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BUILDING LINKS TO IMPROVE SAFETY: HOW SAFETY AND TRANSPORTATION PLANNING PRACTITIONERS WORK TOGETHER



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16. Abstract The 1998 Transportation Equity Act for the 21 st Century (TEA 21) included safety as a priority planning factor in the transportation planning process. The legislation provides an opportunity to identify effective safety strategies and to integrate these strategies into all phases of the performance-based transportation planning processes. An explicit consideration of safety issues can be part of every phase of the transportation process from planning through design, construction, and operations. The ultimate goal is to identify, early in the transportation planning process, methods for addressing safety issues and reducing the human, economic, and environmental consequences of fatal and serious injury crashes. The purpose of this Resource Guide is to provide State Departments of Transportation (DOT), Federal Highway Administration (FHWA) Division offices, Metropolitan Planning Organizations (MPO), and local and Tribal agencies a toolkit of strategies to integrate the safety and transportation planning processes. Also, State Highway Safety Offices (SHSO) may benefit from the information presented on the planning processes. The Guide is presented as three modules: information on safety and the safety planning process for transportation planners, the second with information on the transportation planning process for safety specialists, and the third presenting strategies and practices to integrate the safety and transportation planning processes.			
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Preface

In August 2016, the National Highway Traffic Safety Administration (NHTSA) reported for 2015, 35,092 people died in motor vehicle traffic crashes, about a 7.2 percent increase compared to the 32,744 fatalities in 2014. The fatality rate for 2015 also increased from 1.08 to 1.12 fatalities per 100 million vehicle miles traveled (VMT). The increases are particularly significant among motorcyclists, pedestrians, and pedal cyclists.¹

These alarming statistics call for a renewed emphasis on safety in policy and practice. An explicit consideration of safety issues can be part of every phase of the transportation process from planning through design, construction, and operations. The purpose of this Resource Guide is to provide State Departments of Transportation (DOT), Federal Highway Administration (FHWA) Division offices, Metropolitan Planning Organizations (MPO), and local and Tribal agencies a toolkit of strategies to integrate the safety and transportation planning processes. Also, State Highway Safety Offices (SHSO) may benefit from the information presented on the planning processes.

In the 1998 Transportation Equity Act for the 21st Century (TEA-21), Congress included safety as a priority planning factor in the transportation planning process. The requirement has been enhanced and renewed in all transportation reauthorization legislation since. The legislation provides an opportunity to identify effective safety strategies and processes and integrate the findings into all phases of the performance-based transportation planning processes. The ultimate goal is to identify, early in the transportation planning process, methods for addressing safety issues and reducing the human, economic, and environmental consequences of fatal and serious injury crashes.

The Guide is presented in three modules.

- **Module One**—Introduction to safety and the safety planning process for transportation planners.
- **Module Two**—Introduction to the transportation planning process for safety specialists.
- **Module Three**—Strategies and practices to integrate the safety and transportation planning processes.

The strategies and practices represent a collection of information gathered from a literature review, a questionnaire completed by FHWA Divisions, interviews conducted with transportation planners and safety specialists in five States with a successful track record of linking the transportation and safety planning efforts (Arizona, California, Iowa, Oregon, and Virginia), and experiences and observations of the consultant team and FHWA personnel on the project management team.

¹ NHTSA, Traffic Safety Facts: 2015 Motor Vehicle Crashes: Overview, August 2016, DOT HS 812 318.

1.0 Module 1: Fundamentals of Safety

This module describes safety as a discipline within the transportation industry. It is designed to inform transportation planners and practitioners with adequate knowledge of safety and opportunities for incorporating a consideration of safety in all phases of the transportation planning process. The module includes a discussion of identifying the safety stakeholders, legislation, plans and processes, data and analysis methods, and funding.

Introduction

The goal of safety planning is to reduce fatalities and serious injuries on all public roads. Safety planning is a collaborative and integrated approach that brings together safety partners to leverage resources for a common safety goal. A data-driven safety planning process can identify opportunities to address the safety performance of a roadway.

Transportation safety is a required factor in the planning process and transportation planners are key partners ensuring that safety is an integral component of all planning processes. With knowledge and understanding of safety and safety planning, transportation planners can enhance collaboration, communication, and coordination with their safety specialist partners to achieve the goal of reducing serious injuries and fatalities.

Safety Stakeholders

Transportation safety performance is linked to a variety of elements, including roadway design, traffic law enforcement, road user behavior, and emergency response time. Therefore, effective transportation safety warrants a multidisciplinary approach. Over the past 15 to 20 years, safety practitioners have found value in partnering with a variety of other disciplines, such as public health, advocacy groups, universities, and others to more fully engage the community and the public in safety enhancements. The key players differ from State to State and community to community. Safety stakeholders are becoming increasingly adept in recognizing opportunities for partnerships to help attain safety goals and objectives. This section identifies major safety stakeholders and their roles in the safety planning process.

The 4 Es of Safety

To plan for and shape a safer transportation system, agencies typically consider strategies from engineering, education, enforcement, and emergency medical services (EMS) to improve safety outcomes.

Engineering: Engineers play a critical role in identifying and recommending solutions to address safety performance of the transportation infrastructure. Some of their responsibilities may include managing and participating in the development and implementation of a Statewide or regional road safety plan; collecting and managing crash data; analyzing crash data to identify safety issues and projects; utilizing analysis methods, such as network screening, and sharing the results; identifying safety projects and countermeasures; designing improvements; conducting before and after studies; managing roadway improvements; and coordinating safety issues with other Statewide, regional, and local engineers.

Enforcement: Law enforcement personnel generally are responsible for collecting crash data, traffic law enforcement, behavioral safety campaigns, and sharing information with transportation professionals. In the

event crashes do occur, law enforcement collect data for crash reports, which provide details on the crash itself, such as the people and vehicles involved and the environmental circumstances. This information is critical to planners and engineers who use it to identify and address safety issues.

Emergency Medical Services: This group includes first responders and paramedics, fire and rescue personnel, law enforcement, Department of Transportation (DOT) personnel, and tow truck operators. Crash survival and injury severity are integrally linked to response time and the medical care received after a crash. EMS personnel understanding of impediments to effect response and recovery can be critical. Emergency responders can provide insights into health and trauma data recorded at the crash scene and updated at the hospital to more accurately report fatalities and serious injuries; advise on emergency responder safety as they work a crash scene; discuss how to collect better data (i.e., blood draws) at the crash scene to understand all the factors involved; and share knowledge on roadway connectivity or other issues, which may hinder rapid emergency response and transport.

Education: Transportation systems users are not always aware of the risks associated with their behaviors. This community may include school teachers and administrators, hospital and emergency medical services personnel, driver education instructors, health educators, advocacy groups, DOTs, Metropolitan Planning Organizations (MPO), State Highway Safety Offices (SHSO), and others. Specific roles differ by agency or group, but the main purpose is to administer, advocate for, and implement safety education programs for all road users.

Key Safety Partner

SHSO: Every State has an SHSO, which is led by a Governor's highway safety representative (also referred to as SHSO directors and highway safety or 402 coordinators). SHSO staff is responsible for planning and implementing programs to address behavioral traffic safety issues, such as impaired driving, distracted driving, speeding, occupant protection, etc. While engineers typically are focused on infrastructure safety, the SHSO staff address behavioral safety issues, such as impaired driving, occupant protection, speeding, and the safety of vulnerable road users. The combination of roadway and driving behavior represent nearly all of the crash causation factors and demonstrate the importance of a strong connection between the engineering and behavioral areas.

Other Safety Stakeholders

Health Department Personnel: Many State and local health departments have injury prevention programs, which often include efforts to prevent motor vehicle crashes and resulting injuries and fatalities. This stakeholder group can be particularly effective in providing safety data and analysis skills and insights, lessons learned from other public health efforts, public health approaches to transportation concerns, and advice on topics, such as transportation access, walking, biking, and active lifestyles in general.

Safety Advocates: Many States have locally based groups of safety advocates committed to addressing transportation safety concerns and can be effective in driving awareness and change. The groups typically consist of citizens, law enforcement, public health, medical, diverse groups, government, business, civic and service groups, and the general public. Where available and effective, they serve as a useful resource for advocacy, community education, and fund raising.

Tribal Governments: Tribal governments are responsible for the transportation issues and needs of their citizens. Tribal areas usually experience disproportionately high rates of transportation-related fatalities based on population, so it is critical to engage them in the safety planning process.

Planners: State DOT, MPO, local jurisdiction, and Tribal transportation planners have multiple job functions, which may include duties related to safety. Safety responsibilities vary, but general tasks might include participating in safety plan development and implementation; cooperating on Statewide or regional safety-related committees such as emphasis area teams, to discuss and collaborate on safety issues, crash data collection and management, and data analysis tools, such as geographic information system (GIS) crash mapping. Transportation planners may specialize in a specific transportation mode, such as transit, freight, bicycle, or pedestrian. Planners identify existing and future short- and long-range needs, identify projects and programs, help in establishing priorities, and evaluate outcomes. Experience from each of these areas may provide insight on current safety issues and needs, as well as effective methods for addressing them.

Elected Officials: Decisionmakers sometimes serve as powerful advocates for road safety. They may champion safety needs and direct resources towards the most pressing safety issues; attend ceremonies to publicize newly constructed safety projects; and vocalize support for safety efforts, such as a Vision Zero or Towards Zero Deaths campaigns. Some agencies successfully recruit elected officials to participate in safety plan development and implementation as executive committee members.

Safety Legislation

Reviewing the major pieces of legislation affecting transportation safety provides a historical perspective and a better understanding of current practice in road safety management practices. This action also assists with detecting future trends and needs.

History and Background

Federal transportation highway safety funding eligibility and use requirements are documented in United States Code (U.S.C.), title 23, Highways. Information on Federal Highway Administration (FHWA) programs and plans relevant to safety planning is addressed in chapter 1—Federal-Aid Highways (§101-§181). Chapter 4—Highway Safety (§401-§412) addresses National Highway Traffic Safety Administration (NHTSA) programs and plans. Specific sections are described below.

Early legislation includes The National Traffic and Motor Vehicle Safety Act of 1966 which established the Federal Motor Vehicle Safety Standards (FMVSS) and regulations motor vehicle manufacturers are required to follow, authorized research and development, and expanded the National Driver Register to track individuals whose licenses have been denied, terminated, or withdrawn. The Highway Safety Act of 1966 created a highway safety grant program requiring States to develop and maintain a highway safety program in accordance with uniform standards established by the Secretary of Transportation. The standards have since been replaced by priority program areas. Section 402 of the Act provided funding specifically for the purpose of improving road user behavior and reducing crashes. It became the basic building block for State highway safety programs.

The Acts passed in 1966 established the basis for vehicle and road user behavioral safety programs, but it wasn't until the Highway Safety Act of 1973 that a Federal mandate for roadway safety was introduced. The 1973 Act established a specific methodology for improving roadway safety from an engineering perspective and required the States to conduct a survey of all hazardous locations; study the contributing crash factors at

those locations; conduct a benefit-cost analysis of proposed mitigation strategies; and prioritize improvements based on the results of the benefit-cost ratio analysis.

The Highway Safety Acts of 1966 and 1973 established the foundation for roadway safety management by focusing efforts on the vehicle, the driver, and the roadway. This legislation also further clarified the relationship between the Federal Government and the States—an important component in road safety. The Federal Government establishes program guidelines for investments but States choose projects and priorities within broad program direction; a Federally assisted State delivered program.

During the 1970s and 1980s, Congress established the Motor Carrier Safety Assistance Program (MCSAP) which provides financial assistance to States to reduce the number and severity of crashes and hazardous materials incidents involving commercial motor vehicles (CMV) through inspections of trucks and carriers, and driver regulations. The Federal Motor Carrier Safety Administration (FMCSA) is responsible for providing oversight for the MCSAP programs.

The 1990s brought further changes, the first of which was The Intermodal Surface Transportation Equity Act (ISTEA). ISTEA required States to develop and implement a series of managements systems, including a safety management system (SMS), but the management system provision was made optional in 1995.

In 1998 Transportation Equity Act for the 21st Century (TEA-21) reduced the number of transportation planning priorities to seven, one of which is “safety and security.” TEA-21 represents the first time safety was mentioned as a priority transportation planning factor. Prior to TEA-21, safety may have been incorporated into the vision or goals of a State or MPO long-range transportation plan (LRTP), but specific strategies to increase safety were seldom included in Statewide and metropolitan planning processes or documents.

The importance of safety was further heightened by the Safe, Accountable, Flexible, Transportation Equity Act—A Legacy for Users (SAFETEA-LU), which established the Highway Safety Improvement Program (HSIP) as a new “core” funding program. The amended 23 U.S.C. §148, nearly doubled the funds for infrastructure safety, allowed increased flexibility in program funding, and required a focus on results. This program grew out of the former Hazard Elimination Safety (HES) program that focused on addressing safety issues on the highway system and highway-rail grade crossings.

Program requirements included the development of Strategic Highway Safety Plans (SHSP) in consultation with other key State, Tribal, and local highway safety stakeholders and established a number of reporting requirements. A key element of the SHSP is the direct link to the HSIP. Additionally, to ensure the HSIP is implemented in an organized, systematic manner to achieve the greatest benefits, a formalized HSIP process has been established consisting of three components: planning, implementation, and evaluation. Additional detailed information on the SHSP and HSIP is presented later in this module.

Other programs started under SAFETEA-LU include Safe Routes to School, data improvement programs, traffic records systems improvements (23 U.S.C. §408), and increased funding for 23 U.S.C. §402 (highway safety grants) and several other behavior-oriented grant programs. The legislation also included incentive grants and transfer programs, some of which were carried over from TEA-21. Transfer programs move funds from construction funding categories to safety programs when States fail to pass certain laws or implement specific programs. As in the past, road user behavior programs focus for the most part on occupant protection and impaired driving programs.

Current Legislation and Federal Rules

SAFETEA-LU was replaced by Moving Ahead for Progress in the 21st Century (MAP-21), with MAP-21 being followed by the most recent legislation of the Fixing America's Surface Transportation (FAST) Act. These Acts and the implementing rules require a performance and outcome-based Federal-Aid Highway Program. Transportation performance management helps agencies prioritize needs and align resources for optimizing system performance in a collaborative manner. The specific requirements are outlined below.

Federal Highway Administration Highway Safety Improvement Program

23 U.S.C. §148—Highway Safety Improvement Program (HSIP) describes the requirements for the HSIP and SHSP. The purpose of the HSIP is to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. The Safety Performance Management (PM) Final Rule adds Part 490 to title 23 of the Code of Federal Regulations (CFR) to implement the performance management requirements under 23 U.S.C. §150, including the specific safety performance measure requirements for the purpose of carrying out the HSIP to reduce serious injuries and fatalities on all public roads. The Safety PM Final Rule establishes five performance measures as the five-year rolling averages for: 1) Number of Fatalities; 2) Rate of Fatalities per 100 million vehicle miles traveled (VMT); 3) Number of Serious Injuries; 4) Rate of Serious Injuries per 100 million VMT; and 5) Number of Nonmotorized Fatalities and Nonmotorized Serious Injuries. The Safety PM Final Rule also establishes the process for State DOTs and MPOs to establish and report their safety targets, and the process that FHWA will use to assess whether State DOTs have met or made significant progress toward meeting their safety targets. There are prescribed financial penalties associated with not meeting the safety targets. The Safety PM Final Rule also establishes a common national definition for serious injuries.

Together, these regulations will improve data; foster transparency and accountability; and allow safety progress to be tracked at the national level. They will inform State DOT and MPO planning, programming, and decisionmaking for the greatest possible reduction in fatalities and serious injuries.

The main HSIP components are a SHSP, a Railway-Highway Crossing Program, and a program of safety improvement projects. To obligate HSIP funds, a State must develop, update, and implement an SHSP that identifies and analyzes safety issues and structure a program of projects to correct or improve hazardous road segments, locations, or features. Eligible projects are enumerated in 23 U.S.C. §148(a). Specific requirements for the HSIP include the following:

- A comprehensive, data-driven SHSP with performance-based safety goals and a program of strategies to improve safety.
- 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 correcting safety issues; and establish evaluation procedures.
- HSIP and railway-highway crossing program annual reports describing progress made towards achieving long-term safety outcomes and safety performance targets.
- A subset of Model Inventory Roadway Elements (MIRE) on all public roads to support enhanced safety analysis and project investments. MIRE is a recommended listing of roadway inventory and traffic elements critical to safety management. http://safety.fhwa.dot.gov/tools/data_tools/mirereport/.

NHTSA Programs

23 U.S.C. §402 is known as the State and Community Highway Safety Grant Program. It provides grants to States to improve driver behavior and reduce fatalities and serious injury crashes. 23 U.S.C. §402 supports programs focused on impaired driving, speeding, and other unsafe driving behaviors; school bus deaths and injuries; occupant protection; motorcycle, pedestrian, and bicycle safety; traffic law enforcement; driver performance; traffic records; emergency services; and teen driver programs. The projects and activities are documented in the annual Highway Safety Plan (HSP). Additional detailed information on the HSP is presented later in this module.

The National Safety Priority Programs (23 U.S.C. §405) supports additional programs focused on occupant protection, traffic safety information system improvements, impaired driving, distracted driving, motorcycle safety, graduated driver licensing laws, and nonmotorized safety. States may be eligible for grant funding in each of these program areas. See http://www.ghsa.org/html/stateinfo/programs/405_map21.html.

MAP-21 specifies a single application deadline for all highway safety grants and emphasizes the requirement that all States have a performance-based highway safety program designed to reduce traffic crashes and the resulting deaths, injuries, and property damage. The Final Rule for Safety Performance Management requires the State DOTs to report identical targets for the common measures annually, which ensures coordination between the State DOT and SHSO. The HSP and HSIP share four common performance measures, which are the five-year rolling averages for: 1) Number of Fatalities; 2) Rate of Fatalities per 100 million Vehicle Miles Traveled (VMT); 3) Number of Serious Injuries; and 4) Rate of Serious Injuries per 100 million VMT.

States are required to submit their Section 402 and Section 405 consolidated grant application by July 1 of each fiscal year. NHTSA has 60 days to review and approve the consolidated grant application. Once approved, funds are apportioned to the States under the same formula as SAFETEA-LU: 75 percent population and 25 percent road-miles. At least 40 percent of Section 402 funds must be spent by local governments or be used for the benefit of local governments. See <http://www.ghsa.org/html/stateinfo/programs/405.html>.

More information on the NHTSA programs can be found at <http://www.nhtsa.gov/nhtsa/whatsup/tea21/tea21programs/>.

Safety Plans and Processes

U.S.C., title 23-Highways outlines the Federal transportation safety requirements. This section addresses SHSPs, HSIPs, HSPs, Commercial Vehicle Safety Plans (CVSP), and regional/local safety plans. Particular attention is focused on the SHSP because it is designed to serve as the “umbrella” safety plan for all other State, regional, and local safety plans. The process follows basic strategic planning guidelines, which all safety plans are expected to address.

Strategic Highway Safety Plans

A SHSP is a major component and requirement of the HSIP (23 U.S.C. §148). It is a data-driven Statewide-coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads. An SHSP identifies a State’s key safety needs and guides investment decisions towards strategies and countermeasure with the most potential to save lives and prevent injuries. SHSPs were first required under SAFETEA-LU, which established the HSIP as a core Federal program. The FAST

Act continues the HSIP as a core Federal-aid program and the requirement for States to develop, implement, evaluate and update an SHSP that identifies and analyzes highway safety problems and opportunities on all public roads.

An SHSP is developed by the State DOT in a cooperative process with Local, State, Federal, Tribal, and other public and private sector safety stakeholders. It is a data-driven, multi-year comprehensive plan that establishes Statewide goals, objectives, and key emphasis areas and integrates the 4 Es of highway safety—engineering, education, enforcement and emergency medical services. The SHSP allows highway safety programs and partners in the State to work together in an effort to align goals, leverage resources and collectively address the State’s safety challenges.

The Federal SHSP requirements are documented in 23 U.S.C. §148, and additional information is available on SHSP development, implementation, and evaluation practices in the SHSP Final Guidance, The Champion’s Guide to Saving Lives, the Implementation Process Model (IPM), the Evaluation Process Model (EPM), and other relevant supplementary guidance documents and tools. These resources are available at http://safety.fhwa.dot.gov/legislationandpolicy/fast/shsp_guidance.cfm. See State SHSPs and noteworthy practices at the Strategic Highway Safety Plan Community of Practice. https://rspcb.safety.fhwa.dot.gov/shsp_cop.aspx.

Strategic Highway Safety Plan Requirements

DOTs work closely with FHWA division offices to ensure the requirements are adequately met. The Division Offices are responsible for approving the SHSP development process. A selection of SHSP requirements are summarized below:

- Evaluate and update at least once every five years.
- Consult with stakeholders, specifically the State governor’s highway safety representative and highway-rail grade crossing representatives; regional transportation planning organizations and metropolitan planning organizations (MPO), representatives of major modes of transportation, State and local traffic enforcement officials, motor carrier safety program representatives, motor vehicle administration agencies, county transportation officials, State representatives of nonmotorized users, and other major Federal, State, Tribal, and local safety stakeholders.
- Analyze and make effective use of safety data to address safety problem improvement opportunities on all public roads. Include the findings of road safety audits; location of fatalities and serious injuries, locations without an empirical history of fatalities and serious injuries but contain risk factors, rural roads, pedestrian and bicycle fatalities and serious injuries, cost effectiveness, and rail-highway grade crossings.
- Adopt performance-based goals consistent with FHWA safety performance measures and coordinate the goals with other State highway safety (e.g., HSIP, HSP, CVSP, and local road safety plans) and transportation plans and programs.
- Consider the 4 Es of safety (engineering, education, enforcement, and emergency medical services) to determine effective strategies.
- Identify emphasis areas and strategies with the greatest potential to reduce highway fatalities and serious injuries, and focus resources on areas of greatest need.
- Describe the process and potential resources for implementing the strategies in the emphasis areas.

For more information, refer to the SHSP Final Guidance http://safety.fhwa.dot.gov/legislationandpolicy/fast/shsp_guidance.cfm and the HSIP Final Rule <http://safety.fhwa.dot.gov/legislationandpolicy/fast/qanda.cfm>.

SHSP Process

The basic approach used to develop a safety plan involves multidisciplinary engagement to develop vision and mission statements; collect, manage, and analyze safety data; identify goals and objectives (performance measures and targets); develop emphasis areas, strategies, and action plans. Steps for implementing and evaluating the plan often are identified during and after the development process. This planning approach is highly transferable and generally followed for the development of most safety plans (e.g., SHSP, HSP, regional, local, and Tribal safety plans). Using SHSP as a model, the basic steps are further described below.

SHSPs generally begin with **vision** and **mission** statements. The vision statement provides the overall direction for a SHSP and drives subsequent discussions and decisions related to planning, prioritizing, and programming safety projects. The mission statement provides a general description of how the safety planning process will accomplish the mission.

SHSPs must be developed in consultation with stakeholders. Participants generally include engineers, enforcement agencies, educators, and emergency responders, and outreach to other agencies listed in the Federal requirements. While not required, DOTs often involve the public during SHSP development. To obtain input throughout the planning process, approaches include hosting Statewide and/or regional safety summits, one-on-one meetings with the stakeholders required by Federal legislation, forming a steering committee to oversee the SHSP, online surveys, and committees or working groups for each of the emphasis areas.

SHSPs are required to be **data driven** and identify safety issues on all public roads, select emphasis areas (i.e., areas where the potential for safety improvement is greatest), develop strategies for affecting the emphasis areas, create action plans for implementing strategies, monitor progress toward goals, measure effectiveness of programs and projects, and direct resources to the areas of greatest need. The Safety Data and Analysis Methods section that follows provides an overview of the types of safety data used for SHSP development. However, the crash data, which are stored in a State database and often maintained by the State DOT, serve as the primary data source used to inform SHSPs. Crash data are made available to State DOT personnel and other agencies through a variety of methods (i.e., specific request, online portal, searchable database, etc.). States continually strive to improve safety data and do so through the Federally required Traffic Records Coordinating Committee (TRCC), the Crash Data Improvement Program (CDIP), the Roadway Data Improvement Program (RDIP), or NHTSA's Traffic Records Assessments. Once data are collected and analyzed, analysis outputs are used to identify emphasis areas, strategies, and actions, and performance measures and targets.

Emphasis areas represent the key factors contributing to crashes, which helps stakeholders focus resources on the top priorities. Once emphasis areas are identified, **strategies** describe general approaches or methods for lowering fatalities and serious injuries, while **action steps** detail actions for program and countermeasure implementation. To select emphasis areas, some States start with a list of emphasis areas, such as those identified in the *Towards Zero Deaths: A National Strategy for Highway Safety* <http://www.towardzerodeaths.org/> and then look

at the number of traffic-related fatalities and serious injuries and select those areas with the greatest number. After SHSP completion, stakeholders begin to implement the strategies and actions described in the plan. States approach implementation differently, but a common method is to retain the SHSP steering committee and/or emphasis area teams as implementing structures. The stakeholders meet regularly to provide updates and discuss challenges.

Safety-related **performance management** helps a State measure and monitor progress on fatalities and serious injuries. The SHSP can support performance management by adopting performance-based **goals** consistent with the safety measures FHWA established in accordance with 23 U.S.C. §150. In addition to these performance measures, SHSPs may also set performance-based goals and **objectives** for each emphasis area.

Evaluation is another required SHSP component, and it is an ongoing process beginning when the SHSP is developed and continuing throughout the life of the plan. Evaluation assesses progress toward strategy implementation and meeting SHSP goals and objectives. Most States have mechanisms in place for regularly tracking SHSP implementation and monitoring progress.

National Strategy Emphasis Areas

- Safer Drivers and Passengers.
- Safer Vulnerable Users.
- Safer Vehicles.
- Safer Infrastructure.
- Enhanced Emergency Medical Services.
- Improved Safety Management and Data Processes.

California SHSP

Goal

- *Towards Zero Deaths.*

Objectives

- *A 3 percent per year reduction for the number and rate of fatalities.*
- *A 1.5 percent per year reduction for the number and rate of severe injuries.*

Highway Safety Improvement Program

The HSIP is a core Federal-aid program which allocates funds to highway safety improvement projects to reduce the number and severity of crashes. HSIPs must describe the progress being made to implement highway safety improvement projects, assesses the effectiveness of those improvements, and describe the extent to which the improvements have contributed to reducing fatalities and serious injuries on all public roads. Eligible HSIP projects are primarily infrastructure improvements such as intersection safety Improvements, pavement and shoulder widening, geometric improvements, and can include transportation safety planning, data collection, analysis, and improvement, and Road Safety Audits (RSA), for safety purposes. See 23 U.S.C. §142(a) for the complete list. According to 23 CFR 924.15, the HSIP report shall be submitted annually and address all projects implemented with HSIP funds, including local projects and noninfrastructure projects. The HSIP report consists of four parts: program structure, progress in implementing HSIP projects, progress in achieving safety performance targets, and assessment of the effectiveness of the improvements.

Highway Safety Plans

As administered by NHTSA, the HSP is an annual work program that outlines programs and projects, which primarily address behavioral safety issues, such as speeding, impaired and distracted driving, failure to use required safety equipment, motorcyclist safety, and pedestrian/bicycle safety.

The HSP must be data driven, set performance targets for 15 performance measures, include strategies describing how the State will meet its targets, and share successes on how targets from the previous year were met. NHTSA requires States to develop and submit a State Highway Safety Annual Report and coordinate the HSP with the SHSP. Details for the HSP requirements are contained in 23 U.S.C. §1200.10 to §1200.15.

Commercial Vehicle Safety Plan

FMCSA requires States to develop a CVSP as an annual work program. CVSP identifies a State's commercial motor vehicle safety objectives, strategies, activities, and performance measures. A CVSP must reflect a performance-based program and include 18 items. The planning details are described in 49 U.S.C. §350.105.

Public Transportation Agency Safety Plan

The Federal Transit Administration (FTA) requires Public Transportation Agency Safety Plans, which means public transportation systems operators must develop a safety plan based on the safety management system approach. The planning details are described in 49 CFR §659.19.

Regional and Local Safety Plans

At the State level, the SHSP is considered the primary safety document; however, MPOs, Tribes, or local jurisdictions may choose to develop safety plans to identify safety issues, needs, programs, and projects for their specific planning areas. These plans should be consistent with the direction and goals of the State SHSP but can include elements that are significant to the localized area. The results of crash analysis in these plans can be used to inform and prioritize the selection of transportation projects.

Memphis Metropolitan Planning Organization Regional Bicycle and Pedestrian Plan

The Memphis MPO developed a Bicycle and Pedestrian Plan to identify opportunities for enhancing bicycle and pedestrian travel in the region. During the planning process the MPO conducted a crash analysis to ensure current and future bicycle and pedestrian infrastructure becomes safer.

Safety Data and Analysis Methods

All elements of the SHSP process, from development to evaluation, require States to analyze and make effective use of State, regional, local, and Tribal safety data. Data enable managers to identify safety problems, select appropriate strategies and countermeasures, monitor progress toward achieving goals and objectives, measure strategy effectiveness, identify needed improvements, and direct limited resources to the highest potential for reducing fatalities and serious injuries. Some States identify the need to upgrade, improve, and standardize the traffic records information system as an SHSP emphasis area.

NHTSA requires all States to develop and maintain a TRCC empowered to improve traffic safety data collection, management, and analysis by coordinating the activities of safety data stakeholders and facilitating information sharing across stakeholders. To accomplish the purpose, the States maintain and

regularly update a TRCC Strategic Plan, which includes strategies to improve traffic records accessibility and accuracy. TRCCs are responsible for implementing the Model Minimum Uniform Crash Criteria (MMUCC) (<http://mmucc.us/>). The committee also reviews and manages revisions to its State Crash Report Form. Contact the State's TRCC Chair or Coordinator for more information see <https://www.transportation.gov/government/traffic-records/state-trcc-personnel>.

States strive to improve the safety data needed to identify priorities for Federal, State, regional, Tribal, and local highway and traffic safety programs. To effectively advance data gathering capabilities, safety stakeholders develop active partnerships with the TRCCs, which are responsible for identifying data system enhancement strategies affecting access to data, as well as its accuracy, reliability, and timeliness. Both FHWA and NHTSA sponsor data improvement programs designed to assess the strengths and weaknesses of State safety data systems and offer expert consultation and recommendations for corrections and other improvements.²

Types of Safety Data

The primary types of data used to conduct safety analyses include data on crashes, roadway characteristics, and traffic volumes or exposure. Additional data sets often are used to provide information on drivers, passengers, and vehicles; hospital data; injury control (e.g., EMS response time); and citations and adjudications (e.g., driver citation and arrest records). The following section describes common data sources.

Crash data are used to identify the location and characteristics of crashes. A large set of information is collected by law enforcement at the scene of any crash that meets a minimum injury or property damage reporting threshold. Officers use a crash report form to transcribe information about the crash and the vehicles and people involved. Crash report forms vary by State, but generally, information is collected on specific crash data elements outlined in the MMUCC Guideline, which has more than 70 data elements, such as crash date and time, direction of travel before crash, whether occupants were ejected, contributing circumstances, and more. One of the data fields notes the injury level of the persons involved in the crash, which is coded according to the KABCO scale. Table 1 shows the KABCO injury severity scale. Some States use other scales to rate injuries (e.g., the Manual on Classification of Motor Vehicle Traffic Accidents or American National Standards Institute (ANSI) D.16). FHWA and NHTSA have developed a conversion table to convert serious injuries from other scales to KABCO. Crash data are stored in a database, which is managed by the State DOT or a sister agency.

Table 1. KABCO scale.

KABCO Scale	Severity
K	Fatality
A	Suspected serious injury
B	Suspected minor injury
C	Possible injury
O	No apparent injury

(Source: <http://safety.fhwa.dot.gov/hsip/resources/fhwas09029/sec4.cfm>.)

² FHWA. (October 2012). A Champion's Guidebook to Saving Lives, 2nd Edition, FHWA-SA-12-034, Washington, DC.

In addition to State databases, NHTSA maintains the Fatality Analysis Reporting System (FARS) [http://www.nhtsa.gov/Data/Fatality-Analysis-Reporting-System-\(FARS\)](http://www.nhtsa.gov/Data/Fatality-Analysis-Reporting-System-(FARS)), which provides a Nationwide census on all reported fatal crashes and fatalities involving a motor vehicle operating on a roadway when a person involved in the crash dies within 30 days. FARS provides publicly accessible data regarding fatal injuries suffered in motor vehicle crashes. Fatality data are available from 1975 to present. Queries can be conducted for individual States and at the local/Tribal level. FARS data are obtained from various State documents and reports from law enforcement, death certificates, State vehicle registration files, coroners and medical examiners, driver licensing files, hospitals, highway departments, EMS, vital statistics, and others.

Roadway characteristics refer to the information that describes the physical attributes and conditions of the street network. All States have a roadway inventory database managed and maintained by the State DOT. This information

The FHWA Roadway Safety Data Program includes tools to build or enhance safety data.

is useful to transportation planners and safety practitioners because crashes can be associated with road attributes, such as functional class, number of traffic lanes, speed limits, and average daily traffic. Safety specialists may collaborate with transportation planners to understand the uses of roadway data, brainstorm opportunities to pair the data with other data sets, and determine specific plans and corridor studies where roadway data are needed. When roadway data are linked with crashes, planners are able to characterize crashes by roadway features (i.e., number of crashes per year by roadway functional class, number of traffic lanes, speed limit). The HSIP Final Rule (23 CFR 924) requires States to collect and use MIRE Fundamental Data Elements (FDE) on all public roads to support enhanced safety analysis and safety investment decisionmaking. http://safety.fhwa.dot.gov/tools/data_tools/mirereport/ The HSIP Final Rule establishes three categories of MIRE FDEs based on functional classification and surface type. States must incorporate specific quantifiable and measureable anticipated improvements for the collection of MIRE FDEs into their Traffic Records Strategic Plan by July 1, 2017 and have access to the complete collection by September 20, 2026.

State DOTs are required to collect and submit **traffic counts** data on public roads classified as National Highway System (NHS) routes and all other roads, excluding those functionally classified as minor collectors in rural areas and local roads in any area through FHWA's Highway Performance Monitoring System (HPMS). Understanding the correlation between crashes and traffic volumes helps planners develop methods to calculate crash rates for segments or intersections and prioritize locations for improvement. The HPMS provides a source of information for VMT and can be utilized to calculate the required fatality and serious injury rates.

Additional data sets used to understand safety issues and needs include data on citations and adjudications, hospitals and traumas, vehicles, and driver/passenger information. Citation and adjudication data refer to driver arrest and conviction records for traffic offenses; injury data includes prehospitalization and hospital information regarding injuries, which may differ from the crash report; vehicle data provides information on vehicle safety technologies, as well as vehicle type (i.e., passenger vehicles, commercial motor vehicles); and driver and passenger data reflect human behaviors contributing to a crash.

Safety Analysis Methods and Tools

A number of approaches and tools are used to analyze safety data. Quantitative safety analysis assists with integrating safety performance into highway investment decisions. This section summarizes the common factors and methods used to analyze safety data, and introduces quantitative safety analysis tools. It provides an understanding of safety analysis applications in the safety management process.

An examination of nominal safety versus substantive safety is key to understanding the importance of safety analysis. Nominal safety refers to the design elements meeting all of the design criteria or standards for a roadway. Substantive safety refers to the safety performance (i.e., crash history relative to crash expectations) for a roadway. It is important to understand that substantive safety (safety performance) of a roadway does not always correlate to the nominal safety (design standards) of the roadway. It is not uncommon for a roadway to meet design criteria but at the same time demonstrate poor safety performance. Safety analysis moves beyond the concept of nominal safety to the advantage of examining safety performance.

Most agencies with safety responsibility commonly conduct basic analyses to determine crash frequency, severity, rates, contributing factors, and types to determine priority projects and programs associated with the greatest potential for reducing fatalities and serious injuries. **Frequency** is the number of crashes occurring within a specific jurisdiction on a roadway segment, or at an intersection while **severity** describes the extent to which persons are injured or killed in the incident. This is useful to safety practitioners because locations with more severe crashes are typically prioritized; however, this approach only takes into account injury severity without attention to the roadway, vehicles, human factors, etc.

Rate compares crash frequency with traffic volume or exposure data. Safety practitioners use crash rates to assess safety of roadways, segments, and intersections compared to other similar facilities. Locations with crash rates higher than the Statewide average are prioritized as resources become available. However, careful examination of crash rate is required as an increase in traffic volume without a decrease in crash can produce misleading results of safety improvement. **Contributing factors** include attributes, such as driver behaviors, events, and roadway infrastructure characteristics. Most crashes have more than one contributing factor. **Crash type** describes the manner of collision, such as rear-end, sideswipe, head-on, fixed object, pedestrian, overturned, run off the road, etc. Safety practitioners usually assess and prioritize overrepresented crash types.

The **Highway Safety Manual (HSM)** (<http://www.highwaysafetymanual.org/Pages/default.aspx>) presents an overarching science-based approach to safety management and a variety of predictive analysis tools for quantitatively estimating crash frequency or severity at a variety of locations. This approach provides for a quantitative information-based decisionmaking process. The HSM is divided into four parts: Part A provides an introduction to the HSM, knowledge about human factors, and the fundamentals of highway safety; Part B covers the roadway safety management process; Part C introduces predictive methods for different facility types; and Part D provides information on the development and use of crash modification factors (CMF). The effects of implementing countermeasures, geometric or operational changes to the roadway can be quantified as a CMF.

The HSM methodologies advance beyond the limitations of the basic safety analysis approach of assessing frequency, severity, and rate. Instead, the HSM provides a substantive safety approach referring to the actual or expected safety performance of a roadway based on its characteristics. Examples of the HSM methods include predictive analysis, systemic analysis, and network screening.

Predictive analysis uses safety performance equations known as safety performance functions (SPF) to estimate predicted average crash frequency as a function of traffic volume and roadway characteristics. This information can be used to compare and predict safety performance, and quantify the safety impacts of transportation decisions.

Systemic analysis examines crash history on an aggregate basis to identify high-risk roadway characteristics, such as sharp curves combined with high traffic volumes, sharp curves and narrow

shoulders, etc. Subsequently, low-cost solutions and countermeasures are implemented on a systemwide basis. Systemic improvement examples include installing cable median barriers, rumble strips and stripes, guardrail, the safety edge, and shoulders on narrow two-lane roads; rehabilitating and/or upgrading traffic control devices, pavement marking, surface friction, and lighting; widening lanes and shoulders. FHWA provides a number of resources relevant to systemic analysis on the Systemic Approach to Safety Web site (<http://safety.fhwa.dot.gov/systemic/>).

Network screening analysis pinpoints roadway segments and intersections experiencing more crashes than would be expected for comparable sites. From this analysis, safety practitioners identify specific locations that may benefit from safety improvements and, with more detailed analysis, the specific modifications for any given site. Information in the Improving Safety on Rural Local and Tribal Roads Safety Toolkit provides additional information on network screening (http://safety.fhwa.dot.gov/local_rural/training/fhwas14072/sec4.cfm).

All States must have a highway safety improvement program which uses a roadway safety management process; the HSM Part B contains a process for conducting network screening which could serve as a model. Safety practitioners often utilize Part C, Predictive Methods, because it helps evaluate the expected crash frequency for design alternatives associated with corridor or intersection planning projects.

The FHWA Every Day Counts (EDC) effort provides resources to practitioners on a variety of innovative tools and processes. As an example, the **Data-Driven Safety Analysis (DDSA)** initiative builds on decades of work and collaboration among the various entities in the transportation community to promote the broader implementation of quantitative safety analysis. It has become an integral component of safety management and project development decisionmaking. The effort has inventoried tools agencies can use for safety analysis. The following paragraphs summarize some examples of those tools.



The EDC-3 Data-Driven Safety Analysis Web site (<http://www.fhwa.dot.gov/innovation/everydaycounts/edc-3/ddsa.cfm>) provides a list of analysis tools practitioners can use to inform decisionmaking and optimize investments. These tools include:

- AASHTOWare Safety Analyst—a set of software tools used by State and local highway agencies for network screening and countermeasure identification. <http://www.aashtoware.org/Safety/Pages/Analyst.aspx?PID=1>.
- FHWA Interactive Highway Safety Design Model (IHSDM)—a suite of software analysis tools for evaluating safety and operational effects of geometric design decisions on highways. <http://www.fhwa.dot.gov/research/tfrc/projects/safety/comprehensive/ihsdm/>.
- CMF Clearinghouse—a regularly updated online repository of the CMFs used to forecast the impact of a countermeasure on crash frequency and severity. <http://www.cmfclearinghouse.org/>.
- FHWA Systemic Safety Project Selection Tool—tools for selecting locations and countermeasures, achieving the correct balance between systemic and traditional safety investments, and evaluating effectiveness. <http://safety.fhwa.dot.gov/systemic/fhwas13019/>.
- Roadway Safety Data Program Toolbox—online tool used to identify data collection analysis and management resources. <http://safety.fhwa.dot.gov/rsdp/>.

Safety Funding

The HSIP, NHTSA grant funding, and FMCSA safety grants are the primary Federal-aid safety funding sources available for infrastructure and behavioral safety improvements. However, funding from other Federal, State, and local programs is used to implement safety projects and programs.

The HSIP is a core Federal-aid program managed by FHWA. Its purpose is to reduce the number of fatalities and serious injuries on all public roads. The HSIP includes three components: the SHSP, a Railway-Highway Crossing Program, and a program of safety improvement projects. To identify and prioritize eligible projects, States are required to utilize a safety data system with the ability to perform safety problem identification and countermeasure analysis.

NHTSA manages the primary funding for HSP projects and programs. The funding comes from 23 U.S.C. §402 (State and Community Highway Safety Program) and 23 U.S.C. §405 (National Priority Safety Programs) grant programs. The programs provide grants to States to improve driver behavior and reduce fatalities and serious injury crashes. 23 U.S.C. §402 funds can be used on a wide array of countermeasures identified in the HSP, including programs that reduce impaired driving or speeding, encourage the use of seat belts, improve motorcycle safety, improve pedestrian and bicycle safety, reduce school bus deaths and injuries, reduce crashes from unsafe driving behavior, improve enforcement of traffic safety laws, improve driver performance, improve traffic records, to implement teen driver programs, and enhance emergency services.

23 U.S.C. §405 grants support specific behavioral programs: §405(b) addresses occupant protection, §405(c) is for improving traffic safety information and data systems, §405(d) is for impaired driving and ignition interlock laws, §405(e) is for distracted driving, §405(f) is for motorcycle safety, §405(g) is to encourage graduated drivers licensing programs, and §405(h) is for nonmotorized roadway user programs.

FMCSA offers a number of safety grants for commercial motor vehicle activities. The grants are available for border enhancements, commercial driver license program implementation, CMV operator safety training, commercial vehicle information systems and networks, motor carrier safety assistance program (basic and high-priority grants), new entrant safety audits, performance and registration information systems management, and safety data improvements. See: <https://www.fmcsa.dot.gov/mission/grants>.

Additional funding sources include 23 U.S.C. §1106 **National Highway Performance Program** (NHPP) projects, which must be on an eligible facility and support progress toward achievement of national performance goals for improving infrastructure condition, safety, mobility, or freight movement on the National Highway System (NHS) and be consistent with metropolitan and Statewide planning requirements.

The **Surface Transportation Block Grant Program** (STBG), administered by FHWA (23 U.S.C. §133), lists eligible projects, such as “highway and transit safety infrastructure improvements and programs, installation of safety barriers and nets on bridges, hazard eliminations, projects to mitigate hazards caused by wildlife, and railway-highway grade crossings.” STBG has the most flexible eligibility requirements among all Federal-aid highway programs.

Transportation Alternatives, administered by FHWA (23 U.S.C. §133(h)), eliminated the Transportation Alternatives Program (TAP) and replaced it with a set aside of STBG funding. These grants support a variety of smaller-scale transportation projects, such as pedestrian and bicycle facilities, recreational trails, safe routes to school projects, community improvements such as historic preservation and vegetation management, and environmental mitigation related to storm water and habitat connectivity.

State funding from taxes, or other funding sources, sometimes are leveraged to support transportation improvements. For examples, in Iowa, the Traffic Safety Improvement Program provides State safety funds to Iowa cities, counties, and the Iowa DOT for site-specific countermeasures, traffic control devices, and research. See: <http://www.iowadot.gov/tsip.htm>.

Summary

Safety practitioners analyze data, assess countermeasures, estimate cost benefit, and select and prioritize projects with respect to both safety and general transportation projects with safety components. Meaningful improvements to safety performance on the transportation network warrant collaboration, coordination, and communication among many disciplines. The safety planning process includes the development of the SHSP, HSP, HSIP, CVSP, and the integration of safety into transportation plans. The goal is to identify a combination of behavioral and infrastructure approaches to most efficiently and effectively reduce fatalities and serious injuries. Safety practitioners from the 4 Es are active participants in the safety planning process, but transportation planners also can become engaged to shape safety considerations for transportation infrastructure. The following module focuses on the transportation planners; roles, responsibilities, and opportunities for improving the safety of the nation's roadways.

2.0 Module 2: Fundamentals of Transportation Planning

The purpose of this module is to provide a basic introduction to transportation planning, especially for safety planners, stakeholders, and other audiences. It is designed to inform safety practitioners with adequate knowledge of the planning process and exhibit opportunities for incorporating safety as a consideration in all phases of the transportation planning process. It defines the basic steps of the transportation planning process by identifying the stakeholders, legislation, plans and processes, data and analysis methods, and funding.

Introduction

Transportation planning defines a State, region, or community's vision for the future. It is a collaborative, data-driven process carried out by transportation planners at Departments of Transportation (DOT), Metropolitan Planning Organizations (MPO), public transit agencies, and local and Tribal governments. Transportation planning is a cooperative, performance-driven process by which long- and short-range transportation improvement priorities and investments are determined. MPOs, States, and transit operators conduct transportation planning, with active involvement from the traveling public, the business community, community groups, environmental organizations, and freight operators. It includes 1) a comprehensive consideration of possible strategies; 2) an evaluation process that encompasses diverse viewpoints; 3) the collaborative participation of relevant transportation-related agencies and organizations; and 4) open, timely, and meaningful public involvement.

The 3C planning process (continuing, comprehensive, and cooperative) dates back to the Federal-Aid Highway Act of 1962. It is designed to engage the public and stakeholders in establishing shared goals and a vision for the community. Planners use various tools to forecast population trends, employment growth, and projected land use and to identify major transportation needs and opportunities for investment. This process requires planners to establish existing conditions and needs, review available funding resources, establish transportation performance measure targets and goals, and develop strategies to meet the goals. The information is documented in the Statewide Long-Range Transportation Plan (LRTP) and Metropolitan Transportation Plans (MTP). The Performance-Based Planning Process (PBPP), (http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/) provides tools to establish system performance targets based on informed investment decisions, which are documented in the Statewide Transportation Improvement Program (STIP) at the State level and the Transportation Improvement Program (TIP) at the MPO level.

National Performance Goals

23 U.S.C. §150 specifies seven national goal areas for the Federal-Aid Highway Program:

1. *Safety.*
2. *Infrastructure condition.*
3. *Congestion reduction.*
4. *System reliability.*
5. *Freight movement and economic vitality.*
6. *Environmental sustainability.*
7. *Reduced project delivery delays.*

Transportation safety is a required factor in the planning process. Safety specialists play a significant role in transportation planning and this role can be enhanced if they have working knowledge and understanding of transportation planning job functions, products, and plans. The tools and methods developed by safety practitioners provide data and input when developing short- and long-term transportation safety goals and strategies. Better collaboration, communication, and coordination between safety specialists and transportation planners ensures the integration of safety into the transportation planning process and optimizes opportunities to address the most critical transportation safety issues.

Transportation Planning Stakeholders

Transportation planning covers a range of topics, disciplines, and stakeholders from the traveling public, private industry, community advocates, and local transportation agencies and operators. According to 23 U.S.C. §134 and §135, transportation planning processes should provide reasonable opportunity for involvement from interested parties, which might include representatives of public transportation, employees, public ports, providers of freight, providers of transportation (including intercity bus operators, employer-based commuting programs, transit benefit program, parking cash-out program, shuttle program, or telework program), users of public transportation, users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, and other interested parties.

State DOTs and MPOs use a variety of methods to engage the stakeholders in the planning process to comply with public involvement practices. The techniques include holding public meetings at convenient and accessible locations and times, employing visualization techniques to describe plans; and making public information available in electronically accessible formats and means (e.g., World Wide Web, social media, and phone-based/virtual information sessions). Task forces, focus groups, and technical committees assume various roles in the planning process and are used to gather information and provide input on the transportation system and priorities. Specific methods and information transportation planners can glean from safety practitioners and stakeholders include the following:

- **Data**—Planners utilize crash data, but safety specialists are familiar with crash data and other data sets that may be useful to planning (e.g., demographics and health data, the results of behavioral surveys, or effective education/enforcement programs). Planners can utilize this information to make decisions about infrastructure investments.
- **Safety Expertise and Knowledge**—Safety practitioners provide knowledge relevant to safety areas. They are more likely to be involved in the Strategic Highway Safety Plans (SHSP) process. Sharing this knowledge will help shape the Statewide LRTPs, MTPs, as well as Statewide and metropolitan transportation improvement programs (S/TIP).
- **Information Sharing**—Safety practitioners can share information about upcoming enforcement and education campaigns, safety workshops/meetings, behavioral research, and the safety performance of planned infrastructure investments with transportation planners, encouraging them to learn from and leverage safety opportunities as part of their job responsibilities. This information exchange also can highlight the need to include specific safety-related projects in the Statewide LRTP/MTP or S/TIP.
- **Statewide LRTP/MTP Update**—For a plan update, State DOTs and MPOs utilize outreach to solicit input from different stakeholder groups. They may form specific committees, visit stakeholders one on one, or host workshops. Safety practitioners can contact the State DOT Planning Office or MPO to obtain more information on the next update cycle and opportunities to participate. A safety committee or ad hoc task force may be convened to gather information on the State or region's traffic safety challenges and potential countermeasures. The DOT or MPO's Public Participation Plan could include specific strategies to collect information on safety issues and needs during the public involvement process and opportunities to integrate the collected information into the LRTP, MTP, and SHSP.
- **MPO Committees**—All MPOs have Transportation Policy Committees (TPC) or Policy Boards and most have Technical Advisory Committees (TAC). These are used to inform and make decisions about all transportation planning topics. TPCs and TACs are actively engaged in the development of the MTP and TIP.

Safety practitioners' attendance at these meetings maximizes opportunities to educate elected officials and contribute information about regional safety issues and programs, other planning efforts (e.g., freight plans, transit studies, corridor plans, bicycle and pedestrian plans, etc.) or an update on SHSP-related topics.

- **Special Topic Committees**—Some MPOs have specific safety committees or task forces to discuss behavioral or infrastructure-related topics.

Planning Legislation

This section explains the legislation and Federal rules governing the Statewide, nonmetropolitan, metropolitan, and transit planning processes.

Statewide and Nonmetropolitan Transportation Planning

The Statewide and nonmetropolitan transportation planning process requirements are described in 23 U.S.C. §135. States must develop transportation plans and programs for all areas of the State, including nonmetropolitan areas. State DOTs cooperating with existing Regional Transportation Planning Organizations (RTPO) may conduct transportation planning for nonmetropolitan areas. The plans and programs provide for transportation facilities, which function as an intermodal State transportation system. The intent of the process is to inform investment decisionmaking and considers all modes of transportation. States are required to coordinate with the metropolitan transportation planning activities. The legislation outlines the transportation plans and products States must develop, and the government agencies and public stakeholders who should be engaged.

*The State may establish **Regional Transportation Planning Organizations (RTPO)** to assist them in carrying out the Statewide and nonmetropolitan transportation planning process. The RTPO consists of nonmetropolitan area local officials and transportation system operators who volunteer and represent their jurisdictions in the Statewide planning process.*

Metropolitan Transportation Planning

23 U.S.C. §134 and the planning regulations (23 CFR 450.306) establishes the required transportation planning factors that must be addressed in a metropolitan transportation plan, including operational and management strategies to improve performance by targeting congestion and improving safety of existing facilities. Safety considerations are included in several portions of the planning rule.

Transportation Planning Factors

This section defines key terms and explains the general requirements for States and MPOs to implement the transportation planning process. The key Federally required planning factors or considerations are the same for State DOTs and MPOs and include the following:

- Support the economic vitality of the United States, the States, nonmetropolitan areas, and metropolitan areas, especially by enabling global competitiveness, productivity, and efficiency.
- Increase the safety of the transportation system for motorized and nonmotorized users.
- Increase the security of the transportation system for motorized and nonmotorized users.

- Increase the accessibility and mobility of people and freight.
- Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns.
- Enhance the integration and connectivity of the transportation system across and between modes throughout the State, for people and freight.
- Promote efficient system management and operation.
- Emphasize the preservation of the existing transportation system.
- Improve transportation system resiliency and reliability and reduce (or mitigate) the stormwater impacts of surface transportation.³
- Enhance travel and tourism.⁴

Transit Planning

Transit planning is governed by the 49 U.S.C. Chapter 53, which provides funding to support public transportation; establishes standards for the state of good repair of public transportation infrastructure and vehicles; and promotes continuing, cooperative, and comprehensive planning that improves the performance of the transportation network. Statewide and metropolitan planning requirements for public transportation mirror those of 23 U.S.C. §134 and §135.

Transportation Plans and Processes

Legislation requires transportation planners to complete a Statewide LRTP, MTP, STIP, and TIP. State DOTs must also develop a State Planning and Research Guide (SP&R). MPOs also are required to develop a Unified Planning Work Program (UPWP). Transportation planners conduct other planning efforts based on State, regional, and local needs.

³ FAST Act expanded the scope of consideration of the metropolitan planning process to include this factor.

⁴ FAST Act expanded the scope of consideration of the metropolitan planning process to include this factor.

Table 2 summarizes the key transportation planning products. The transportation plans are described below.

Table 2. Key Transportation planning products.

	Who Develops?	Who Approves?	Time Horizon	Content	Update Requirements
Statewide LRTP	State DOT	State DOT	20 years	Future Goals, Performance Measures, and Strategies	Not specified
MTP	MPO	MPO	20 years	Future Goals, Strategies, and Projects	Every 5 years (4 years for nonattainment and maintenance areas)
STIP	State DOT	Federal Highway Administration (FHWA)/Federal Transit Administration (FTA)	4 years	Transportation Investments	Every 4 years
TIP	MPO	MPO/Governor	4 years	Transportation Investments	Every 4 years
UPWP	FHWA/FTA/MPO	MPO	1 or 2 years	Planning Studies and Tasks	At least once every 2 years
State Planning and Research Work Program (SP&R) Guide	State DOT	FHWA	Not specified	Planning and Research	Not specified
Congestion Management Process (CMP)	MPO	MPO	Not specified	Congestion Management Objectives, Performance Measures, Strategies	Periodic review and update
Public Participation Plan	MPO	MPO	Not Specified	Public Engagement Strategies and Goals, Incorporating Input, Responding to Comments	Periodic review and update

(Source: FHWA, The Transportation Planning Process Briefing Book, 2015 Update.)

Long-Range Transportation Plan/Metropolitan Transportation Plan

The Statewide LRTP/MTP is the **primary** transportation planning document required for the State DOT and MPO planning process. The plans are guided by the planning factors listed in 23 U.S.C. §134 and §135. Data analysis results, travel demand model outputs, and stakeholder/public input are used to identify the key roadway and transit issues and needs over the next 20-plus years. To meet those needs, MTPs detail capital improvements, and operations and maintenance projects that are fiscally constrained. Statewide LRTPs are not required to be fiscally constrained, but may include a financial plan. The Statewide LRTP may be a policy plan and may not include any specific projects. Statewide LRTPs/MTPs must include a description of the performance measures and performance targets, as described in 23 U.S.C. §150(b), used in assessing the performance of the transportation system, a system performance report, and subsequent updates evaluating the condition and performance of the transportation system, with respect to the performance targets.

Basic Elements of a Performance-Based LRTP

- *Goals, performance measures, and desired trends or targets.*
- *Status report of current conditions.*
- *Assessment of needs.*
- *Investment priorities, policies, and strategies.*

(Source: FHWA Performance-Based Planning Guidebook.)

Statewide LRTPs and MTPs address a wide range of transportation topics (e.g., air quality, environment, health, connectivity, and mobility), but an essential component is the safety of the transportation network. A range of approaches should be used to integrate safety into Statewide LRTP/MTPs. Safety may be addressed in the Statewide LRTP/MTP as a chapter or element and as project evaluation and selection criteria. Some MTPs address safety more broadly and develop a separate Regional Safety Plan, which provides a detailed 4 Es (Engineering, Education, Enforcement, and Emergency medical services) regional approach to safety improvement project development and implementation.

Statewide Transportation Improvement Program/Transportation Improvement Program

State DOTs and MPOs must develop STIPs/TIPs to identify projects that are to be funded, the implementation timeframe, and the available or committed funding sources for each project. The STIP/TIP is a financial program that describes the schedule for obligating funds to State, regional, and local projects over a four-year period.

The TIP draws from the pool of projects identified in the cost-feasible MTP that will be implemented over the next four years. Project selection criteria are then used to rank projects and match available funding streams to projects and strategies. Safety can be one of the project selection criteria. The TIP contains funding information primarily for roadway and transit projects, and is updated regularly to reflect the highest priority projects.

The STIP includes Federally funded transportation projects in consultation with MPOs, Tribal governments, and local governments in nonmetropolitan areas, and the public. Additional projects may come from the Highway Safety Improvement Program (HSIP), nonmetropolitan regional transportation planning organizations (RTPO or RPO), and transit operators.

Unified Planning Work Program

MPOs are required to prepare a Unified Planning Work Program. It is an annual or biennial statement of work identifying the planning priorities and activities to be carried out within a metropolitan planning area. MPOs list work relevant to safety in the UPWP, including upcoming safety plans or studies, data collection efforts, corridor studies, and development of the MTP and TIP.

State Planning and Research Program

State DOTs are required to prepare a State Planning and Research Program, which outlines how they will conduct their research and technology program with SP&R funds.

Congestion Management Process

The Congestion Management Process (CMP) is a structured process for analyzing congestion and air quality issues using a systematic and regionally accepted approach. The process includes development of congestion management objectives, establishment of multimodal transportation system measures, data collection, and system performance monitoring to

Transportation Management Areas (TMAs) are required to develop and implement a CMP. TMAs are urbanized areas with populations exceeding 200,000.

determine the extent and duration of congestion, identification of strategies to manage congestion, implementation activities, and evaluation of strategies. A CMP is required in MPO urbanized areas with populations exceeding 200,000, known as Transportation Management Areas (TMA). The CMP is developed and implemented as an integrated part of the metropolitan transportation planning process. In TMAs designated as ozone or carbon monoxide nonattainment areas, Federal law prohibits projects that result in a significant increase in carrying capacity for single-occupant vehicles (SOV) from being programmed into these areas' TIPs, unless the project is addressed in the CMP.

Public Participation Plan

Public involvement is a key component of the transportation planning process. To ensure the public's needs and preferences are considered in the planning process, State DOTs and MPOs are required to document public and stakeholder engagement in transportation planning. State DOTs are required to document the process for Statewide engagement of the public and interested agencies and organizations. Public involvement should be coordinated with MPOs and RTPOs, when relevant. MPOs prepare Public Participation Plans (PPP), which describe how the MPO involves the public and stakeholder communities in transportation planning. The Transportation Planning Stakeholders section of this module describes the broad group of stakeholders to be engaged in the public involvement process and specific opportunities for safety specialists to engage in the transportation planning process.

Other Transportation Plans

While not required, State DOT and MPO planners undertake a range of planning activities to meet regional needs. These activities may include small area studies, corridor or subarea studies and plans, transit plans, freight and logistics plans, and bicycle and pedestrian plans. Safety is often addressed as part of a corridor or subarea plan to identify solutions for crashes in a specific area. Modal plans (e.g., bicycle and pedestrian, freight, and transit plans) explore opportunities to expand or enhance the use of the modes and often include safety components. Subarea plans propose growth and mobility options for a planning area, and also address the safety for all transportation users. 23 CFR 450.306(d)(4) requires State DOTs and MPOs to integrate directly or by reference the goals, objectives, performance measures, and targets described in other transportation plans and transportation processes. This includes applicable portions of the HSIP and SHSP.

Agencies may conduct the planning processes differently, but all agencies use the framework similar to one outlined to the Performance-Based Planning Process (figure 1) to identify, prioritize, implement, and evaluate transportation projects. The process framework asks four basic questions with the expectation that the plans

will answer them. The questions are: Where do we want to go? How are we going to get there? What will it take? and How did we do? Transportation safety can be addressed during the answers to each of the questions. State DOTs and MPOs are required to integrate other performance-based plans, such as the SHSP, into the transportation plans. Transportation planners participate in the performance management process by developing performance measures to address established goals, conducting data analysis and forecasting to determine the future performance of the transportation system, setting performance targets, identifying a plan of action to achieve desired results, tracking progress in achieving the targets, and developing performance reports.



Figure 1. Performance-based transportation planning process.

(Source: FHWA, The Transportation Planning Process: Key Issues, 2015 Update.)

The transportation planning process follows a process similar to the safety planning process summarized in Module 1. The process must be transparent and cooperative and includes several steps, such as collecting and analyzing data, establishing goals and objectives, identifying performance measures, prioritizing projects, implementing and evaluating projects and programs.

As with safety, transportation planning is multidisciplinary involving **public involvement and coordination**; however, in the case of transportation planning public involvement is foundational and required by law.

Stakeholders and the public are involved and engaged, throughout the transportation planning process, in workshops, meetings, committees, focus groups or one-on-one meetings. The purpose of these outreach activities is to obtain input from stakeholders to be used during the process and to inform the resulting products (e.g., long-range transportation plans).

Goals address the key desired outcomes for the transportation network and are usually developed for all the major transportation modes and topic areas. State and regional transportation agencies often utilize the planning factors as a guide to establish goals. **Objectives** describe methods for achieving the goals, and **performance measures** track progress towards goals and objectives, which assess the extent to which goals and objectives are met. This is similar to the SHSP in the sense that emphasis areas, strategies, and actions provide the structure for the plan. Performance measures and targets are used to describe and assess the expected outcomes and achievements for safety.

To initiate a planning process, planners utilize **data, forecasting tools, and stakeholder input** to identify current and future transportation needs and develop investment priorities to address them. The analysis will consider factors such as travel modes, mobility, connectivity, environment, air quality, economy, health, security, and safety. Planners may also analyze alternatives or scenarios to produce the best program of projects for addressing future needs, given a fiscally constrained revenue budget.

States and MPOs use a project **prioritization** or programming process to evaluate potential projects-based on performance-based planning priorities. The prioritization process results in the S/TIP. The project prioritization process may involve a scoring system which incorporates planning factors and priorities. Once projects have been programmed into the S/TIP, they are eligible to begin further project development.

During the **implementation and evaluation** process, programs and projects in transportation plans are implemented and performance measures are used to understand how the projects impact system performance goals. Finally, planners and decisionmakers continually consider alternatives for achieving future performance goals.

For more information see:

http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/pbppguidebook.pdf.

Transportation Planning Data and Analysis Methods

To initiate transportation plans, State DOTs and MPOs obtain data and analyze it using the travel demand model and other tools to identify future transportation trends, issues, challenges, and needs. The most common data sources and analysis tools are discussed below.

Types of Planning Data

The **Census Transportation Planning Products** (CTPP) are based on data from the American Commuter Survey (ACS), which is designed to help transportation planners understand commuter information (e.g., where people are commuting to and from and how they get there). The data are used to inform the travel demand model to forecast future travel trends and decisions regarding infrastructure investments. The ACS data are organized by where workers live (residence geography tables), where they work (workplace

geography tables), and by the flow between those places (residence to workplace flow geography tables).⁵ See: http://www.fhwa.dot.gov/planning/census_issues/ctpp/data_products/acsdatabprod.cfm.

The **United States Census Bureau** collects quality data about the Nation's people and economy that can be used by transportation planners for the travel demand model or qualitative assessment. Population, employment, income and poverty, education, health, and housing information, all collected through the Census, inform future transportation investments. The four primary methods for accessing Census Bureau data include: 1) the American FactFinder Web site; 2) DataFerrett (Ferrett stands for Federated Electronic Research, Review, Extraction, and Tabulation Tool); 3) the File Transfer Protocol (FTP) download system; and 4) Census application program interface (API). See: <http://www.census.gov/en.html>.

The **National Household Travel Survey** (NHTS) provides comprehensive data on travel and transportation patterns in the United States. The data include information on trip purpose, transportation means, travel time, time of day and day of week, number of people in the vehicle, driver characteristics, and vehicle attributes for private vehicle trips. Planners utilize the data to quantify travel behavior and understand travel patterns to inform future infrastructure needs. State DOTs and MPOs also typically conduct household travel surveys to obtain specific information for the State or region. See: <http://nhts.ornl.gov/>.

Traffic count data help planners understand the volume of vehicle travel on highways and roads in a planning area. The data are used to calibrate and validate the travel demand model, show growth trends, and inform decisions about how and where to program future transportation funds.

DOTs and MPOs develop and utilize **transit passenger surveys** to evaluate the travel patterns and demographics of public transportation users. The information allows planners to consider future transit routes, service changes or cuts, service expansion, and access/egress to services.

In transportation planning, planners use a wide range of data to make informed decisions. Freight data, land use information, economic development, environmental data, historic preservation, recreation and tourism data, and natural resources are examples of the types of data used in the planning process. The FHWA Planning Web site <http://www.fhwa.dot.gov/planning/> provides information on planning data and other planning resources.

Transportation Planning Methods and Tools

Travel demand modeling is a tool that uses the best available transportation, population, employment, and socioeconomic data to assess existing travel conditions (baseline) and forecast future travel by testing the impacts of projects or sets of projects on expected performance. The model estimates the amount of travel within, into, and out of a specified area, calibrated to actual existing conditions. The transportation network in the model can be modified to include new projects to see how travel patterns, transportation modes utilized, and congestion changes under these new conditions. Another major application of travel demand models is to demonstrate conformity of future transportation investments with air quality emissions levels. State DOTs and MPOs rely on the results of the model and qualitative inputs (e.g., public and stakeholder engagement) to identify future transportation investments.

Geographic Information Systems (GIS) is another tool that captures, stores, and displays spatial transportation data. Transportation planners can use GIS to show information to devise programs and projects. Some examples

⁵ ACS data for 2012 to 2016 will soon be released and replace the 2006-2010 data.

of GIS displays include transportation scenario comparisons, crash clusters, bike routes, land uses, planning study areas, functional classifications, and more. GIS gives meaning to short- and long-range transportation plans by providing innovative ways to visualize data.

A tool that could prove useful to transportation planners is *The Transportation Planner's Safety Desk*. The Desk Reference provides a summary of how safety can be integrated into the transportation planning process (http://tsp.trb.org/assets/FR1_SafetyDeskReference_FINAL.pdf). This reference, a resource providing a range of safety strategies in 22 emphasis areas that may be implemented by or coordinated by transportation planners. The strategies in the document are derived from the National Cooperative Highway Research Program's (NCHRP) Report 500 Guidance for Implementation of the American Association of State Highway and Transportation Officials (AASHTO) Strategic Highway Safety Plan that covers the 22 key emphasis areas identified in the AASHTO Strategic Highway Safety Plan, as well as additional sections on collecting and analyzing highway safety data and developing an emphasis area plan (<http://www.trb.org/Main/Blurbs/152868.aspx>). Each emphasis area section provides an overview of the problem, data defining the problem, and descriptions of strategies that are most relevant to planners. When available, crash modification factors are included that can be used to determine the safety performance of specific safety improvements. Each section provides lists of additional resources and best practices, when available.

One of the strengths of transportation planning is looking at a range of issues and the interrelationships and interactions of these issues. There is a number of tools and applications available for the transportation planning areas of travel demand modeling, scenario planning, land use planning, motor vehicle emissions, and other environmental issues. As examples of these tools, **PlanWorks** (<https://fhwaapps.fhwa.dot.gov/planworks/>) is a resource that assists collaborative decisionmaking in the transportation planning and project development process. This resource provides information to improve development, prioritization, and apprise transportation plans and projects. Metropolitan areas and States also have applied tools to evaluate current and predicted future safety performance. Scenario planning has been embraced by many metropolitan areas and States as a way to examine alternative investments and alternative population, employment, and financial forecasts; while many different performance outcomes can be predicted there has been relatively little focus on safety outcomes. The **Travel Model Improvement Program** (TMIP) (<http://www.fhwa.dot.gov/planning/tmip/>) provides research, technical assistance, and training to transportation planners at local, regional, and State levels. Information on these tools and other planning resources can be found at the FHWA Planning Web site <http://www.fhwa.dot.gov/planning/>.

Transportation Funding

Funding for transportation plans and projects come from a variety of sources, including Federal and State Governments, public or private tolls, local district tax assessments, and local government general fund contributions. The Federal Highway Trust Fund and the Mass Transit Account of the Trust Fund provides funds for transportation projects. Funding programs include:

- The National Highway Performance Program.
- The Highway Safety Improvement Program.
- The Surface Transportation Block Grant Program.
- State Planning and Research (SPR).
- Metropolitan Planning (PL).

- Federal Lands Highway programs.
- Federal Transit Grant Programs.
- National Highway Freight Program.

Fixing America's Surface Transportation (FAST) Act supports transit funding through fiscal year 2020, reauthorizes FTA programs and includes changes to improve mobility, streamline capital project construction and acquisition, and increase the safety of public transportation systems across the country.

The Act's five years of predictable formula funding enables transit agencies to better manage long-term assets and address the backlog of state of good repair needs. It also includes funding for new competitive grant programs for buses and bus facilities, innovative transportation coordination, workforce training, and public transportation research activities.

States and MPOs also receive Federal funds, established by formula, to support planning studies and report preparation for the transportation planning process, through FHWA's State Planning and Research Funds and Metropolitan Planning Funds, and through the FTA §5305(d) and §5305(e) programs, which respectively correspond to the metropolitan planning program and Statewide planning and research program. Planning program funds typically make up a large portion of the State or MPO budget for carrying out planning activities and studies and developing transportation plans, such as S/TIPs and other planning documents. Surface Transportation Block Grant Program (STBG) and FTA's urban and nonurban area formula programs also can be used for developing transportation plans and other planning documents.

Summary

Safety specialists and transportation planners are working toward a common goal, i.e., a safer transportation system with fewer fatalities and serious injuries as the outcome. Many opportunities are available for coordinating the long-range planning process with the SHSP and other safety plans. Both processes require data collection and analysis, identification of alternative investment opportunities, alternatives ranking, and evaluation.

Module 3 explores the strategies and tools safety and transportation planners can use to communicate safety and planning needs, collaborate on safety and transportation plans and programs, and coordinate the objectives and strategies in safety and transportation planning products.

3.0 Module 3: Improving Safety through Coordination

Module 3 demonstrates methods and practices for integrating the safety and transportation planning processes to produce safer roadways for all road users. The goal is to create a surface transportation system with zero fatalities and serious injuries.

Introduction

Modules 1 and 2 addressed the fundamentals of the safety and transportation planning disciplines, such as the stakeholders involved, legislation, planning processes and products, and funding mechanisms. Each process has clear goals and performance measures; key stakeholders; data, analysis methods, and tools; and process outcomes (i.e., plans, programs), which are implemented and evaluated as an outcome of the planning processes. The purpose of Module 3 is to provide Departments of Transportation (DOT), Federal Highway Administration (FHWA) Division offices, Metropolitan Planning Organizations (MPO), Tribal governments, local agencies, and transit agencies with a guide for integrating the two processes. In some cases, integration of the two processes may not be possible. However, coordination and alignment can still add overall value and the focus should be on outcome rather than the course of action.

Once safety specialists and transportation planners have a clear understanding of each other's responsibilities and processes, the next step is to identify effective methods for the two groups to communicate priorities, share information, discuss project alternatives, inform each other of upcoming plans and programs, and coordinate safety and planning efforts. This concept has been the subject of a number of research efforts, including:

- NCHRP Report 546: Incorporating Safety into Long-Range Transportation Planning (<http://www.trb.org/Publications/Blurbs/156716.aspx>).
- NCHRP Report 811: Institutionalizing Safety in the Transportation Planning Process: Techniques, Tactics and Strategies (<http://www.trb.org/Publications/Blurbs/172977.aspx>).
- FHWA Integrating Safety in the Rural Transportation Planning Process (http://safety.fhwa.dot.gov/local_rural/training/fhwasa14102/).

This module uses information from the NCHRP 811 report and the collection of information gathered from research and interviews conducted with transportation planners and safety specialists. This information is summarized around five strategies to be used to enhance communication, collaboration, and coordination between the safety and transportation planning processes:

1. Use committees and groups to expand **multidisciplinary communication and collaboration**.
2. **Data sharing and analysis** to enhance consideration of transportation safety in the planning process.
3. **Long-range, metropolitan, regional, and local transportation planning coordination**.
4. **Integrate safety into transportation planning processes**.
5. Develop **education and training programs** on safety and planning.

This module explains the importance of each strategy and steps for enhancing linkages between safety and transportation planning. It targets actionable steps for safety specialists and transportation planners, but a

broader audience of State DOT engineers, city and county public works directors, and other transportation practitioners could benefit from applying these strategies.

Multidisciplinary Communication and Collaboration

Modules 1 and 2 discussed safety and transportation outreach mechanisms to communicate and collaborate with stakeholders. Multidisciplinary committees offer the opportunity for safety specialists and transportation planners to meet with peers and network, share technical activities and information, and learn more about actions where disciplines can coordinate to realize a shared goal. Involvement may include providing an update on current and future programs and projects, presenting on a technical topic, or providing input for future planning and programming. The following sections discuss committees or groups where linkages between safety and transportation planning can be discussed.

Join Strategic Highway Safety Plan Committees and Participate in Safety Events

Through the Strategic Highway Safety Plans (SHSP) process, the State's key safety priorities are determined and evidenced-based solutions are identified through a data-driven, multidisciplinary collaboration process. The process results in emphasis areas, strategies, and actions for improving safety. To enhance inclusivity, States often establish committees or teams to address specific issue areas. The teams assist with SHSP updates and implementation processes. They may also host outreach activities to inform stakeholders of SHSP goals and strategies.

Collaboration can occur at a number of levels depending on planning objectives. Ideally transportation managers and planners are represented as members of all entities in the SHSP process. The entities are described in Module 1 and include SHSP executive committees, steering committees, and emphasis area teams. Transportation planners can use these teams as one way to identify the SHSP-related strategies and incorporate them into planning and programming. For example, many MPOs develop Pedestrian and Bicycle Plans. These plans may be standalone documents or incorporated into the Metropolitan Transportation Plan and would typically include consideration of safety in the pedestrian and bicycle planning process. As another opportunity for collaboration, some States and MPOs develop Pedestrian or Bicycle Safety Action Plans. Safety-related issues, needs, projects and strategies from this regional planning effort can inform the SHSP. The transportation planning representative on the Bicycle and Pedestrian Emphasis Area Team can keep the team informed of the Pedestrian and Bicycle Plan activities and opportunities to provide input. Any data on pedestrian and bicycle usage, user preferences, and safety can be shared with the appropriate Emphasis Area team and used to inform the Emphasis Area Action Plan.

Iowa DOT uses its SHSP Advisory Team as a conduit to coordinate safety and transportation planning. The Planning Division is represented on the team. The team meets quarterly to coordinate plans and programs. The Planning Division representative provides updates on transportation plans and activities relevant to safety and takes information on the SHSP strategies and activities back to planning staff.

California Department of Transportation (Caltrans) hosted a Statewide SHSP Summit in the fall of 2014 to gather input from stakeholders for its SHSP update. They also hosted regional summits in 2016 to invigorate local partners and kickoff SHSP implementation. Transportation planners from Caltrans headquarters and the Districts gave presentations on region-specific issues and collision data, safety activities already underway, funding opportunities available for safety planning, infrastructure, and noninfrastructure projects, and safety resources available to help Tribes realize their traffic safety goals. Regional summit participants learned about the newly California SHSP Update, participated in workshop discussions about priority safety strategies and actions for their regions, and learned about safety resources. A key outcome of the summits was to encourage greater coordination with local transportation planning partners.

Many States host Statewide or regional safety summits, town hall meetings, and other events to educate stakeholders on the SHSP process, obtain feedback on strategies, share results of an SHSP update, educate participants on noteworthy safety practices and research, and initiate or enhance SHSP implementation. Attendees typically include DOT planning, intermodal, and traffic safety staff; MPO planners and engineers; city and county public works departments; local and State law enforcement agencies; and advocacy groups. Safety specialists should invite transportation planners to give technical presentations on recent planning efforts and opportunities to include safety in studies, plans, and programs. These summits provide opportunities for collaboration and coordination between safety and planning staff at different levels of government.

Regional safety summits are another way to promote the SHSP and bring local stakeholders together to enhance collaboration. Taking the planning process to various regions of the State encourages broader attendance by local agencies. It also promotes participation by local officials (county and city managers, public works directors, and elected or appointed officials). Transportation planners can play a key role in regional summits by soliciting the participation of local planning partners and giving planning updates as an agenda item. Safety specialists can network with local planning partners and develop relationships needed to support safety improvements at the local level.

Participate in Long-Range Planning and Other Transportation Planning Committees

State DOTs, Highway Safety Offices (HSO), and MPOs may form or utilize an existing committee(s) to conduct ongoing outreach during the planning process. One example might be a transportation safety committee tasked with providing input for the safety elements of the Statewide Long-Range Transportation Plan (LRTP) or Metropolitan Transportation Plans (MTP). Safety specialists can share ideas, safety trend analyses, and information on safety performance during the Statewide LRTP/MTP updates. By including safety specialists, the planning process can be opened up to directly integrate safety into the goal setting, issue identification, solution generation, and prioritization processes.

The New Mexico DOT formed a number of special topic committees, one of which focused on safety, for each of the goal areas in the Statewide LRTP update. The safety committee reviewed safety trends, existing conditions, and data; and provided input on the strategies and performance measures included in the plan.

MPO Technical Advisory Committees (TAC) are typically made up of representatives from the local jurisdictions, DOT staff, transit agencies, and Federal government, e.g., FHWA and FTA. They usually meet monthly or quarterly to provide input and make recommendations to the MPO Executive Board. MPOs also may have other committees to address specific modes or topics. At TAC meetings, MPOs may discuss safety challenges, report performance, and update the TAC on any safety projects or initiatives in progress. Some MPOs include it as a standing agenda item on the TAC agenda, but it also can be discussed on an as-needed basis. The same is true for other committees focused on topics, such as freight or bicycle/pedestrian, where safety is often a topic of importance. Some MPOs also may have a safety committee to communicate with transportation and safety stakeholders specifically on the topic.

The Mid-America Regional Council (MARC) Destination Safety Leadership membership includes local, regional, State, and Federal representatives from transportation, emergency response, law enforcement, public health, and nonprofit groups dedicated to transportation safety. The Leadership Team and MARC planning staff support the coalition [what coalition?] by providing technical expertise, participating in discussions on safety target setting, and sharing information on other transportation plan updates.

Many State HSOs have program-specific strategic plans for occupant protection, traffic records, pedestrian safety, and other program areas. In fact, in order to qualify for 405 funding, many States are required to have strategic plans in place. In addition, there are numerous advisory committees or task forces for several of the program areas, such as teen driving, or impaired driving.

All of these committees can provide a forum for transportation planners and safety specialists to coordinate planning products and share transportation safety information. Existing safety committees at the State level are typical as a division, office, or bureau; however, MPO safety issues are more often represented by an ad hoc committee, such as a task force. In addition, safety specialists and transportation planners can use regional safety coalitions as a conduit to enhance the link between planning and safety processes, both at the State level and within regional and local agencies. These groups can serve as a forum to identify local projects, opportunities to consolidate safety and planning projects into a single effort, and funding to address both safety and planning needs. Examples of this approach include the following:

- In Florida, multidisciplinary regional safety coalitions are called Community Traffic Safety Teams (CTST), and are comprised of local, city, State, and private industry stakeholders and interested citizens. The groups are focused on reducing fatalities and serious injuries within the community boundaries. For example, The Pinellas CTST is chaired by the Pinellas MPO staff and Highway Safety Improvement Program (HSIP) projects in the region must be presented to this group to be eligible for funding. This requirement helps streamline the HSIP process in the region and encourages the development of HSIP projects as an outcome of the CTST.

The Louisiana Department of Transportation and Development (DOTD) uses nine regional safety coalitions to implement the SHSP at the local/regional level. The DOTD provides regional safety coordinators who establish and manage coalitions and develop regional safety plans reflecting SHSP goals, objectives, and proven effective strategies. The regional safety coalitions can compete for funding to implement Statewide or regional strategies and actions in the SHSP or regional safety plans.

- In Iowa, Multidisciplinary Safety Teams (MDST) are local safety coalitions populated by transportation and safety stakeholders. They convene to identify and collaborate on safety projects and programs. Meeting activities can include facilitated discussions on safety issues, crash analysis workshops, construction zone management, safety audits, safety corridor evaluation, local media, and marketing campaign efforts, and other multimodal planning topics. The teams enhance communication and collaboration between Iowa DOT planners and safety specialists and local planners.
- Alabama is establishing regional safety coalitions to promote more input and participation in the SHSP from MPOs, cities, and counties. Alabama DOT is using a “bottom up” approach to update the SHSP. This approach involves developing regional coalitions to provide input for data-driven regional safety action plans. Each plan will identify the most pressing traffic safety challenges (emphasis areas) and outline strategies to reduce fatalities and serious injuries in the region. The regional plans will be used to update the overall Statewide SHSP in 2017.

State DOTs provide support and technical assistance to Tribes through Tribal liaison offices or committees. These offices or committees are responsible for coordinating planning and safety efforts with Tribes. Transportation planners and safety specialists can support Tribal safety efforts by sharing data and analysis with Tribal safety committees, providing presentations on relevant planning projects and programs that may be of interest to Tribal lands, and offering assistance to help develop Tribal safety plans.

- The Mountain West Regional Tribal Technical Assistance Program offers Tribes training on how to develop a safety plan. The program also holds a traffic safety summit that provides workshops, training, and information sessions.

Table 3. Multidisciplinary communication and collaboration.

Transportation Planners	Safety Specialists
<i>How can I integrate safety concerns and expertise into the transportation planning process?</i>	<i>How can I become more involved in and influence the transportation planning process?</i>
Attend SHSP Steering Committee and/or Emphasis Area Team meetings and identify SHSP-related strategies to incorporate into planning and programming.	Invite State, regional, and local planners to present at and participate in SHSP Steering Committee and/or Emphasis Area Teams.
Attend and/or present at Statewide/Regional Safety Summits, encourage local planning partners to attend, give presentation on recent planning efforts and opportunities to include safety in studies, plans, and programs.	Integrate transportation planning topics and training into Statewide or Regional Safety Summits.

Data Sharing and Analyses

The data and analyses used in each process may be shared and used by both safety specialists and transportation planners. Transportation planners frequently use future population, demographic, and socioeconomic trends, and forecasts to plan for long-term system performance. Safety specialists track and analyze crash, roadway, and exposure data. The safety and transportation planning processes benefit from access and use of these data. Additional details on the data and analytic methods and tools used by safety and transportation planners are included in Modules 1 and 2. State and MPO noteworthy practices for data and analyses sharing are outlined below.

Data

- The Missouri DOT started hosting monthly Moving Ahead for Progress in the 21st Century (MAP-21) conference calls with the MPOs to discuss performance management-related Federal requirements. The first conference call shared information, and subsequent calls focus on safety performance management and data sharing needs to develop safety performance measures and targets. The monthly calls helped State DOT and MPO safety specialists and planners understand each other’s needs and are designed to meet the requirements of the Safety Performance Management Final Rule.
- Caltrans crash databases, the Transportation Injury Mapping System (TIMS) and the Statewide Integrated Traffic Records System (SWITRS) are available online and accessible to MPOs and other transportation and safety stakeholders with a basic registration requirement. They include enhanced functionality, such as creating custom reports and mapping capabilities of specific or systemic crash patterns.
- The New Mexico Department of Transportation (NMDOT) provides access to crash data to transportation planners and safety specialists either through the University of New Mexico (UNM) Division of Government Research (DGR) Web site or by emailing the NMDOT Crash Records reporting office. See: <http://tru.unm.edu/index.html>.
- In the Tennessee DOT, the Long-Range Planning Division and the Safety Office collaborate to share data for overlapping initiatives, such as the Tennessee Bicycle and Pedestrian Safety Assessment.

- The Oregon DOT has formed a partnership with the Oregon Health Authority to collaborate on how to bring health data into the planning process. The intent of the partnership is to have health influence or be considered directly in the DOTs decisionmaking process. The partnership has led to the development of a Health and Transportation Working Group, which includes Oregon DOT and Oregon Health Authority members. Representatives from the Oregon Health Authority also are included on the SHSP committee.
- The Idaho DOT Office of Highway Safety, along with several other States, publishes an Idaho Traffic Collisions report annually and shares it publically on their Web site. Reports are generated for a number of data sets, including, but not limited to, general collision statistics; collisions by roadway characteristics; collisions by contributing factor (e.g., distracted driving, driver collision statistics); and maps of fatal collision locations. See: <http://itd.idaho.gov/ohs/Stats.htm>.
- The Iowa DOT provides a Web site with links to geospatial information, including boundary data, road centerlines, linear referencing system, and other information.
- The Tennessee DOT collects a consistent set of roadway attributes and volume estimates for all public roads. The data are stored in the Tennessee Roadway Information Management System (TRIMS) and is available to DOT Division staff and MPOs.
- The Ohio DOT Location-Based Response System (LBRS) is a linear referencing centerline network being developed across the State on a county basis. The LBRS project establishes partnerships between State and county government for the creation of spatially accurate street centerlines with address ranges. The DOT provides funding for counties to develop local roadway databases, which are used by State and regional transportation planners to address safety issues.
- In Utah, a Hot Spot Committee that includes law enforcement, DOT and HSO (Department of Public Safety) representatives was formed to review various data sources and help guide enforcement activity toward high-crash locations. The data the Utah DOT gathers for their infrastructure and speed limit changes is vitally important in helping to guide enforcement activities.

Analyses

- The Pennsylvania DOT develops annual Highway Safety Guidance reports for PennDOT districts, MPOs, and Regional Planning Organizations (RPO). Previously, a component of the report included a high-crash location list. Based on feedback, PennDOT revised the reports to provide the high-crash location information through a geographic information system (GIS) online mapping tool and in spreadsheet format. This allows agencies to better visualize crash locations and overlay crash data on district or regional roadway network maps. Districts and MPOs are now using the information to inform planning and project decisions.
- The Florida DOT (FDOT) has developed and calibrated Florida-based safety performance functions) for most facilities using the Highway Safety Manual (HSM). The DOT also is calibrating intersections. FDOT collaborates with district offices to share information on the safety performance functions (SPF) and analyze crashes for the development of safety project lists.
- The New Jersey Department of Transportation (NJDOT) assists the MPOs in collecting and analyzing data for transportation safety planning. NJDOT provided updated lists of high-crash locations for each region ranked by frequency with severity included in the ranking. In partnership with FHWA Division Office and the Resource Center, NJDOT also has provided training on the HSM applications.

- The Utah DOT conducted research that involved examining the characteristics of fatal pedestrian crashes. From the Utah Department of Public Safety, the Director of the Utah Highway Safety Office was asked to participate on the technical advisory committee to ensure a behavioral expert was on the transportation research project. While the project was primarily geared toward infrastructure, the involvement of the Highway Safety Office director provided the opportunity to ensure the research results could be used to support and strengthen the Highway Safety Plan.

Table 4. Data sharing and analyses.

Transportation Planners	Safety Specialists
<i>How can I offer relevant planning data and analyses to safety specialists and become informed about safety/analyses data I might find useful?</i>	<i>How can I ensure safety data and analyses are accessible and used in the development of planning products?</i>
Present forecasts and other trends from the planning process to safety specialists at SHSP committee, MPO technical committee, and regional safety coalition meetings.	Present crash data and other related information on safety programs to planners during LRTP/MTP development, Statewide and MPO TAC meetings, and regional coalition meetings.
Become familiar with the data systems and request the most recent and relevant crash data available for the LRTP and MTP, corridor studies, and modal plans.	Promote database and safety data sharing platforms to ease access for State and local planners.
Become familiar with roadway data and collaborate with safety specialists to brainstorm opportunities to pair the data with crash data for specific plans and corridor studies.	Become familiar with roadway data and collaborate with planners to brainstorm opportunities for pairing the data for specific plans and corridor studies.
Use crash analyses to incorporate safety into LRTP and MTPs, corridor studies, and local safety plans.	Ensure planning partners are involved in the Traffic Records Coordinating Committee (TRCC) to advise on issues or challenges.

Long-Range, Metropolitan, Regional, and Local Transportation Planning Coordination

The SHSP provides strategic direction for Statewide safety plans and programs, such as the HSIP, the Highway Safety Plan (HSP), and the Commercial Vehicle Safety Plans (CVSP). The FAST Act requires transportation plans, such as the LRTP and MTP to be coordinated with the SHSP. At a minimum, transportation plans should be consistent with SHSP goals, objectives, and strategies.

Safety specialists and transportation planners use various tactics to coordinate the SHSP with the LRTP and MTP. Some initial steps include reviewing the SHSP goals and strategies and discussing opportunities to coordinate, ensuring safety specialists participate in and provide input during the Statewide LRTP/MTP development processes, and sharing data from the SHSP and other safety analyses for the benefit of the Statewide LRTP/MTP. Coordination examples, including the following:

- Iowa’s 2012 Long-Range Transportation Plan includes a comprehensive section on safety efforts across the State. The State’s SHSP emphasis areas, other key Statewide safety issues (e.g., distracted driving and emergency operations support) also are included. The plan considers safety issues for other modes of transportation, including aviation, bicycle, pedestrian, public transit, and rail. In the current LRTP, the DOT enhanced the link between the two processes by including the Planning Division on the SHSP Advisory Team and the Director of Traffic Safety on the LRTP Steering Committee. Also, the Director of

Traffic Safety is a member of the LRTP Focus Group, which is developing action plans for the LRTP. See: http://www.iowadot.gov/iowainmotion/files/iowaInMotion_final.pdf.

- The Del Norte Transportation Commission in California adopted the emphasis areas and strategies outlined in the California SHSP into the MTP and customized the strategies to address regional and local safety priorities. Additional analysis was conducted at the regional level to identify local safety priorities.

Some States are implementing SHSPs by providing resources to MPOs and local jurisdictions to develop regional safety action plans, which address regional or local safety challenges using a data-driven process similar to the SHSP planning process. The plans usually address many of the same traffic safety challenges identified in the SHSP, and also provide an opportunity to include a focus on safety issues specific to a region. Below are examples of how two States integrate strategies and priorities from the SHSP into regional safety plans:

In 2012, Virginia Department of Transportation (VDOT) conducted regional and local level meetings to coordinate SHSP efforts. Since VDOT maintains 85 percent of the roadway network and all county roads, participation by local agencies was high. They wanted to be involved in the planning process since it directly affects them. The meetings enhanced coordination of safety improvement projects with the local agencies.

- The Iowa DOT is assisting 12 counties with developing county safety plans. The plans are funded by Iowa DOT and include a list of projects counties can implement to improve safety. The plans are funded by the Traffic Safety Improvement Program, a State-funded improvement program started in 1987, which uses one-half of one percent of State revenue funds to support safety improvements.
- The Louisiana Department of Transportation and Development (DOTD) supports nine regional safety plans designed to support SHSP implementation. The State’s experience shows regional safety planning effectively engages local agencies, which implement the regional safety plans.

Table 5. Long-range, metropolitan, regional, and local transportation planning coordination.

Transportation Planners	Safety Specialists
<i>How can I ensure safety stakeholders are fully engaged in the transportation planning process?</i>	<i>How can I ensure transportation planners utilize safety planning activities and outcomes in the transportation planning process and documents?</i>
Meet with safety specialists to review SHSP goals and strategies.	Identify planning managers/directors to participate on the SHSP Executive Committee and/or Steering Committee.
Invite safety specialists to present data and information during the LRTP and MTP development.	Invite planners tasked with relevant topic areas to contribute to SHSP Emphasis Area Teams (e.g., Pedestrian and Bicycle, Freight).
Ask the SHSP Steering Committee how the LRTP and MTP can address SHSP goals, objectives, and strategies.	Use regional and local safety coalitions as a source to identify HSIP projects.
Actively participate in regional or local coalitions or safety teams tasked with developing regional and local safety plans.	

Integrate Safety into Transportation Planning Processes

Beyond the multidisciplinary collaboration, data sharing and analyses, and elements of the overall transportation planning processes, opportunities exist for coordination of transportation and safety planning activities. These are outlined below.

Research shows most DOTs and MPOs have incorporated a safety goal and objectives into LRTPs and MTPs, but evidence of safety considerations in the project identification and prioritization process are less common. To ensure safety is considered when projects are identified and prioritized, it is necessary to establish performance measures related to the safety performance of the system. Current legislation requires performance-based planning and programming. The following sections focus on the opportunities to enhance linkages between the safety and planning processes by coordinating performance measures and targets and integrating safety into the project identification and prioritization process.

Performance Measures and Targets

Safety specialists and transportation planners can ensure the performance management process is coordinated by including planners in major meetings and groups tasked with developing and coordinating the annual safety targets, and planners should include safety specialists in any major meetings and groups tasked with establishing annual performance targets for other program areas. Topics to discuss may include data limitations, timing of annual target reporting, target setting methods, and opportunities to monitor progress. The following examples of strategies used to coordinate performance measures and targets were implemented prior to the Final Rule:

- Caltrans developed a Planning Office Community Development MAP-21 Performance Management Team led by the director's office to address all MAP-21 goal areas and how to achieve targets. One purpose of the team is to ensure consistency across multiple divisions and make sure all topics are covered.
- Pennsylvania DOT developed a process to coordinate safety targets across the State. The process involved Pennsylvania DOT assigning each DOT district a target for the required performance measures. The districts then develop a safety action plan designed to achieve their targets.
- The Portland Metro MPO (Oregon) held a workshop on performance measures. Topics included integrating safety into performance measures, local-level implementation of performance-based planning, and bringing a safety component into LRTP issues. The MPO also had developed a safety plan to frame investment priorities for the region.
- The New Jersey DOT began monthly meetings with the State's MPOs along with the New Jersey Director of Highway Traffic Safety on establishing safety performance measure targets. The goal is to collaborate and coordinate the State's target setting well ahead of the reporting deadlines for the different agencies.

Project Identification

To identify projects, transportation and safety agencies will collect data and conduct analysis; identify crash types and contributing factors; establish crash patterns; conduct field reviews; identify countermeasures; and assess countermeasure effectiveness. Safety specialists should share information and coordinate with State and local planners to identify projects for the HSIP and HSP, and planners should collaborate with safety

specialists to overlay crash and safety data with transportation projects and identify opportunities to plan and implement projects with strong safety benefits. The following examples discuss collaborative approaches to project identification:

- The Indiana DOT prepared a guidance document to assist local public agencies with the identification of HSIP projects. The guidance provides a step-by-step process to identify safety projects and offers resources to assist local planners and engineers, such as information on how and where to access data and a list of eligible project types/countermeasures. See: <http://www.in.gov/indot/files/LocalHSIPProjectSelectionGuidance.pdf>.
- The Arizona DOT (ADOT) provided funding to MPOs and Council of Governments (COG) to hire consultant support to develop regional safety plans and identify infrastructure projects eligible for HSIP funding. The general approach to problem identification includes access to crash and roadway data for the State and local routes through the ADOT crash database; conduct network screening to identify the segments and intersections that would benefit from safety improvements; review proven safety countermeasures that would be most effective at addressing crash causation to further prioritize segments and intersections; and apply for HSIP funding through the ADOT application process. The funding has enhanced coordination and collaboration between ADOT planners and safety specialists and MPO/COG planners.
- In Ohio, the DOT Highway Safety Program Division and Planning Division recognized the need to better incorporate safety analysis into all highway projects. Therefore, the safety and planning staff are working together to incorporate predictive crash analysis into the project identification and development process for all highway projects.
- As part of the regional safety planning process in Louisiana, the Louisiana DOTD, Louisiana Transportation Research Center (LTAP), and FHWA Division staff worked with interested regional coalitions to analyze crash data on the local road system and, where applicable, conduct road safety assessments to identify low-cost countermeasures. The DOTD provides HSIP funding for eligible safety improvements.
- New Jersey committed alignment of HSIP infrastructure funds in their most recent 2015 SHSP. Since 60 percent of crashes in New Jersey occur on local roads the New Jersey DOT commits 60 percent of HSIP funds to local roads. Also, this action is identified in the Statewide Transportation Improvement Program (STIP). For the past two years this action has resulted in a five-fold increase of HSIP infrastructure investments on local roads.

Project Prioritization

Once projects have been identified, State DOTs, MPOs, State Highway Safety Offices (SHSO), and other agencies prioritize them for funding. A project prioritization process is used to evaluate a list of potential projects based on performance and plan priorities, and the prioritized list is adopted into the Metropolitan Transportation Improvement Program (S/TIP). The project prioritization process typically involves a scoring component, incorporating various planning factors and priorities. All agencies are encouraged to adopt a transparent project prioritization process, providing evaluation criteria and application information online. Different elements of prioritization can include qualitative data, the results of data analysis, and benefit-cost ratios. These processes are conducted both for safety improvement programs, such as the HSIP and HSP, as well as for general transportation planning projects encompassing all modes. While safety and transportation identification and prioritization processes are separate, the priorities considered should

overlap and be coordinated. Planners and safety specialists can collaborate to help project sponsors fully understand the prioritization process and provide guidance on how to complete an application. The following examples discuss collaborative approaches to safety project prioritization:

- In California, a local HSIP advisory committee was created to give local and regional agencies a stronger voice in policy/program development and prioritization for local HSIP projects. In addition, Caltrans developed HSIP Guidelines to provide information on the project selection and application process for local HSIP projects. The guidelines helped local planners and engineers understand better the HSIP process and enhanced the link between Caltrans safety and planning staff and the local agency planning and engineering staff. See: <http://dot.ca.gov/hq/LocalPrograms/HSIP/2016/HSIP-Guidelines.pdf>.
- The Utah DOT developed the Utah Roadway Imaging and Inventory Project, which utilizes Light Detection and Ranging (LIDAR) to gather attributes for all public road mileage in the State. They use the data to examine the geometric attributes that impact safety to aid in project prioritization. They also use the Utah Crash Prediction Model developed by Brigham Young University to prioritize projects. These tools are available to the MPOs and other transportation and safety agencies in the State to identify safety projects or safety benefits in coordination with transportation projects.
- The Arizona DOT prepared a HSIP Project Application Process and Worksheets resource to help agencies submit projects eligible for HSIP funds. The document provides a list of prioritization criteria, instructions on how to calculate benefit-cost ratio, information on supporting crash data, condensed list of the most effective, proven safety countermeasures, consistency with the State SHSP, and other items. The HSIP application form also is included in the document. See: <https://www.azdot.gov/docs/default-source/traffic-library/hsip-appendix-a.pdf?sfvrsn=4>.
- Virginia DOT (VDOT) has incorporated safety into the LRTP and the project prioritization process used to rank projects funded by House Bill 2: SMARTSCALE—Funding the Right Transportation Projects. This prioritization process includes six factors: 1) safety; 2) congestion mitigation; 3) accessibility; 4) environmental quality; 5) economic development; and 6) land use and transportation coordination. VDOT developed planning-level crash modification factors (CMF) for common project types. The CMFs allow planners and safety specialists to consistently rank projects based on estimated safety improvements. See: <http://vasmartscale.org/>.
- In New Jersey, HSIP funds are allotted to the three MPOs proportionally to the amount of injury and fatality crashes in each region. Each MPO has a HSIP technical advisory committee that provides their subregions with information on high-crash locations along with applications for projects that include an HSM analysis requirement. Once applications are submitted, the MPO forwards copies to each member of the advisory committee which includes State DOT safety, environment and local aid subject matter experts (SME) who score the applications. The MPO then conducts a meeting to compile the scores and discuss the potential projects for funding investment.

Project Implementation

Once safety projects have been identified and prioritized, they are programmed into the S/TIPs and eligible for implementation. Using a collaborative approach, safety specialists and transportation planners should work together to implement both safety projects and transportation projects with a safety element. The following examples discuss collaborative approaches to safety project implementation:

- In New Mexico, the HSIP Program Manager oversees transportation planning efforts and the HSIP program. This organizational arrangement has improved collaboration between planning and safety efforts, including safety project planning, project timing, and project obligation rates within the planned year. In addition, the manager interacts with local planning entities and to gain more knowledge of local planning capabilities and technical assistance needs.
- The Virginia DOT developed Highway Safety Improvement Implementation Guidelines, which include the project planning and development processes for safety programs (e.g., Highway Safety, Bike and Pedestrian Safety, Highway-rail Grade Safety Crossings, and Local Agency Safety). See: http://www.virginiadot.org/business/tes_app_pro.asp.
- The Southwestern Pennsylvania Commission (SPC), the MPO for the Pittsburgh region, collaborates with the Pennsylvania DOT (PennDOT) District staff, the local municipalities, and/or counties to review candidate locations. Where applicable, they jointly conduct a road safety audit and prepare a formal report on these locations. Based on the collaborative effort between the State, region, and localities, a number of low-cost safety countermeasures have been implemented throughout the region.
- The Louisiana DOTD safety and planning staff collaborate on the delivery for all transportation projects. To ensure projects are feasible and can be completed on time and within budget, DOTD uses a six-stage process. Stage-zero develops the project scope and alternatives and assesses feasibility to identify and document safety needs. Understanding and identifying the key safety issues early in the project development process ensures countermeasures are incorporated into project design and project construction. See: http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Project_Management/Project%20Delivery%20Manual/LA%20DOTD%20Project%20Delivery%20Manual%202013%20-%20FINAL.pdf.

Modal Plans

States and MPOs also may develop mode-specific plans (e.g., bicycle and pedestrian or freight plans). These plans use a similar transportation planning process as the LRTP/MTP and engage a larger group of key stakeholders close to the mode's challenges and needs. States and MPOs regularly evaluate and revise these plans. Since States and MPOs also use these plans during the programming process when developing S/TIPs, it is important for safety specialists and transportation planners to coordinate the development and implementation of the plans. Examples of safety specialists and transportation planners coordinating efforts to incorporate safety into other transportation plans:

Caltrans incorporated elements of the State's SHSP into its Statewide Complete Streets Action Plan. The two action items related to the SHSP are data driven update, including all modes of transportation, and local assistance for developing bicycle/pedestrian guidance.

- Iowa's Bicycle and Pedestrian Plan includes a safety analysis. Safety specialists provided data for the analysis and were involved in the plan development process.
- A major component of the Iowa Rail Plan includes rail crossing safety issues. The rail division applied for Transportation Safety Improvement Program (TSIP) funds for a rail safety campaign. See: <http://www.iowadot.gov/tsip.htm>.
- The Caltrans Roundabout Inventory Report and Ramp Meter Development Plan are two examples of other plans coordinated to include safety. The Roundabout Inventory Report provides background on the

safety benefits of roundabouts and maps all the roundabouts in the State. The Traffic Operations, Planning Division and districts coordinate on the report development. The Ramp Meter Development Plan includes several safety elements.

- The Caltrans Planning Forward Team is responsible for developing Transportation Concept Reports, providing guidance on all State highways for long-range planning. The team includes Statewide district participation, along with traffic operations. Safety is being incorporated into the reports, and the team is looking at ways to discuss safety at the conceptual level.
- The New Jersey DOT utilized HSIP funds to fund a pedestrian and bicycle safety action plan for the State's pedestrian focus city. The local MPO took the lead overseeing the identification of high-crash locations in the city and gathered together stakeholders to focus on the top 10 locations for infrastructure improvements. The final plan was endorsed by the mayor to demonstrate local support for the plan. With recommended infrastructure improvements. The plan, with recommended infrastructure improvements for each location, was designed to provide the data for the next HSIP project application for the MPOs annual project solicitation.

Safety Needs in Transportation Plans

Safety issues identified in transportation plans should be incorporated into safety plans, such as the SHSP. Safety specialists can participate in a number of transportation planning activities to understand midterm and long-term safety priorities and coordinate the integration of safety needs from transportation plans into the SHSP and regional/local safety plans. Transportation planners can share safety needs identified during public outreach activities, and discuss the potential impacts to safety performance at a systems level. Examples include:

- Caltrans uses its Policy Advisory Committee and TAC as opportunities for safety specialists and planners to coordinate incorporating safety needs from transportation plans into the SHSP and regional/local safety plans. The Caltrans Policy and Advisory Committee includes: FHWA, large MPOs, Rural Transportation Planning Agencies (RTPA), California Walks, Departments of Aging and Health, and other members. The committee shares results from the travel demand model and freight travel demand model and collaborate to obtain consensus on and support for the plans. TAC is used as a forum to discuss and collaborate on transportation plans and programs. Information from these committees is distributed via the California Council of Governments (CalCOG) and Rural Counties Task Force.
- Oregon DOT conducts regional leadership meetings with district area managers, technical services managers, and other staff responsible for maintenance and project delivery. At those meetings, statistics on traffic fatalities and injuries are presented and discussed to coordinate safety performance awareness at the system level. The meetings also allow safety specialists to understand other perspectives on safety needs, such as maintenance and project delivery perspectives.
- The Pima Association of Governments (Arizona) used a public engagement tool to collect public input on the long-range plan. The tool created four different planning scenarios on a performance-driven planning approach. The results included a strong emphasis on infrastructure maintenance rather than adding new capacity. Safety was a top priority and an overall common theme. The information collected from the LRTP outreach process will be incorporated into the MPO's regional safety plan.

Table 6. Integrate safety into transportation planning processes.

Transportation Planners	Safety Specialists
<i>What can I do to ensure safety concerns are addressed at each stage of the transportation planning process: conducting public outreach, establishing performance targets, utilizing safety data, etc.?</i>	<i>What can I do to provide transportation planners with the information and contacts they need to incorporate safety concerns into each stage of the transportation planning process?</i>
Integrate safety into public involvement and outreach activities used to develop a long-range vision, mission, and goals.	Provide suggestions to planners on safety topics to be included in public involvement and outreach activities used to develop a long-range vision, mission, and goals.
Include safety specialists in major meetings and groups tasked with establishing annual performance targets for other program areas.	Include planners in major meetings and groups tasked with developing and coordinating annual safety targets. Topics may include data limitations, timing of annual target reporting, and methods used to set targets.
Work with safety specialists to overlay crash and safety data with transportation projects and identify opportunities to plan and implement projects with strong safety benefits.	Share information on safety issues and coordinate with State and local planners to identify projects for the HSIP and HSP.
Become familiar with tools and guidance to help planners understand the project prioritization process used for safety improvement projects.	Develop tools and guidance to help planners understand the project prioritization process used for safety improvement projects.
Incorporate safety into analysis and planning procedures manuals and work with safety specialists to develop content.	Provide data and relevant stakeholder input on safety issues for modal plans (e.g., freight, rail, pedestrian and bicycle).
Share data on any safety needs gathered during the Statewide LRTP, MTP, Freight Plan, Pedestrian and Bicycle Plan, etc. with safety specialists.	Provide suggestions for safety-related questions in long-range planning outreach.
Invite safety specialists to lead a discussion on safety needs and goals at policy and/or TAC meeting.	Participate in transportation plan outreach activities to understand the safety needs identified.

Education and Training Programs

To enhance collaboration on transportation and safety planning processes, training is often required to align and elevate staff skill sets. Safety specialists can provide training on any aspect of the transportation safety or safety planning processes, and transportation planners can offer training to safety specialists on the transportation planning process, technical information on modal issues, and metropolitan planning priorities. The following examples showcase successful training opportunities:

- The Virginia DOT STARS program brings together planners, traffic and safety engineers, maintenance specialists, and local stakeholders to identify, prioritize, and program transportation projects to improve safety and reduce congestion. To help participants take advantage of the program and the process used to select projects, VDOT offers trainings on the program. To date,

The Virginia DOT has a Strategically Targeted Affordable Roadway Solutions (STARS) program for planners, traffic and safety engineers, maintenance specialists, and local stakeholders. The goal of the program is to identify, plan, conceptually design, and program projects to reduce congestion and improve safety. The program overlays safety and traffic databases in GIS to assist with selecting locations that will put the program's resources to best use. Projects are prioritized using a travel time index, planning time index, buffer time index, volume-to-capacity ratios, potential for safety improvement rankings, and historic crash data.

training has included a GIS-101 to provide everyone with baseline knowledge of the tool, an interactive training on how GIS is used for the STARS Program, and crash data collection. See: http://www.virginiadot.org/projects/stars_ii.asp.

- The Oregon DOT (ODOT) developed an Analysis Procedures Manual (APM), which provides current methodologies, practices, and procedures for conducting long-term analysis for transportation plans and projects. With an update to the APM recently completed, new information, such as how to utilize the HSM is now included. ODOT provides training on the APM for regional and local staff. The planning and engineering staff deliver the training together to demonstrate to local entities the importance of coordination between the two groups. See: <https://www.oregon.gov/ODOT/TD/TP/pages/apm.aspx>.
- The Oregon DOT is collaborating more with health entities for the current SHSP update process and is training planners on conducting and using health impact assessments. The training will be used as an opportunity to broaden the number of people who understand the relationship between health and safety.
- The Mountain West Regional Tribal Technical Assistance Program has offered trainings and workshops on developing Tribal Safety Plans.

The Ohio Department of Transportation (ODOT), in coordination with the Local Technical Assistance Program, and Department of Public Safety provides a number of regular training opportunities to help transportation planners, engineers, law enforcement agencies, and State and local safety advocates understand crash data and analysis. Trainings include the HSM Overview Workshop, HSM Focus Training Class, HSM Freeway Training Class, ODOT Traffic Academy—Safety Studies Course, and GIS Crash Analysis Tool (GCAT) Computer Training for Local Agencies.

Table 7. Education and training programs.

Transportation Planners	Safety Specialists
<i>How can I identify and provide access to transportation planning training opportunities to safety specialists?</i>	<i>What safety training opportunities are available for transportation planners at all levels?</i>
Determine the workforce development/training opportunities related to safety within your organization.	Determine the workforce development/training opportunities related to planning within your organization.
Identify available workforce development/training opportunities outside of your organization.	Identify available workforce development/training opportunities outside of your organization.
Meet with safety specialists and develop a list of desired training objectives.	Meet with transportation planners and develop a list of desired training objectives.
Provide training to safety specialists on Statewide, regional, and modal transportation planning processes and priorities.	Provide planners with training on safety, transportation safety planning, and crash data and analysis procedures.
Assist MPO and local planners by introducing them to safety specialists.	Work with LTAP and Regional Safety Coalitions/Teams to identify opportunities for safety training to local planners.

Summary

Enhancing the link between the safety and transportation planning processes can result in enhanced collaboration and coordination between the two planning processes, more opportunities to leverage

resources, and ultimately, reductions in fatalities and serious injuries on the transportation system. Safety specialists and transportation planners have many opportunities to effectively communicate within and between agencies and across disciplines and job functions; collaborate to share information, resources, data, and tools to enhance safety considerations in the transportation planning process; and coordinate the two processes to address safety in the transportation process and translate safety needs from transportation plans into information to influence safety plans and programs. While research has addressed opportunities to integrate safety into the transportation planning process for many years, this Resource Guide has added to that body of knowledge and identified strategies to tie safety and transportation planning needs identified during the long-term planning process into the SHSP and other safety planning efforts.

Appendix A. Glossary

American Association of State Highway and Transportation Officials (AASHTO)—A nonprofit, nonpartisan organization representing highway and transportation departments in all 50 States, the District of Columbia, and Puerto Rico.

Commercial Vehicle Safety Plan (CVSP)—An annual plan completed by each State to receive Basic Motor Carrier Safety Assistance Program (MCSAP) Grant funds. The plan outlines the State's commercial motor vehicle safety objectives, strategies, activities, and performance measures.

Congestion Management Process (CMP)—A required process for metropolitan areas with populations exceeding 200,000; also known as Transportation Management Areas (TMA). A CMP is an approach for managing congestion with the purpose of providing safe and effective integrated management and operation of the multimodal transportation system. The CMP has been used by some Metropolitan Planning Organizations (MPO) to identify congestion issues based on safety and lead to efforts to address safety improvements.

Crash Data Improvement Program (CDIP)—Program to assist State crash database managers and other safety professionals in identifying, defining, and measuring the characteristics of the data quality within the State crash database.

Emphasis Areas—Key factors contributing to crashes which, if addressed, have the greatest potential to reduce fatalities and series injuries. The National Strategy on Highway Safety outlines a list of potential emphasis areas. (http://www.towardzerodeaths.org/wp-content/uploads/TZD_Strategy_12_1_2014.pdf)

Fatality Analysis Reporting System (FARS)—A Nationwide census providing annual data regarding fatal injuries in motor vehicle traffic crashes. The National Highway Traffic Safety Administration maintains this database.

Federal Highway Administration (FHWA)—A division within the U.S. Department of Transportation that specializes in highway transportation.

Federal Highway Administration Divisions—Local field offices found in every State representing the FHWA. Division employees provide guidance, leadership, and assistance on various modal topics and transportation issues to State Departments of Transportation (DOT) and MPOs.

Federal Motor Carrier Safety Administration (FMCSA)—An agency within the U.S. Department of Transportation that regulates the trucking industry whose primary mission is to reduce crashes, injuries, and fatalities involving large trucks and buses.

Federal Transit Administration (FTA)—An agency within the U.S. Department of Transportation that provides financial and technical assistance to local public transportation systems.

Fixing America's Surface Transportation (FAST) Act—A 2015 Federal funding and authorization bill that governs the Nation's Federal surface transportation spending.

Highway Performance Monitoring System (HPMS)—A national-level highway information system (database) that includes data on the extent, condition, performance, use, and operating characteristics of the Nation's highways.

Highway Safety Improvement Program (HSIP)—A program with a goal of achieving a significant reduction in traffic fatalities and serious injuries on all public roads. The HSIP includes three main components: 1) a Strategic Highway Safety Plan (SHSP); 2) Railway-highway Crossing Program; and 3) a program of safety improvement projects.

Highway Safety Manual (HSM)—A document providing an overarching approach to safety management, including a variety of methods for quantitatively estimating crash frequency or severity.

Highway Safety Plan (HSP)—An annual publication developed by States that serves as a programmatic guide and application for Federal grant funding from the NHTSA. The report outlines the use of Federal highway safety funds and evaluates the programs supported by the funds.

Interactive Highway Safety Design Model (IHSDM)—A suite of software analysis tools used to evaluate the safety and operational effects of geometric design decisions on highways.

KABCO Scale—A scaled used to classify roadway injuries. K is fatal, A is incapacitating injury, B is nonincapacitating injury, C is possible injury, and O is no injury.

Manual on Uniform Traffic Control Devices (MUTCD)—A document defining the standards and guidance of traffic control devices, such as roadway sign shape, color, and location.

Metropolitan Long-Range Transportation Plan (MTP)—The primary transportation-planning document required for MPOs. This report is used to identify key roadway and transit issues and needs over the next 20 plus years.

Metropolitan Planning Organization (MPO)—A public, governmental agency responsible for planning and coordinating transportation services in metropolitan areas with more than 50,000 in population.

Metropolitan Transportation Improvement Program (TIP)—A document developed by MPOs, which outlines the transportation projects for funding in a specific geographic area over the next four to six years, including implementation timeframe and funding sources.

Model Inventory Roadway Elements (MIRE)—A recommended listing of roadway inventory and traffic elements critical to safety management. These guidelines are intended to help transportation agencies improve their roadway and traffic data inventories.

MIRE Fundamental Data Elements (FDE)—A fundamental set of roadway traffic data elements that States must collect and can be used to support safety analyses. The data collected includes 37 data elements on nonlocal paved roads, 9 elements on local paved roads, and 5 elements on unpaved roads.

Model Minimum Uniform Crash Criteria (MMUCC)—A voluntary guide providing a minimum, standardized data set for describing motor vehicle crashes and the vehicles, persons, and environment involved. The 110 data elements presented in this document include 77 data elements at the scene; 10 data elements to be derived from the collected data, and 23 data elements to be obtained after linkage to driver history, injury, and roadway inventory data.

Moving Ahead for Progress in the 21st Century Act (MAP-21)—A funding and authorization bill that governs the Nation’s Federal surface transportation spending. This bill was replaced by the FAST Act in late 2015.

National Highway Performance Program (NHPP)—Federal funding to provide support for the condition and performance of the National Highway System (NHS), the construction of new facilities on the NHS, and to ensure investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a State’s asset management plan for the NHS.

National Highway System (NHS)—A network of strategic highways within the United States important to the Nation’s economy, defense, and mobility.

National Highway Traffic Safety Administration (NHTSA)—An organization under the U.S. Department of Transportation responsible for carrying out safety programs. This includes implementing programs that reduce deaths, injuries, and economic losses resulting from motor vehicle crashes; investigates safety defects; and conducts research on driver behavior and traffic safety.

Performance-Based Planning Process (PBPP)—A method of planning and programming used by transportation agencies to achieve a desired performance outcome for the multimodal transportation system.

Policy on Geometric Design of Highways and Streets—A document covering the functional design of roads and highways, such as intersection layout, horizontal curves, and vertical curves. Commonly known as the Green book.

Regional Transportation Planning Organization (RTPO)—Agencies that operate in nonmetropolitan areas to conduct outreach to the public and local officials, and provide transportation-planning support under contract to State Departments of Transportation (DOT). Also known as Regional Planning Organizations (RPO).

Regional Safety Coalition—Regional entities that bridges the gap between multiple safety stakeholders, such as State DOT, local governments, law enforcement, civic organizations, and education leaders. These coalitions usually work closely with the development of the SHSP and other local and regional safety documents and programs.

Roadway Data Improvement Program (RDIP)—A FHWA program that provides information and resources to help agencies improve roadway safety data systems, collection, analysis, and evaluation.

State Highway Safety Offices (SHSO)—This State office works with various safety stakeholders (law enforcement, judicial personnel, community advocates, et al.) to coordinate activities and initiatives relating to highway safety, specifically behavioral aspects (e.g., texting while driving, wearing seatbelts). Every State has an SHSO.

Statewide Long-Range Transportation Plan (LRTP)—The primary transportation-planning document required for State DOTs. This report is used to identify key roadway and transit issues and needs over the next 20 plus years.

Statewide Transportation Improvement Program (STIP)—A document developed by DOTs that outline the projects for funding over the next four to six years, including the timeframe for implementation and the source of funding.

S/TIP—This acronym is a shorthand methods of referring to the Statewide and metropolitan transportation improvement programs.

Strategic Highway Safety Plans (SHSP)—A Statewide coordinated safety plan developed by the State DOT in consultation with safety stakeholders. It provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads.

Technical Advisory Committees (TAC)—MPO committees made up primarily of representatives from local jurisdictions, DOT staff, transit agencies, and FHWA. They usually meet monthly or quarterly to provide input and guidance into all transportation planning activities. Some committees address specific modes or topics, such as safety.

The 4 Es of Safety—An approach to safety to include all disciplines: engineering, enforcement, education, and emergency response. Stakeholders from each of these disciplines are engaged in the SHSP planning process, and their expertise can be utilized for other safety and transportation plans.

Toward Zero Deaths—The safety vision for the Nation and many States. The goal is to have zero highway fatalities, and many efforts are underway to help move toward this goal.

Traffic Records Coordinating Committee (TRCC)—A State committee with the goal of improving the collection, management, and analysis of traffic safety data by coordinating the activities of safety data stakeholders.

Transportation Planning Process—An approach DOTs and MPOs take to develop plans and projects, which involves a cooperative, performance-driven process, by which long- and short-term investments are determined.

Transportation Research Board (TRB)—One of the seven program units of the National Academies of Sciences, Engineering, and Medicine. The program provides independent, objective transportation analysis and advice to the Nation, and conducts other activities to solve complex problems and inform public policy decisions.

Unified Planning Work Program (UPWP)—An annual or biennial statement of work identifying the planning priorities and activities to be carried out within a metropolitan planning area. MPOs are required to develop these documents.

Vision Zero—An approach that envisions even one traffic death is unacceptable. Some of the principles include: transportation safety responsibility is shared between individual users and system designers (i.e., transportation engineers, automotive industry, lawmakers and transportation agencies); and transportation system design should take into account that human behaviors are not perfect.

U.S. Department of Transportation
Federal Highway Administration
Office of Safety
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