Building a Better Driving Experience

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You may not have heard of it yet, but the results emerging from the second Strategic Highway Research Program just might improve the quality of your life. Or even save it.

You're stuck in highway traffic again. No sense of why, or what, or for how long. As the minutes tick by, you become more and more frustrated, "CAN'T SOMEBODY DO SOMETHING?!"

Well, lots of people *are* doing something, about traffic congestion and about all the components that impact it. But right now and for only a short time, somebody is carrying out a strategic plan for doing something. Doing something to get you where you're going more reliably. Doing something to renew old roads faster and with fewer delays. Doing something to build new roads more quickly and with less expense and political complexity. And doing something to help you and your family get where you're going safely and without incident.

That somebody is the Transportation Research Board. And that something is the second Strategic Highway Research Program, or SHRP 2. And, if the ultimate impact of the group's research is half as successful as many stakeholders think it will be, this infuriating scenario that each of us has lived through so many times—including the transportation professionals on the receiving end of consumer complaints—will one day be, if not a thing of the past, at least noticeably reduced in length, frequency, and severity. Indeed, one need only look at SHRP 2's formal mission statement—"Saving Lives, Reducing Congestion, Improving Quality of Life"—to get an inkling of the seriousness and the passion with which the program's 25 staff members, approximately 400 volunteers, and more than 600 researchers approach their tasks.

"There are many big, persistent problems related to our highways that impact us detrimentally every day," said Neil Hawks, the Director of SHRP 2. "Our job is to find innovative ways to solve them. And we are actively doing that, right now."

Revitalizing an aging system

According to Hawks, America's highways are a vital network that is in need of serious and long-overdue attention.

"It's hard to overstate the importance of the highway system to our way of life," he explained. "Most of us rely on highways every day for getting to work, getting to school, visiting friends and family, going to events, and even getting to other forms of transportation, such as planes and trains. We're on the roads for hundreds of hours, thousands of miles, year in and year out."

Further, he notes, the nation's highways are the indisputable backbone of the consumer economy, providing the means for trucks loaded with goods from food to clothes to industrial supplies to reach every nook and cranny of the country quickly, efficiently, and cost-effectively.

But, inevitably, with this dependence on the highway system comes vulnerability. And Hawks, like many infrastructure experts, warns that America's roads are living on borrowed time. Most main arteries can trace their origins back to the interstate highway system work famously championed by the Eisenhower Administration in the mid 1950s. Engineers at the time estimated a useful road life of 30-40 years, and that was based on an approximation of traffic volumes that did not even begin to anticipate the scope of life-style changes in subsequent decades, such as multi-car families, lengthy daily commutes, and consumer demands for more and more truck-delivered goods.

This suggests two obvious conclusions: one, our grandparents did an absolutely phenomenal job of infrastructure building, with their work far outlasting and outperforming any reasonable expectations; and two, the monumental task of upgrading and rebuilding their work now requires an achievement of similar scope.

As daunting as that latter conclusion is, also consider this: in the 1950s, the roadwork was done primarily in big empty areas with few hindrances; today, we face the escalated challenges of rebuilding the highway system while it is necessarily in active, every day, unrelenting use. Further, today's work needs to be done within a far more complex culture, balancing not only the perpetual financial and political challenges, but also environmental, legal, safety, neighborhood, historical, archaeological, and other issues that were all but unheard of 60 years ago.

Congress Turns to TRB

It was this realization, in the late 1990s, that led Congress to take action. To help make sense of the complex issues involved, they turned to the Transportation Research Board within the National Research Council, a private, nonprofit institution part of the prestigious National Academy of Sciences. A decade earlier, the NAS had run a program called the Strategic Highway Research Plan, now referred to as SHRP 1.

Ann Brach was the new hire who came on board to research and, with a committee of knowledgeable transportation professionals, write the design recommendation for what would become the successor to that program, referred to as SHRP 2. For several years this team criss-crossed the country, interviewing highway experts in the public, private, and academic sectors about highway users' highest-priority needs and assessing current research to determine the best path forward. Brach had not been involved with the earlier SHRP effort, but quickly saw the value of the model.

"SHRP 1 was unusual in that it was designed to take on a small number of high priority issues, focus on them very intensely for a short period of time, pass the results on to the users, and then shut down," said Brach, now SHRP 2 Deputy Director. "It wasn't broad-based and on-going like most highway research has been, and I think that made it more cogent, more practical."

Indeed, another unusual thing about SHRP 1 was its fast and far-reaching real-world impact. One of the products of its research was the recipe and method for a superior, standardized asphalt paving process dubbed Superpave®. Whereas before the 1990s there was a wide disparity in the quality of paving results even between similar batches of asphalt, the Superpave process creates roads with predictable, and significantly better, durability and longevity, and has become the standard throughout the United States.

"SHRP 1, within just a few years, essentially changed the way a very fundamental DOT activity is carried out," noted Brach. "Superpave has been widely and quickly adopted across the US and in other countries, which is pretty amazing considering the conservative nature of our industry."

Building on the SHRP 1 operating model, the committee recommended to Congress a specific, yet more diverse research agenda for the proposed SHRP 2. Like its predecessor, it would focus intensely, for a set period of time, on a finite number of issues identified as the highest priorities by the highway community. Congress authorized approximately $150 million for a seven-year working program, which set to work in March 2006.

Four Customer-Oriented, High-Priority Research Areas

Flowing from the original design recommendations, SHRP 2 research is organized into four high-priority focal areas, each effort contributing to that overarching program goal of saving lives, reducing congestion, and improving quality of life through better highways.

Reliability research is working on making optimum use of our existing roads by better managing issues related to nonrecurring congestion, such as accidents and work zones.

Renewal research is geared toward the best way to rebuild these roads, with faster construction techniques that cause minimal disruption and produce the longest practical useful life.

Capacity research is focused on systematically integrating environmental, economic, and community re-

CAPACITY: Bringing greater collaboration to road building

"At one time, building a new road meant developing a purely engineering-based solution; the best alignment and lowest cost engineering solution would be identified, and they would go ahead and build the road accordingly," noted Steve Andrle, SHRP 2's Capacity Program Officer.

But to build roads today, he explains, DOTs need to take an environmental stewardship approach from the beginning. Previously unfamiliar terms such as habitats, species migration and preservation watersheds and wetlands, greenhouse gases, social dislocation, and economic impact have to be part of the vocabulary, and partnerships have to be forged with a host of new partners, including federal regulatory agencies such as the EPA, state and local natural resources and fish and game organizations, and private environmental and wildlife advocacy groups.

And still, that can be only the beginning. Today, a wide range of potential stakeholders including community activists with concerns about increased noise and traffic, local businesses with access concerns, those concerned about displacement of culturally significant artifacts, and many other groups can weigh in at any time in the process and add significant time and expense to any new highway plan, or even derail it all together.

"The best engineering solution isn't necessarily the best solution anymore," said Andrle. "The best solution today is the one that generates consensus and can actually get built."

A big part of Capacity research, according to Andrle, is creating tools and forums to help DOT officials and other stakeholders understand and work most effectively within these challenging realities. The key to road building success in today's environment, he says, is "collaborative decision making," a phrase which he considers a mantra for his program.

"Working reactively is counterproductive for everyone; we need to be proactive to keep things moving in a productive direction," said Andrle. "That means that the right people need to be at the table at the right time with the right information and that's not the easiest thing in the world to do."

To help DOT practitioners and other stakeholders achieve this goal, the SHRP 2 Capacity program has unveiled its Transportation for Communities—Advancing Projects Through Partnership (TCAPP) website, located at http://www.transportationforcommunities.com. Tools at the website include a step-by-step framework that, based on real-world road-building case studies, guides participants through more than 40 decision points, providing guidance on negotiating each decision point and helping ensure that the right groups sign off so forward motion can be maintained.

In addition to providing other collaboration-promoting tools, the TCAPP website will also serve as a searchable database for much of the group's research output. Other tools emerging include a framework for analyzing the economic impact of a new road on a community, forecasting truck and freight traffic and its impact on new road building, and creating models to accurately predict the impact of highway management strategies such as reversible lanes, open shoulders, and ramp metering on capacity needs.

Neil Pedersen, Administrator of the Maryland State Highway Administration, is one DOT professional eagerly awaiting the full implementation and availability of TCAPP and all the SHRP 2 Capacity research.

"I know from first-hand experience that things take seemingly forever in planning large controversial projects," he said. "Historically, one of the biggest problems we discovered in Maryland is having to go back to revisit decisions we had made or re-do analyses that had been done because key stakeholders had not been involved in the process."

As an example, Pedersen points to his state's own Intercounty Connector highway project, which, he says, had a "60-year history" before finally getting successfully under way in 2007.

"Ultimately, after many missteps, it was getting the right people together and reaching consensus that broke the deadlocks," he said.

Maryland's experiences will be part of the case history database on TCAPP, and Pedersen is eager to learn from the successes and mistakes of others to fine-tune his approach.

"We're looking forward to reading more about other states' experiences, best practices, and lessons learned," he said. "I expect that this information will help our next major capacity project advance much more smoothly, helping us make decisions that hold, and keep us moving forward."

quirements into the analysis, planning, and design of new highway capacity.

And, while many of these focal areas include a safety component, for example, helping keep road repair crews safe in the face of diverted traffic, a separate SHRP 2 *Safety* research program primarily involves a naturalistic driving study that is unprecedented in the industry: some 3000 drivers from all walks of life will have cameras installed in their personal cars and have their driving behavior recorded for upwards of two years. The motivation for this study is that the driver is the last frontier for improving safety.

The approximately 90 individual projects in progress among the four areas (see sidebars for more details on specific efforts underway) encompass innovative approaches to pervasive strategic issues that loom large for the transportation industry. For example, what's involved with building a highway in large sections offsite, then bringing it in and installing it quickly in the work area? What is the

RELIABILITY: Championing predictable travel times

Travel time reliability is a relatively new, driver-focused way of looking at nonrecurring congestion, the kind that builds from unexpected rain storms, work zones, accidents, and stadium traffic after a baseball game, that can turn a three-hour trip to the beach into a four-hour exercise in frustration. When one or more random events like these leads to traffic congestion, then unreliability increases.

The Reliability research program addresses definitions, performance measures, data collection, highway design features, operational strategies, travel information, incident management, corridor and long-range planning, as well as how to continually improve organizations to enhance reliability through systems operations and management. One key project addresses ensuring that states and metropolitan planning organizations adequately consider allocating funds to operations projects that improve reliability.

"Basically, modeling efforts capture the actual travel time data of all the drivers on a particular stretch of road for a particular time of day over a long period of time. The data captures all the factors that affect the interaction of supply and demand, including nonrecurring factors," explained Bill Hyman, SHRP 2's Reliability Program Officer. "You can plot the data and looking at the travel time distribution, you have objective, real-world information on the reliability of using that segment of road. You can see how long it takes the slowest vehicles, represented by the 95th percentile travel time (and higher) to traverse the road segment. You can do the same thing for trips from home to work by collecting travel times every work day. For 95 percent reliability, you would be late to work only one day per month.

"When the possibility of unreliability is there and you must be somewhere at a particular time, you build in extra time," Hyman explained. "The cost of being late can be very high sometimes, missing a flight or having to pay a fine for arriving at a day-care center after the official closing time. But if you didn't need that extra time, it is wasted because you could have been doing something else. There is an opportunity cost to being too early.

"In the past, the main way to remove bottlenecks and improve reliability was to add new capacity," said Hyman. "But our goal is to increase the efficiency of the current system first by mitigating the random factors that lead to unexpected congestion. We are developing a new method for diagnosing an important class of congestion problems and identifying different strategies to reduce the effects of incidents, bad weather, work zones and other factors. Many of these strategies will prove highly cost-effective in helping states and local governments reduce traffic congestion."

Interestingly, in the reliability world, faster trips are not always better trips. Many people would prefer to take a route that provides a highly consistent travel time than a route that has a lot of travel time variability but is faster on average. The preference holds up with public transit as well. "In surveys of our 65,000 bus commuters, what they tell us is most important to them is not necessarily a fast trip, but a predictable one," explained Mark Muriello, Assistant Director of Tunnels, Bridges and Terminals for the Port Authority of New York and New Jersey. "They want to be able to know accurately what time they should board the bus in order to be at work at a certain time, without being late, and without having to leave a big buffer zone. The tools coming out of SHRP 2 will help us provide even more consistent and reliable service to our customers every day."

Potential users of the Reliability program's research find SHRP 2's new way of looking at congestion a welcome one, and one that will offer practical solutions to real issues. Like the other SHRP 2 focus areas, the Reliability research is trying to achieve practical outcomes that can be implemented. Those responsible for systems management and operations will directly employ the research results and the road users will directly benefit.

best, fastest, and safest way to clear an incident site? What are drivers actually doing in the seconds before a crash, and how can that behavior be changed? And, how do you bring all possible stakeholders to the table early on so that better transportation planning decisions are made and seemingly endless entanglements are avoided?

Hundreds of researchers from universities, corporations, DOT research centers, and other contracting organizations compete to tackle these questions and many others. As befits each project, the work may include laboratory analysis, engineering modeling, field surveying, policy research, literature analysis, or combinations of these and other research methods.

Volunteers—The Lifeblood of SHRP 2

While SHRP 2's 25 staff members manage the core activities, the perspectives and expertise of many others are essential to the conduct and to the value of the program. "There's no doubt that our volunteers are the lifeblood of SHRP 2," said Hawks of the approximately 400 DOT, industry, and academic professionals who support SHRP 2's efforts. "They bring their project management abilities, their real-world user perspectives, and their technical expertise. After all, a lot of these projects have a very narrow, specific technical focus and there's no way our staff could be expert in all these areas. So we call upon the foremost experts in those areas to provide input. SHRP 2's progress

RENEWAL: Enabling faster, minimally disruptive, and longer-lasting improvements

The challenge of roadway renewal was summed up early in the program by David Burwell, former chair of the TRB Task Force on Transportation and Sustainability: renewing the interstate system will be like overhauling your car with the engine running—a big job with difficult challenges.

There is no way around the reality that our hard-traveled pavements, bridges, and tunnels, no matter how well built, are wearing out. We need to replace them with better and longer-lasting versions—even while they are still being used! What most people would see as the "holy grail" of renewal activities, completing them with maximum speed, minimal disruption, and long-lasting results, has been discussed frequently in the industry, and the concept has been given the term "rapid renewal." However, with current resources, even the promise of rapid renewal remains a luxury, attempted only rarely in high-profile situations. SHRP 2, through the Renewal focus area, wants to change that.

"Highway renewal refers to the reconstruction or substantial rehabilitation of deteriorating highway infrastructure to new standards of service. We want to help give every DOT the tools to achieve the benefits of rapid renewal in every highway reconstruction project," said Monica Starnes, Renewal Program Officer.

Informally referred to as the "get in, get out, and stay out" approach, rapid renewal requires analysis of every aspect of the renewal process, from technologies to management.

"In order to achieve the rapid renewal of our aging highways while they remain in service, we need improved processes and methods that address all phases of the lifecycle of the highway facility as an integrated system rather than independent and unconnected activities. As an example, if a bridge replacement is being designed, how its components will be inspected should be thought out. This would not only facilitate upcoming operations, but it would also extend the life of the bridge, which minimizes future traffic disruptions," explained Starnes.

By all accounts, this way of looking at highway renewal holistically, through the entire project life cycle, is fairly revolutionary and will necessarily drive new paradigm shifts in the industry. But this isn't the only area where the group's thinking is revolutionary.

From this new way of thinking come a number of projects that eschew the entire conventional "work zone" mentality. For example, today, periodic inspection of tunnel linings necessitates closing lanes or sometimes the entire tunnel; a SHRP 2-funded project is investigating doing this same assessment from a truck moving through the tunnel at highway speeds. Other projects are looking at flipping the entire process on its ear, and, rather than sending in workers to renew the lanes, bringing the lanes to the highway; that is, creating pre-cast pavement panels offsite and then quickly installing them in the wee hours, potentially reducing traffic disruption to near zero.

Other projects are looking to help DOTs deal with their most vexing challenges. For example, the need to negotiate with adjacent railroads is often a source of legal entanglements and delays; a recently released, eagerly anticipated report provides highway professionals with successful mitigation strategies and sample agreements for railroad-DOT cooperation. And, although not well known to the general public, one of the biggest challenges to successful renewal projects involves dealing with what crews might find under the road.

"Gas lines, water pipes, telecom wires, cables, sewage pipes, crews find all types of utilities during their work, and sometimes they've been abandoned or otherwise unmapped," Starnes explained. "Utility issues are one of the major problems in highway construction and they cause a lot of delays."

SHRP 2 projects are tackling this issue from a number of angles, including the development of a multi-sensor device that can geophysically locate different materials in different soil conditions, allowing for the first time a single-pass assessment of everything underground before digging begins. Others include a case study-based conflict resolution matrix and a model for a 3-D data repository to maintain comprehensive records going forward.

Another Renewal effort gaining significant attention looks at furthering the useful life of bridges, creating a new standard that one engineer describes as "a long sought-after dream." With technical standards long targeting 50-year life spans, the American Association of State Highway and Transportation Officials (AASHTO) increased its technical standards to build in anticipated 75-year life in the late 1990s. Now, SHRP 2 is testing the economic and technical feasibility of building bridges that can be expected to last 100 years plus.

This latter effort is of special interest to Bruce Johnson, State Bridge Engineer, Oregon State Department of Transportation. His state's nearly 7000 bridges were built with typical 50-year life construction guidelines and currently have an average age of 46 years.

"The tools to optimize longevity and an understanding of the cost vs. longevity trade-offs just weren't available before," he said. "For the first time, SHRP 2 will give us the calculations we need to determine where we can spend upfront on superior materials and methods and achieve longer service life, and where we should choose to spread the costs out further over time. This is very valuable for us in Oregon, and, I think, for any DOT with the responsibility for bridge construction. We'll be putting this information to good use as soon as it's available."

As with all SHRP 2 products, these reports and others are posted on http://www.trb.org/SHRP2 as soon as they are published.

is a testament not only to their substantial knowledge and skills, but to their dedication as well. Their efforts are really extraordinary."

Industry volunteers are active on a host of committees, including an overall SHRP 2 Oversight Committee, a Technical Coordinating Committee for each of the four focal areas, and Expert Task Groups for each individual project. In varying roles, volunteers are involved in all phases of every project, from prioritizing needs, developing statements of work, and writing RFPs, to reviewing proposals and awarding contracts, to overseeing work and reviewing deliverables.

Why would so many busy professionals give so much of their time, without compensation, to this effort? Part of the answer may lie with the genesis of the National Academy of Sciences, under whose auspices SHRP 2 is run. Founded by an Act of Congress and authorized by President Lincoln in 1863, the National Academy's role is to convene the best scientific minds in the nation, as needed, to advise Congress on technical matters. With this history, being elected to membership in the Academy is considered by many scientists to be second only to the Nobel Prize as the highest honor of the profession and being tapped to participate in any of the Academy's activities can carry significant professional cachet.

"The people I work with through TRB and SHRP 2 are extremely talented, really the best of the best, and to think that someone actually believes that you might belong in their company, well, that's really an honor," said Kirk Steudle, director of the Michigan Department of Transportation, who has been called to serve on several SHRP 2 and TRB committees.

Steudle notes that a great benefit of being involved with SHRP 2 has to do with playing an active role in transportation's future, a realization he made, when, as an industry "customer" 20 years ago, he received the information on Superpave that flowed from the SHRP 1 effort.

"I saw first-hand how useful and powerful the products of SHRP 1 were, so when I was asked to participate in SHRP

SAFETY: Identifying the behaviors that cause—and avert—collisions

There have been reams of research investigating what happens to the human body during an automobile collision; the sacrifices of those ubiquitous crash test dummies have helped create life-saving innovations such as strategically reinforced cabins and multiple air bag systems. But while this research has mitigated the results of collisions, it has not done anything to reduce their numbers, and the enormous toll they still take in deaths, injuries, life-style impact, and property damage.

"We know that nearly all collisions are caused by driver behavior," said Ken Campbell, Safety Program Officer. "If we could see, really see, what a driver is doing in the seconds before an accident, or, just as importantly, in the seconds before a near miss where a collision is successfully avoided, it would open up an entirely new world of opportunities to help stop collisions before they happen."

Richard Compton, Director of the Office of Behavioral Safety Research at the National Highway Traffic Safety Administration says this new knowledge will lead to much more effective crash prevention efforts. "There are real limitations to post-crash reconstruction in understanding the causes of many crashes, which has severely restricted our ability to prevent these crashes," Compton said. "For example, evidence showing the role of driver distraction in contributing to crashes is currently limited to witness statements, self-reports, and inferences from statistical analyses. The SHRP 2 naturalistic driving study offers an exciting opportunity to actually see what other activities drivers engage in while driving and how these nondriving activities (like cell phone use and texting) contribute to the likelihood of getting in a crash."

In an attempt to get a real-world glimpse into driving behavior, safety researchers over the years have tried putting people in driving simulators, or specially configured test vehicles, but these were distinctly unnatural environments. In fact, it was quickly evident that these tests lacked the "nose pick" factor, the well-observed phenomenon that natural behavior will begin when, and only when, the presence of the camera and other study mechanisms are forgotten.

It's only been a scant few years that cameras and data recording systems have become small enough and inexpensive enough to make the concept of unobtrusively recording real drivers driving in their own cars a possibility. This type of "naturalistic driving study" has so far been attempted only on a very small scale, with a few dozen drivers for a short time, providing limited insights.

With SHRP 2, the concept is reaching by far its fullest extent to date—a study of approximately 3000 volunteer drivers, of both genders and various ages, ethnicities, and income levels, culled from six regions around the U.S. Participants and their vehicles, after passing certain eligibility criteria, will provide data through a system of strategically placed cameras and data recorders every moment their engine is running for up to 24 months.

"We will see scenes as they really unfolded," said Campbell. "A record of speeds, accelerations and conditions as well as digital video telling us things like 'what was the driver doing?' 'Where were they looking?' 'When did they look away?' 'How long did they look away?'"

To those wondering how such factors

2, I was excited to have a chance to help contribute to work that could advance the science of transportation in a major way," he said. "Call it 'professional responsibility,' or call it 'professional satisfaction,' or both, but it's something I knew I wanted to be a part of."

Moving to "Pre-Implementation"

A little more than half way through its original lifespan, SHRP 2 is just beginning to generate the first research products that, like the products of SHRP 1 years ago, will likely have enormous practical impact on the way highways are maintained and managed, and, hopefully, enormous positive impact on the experience that each driver has on the roads every day.

The full-scale implementation of SHRP 2 research results is ultimately expected to be led by the Federal Highway Administration (FHWA), part of the U.S. Department of Transportation. Direction and funding for that initiative is expected to come as part of the next federal highway authorization act, the successor to 2005's Safe, Accountable, Flexible, Efficient Transportation Equity Act-A Legacy for Users (SAFETEA-LU).

To bridge the gap in the meantime, Congress has provided SHRP 2 with additional funds and two additional years for "pre-implementation" activities. Pilot tests and demonstration projects that refine research findings into implementable products are high-value activities that support implementation. Field tests of new bridge construction techniques and specialized pavements for challenging environments are two examples that are already programmed, In addition, the funds will be invested in developing training curricula and tools and in accelerating the existing outreach efforts including publications and reports, websites, accessible data bases, journal articles, newsletters, and a "speakers' bureau", which provides engineering, transportation and other stakeholder organizations with expert presenters for meetings and conferences.

can be recorded and analyzed scientifically, it should be noted that a key goal of this biggest-ever naturalistic driving study is to replace as much subjective information as possible with objectively recorded information. For example, rather than making a judgment as to where people are looking, the researchers have developed a video mask which overlays numeric coordinates on the drivers face, which can provide objective data points relating to where the driver's attention is focused.

The team began outfitting volunteers' cars in late 2010, after about three years of planning; pioneering decisions had first needed to be made on defining the instrumentation, driver assessment tests, cataloging measurements, analysis methods and myriad other aspects of the revolutionary program. Roadway characteristics will be measured separately so they can be linked with the driving data and included in the analysis. Interestingly, even before any data was collected, information on the upcoming project design plan was in high demand by safety researchers worldwide, and naturalistic driving studies are being planned by researchers in Canada, Europe, and elsewhere piggybacking on SHRP 2's work.

"Once word got out about what we were attempting, the idea of naturalistic driving studies generated a lot of interest," said Campbell. "The promise of naturalistic studies is exciting to highway safety researchers, including myself."

And no wonder. When the project is completed, Campbell and his team expect to have a rich database that will provide researchers, manufacturers, and lawmakers with unprecedented insights into collision-causing behaviors, and more importantly, the means to create countermeasures—road-based, vehicle-based, awareness-based, enforcement-based or otherwise—to mitigate them.

"This type of naturalistic driving data offers information not currently available about why there are so many run-off-road crashes," Compton adds. "Data from the naturalistic driving study should tell us much more precisely than ever before possible the role of drowsiness, distraction, speeding, and other potential factors in why so many drivers appear to run off the roadway without any obvious precipitating event. Progress in developing collision avoidance systems to prevent run-off-road crashes and in safer roadway design would benefit tremendously from having this information."

"The general goal is to give us a clearer, evidence-supported ability to develop safety countermeasures and apply them in a more effective fashion," said Campbell. "For example, we know driver fatigue is a key factor in collisions. Thinking out loud, if we had a lot of data on these events, we could perhaps identify a recognizable pattern of degradation in the subtle aspects of driving performance, such as how well you maintain speed, or how you move the steering wheel. Identifying the difference between alert and non-alert behaviors could be the basis for new types of warning systems."

Overall, Campbell says, he and his team find it hard to predict where the research results will take the industry. Easier to predict, he hopes, will be the ultimate results of the insights uncovered. "We expect that in the years to come there will be a clear decline in the number of collisions," he said.

To keep track of it all, readers are invited to subscribe to the free SHRP 2 News, through http://www.trb.org/SHRP2. Links to reports, publications and other products are also posted on the site as soon as they are available.

Of SHRP 2's approximately 90 projects, a small handful have been completed, many are reaching maturity, and some, the naturalistic driving study, for example, are just beginning after years of detailed groundwork.

Among the first research products beginning to emerge are a web database of case studies on effective collaborative decision making in building new highways, sample specifications for coordinating with utilities and railroads for speedier repair work, and a report on strategies for reducing congestion and their relative impact on travel time reliability. And, interestingly, even before the SHRP 2 Safety area's naturalistic driving study got underway, researchers in other countries were so intrigued by the innovative concept that the project design itself has become an in-demand "product."

Anticipating the SHRP 2 legacy

Although the program is entering perhaps its busiest and most exciting time, many are looking ahead and anticipating what the legacy of the program might be. When asked what he wants people to see as a result of his team's nine-year effort, Director Hawks has a succinct and intriguing answer: "Nothing," he says. After a beat, he elaborates:

"What are people seeing from SHRP 1? Nothing. They're not seeing the broken asphalt anymore. They don't remember how roads were before Superpave, that roads are now lasting much longer and standing up to winter much better. We tend not to notice when a problem has gone away. We just see nothing, and that's good," he explained. "In the same way, I want more people to see nothing as they drive—no impediments, no accidents, no congestion. Just benefiting from the roads more than ever before and not needing to give them a second thought. That, I think, is what we're all working toward."