Perspectives for the Development of the Roadway Safety Data Program

U.S. Department of Transportation
Federal Highway Administration

Safe Roads for a Safer Future
Investment in roadway safety saves lives

FHWA-SA-13-028

FOREWORD

This document summarizes perspectives of the project team and the State representatives that participated in the Roadway Safety Data Capabilities Assessment and Peer Exchanges on the Federal Highway Administration (FHWA) Roadway Safety Data Program. It offers input on roles FHWA could play in improving state and local safety data systems and safety analysis capabilities. The FHWA will consider these perspectives as it further develops and implements the Roadway Safety Data Program.

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16. Abstract

FHWA developed the Roadway Safety Data Program (RSDP) as a collaborative effort between FHWA and States to ensure that they are best able to develop robust data-driven safety capabilities. The RSDP included an assessment of all fifty States, Puerto Rico, and the District of Columbia to determine each State's roadway safety data capabilities. FHWA also held a series of four peer exchanges to garner additional State input. This document follows the assessment process and and summarizes the project team's and State participants' perspectives, organized into four areas: data collection, data analysis, data management, and data expansion. For each goal area and proposed action item the document includes discussion on motivation, priority, delivery methods, and recommendations.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
	NOTE: volumes greater than 1000 L shall be shown in m^3			
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	$candela/m^2$	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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Acronyms

FHWA	Federal Highway Administration
USDOT	United States Department of Transportation
DOT	Department of Transportation
MAP-21	Moving Ahead for Progress in the 21st Century Act
RSDP	Roadway Safety Data Program
SHSP	Strategic Highway Safety Plan
FDE	Fundamental Data Elements
MIRE	Model Inventory of Roadway Elements
MIRE MIS	Model Inventory of Roadway Elements Management Information System
MPO	Metropolitan Planning Organization
GPS	Global Positioning System
HSIP	Highway Safety Improvement Program
CMF	Crash Modification Factor
HSM	Highway Safety Manual
MMUCC	Model Minimum Uniform Crash Criteria
LRS	Linear Referencing System
IT	Information Technology
FMCSA	Federal Motor Carrier Safety Administration
TRB	Transportation Research Board
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
GIS	Geographic Information System
TRCC	Traffic Records Coordinating Committee

INTRODUCTION

Over the past several decades, the Federal Highway Administration (FHWA) and the United States Department of Transportation (USDOT) have focused on using data to improve decisions related to transportation investments. Whether maintenance, safety or operations focused, the FHWA has leveraged limited resources and targeted important projects to address needs that often times outstrip available funding. This focused approach has also carried over to the State Departments of Transportation (DOTs) to improve safety and mobility across the country.

The Moving Ahead for Progress in the 21st Century Act (MAP-21) has provided a foundation for better roadway safety data. States are required to have a safety data system to perform problem identification and countermeasure analysis on all public roads, adopt strategic and performance-based goals, advance data collection, analysis, and integration capabilities, determine priorities for the correction of identified safety problems, and establish evaluation procedures. In addition, the Secretary will establish a subset of the model inventory of roadway elements (listing of roadway and traffic data elements critical to safety management, analysis, and decision-making), to be adopted and used by States to support these requirements.

Highway safety analysis is evolving, and the importance of quality data has never been more apparent. Quality safety data are the foundation for highway safety decisions. Much of the effort in the safety community at the turn of the century concentrated on crash data; however, crash data are only part of the picture. Roadway and traffic data are also essential. By incorporating roadway and traffic data into their network screening, prioritization, and countermeasure selection analysis, agencies can better identify safety problems and prescribe solutions to improve safety and make more efficient and effective use of their safety funds.

Crash data alone are useful, but leave safety practitioners with purely reactive approaches—identifying the locations where crashes have already happened. With the addition of traffic volume and roadway data, it is possible to develop estimates of the expected crash frequency and compare crash risks for roadways with vastly different levels of service. As safety practitioners add detailed roadway inventory information to the mix, they can now develop a more in-depth understanding of the roadway attributes that contribute to crash risk thus allowing them to adopt a proactive approach seeking out those factors associated with a high risk of crashes and addressing sites that share those features.

In anticipation of the MAP-21 requirements, FHWA developed the Roadway Safety Data Program (RSDP) as a collaborative effort between FHWA and States to ensure that they are best able to develop robust data-driven safety capabilities. RSDP includes a variety of projects all

aimed at improving the collection, analysis, management, and expansion of roadway data for use in safety programs and decision-making. The Office of Safety surveyed all fifty States, Puerto Rico, and the District of Columbia to assess each State's roadway safety data capabilities. In addition to the recommendations and national gaps found in this baseline assessment, the FHWA held a series of four peer exchanges to garner additional State input.

This document follows the assessment process. It summarizes perspectives of the project team and the State participants in the capabilities assessment and Peer Exchanges on FHWA's Roadway Safety Data Program. It offers input on roles FHWA could play in improving safety data systems and safety analysis capabilities. The document organizes these perspectives into the following four areas:

- **Goal I Data Collection:** This goal covers four elements: completeness, timeliness, accuracy, and uniformity / consistency. When addressing roadway inventory data collection, the assessment followed the primary categories from the Model Inventory of Roadway Elements (MIRE) Version 1.0.
- **Goal II Data Analysis:** This goal covers five elements in the safety planning process, including network screening, diagnosis, countermeasure selection, evaluation and accessibility.
- **Goal III Data Management:** This goal for the effective management of roadway safety data covers three elements: policies, procedures, and personnel.
- **Goal IV Data Expansion:** This goal covers how roadway safety data relates to other data including, but not limited to, crash data and roadway inventory data. Additionally, existing data may expand as needs change and new technologies and tools develop.

This document discusses each proposed action in the report to offer additional perspectives to FHWA on the findings of the assessments, the peer exchanges, and the team's experience. The document provides consistency using the following categories to discuss each proposed action:

- **Detailed Description and Motivation** – The project team recognizes that context is extremely important and while an action can provide some limited context, additional detailed information regarding the motivation for the action by the States is helpful in determining priority.
- **Priority** – The project team used several methods to determine priority from the States' perspective and outlines the support generated by discussing:
    - Whether it was a key finding from the assessments.
    - Whether it was supported as a top three action in the peer exchanges.
    - Whether the team supported the action as a top three action independent of the assessments or peer exchanges.

The project team summarized the priority into four categories:

- **Critical** – These actions are critical to meeting FHWA and State safety data capability improvement objectives.
- **High** – These actions are not critical; but, desired by the States, the FHWA, and the project team.
- **Medium** – These actions are not critical, but, desired by the States and the project team.
- **Low** – These actions are not critical; but desired by the States or the project team.

- **Potential Delivery Methods** – There are several methods that the FHWA commonly uses to provide technical assistance. The project team identified the recommended method in bold and provides the following partial list of proven methods to deliver technical assistance:
  - Talking points.
  - Management briefings.
  - Videos or CD-ROMs.
  - Clearinghouses.
  - Training / presentations / webinar sessions.
  - Panel discussion.
  - Domestic / international scans.
  - Peer exchanges.
  - Community of practice.
  - Symposium, conference, or summit.
  - Site visits.
  - Program reviews.
  - Literature review.
  - Best practices.
  - Case studies.
  - Guidebook.
- **Team Recommendation** – The project team summarized its recommended delivery method for each action and identified if another similar action could be offered concurrently.

DATA COLLECTION

This section summarizes the following actions to improve data collection and discusses each action using the framework established in the introduction.

	Action		Priority
Data Collection	A	Develop a reference that States can use to guide their efforts in developing an intersection, curve, grade or other inventory information.	HIGH
	B	Provide additional technical assistance to States to develop their State Roadway Safety Data Action Plans.	CRITICAL
	C	Provide materials and support to demonstrate the value of roadway safety data improvements to State DOT management and elected officials.	HIGH
	D	Provide the States examples to fund, process, and extract roadway inventory items using cost-effective, accurate, and innovative data collection practices.	HIGH
	E	Develop a reference that States can use on how to properly apply the requirements for fundamental data elements and performance measurements.	MEDIUM
	F	Develop a reference that States can use to process locally maintained roadway safety data.	CRITICAL
	G	Create a reference with a priority list of data elements to improve data accuracy through external verification and validation.	MEDIUM
	H	Identify specific examples where the Strategic Highway Safety Plan (SHSP) process promoted the funding and implementation of local and regional jurisdiction level roadway data improvement plans.	LOW
	I	Provide technical assistance to States to show how to implement MIRE fundamental data elements (FDEs) including intersection inventory attributes list, volume data, and geometrics for local roads.	MEDIUM
	J	Establish National Data Quality Measures for Data Collection and conduct periodic reviews to compare to a baseline.	CRITICAL
	K	Establish national standards, data quality control practices, and guidelines on what constitutes a sustainable traffic count program in terms of coverage, frequency of updates, and quality of the data collected.	MEDIUM

A. Develop a reference that States can use to guide their efforts in developing an intersection, curve, grade or other inventory information. The reference should provide guidance on elements that should be collected and processes for collection.

DETAILED DESCRIPTION AND MOTIVATION

From the capabilities assessment and the peer exchanges, States identified intersection inventories as the most important roadway data that they are currently seeking to support improved safety analysis. States also identified curve and grade inventories as important. For most States, these specialized inventories do not exist or are only partially populated. For instance, one State noted during a peer exchange that they know where their intersections are located and have limited data but they are lacking some of the data they need to use the data for safety analysis. In the last few years, a handful of States have undergone efforts to develop these inventories. Many other States are planning to move forward with similar efforts. Federal guidance on how to collect these data and specifically what elements to collect would be timely. Best or noteworthy practices from peer States that have collected these data would be a useful reference for the States. Any guidance should include data elements important for analysis and the best collection methods.

PRIORITY

HIGH – This action was a key finding from the State data capability assessments and supported by the first two peer exchanges. In the last two peer exchanges, 11 participants out of 19 States / Territories ranked this action as a top three priority in the data collection emphasis area. Additionally, the data improvements that would result from this action would support the Intersection Safety and Roadway Departure Safety focus areas that are part of FHWA's Focused Approach to Safety.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☒	Site visits
☐	Clearinghouses	☒	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	**Best practices**
☒	Domestic / international scans	☒	**Case studies**
☒	Peer exchanges	☒	**Guidebook**
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends developing a guidebook that provides specific guidance to States on how to develop intersection inventories. The guidebook could draw from the successful practices of several States including the MIRE Management Information System (MIRE MIS) effort that developed New Hampshire's intersection inventory and Ohio's internal efforts to develop their intersection inventories.

The guidebook could also address other inventories such as curve and ramp inventories. However, there are limited successful practices to draw from, particularly for curve inventories. Several States have attempted to develop curve inventories with varying success. A demonstration project or direct technical assistance may be needed to help one or more States develop a curve inventory before this can be addressed in a guidebook.

B. Provide additional technical assistance to States to develop their State Roadway Safety Data Action Plans.

DETAILED DESCRIPTION AND MOTIVATION

The key method for States to coordinate and advance their roadway data improvements is to create an implementation plan. As part of the capabilities assessment, the project team provided each State with an action plan template to advance their data capabilities in four areas: collection, analysis, management, and expansion.

The Focused Approach to Safety provides additional resources to eligible high priority States to address the Nation's most critical safety challenges through additional program benefits such as people, time, tools and training. Each eligible state participating in the Focused Approach can receive assistance to address fatality reductions in any one or all of three critical focus areas. These areas have been identified as providing the greatest potential to reduce highway fatalities using infrastructure-oriented improvements, namely: roadway departure, intersection-related crashes, and pedestrian crashes. This same approach could be used for data improvements.

A tailored approach for FHWA technical assistance is required to meet each State where they are and where they are headed. Implementation plans are extremely important in focus States where intersection safety, roadway departure, or pedestrian safety are a critical safety need. Data improvements aimed at filling specific gaps noted by focus States would help those States' decision makers address their most pressing needs.

PRIORITY

CRITICAL – The States added this action during the first two peer exchanges and ranked it highly. The team also identified this as a key priority to move data improvements forward. The States identified this action in the Ohio Peer Exchange as being a top three priority by 1 out of 10 States.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☒	Clearinghouses	☒	Program reviews
☒	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	Case studies
☐	Peer exchanges	☒	Guidebook
☒	Other: Implementation Plan	☐	Other:

TEAM RECOMMENDATION

The project team recommends that direct technical assistance be provided to States to refine their safety action plan templates into data improvement plans. The project team recommends that States be prioritized for this support based upon their data capability (pre the assessments), the number of Focus areas, and their expressed desire to increase their data capability. These data improvements would support the Focused Approach to Safety and lay the foundation for decision makers to address the most pressing safety needs.

C. Provide materials and support to demonstrate the value of roadway safety data improvements to State DOT management and elected officials.

DETAILED DESCRIPTION AND MOTIVATION

The need and importance of demonstrating the value of roadway safety data improvements was a common theme in each of the four peer exchanges. Safety data professionals need an umbrella of leadership in order to secure resources, increase staff expertise, and produce useful data to improve decision-making. There is a need for State DOT management to understand the importance of collecting MIRE FDEs on all public roadways to support improved safety decision-making. Guidance is needed on why the collection of data describing locally maintained roadways is important. States need specific guidance on what elements are critical to collect, the return on investment in data collection, and effective ways to communicate these issues to management.

PRIORITY

HIGH – The States added this action at the first two peer exchanges and ranked it highly. The States supported the action at the first two peer exchanges. In the last two peer exchanges, 7 participants out of 19 States / Territories ranked this action as a top three priority in the data collection emphasis area.

POTENTIAL DELIVERY METHODS

☒	**Talking points**	☐	Community of practice
☒	**Management briefings**	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	**Training / presentation / webinars**	☐	Literature review
☒	Panel discussion	☐	Best practices
☐	Domestic / international scans	☐	Case studies
☒	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that a suite of resources be developed and distributed for use by State DOTs and FHWA Resource Center and Division Office staff in communicating with upper State DOT management, politicians, and partners such as metropolitan planning organizations (MPOs) and local agencies. These resources can include talking points, management briefings, and executive presentation for use to secure resources, increase staff expertise, and collect useful data to improve decision-making. It is also recommend

that FHWA State Division Offices attend periodic webinars to elevate and encourage the dialogue between the Division Offices and State DOT management. These resources would support the Focused Approach to Safety and MAP-21 requirements for safety data systems.

D. Provide the States examples to fund, process, and extract roadway inventory items using cost-effective, accurate, and innovative data collection practices.

DETAILED DESCRIPTION AND MOTIVATION

In the broader context of data collection, State DOTs are looking for cost-effective innovations to collect data for use in safety analysis. During the peer exchanges, States expressed that they lack an understanding of the funding and mechanisms for data collection. Specifically, this action addresses: *How can a State fund data collection equipment and personnel? What data collection practices are the best for processing and extracting roadway inventory data?*

PRIORITY

HIGH – This action was a key finding from the State data capability assessments. It was supported by the first two peer exchanges. In the last two peer exchanges, 8 participants out of 19 States / Territories ranked this action as a top three priority in the data collection emphasis area.

POTENTIAL DELIVERY METHODS

☐	Talking points	☐	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☒	Clearinghouses	☒	Program reviews
☒	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☒	Best practices
☒	Domestic / international scans	☒	**Case studies**
☒	Peer exchanges	☒	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that new case studies be undertaken to document lessons learned on how to fund data collection equipment and personnel and to identify collection practices for processing and extracting roadway inventory data. There should also be an emphasis on how to collect data on locally maintained roadways. These case studies would support the notion that innovation can decrease costs and increase accuracy and interoperability concurrently. There are several States that have practices that would be useful for case studies including Wisconsin, Utah, Tennessee, Illinois, and Ohio.

E. Develop a reference that States can use on how to properly apply the requirements for fundamental data elements and performance measurements.

DETAILED DESCRIPTION AND MOTIVATION

States want to know more about how MAP-21 relates to their safety data programs. At the peer exchanges, many States expressed the need for FHWA requirements to gain leadership buy-in and support. Guidance on FDEs and safety performance measurements were common areas of interest from the States. States would like to see a tiered approach to FDE data collection requirements, reflecting an approach they can follow. Currently, FDE requirements are divided into two sets – a full set of FDEs, and a reduced set of FDEs for roads with less than 400 vehicles per day. States would like to see some additional tiers of collection, beyond the low volume roads. States also want to understand the performance measurement requirement better as it relates to what data are to be collected to support State-level and national performance measurements.

PRIORITY

MEDIUM – This action was added at the first two peer exchanges and ranked highly. It was supported by the first two peer exchanges. In the last two peer exchanges, 5 participants out of 19 States / Territories ranked this action as a top three priority in the data collection emphasis area. With MAP-21 rulemaking on the horizon, clarifying these requirements will shape the future direction of State DOTs and their safety data systems.

POTENTIAL DELIVERY METHODS

☒	**Talking points**	☐	Community of practice
☒	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	Case studies
☐	Peer exchanges	☒	Guidebook
☐	Other:	☒	**Other: Rule making process**

TEAM RECOMMENDATION

The project team recommends that new guidance documents for FDEs be issued through the rule making process and a tiered approach be used for the data collection requirements. The fewest number of elements should be for less traveled roadways with no crash experience, with the highest number of elements on higher traveled roadways or a

substantive crash experience. Additional dialogue should be encouraged to hear the States' perspectives on the proposed safety performance measurements. Talking points for Division Offices should also be developed to increase the dialogue with State DOT safety professionals and management executives.

F. Develop a reference that States can use to process locally maintained roadway safety data. Through pilots and case studies, this reference should also cover the following activities:
    - Use Highway Safety Improvement Program (HSIP) funds for locally maintained roadway safety data collection.
    - Locate local road crashes using various methods, including global positioning system (GPS) coordinates.
    - Use return on investment methods to guide collecting inventory and traffic data on local roads with very low crash histories.
    - Enhance communication and coordination methods between State DOTs and local DOTs.
    - Provide techniques to State DOTs that are prohibited by State law from working on locally maintained roadways.

DETAILED DESCRIPTION AND MOTIVATION

Compared to data collected on State-maintained roads, States scored lower in completeness in their safety data capability assessments related to collecting data on locally maintained roadways. Only one State had a process in place to achieve the highest capability score. From the peer exchanges, there is a wide spectrum of issues involving locally maintained roadways. These issues include:

- Little guidance on how HSIP funding can be used by State DOTs to collect local safety data.
- Local jurisdictions not understanding how to use federal funding.
- Few resources at the local level to provide current roadway safety data.
- Little communication and cooperation between State and local DOTs.
- No or insignificant crash densities on locally maintained roadways.
- State law prohibiting State DOTs from working on locally maintained roadways.

Several States can provide examples of excellent coordination and communication models between MPOs, State DOTs, and local agencies. In addition, States can provide legislative examples to serve as mechanisms for local agencies to provide roadway safety data. In the peer exchange, States wanted proof that the data collected on local roads would have a positive return on investment in order to prove to their leadership that this was worthwhile expense. States want to know what the best methods are (law, access to funding, penalties) to develop a process to collect non-State maintained roadway data. States also want guidance on how to best leverage HSIP funds for local roads and how to locate local road crashes and roadway features.

PRIORITY

CRITICAL – This action was a key finding from the State data capability assessments and is ranked as a high priority action. In the last two peer exchanges, 5 participants out of 19 States / Territories ranked this action as a top three priority in the data collection emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☒	Clearinghouses	☒	Program reviews
☐	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☒	**Best practices**
☐	Domestic / international scans	☒	**Case studies**
☒	Peer exchanges	☒	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that a new reference, containing the results of case studies and pilots, document lessons learned on how to process and fund roadway safety data collection on local roadways. A key perspective to gain through this case study process is to determine what roadway data should be required on low volume roadways with no crash history and what communication models work best for State and local agencies. These case studies would support States to consider safety on all public roadways in a manner that is cost effective and pertinent to achieving better safety decisions and outcomes.

G. Create a reference with a priority list of data elements to improve data accuracy through external verification and validation.

DETAILED DESCRIPTION AND MOTIVATION

From the capabilities assessments, States would like to see MIRE and/or FDE elements with an estimate of accuracy or tolerance intervals for effective safety data analysis. Currently there are many data collection methods, from manual to automatic; however, there is no guidance for States on the accuracy of roadway inventory data. States also find it time intensive to review the accuracy of each data element. If a State were to obtain funding to improve data accuracy, they want to know which elements they should pursue.

PRIORITY

MEDIUM – This action was a key finding from the State data capability assessments and is ranked as a medium priority action. In the last two peer exchanges, 3 participants out of 19 States / Territories ranked this action as a top three priority in the data collection emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☒	**Guidebook**
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that a new tolerance guidebook be developed to identify key MIRE elements or FDEs and the acceptable ranges for accuracy for effective safety analysis. Talking points for the FHWA Division office could also be developed to inform State DOTs of acceptable accuracy ranges for data collection purposes. This guidebook would support State DOTs to implement MIRE and FDE data elements with a sufficient level of accuracy to perform safety analysis to achieving better safety decisions and outcomes.

H. Identify specific examples where the SHSP process promoted the funding and implementation of local and regional jurisdiction level roadway data improvement plans.

DETAILED DESCRIPTION AND MOTIVATION

MPOs and local governments have their own safety data capability levels and are taking actions to improve their data collection. The SHSP process is an opportunity to engage the MPOs and localities regarding their safety data plans and to tie their efforts back to the State Traffic Records Coordinating Committee (TRCC). Existing data improvement projects may be leveraged within a region or on a statewide basis through increased communication, coordination, and collaboration. Some States have used local SHSPs to address data collection challenges.

PRIORITY

LOW – This action was added at the first two peer exchanges. In the last two peer exchanges, 3 participants out of 19 States / Territories ranked this action as a top three priority in the data collection emphasis area.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☒	Literature review
☒	Panel discussion	☒	**Best practices**
☐	Domestic / international scans	☒	**Case studies**
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that several case studies document noteworthy SHSP practices on how to fund and implement local and regional jurisdiction level roadway data improvement plans. Often times, local and regional data collection is more robust than at the State level. Through partnering agreements, all involved stakeholders can leverage limited resources to improve data sharing and save on the costs of data collection. These case studies would support States to consider safety on all public roadways in a manner that is cost effective and pertinent to achieving better safety decisions and outcomes.

I. Provide technical assistance to States to show how to implement MIRE FDEs including intersection inventory attributes list, volume data, and geometrics for local roads.

DETAILED DESCRIPTION AND MOTIVATION

According to the data capabilities assessments, there is a disconnect between the level of completeness between the State-maintained roadways and the locally-maintained roadways. Typically, the State-maintained roadways will have better coverage of intersection inventories, roadway characteristics, and traffic volumes. The States want to know how FDE requirements will be implemented with limited resources on the non-state maintained roadways.

PRIORITY

MEDIUM – This action was added at the first two peer exchanges. In the last two peer exchanges, 7 participants out of 19 States / Territories ranked this action as a top three priority in the data collection emphasis area.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	**Case studies**
☒	Peer exchanges	☒	Guidebook
☐	Other:	☒	**Other: Pilots**

TEAM RECOMMENDATION

The project team recommends pilots and case studies to document how to collect FDEs on local roads. These pilots could be selected in focus States and would support States to to consider safety on all public roadways in a manner that is cost effective and pertinent to achieving better safety decisions and outcomes.

J. Establish national data quality measures for data collection and conduct periodic reviews to compare to a baseline.

DETAILED DESCRIPTION AND MOTIVATION

One of the most important aspects of data collection is data quality management. Measures of data quality, compared to a baseline condition, can tell States if the data are meeting the needs of users and if the data are improving or not. The addition of a set of data quality goals and data quality management programs will help States better plan the future of data collection. Programs that are not measured and for which a State has not established some sense of what is the desired level of quality are less likely to produce usable data, and much less likely to improve over time.

PRIORITY

CRITICAL – This action was added by the team independent of the capability assessment results and the peer exchanges. It was not vetted by the peer exchange participants.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☐	Best practices
☐	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☒	**Guidebook**
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that a guidebook be developed to describe what data quality measurements would best indicate whether a State's safety data systems are providing their users the right level of data collection. This may fit into the same guidebook that describes acceptable tolerance levels and improved data element accuracy. This guidebook would support safety analysts and network screening to achieving better safety decisions and outcomes.

K. Establish national standards, data quality control practices, and guidelines on what constitutes a sustainable traffic count program in terms of coverage, frequency of updates, and quality of the data collected.

DETAILED DESCRIPTION AND MOTIVATION

There are no national standards on what constitutes a "sufficient" traffic count program in terms of coverage, frequency of updates, or quality of the data collected. There is a wide variety of data quality control practices in place. Some are very detailed (e.g., Virginia uses their data stream from permanent counters to determine when the detector is starting to fail); others are not. There is still a lot of data that is estimated by State DOTs based on factors and nearby locations. There are numerous projects (FHWA-sponsored and others) in place to address the need for more accurate count data, but, realistically, we also need a useful description of formal data quality control practices and guidelines for how to maintain a sustainable traffic count program.

PRIORITY

MEDIUM – This action was added by the team independent of the capability assessment results and the peer exchanges. It was not vetted by the peer exchange participants.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	**Case studies**
☐	Peer exchanges	☒	**Guidebook**
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that a guidebook be developed to describe a quality management approach to sustain an active State DOT traffic count program. This document should provide quality control best practices regarding appropriate coverage, frequency of updates, and the quality of the data collected. This guidebook would support States to meet the MAP-21 requirements regarding FDEs.

DATA ANALYSIS

This section summarizes the following actions to improve data analysis and discusses each action using the framework established in the introduction.

	Action		Priority
Data Analysis	A	Provide materials and support to demonstrate the value of data analysis and stress the importance of data quality for accurate safety analysis to make sound safety decisions.	HIGH
	B	Develop a reference with noteworthy practices and host a peer exchange exploring how to improve data analysis and data sharing tools and techniques, including the Crash Modification Factor (CMF) Clearinghouse, using HSIP funds at the State and local level.	HIGH
	C	Develop training to deliver advanced analytic techniques for the Roadway Safety Management Process (Highway Safety Manual [HSM] Part B), including the systemic approach, to State and local agencies, as well as map and link data in analysis tools such as Safety Analyst.	CRITICAL
	D	Develop a reference on how to handle tort liability involved with providing safety data, in particular results from safety analysis.	MEDIUM
	E	Provide training on how the Model Minimum Uniform Crash Criteria (MMUCC) 4th Edition affects data analysis and screening.	LOW
	F	Develop a reference containing noteworthy practices to show States how to incorporate safety into larger transportation projects so that safety dollars can be added to other projects to expand their crash reduction benefit.	LOW
	G	Develop a behavioral-focused analytic companion to the HSM to match the rigor of the engineering countermeasure selection analysis.	MEDIUM

A. Provide materials and support to demonstrate the value of data analysis and stress the importance of data quality for accurate safety analysis to make sound safety decisions.

DETAILED DESCRIPTION AND MOTIVATION

In each peer exchange, this was a common theme. Leadership support is vital in deploying data analysis tools and methodologies. States discussed the need for FHWA to communicate directly with top leadership at the state level about the importance of funding safety analysis research, tools, and techniques. States also mentioned the need for quality data collection in order to have quality safety analysis, and it was suggested that FHWA could also directly communicate with agency leadership about funding such data collection projects. The idea of an FHWA "start-up kit" for States looking to move forward with data analysis programs was discussed.

Leadership disconnects and turnover can present significant barriers to data analysis improvements. Safety data professionals need an umbrella of leadership in order to leverage resources, staff expertise, and analyze data to improve decision-making. Currently, when it comes to data analysis, there is a need for State DOT management to understand the importance of data quality, trained experts, and analytic tools to allow the best safety improvement decisions to be made. Data improvements "don't cut ribbons"; there are different techniques required to visualize these improvements. The data elements that are collected should at a minimum cover the inputs needed for analysis. Guidance on why data quality is important, on what training is critical to success, and on efforts to link datasets for detailed analysis, are all items to be emphasized with State DOT management.

PRIORITY

HIGH – This action was a key finding from the State data capability assessments. It was supported by the first two peer exchanges. The team also identified this as a key priority to move data improvements forward in involved States. In the last two peer exchanges, 15 participants out of 19 States / Territories ranked this action as a top three priority in the data analysis emphasis area.

POTENTIAL DELIVERY METHODS

☒	**Talking points**	☒	Community of practice
☒	**Management briefings**	☐	Symposium, conference, or summit
☒	Videos or CD-ROMs	☐	Site visits
☒	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☐	Literature review
☒	Panel discussion	☐	Best practices
☐	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that talking points and management briefings be developed to understand the importance of data quality, trained experts, and analytic tools to allow the best safety improvement decisions. The team also recommends that FHWA State Division Offices attend periodic webinars to elevate and encourage the dialogue between the Division Offices and State DOT management. These talking points and management briefings would support the Focused Approach to Safety and MAP-21 requirements for safety data systems.

B. Develop a reference with noteworthy practices and host a peer exchange exploring how to improve data analysis and data sharing tools and techniques, including the CMF Clearinghouse, using HSIP funds at the State and local level.

DETAILED DESCRIPTION AND MOTIVATION

Noteworthy practices are required to demonstrate the potential use of HSIP funds to create a robust safety data system and to implement analysis techniques with new tools in each State. It was mentioned at the Missouri Peer Exchange that one website for data analysis would be a good next step for practitioners looking for guidance and support.

The specific needs of local agencies and rural road applications need to be considered in deploying data analysis tools and methodologies. Tools developed for the State DOT may be too complicated for local agencies. Strong network screening tools can be hindered by a lack of local data. Local agencies should be an active participant in identifying safety solutions; however, it may be more effective for the State DOT to identify projects with the assistance of relevant local agencies. Deploying Safety Analyst required a significant level of investment in terms of resources and data. The FDEs were created, in part, to assist with the deployment of Safety Analyst and to better define what roadway inventory data are required for improved data analysis capabilities. Outside expertise is needed to show States how to deploy Safety Analyst. States agreed that Safety Analyst deployment at the local level is highly unlikely, given the requirements.

FHWA could provide additional support in the form of comprehensive peer exchanges and additional tools (e.g., for rural roads and systematic approaches). FHWA could support States with flexible spreadsheet tools for safety analysis, as well as simplified tools for use by local agencies.

PRIORITY

HIGH – This action was a key finding from the State data capability assessments. It was supported by the first two peer exchanges. The team also identified this as a key priority to move data improvements forward in involved States. In the last two peer exchanges, 12 participants out of 19 States / Territories ranked this action as a top three priority in the data analysis emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☐	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	**Best practices**
☐	Domestic / international scans	☒	Case studies
☒	**Peer exchanges**	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends developing noteworthy practices and hosting a peer exchange to provide a comprehensive look at how to fund and utilize new data analysis tools and techniques at the State, regional, and local level. States that developed analysis tools or techniques to handle rural roads in a systemic approach should also be shared in a peer exchange or documented. These noteworthy practices would support States to consider safety on all public roadways.

C. Develop training to deliver advanced analytic techniques for the Roadway Safety Management Process (HSM Part B), including the systemic approach, to State and local agencies, as well as map and link data in analysis tools such as Safety Analyst.

DETAILED DESCRIPTION AND MOTIVATION

Although not explicitly stated, it is clear that the top-level "goal" for highway safety analysis is for States to adopt use of advanced analytic techniques for the Roadway Safety Management Process (HSM Part B), including the systemic approach. Whether a State adopts the HSM as its standard or develops its own methods, the hope is that States can move away from methods that are prone to math errors. Not all States are as far along as they could or should be at this point. FHWA is already doing a lot to promote use of advanced analytic techniques, but there is a need for more training as well as sharing of ideas among States. The safety workforce may be inexperienced in data analysis and could benefit from general safety data training.

States discussed the importance of Safety Analyst software, not only as an analysis tool, but also as a means to bring together and integrate the efforts of different agencies under one umbrella. During the peer exchanges, States noted their concern about how Safety Analyst requires a great deal of data to be fully utilized; however, this could be useful when identifying which important data is missing or needed. Additional concerns were raised about the difficulty of mapping data (i.e., crash to roadway data) when attempting to use data analysis tools. A suggestion was to have in place a good linear referencing system (LRS) to make mapping easier and simpler.

FHWA could support States by providing expertise on the resources needed to deploy Safety Analyst. Data on resources that Safety Analyst can save agencies by reducing the number of sites they investigate and increasing the effectiveness of safety projects would lead to better-informed decisions about deploying Safety Analyst. Moreover, deployment of Safety Analyst can justify the need for organizational changes like implementation of data management concepts or data standardization, which may be another selling point for DOT management.

PRIORITY

CRITICAL – This action was a key finding from the State data capability assessments. It was supported by the first two peer exchanges. The team also identified this as a key priority to move data improvements forward in involved States. In the last two peer exchanges, 6 participants out of 19 States / Territories ranked this action as a top three priority in the data analysis emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☒	Management briefings	☐	Symposium, conference, or summit
☒	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	**Training / presentation / webinars**	☐	Literature review
☒	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	Case studies
☒	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that new training modules and webinars be developed to provide guidance on how to use advanced analytic techniques for network screening, countermeasure selection, and evaluation. States want to know how to map analysis tools, such as Safety Analyst, to their existing safety data. These training modules would grow a cadre of safety professionals and their analysis skills to consider safety on all public roadways.

D. Develop a reference on how to handle tort liability involved with providing safety data, in particular results from safety analysis.

DETAILED DESCRIPTION AND MOTIVATION

At the State, regional, and local level, jurisdictions are hesitant to share their network screening results with potential partners or the public. Some are reluctant to report any results for potential sites of opportunity because there is little understanding about the true impacts and rules related to risk management and tort liability. Knowledge of techniques to protect governing entities from exposure to risk is not widespread making it difficult to communicate to partners potential liability issues. Several States requested additional guidance to enhance the sharing of the results of their data analysis.

PRIORITY

MEDIUM – The team identified this as a key priority to move data analysis results forward in involved States. In the last two peer exchanges, 3 participants out of 19 States / Territories ranked this action as a top three priority in the data analysis emphasis area.

POTENTIAL DELIVERY METHODS

☒	**Talking points**	☒	Community of practice
☒	**Management briefings**	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☒	Panel discussion	☒	Best practices
☐	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that a reference containing talking points or management briefings be developed to provide safety professionals and managers a level of comfort surrounding tort liability and safety analysis. FHWA Division Offices could use these talking points to set expectations with State DOT management regarding safety analysis and work through any challenges that may arise. These management briefings would support States to remove legal barriers to effective safety data analysis. This action is similar to an action listed in the data management section and may be combined.

E. Provide training on how MMUCC 4th Edition affects data analysis and screening.

DETAILED DESCRIPTION AND MOTIVATION

MMUCC is a voluntary set of guidelines to promote consistency in crash data collection. It describes a minimum, standardized dataset for describing motor vehicle crashes, which generate the information necessary analyze safety data. MMUCC helps States collect consistent, reliable crash data effective for identifying traffic safety problems, establishing goals and performance measures, and monitoring the progress of programs. MMUCC 4th Edition adjusts the "speeding-related element" to better capture crashes in which speeding was involved, expands the "driver distracted by" data element, and recommends a simpler set of definitions for injury status (KABCO) attributes. States want to know how these proposed changes affect data analysis and screening.

PRIORITY

LOW – In the last two peer exchanges, 3 participants out of 19 States / Territories ranked this action as a top three priority in the data analysis emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	**Training / presentation / webinars**	☐	Literature review
☒	Panel discussion	☐	Best practices
☐	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that a new training module be developed in conjunction with the National Highway Traffic Safety Administration (NHTSA) to provide guidance on how proposed MMUCC changes affect data analysis and screening. NHTSA is currently updating an online training program. This new online training module could support States to collect consistent, reliable crash data effective for identifying traffic safety problems.

F. Develop a reference containing noteworthy practices to show States how to incorporate safety into larger transportation projects so that safety dollars can be added to other projects to expand their crash reduction benefit.

DETAILED DESCRIPTION AND MOTIVATION

In many State DOTs, the safety considerations may be limited to just the HSIP program or hard to track since there are no FHWA approval codes for safety. The planning, maintenance and design of new and existing transportation construction projects may have a limited or no crash analysis component to prioritize improvements from a safety perspective. The HSIP Program Managers are looking for additional guidance and direction through noteworthy practices to determine how to leverage HSIP funds to better target and reduce severe crashes on non-HSIP transportation projects. Safety culture creates policies that are favorable to letting the HSIP program positively influence other areas of a State DOT. By providing model best practices, FHWA can assist States to achieve their safety performance measurements and their SHSP safety goals.

PRIORITY

LOW – In the last two peer exchanges, 5 participants out of 19 States / Territories ranked this action as a top three priority in the data analysis emphasis area.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	**Best practices**
☒	Domestic / international scans	☒	Case studies
☐	Peer exchanges	☐	Guidebook

TEAM RECOMMENDATION

The project team recommends that a series of noteworthy practices be developed to leverage HSIP funds to better target and reduce severe crashes on non-HSIP transportation projects. These practices could be fashioned into a framework that would support States' safety goals and allow for better safety decision-making.

G. Develop a behavioral-focused analytic companion to the HSM to match the rigor of the engineering countermeasure selection analysis.

DETAILED DESCRIPTION AND MOTIVATION

Although the RSDP is focused specifically on roadway data, it should be recognized that safety depends to a great extent on the human factor and that the level of analytic sophistication in this important area is lagging. At present, there is not a behavioral-focused analytic equivalent of the HSM. There has been talk of a behavioral companion to the HSM for years; but in the meantime, serious consideration should be given to how we can raise the analytic bar on the behavioral side of safety. FHWA can help to focus attention on this issue and work with the other safety partners and the surface transportation modes to foster a higher level of analytic sophistication.

PRIORITY

MEDIUM – This action was added by the team independent of the capability assessment results and the peer exchanges. It was not vetted by the peer exchange participants.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☒	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☒	**Guidebook**
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that a guidebook be developed to raise the analytic sophistication on behavioral issues. This guidebook would complement the existing HSM and is an important component of a comprehensive approach to improving safety outcomes.

DATA MANAGEMENT

This section summarizes the following actions to improve data management and discusses each action using the framework established in the introduction.

	Action		Priority
Data Management	A	Develop a reference for States to integrate data from various agencies and move towards a modern relational database with a comprehensive data clearinghouse for centralized and decentralized structures.	HIGH
	B	Provide a reference to include pilots and case studies for State DOT leaders to understand how highly ranked data management States use data governance and data management through a strong IT-driven data governance process or alternative means.	CRITICAL
	C	Develop a common glossary of terms can assist safety professionals to understand information technology (IT) terminology and vice versa.	HIGH
	D	Provide a reference for State DOTs to understand the benefits of how to use data management documentation to retain institutional knowledge, practices, organizational structures, etc.	HIGH
	E	Develop a reference for State DOTs that includes talking points and training webinars on data sharing expectations for roadway safety data for the public and between stakeholders.	MEDIUM
	F	Develop and implement performance measurement models where system-wide performance is monitored.	MEDIUM
	G	Conduct model pilots and case studies on data quality management from highly ranked data management States.	CRITICAL
	H	Develop and implement USDOT coordination models where FHWA Division Offices coordinate with NHTSA and the Federal Motor Carrier Safety Administration (FMCSA), and the three administrations act in concert, eliminate duplicative efforts, and mutually reinforce USDOT objectives.	HIGH

A. Develop a reference for States on how to integrate data from various agencies and move towards a modern relational database with a comprehensive data clearinghouse for centralized and decentralized structures.

DETAILED DESCRIPTION AND MOTIVATION

As recorded in the peer exchanges, there are four types of roadway safety data systems:

- Centralized – where the State file has a complete view of everything making standards crucial. This model requires manual integration efforts, particularly for local jurisdictions and the cost is typically solely at the DOT.
- Decentralized – where legacy model have silos and modern models have links with only one copy of any particular record.
- Enterprise-wide Data Systems – where all data are accessible through a single system that is usually spatially-based and housed at the DOT or a statewide IT department. These systems have better analysis tools and are easier to maintain and control, but expensive and time-consuming to build.
- Service-Oriented Architecture – "Software as a Service," includes web services and allows users to "bring your own device."

While putting everything into a centralized model requires a lot of effort and can be difficult to implement, tools for integrating data sets are getting better, and it may be easier to combine data in a data mart or a smaller data warehouse.

Enterprise-wide data systems require a coordinated organizational effort and a long range vision of where and how data resources are deployed. An enterprise data system requires commitment from across an organization, but the payoff can be huge. They often fail because there are not enough personnel or financial resources, and the timeframes are often too short. As agencies experience some failures in implementing this concept, successes will follow.

"Big data" is a hot topic now and there has always been a focus on decision-making. The Transportation Research Board (TRB) and National Cooperative Highway Research Program (NCHRP) projects are looking at geographic information systems (GIS), business intelligence, and applications of data to intelligent decision-making. Tools are getting better to do these things; however, the hardest part is integrating the data across an enterprise. FHWA can assist by exploring these structures further and demonstrating the models. States need to know best practices in shifting into a GIS warehouse or traffic safety data fusion center.

PRIORITY

HIGH – This action was supported by the first two peer exchanges. In the last two peer exchanges, 15 participants out of 19 States / Territories ranked this action as a top three priority in the data management emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☒	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	**Case studies**
☒	Peer exchanges	☒	Guidebook
☒	**Other: Model Pilots**	☐	Other:

TEAM RECOMMENDATION

The project team recommends that new case studies and pilots provide guidance on how to structure data management practices and integrate the data across an enterprise. States want to know what the pros and cons are to the various data management structures and decide which structure would best assist them in meeting their safety analysis needs. These case studies would support States to meet their safety data capability needs in the most efficient and cost-effective data management structure.

B. Provide a reference to include pilots and case studies for State DOT leaders to understand how highly ranked data management States use data governance and data management through a strong IT-driven data governance process or alternative means.

DETAILED DESCRIPTION AND MOTIVATION

There is no obvious goal for data management of highway safety data. Should States truly aspire to having a strong IT-driven data governance process, or, should they strive to have systems and data to meet users' needs regardless of how they are governed? These two concerns are not incompatible, but we often see that the system management initiatives in safety data are placed too low in the set of IT priorities and that, as a result, users are left either without data or having to develop work-arounds to get their jobs done. At the national level, some case studies or pilots of successful partnerships among the creators, managers, and users of systems are needed. In particular, if *data governance* is a "goal", then practitioners have to be convinced that inviting IT into the process can result in better systems, more responsive support, and, ultimately, more satisfied users. This is one key area of the RSDP capabilities matrix where we had several States shying away from the "top" level of capability because, in their present environments, it would mean turning control of a key system over to *adversaries* in the IT group. FHWA can help to develop the models for how data governance can work. This is also a good opportunity for peer exchange in which States could describe how they succeeded (or failed) and what other States can do to replicate the successes and avoid the pitfalls.

PRIORITY

CRITICAL – This action was a key finding from the State data capability assessments. The team also identified this as a key priority to move data improvements forward in involved States. It was supported by the first two peer exchanges. In the last two peer exchanges, 6 participants out of 19 States / Territories ranked this action as a top three priority in the data management emphasis area.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☒	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☒	Program reviews
☐	Training / presentation / webinars	☒	Literature review
☒	Panel discussion	☒	Best practices
☒	Domestic / international scans	☒	**Case studies**
☐	Peer exchanges	☐	Guidebook
☐	Other:	☒	**Other: Pilots**

TEAM RECOMMENDATION

The project team recommends new case studies and pilots to provide guidance on how highly ranked data management States use data governance and how to advance system management initiatives. States want to know how successful IT partnerships among the system developers, managers, and users can benefit practitioners through better systems, more responsive support, and satisfied users. These case studies and pilots would dovetail into the previous proposed action. The case studies would support States to meet their safety data capability needs by documenting what works well and how to select the best data management model to match a particular need. This reference should note how to advance and elevate system management initiatives involving safety data higher in the set of IT priorities. Case studies should include national data governance models where successful IT partnerships among the system developers, managers, and users benefit practitioners through better systems, more responsive support, and satisfied users.

C. Develop a common glossary of terms to assist safety professionals to understand IT terminology and vice versa. This glossary could be part of a larger guidebook, described in the action following this one, that focuses on effective data management documentation techniques.

DETAILED DESCRIPTION AND MOTIVATION

Early on in the pilot portion of the data capabilities assessment, the team found that the original data management portion of the questionnaire was not understood by the States. As a result, there was a significant revision performed to clarify and simplify this section of the assessment. A number of the questions were placed in the appendix and set aside specifically for IT professionals to respond to as the IT language was not understood by transportation engineers. Similarly, IT professionals often do not grasp the language, vision, mission, and goals of traffic safety engineers and planners. There is no ready resource describing to IT professionals the process of data collection, analysis, and management to achieve the end goals of selecting sites with promise to fund appropriate 4-E improvements. FHWA can provide guidance to bridge the language differences between IT professionals and safety professionals.

PRIORITY

HIGH – This action was a key finding from the State data capability assessments. It was supported by the first two peer exchanges. In the last two peer exchanges, 7 participants out of 19 States / Territories ranked this action as a top three priority in the data management emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☐	Best practices
☐	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☒	**Guidebook**
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that a new guidebook be developed to bridge the language differences between IT professionals and safety professionals. This guidebook would

support both safety and IT professionals to communicate needs and limitations regarding people, policies, and technology. It is recommended that this glossary be combined with the action following this one.

D. Provide a reference for State DOTs to understand the benefits of how to use data management documentation to retain institutional knowledge, practices, organizational structures, etc.

DETAILED DESCRIPTION AND MOTIVATION

With high turnover rates, retirements, and downsizing, documenting data management policies are critical to pass knowledge of systems and procedures onto the next set of employees to keep critical systems functioning and productive. *Data management policies* were the lowest ranked element in the data capabilities assessment nationwide. FHWA can provide information on the benefits of utilizing the best practices in IT policies as it relates to safety data management to retain institutional knowledge.

PRIORITY

HIGH – This action was supported by the first two peer exchanges. The team also identified this as a key priority to move data improvements forward in involved States. In the last two peer exchanges, 8 participants out of 19 States / Territories ranked this action as a top three priority in the data management emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☒	**Best practices**
☐	Domestic / international scans	☒	Case studies
☒	Peer exchanges	☒	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that common and noteworthy data management documentation techniques or policies be catalogued by topic area to retain institutional knowledge through policy documentation. These best practices would support State DOTs to pass critical institutional knowledge onto the next set of employees to keep these important systems functioning and productive.

E. Develop a reference for State DOTs that includes talking points and training webinars on data sharing expectations for roadway safety data for the public and between stakeholders. Provide an interpretation of the Washington State legal decision on release of data. Identify what information may be publically distributed.

DETAILED DESCRIPTION AND MOTIVATION

Throughout the peer exchanges, the States expressed an uncertainty on how their respective State laws affect their ability to share data between agencies and the public. Most of the concern was associated with tort liability issues. Many State DOT risk managers do not want to release detailed highway safety data to the public. This causes problems from a data quality perspective because one of the key mechanisms for identifying data improvement needs is to let as many people as possible use the data. There are no easy solutions here—tort liability is not an issue that is likely to decrease in importance without specific legislation. However, it should be possible to find examples of data access improvement that do not result in increased tort claims—several States have experience with exactly this outcome after making the data more accessible.

There is an opportunity for FHWA to set the proper expectations for communication, coordination, and cooperation. Simply raising the comfort level of risk managers with the selective release of data would be a good outcome for which to strive. By sharing State success stories, FHWA could help to counter the barriers to data access that exist in many DOTs. Other options might be to share model legislation among States so that risk managers can become aware of how other States have thought to solve the same problems.

PRIORITY

MEDIUM – In the last two peer exchanges, 6 participants out of 19 States / Territories ranked this action as a top three priority in the data management emphasis area.

POTENTIAL DELIVERY METHODS

☒	**Talking points**	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	**Training / presentation / webinars**	☒	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that new talking points or webinars be developed to provide safety professionals and managers a level of comfort surrounding tort liability and safety analysis. FHWA Division Offices could use these talking points to set expectations with State DOT management regarding data sharing and work through any challenges that may arise. These training webinars would support States to remove institutional barriers to effective safety data analysis. This action is similar to a data analysis action listed in the data analysis section and may be combined.

F. Develop and implement performance measurement models where system-wide performance is monitored. A safety data performance measurement peer exchange would also provide additional opportunities for States to share ideas.

DETAILED DESCRIPTION AND MOTIVATION

There are still too many States where system performance is measured only within a project, and not at the system-wide level. Because of this, we often know whether or not an individual project is meeting its targets, but not whether or how much the entire system has been affected. FHWA could help through the cooperative establishment of guidelines for system-wide performance measures and by setting up opportunities for States to share ideas (e.g., peer exchanges, a clearinghouse, etc.).

PRIORITY

MEDIUM – This action was added by the team independent of the capability assessment results and the peer exchanges. It was not vetted by the peer exchange participants.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☒	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☒	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	Case studies
☒	**Peer exchanges**	☒	Guidebook
☒	**Other: Pilots**	☐	Other:

TEAM RECOMMENDATION

The project team recommends pilots and peer exchanges to develop and share system-wide performance measures. These interactive activities would support States to measure safety outcomes in a way broader than just individual projects.

G. Conduct model pilots and case studies on data quality management from highly ranked data management States. Establish model methods and expectations for what constitutes "good data" and "proper data quality management" to formalize a comprehensive data quality management program.

DETAILED DESCRIPTION AND MOTIVATION

Few States have what could be called a formal, comprehensive data quality management program. Those that do have demonstrably better data than when they started. Too many States operate under the assumption that because they are using field data collection technology and software their data are now of acceptable quality. Without measurement of data quality, they can't prove it, and, often, the improvements in quality that are achieved are the result of the easiest fixes (timeliness is better, fewer reports come in with missing data). Data quality management practices are lacking even in some of the model States for electronic field data capture. National level actions to establish methods and expectations for what constitutes both "good data" and "proper data quality management" are needed.

PRIORITY

CRITICAL – This action was added by the team independent of the capability assessment results and the peer exchanges. It was not vetted by the peer exchange participants.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	**Case studies**
☐	Peer exchanges	☒	Guidebook
☐	Other:	☒	**Other: Pilots**

TEAM RECOMMENDATION

The project team recommends case studies and pilots to establish methods and expectations for what constitutes sufficient data quality. Formalizing a comprehensive data quality management program would support States to meet their safety analysis needs.

H. Develop and implement USDOT data coordination models where FHWA Division Offices coordinate with NHTSA and FMCSA, and the three administrations act in concert, eliminate duplicative efforts, and mutually reinforce USDOT objectives.

DETAILED DESCRIPTION AND MOTIVATION

FHWA Division Offices' efforts are not always well coordinated with their counterparts in the other surface modal agencies (FMCSA Division Offices, NHTSA Regional Offices). The States want USDOT to act in concert and, perhaps more to the point, stop the apparent duplications of effort.

There are too many unrelated strategic plans. It has created a new need: to coordinate and combine plans. This is a big undertaking in part because the plans are not always entirely compatible. States would benefit enormously from standards and examples. In particular, as States move from creating a plan to implementing it, examples of detailed action item table—what it is and how to use it—would be extremely valuable. This is one area where FHWA, FMCSA, and NHTSA could work together to assist States in coordinating their various plans and developing plans that mutually reinforce one another.

Some State DOTs are barred by state law from working on issues related to local roads per the interpretation of departmental lawyers at both State and local agencies. This makes it very difficult to place a "local road safety management" burden on the State DOT. Under its own State's law (or interpretation thereof) the DOT cannot legally comply. Data sharing and access to analytic resources are two good ways to bring State and local agencies into closer cooperation. This is something that FHWA, NHTSA, and FMCSA could work together on to foster improvement. Perhaps by targeting the largest States, the three Administrations could ensure that they gain the most for these coordination efforts.

PRIORITY

HIGH – In the last peer exchange, 4 participants out of 9 States / Territories ranked this action as a top three priority in the data management emphasis area. The team also identified this as a key priority to move data improvements forward in involved States.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☒	Guidebook
☐	Other:	☒	**Other: Model Pilots**

TEAM RECOMMENDATION

The project team recommends that new models of communication, coordination, and collaboration be established for USDOT agencies to act in concert, eliminate duplicative efforts, and mutually reinforce safety data objectives. FHWA, NHTSA, and other agencies would consolidate strategic planning efforts through detailed action plans that would detail how to implement the strategic plan. Division offices and State DOTs would benefit enormously from standards and examples. The Highway Performance Monitoring System (HPMS) presents an opportunity for better coordination and standardization.

DATA EXPANSION

This section summarizes the following actions to improve data expansion and discusses each action using the framework established in the introduction.

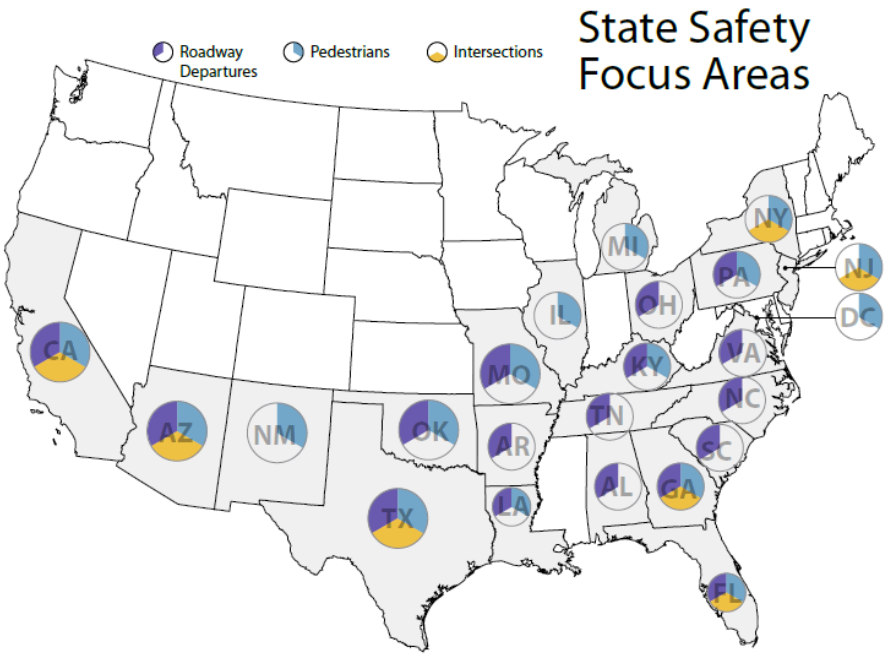
	Action		Priority
Data Expansion	A	Select and improve roadway safety data capabilities in focus States to support the vision and goals of the Focused Approach to Safety.	CRITICAL
	B	Provide roadway safety data training modules to enhance the program's visibility, consistency, and effectiveness.	HIGH
	C	Implement three to five case studies or pilots for State DOTs to understand how linking citation, injury, and driver data to other safety data can yield better safety decision-making and positive safety benefits.	HIGH
	D	Develop noteworthy practices and case studies on how TRCCs and Statewide Planning and Programming are structured, and how they disseminate information on data collected by various partners.	HIGH
	E	Develop model intergovernmental agreements with appropriate options for data sharing using examples from the States, regional MPOs, and local agencies.	MEDIUM
	F	Develop a reference for how States can adopt national standards for driver and injury data.	LOW
	G	Research and develop models for data sharing agreements, technical requirements, and overcoming barriers for local agency and regional MPOs to link to State DOT safety databases.	LOW
	H	Provide case studies and potentially pilots of what States should request for in their next system upgrade projects, particularly as it relates to data expansion models and vision statements.	HIGH
	I	Develop a presentation that highlights the latest LRS and GIS noteworthy practices to comprehensively collect and manage data for all public roadways and identify which practices rely on GIS to support access to expanded information.	HIGH
	J	Implement a multi-State cooperative project where each involved State contributes compatible (MIRE-compliant) roadway inventory data to show the value of the expanded set of data elements and reinforce the adoption of MIRE as the standard for safety analysis decision support systems	MEDIUM

A. Select and improve roadway safety data capabilities in focus States to support the vision and goals of the Focused Approach to Safety.

DETAILED DESCRIPTION AND MOTIVATION

The Focused Approach to Safety provides additional resources to eligible high priority States to address the Nation's most critical safety challenges through additional program benefits such as people, time, tools and training. Each eligible State participating in the Focused Approach can receive assistance to address fatality reductions in any one or all of three critical focus areas. These areas have been identified in providing the greatest potential to reduce highway fatalities using infrastructure-oriented improvements, namely: roadway departure, intersection-related crashes, and pedestrian crashes.

There are several focus States that have multiple focus areas. Some of these focus States need and desire targeted safety data improvements to provide better decisions related to safety project selection. This action recognizes that certain States have larger-than-average safety challenges and that improvements to their data capabilities can further the goals of the Focused Approach to Safety and leverage the resources of the Roadway Safety Data Program.



PRIORITY

CRITICAL – This action was a key finding from the State data capability assessments. It was supported by the first two peer exchanges. In the last two peer exchanges, 9 participants out of 19 States / Territories ranked this action as a top three priority in the data expansion emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☒	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☒	**Site visits**
☐	Clearinghouses	☒	**Program reviews**
☒	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☐	Best practices
☐	Domestic / international scans	☒	**Case studies**
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that three to five focus States that have a high demand for roadway safety data capability improvements, and a strong desire to improve, be selected and granted technical assistance through an application process. This technical assistance would include site visits, program reviews, and recommendations to advance their data capability through a tailored approach. Case studies would be generated from the results to share with other States. Division offices and State DOTs would benefit from this initiative.

B. Provide roadway safety data training modules to enhance the program's visibility, consistency, and effectiveness.

DETAILED DESCRIPTION AND MOTIVATION

This action focuses on obtaining leadership and State DOT management support for expanding and improving the linkages and interoperability between safety datasets. There are many ideas that compete for a State DOT's attention and there is not a consistent program to raise the visibility of the benefits and resources available to upgrade safety data. By providing training to create a cadre of safety data professionals, the State DOT can grow the human resources required to provide more consistent and effective safety data programs. With retirements, down-sizing, and turnover, it is difficult to obtain leadership support and sustain a data improvement program. When there is top-level training and marketing available for State DOTs, data professionals can use it to make their case; then, there is the opportunity to push against these challenges and improve the program's effectiveness.

PRIORITY

HIGH – This action was a key finding from the State data capability assessments. It was supported by the first two peer exchanges. The team also identified this as a key priority to move data improvements forward in involved States. In the last two peer exchanges, 12 participants out of 19 States / Territories ranked this action as a top three priority in the data expansion emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☒	**Management briefings**	☒	Symposium, conference, or summit
☒	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	**Training / presentation / webinars**	☐	Literature review
☒	Panel discussion	☐	Best practices
☐	Domestic / international scans	☐	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that management briefings and leadership training modules be developed to highlight the importance of roadway safety data and the need for program support through financial, technical, and human resources. These management briefings

are critical tools for FHWA Division safety professionals and State DOTs' managers to move safety data improvements forward and to address the challenges of sustaining an improvement program. There are other actions very similar to this recommended action. These actions could be combined as components of a successful data expansion program to sustain leadership support. These training modules would support the Focused Approach to Safety and MAP-21 requirements for safety data systems.

C. Implement three to five case studies or pilots for State DOTs to understand how linking citation, injury, and driver data to other safety data can yield better safety decision-making and positive safety benefits.

DETAILED DESCRIPTION AND MOTIVATION

This action comes from several States that want concrete examples of the benefits of linking citation, injury, or driver data to traditional safety data (crash, roadway, traffic). Injury and citation data can present challenging legal barriers, processes, and concerns. States want to see how another State uses the links to make better decisions. If FHWA can provide best practices or case studies on successful deployments, then data linkage models could be developed and deployed in other States that have lower capability.

PRIORITY

HIGH – This action was a key finding from the State data capability assessments. It was supported by the first two peer exchanges. The team also identified this as a key priority to move data improvements forward in involved States. In the last two peer exchanges, 7 participants out of 19 States / Territories ranked this action as a top three priority in the data expansion emphasis area.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☒	Site visits
☐	Clearinghouses	☒	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☒	Domestic / international scans	☒	**Case studies**
☐	Peer exchanges	☒	Guidebook
☐	Other:	☒	**Other: Pilots**

TEAM RECOMMENDATION

The project team recommends that case studies for existing examples (or pilots if no examples exist) be developed to highlight the benefits of linking citation, injury, or driver data to traditional safety data. These case studies would support the data expansion objectives of the States and local agencies, as well as NHTSA and FMCSA, to perform new safety analysis, improve problem identification and improve safety outcomes.

D. Develop noteworthy practices and case studies on how TRCCs and Statewide Planning and Programming are structured, and how they disseminate information on data collected by various partners (e.g., judicial data, department of health data, transportation data).

DETAILED DESCRIPTION AND MOTIVATION

In some States, more connection between the TRCC and infrastructure safety professionals is needed. There are several different models for TRCCs to operate. FHWA could provide guidance on these models through case studies and develop a process for TRCCs to use to improve their organizational structure to meet their data expansion goals. One of the first steps to expanding and linking useful datasets is to explore what data the various involved safety partners collect. By mapping where the data are collected through surveys, these initial steps could be institutionalized and move a State TRCC on a path to improve their data expansion capabilities.

PRIORITY

HIGH – This action was supported by the first two peer exchanges. The team also identified this as a key priority to move data improvements forward in involved States. In the last two peer exchanges, 14 participants out of 19 States / Territories ranked this action as a top three priority in the data expansion emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☐	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	**Best practices**
☐	Domestic / international scans	☒	**Case studies**
☐	Peer exchanges	☒	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that noteworthy practices and case studies be developed to highlight the how TRCCs are structured and how TRCCs engage their members to determine what data are currently collected and how they embark on data expansion projects. These case studies would support the data expansion objectives of the States to structure their TRCC to support appropriate projects.

E. Develop model intergovernmental agreements with appropriate options for data sharing using examples from the States, regional MPOs, and local agencies.

DETAILED DESCRIPTION AND MOTIVATION

Intergovernmental agreements for data improvements are important for various local, State, and Federal agencies to share safety data. In order to improve data linkage, FHWA could create several model agreements to demonstrate what legal components a local to State or a State to regional agency agreement might use for effective data sharing.

PRIORITY

MEDIUM – In the last two peer exchanges, 5 participants out of 19 States / Territories ranked this action as a top three priority in the data expansion emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☒	**Other: Model Agreements**

TEAM RECOMMENDATION

The project team recommends that model intergovernmental agreements be developed to provide examples to State DOTs of the components required for effective data expansion and sharing activities. These agreements would support the data expansion objectives of the States to share roadway safety data.

F. Develop a reference for how States can adopt national standards for driver and injury data.

DETAILED DESCRIPTION AND MOTIVATION

The two systems listed (driver and injury) already have national standards. Whether States have adopted them or not is another question. This might be a partnering opportunity with NHTSA to develop a reference that has an equivalent to FHWA's MIRE and FDEs. This action originally listed citation data as a candidate for national standards. The project team removed citation data from this action as a national standard citation is not likely as citations always reference specific sections of state code. This suggestion is akin to asking States to develop a standard set of traffic laws.

PRIORITY

LOW – In the last two peer exchanges, 3 participants out of 19 States / Territories ranked this action as a top three priority in the data expansion emphasis area.

POTENTIAL DELIVERY METHODS

☒	**Talking points**	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☒	Program reviews
☐	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that talking points be developed to link existing resources for driver and injury data standards to State Department of Motor Vehicle agencies to ensure all of the appropriate date components are collected and linked. These talking points would support the data expansion objectives of the States to comprehensively share roadway safety data.

G. Research and develop models for data sharing agreements, technical requirements, and overcoming barriers for local agency and regional MPOs to link to State DOT safety databases.

DETAILED DESCRIPTION AND MOTIVATION

The State data capabilities assessment results focused on State-level government. From other FHWA work, the team recognized that safety data can be more robust at the MPO or local level. Several States identified relationships with local or regional jurisdictions to share and cleanse safety data and return to the data stewards. FHWA could develop models of linking State safety data to local and regional datasets. These models could also outline the sharing agreements, technical requirements, and benefits of these partnerships.

PRIORITY

LOW – In the last two peer exchanges, 2 participants out of 19 States / Territories ranked this action as a top three priority in the data expansion emphasis area.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that model intergovernmental agreements be developed to provide examples to State DOTs of the components required for effective data expansion and sharing activities. These agreements would support the data expansion objectives of the States to share roadway safety data.

H. Provide case studies and potentially pilots of what States should request for in their next system upgrade projects, particularly as it relates to data expansion models and vision statements.

DETAILED DESCRIPTION AND MOTIVATION

There is no clearly defined goal that would give States an idea of what should be possible to accomplish with their systems. They know that "stovepipes" are bad, and, as users, they know the downsides of data systems that are not well designed, modern databases. What States may not know is what is truly possible. What should they be asking for in their next system upgrade/replacement projects? They need more specific guidance than just that their systems should be easy to update or expand, and that the data should be compatible with data in other systems so that the information can be linked. Examples of why linked data sets are valuable and how to successfully establish a linked data set are crucial. States need peer examples of how to get such a system successfully under contract, designed, built, and implemented. FHWA could develop this type of guidance in conjunction with the guidance related to data governance. The hope would be that States with success stories could share those with their peers. In addition, it would be very useful for States to share examples of the utility of data integration efforts—what new analyses can a State perform by virtue of having access to a database that combines roadway information with other sources of data.

PRIORITY

HIGH – This action was added by the team independent of the capability assessment results and the peer exchanges. It was not vetted by the peer exchange participants.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	Community of practice
☒	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☒	Training / presentation / webinars	☒	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	**Case studies**
☐	Peer exchanges	☒	Guidebook
☐	Other:	☒	**Other: Pilots**

TEAM RECOMMENDATION

The project team recommends that case studies be developed from existing examples (or potentially pilots where no viable examples exist) to provide examples to State DOTs of the contract components required and what is possible for effective data expansion and sharing activities. These highlighted examples should be current and show how to construct and implement a system with linked data sets and emphasize why linked data sets are valuable. It is also important to outline for State DOTs, the utility of data integration efforts and what new analyses a State can perform with other sources of data. These case studies and pilots would support the data expansion objectives of the States through a better vision of what is possible to implement roadway safety data improvements.

I. Develop a presentation that highlights the latest LRS and GIS noteworthy practices to comprehensively collect and manage data for all public roadways and identify which practices rely on GIS to support access to expanded information.

DETAILED DESCRIPTION AND MOTIVATION

The call to collect and manage data for *all* public roadways (not just those that the State maintains or those eligible for Federal-aid) is prompting States to increase the coverage of their roadway inventory files. A comprehensive base map for integrated data collection methods are a basic need of many States. These solutions all rely on GIS rather than a series of flat (not geospatial) files to allow access to the expanded information. These best practices would serve as good examples that could be presented in peer exchanges or documented in a clearinghouse setting.

PRIORITY

HIGH – This action was added by the team independent of the capability assessment results and the peer exchanges. It was not vetted by the peer exchange participants.

POTENTIAL DELIVERY METHODS

☒	Talking points	☒	**Community of practice**
☐	Management briefings	☐	Symposium, conference, or summit
☐	Videos or CD-ROMs	☒	Site visits
☐	Clearinghouses	☒	Program reviews
☒	**Training / presentation / webinars**	☒	Literature review
☐	Panel discussion	☒	**Best practices**
☐	Domestic / international scans	☒	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☐	Other:

TEAM RECOMMENDATION

The project team recommends that the latest LRS and GIS practices be highlighted in a community of practice as this area is evolving. These latest practices could also be summarized into a training presentation and presented at conferences or peer exchanges with additional references for further information to collect and manage safety data on all public roadways. These noteworthy practices would support the data expansion objectives of the States utilizing the most recent tools and techniques.

J. Implement a multi-State cooperative project where each involved State contributes roadway inventory data (compliant with MIRE recommendations) to show the value of the expanded set of data elements and reinforce the adoption of MIRE as the standard for safety analysis decision support systems.

DETAILED DESCRIPTION AND MOTIVATION

A national-level adoption of MIRE as the standard for a decision support system for safety analysis would be a boon to shared data and analysis. That would be especially helpful to small States that cannot always find enough data in their own State to conduct valid analyses (especially valid analyses of safety countermeasure effectiveness). There are other values to having national level data related to roadway infrastructure. Those benefits are among the reasons for MIRE's creation, but it must also be recognized that multi-state datasets could be of real benefit in small States, States with low crash frequency counts, and States with limited analytic resources. A multi-State cooperative project where each State contributes roadway inventory data (compliant with MIRE recommendations) could show the value of the expanded set of data elements.

PRIORITY

MEDIUM – This action was added by the team independent of the capability assessment results and the peer exchanges. It was not vetted by the peer exchange participants.

POTENTIAL DELIVERY METHODS

☐	Talking points	☒	Community of practice
☒	Management briefings	☐	Symposium, conference or summit
☐	Videos or cd-roms	☐	Site visits
☐	Clearinghouses	☐	Program reviews
☐	Training / presentation / webinars	☐	Literature review
☐	Panel discussion	☒	Best practices
☐	Domestic / international scans	☒	Case studies
☐	Peer exchanges	☐	Guidebook
☐	Other:	☒	**Other: Pilots**

TEAM RECOMMENDATION

The project team recommends that a multi-State project be implemented with data compliant with MIRE recommendations and/or Safety Analyst States to demonstrate the benefits of compatible data systems. It is possible that some of the HSIS States could be included as they are used to working with the FHWA. These model projects would support the data expansion objectives of the States utilizing common MIRE elements.