Roadway Safety
Professional Capacity
Building Program

Through engaging peer workshops, the RSPCB Program matches agencies seeking solutions to roadway safety issues with trailblazers who have addressed similar challenges and emerged with a roadmap and noteworthy practices for approaching the issue.

U.S. Department of Transportation
Federal Highway Administration

Local Roads Safety Data Analysis Approaches Peer Exchange
An RSPCB Peer Exchange

OVERVIEW

This report is a summary of the Local Roads Safety Data Analysis Approaches Peer Exchange held in Seattle, Washington on August 30-31, 2016 sponsored by the Federal Highway Administration (FHWA) Office of Safety. Participants from Federal, State, and local agencies from Indiana, Kentucky, Louisiana, Michigan, New Jersey, Ohio, Washington, and Wisconsin shared information on methods and practices related to local roadway and crash data collection, analysis, and application employed in their States. An event agenda is found in **Appendix A** and a full list of attendees is provided in **Appendix B**.

The two-day peer exchange included presentations on leading data collection, management, and analysis practices from participants and the Office of Safety. In addition, participants engaged in roundtable discussions on several major topic areas highlighting challenges and noteworthy practices. The peer exchange concluded with a break out session where participants came together by State to consider the implications of what they learned through the peer exchange and how those lessons could be applied to their programs. Key takeaways from the event included:

- States can use local agencies to collect data (e.g. Michigan and Wisconsin) or embark on a Statewide data collection initiative like what Louisiana has done.
- Strong collaborative partnerships are extremely beneficial to collecting accurate and timely safety data on local roads.

> **TOPIC AREAS**
> - Local roads safety data collection approaches
> - Data analysis tools and methodologies
> - Coordination between State and local agencies
> - Technical expertise and support mechanisms
> - Program and funding requirements and models

- Communicating safety data in an effective and easy-to-understand format is important to make the case for local road improvements and for engaging local involvement.
- Data collection and maintenance programs need to be a sustained commitment—it is not a single occurrence activity. Long term, high quality local data sets provide context for project selection.
- Local safety data such as the data elements in the Model Inventory of Roadway Elements Fundamental Data Elements (MIRE FDE) allows for a systemic project selection approach leading to stronger safety improvements and benefits.
- Application of new approaches and tools (e.g. 5% reports and training on HSM and SafetyAnalyst) can lead to better information sharing and more robust analysis, supporting project selection and local engagement.

PEER EXCHANGE PROCEEDINGS

The following sections summarize the peer presentations and discussion across key topic areas.

Collecting and Managing Local Road Safety Data

The Moving Ahead for Progress in the 21st Century Act, MAP-21, sets the requirement that States must have a safety data system in place to perform analysis in support of strategic and performance-based goals identified in Strategic Highway Safety Plans (SHSP) and Highway Safety Improvement Programs (HSIP) and the Fixing America's Surface Transportation (FAST) Act continued it. The legislation applies to the collection of roadway data on all public roads and provides the impetus for States to seek collaboration with local agencies. Key topics covered in the presentations included data collection and maintenance and engaging and achieving buy-in from local agencies to support these efforts.

Data Collection

Effective and efficient data collection and management is a challenge that every State faces when developing data-driven local safety programs. The source of safety data varies widely across different States. Michigan and Wisconsin are examples where the local agencies collect their own data and provide it to the State. In Michigan's case, locals not only report the collected data to the State, they are also encouraged to make use of the safety data they collect in their analysis to identify locations for safety improvements. Michigan's GIS-based roadway management system known as Roadsoft was built for the locals and is free for them to use in their asset management. Wisconsin strongly incentivizes accurate and prompt data collection by tying transportation funding to data submissions and requiring an annual roadway data report to the State DOT.

Other States take a more centralized approach. In Indiana, roadway data sets are collected by the State DOT, metropolitan planning organizations (MPO), local technical assistance programs (LTAP), local agencies, and the Indiana Geographic Information Council, with the Indiana LTAP serving as a central repository for crash data. A more State-centric model is present in Louisiana and Ohio. The Louisiana Department of Transportation and Development (LaDOTD), through the LTAP, collects road data (i.e. Model Inventory of Roadway Elements (MIRE) Fundamental Data Elements (FDE)), and the Ohio Department of Transportation (ODOT) has an established practice of data collection for both the State owned system (on a 3-year cycle) and locally owned roads (on a longer, 6+ year rotation). Louisiana, in particular, noted that, in general, their local agencies are limited in the resources needed to collect and process roadway data, thus necessitating a collection approach driven at the State level.

The Kentucky Transportation Cabinet (KYTC) is collecting significant high resolution roadway data in collaboration

with the University of Kentucky. State or private research universities represent additional possible partners with strong expertise for data collection, maintenance, and analysis within other States.

Data Maintenance

Regardless of the data collection approach, there are challenges for maintaining comprehensive safety data databases. The accuracy and timeliness of safety data is a significant obstacle for Statewide systems as reported by nearly all participants. The sheer quantity of data makes central quality assurance difficult; to address this issue, Michigan Department of Transportation (MDOT) and ODOT discussed giving access to county and local officials to review data relevant to their jurisdiction and report errors and updates. This arrangement can remove the burden of collection from the resource-strapped local agencies while allowing them to have oversight of their region and reap the benefits of robust data sets. As noted above, Wisconsin DOT determines funding based on local data, so the local agencies are strongly encouraged to ensure their information is accurate and timely. Another challenge is that crash data, roadway characteristics, and other safety and spatial data may be encoded using different systems which may not directly align. For ODOT, many recorded crashes could not be accurately mapped onto a road segment due to a base map alignment problem. Significant effort was required to correct crash data coordinates in order to link safety information to a single, unified roadway base map for spatial analysis.

ODOT and Washington State DOT (WSDOT) noted the importance of making data useful to local agencies to ensure it is a long term effort.   Data collection is not a single occurrence process; continued maintenance is important to ensure regular and reliable data for long term understanding of safety concerns. It is important to ensure that data use is institutionalized in agencies and the value of updating the data is clear to both the State and local agencies.

Local Engagement

One of the most important topics discussed during the peer exchange was cultivating active engagement from local agencies. Motivating local officials is difficult for many peer States, and without strong agency buy-in for advancing local safety programs and data efforts, progress becomes significantly more difficult.

Successful strategies for engaging local agencies focus largely on enhancing coordination between State and local governments or creating local government partnerships. MPOs and LTAPs helped to build strong relationships with New Jersey DOT (NJDOT) and bridge the gap between local safety project needs and State safety funding priorities. Simply getting local agencies in the same room with the State DOT can provide an important opportunity for developing safety projects. LaDOTD discussed the importance of in-person meetings, workshops, and exchanges between State and local officials as a way to introduce or reinforce the importance of safety and safety data.

NJDOT and MDOT described how funds are allocated for local road safety projects in an effort to ease competition for resources. In New Jersey and Michigan, local and regional agencies projects are not forced to compete against State-level projects, making it more attractive for local officials to prepare time-sensitive and funding-sensitive project applications. In the case of New Jersey, such set-asides of HSIP funding and strong promotion by the State DOT have increased the total resources spent on local road safety considerably in the past several years.

MDOT is also helping its constituent local agencies develop robust plans in order to institutionalize the use of varied funding sources for safety. The State pays for local road safety plans (LRSP), which incorporate data-driven approaches to safety and a mechanism for LRSP-identified projects to get priority in HSIP funding. The hope is that an initial investment in local road safety planning from the State will develop into a strong locally-driven program into the future.

Engaging leadership within the State DOT itself was also mentioned as a key attribute for successful safety data programs. Strong leadership at the State level, especially a key leader acting as a "champion" for safety, can push for executive action supporting local safety programs, assist in opening dialogues with key local stakeholders.

Providing Data and Technical Tools to Local Agencies

The number and diversity of local agencies and organizations within States presents a hurdle both administratively and technically for safety data collection and analysis. In some cases, local agencies lack technical expertise for processing safety data; many counties and parishes do not have an engineer on staff. County or city officials may also be unfamiliar with the Federal-aid process and reticent to commit time to developing projects to compete for HSIP funding. As such, partnerships with the State DOT or regional planning organizations can provide the support necessary to fill the expertise gaps which otherwise delay initiation of safety improvements.

Lack of qualified technical staff at the county or city level is often a hurdle for making safety improvements. Even in local agencies with dedicated, full-time engineers, data analysis and mapping skills are not necessarily sufficient to handle the task of parsing crash information in order to make effective data-driven decisions. A wide variety of approaches have been taken to handle this issue. In Wisconsin and Louisiana, the LTAP provides technical support for counties and parishes, including preparing project applications, coordinating data collection and analysis, and providing training and insight so that local officials can make informed and effective decisions. The Louisiana LTAP organizes conferences and workshops to help local officials work through the project development process. The Ohio LTAP provides training for the State's Geographic Information System (GIS) crash analysis tool to assist local agencies in identifying projects and preparing project applications.

States such as Washington and Ohio are providing counties, MPOs, and cities with summary information based on network screening techniques to help locals prioritize safety spending. "5% Reports" are used to identify the most crash-prone segments within local or State contexts and additional screening statistics can contextualize each county's performance relative to the State and surrounding peer counties. WSDOT provides these reports to their counties but still rely on local officials and engineers to apply their best judgement on what priorities should be incorporated into projects. Broadly, peers also spoke to the importance of strong data visualizations which can impart understanding of the safety challenges within a network to those without a background in data analysis, such as executive leadership or the general public.

An important note which was voiced by the peers regarded the purpose of working with comprehensive safety information at the local level. Through 5% Reports and more sophisticated data analysis, agencies are able to assess their systems more holistically, and avoid the problem of "chasing the crashes" where spot improvements follow year-to-year variation in crashes. By examining the data systemically, underlying crash causal factors can be detected and resolved, leading to broader safety benefits. Additionally, several States, including Michigan, automatically confirm HSIP eligibility for any projects which show up on these 5% screening lists to minimize ambiguity for locals seeking Federal-aid funding. This further simplifies the process of project selection and application for local agencies.

Washington and Michigan provide direct technical support to local agencies. WSDOT provides trainings and organizes workshops on data analysis, systemic safety approaches, and the Highway Safety Manual (HSM) and SafetyAnalyst tools. Similarly, MDOT has a Local Safety Initiative which provides free technical support for locals and helps coordinate safety projects with the state.

In other States, the MPOs act as the technical support mechanism. In New Jersey, three MPOs cover the State and take the lead in performing HSM analysis and providing easily digestible safety information to their constituent cities and counties, which eases the burden of identifying likely safety project locations. Coalitions of local

agencies, such as the County Road Association of Michigan's Data Driven Safety Subcommittee or the Traffic Safety Commissions in Wisconsin, help transfer knowledge and expertise across county boundaries and provide a mechanism for cooperation between multiple smaller agencies to improve the ability to plan and execute safety projects.

Academia can play a key role in providing technical expertise to support local road safety initiatives. The University of Kentucky, for example, has been a strong partner for the State in collecting local road data and developing the necessary data management and analysis tools to make local road safety approachable and achievable.

Peer State Use of Advanced Safety Analysis Tools

The tools and analysis platforms required and used by States cover a wide spectrum. The simplest approaches include spreadsheet-based tools or lists of broad statistics about roadways or regions which prioritize safety projects according to number or frequency of crashes. More sophisticated tools are being developed or employed by many of the peer States to perform advanced analysis or provide data visualization to more easily identify safety concerns and convey more robust information.

GIS-based systems are prevalent across the peer States and local agencies. The Delaware Valley Regional Planning Commission uses Esri's ArcMap, a widely used commercial product with a vast suite of spatial analysis tools. Indiana DOT (IDOT) discussed 39° North and Think GIS as alternative programs to store, visualize, and analyze spatial data. Although no specific State uses it, QGIS was also mentioned as an open-source alternative to Esri's ArcMap. Wisconsin's "WisTransPortal," is a customized crash data tool which allows users to visualize crash data in a variety of ways and submit correction reports to help maintain the accuracy of the underlying dataset. Similarly, the Michigan LTAP developed Roadsoft as a data management and analysis system for local agencies. Ohio DOT developed a GIS-based crash analysis tool (GCAT) which allows users to select regions from a map and produce summary statistics and visualizations on demand. Ohio DOT also provides maps and screening lists to counties with fact sheets that highlight SHSP emphasis areas.

Other States are relying on existing data analysis applications and adapting them for their locality. NJDOT and Kentucky use HSM software to process safety data and produce reports and summaries to support project applications (although a custom application, NJ Data Voyager, was developed to handle visualizations and mapping). Ohio DOT, in addition to GCAT, uses SafetyAnalyst to assess safety concerns, identify priorities, and select appropriate countermeasures. KYTC is collecting high resolution roadway data to incorporate into the United States Road Assessment Program (usRAP) system, which uses detailed relationships from previous research studies to assess road segments, assign star-based ratings for each section of local roadway, and recommend a feasible plan of cost effective countermeasures.

As expected, the more advanced programs rely on more comprehensive and specific data in order to perform complex calculations and estimations. SafetyAnalyst, usRAP, and HSM software, in particular, require highly detailed information about roadway features and characteristics in order to accurately assess safety and determine appropriate countermeasures to address challenges.

CONCLUSION

Data collection and analysis improves the ability of local agencies to make informed decisions to develop safety projects and improve safety on roadways. The peer States identified a substantive difference between data and information, stressing that data interpretation and the method of delivering data was critical in gaining buy-in with local agencies and sustaining effective local safety data programs. Providing local agencies with the information gleaned from the data analysis, such as locations under their jurisdiction which demonstrate a safety issue, can

potentially improve buy-in from local agencies as well as their safety awareness. The jump from roadway and safety data collection to useful information for decision makers is a key challenge which each State faces. Further, if a systemic approach is not taken, the random nature of crashes on local and rural roads will result in safety projects addressing hot spots instead of taking a more proactive approach of addressing risk factor to prevent crashes.

Data is fundamental to assessing safety performance, setting realistic targets, and evaluating the effects of safety projects and programs. The federal requirements laid out in the FAST Act and previous legislation are motivating States to develop comprehensive data systems, develop partnerships for collecting and maintaining those data, and build the capacity to analyze and interpret safety data to make safety improvements and ensure effective and efficient use of safety resources at the local level.

Key Takeaways

At the conclusion of the peer exchange, participants listed key takeaways including:

- Collaboration and Communication:
    - States should expand efforts to recruit local governments to both collect and use safety data throughout the project development process.
    - States should collaborate more with their MPOs, LTAPS, and other intermediate bodies and develop strong partnerships with them.
    - States can hold internal peer exchanges to build relationships between State and local officials and share knowledge and expertise.
- Training and Tools:
    - States should continue and expand efforts to provide training for local officials – many local agencies lack foundational knowledge necessary to deal with local safety data in an effective way.
    - States should work to simplify and streamline tools and practices where possible to ease expertise requirements for local officials.
    - States should develop strong institutions surrounding their data collection, maintenance, and analysis processes to retain knowledge of best practices.
    - States should look toward visualization tools to provide easy-to-understand figures and maps which can enhance the project selection process.

APPENDIX A: AGENDA

LOCAL ROAD SAFETY DATA ANALYSIS APPROACHES PEER EXCHANGE
Seattle, WASHINGTON
AGENDA
August 30-31, 2016

TUESDAY AUGUST 30, 2016

7:30 – 8:00	**Registration**
8:00 – 8:30	**Welcome** Washington Department of Transportation – Matthew Enders, Local Programs
8:30 – 9:00	**Introductions and Expectations**
9:00 – 10:00	**FHWA Presentations** State Safety Data Systems Guidance – including Data Collection, Project Selection and Performance Management, the value and benefit of collecting and using roadway data for data-driven safety analysis *Stuart Thompson, FHWA Office of Safety*
10:00 – 10:15	**BREAK**
10:15 – 11:45	**Collecting and Managing Local Road Safety Data** Noteworthy practices in data collection and integration – highlighting efficient data, data collection, access and warehousing as well as the benefits of integration to local road safety. *Marie Walsh,* Louisiana LTAP/Louisiana Transportation Research Center *Steve Pudloski,* Wisconsin LTAP *Laura Slusher,* Indiana LTAP
11:45 – 12:45	**LUNCH**
12:45 – 1:15	**Roundtable Discussion – Collecting and Managing Local Road Safety Data Collection** How are states engaging local agencies in safety data collection, analysis and what can be done to encourage local participation? What other data (beyond MIRE FDE) is being used to inform local safety investment decisions?
1:15 – 2:30	**Providing Data and Analysis Tools to Local Agencies** Many states have developed automated data analysis tools to ease a process that can be cumbersome. This discussion will examine data analysis tools development, capability, available training, and technical assistance provided. *Matthew Enders,* Washington DOT *Tim Colling,* Michigan LTAP; *Larry Hummel,* Van Buren County; *Pamela Blazio,* Michigan DOT *Michelle May,* Ohio DOT; *Jordan Whisler,* Mid-Ohio Regional Planning Commission
2:30 – 2:45	**BREAK**
2:45 – 3:15	**Roundtable Discussion: Providing Data and Analysis Tools to Local Agencies** What other approaches/processes are agencies using? Are the processes applied statewide or are there separate processes for state and local agencies? *Outcome:* Identify effective analysis approaches and tools for local agencies.

3:15 – 4:15   **Break-out Discussion** - Participants will breakout by states to discuss applicability of the information (tools, practices) presented for data a collection and analysis improvements in their states at the local level

4:15 – 4:45   **Report out**

4:45 – 5:00   **Day 1 Wrap-up/ADJOURN**

WEDNESDAY AUGUST 31, 2016

8:00 – 8:30   **Recap of DAY 1**

8:30 – 10:00   **Using Advanced Safety Analysis Tools**
Noteworthy practices applying advanced safety analysis tools such as AASHTOWare SafetyAnalyst, Highway Safety Manual and usRAP, including discussion on data requirements and assumptions, challenges and lessons learned and benefits.
David Kuhn and *Sophia Azam*, NJDOT; *Christine Mittman*, NJTPA; *Kevin Murphy*, DVRPC
Derek Troyer, Ohio DOT
Tracie Leix, Michigan DOT
Reginald Souleyrette, Kentucky Transportation Center

10:00 – 10:15 Break

10:15 – 11:00 **Facilitated Roundtable Discussion** – Using advanced methods and tools at local level
Outcome – Identifying and developing strategies to get locals using more advanced methods and tools.

11:00 – 11:45 **Key Takeaways**
Discussion will focus on participant opportunities and key takeaways from the peer exchange.

11:45 – 12:00 **Wrap Up & Adjourn**

APPENDIX B: PARTICIPANT LIST

INDIANA					
Rick	Drumm	Highway Safety Engineer	FHWA - Indiana Division	317-226-7487	rick.drumm@dot.gov
Laura	Slusher	Traffic Safety Engineer	Indiana LTAP	765-494-7038	lslusher@purdue.edu
KENTUCKY					
Tracy	Lovell	Transportation Engineer	Kentucky Transportation Cabinet	502-782-5534	tracy.lovell@ky.gov
Scott	Pennington	County Engineer/ Director of Public Works	Boone County Fiscal Court	859-308-7862	spennington@boonecountyky.org
Reginald	Souleyrette	Professor and Chair	University of Kentucky Civil Engineering	859-257-5309	souleyrette@uky.edu
Jarrod	Stanley	Transportation Engineer Specialist	Kentucky Transportation Cabinet	502-782-5539	jarrod.stanley@ky.gov
Ryan	Tenges	Safety Engineer	FHWA KY Division	502-223-6750	ryan.tenges@dot.gov
LOUISIANA					
Sarah Paul	Edel	PE IV	LaDOTD Department of Transportation and Development	225-389-2170	sedel@brgov.com
Joshua	Manning	Transportation Planner II	South Central Planning and Development Commission	985-851-2900	josh@scpdc.org
Mary	Stringfellow	Program Delivery Team Leader	FHWA Louisiana Division	225-757-7610	mary.stringfellow@dot.gov
Marie	Walsh	Director	Louisiana LTAP	225-767-9184	marie.walsh@la.gov
Jay	Watson	Development Engineer	St. Tammany Parish Government	985-809-7448	jwatson@stpgov.org
MICHIGAN					
Pamela	Blazo	Safety Engineer	Michigan Department of Transportation	517-335-2224	blazop@michigan.gov
Tim	Colling	Director Michigan LTAP	Michigan Tech University	906-487-2102	tkcollin@mtu.edu
Lawrence	Hummel	Engineer - Manager	Van Buren County Road Commission	269-674-8011	larryhummel@vbcrc.org
Tracie	Leix	Local Agency Program Engineer	Michigan DOT	517-335-2233	leixt@michigan.gov

NEW JERSEY					
Sophia	Azam	Acting Manager	NJ Department of Transportation	609-530-3474	sophia.azam@dot.nj.gov
Dave	Kuhn	Assistant Commissioner	NJ Department of Transportation	609-530-3855	david.kuhn@dot.nj.gov
Christine	Mittman	Project Manager	North Jersey Transportation Planning Authority	973-639-8448	cmittman@njtpa.org
Kevin	Murphy	Assistant Manager, Safety Programs	Delaware Valley Regional Planning Commission	215-238-2864	kmurphy@dvrpc.org
Caroline	Trueman	Safety Engineer	FHWA NJ Division Office	609-637-4234	caroline.trueman@dot.gov
OHIO					
Michelle	May	Highway Safety Program Manager	Ohio DOT	614-644-8309	michelle.may@dot.ohio.gov
Derek	Troyer	Data Analysis and Safety Engineer	Ohio DOT	614-387-5164	derek.troyer@dot.ohio.gov
Jordan	Whisler	Senior Planner	Mid-Ohio Regional Planning Commission	614-233-4148	jwhisler@morpc.org
WASHINGTON					
Susan	Bowe	Traffic & ADA Services Manager	Washington State DOT	360-705-7380	bowes@wsdot.wa.gov
Dongho	Chang	City Traffic Engineer	City of Seattle	206-684-5106	dongho.chang@seattle.gov
Scott	Davis	Traffic Engineer	Thurston County	360-867-2345	davissa@co.thurston.wa.us
Matthew	Enders	Technical Services Manager	Washington State DOT	360-705-6907	matthew.enders@wsdot.wa.gov
Don	Petersen	Safety/ Geometric Design Engineer	FHWA Washington Division	360-534-9323	don.petersen@dot.gov
WISCONSIN					
Stephen	Pudloski	Director	Wisconsin Transportation Information Center	608-262-8707	pudloski@wisc.edu
NACE/FHWA/VOLPE					
Brian	Roberts	Executive Director	NACE	202-393-5041	broberts@naco.org
Rosemarie	Anderson	Transportation Specialist	FHWA Office of Safety	202-366-5007	rosemarie.anderson@dot.gov
Stuart	Thompson	Transportation Engineer	FHWA Office of Safety	202-366-8090	stuart.thompson@dot.gov
Laura	Black	Civil Engineer	U.S. DOT Volpe Center	617-494-2274	laura.black@dot.gov
Stephen	Zitzow-Childs	Operations Research Analyst	U.S. DOT Volpe Center	617-494-2287	s.zitzow-childs@dot.gov