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# A Vision of the Future—Safe Roads Create a Safe and Prosperous America

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# A Vision of the Future—Safe Roads Create a Safe and Prosperous America

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Written by Timothy R. Neuman, CH2M HILL

Each and every day over 120 people die and over 7,400 are seriously hurt on our nation's highway system. Virtually every family in the United States knows a relative, friend, or associate who has been a victim of a serious crash.

The risk of death and injury is borne by all. About one in four injury deaths among children 12 and younger are attributed to motor vehicles. Car crashes are the leading cause of death for persons between the ages of 3 and 33. For elderly drivers, they represent among the greatest risk factors, with one in ten fatalities being an elderly driver or a pedestrian.

Whether one lives in an inner city, the suburbs or rural areas the risk of being killed or injured simply by driving or walking on our streets and highways is part of daily life. For the most part, accepting this risk is not a matter of choice. Americans rely on public roads and streets to drive, ride, walk, or bicycle to work, to shop, to visit friends and family, for leisure or recreation—in short, to experience “life, liberty, and the pursuit of happiness.”

Given the importance of the surface transportation system to the American way of life and the magnitude of our traffic safety problem, it is both surprising and disappointing that more has not been done to address the problem. Indeed, a recent WHO study<sup>1</sup> provides a disturbing glimpse of the future should we continue to accept the unacceptable. Road injuries were the ninth leading global burden of disabling disease in 1990. World Health Organization (WHO) projects that they will rise to number 3 overall by 2020. Providing health care is among today's more visible and critical political issues; the damage to the health of the nation caused by the performance of our highway system is well understood. *Clearly, the death toll on the nation's highway system amounts to among the most compelling public health issues of our time.*

Indeed, the state of the public health problem posed by the road safety record in the United States has reached a point where it imposes a significant economic burden as measured by lost time, reduced productivity and direct societal costs for the care of crash victims. These increasing costs threaten our competitiveness in a global economy. WHO estimates that the economic costs of road crashes impose a burden of as much as two percent of Gross National Product for high income economies such as enjoyed by the United States. This economic burden is further illustrated by a recent study of the economics of highway safety in one state,<sup>2</sup> which established that *highway crashes imposed a monetary burden almost three times greater than that associated with index crimes.*

We can do better. Other countries have better safety records. As the wealthiest nation on earth, and reliant on the most advanced surface transportation system, we can ill afford to not be the world leader in highway safety. There are solutions to the traffic safety health care problem. Their implementation requires vision, leadership, and the resources to come to fruition.

*The country's elected leaders at the Federal, state and local levels, recognizing the public health and economic threat posed by the performance of our highway system, have joined forces to reduce highway fatalities by 50 percent by the year 2030 toward an ultimate goal of zero deaths.*

## Achieving the Vision

Halving of fatalities over even a 25-year period may appear aggressive and perhaps to some unlikely. This amounts to a saving of lives of 1,000 per year. With this in mind, the benefits derived from striving for and achieving the vision are clearly worth the effort. Moreover, there is strong evidence that, given the right leadership, political will and attention, and with reasonable resources, such a vision is clearly achievable.

Evans<sup>3</sup> and others have noted that some countries with similar laws, road systems, and forms of government have better traffic safety records. While there is some question about the comparability of safety in Sweden, the Netherlands, and Australia<sup>4</sup> it seems clear that the United States is at best “in the middle” with respect to the safety performance of their roadway system.

An International Scanning Tour on Highway Safety<sup>5</sup> documented how one government (Victoria, Australia) through aggressive, targeted and effective actions, halved their fatality rate in only nine years. Closer to home, there are individual state and local jurisdictions where a focus on highway safety has borne fruit over the past few years. In 2005, the states of Iowa, Michigan, and Washington received AASHTO leadership awards for achieving measurable reductions in highway fatalities; in 2006 Utah was similarly cited. These states are models for others.

The lessons learned from successes both overseas and here in the United States provide direction to achieving the vision on a national basis:

- *A culture that embraces or tolerates risk-taking and anti-social behaviors must be changed.* There remains a culture in many parts of the United States that celebrates risk-taking and unhealthy as well as anti-social behavior, such actions being played out on public roads and streets. Almost 40 percent of highway fatalities involve drivers with alcohol in their system. This is despite the well advertised and known adverse effects of alcohol and driving. Aggressive driving, excessive speeding, and distracted driving (e.g., driving while using cell phones, eating, operating DVDs, and PDAs, etc.) are also prevalent. It has been estimated that at any given time six percent of drivers are using a cell phone while driving; this number is probably increasing and may now be greater than 10 percent. It has also been established and publicized that the crash risk increases four-fold for drivers using a cell phone. These behaviors all reflect a lack of respect for the seriousness of the driving task and for others on the public roadway system. Culture change is possible through carefully coordinated programs of education, Federal and state legislation or regulation, governmental incentives and disincentives, and aggressive, targeted enforcement. Our historic successes in raising seat belt usage over the past 30 years are an excellent

example of this. As a nation, we must bring about a shift in the culture, especially related to drinking and driving, speeding, and driving with respect for others.

- There is a need for effective partnerships among agencies that share a common vision and responsibilities for transportation and public safety.* The design, construction, operation, and maintenance of highways; enactment of legislation concerning driving and licensing; enforcement of traffic laws (including adjudication); and the licensing of drivers remain a patchwork of jurisdictional responsibility at all levels of Federal, state, and local government. Changing this system is not envisioned, but recognizing the barriers it presents and addressing these barriers are keys to success. Effective laws dealing with high-risk behaviors must be debated and legislated state by state—a time consuming yet necessary process. Legislative strategies that are proven effective must overcome regional and local interests and biases. Incentives and disincentives associated with Federal programs may be necessary to produce the desired outcome. New partnerships are needed, in recognition of the issue as one that transcends transportation and includes health care. Engaging the public health industry to include, for example, road safety in health promotion and disease prevention programs, to incorporate a safety culture into health education for children, and providing public health tools and assistance to road safety audit activities are examples of how such new partnerships can produce real contributions. Institutional and organizational barriers involve funding, coordinating work efforts, prioritizing activities, and sharing of information and resources. This is feasible yet hard work that needs to be repeated everywhere to have a measurable effect at the national level.
- The allocation of resources and their effective use to address highway and traffic safety problems will be central to success.* At the state level, investments in safety need to be viewed as addressing the core public health problem (and not merely an adjunct of surface transportation policy or just the responsibility of the Departments of Transportation). Allocation of resources means directing the dollars to where the problems are. If in a given state, the primary safety problem is on the local road system, then that is where the dollars should be spent, regardless of who holds the purse-strings (this issue is an extension of the barriers discussed above). But dollars alone are not enough. We have underinvested in both the “science” of highway safety and in the development and deployment of trained highway and traffic safety professionals. Consequently, we risk wasting those dollars that are made available unless we have the means to use them wisely everywhere. Having the tools, robust and complete data, and capabilities to diagnose problems, implement effective solutions and monitor performance takes special skills that are in limited supply. This resource gap is particularly acute at local levels of government. Research on causes of crashes, on high quality evaluations of countermeasure effectiveness, and on tool development, such as FHWA’s *SafetyAnalyst* must continue. Moreover, a significant effort is needed to advance the education of professionals in highway and traffic safety and make such individuals available at all levels of government.

- *We must take full advantage of advancements in safety-based technology.* The United States has a well-earned reputation for investing in and embracing technology. We have a history of success (e.g., improved vehicle design for impact, airbags, navigational systems, roadway hardware infrastructure, ITS) on which to build in both the automotive and highway industries. Both the Federal government and the private sector continue to innovate. Directing our attention to traffic safety as a primary driver behind technology investments is needed. Furthermore, there need to be efforts to fully institutionalize the safety-based technology innovations already developed. The benefits of such innovation can come only with acceptance of such technology within the overall fleet and highway system. Future safety-driven technologies include electronic stability control, driver warning and even controls for collision avoidance. *Technology contributions will require widespread deployment to have a measurable effect.* This will come from market solutions in which automotive safety features become a competitive advantage; through cooperative deployment of breakthrough technology (e.g., side air bags); and through legislation, regulation and incentives for buyers of vehicles with such technology.
- *Perhaps of greatest importance is leadership.* There are states and local government officials that recognize the threats of traffic crashes and also have prioritized implementing solutions and allocating resources. Leadership at all levels of government is needed to halve the death toll on our nation’s highway system.

## Summary of a Roadmap to Success

We understand the magnitude of the problem, its aspects and characteristics. We know how to reduce fatalities. It is an interdisciplinary task requiring cooperation among a wide range of agencies and stakeholders. There are models for success and achievable targets. Finally, we know that the resources required to accomplish the vision are affordable, particularly when measured against the clear health and economic benefits resulting from success.

There are strong “headwinds” to fight; trends, cultural attitudes, and barriers to overcome. The next three-to-five years will prove critical in determining whether we have the will and choose to affect measurable reductions in highway fatalities. It seems clear, however, that success over the long term requires continuation of both funding beyond SAFETEA-LU and other efforts to achieve the vision.

Reaching the vision requires steady progress in both actions and outcomes. The following “roadmap” is both aggressive yet reasonable:

### 2007 to 2012

- Congress formally adopts a national vision zero goal as part of the FY 2010 multi-year reauthorization;
- The reauthorization bill provides significant safety funding for infrastructure, behavioral, research and development, and data management system;s

- The reauthorization bill provides flexibility and freedom to states and local governments to use highway funds to their best advantage, including for behavioral programs;
- Congress recognizes the importance of freight and goods movement and truck safety, and establishes a process to increase capacity of our safest roads—interstate highways;
- Congress encourages the acceptance of in-vehicle safety technology, such as alcohol interlock systems through incentive programs such as tax credits;
- Governors in a majority of states exercise leadership to grow the number of zero vision states from 4 to a majority;
- All states have enacted primary seat belt legislation;
- All states have enacted legislation covering motorcycle helmet usage;
- All states have enacted legislation enabling allowance of automated speed enforcement;
- All states have developed robust, high quality, accessible and integrated safety data; have developed sufficient intellectual highway safety capital and begun institutionalizing application of tools and data as part of program and project development;
- All states are well into implementation of safety-based infrastructure programs, such as freeway median cable barrier placement, rumble strips on two-lane roads, and major intersection upgrades;
- All states offer assistance to local units of government in terms of data, tools, and advice as needed to enable advancement of their safety efforts; and
- Electronic Stability Control technology is widely available in the vehicle fleet and affordable.

By 2012, highway fatalities should be no more than 37,000 per year. Alcohol involvement fatalities are trending downward, reversal of motorcycle fatality trends is evident, and a measurable decline in fatality rates on two-lane rural highways is evident. Over half the states should have recorded restraint usage of greater than 90 percent.

### 2012 to 2020

- Congress continues its support for highway safety through future reauthorization bills;
- Highway safety is a significant, core technology imbedded in decisions and actions by all state DOTs;
- All state DOTs have adopted and implemented traffic and highway design engineering practices to fully reflect measures to deal with the needs of elderly drivers;
- The majority of the United States population lives in counties or cities where safety management data and practices have been introduced and local governments have capabilities to manage their programs;

- The majority of the United States population lives in counties or cities where political leadership has taken advantage of enabling legislation and technology to aggressively address drinking drivers;
- Use of automated enforcement is accepted and implemented appropriately across the country in at least three quarters of all states;
- All vehicles entering the fleet contain electronic stability control; and
- Both private-sector and public-sector investments in the next generation of safety-based in-vehicle technologies continue.

By 2020 fatalities should be reduced to less than 30,000. Clear downward trends in alcohol involved fatal crashes are evident. Restraint usage exceeds 95 percent nationally.

### 2020 to 2030

- Congress continues its support for highway safety through future reauthorization bills;
- Use of automated enforcement is accepted broadly, is no longer controversial, and applications are evident in all states;
- Essentially 80 percent of the vehicle fleet includes core, in-vehicle safety technologies
- Repeat offenders (alcohol, aggressive driving) are essentially eliminated from driving through a combination of enforcement, judicial and technology solutions; and
- Both private-sector and public-sector investments in the next generation of safety-based in-vehicle technologies continue.

By 2030, we will have reached the goal and experience no more than 23,000 fatalities per year, despite traffic increases of 50 percent over 2007 levels.

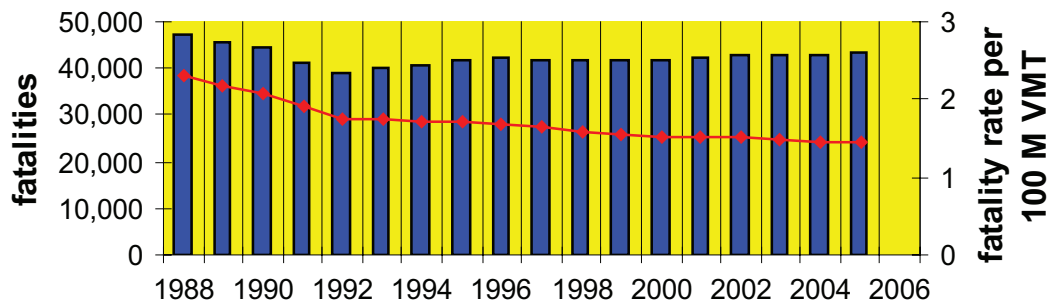
## Where Do We Stand Today? How Far Do We Have to Go?

To be sure, historical perspective on highway safety confirms some success in reducing safety risk on the highway system. When global exposure measures are referenced (i.e., fatalities per 100 MVMT, per million registered drivers, etc.) our highways are safer by orders or magnitude than they were 50 or even 20 years ago. Progress can clearly be attributed to improvements in vehicle technology, improvements in road design policies (roadside design, access management, for example), in licensing (graduated driver and commercial driver licensing) some cultural/behavioral changes (e.g., improved voluntary and legislated restraint use) and legislated and administrative actions.

Progress has not been steady, though, and indeed, has stalled in recent years. The history of highway safety reveals periods when concerted efforts resulted in measurable gains over the short term. From the mid-1960s to mid-1970s, the fatality rate was almost halved, in part as a reflection of the energy crisis at that time and measures such as lower

national speed limits, but also due to a similar concern about safety. After about an 8-year period when little progress was made, a further reduction in over 50 percent of the fatality rate occurred from the mid-1980s to early 1990s.

By the mid-1990s, it became apparent, though, that the gains of the 1970s had halted. Fatality and serious injury rates changed little from year to year, and as travel increased the total number of highway deaths began creeping upward. From 1990 to the present, the national death toll has been virtually unchanged as shown in Figure 1 (44,599 in 1990 and 43,443 in 2005). While the rate of fatalities has decreased (and serious injuries have dropped), this decrease has not been enough to overcome the increase in travel during this period. Reaching a vision of reduced fatalities in the face of steadily increasing traffic will require a dramatic, not just incremental change in the fatality rate.



**Figure 1.** Recent history of highway fatalities and fatality rates in the United States.

Aggregate statistics mask where the real concerns are, and where our attention needs to be to achieve the vision. It is well understood among safety experts that the “big three” behavioral factors in highway fatalities are:

- *Seat Belts and Restraints*—55 percent of fatal crash victims for which restraint usage was known were unrestrained.
- *Alcohol*—39 percent of fatalities involved alcohol.
- *Speed*—30 percent of fatalities involved excessive speed.

Also, from the perspective of the highway, two basic types of crashes and “contexts” are of greatest concern:

- *Road Departure*—60 percent of highway fatalities involve a vehicle leaving the roadway or lane.
- *Intersection*—45 percent of all crashes and 21 percent of fatalities occur at intersections.

## A Framework for Achieving the Vision— The AASHTO Strategic Highway Safety Plan

The leadership of AASHTO working with other governmental, non-governmental organizations and private-sector partners addressed the highway safety problem beginning in the 1990s. The *AASHTO Strategic Highway Safety Plan* (SHSP), published in 1995 was the culmination of this multiple stakeholder effort. The SHSP provided a framework for addressing the full array of safety problems across 22 emphasis areas. The SHSP acknowledged the nature of the problem as belonging to not just the highway agency/engineering field, but also law enforcement, education, behavioral, legislative, and medical communities. AASHTO’s SHSP and the construction industry, and other key partners’ support for safety were major drivers behind the SAFETEA-LU legislation now in force.

With the SHSP as a basic framework, AASHTO and the FHWA established a goal—to reduce highway crash fatalities by 7,000 in real terms by 2010. Over time, the U.S. DOT refined that goal, calling for a reduction in the overall fatality rate to 1.0 per 100 MVMT.

Unfortunately, while much effort has been expended and some successes garnered, we are well short of the national goals. The previously established goal will clearly not be met in the time frame envisioned. Delays in the passage of SAFETEA-LU and the timely availability of promised resources for safety are one factor. Other factors, though, provide further insights on our ability to reach what should have been an achievable goal.

Neuman<sup>6</sup> recently completed an assessment of progress toward each of the 22 emphasis areas in a report for AASHTO in September 2006. Progress was assessed based on both year 2005 fatality and injury statistics and on measures of implementation of strategies outlined for each of the 22 areas. The following are his key conclusions:

- *In only 6 of the 22 emphasis areas, significant, measurable progress is evident at the national level.* Foremost among these is the continued improvement in use of restraints (including implementation of primary seat belt legislation).
- *In 10 of the 22 areas, minor progress is noted, primarily based on an assessment of strategy implementation, but with little measurable effect yet on safety.*
- *In 5 of the remaining six areas, no notable progress is evident; and in one area (motorcycle safety), we have gone backward from the original AASHTO plan.*
- *Based on trends and knowledge to date, the potential for a reduction of 9,200 fatalities from 2004 levels appeared possible through full implementation of the SHSP.* This estimate runs well short of the vision of halving total fatalities in the face of increasing travel. While this assessment omitted any evaluation of one area dealing with vehicle safety, the evidence is that much more effort and success than has occurred will be needed to meet the vision.
- *Finally, the importance of alcohol and restraint usage as well as the great variability in such behaviors by state was highlighted.* States in which the percentage of alcohol in fatalities was lower and seat belt usage higher had overall fatality



more years. Providing for their mobility and recognizing their greater risk as drivers, occupants, and pedestrians will require greater attention and focus.

The number of younger drivers also is increasing; fully 14 percent of drivers are young drivers (16 to 20 years old). Their lack of driving experience and maturity result in their being high risk drivers and passengers. Continued emphasis and focus on licensing, training, and minimizing risk for younger drivers will be needed given this trend.

### Growth and Distribution of Traffic

Overall travel increases have historically exceeded two percent per year. Travel growth tracks the economy. In addition, there is an even stronger growth in traffic that has a greater risk associated with it. Truck, freight, and goods movement is increasing at a much greater pace than other traffic; as the economy grows this trend is expected to continue. One in eight crashes involves a large truck. Large trucks' greater mass results in their being overrepresented in fatal crashes.

Promotion and accommodation of freight traffic demand is a given. Addressing this trend will mean looking at how regulations and project development influence the number of trucks and their relationship to other vehicles and to crash potential. This may involve, among other things, examination of truck size and weight restrictions. It also may entail new infrastructure solutions. In some states and along some high-volume corridors, there is emerging interest in providing separate truck facilities. Understanding and then promoting the safety benefits of truck-only facilities will require growing emphasis.

### Tolling and Road Pricing

Shortfalls in revenue for highway improvements are driving many states to consider or implement tolling. Road pricing is being aggressively promoted by the FHWA as a solution to congestion in urban areas where neither funds nor space for new capacity are available. Unless carefully implemented, the combination of these policies may run at cross purposes to achieving safety. Diversion of traffic through tolling strategies may create incentives for higher risk traffic such as trucks to leave safer, tolled facilities for less safe but “free” roads.

### Speeds and Speed Limits

The authority for setting of speed limits was returned to the states in 1995. Economic pressures, particularly in western states, are resulting in re-evaluation of speed limits with upward revisions in some states. Implementation of 75- and 80-mph speed limits offers the potential to increase high-speed fatal crashes on two-lane rural roads. Higher speed limits can run counter to safety-driven policies that promote reasonable speed limits and speed management as a means of reducing the severity of crashes. Fully 30 percent of fatal crashes now involve excessive speed. However, there is little public pressure to decrease speed limits, and in some locations pressure to increase them.

The trend for speed has many explanations. As we become more prosperous, we value time to a greater extent, and hence wish to minimize our travel time. Roadway design is based on providing a level of comfort to drivers; advances in vehicle



technology and equipment have made higher speed travel more comfortable on older roads designed for lower speeds. Finally, drivers subconsciously know that safety advances such as airbags have reduced their risk injury in a high-speed crashes.

The issue and trend is complex. Roads have been historically designed by highway engineers with the notion that a high design speed equates to high quality. Drivers respond naturally to the driving environment as laid out by the designer. Setting of appropriate speed limits reflects this driving environment. Indeed, there is evidence that setting unreasonably low limits can have unintended adverse safety consequences, be unpopular, and also present unreasonable burdens on law enforcement.

The highway engineering profession, working with law enforcement, must come to grips with the safety and traffic service trade-offs associated with notions of “quality,” safety, and proactive speed management of the highway system.

### Alcohol and Driving

We have finally achieved the goal of establishing in every state the sanction of “driving while intoxicated” with a blood–alcohol (BAC) of 0.08 percent, a serious offense if prosecuted and punished. There has been some change in culture that reflects disdain for social drinking and driving and that promotes designated drivers and other solutions to social drinking. However, despite laws and some culture change, the number of fatalities involving a driver under the influence of alcohol remains steady at almost 40 percent of all fatalities. In only a very few states, is this number less than 30 percent, and in five states alcohol involvement tops 50 percent of highway fatalities. As shown in Figure 3, after measurable success from the 1980s into the 1990s, there has been little progress in reducing alcohol-related highway fatalities over the past 10 years. We have a long way to go to reach National Highway Traffic Safety Association’s (NHTSA) goal of no more than 11,000 alcohol-involved fatalities annually.

### Alcohol-related Traffic Fatalities

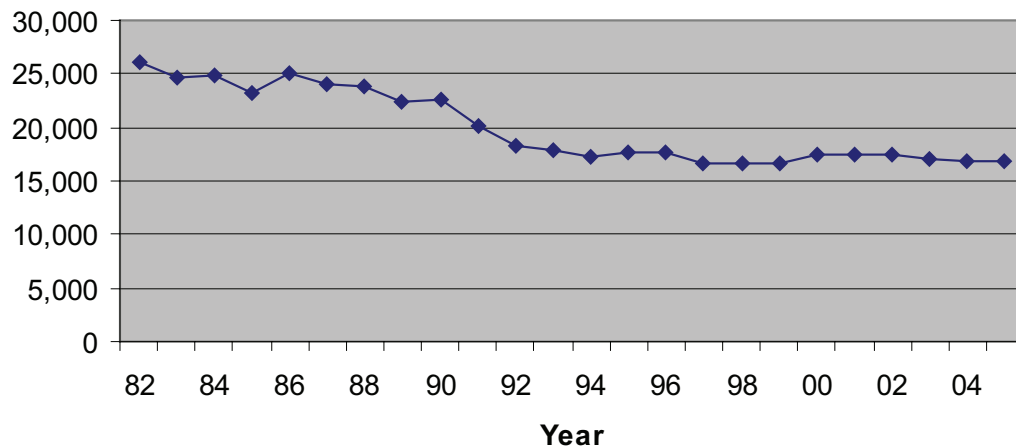


Figure 3. Recent history of alcohol-related highway fatalities in the United States.

Laws, public pressure, and education campaigns notwithstanding, our failure to effect a downward trend in alcohol-related fatalities is arguably the single greatest trend keeping highway deaths at current levels. Further examination of the data suggests that a major part of the problem is hard core alcohol consumption. In 2005, over 10,000 fatalities involved drivers with a BAC >0.15 percent. This trend appears reflective of that segment of the population that abuses alcohol.

### Restraint Usage

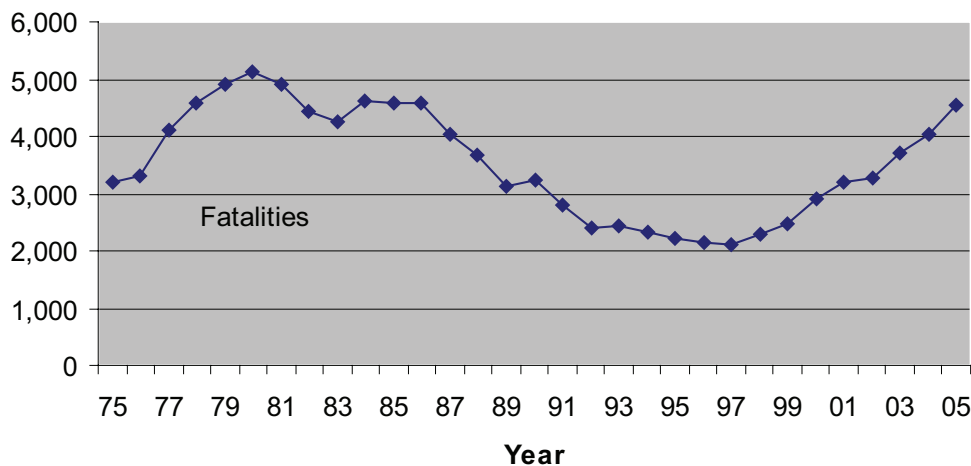
The use of seatbelts and child restraint systems has steadily increased as a result of public education and legislation. While many states still do not have a primary seat-belt law, the trend toward 90 percent restraint usage is favorable. Since the mid-1990s seat belt usage nationally has risen from less than 70 percent to over 81 percent in 2006. In fully 11 states the rate exceeds 90 percent. Still, 27 states do not have primary seat belt legislation despite its proven effectiveness in increasing usage of belts and reducing fatalities.

Ironically, the success of the seatbelt usage trend means that garnering further meaningful reductions in fatalities through increased restraint usage will be limited and more difficult. The challenge that lies ahead is to transfer success in restraint usage to the motorcycle rider community and usage of helmets.

### Motorcycles

Concurrently with the growth in truck traffic is the significant growth in motorcycle ownership and travel. With this growth has emerged the single most disturbing trend that must be reversed—the more than doubling of motorcycle fatalities in less than 10 years (see Figure 4). It is truly astounding that fully *one in ten highway fatalities in the United States now involves a motorcycle rider*. This is despite the fact motorcycles made up only 2.4 percent of all registered vehicles in the United States and account for only 0.3 percent of all vehicle miles traveled.

**Motorcycle Rider Fatalities**



**Figure 4.** Recent history of motorcycle fatalities in the United States.

This disturbing statistic reflects a trend away from the single greatest motorcycle safety measure—the use of effective helmets. Only 58 percent of riders wear helmets, down 13 percent from just four years ago. Yet, in the face of increased registrations and ridership and increasing fatalities, *repeal* of mandatory helmet legislation has been considered and in some states enacted, and progress toward passing mandatory helmet legislation in other states has stalled. Only 21 states currently have helmet laws in place for all riders. We now estimate that enacting and enforcing mandatory helmet usage could save 700 lives, nationally.

### Pedestrian and Bicycle Travel

Pedestrians comprise 11 percent of all fatalities, over 4,600 per year. There is an emphasis nationally on recognizing, promoting, and providing for non-motorized travel. This emphasis is particularly strong in urban areas, and reflects a change in attitudes about driving, land use, “livability” and the environment. Promotion of walking or riding a bicycle has been widely described as a public health solution to the “under-exercised” American. FHWA, Institute of Transportation Engineers (ITE), and others have provided leadership in promoting pedestrian and bicycle facilities.

Pedestrians and bicyclists are vulnerable roadway users. The trend to promote more of such activity can be expected to increase the exposure of these users to crashes (most of which result in serious injury). Indeed, from 2004 to 2005, the second greatest factor explaining overall fatality increases (next to motorcycle crashes) was an increase of 317 fatalities involving pedestrians and bicyclists.

### Technology

Research and development technology investments by both government (FHWA, NHTSA) and the private sector continue. Such investments are proving their value in applications specific to enhancing safety. These include vehicle improvements (electronic stability control side air bags, navigation systems, guidance and collision warning, alcohol interlocks), and roadway and other technology (automated enforcement for red-light running and speeding). “Low-tech” advancements such as rumble strips and roundabouts have also been proven effective for certain highway types and contexts.

### Achieving the Vision

Taken as a whole, the trends noted above need not prevent us from reaching the vision of halving fatalities by 2030. The “good news” is that there is a wealth of knowledge on proven strategies to improve safety across the full range of engineering, enforcement, education, and emergency medicine areas. There is also a growing understanding at the state and Federal of the complexity of the problem in terms of organizational and institutional issues. Finally, SAFETEA-LU legislation provides both impetus and some financial incentives to succeed.

The challenge is that there are clear barriers and key issues requiring resolution to solving the problem. The significant ones are summarized below.

## Safety Champions Are Needed

Strong national and state leadership champions must step forward at the highest levels of government to declare an end to the carnage on the nation’s highways. In only four states has a “vision zero” been adopted. Legislative and administrative priorities in *all* states must reflect recognition of the problem as the serious public health issue it is. Leadership must demonstrate that institutional barriers can be addressed and real progress is mandatory.

At the Federal level, leadership is necessary to not only provide funding, but also enact the necessary legislation (regulatory, incentive, and disincentive as needed) to induce all states to implement proven behavioral strategies; or to give states the flexibility to make safety-based operational decisions reflective of their own situation.

## Overcome Institutional Barriers

Solving the highway safety problem will require partnerships among government, private industry (insurers, vehicle manufacturers), the medical profession, and academia. The Transportation Research Board’s Strategic Partnership is one excellent model to accomplish the coordination and execution of research and countermeasure implementation.

Multiple jurisdictions are involved at the Federal, state, and local governmental levels. Government activities require a common vision and coordination in response to safety problems among transportation agencies, motor vehicle licensing, law enforcement, and the judiciary. To illustrate the challenge, consider that the U.S. DOT and Centers for Disease Control (CDC) do not yet have a common definition of the traffic safety problem nor a common set of goals.

Different agencies need a common understanding and sense of both priorities and urgency. This facilitates effective partnerships in which sharing of data and knowledge, coordinated responses for maximum effectiveness, and a common public message are possible.

Some barriers involve allocation of resources, whether by emphasis area or unit of government. A balance needs struck between accountability for investments and a desire to provide maximum flexibility to allocate the dollars where they are most needed. Such flexibility should reflect inherent differences in the “context” of highway safety across the country, reflective of climate, nature of travel (urban vs. rural), size, and scope of the system, local culture and types of crashes prevalent. What may work best in Georgia may be less than optimal in, say, Montana. The resources must be applied where they can do enough good. In many states, this involves road systems that are the responsibility of counties or local units of government, not just the state DOT.

Some barriers involve competing regulatory interests. Truck size and weight restrictions, for example, have the effect in some states of increasing the number of trucks (and hence their exposure) or restricting their ability to use the safest highways on their systems. A “safety-first” focus applied to any and all such regulations is needed.

Legal liability remains a strong barrier to implementation of innovative solutions or new technologies. This barrier is a concern to the private sector, but also influences actions and decisions by many governmental agencies. There is inherent risk associated



with implementing new, experimental or not fully “proven” technology. Appropriate protections to remove disincentives from innovation are needed.

Another significant institutional barrier to success is the overall lack of experts trained in all aspects of highway safety, from behavioral work to engineering to law enforcement. This barrier or problem is evident at all levels of government (it is a growing concern at the state DOT level as experienced staff retire), but is particularly acute at local levels of government (cities and counties). The university community and professional organizations, such as the ITE, partnering with state and Federal government must meet the challenge of growing and delivering the knowledge base of highway safety within the community.

### Address Cultural Issues

There are strong cultural barriers in many parts of the country to achieving the vision. Foremost among these is the continuation of a significant segment of the population that chooses to drink and drive. Alcohol is legal, and there are imbedded economic interests associated with its public consumption. It may be beyond our control to influence alcohol consumption, but we must prevent those who drink and in particular those who drink heavily from operating motor vehicles; and if they do so our legal system must demonstrate such behavior will not be tolerated, sanctions will be meted out, and they will be severe.

Another cultural issue creating serious safety concerns is illustrated by our problems in motorcycle safety. As motorcycles gain popularity the risk to their riders increases. The cultural allure of motorcycle riding runs counter to promotion of safe driving behavior.

There also remains a culture that accommodates and indeed celebrates speed. Drivers who speed well in excess of posted speed limits flout the law and put not just themselves, but others at risk as well. They do so with a high degree of confidence that they will not be caught, or with a belief that the consequences are minimal. Changing these cultural attitudes is a task for educators, political leaders, law enforcement, and the judiciary. It will require new ways to communicate with the public, and to deal in particular with repeat offenders.

An equally contentious cultural issue involves concerns over privacy and the use of technology to enforce laws and cite unsafe or law-breaking by drivers. Automated enforcement of red-light running and speeding has been proven both effective and affordable in the United States and abroad. It has been implemented in many jurisdictions with notable successes and acceptance by the public.

There remains, however, in many states and regions a feeling that automated enforcement is an infringement on privacy or intrusion by the government. Privacy or personal freedom arguments are also raised when the subject of primary seat belts, mandatory motorcycle helmets, or alcohol interlock systems is raised.

To be sure, many of the current barriers reflect self-inflicted “wounds” by governments. Not all automated enforcement programs have succeeded, and many have not been embraced by the public. Unsuccessful automated enforcement programs (due to poor or lacking studies, or poor contracting or communication about the intent of the program) have hurt the credibility of such technology. Where speed limits are

viewed as unreasonable and enforcement activities seem driven by revenue generation as opposed to public safety, public outcry has ended attempts to implement innovative enforcement programs.

Also, there remains a strong concern in many areas about the potential use or misuse of data obtainable from such technologies by government. Technology safeguards and appropriate laws aside, many view automated technologies as a fundamental infringement on their personal freedom. Changing these attitudes and breaking these cultural barriers at the individual state level means not only passing enabling legislation but accepting such technology as the most cost-effective and fair means of assuring safe behaviors on public rights of way and protecting innocent and law-abiding users of the public road system against the actions of irresponsible drivers.

To summarize, while public education can have some influence, addressing serious cultural problems often calls for legislative and enforcement actions. Proven strategies to address cultural barriers include mandatory motorcycle helmet legislation, primary seat belt laws, ability to require placement of alcohol interlock systems, and legislation to enable automated enforcement of traffic laws. Their aggressive implementation requires political will to make them stick.

### **Institutionalize Technological Solutions**

Americans have historically embraced innovation and technology. Many success stories in highway safety can be attributed to advances in technology, including vehicle restraint systems, airbags, etc.; roadway hardware such as guardrail, crash cushions, and median barriers and cable; and even “low-tech” solutions such as rumble strips, chevrons and improved traffic signal and sign materials and features. More recently, innovations in automated enforcement have proven their value, most notably in Australia, but also in some locations in the United States.

There is clearly an important role for technology in the future of highway safety. Crash avoidance technology continues to be tested and offers hope for significant improvements. Proven technologies in automated enforcement and in vehicle interlock systems to prevent intoxicated drivers from operating motor vehicles are also part of the long term solution.

In-vehicle technology offers significant potential. For example, NHTSA estimates that a lane change/merge collision avoidance system is potentially effective in 37 percent of crashes. Road departure warning systems to address the most prevalent type of crash on rural highways are estimated to be effective in 24 percent of crashes; and another NHTSA study indicates forward collision warning systems could be effective in over 50 percent of rear-end crash situations typical of congested arterials and freeways. Indeed, the implementation of just one advanced technology throughout the entire vehicle fleet—electronic stability control (ESC)—could save up to 9,600 lives annually according to NHTSA.

The technology also currently exists to provide safeguards against drinking and driving in vehicles (intoxilizers, PBTs, interlocks). Full deployment of such technology or its widespread linkage to known problem drinkers has great potential.



With full deployment of effective, safety-based technologies in the vehicle and the overall roadway infrastructure it would seem that technology alone could reduce fatalities by 30 percent or more. Of course, such an impact can only occur over time as the technology becomes proven and becomes standard equipment in the vehicle fleet. And most importantly, societal acceptance of the use of this technology must occur. Such acceptance will come through auto companies' marketing of such technology, cooperative deployment, and through responses to Federal regulations, laws and incentives. (For example, consider that NHTSA has just issued a final rule for implementation of ESC by 2012.)

Technology, however, should not be viewed as the sole or even primary solution to the problem. Individual driver and citizen responsibility and respect for the driving task will always be an element. Indeed, there is concern that public beliefs of the benefits of technology may contribute to the apparent lack of respect for the seriousness of the driving task and need for drivers to pay attention and take personal responsibility. In any event, any major introduction of new in-vehicle technologies is at best a longer term solution that must first pass political and cultural acceptance tests.

### **Invest in Safety-Based Information Management Infrastructure**

The ability to program, evaluate, and deliver cost-effective safety solutions requires a much greater information infrastructure than is currently present in all but a few DOTs. The lack of high quality, timely, and useful data and tools hinders informed decisions and hence prevents effective implementation of solutions. Data systems that are in place were developed for other purposes. Rich sources of external data (law enforcement, medical service providers) remain untapped.

An historic lack of focus on safety performance has resulted in most transportation agencies not investing in “safety asset management.” This inhibits their ability to diagnose problems, perform prioritization or programming studies, monitor the success of their safety investments, and in effect assure cost-effective use of safety dollars. The issue involves not just assembling and maintaining crash data per se, but other relevant data and records (enforcement citations, medical records, traffic volume, speed data, roadway and traffic control inventories). It also includes the further development and then institutionalization of robust and sophisticated tools. FHWA's *SafetyAnalyst*, the major AASHTO and FHWA-sponsored *Highway Safety Manual*, Road Safety Audits, and other emerging technology. Under SAFETEA-LU these investments are being made, but in many cases this takes years of effort for the data systems to be fully operational and useful. Moreover, the lack of data, systems and knowledge is a particularly acute problem at the local government level.

Only with a strong safety data system in place can safety conscious decisions become routinized. The issue goes well beyond HSIP or specific safety efforts. Consider, for example that it is now possible to complete an Environmental Impact Statement for a major project without a quantitative assessment of relative safety impacts of the alternatives. A true “safety-based” project development process and mindset would not allow this to occur.

Once data are in place and knowledge management systems implemented their ongoing maintenance is required. Investments in safety data and knowledge management above current levels may require as much as \$0.5 billion annually according to Neuman.<sup>6</sup> Without the data, knowledge, and skills of trained professionals, success can not occur.

### Provide Resources

Sufficient funding to not only achieve the vision but sustain it is essential. Funding is needed for safety-based infrastructure, for data gathering, management and decision support activities at all levels of government, for continued research on highway safety, for public education programs, and to support targeted and sustainable enforcement activities. SAFETEA-LU established precedents for not only funding but accountability to the states. A continuation of this policy and sufficient funding will be needed to achieve the vision.

Neuman's reassessment of the status of safety included an update of costs both for capital investments and annual maintenance and upkeep. At least \$2.4 billion (2006 dollars) annually and \$24.5 billion in capital costs were estimated for full implementation of effective strategies to address the 22 areas in the AASHTO SHSP. These estimates do not include research, development, and deployment costs associated with in-vehicle technologies.

### Endnotes

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Note: Statistics cited in all Figures from FARS data bases and NHTSA and FHWA.

## Credits

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