

**XXIVth WORLD ROAD CONGRESS  
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# **UNITED STATES OF AMERICA – NATIONAL REPORT**

## **STRATEGIC DIRECTION SESSION STC**

### **A STRATEGIC APPROACH FOR SAFETY: PUTTING KNOWLEDGE INTO PRACTICE**

**A New Strategic Vision for Highway Safety in the United States**



United States Department of Transportation  
Federal Highway Administration (FHWA)  
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## ABSTRACT

The United States has a rich tradition of highway safety dating back to the advent of the automobile in the early 1900s and continuing successfully through development of the nation's modern highway system. Whether through laws, regulations, technical innovations, or infrastructure improvements, highway safety has always been the highest priority within the country's transportation community.

When automobiles attained higher speeds in the 1920s, the Bureau of Public Roads, the predecessor of today's Federal Highway Administration (FHWA), started addressing the problem through such design improvements as superelevation or the banking of curves to counter the increased lateral forces of faster automobiles. The U.S. transportation community also started working with manufacturers to make automobiles safer for vehicle occupants. The development of an extensive national freeway network, or Interstate Highway System, in the 1950s and 1960s was an example of how the country advanced highway safety through infrastructure improvements.

The formation in 1966 of the National Traffic Safety Bureau, the predecessor of today's National Highway Traffic Safety Administration, was viewed as the start of the modern era of highway safety in the United States. From there, the United States has enacted a long series of laws covering seatbelt usage, drinking and driving, child safety, motorcycle and bicycle helmet usage, and vehicle crash safety.

From the early years to the present, the United States has maintained strong leadership in highway safety policy and implementation. As a result of these efforts, highway fatalities and injuries have steadily declined over the past 30 years, from 51,093 in 1979 to an estimated 33,963 in 2009, nearly a 33% decrease.

Despite these accomplishments, significant room for improvement still exists. The U.S. Department of Transportation and its primary partners at the state and local levels of government recognize the need for a renewed examination of the country's national strategic approach to highway safety. This new approach seeks to simultaneously change Americans' attitudes toward highway safety and build on the country's existing safety foundation to reduce highway fatalities and injuries. This new approach is already emerging, but much more work remains.

Part 1 of the report focuses on the country's strategic approaches. This focus deals with developing strategies in cooperation with the broad safety community, including the American public. There will be strong element on building personal responsibility for highway safety and public intolerance for unsafe behaviors. Two parallel efforts will be outlined:

- A U.S. Department of Transportation Roadway Safety Plan
- A national program called Toward Zero Deaths: A National Strategy for Highway Safety.

Part 2 of the report explains how the United States will build on current programs and technologies to implement the new strategic vision. This section includes in-depth discussions of the programs, guiding principles, partnerships, innovations, and technology

deployment methods that will be used to move the nation toward accomplishing this new strategic vision.



*Despite a nearly 33% reduction in fatal highway crashes over the past 30 years, the United States has room for improvement. In the first decade of the 21<sup>st</sup> century, from 2000 to 2009, the United States suffered more than 400,000 deaths and 4 million serious injuries in crashes on its highways. The country's transportation community recognizes the need for a renewed examination of a national strategic approach to highway safety to reduce highway fatalities and injuries, such as what occurred in the crash shown above on a U.S. interstate highway near Salt Lake City, Utah.*

### **Part 1 – A New National Strategic Approach**

In 2009, an estimated 33,963 fatalities occurred on U.S. highways, a drop of 9% compared with 37,261 deaths reported in 2008. The U.S. fatality rate for 2009 declined to the lowest levels on record, to 1.16 fatalities per 100 million vehicle miles traveled (VMT). That's down from 1.25 fatalities per 100 million VMT in 2008. This is encouraging news even though part of the decline was likely related to the recent economic downturn. The United States not only wants to maintain these lower fatality levels, but also continue to improve its safety performance.

The United States ranks 27<sup>th</sup> among leading industrial countries in highway fatalities per capita. The United States also ranks 12<sup>th</sup> in highway safety within this group when fatality rates are measured as a function of vehicle miles traveled. Whatever the measurement, these rankings indicate that the United States has significant room for improvement. This is especially true given that in the first decade of the 21<sup>st</sup> century (2000 to 2009), the United States suffered more than 400,000 deaths and 4 million serious injuries in crashes on our nation's highways.

The United States and other countries have opportunities for advancements in highway safety by working in partnership through the United Nation's Global Road Safety Decade of Action, a worldwide campaign calling on the international community to ensure that politicians, institutions such as the World Bank, vehicle manufacturers, and transportation

planners put road safety first. The campaign goal is to reduce the forecasted level of road deaths worldwide by 50% by 2020. For the United States to achieve a safer future for its own highway system, the U.S. transportation community recognized that a renewed examination of the country's national strategic approach had to be undertaken.

Since the formation of the National Traffic Safety Bureau in 1966, numerous laws and regulations have been enacted and implemented to improve highway safety, including requiring front seat lap and shoulder belts in passenger vehicles in 1968, stricter laws on and enforcement of alcohol drinking and driving in the early 1980s, and child safety seat and motorcycle and bicycle helmet requirements in the 1990s. A historical perspective of certain US safety laws, programs, and statistics is found in Figure 1 on the next page.

In 1998, the American Association of State Highway and Transportation Officials (AASHTO), a national non-profit association that advocates for transportation-related policies and provides technical services to states and local transportation agencies, approved its Strategic Highway Safety Plan, which was developed in partnership with several organizations, including the U.S. Department of Transportation. The plan included safety strategies in 22 key emphasis areas. This plan resulted in many partners working together on various new initiatives, including the development and implementation of a series of guides for the 22 emphasis areas. Many efforts were successfully executed from the plan.

### **Figure 1** **Modern History of U.S. Highway Safety**

- 1966** – National Traffic Safety Bureau, predecessor of today's National Highway Traffic Safety Administration, is established.
- 1968** – Front seat lap and shoulder belts required in passenger vehicles.
- 1978** – State of Tennessee enacts first child passenger safety law.
- 1984** – State of New York enacts first seatbelt use law. All states and the District of Columbia, except New Hampshire, enact similar laws by 1995.
- 1996** – National safety campaign urges drivers to move children to the rear seat.
- 2002** – National seatbelt awareness campaign, Click It or Ticket, is launched.
- 2004** – Seatbelt use nationwide reaches 80%.
- 2005** – A new 6-year federal surface transportation law, The Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was signed into law on August 10, 2005, establishing the Highway Safety Improvement Program (HSIP) as a core Federal-aid program. Also, all U.S. states, the District of Columbia, and Puerto Rico enact laws limiting blood alcohol levels while driving to .08%.
- 2007** – Overall traffic fatalities drop 3.9% from previous year; motorcycle fatalities drop 6.6% from 2006, alcohol-impaired driving fatalities drop 3.7%, and seatbelt usage rate reaches 82% nationwide.
- 2009** – Highway fatalities in the United States fell to their lowest level since 1961.

The success of the Strategic Highway Safety Plan has laid the foundation for a new national strategy that is now evolving in the United States. This new national strategy will likely contain:

- A new national U.S. Department of Transportation roadway safety plan
- More robust goal setting
- A visionary framework for future safety programs developed by the broad safety community
- Tools to measure performance to measure progress toward safety goals
- Increased emphasis on getting innovation into practice

As long as people continue to lose their lives on U.S. highways, the country remains committed to finding new and innovative approaches for reducing fatalities and injuries. Building on the strong foundation of safety requirements and resources provided under the current national surface transportation law known as SAFETEA-LU, the U.S. Department of Transportation sees many opportunities for improving highway safety through refocused transportation policies.

## **National Efforts**

In late 2009, the Office of Management and Budget (OMB), which oversees the preparation and administration of the federal budget for the U.S. President, asked the U.S. Department of Transportation to identify a set of national priorities and specific goals to accompany the President's Fiscal Year 2011 (October 1, 2010 - September 30, 2011) federal budget. When this process began, the U.S. Department of Transportation did not have a current plan that involved all of the agencies within the Department working together to advance highway safety programs.

Although a goal was ultimately developed and provided to OMB, the U.S. Department of Transportation needed a better process or plan for developing subsequent goals. Some key elements that have been identified include the following:

- Any future goals that are set should be tied to a national strategic plan that lays out the actions that would need to be achieved to reach those goals. The U.S. Department of Transportation wants to look more strategically at setting longer-term goals and plans that shape future investments and legislation for highway safety.
- The need for a U.S. Department of Transportation Roadway Safety Plan (RSP) that brings together all roadway owners and users in working toward a common broad-based national safety strategy.
- The plan should provide substance to the U.S. Secretary of Transportation's charge to ensure that safety remains the U.S. Department of Transportation's first priority by building on the foundation of the Distracted Driving Initiative (<http://www.distraction.gov>), which educates the public about the dangers of using electronic and digital devices while driving. The plan should build broad-based support to implement an aggressive action plan.
- The plan should target the American public and include simple messages. While transportation officials may be able to gauge progress through such statistics as fatality rates, the public may not fully grasp such measurements.

Two major parallel efforts are contributing to the development of a new national strategy. The first effort is internal to the U.S. Department of Transportation and involves the development of the internal RSP. The second effort is external and involves the broader

safety community made up of all key stakeholders, including state associations, industry, public health organizations, the public, and the U.S. Department of Transportation.

## More Robust Goal Setting

U.S. Secretary of Transportation Ray LaHood has taken two specific actions to ensure a new bold direction is attained. First, he established the Department of Transportation Safety Council, which brings leadership together to focus on the single issue of how to save lives. This group coordinates safety issues across all of the transportation modes and explores opportunities for collaborative safety-based research and sharing of best practice. Some of the issues the council has been examining include transit safety, the safety culture within the U.S. Department of Transportation, and vehicle operator fatigue. Second, LaHood has endorsed the development of the U.S. Department of Transportation's RSP for reducing fatalities and serious injuries.

The RSP will articulate strategic direction and identify actions to achieve the plan's safety goals. The program involves those U.S. Department of Transportation agencies that primarily deal directly with highway safety: FHWA, National Highway Traffic Safety Administration, Federal Motor Carrier Safety Administration, and the Research Innovative Technology Administration. The plan will focus on coordinating the actions and initiatives of U.S. Department of Transportation's organizations and will seek to identify any gaps or opportunities where further work is needed. The plan will have both a strategic view of roadway safety and performance goals that are measurable and quantifiable to ensure that expected safety outcomes are identified and achieved.

The plan will integrate strategic planning with performance management, a discipline in which performance is measured and monitored in order to achieve better long-term results. Some of the expected outcomes of the plan include:

- A national strategic plan for roadway safety
- National goals for reducing fatalities and serious injuries
- New surface transportation legislation, called "reauthorization," that establishes the goals and helps shape future government investments
- A set of performance measures and performance targets supporting the achievement of the goals

To achieve these outcomes will require an ambitious effort on multiple fronts, including:

**Analysis** – Taking a comprehensive look at what factors and circumstances have the greatest influence on highway safety, and then determine if those factors may provide additional opportunities for future actions. Use the U.S. Department of Transportation's models to help define future scenarios that would also evaluate the effects of specific additional actions.

**Outreach** – Providing leadership in bringing the highway safety community together to enlist its help in developing a plan for moving the country "toward zero deaths." Encouraging the safety community's ownership of the process and support it through analysis and data.

**Advocacy** – Seeking to bring about changes in public attitudes and perceptions toward highway safety on both individual and group (national) levels. Provide leadership in setting national direction for legislative change.



The primary focus for the RSP will be setting goals for the period 2012-2017, the period covered by the next U.S. transportation reauthorization legislation.

### **Creating a Visionary Framework**

A new overarching initiative called Toward Zero Deaths (TZD): A National Strategy on Highway Safety (<http://safety.fhwa.dot.gov/tzd.cfm>) is gaining momentum. The TZD initiative is an effort focusing on identifying and developing bold and innovative strategies for improving highway safety. A significant component of TZD is identifying and creating opportunities for changing American culture as it relates to highway safety.

The effort also focuses on developing strong leadership and champions in organizations that can directly impact highway safety through engineering, enforcement, education, emergency medical services, policy, public health, and outreach. The TZD initiative was introduced in September 2009 at a meeting of representatives from some 20 safety organizations. The National Highway Traffic Safety Administration, Federal Motor Carrier Safety Administration, and FHWA are all participating as ex-officio members on the TZD's steering committee.

The primary purpose of the TZD program is for the broad safety community to work together to create the visionary framework for future safety programs. The vision must be "toward zero deaths." In order for it to be successful, the program must have a strong focus on changing the public's attitudes and culture regarding safety. Because of its broader scope and longer-term visionary view, the TZD should not conflict with the development of the internal U.S. Department of Transportation's planning efforts, such as the RSP. The TZD should build momentum for a broad coalition of support that could be potentially highlighted through a White House summit.

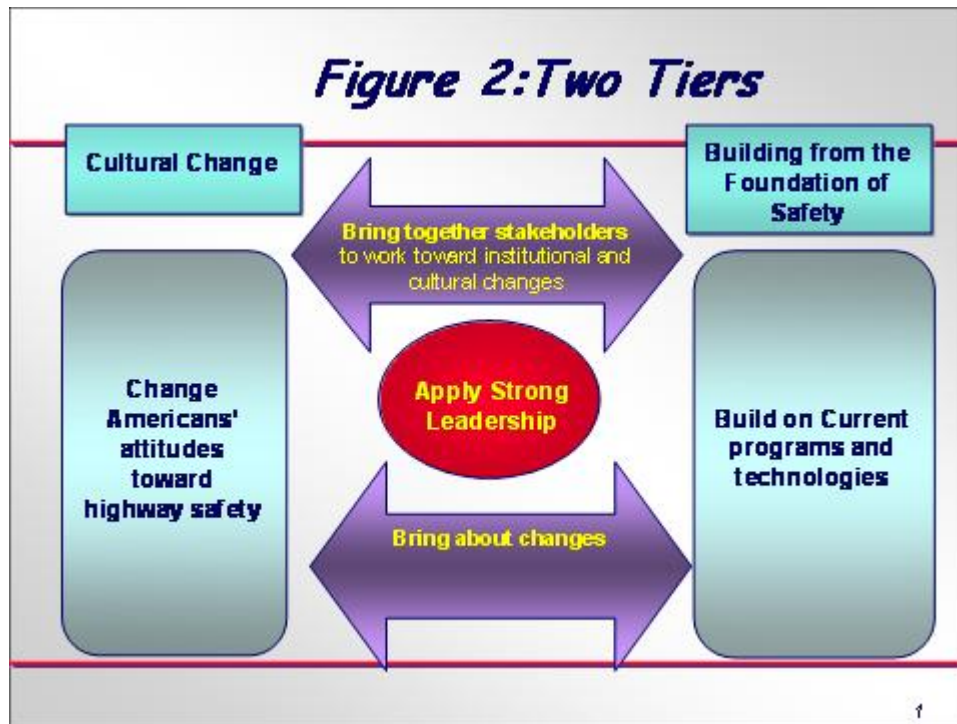
The intent of the TZD program is to engage all of the organizations that can contribute to reducing deaths and serious injuries on U.S. highways and have these organizations work together to develop a shared plan for the future. TZD is about involving government at the federal, state, and local levels, as well as engaging the private sector, associations, and academia. Because of the large number of participants, the TZD program needs to be executed on a more visionary and strategic level. The development of this approach is going to require the following actions:

- Establish broad, coordinated objectives
- Develop an open process to look at the program's strengths, weaknesses, opportunities and risks
- Conduct focus groups and outreach meetings to determine the attitudes, needs, and interests of the American public as they relate to highway safety
- Establish a clear vision for highway safety
- Identify barriers to progress from the participant's perspective
- Establish an action plan for addressing barriers
- Identify operational goals for the years addressed in the plan

The TZD coincides with the development of the RSP, and the two programs are expected to benefit from one another. But their exact connections will become more apparent as work proceeds.

The overarching framework contains two major tiers or levels, which are shown below in Figure 2.





The tier on the left focuses on the safety culture in the United States and involves changing American attitudes toward highway safety. The tier on the right will build on the existing foundation of current safety programs and policies, continue to advance and refine them, and develop new and improved ones. This right tier will be discussed later in Part 2, titled Building on Current Programs and Technologies.

The tier on the left related to cultural change will likely be more challenging and pose more risks since changing the public's attitudes and behaviors requires new groundwork to be established. Attaining cultural change will require the U.S. Department of Transportation to first determine what prevailing negative attitudes and behaviors exist that affect highway safety in the United States and then develop strategies to change those attitudes. Lessons can be learned from other countries, such as Sweden, Netherlands, Australia, and the United Kingdom, which have very positive safety cultures in place.

The U.S. Department of Transportation needs to address the cultural issues with the public on multiple fronts as highway users, voters, and parents that serve as role models. Some possible cultural issues might include the public's resistance to so-called "government interference" in people's personal lives and the view that wearing seatbelts and helmets are personal choices that should be made without government mandates.

Most safety initiatives are implemented on the state and local levels, and success is often dependent on regional and local attitudes and norms. The public will not accept a cultural change without factual evidence to show benefits, achievable goals, and repetitive messages from all sources, and a strong push from all of the states. The annual toll of deaths and serious injuries on the highways has to be considered unacceptable to the public. The United States was able to successfully change its attitudes toward tobacco use and significantly reduce smoking rates in the 1980s and 1990s. The country needs to follow the same successful path for highway safety in the decades to come.

A series of 10 white papers are being written to outline key issue areas that will be addressed as part of the process for developing a national strategy on highway safety. The purpose of these papers is to stimulate discussion in the safety community to encourage critical thinking and draw out significant ideas that will shape the future of highway safety.

One expected outcome of these reports is to set the direction on the key strategies to pursue. The reports will cover the following 10 major topics:

1. *Future View of Transportation: Implications for Safety*
2. Safety culture
3. Safer drivers
4. Safer vehicles
5. Safer vulnerable users
6. Safer infrastructure
7. Emergency medical systems
8. Data systems and analysis tools
9. Lessons learned from the American Association of State and Highway Transportation Officials strategic plan
10. Successful experiences from other countries

The first item on the above list, *Future View of Transportation: Implications for Safety*, will highlight factors that are expected to affect future transportation over the next 10–15 years and present implication for safety. The following key elements will be addressed in the other 9 papers:

- Current state of affairs for each area
  - General assessment of how well current strategies, initiatives, and legislation are working
  - Recent progress and setbacks
- Potential strategies, initiatives, and actions to pursue and possible funding options
- Opportunities and challenges for implementation
- Expected impacts of strategies, initiatives, and actions with respect to saving lives and preventing injuries

## **Part 2 - Building on Current Programs and Technologies**

Over the past 80 years, the United States transportation community has built a firm foundation of programs, policies and technological innovation to sustain and improve the country's highway safety. That same solid foundation will be the base from which the new strategic vision will be realized. The United States has at its immediate disposal a variety of successful guiding principles, partnerships, innovations, research institutions, and technology deployment methods that can be used to move the nation toward accomplishing the new strategic vision. The Nation is well-positioned to refine these policies and programs – and develop new and improved ones if necessary – in order to attain the vision.

The following programs within the United States identify, develop, evaluate, and refine innovations:

- FHWA safety research, development, and technology program
- Transportation pooled-fund program
- National Cooperative Highway Research Program

- Strategic Highway Research Program
- International and domestic scan programs
- Highways for LIFE program
- Manual on Uniform Traffic Control Devices Experimentation Program

**FHWA safety research, development, and technology program** – This program aims to identify, develop, promote, and accelerate implementation of new and proven technologies and innovative solutions to improve system performance. The FHWA program focuses on crash types that result in significant fatalities and serious injuries and for which highway infrastructure investments may constitute cost-effective solutions. FHWA’s safety focus areas include roadway departure, intersection-related, pedestrian-involved, and speed-related crashes. Examples include:

- Evaluating low-cost safety improvements with the country’s state and local partners, and maintaining an Internet-based clearinghouse of available safety information for FHWA’s partners and customers.<sup>i</sup>
- Using advanced crash simulation and analysis to enhance the design of median cable barriers and other roadside hardware to make roadsides safer.
- Developing and deploying a new generation of safety analysis tools to assist states in making cost-effective safety investment decisions.<sup>ii</sup>
- Addressing human-centered systems to ensure that driver responses are considered in road design. These human factors involve analyzing the capabilities and limitations of people as vehicle drivers, bicyclists and pedestrians to fully optimize highway design.
- Releasing targeted technical briefs or brochures on innovative intersection designs that enhance safety, alleviate congestion, and reduce construction costs. The double crossover diamond interchange (<http://www.fhwa.dot.gov/publications/research/safety/09054/index.cfm>) is a typical example.
- Evaluating new, low-cost signing and pavement markings to better manage speeds on main roads through rural communities and at horizontal curves.
- Issuing informational reports on the illumination of mid-block pedestrian crossings and innovative warning devices to improve pedestrian safety.
- Conducting a motorcycle crash causation study using a methodology from the Organization of Economic Cooperation and Development.
- Conducting research for the next generation of Cooperative Intersection Collision Avoidance Systems (<http://www.its.dot.gov/cicas/index.htm>).

The FHWA research, development and technology program is guided by seven principles.<sup>iii</sup>

- FHWA’s research and technology process, from research through implementation, is systematic and begins with the end in mind.
- FHWA engages in advanced and applied research and innovation deployment activities where there is an appropriate federal role in relation to the states.
- Stakeholders are engaged throughout the research and technology process.
- The research and technology process is grounded in the FHWA mission and goals, and is guided by multi-year plans.
- The research and technology budget allocation is based on and driven by multi-year plans and priorities.

- FHWA measures the performance of research and technology within its own organization, programs, and projects.
- FHWA effectively communicates its research and technology and projects.

As discussed earlier, FHWA collaborates with other federal agencies within the U.S. Department of Transportation that also have safety-related missions. These organizations include the National Highway Traffic Safety Administration (NHTSA) and the Federal Motor Carrier Safety Administration (FMCSA).

**NHTSA** – This agency sets safety standards for motor vehicles and associated equipment, investigates possible safety defects, ensures that products meet safety standards and are not defective, and tracks safety-related recalls. NHTSA works through state highway safety agencies and other partners to encourage the safe behavior of drivers, occupants, cyclists, and pedestrians across the country. Since traffic safety problems affect people in all communities, the effort to implement programs to improve safety involves people at all levels of government, within businesses and organizations, and individual volunteers.<sup>iv</sup>

**FMCSA** – This agency’s primary mission is to prevent commercial motor vehicle-related fatalities and injuries. Commercial vehicles in the United States typically include larger freight-hauling trucks and passenger coaches and buses. FMCSA ensures safety in motor carrier operations through strong enforcement of safety regulations, targeting high-risk carriers and commercial motor vehicle drivers. FMCSA also improves safety information systems and commercial motor vehicle technologies. The agency also strengthens commercial motor vehicle equipment and operating standards and increases safety awareness. To accomplish these activities, FMCSA works with federal, state, and local enforcement agencies, the motor carrier industry, labor safety interest groups, and others.<sup>v</sup>

The U.S. Department of Transportation also sponsors or collaborates with several other programs to encourage innovation. These programs include the following:

**Transportation Pooled Fund Program** - FHWA sponsors this program<sup>vi</sup> as a means for interested states, FHWA, and other organizations to partner when significant or widespread interest is shown in solving transportation-related problems. Partners may pool funds and other resources to solve these problems through research, planning, and technology transfer activities. To qualify as a pooled fund study, more than one state transportation agency, federal agency, other agency such as a municipality or metropolitan planning organization, college, university or private company, must find the subject important enough to commit funds or other resources to conduct the research, planning, and technology transfer activity. If a subject or issue has been studied previously, the new study should provide new information that will complement or advance previous investigations of the subject matter or issue. Federal and state transportation agencies may initiate pooled fund studies.

**The National Cooperative Highway Research Program (NCHRP)** – The National Cooperative Highway Research Program (NCHRP) is a special pooled- or shared-fund program administered by the Transportation Research Board (TRB).<sup>vii</sup> The NCHRP is sponsored by member departments such as individual state departments of transportation of the American Association of State Highway and Transportation Officials (AASHTO), which is a national non-profit association that advocates for transportation-related policies and provides technical services to states and local transportation agencies. FHWA is a cooperating agency.

**Strategic Highway Research Program 2** – The U.S. Congress established a second strategic highway research program (SHRP 2) in 2006 to investigate the underlying causes of highway crashes and congestion in a short-term program of focused research. SHRP 2 has goals in four interrelated focus areas: safety, renewal, reliability, and capacity. The SHRP 2 safety goal is to significantly improve highway safety by understanding driving behavior in a study of unprecedented scale. Safety research in SHRP 2 aims to reduce crash risk, injuries, and fatalities by understanding driver behavior.

The centerpiece of the research is a naturalistic driving study of 3,000 volunteer drivers, the largest of its kind ever undertaken.<sup>viii</sup> The study investigates ordinary driving under real-world conditions to make the driving experience safer. In the SHRP 2 study, the volunteer drivers agree to have their cars fitted with cameras, radar, and other sensors to capture data as they go about their usual driving tasks. Experience with earlier naturalistic driving studies demonstrated that drivers quickly forget the presence of cameras and sensors, which are as inconspicuous as possible. This allows researchers to study driving behavior that is as close to “natural” as possible, thus a “naturalistic” driving study. This kind of study is needed because driver behavior contributes to more than 90 % of crashes and is the primary factor in more than 60 % of crashes.

**University Transportation Centers Program** – The U.S. Department of Transportation’s Research and Innovative Technology Administration (RITA) also manages a program of university transportation centers, some of which focus on highway safety.<sup>ix</sup> These centers receive federal funds, which are matched with state and local agency funds, industry, and nonprofit organizations.

**State Planning and Research Program** – Departments of transportation from each of the 50 states, District of Columbia, and Puerto Rico fund highway safety research both within their individual jurisdiction and through participation in programs that pool funds among states, including the National Cooperative Highway Research Program and Transportation Pooled-Fund Program.<sup>x</sup> Nonprofit and private organizations, such as the American Automobile Association (AAA) Foundation for Traffic Safety, the Insurance Institute for Highway Safety, and private insurance companies, also fund highway safety research.

**The International Highway Technology Scanning Program** – The scanning program serves as a means to access innovative technologies and practices in other countries that could significantly improve highways and highway transportation services in the United States. The program enables innovations to be adapted and put into practice much more efficiently without spending scarce research funds to recreate advances already developed by other countries. Personal domestic and international networking, team dynamics, and the creation of domestic champions for promising ideas from other countries are key functions of the scan process.

Successful U.S. implementation of the world's best practices is the goal of the program. The program collaborates among FHWA, AASHTO and the NCHRP. This cooperation includes shared financing, joint proposal and selection of scan topics, and joint responsibility for implementing scan results. Each scan focuses on a topic of high interest to the domestic transportation community and is led by a designated FHWA and AASHTO co-chair. Scan team members typically represent FHWA, state departments of transportation, local governments, transportation trade and research groups, the private sector, and academia.

After a scan is completed, team members evaluate findings and develop a comprehensive report, which is circulated throughout the U.S. highway transportation community. The scan team also develops an implementation plan, which summarizes the scan team's strategy for implementing the most significant and promising technologies and policies identified on the scan. To accelerate early implementation activities, the scan program supports scan teams when they return to the United States with both implementation expertise and funding.

More than 80 scans have been conducted to date, resulting in a wealth of information and benefits to the U.S. transportation community. Safety-related topics have included safety audits, pedestrian and bicycle safety, safety management, signalized intersection safety, traffic safety information, and human factors.<sup>xi</sup>

**Highways for LIFE (HfL)** – This program is a congressionally authorized initiative of FHWA aimed at expediting deployment innovations and new technologies into standard use. The program includes demonstration construction projects, technology partnerships, stakeholder input and involvement, technology transfer, information dissemination, and monitoring and evaluation. State transportation agencies submit applications for funding of projects that employ rarely-used innovations.



*The Safety Edge, shown above immediately after installation, is a 30-degree angled wedge installed at the edge of pavement as a countermeasure to pavement-edge dropoff, the uneven and sometimes vertical edge between the paved travel lane and the unpaved shoulder. When a vehicle leaves the pavement and straddles the unpaved shoulder, the vertical edge can make it difficult for a driver to safely reenter the paved travel lane. The Safety Edge makes it easier for motorists and cyclists to safely recover after encountering a dropoff. The Highways for Life program has played an important role in deploying this promising technology more rapidly.*



Within HfL is the Technology Partnerships Program (TPP). This program provides grants to fund the critical final steps in developing technologies with potential to improve highway quality and safety or reduce construction congestion. The TPP also promotes partnerships with state and local highway agencies to test and demonstrate those technologies in real-world settings. Private industry is an essential partner in developing solutions to the challenges facing our nation's transportation system. The TPP was established to assist private-sector companies with technologies that have already been developed to a late-stage prototype and deployed to the marketplace faster. While FHWA has long supported technology research and development, the agency for the first time has provided grants to general industry for late-phase technology development.<sup>xii</sup>

**The *Manual on Uniform Traffic Control Devices* (MUTCD)** - An important way in which innovation is encouraged and incorporated into practice is through regular updates to policies and standards. One excellent example of this process is the *Manual on Uniform Traffic Control Devices* (MUTCD), which is published by FHWA and defines the standards road managers nationwide use to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic.<sup>xiii</sup> Ten editions of the MUTCD have been published during its 74-year history.

The MUTCD adapts to changes in travel patterns, needs, and emerging technologies and materials. Over the years those changes have resulted from research, experimentation, and practical experience, with the best and most effective devices and practices being implemented.

One source of traffic control device research is the Traffic Control Devices Pooled Fund Study (TCD PFS), a consortium of FHWA, 18 state departments of transportation, and others.<sup>xiv</sup> Because of the potential for change, FHWA officials continually review and consider completed research, requests for interpretations, experimentations, and requested changes to the information contained in the MUTCD.

### **Day-to-Day Deployment of Safety Products in the United States**

The United States disseminates and deploys safety technology in various ways. FHWA works closely with organizations that represent state and local governments and the private sector. Some of those organizations include AASHTO on the national level and the National Association of County Officials on the local level.

FHWA also works with other organizations, such as the Institute of Transportation Engineers, an international organization that stimulates research, develops public awareness programs, and serves as a conduit for the exchange of professional information. The choice of partners and their role is often determined by the product under consideration and where it is likely to have the most impact on safety. As a result of the critical collaborative role in so many products, routine coordination and discussion takes place as part of the day-to-day business of all of these organizations.

**Market Ready Technologies** - An on-going issue in the United States pertaining to innovation is the establishment of priorities among the numerous and varied safety policies and products developed over the years. One of the approaches for prioritization and investment is FHWA's identification of Market Ready Technologies.<sup>xv</sup> As the name implies, products on the list are ready for immediately deployment because they have been developed to a high enough level of confidence to contribute immediately to safer roads. Once on the list, they are expected to be given a higher level of time and investment for

deployment compared with other products. They also receive higher levels of recognition and attention from stakeholders and partners. Safety products that are included on the Market Ready Technology list include roundabouts, rumble strips, road safety audits, cable median barriers, and red-light cameras.

**Technology Innovation Group (TIG)** – This program closely parallels the Market Ready Technologies. AASHTO's TIG creates a list of innovative safety products that mirrors the Market Ready Technologies list. One major difference is that the TIG list is formed by representatives from state agencies implementing the technology and reflects input from the diverse membership. In order to make both lists stronger, it is not unusual for the groups to collaborate in some form to have several of the same technologies on their lists. In this manner, the country can better leverage dissemination, deployment, and implementation resources on the most promising safety products. If FHWA and AASHTO show agreement for a specific safety product, interest and action are generated in other national organizations and in implementing agencies at the state and local levels.

**Guidance Memorandum** - Another mechanism used in the United States to enhance the dissemination, adoption and implementation of innovative safety products are national policies that encourage adoption of the most promising safety technologies. These policies are disseminated through "guidance memoranda," which identify proven safety countermeasures and encourage FHWA field offices to implement them.

Some technologies receiving guidance memorandum in recent years are [road safety audits](#), [rumble strips and rumble stripes](#), [median barriers](#), the [Safety Edge](#), [roundabouts](#), [left- and right-turn lanes at stop-controlled intersections](#), [yellow-light change intervals](#), [medians and pedestrian refuge areas in urban and suburban areas](#), and [walkways](#).

## **Effective Implementation of Best Practices and Technologies**

Effective implementation is initiated in the United States from the "bottom up" or from the "top down." In a bottom-up implementation, innovation starts at the local or state level. If they are successful, word may spread of the successful innovation, and over time national organizations may conduct appropriate evaluation or broader national dissemination as appropriate. In a top-down implementation, an innovation or product is developed through a national research or other effort, and broad efforts for dissemination and implementation occur at the national level.

Whether a bottom-up or a top-down effort, the key to successful implementation is the creation and existence of a champion or proponent for the product's implementation and use. The ideal champion has first-hand experience with the new safety product and can speak credibly to its benefits. Also, champions serve as a consistent messenger with their peers and colleagues nationwide to encourage more use of the product, thereby creating more champions.

**Cable median barriers (CMBs)** are a classic case of bottom-up implementation. While cable barrier systems have been a standard treatment for roadside safety in the United States, their application has not been widespread. However, the convergence of efforts from three separate states led to a national deployment efforts and eventually implementation of this life-saving product across the country. The developments started when the state of North Carolina performed a statewide study on the incidence of cross-median crashes in 1998. The state initiated a plan in 1999 to use cable barriers to reduce

these horrendous crashes. Unfortunately, the typical design required high maintenance, so the deployment was slowed.

In 1996 and 2000, the state of Washington was examining and crash-testing median designs for cable barrier. Through routine interaction, North Carolina became aware of this and deployed the Washington design across its state. The crash reductions were significant, with cross-median fatalities dropping by about 50%.



*The cable median barrier, shown at left, is a typical example of a “bottom-up” implementation in which the technology deployment starts at the local level and then expands nationally.*

In 2001, the state of Oklahoma introduced a trial application of high-tension cable barrier that had been used in other countries, but not the United States. The state’s crash testing and later in-service performance and evaluation showed high-tension CMB to be a very effective safety treatment.

The convergence of the introduction of high-tension cable barriers with innovative designs for median applications gained notoriety. At this stage, FHWA and AASHTO identified CMB as a proven safety countermeasure and gave it a priority status for deployment nationally. CMB was added to both the FHWA Market Ready Technologies list and the AASHTO TIG list. Following this recognition, significantly more investment of time and funding was given to market the benefits of CMB, provide technical training and support, and encourage installations.

At least 47 of the country’s 50 states have at least tried one installation of CMB. Trying even one installation of either high- or low-tension CMB suggests that the state has established a CMB standard. Some states have chosen not to use CMB extensively. Despite this, CMB implementation is considered a success because CMB has been tried almost universally and is used systematically in many states. Its success would not have happened as quickly without innovation at the state level, the presence of champions who told their peers about the success, and without a national structure that was able to accept new ideas and promote them widely.

**Road Safety Audits** - The implementation of road safety audits (RSAs) in the United States was predominantly a top-down effort. In the mid 1990s, safety professionals had some knowledge of RSAs, but only the state of Pennsylvania had any meaningful practical experience in RSA application. This changed in 1997, when the United States conducted an international scanning program review of RSAs in numerous countries worldwide. The

ensuing report prompted FHWA action to disseminate information on RSAs and to encourage greater adoption of them in the United States.

FHWA first developed a training course that was used to educate highway professionals around the country about RSAs. In order to make this training more effective in terms of its acceptability to U.S. practitioners, many of the guidance and other materials found overseas were adapted to the U.S. business environment or “market.” Special needs included updated checklists, creating emphasis on applications for existing roads, and addressing liability concerns.

Over the next 10 years, FHWA increased its emphasis on and investment in RSAs. FHWA placed RSAs on its Market Ready Technologies list. FHWA also partnered with organizations such as AASHTO and the Institute of Transportation Engineers to promote RSAs and encourage implementation with their memberships. FHWA also included RSAs as a priority innovation with Highways for Life, which provided significant funding and marketing and deployment support. FHWA also included RSAs on its list of 9 proven safety countermeasures, which became priorities for FHWA field offices to implement with their partners.

The actions described previously created a clear communication that RSAs are important to safety and that FHWA professionals in particular needed to promote them with all partners. Numerous training courses have been taught, technical assistance efforts have been carried out to support RSAs as organizations learned how they worked, and technical expertise developed across the country. RSAs are now common practice, if not standard practice, in many states across the country, with many of these same states serving as role models and champions for RSAs. This success was garnered through dedicated efforts predominantly from national to local levels.



*This Road Safety Audits team prepares to evaluate an intersection in McLean, Virginia. RSAs help produce designs that may reduce the number and severity of crashes, promote awareness of safety and design practices, and cut costs by eliminating potential safety problems.*

**The Highway Safety Manual (HSM)** is an excellent example of the collaborative and multi-faceted development and delivery of safety innovations in the United States. The manual satisfies the need for more explicit and quantitative consideration of safety in the transportation planning and highway project development processes, and the growing emphasis on performance measurement. AASHTO will publish the HSM in July 2010.

This manual will assist highway agencies as they consider improvements to existing roadways or as they are planning, designing, or constructing new roadways. The HSM will

present information on roadway safety fundamentals, the safety management process, models for estimating the expected safety performance of a specific facility, and crash modification factors for estimating the expected effectiveness of individual infrastructure-based countermeasures. The publication of the manual is the result of a decade of research and development efforts of AASHTO, FHWA, and TRB.<sup>xvi</sup>

AASHTO is working with FHWA and TRB to develop training, information sessions, and other implementation tools that will be made available to states and others in the highway industry. AASHTO will maintain an Internet site and Web-based community of practice. FHWA is developing coordinated marketing and implementation plans, providing technical assistance resources, and delivering training courses and webinars. NCHRP will fund a “lead-states” initiative that will enable states that are early implementers of the HSM to share their experience and expertise with others. TRB, through its technical committee structure, will provide input on research needs to build an improved and expanded second edition of the HSM.

## Attaining a Brighter Future for Highway Safety

When the U.S Department of Transportation and its partners successfully change Americans’ attitudes and behaviors toward highway safety while simultaneously building on the country’s existing strong foundation of innovation and deployment, the United States will have taken a major step toward realizing its new strategic vision for highway safety. The end result will include far fewer traffic fatalities and injuries. This accomplishment will go a long way in making the country’s own highway system safer and contributing to the Global Road Safety Decade of Action’s goal of reducing road deaths by 50% by 2020.

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<sup>i</sup> [www.cmfclearinghouse.org](http://www.cmfclearinghouse.org)

<sup>ii</sup> [www.highwaysafetymanual.org](http://www.highwaysafetymanual.org), [www.ihsdm.org](http://www.ihsdm.org), [www.safetyanalyst.org](http://www.safetyanalyst.org)

<sup>iii</sup> Federal Highway Administration Corporate Master Plan for Research and Deployment of Technology & Innovation, Publication Number FHWA-RD-03-077, <http://www.fhwa.dot.gov/legsregs/directives/policy/cmp/03077.htm>

<sup>iv</sup> This is NHTSA—People Saving People. Publication Number DOT HS 810 552, January 2006. <http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.416f74e8613992381601031046108a0c/>.

<sup>v</sup> <http://www.dot.gov/summary.htm>

<sup>vi</sup> <http://www.pooledfund.org>

<sup>vii</sup> <http://www.trb.org/NCHRP/Public/NCHRP.aspx>

<sup>viii</sup> [http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/Public/Pages/Safety\\_153.aspx](http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/Public/Pages/Safety_153.aspx)

<sup>ix</sup> <http://utc.dot.gov/>

<sup>x</sup> <http://www.tfhr.gov/services/state/stateplan.htm>

<sup>xi</sup> <http://international.fhwa.dot.gov/scan/overview.cfm>

<sup>xii</sup> <http://www.fhwa.dot.gov/hfl>

<sup>xiii</sup> <http://mutcd.fhwa.dot.gov/>

<sup>xiv</sup> <http://www.pooledfund.org/projectdetails.asp?id=281&status=4>

<sup>xv</sup> <http://www.fhwa.dot.gov/resourcecenter/misc/technology.cfm>

<sup>xvi</sup> [www.highwaysafetymanual.org](http://www.highwaysafetymanual.org)