U.S. Department of Transportation

Office of the Under Secretary for Policy

Safety Data Forum

June 14, 2018
Summary Report
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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. 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.

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/
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

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

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Debra Alvarez</td>
<td>Senior Legislative Representative</td>
<td>AARP</td>
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<tr>
<td>Andrew Avery</td>
<td>Public Works Commissioner</td>
<td>Chemung County, New York / National Association of Corrosion Engineers</td>
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<td>Linda Bailey</td>
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<td>National Association of City Transportation Officials</td>
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<td>Matt Barrett</td>
<td>Federal Account Manager</td>
<td>Qlik</td>
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<td>Timothy Black</td>
<td>Data Analyst, Vision Zero Division</td>
<td>Los Angeles Department of Transportation</td>
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<tr>
<td>Mike Boland</td>
<td>Embedded Analyst</td>
<td>Palantir</td>
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<tr>
<td>Alec Chalmers</td>
<td>Director, Public Sector Industries</td>
<td>Amazon Web Services</td>
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<td>Ivan Cheung</td>
<td>Transportation Research Analyst</td>
<td>National Transportation Safety Board</td>
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<td>Jessica Cicchino</td>
<td>Vice President, Research</td>
<td>Insurance Institute for Highway Safety</td>
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<td>Gregory Ciparelli</td>
<td>Transportation Planner</td>
<td>Connecticut Department of Transportation</td>
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<tr>
<td>Wyatt Cmar</td>
<td>Researcher / Writer</td>
<td>Harvard Kennedy School</td>
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<tr>
<td>Larry Cook</td>
<td>Professor</td>
<td>University of Utah</td>
</tr>
<tr>
<td>Cheryl Croft</td>
<td>Director</td>
<td>The MITRE Corporation</td>
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<tr>
<td>Tim Czapp</td>
<td>Compliance and Safety</td>
<td>Fiat Chrysler</td>
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<tr>
<td>Patrick Dolan</td>
<td>Statistical Research Manager</td>
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<td>Michael Donofrio</td>
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<td>Kim Eccles</td>
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<td>VHB (Vanasse Hangen Brustlin, Inc.)</td>
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<td>Garrett Eucalitto</td>
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<td>National Governors Association</td>
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<td>Bob Fox</td>
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<td>Shane Glass</td>
<td>Public Dataset Program Manager</td>
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<td>J.T. Griffin</td>
<td>Chief Government Affairs Officer</td>
<td>Mothers Against Drunk Driving</td>
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<td>Loren Groff</td>
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<td>Katy Hartnett</td>
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<td>Juliet Hirni</td>
<td>Director, Southeast</td>
<td>StreetLight Data</td>
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<td>Cory Hutchinson</td>
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<td>Russ Klaus</td>
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<td>Shoshana Lew</td>
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<td>Rachel Sturm</td>
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<td>Rob Viola</td>
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<td>Carol Wright</td>
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<td>Easterseals, Inc.</td>
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# Appendix D: Safety Data Forum USDOT Participants

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<tr>
<th>Name</th>
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<tr>
<td>Elizabeth Alicandri</td>
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<td>Federal Highway Administration</td>
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<td>Chief, Analysis Division</td>
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<td>Chou-Lin Chen</td>
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<tr>
<td>Chip Chidester</td>
<td>Director, Office of Data Acquisitions</td>
<td>National Highway Traffic Safety Administration</td>
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<td>Kara Fischer</td>
<td>Senior Attorney</td>
<td>National Highway Traffic Safety Administration</td>
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<tr>
<td>Dan Flynn</td>
<td>Environmental Biologist</td>
<td>Volpe National Transportation Systems Center</td>
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<td>Michael Griffith</td>
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<td>Jed Hanson</td>
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<td>Patricia Hu</td>
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<td>Derek Kan</td>
<td>Under Secretary of Transportation for Policy</td>
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<td>Brian Kim</td>
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<td>Heidi King</td>
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<td>Aloha Ley</td>
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<td>Jasmy Methipara</td>
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<td>Tina Morgan</td>
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<td>Jordan Riddle</td>
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<td>Terry Shelton</td>
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<td>Renee Sigel</td>
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<td>Jake Streeter</td>
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<td>Ed Strocko</td>
<td>Director, Spatial Analysis and Visualization</td>
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<td>Raj Subramanian</td>
<td>Mathematical Statistician</td>
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<td>Paul Teicher</td>
<td>Transportation Safety Analyst</td>
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<td>Alicia Wilson</td>
<td>Senior Attorney</td>
<td>Office of General Counsel</td>
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<tr>
<td>David Winter</td>
<td>Director, Office of Highway Policy Information</td>
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Appendix E: Presentations

U.S. Department of Transportation Safety Data Initiative Projects

Estimating Traffic Crash Counts Using Crowdsourced Data
Dan Flynn, PhD, Volpe National Transportation Systems Center

Challenge: Tracking crashes in near real-time
- Crash data are typically available for certain crashes, after several months
- EDT (Electronic Data Transfer) of police accident reports available nightly for nine states
- Waze incident data available where user reported, all 50 states, every 2 minutes
- Waze and EDT could provide near-real time, granular estimates of crashes to inform safety policy and operations

Analysis: Challenges and Solutions

Challenges
- Waze and EDT coordinates do not all align with FHWA road network
- How do we associate Waze events and EDT reports?
- Need to define zeros (time and places with no accidents)

Solutions
- Spatial aggregation of data to hexagonal grids (1 mile area)
- Match Waze to EDT on user-selected buffers in space and time
- Define zeros as grid cells and time periods with 1 or more non-accident Waze events but no EDT reports

Safety Data Initiative: Waze Pilot Project Overview

Objectives
- Use crowdsourced data insights to improve transportation safety

Questions
- Can we integrate DOT data resources at large scales?
- Do Waze data support vision of a rapid crash indicator?

Model Performance (April-Sept 2017 in MD)

Model estimates highly accurate overall; miss some precise patterns

Results – what have we learned?

Can we integrate DOT data resources at large scales?
- YES – Our data integration and analysis pipeline can support rapid crash estimates (when/where Waze signal present)
- Successfully integrated transportation data that are not originally intended to track traffic safety

Do Waze data support rapid crash indicator?
- YES – With Waze signal, models produce good overall estimates for MD (next test performance for other EDT states)
- Foundation for tool for rapid tracking of traffic safety trajectories

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

**Statistical Approach: Supervised Classification**

**Random Forests**

- Machine learning approach which minimizes overfitting
- Trained models on 70% of data using EDT reports in 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

**SDI Waze Data Pipeline Development**

**Waze Data: Distribution in Space and Time**

Six months of geolocated Waze data for Maryland (April - September, 2017)

**SDI Waze Data Pipeline Development**

1. **SDC**
   - 3. Grid and Urban Area Overlay
   - 4. Grid Aggregation
   - 5. Weather Overlay

2. **AIA**
   - 6. Modeling
   - 7. Visualization and Reporting

**Additional Slides**
Evaluating Model Performance

Divide data into training and testing subsets
- Training: Select 70% of observations (random by rows, within 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

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?

Waze Data: Jams and Crash Sequence Analysis

April, 2017 MD Waze/MDCrashCounts

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Potential Applications:
- Incident Duration
- Clearance Times
- Secondary Crashes
Rural Speed Pilot Project
Paul Teicher, Office of the Under Secretary for Policy

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 speeding-related fatalities are on rural roads
- Speeding increases the likelihood of a crash, and increases its severity

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

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
Rural Speed Pilot Details

- Integrate crash data, roadway attributes, traffic volumes, and speed information
- Connect crashes to 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

The Pilot Continues

- First iteration completed
- Very preliminary results show correlations between speed and crash rates
- Second iteration continues
Fatality Analysis Reporting System (FARS) Visualization
Rajesh Subramanian, NHTSA

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

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

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

Why Visualize?
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

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

Fatalities in Speeding-Related Crashes

10,111 fatalities (27% of all fatalities)

![Pie chart showing distribution of fatalities by location](source: 2016 FARS)

THANK YOU
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

Leveraging diverse data sources tells us different things about risk

Traffic density, by roadway type (FHWA HPMS)
Built environment data (EPA Smart Location Database & Census LHDR)
Sociodemographic data (Census American Community Survey)
Ped. Fatalities (NHTSA FARS)

Integrate spatially: Census tract geography

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

Increases in pedestrian fatalities outpace other modes

2010-2016: 9% increase
2010-2016: 35% increase
2010-2016: 30% increase

Built environment, traffic density variables have significant effects

Urban Tracts, Population and Employment Density Variables
Urban Tracts, Traffic Density Variables

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

**SHRP2 Naturalistic Driving Study: Safety Countermeasures from Big Data**

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

June 14, 2018

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### MAKING PRACTICAL USE OF SHRP2 DATA

<table>
<thead>
<tr>
<th>Performance Organization</th>
<th>Topic</th>
<th>Partner State(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRIGlobal</td>
<td>Speed</td>
<td>MO</td>
</tr>
<tr>
<td>RTI</td>
<td>Safety Enforcement</td>
<td>NY</td>
</tr>
<tr>
<td>Iowa State University</td>
<td>Rural Intersections</td>
<td>IA, IL, WI, MI</td>
</tr>
<tr>
<td>University of Michigan</td>
<td>Work Zones</td>
<td>IN</td>
</tr>
<tr>
<td>TransporTech, Inc.</td>
<td>Manufacturer Road Users</td>
<td>MD, FL, IA</td>
</tr>
<tr>
<td>University of Missouri</td>
<td>Work Zones</td>
<td>MO</td>
</tr>
</tbody>
</table>

[http://www.shrp2stl.org/Details/Study24Li](http://www.shrp2stl.org/Details/Study24Li)

Six State DOTs to date: AL, CT, IA, IL, IN, WA

Three FHWA Offices (Road Safety & Office Operations, Office Planning, Environment & Policy)

> 360 to date; 5 years (Until 2022)

![NDS DATA](image)

- 3,000+ Participants
- 5.4 Million trips – 30+ million miles
- Passenger car, Van, SUV, Pickup
- 1,465 crashes

> 2 Million hours continuously recorded video exposure data

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### PARTNERSHIP FOR ANALYTICS RESEARCH IN TRAFFIC SAFETY (PARTS) Prototype

Cheryl Croft, MITRE Corporation

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**PARTNERSHIP FOR ANALYTICS RESEARCH IN TRAFFIC SAFETY (PARTS) PROTOTYPE**

**Vision**

**PARTS LONG-TERM VISION**

**WORKING TOGETHER FOR A SAFER TRAFFIC SYSTEM**

**Purpose**

- Create a robust, scalable, and sustainable data sharing partnership to support the Federal Highway Administration (FHWA) and industry partners in developing and deploying effective safety countermeasures using a data-driven approach.

**The Safety Systems Approach**

- Analyzes interactions and linkages across entire traffic systems to identify trends, risks, and opportunities.
  - Community: Facilitates a neutral forum for industry partners and FHWA to collaboratively discover new safety insights.
  - Quantitative Insights: Data-driven and focused on development of safety performance metrics, including crash, vehicle fleet, and traffic patterns, trends, and forecasts.
  - Process Framework: Integrates and supports use of MITRE’s Defense and Independence (D&I) framework, focusing on what works in a virtual and other industries, including industry leading practices in self-driving highly autonomous and proprietary data.

---

**PARTNER RESOURCES COMMITMENT**

**Funding Commitment**

- OEM partners do not provide funding to participate in the prototype

**Time Commitment**

- Participate in or attend 2-hour conference calls and 2-hour biannual meetings

**Data Commitment**

- Share limited access to raw/processed data and limited analysis with MITRE

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Approved for Public Release: Distribution Unlimited: Date: [12/20/2018]
Integration of Traffic Records Data in Maryland

Timothy Kerns, PhD, University of Maryland School of Medicine

Crash Outcome Data Evaluation System

- Initiated by NHTSA in the 90s to assist States in linking crash data to medical data
- Expanded in Maryland to include other traffic records data systems
- Provides a model to define serious injury
- Establishes the foundation for highway safety research and evaluation projects through data integration

Traffic Records

- Broad spectrum of information related to traffic crashes
  - Within your State
  - On the National level

- Details from the crash occurrence through the final outcome of the individuals involved
  - The Big Picture
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

---

### Hudson Matrix Applied to the Problem of Motor Vehicle Crashes

<table>
<thead>
<tr>
<th>Phases</th>
<th>Host</th>
<th>Agent: Vehicle</th>
<th>Factors</th>
<th>Physical Environment</th>
<th>Social Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-event (before the crash)</td>
<td>- Driver cortex&lt;br&gt;- Alcohol impairment&lt;br&gt;- Driver, e.g., fatigue</td>
<td>- Traffic volumes&lt;br&gt;- Speed control</td>
<td>- Influence of drugs, age, sex&lt;br&gt;- Lead intoxication</td>
<td>- Adequate roadway width&lt;br&gt;- Speed limits&lt;br&gt;- Roadside features&lt;br&gt;- Road use limits</td>
<td>- Public education on drinking and driving&lt;br&gt;- Improved lighting&lt;br&gt;- Enforced speed limits&lt;br&gt;- Improved air quality programs</td>
</tr>
<tr>
<td>Event (During the crash)</td>
<td>- Speed or energy of impact&lt;br&gt;- Alcohol, speed, rear-end&lt;br&gt;- Child restraint</td>
<td>- Vehicle type&lt;br&gt;- Crashworthiness</td>
<td>- Inattention to hazards—such as, speed, conspicuity, overall vehicle design&lt;br&gt;- Premature ejection&lt;br&gt;- Rear-end impact</td>
<td>- Adequate roadway width&lt;br&gt;- Speed limits&lt;br&gt;- Roadside features&lt;br&gt;- Road use limits</td>
<td>- Public education on drinking and driving&lt;br&gt;- Improved lighting&lt;br&gt;- Enforced speed limits&lt;br&gt;- Improved air quality programs</td>
</tr>
<tr>
<td>Post-event (After the crash)</td>
<td>- Crash victim's personal health status&lt;br&gt;- Age of victims</td>
<td>- Injury severity&lt;br&gt;- Post-crash level of functioning&lt;br&gt;- Rear-end impact</td>
<td>- Availability of effective EMS systems&lt;br&gt;- Driver's role in crash manifestation</td>
<td>- Adequate roadway width&lt;br&gt;- Speed limits&lt;br&gt;- Roadside features&lt;br&gt;- Road use limits&lt;br&gt;- EMS/injury data</td>
<td>- Public awareness of drunk or distracted&lt;br&gt;- EMS training&lt;br&gt;- Dry drunk training&lt;br&gt;</td>
</tr>
</tbody>
</table>


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### Integration

- High crash locations = roadway/intersection improvements
- Impaired driver zip codes = increased awareness and education
- Crash injury outcomes/Serious injuries = High risk drivers/GDL

---

Contact information

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  - 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.

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

Current Efforts

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

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

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

June 14, 2018
US DOT Safety Data Forum
Megan Wier, San Francisco Dept. of Public Health

DATA IS ESSENTIAL TO ADVANCING CORE VISION ZERO PRINCIPLES

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

TRAFFIC INJURY IN SAN FRANCISCO:
A PUBLIC HEALTH PROBLEM

~30
Fatals 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

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 [Jin et al. 2013]
  - African Americans less likely in police records
  - 25% underreporting of cyclist injuries [Jin et al. 2013]

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

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

2017 HIGH INJURY NETWORK

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

Devan Morris
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Mimi Tam
Vision Zero Health Program Planner

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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
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

Highway Safety Research 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.

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.

Level 1 – Identify Problem Areas

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

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

http://dataviz.cs.lsu.edu/DSPlaned/}

Level 1 – Identify Problem Areas

Capital Region fatal data

Target Areas:
- Roadway Departures
- Alcohol Involved
- No Restraint
- Young Driver

Level 1 – Identify Problem Areas

Level 2 – Set a Goal

Level 3 – Address Where and Who

Level 1 – Identify Problem Areas

Level 2 – Set a Goal

Level 3 – Address Where and Who
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://traings.psu.edu/SHSP Dashmaps

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://traings.psu.edu/SHSP Crashmaps
Person dashboard http://traings.psu.edu/SHSP Person dashmaps

Benefits of SHSP Dashboards

Data is easily accessible to end user.
Data is displayed in a visually appealing manner versus traditional spreadsheets.
Moving from layout/form led to data/discovery tool.
Dashboards are interactive.
Decision makers can make more informed data driven decisions and implement effective counter measures.

http://traings.psu.edu/SHSP Dashmaps

Next Steps – Network Screening

Capital Region fatal alcohol data
Below SHSP goal for alcohol fatalities

Capital Region people killed in an alcohol crash