Remarks Prepared for

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National Highway Traffic Safety Administration

RMS Partnership Annual Symposium and Workshop

Waterford Conference Center

Springfield, VA

September 19, 2012

Thank you, for that generous introduction. I am honored to be your lead-off speaker at this important gathering.

I feel very connected to the work of the symposium. At NHTSA we are invested in vehicle safety, reliability, and performance. Our daily task is to save lives, prevent injuries, and reduce the economic costs of road crashes throughout the United States. And we fully appreciate that for our Armed Forces safer and more reliable

transportation is critical to mission success and the well-being of all those who serve.

Today I want to speak about the implications and impacts of data and research for our safety work at NHTSA—and for the RMS community. To put it simply: credible data and robust research partnerships are the keys to improving the safety and reliability of vehicles—today and for the future.

I'll also touch on several other aspects of NHTSA's agenda and areas of interest, including advanced vehicle-to-vehicle technology and automated driving, fuel efficiency standards, our advanced THOR crash test dummy, and Emergency Medical Services (EMS).

But first, I want to let you know that two NHTSA leaders will be panel participants in the course of the workshop:

- **This afternoon, Christopher Bonanti, Associate Administrator of Rulemaking at NHTSA, will speak at Panel #3, Reliability & Safety Standards for Ground Vehicles. He will discuss how Federal Motor Vehicle Safety Standards (FMVSSs) are developed and will also provide a few examples on how NHTSA's safety standards can help benchmark the safety attributes of military vehicles. These examples will include ejection mitigation, roof strength, side impact, post-crash safety standards, and electronic stability control.**
- **Tomorrow, Stephen A. Ridella, NHTSA's Director of the Office of Vehicle Crashworthiness Research, will participate in Panel #4, Crash Worthiness (Survivability). He will speak to such issues as the Fleet Safety Analysis for Lightweight**

Vehicles;oblique frontal impact research; battery research; and the THOR crash test dummy.

To give a brief overview: NHTSA's agenda includes crash-testing of vehicles, national and international safety standards, and researching and testing next-generation vehicle technologies. We also undertake enforcement and public education campaigns to make drivers aware of the deadly consequences of poor decisions, such driving while impaired, speeding, not wearing a seatbelt, and driving while distracted. These issues impact drivers worldwide, including members of the armed services in their off-duty hours.

In addition, NHTSA has partnered with the Environmental Protection Agency to develop the long-term initiative to significantly boost fuel efficiency in the U.S. vehicle fleet—new standards that were

announced this month. Increased fuel efficiency can reduce operational costs, enabling our armed services to continue to fulfill their missions in economically challenging times.

NHTSA's success in reducing highway fatalities and injuries is built on credible data and the all-out effort of a dedicated staff that is deeply invested in our safety agenda. I see a lot of common ground between NHTSA's passion for saving lives and the fundamental tenets of mission readiness and operational effectiveness in the Armed Services arena.

As you probably know, NHTSA is a data-driven organization. Data helps us define and advance our safety agenda: by describing problems, revealing new opportunities, and focusing our efforts on continuous innovation. At NHTSA we constantly collect and

leverage data to make driving safer—by analyzing and understanding crashes, influencing driver behavior, and advancing automotive technology.

Through dedicated research and regulatory actions, NHTSA is working to create a new safety era that features safer vehicle designs and emerging technologies. We also concentrate on understanding driver behavior and the important interfaces between the driver and automotive technologies.

At the same time that NHTSA continues our vehicle assessment and passenger safety work, it is clear that the greatest gains in highway safety in the future will result from fully evolved crash avoidance technologies—technologies that prevent crashes from ever occurring. The development of this technology

requires a deeper, detailed understanding of the causes of crashes.

NHTSA is now focusing on naturalistic data as a resource for better understanding the behaviors that lead to crashes or avoid crashes. Naturalistic studies provide us with new views of driving-in-progress and can be a valuable complement to crash data.

At a fundamental level, our research community is making significant new investments in expanding the tools of our trade—data collection, analysis, and dissemination. Instrumentation suites that capture naturalistic driving behavior provide a rich perspective on the complex connections between driver behavior and crashes.

Observing people while they're driving reveals new insights into the factors affecting driving safety. One of the best examples of this research in recent years is the Strategic Highway Research Program (SHRP) 2 Naturalistic Driving Study conducted by the Transportation Research Board (TRB).

SHRP 2 is the largest ever naturalistic driving study for understanding the interaction among the key factors involved in highway crashes—driver, vehicle, and infrastructure. The data collected under SHRP 2 will provide new information related, for example, to driver behavior at intersections and during lane changes.

NHTSA proposes to use this database to further our knowledge of the risks associated with aggressive driving, drowsy driving, and speeding—as well as the

manual, visual, and cognitive sources of driver distraction.

V2V

We expect that this data will be a compelling resource for transportation safety researchers and communities of users for at least 20 years—and that it will inform NHTSA's work on the next generation of vehicle-to-vehicle communications (V2V): emerging technology that may soon prevent many crashes from occurring.

At NHTSA we see crash avoidance as the way of the future. V2V technologies enable cars to automatically send and receive warnings about impending crashes so that drivers can take action to avoid a collision. This technology has the potential to address approximately 80 percent of the vehicle crash scenarios involving unimpaired drivers.

Since 2011, NHTSA has been working with the Research and Innovative Technologies Administration (RITA) Intelligent Transportation Systems Joint Program Office and industry partners from the Crash Avoidance Metrics Partnership on testing the next generation of vehicle-to-vehicle communications.

Our Safety Pilot driver clinics measure how drivers respond to in-car collision warnings generated via Dedicated Short Range Communications technology: "Do not pass" alerts, warnings that a vehicle ahead has stopped suddenly, and similar safety messages. We've found that 9 out of 10 of the drivers who have experienced these safety features have a highly favorable opinion of its safety benefits and would like to have them on their personal vehicle.

In late August, Secretary LaHood launched the second phase of our V2V testing—a real-world field test that will continue through the summer of 2013. This effort is based in Ann Arbor, Michigan, and includes nearly 3,000 cars, trucks, and buses equipped with vehicle-to-vehicle communications technology.

The prospect of integrating V2V communications with increasing levels of vehicle automation could result in the most dramatic safety improvements in our nation's driving history. NHTSA plans to make a decision about the Agency's next steps for vehicle to vehicle technology for passenger vehicles in 2013 and for large commercial vehicles in 2014.

AUTOMATED DRIVING

There is now a real need to develop performance specifications and non-traditional methods to validate

the performance of a high level of automated driving where the vehicle is making decisions for the driver. There are currently no established methods for doing this. We need input from our community and research partners—including the kind of expertise that is this room—to ensure that we are not sacrificing public safety for the sake of technological advancements.

We must understand and develop standards and methods of operation that accommodate distinct levels of automated control. We think about various levels of automation along a continuum that balances the roles of the driver and the machine, culminating in fully automated driving.

We are already familiar with Assisted Automation, where the driver has complete authority, but cedes limited fundamental control to the vehicle in certain

normal driving or crash-imminent situations (such as automatic braking and cruise control).

Monitored Automation involves shared authority: The driver cedes primary control but is still responsible for monitoring and safe operation. An example would be a system that combines lane centering with adaptive cruise control for "hands-off" and "feet-off" driving. But it is still "eyes-on" for the driver to continually monitor the road and traffic.

For Conditionally Automated driving, the human can cede full control authority under certain traffic and environmental conditions, but is expected to be available for occasional control. We consider the current Google concept car to be in this category.

In the Fully Automated mode, the driver provides destination or navigation input, but is not expected to be available for control. Responsibility for safe operation rests solely on the automated systems. We know of no such vehicle being designed for civilian highway use at this time, but at some time in the future this may be the logical outcome of the many efforts at automation currently underway.

NHTSA has made a significant research investment in the potential applications of Assisted Automation technologies, including forward collision warning, crash imminent braking, and lane departure warning. The agency is encouraging manufacturers to install some of these technologies on vehicles through its New Car Assessment Program (NCAP) and is engaged in research that will help us decide whether to incorporate some of them into our regulatory regime.

Automated vehicles offer a promising new method for reducing crash risk. The question is: What we should be doing to ensure that this new technology is responsibly entering the market so as not to create unanticipated negative consequences that could affect the public's confidence in the technology?

NHTSA has held extensive discussions with Google and numerous car makers about plans to deploy this technology and the issues that we believe are going to be important to its safe introduction.

Our challenges include: Understanding and evaluating driver behavior in these vehicles; developing performance requirements for the highly complex crash environments that they will encounter; and ensuring

that the systems (including sensors, maps, and software, etc.) are effective and reliable.

We have developed a Motor Vehicle Automation Roadmap to examine the performance of automated technology as a vehicle safety system. As part of this work we plan to conduct research on the reliability and security of software systems that support automated vehicle control and on the performance of drivers interacting with these vehicles.

NHTSA is seeking to be an active partner in the development and implementation of connected vehicle and automated driving technologies—an undertaking that requires collaboration with product developers, insurers, academia, and state and federal governments. I extend an invitation to all of you to think about what you might have offer to this exciting initiative.

THOR ADVANCED CRASH TEST DUMMY

Driver and passenger crash trauma impacts civilians and military personnel worldwide. As a component of a long-term research program dedicated to the reduction of automotive crash trauma, the National Transportation Biomechanics Research Center of the NHTSA Research and Development Office has directed the development of the THOR advanced crash test dummy.

THOR is designed to assist the development and evaluation of advanced vehicle occupant safety systems. It incorporates significantly improved biofidelity and greatly expanded injury assessment capabilities in all body regions. Though designed

specifically for use in frontal and oblique crash environments, the design offers multi-directional capabilities in several of its components.

By virtue of its enhanced design and measurement capabilities, THOR offers new functional benefits as compared with earlier crash test dummy technology, including: optimization of "smart" occupant restraint systems, improved kinematics, and injury assessment for face, neck, spine, and abdomen.

NHTSA has involved worldwide automotive manufacturers, research organizations, and government agencies in extensive THOR testing and evaluation trials. We are grateful for the contributions of individual experts and institutions in North America, Japan, Europe, and Australia—which have helped us identify and incorporate many useful refinements into

the current THOR version. I am certain that many stakeholders, including the armed services, will benefit from this ongoing work.

ADVANCED AUTOMATIC CRASH NOTIFICATION

I'll conclude with a few remarks about how advanced technology is saving lives after a crash occurs. Development of this technology began more than a decade ago with onboard-automatic crash notification (ACN) systems. These systems enable medical personnel to respond to crashes more rapidly by immediately notifying emergency responders of a crash and its location.

Today, when a crash occurs, more advanced ACN systems (AACN) not only provide rapid notification of the crash, but also transmit vehicle sensor data together with a prediction of injury severity.

The vehicle sensor data and injury severity prediction communicated via an AACN system enable a faster response to serious motor vehicle crashes and improved decisions regarding the transport and care of the injured. The resulting reduction in time to definitive medical care for seriously injured occupants has the potential to save a significant number of lives.

In addition, studies show that getting the right people to the right care can significantly increase their chances of surviving a serious crash. The Centers for Disease Control and Prevention have been developing field triage protocols to help emergency responders determine whether or not a crash victim needs trauma center care. The injury severity prediction provided by AACN systems is included in the latest version of this field triage protocol. I think this technology has

significant potential for helping injured service men and women in the field.

I'm optimistic about our prospects of making a leap forward in vehicle safety in the years ahead—especially through improved understanding of the causes of crashes and advances in crash avoidance technologies. NHTSA is committed to robust collaboration with our governmental and academic partners on initiatives that will enable all of our communities to reduce fatalities and injuries. Thank you.

I would be happy to respond to your questions.