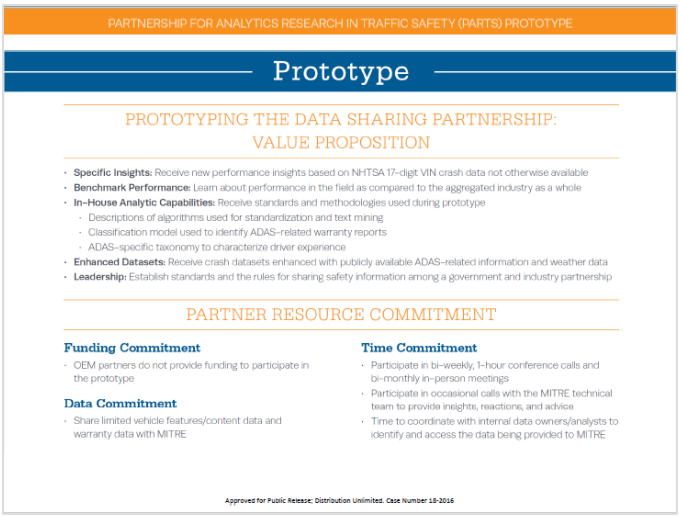


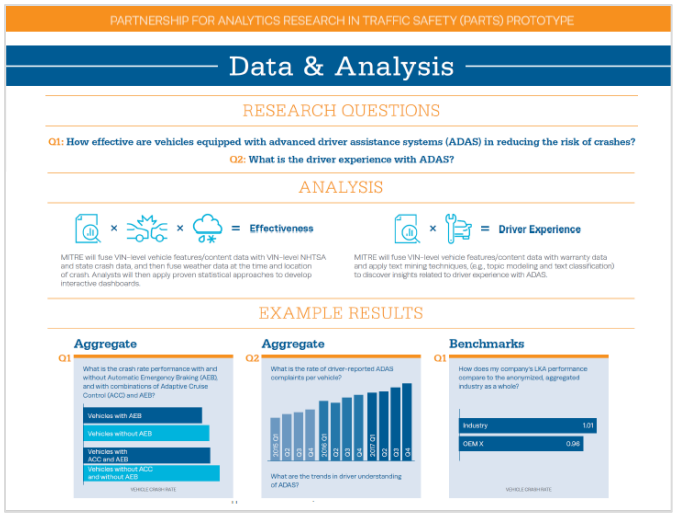


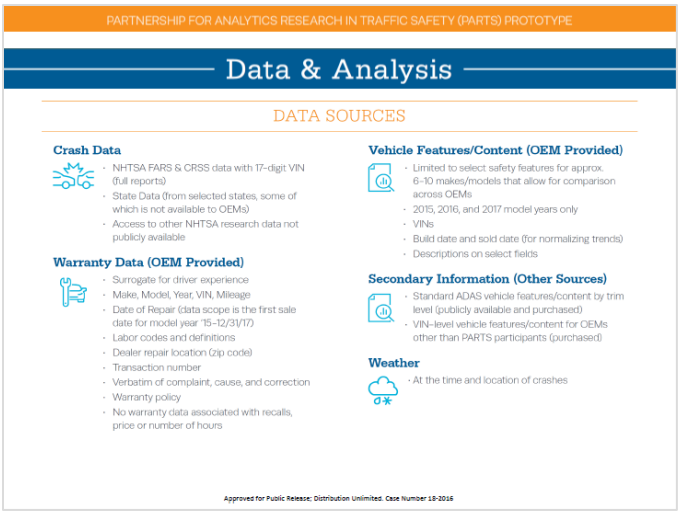


Partnership for Analytics Research in Traffic Safety (PARTS) Prototype

Cheryl Croft, MITRE Corporation

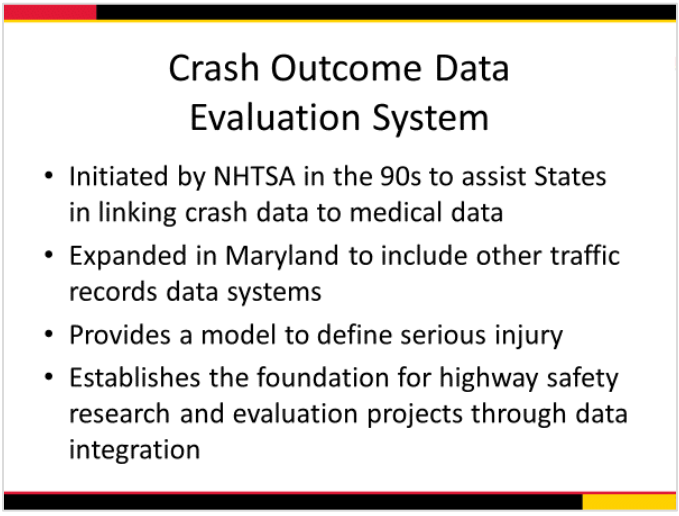


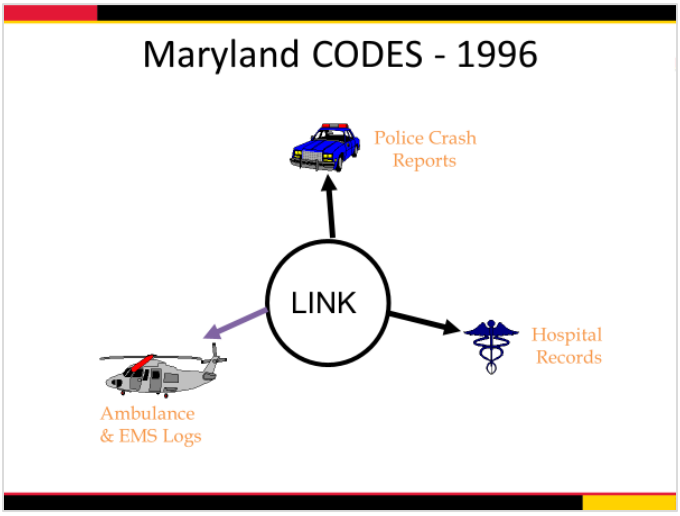


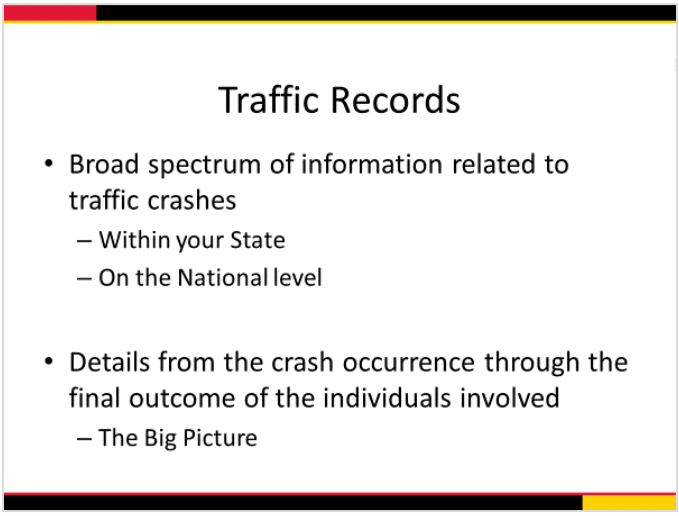


Integration of Traffic Records Data in Maryland

Timothy Kerns, PhD, University of Maryland School of Medicine

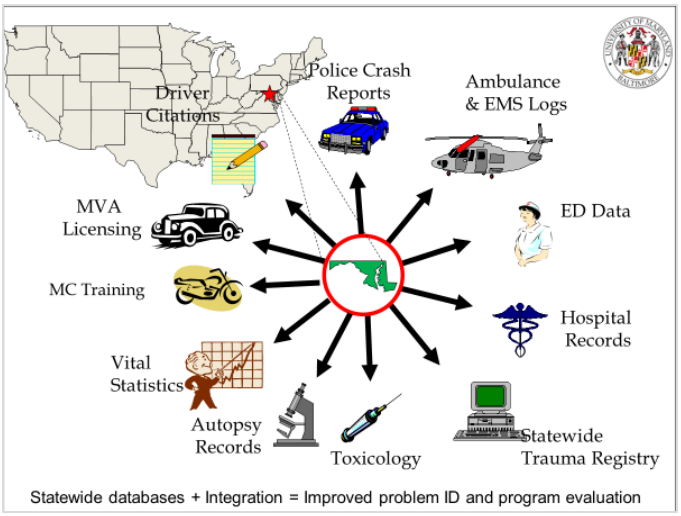






Why are they important?

- Quality data from all six component systems may be used together to:
  - Identify problems
    - Further identify countermeasures
    - Garner support for legislative changes
    - Initiate engineering (vehicle & environment) changes
  - Evaluate programs
    - Identify best practices
    - Discontinue ineffective/costly programs



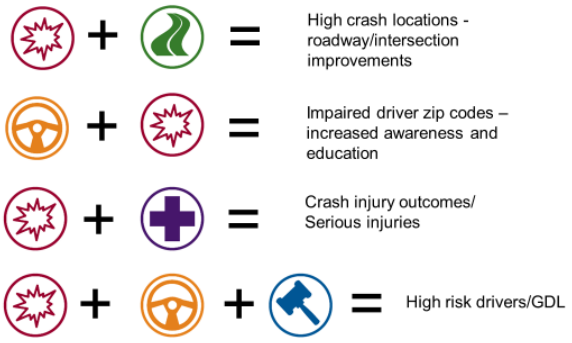
Statewide databases + Integration = Improved problem ID and program evaluation

Haddon Matrix Applied to the Problem of Motor Vehicle Crashes

Phases	Factors			
	Host	**Agent/ Vehicle**	**Physical Environment**	**Social Environment**
Pre-event *(Before the crash occurs)*	• Driver vision • Alcohol impairment • Driver experience/ability Driver data Citation data	• Maintenance of brakes, tires • Speed of travel • Load characteristics Vehicle data	• Adequate roadway markings • Divided highways • Roadway lighting • Hazardous intersections • Road curvature • Adequate roadway shoulders Roadway data	• Public attitudes on drinking and driving • Impaired driving laws • Graduated licensing laws • Speed limits • Support for injury prevention efforts
Event *(During the crash)*	• Spread out energy in time and space with seat belt and/or airbag use • Child restraint use Crash data	• Vehicle size • Crashworthiness of vehicle—"crush space", integrity of passenger compartment, overall safety rating • Padded dashboards, steering wheels, etc. Vehicle data	• Guard rails, median barriers • Presence of fixed objects near roadway • Roadside embankments Roadway data	• Adequate seat belt and child restraint laws • Enforcement of occupant restraint laws • Motorcycle helmet laws
Post-event *(After the crash)*	• Crash victim's general health status • Age of victims Citation data EMS/Injury data	• Gas tanks designed to maintain integrity during a crash to minimize fires	• Availability of effective EMS systems • Distance to quality trauma care • Rehabilitation programs in place EMS/Injury data	• Public support for trauma care and rehabilitation • EMS training

Source: Injury Prevention: Meeting the Challenge, AJPM, 1989; Christoffel T, Gallagher S. Injury Prevention and Public Health, Gaithersburg, MD, 1999.

Integration



Contact information

- Tim Kerns
  - tkerns@som.umaryland.edu

Safety Data Integration and Uses in Tennessee
Patrick Dolan, Tennessee Highway Patrol

Safety Data Integration and Uses in Tennessee

USDOT Safety Data Forum
June 14, 2018
Washington, D.C.

TN Department of Safety & Homeland Security

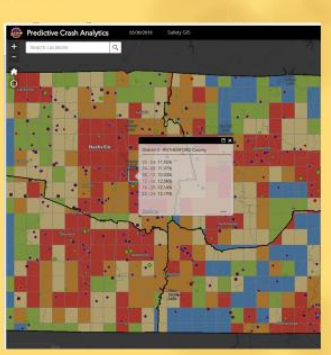
TENNESSEE INTEGRATED TRAFFIC ANALYSIS NETWORK
TITAN

Current Efforts

- Predictive Analytics
  - Crash
  - Impaired Driving
  - Commercial Vehicle
- Data Integration
  - Roadway
  - Health

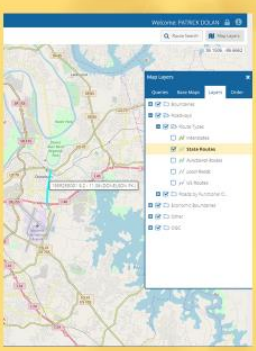
Predictive Analytics

- Law Enforcement Resource Allocation Tool
  - Targeted enforcement at the right places and times



Data Integration

- Crash/Roadway Integration
  - Crash data into TRIMS
  - LRS data into TITAN
- Support TDOT roadway improvement research
- Additional location identifiers and roadway data elements in TITAN

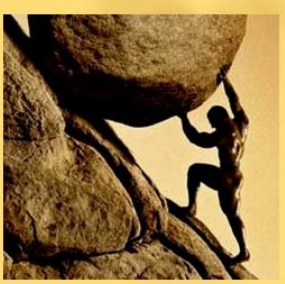


Data Integration

- Crash/Health Integration
  - New initiative
- Understand the true severity of crash related injuries
- Provide better information to policy makers and the public

Challenges

- Predictive Analytics
  - Retain skilled employees
  - User buy in
- Data Integration
  - Data quality
  - Legal requirements
  - Cooperation among data custodians



Results

- Predictive Analytics
  - Steadily decreasing fatality rate
  - Decrease THP response times by 33%
- Data Integration
  - Improved data quality
  - Better location based analysis of crash data

Patrick Dolan
Statistics Office Manger
Tennessee Highway Patrol
615-743-4993
patrick.dolan@tn.gov

Vision Zero in San Francisco: Leading with Data to Save Lives and Advance Equity
Megan Wier, MPH, San Francisco Department of Public Health

VISION ZERO SF

Through Vision Zero SF we commit to working together to prioritize street safety and eliminate traffic deaths in San Francisco.

VISION ZERO IN SAN FRANCISCO: LEADING WITH DATA TO SAVE LIVES AND ADVANCE EQUITY

POPULATION HEALTH DIVISION
SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH

June 14, 2018
US DOT Safety Data Forum

Megan Wier, San Francisco Dept. of Public Health

TRAFFIC INJURY IN SAN FRANCISCO: A PUBLIC HEALTH PROBLEM

~30 Fatalities per year

~500 People hospitalized with severe injuries annually in our public hospital

$35M in medical costs *alone* per year

Every 17 hours City Trauma Surgeons respond to a serious traffic injury

~50% of patients At Zuckerberg San Francisco General's Trauma Center are treated for *transportation-related injury*

VISIONZEROSF

DATA IS ESSENTIAL TO ADVANCING CORE VISION ZERO PRINCIPLES

Core Principles

Prevention
Saving Lives
Equity
Safe Streets
Safe People and Safe Vehicles
Speed

VISIONZEROSF

DATA-DRIVEN INITIATIVES REQUIRE MORE COMPREHENSIVE INJURY ASSESSMENT

Standard Practice: Police Reported Injury Collisions

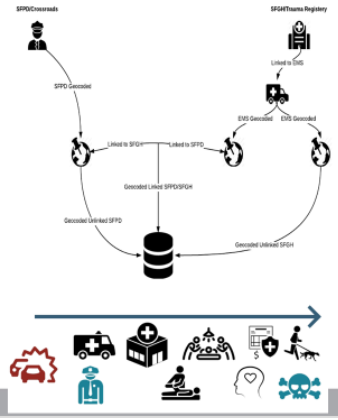
- Detailed data about **crash characteristics, cause**
- **Very limited data** on **injury severity**
- ***Underreporting of injuries***
  - ***~20% underreporting*** of pedestrian injuries (Sciortino et al 2005); ***African Americans less likely in police records***
  - ***~25% underreporting*** of cyclist injuries (Lopez et al 2012)

Unintentional Injury: Hospital Medical Records

- **Improved injury severity assessment** and **detailed health outcome data**
- Comorbidities (**mental illness, hypertension, etc.**)
- **Disability** status
- Demographics (**race/ethnicity, insurance type**)
- **Homelessness**
- ***Limited data on cause, injury location***

VISIONZEROSF

SFDPH LINKED THREE YEARS OF HOSPITAL, EMS AND POLICE DATA FOR VZSF INITIATIVES

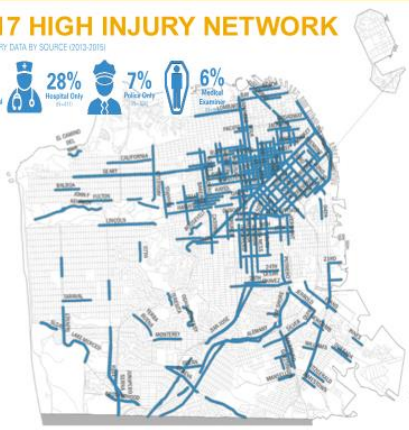


VISIONZEROSF

2017 HIGH INJURY NETWORK

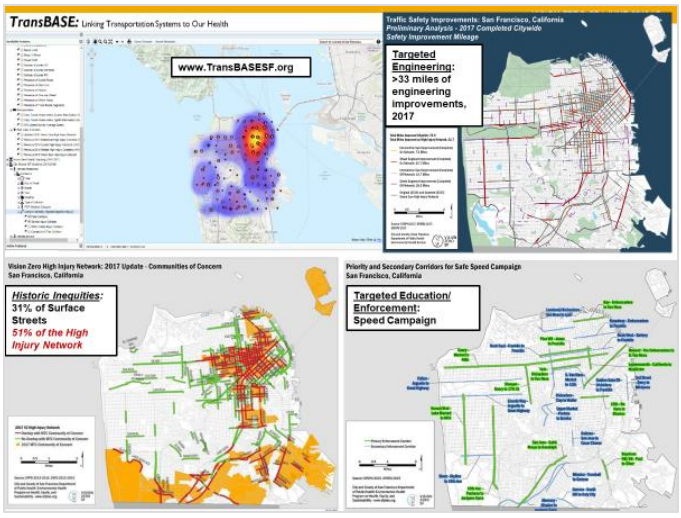
SEVERE AND FATAL INJURY DATA BY SOURCE (2013-2015)

59% Linked Police and Hospital
28% Hospital Only
7% Police Only
6% Medical Examiner

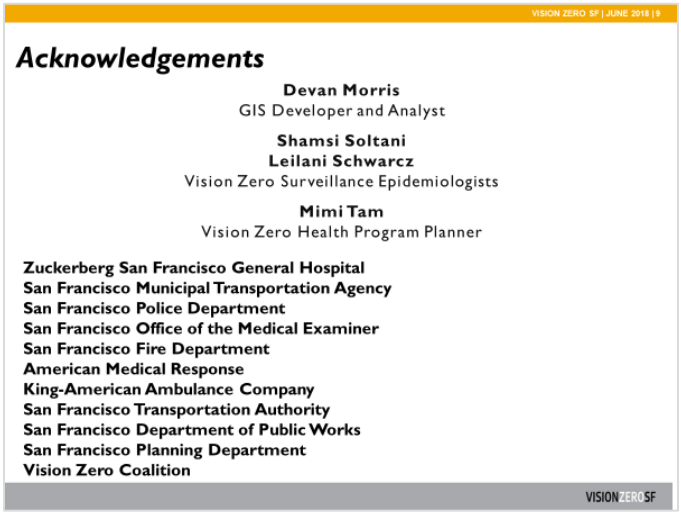


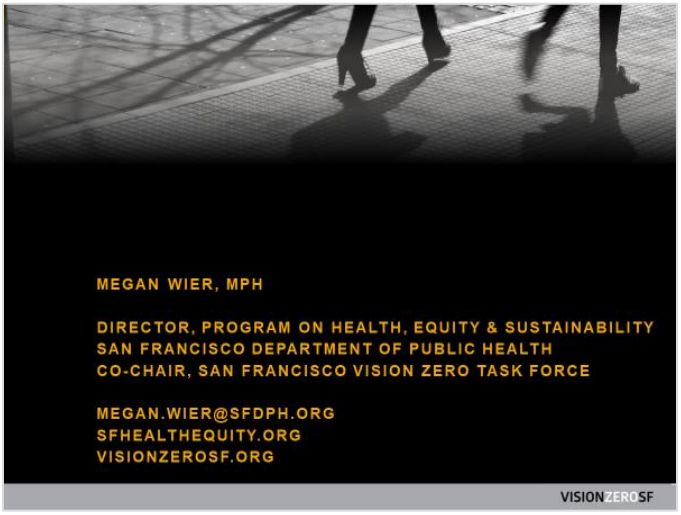
13% of the city's street miles
75% of all severe and fatal injuries
77% of pedestrian severe and fatal injuries
71% of cyclist severe and fatal injuries
75% of vehicle severe and fatal injuries
61% of all transportation-related injuries

N = 1,494 severe and fatal transportation-related injuries.
SFPD = San Francisco Police Department collision reports, 2013-2015.
ZSFG = Zuckerberg San Francisco General Hospital data linked to Emergency Medical Services data, 2013-2015.


TransBASE: Linking Transportation Systems to Our Health
www.TransBASESF.org
Traffic Safety Improvements: San Francisco, California
Preliminary Analysis - 2017 Completed Citywide
Safety Improvement Mileage
Targeted Engineering: >33 miles of engineering improvements, 2017
Vision Zero High Injury Network: 2017 Update - Communities of Concern
San Francisco, California
Historic Inequities: 31% of Surface Streets 51% of the High Injury Network
Priority and Secondary Corridors for Safe Speed Campaign
San Francisco, California
Targeted Education/ Enforcement: Speed Campaign


VISION ZERO SF | JUNE 2018 | 8
DATA: ESSENTIAL - BUT NOT SUFFICIENT
POLITICAL WILL
Data/Tools/Evidence
Stakeholders
Policy Target


VISION ZERO SF | JUNE 2018 | 9
Acknowledgements
Devan Morris
GIS Developer and Analyst
Shamsi Soltani
Leilani Schwarcz
Vision Zero Surveillance Epidemiologists
Mimi Tam
Vision Zero Health Program Planner
Zuckerberg San Francisco General Hospital
San Francisco Municipal Transportation Agency
San Francisco Police Department
San Francisco Office of the Medical Examiner
San Francisco Fire Department
American Medical Response
King-American Ambulance Company
San Francisco Transportation Authority
San Francisco Department of Public Works
San Francisco Planning Department
Vision Zero Coalition
VISIONZEROSF


MEGAN WIER, MPH
DIRECTOR, PROGRAM ON HEALTH, EQUITY & SUSTAINABILITY
SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH
CO-CHAIR, SAN FRANCISCO VISION ZERO TASK FORCE
MEGAN.WIER@SFDPH.ORG
SFHEALTHEQUITY.ORG
VISIONZEROSF.ORG
VISIONZEROSF

Analyzing Crash Data to Reduce Fatalities and Serious Injury Crashes

Cory Hutchinson, PhD, Louisiana State University Highway Safety Research Group

HIGHWAY SAFETY RESEARCH GROUP

Analyzing Crash Data to Reduce Fatalities and Serious Injury Crashes

LSU E.J. Ourso College of Business

HSRG hsrg.lsu.edu

LSU HIGHWAY SAFETY RESEARCH GROUP HSRG

Strategic Highway Safety Plan

The **Strategic Highway Safety Plan (SHSP)** is a comprehensive, multidisciplinary approach to reducing the devastating effects of motor vehicle-related fatalities and injuries on Louisiana roadways.

The Louisiana **SHSP** is based on Data Driven approaches to reduce fatalities/serious injuries.

Crash data is collected by the HSRG, integrated with other systems, and stored in a data warehouse. Tableau dashboards are used to make the data more accessible, visual, and informative for decision makers.

LSU HIGHWAY SAFETY RESEARCH GROUP HSRG

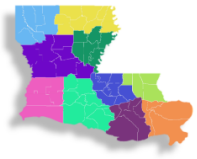
Louisiana Regional Safety Coalitions

9 Regional Safety Coalitions across the state

Involve Numerous Agencies

Address local needs and concerns

Facilitate the development of action plans



Use the procedures of the LA SHSP to identify problems and produce countermeasures

---

LSU HIGHWAY SAFETY RESEARCH GROUP HSRG

Louisiana Regional Safety Coalition Data

To accommodate each Safety Coalition, HSRG produces Tableau dashboards consisting of 3 Levels

Level 1
What **are our problem areas?**

Level 2
How **do we set a goal?**

Level 3
Where and Who **do we address?**

LSU HIGHWAY SAFETY RESEARCH GROUP HSRG

Level 1 – Identify Problem Areas

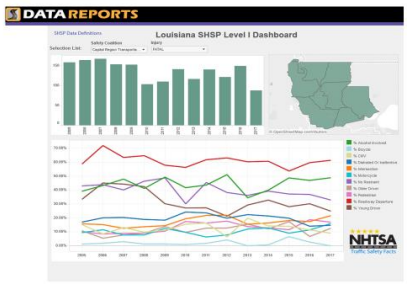
What are the major reasons people are dying or being seriously inured?

We used Tableau to build a dashboard displaying trends and ranking the different emphasis areas.

http://datareports.lsu.edu/SHSPLevel1.aspx

LSU HIGHWAY SAFETY RESEARCH GROUP HSRG

Level 1 – Identify Problem Areas



Capital Region fatal data

Target Areas:

Roadway Departures
Alcohol Involved
No Restraint
Young Driver

HIGHWAY SAFETY RESEARCH GROUP

Level 2 – Setting Target Measures

How much of a reduction can we expect to achieve?

What are our actual numbers?

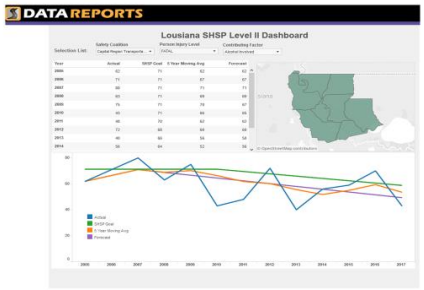
How does our target numbers compare to actual numbers and our SHSP Goal numbers?

We used Tableau to build a dashboard displaying trends in actual, SHSP Goal, 5 Year Moving Average, and Forecasted numbers.

http://datareports.lsu.edu/SHSPLevel2.aspx

HIGHWAY SAFETY RESEARCH GROUP

Level 2 – Setting Target Measures



Capital Region fatal alcohol data

Below SHSP goal for alcohol fatalities

HIGHWAY SAFETY RESEARCH GROUP

Level 3 – Addressing Identified Problems

Where and when are fatal and serious crashes occurring?

What are the characteristics of people dying and being seriously injured?

Create counter measures.

Track progress over time.

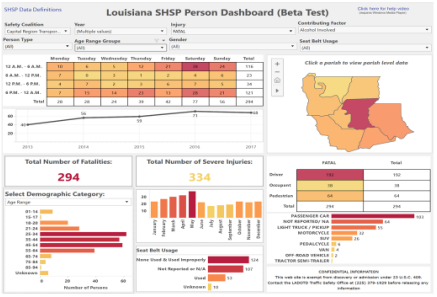
We used Tableau to build a

Crash dashboard http://datareports.lsu.edu/SHSPCrash.aspx

Person dashboard http://datareports.lsu.edu/SHSPPerson.aspx

HIGHWAY SAFETY RESEARCH GROUP

Level 3 – Person



Capital Region people killed in an alcohol crash

HIGHWAY SAFETY RESEARCH GROUP

Benefits of SHSP Dashboards

Data is easily accessible to end users

Data is displayed in a visually appearing manner versus traditional spreadsheets

Moving from layout/form lead to data/discovery lead

Dashboards are interactive

Decision makers can make more informed data driven decisions and implement effective counter measures

http://crashdata.lsu.edu/SHSPCrash.aspx

HIGHWAY SAFETY RESEARCH GROUP

Next Steps – Network Screening