

**SURFACE TRANSPORTATION REAUTHORIZATION:
PERFORMANCE, NOT PRESCRIPTION**

HEARING

BEFORE THE

SUBCOMMITTEE ON SURFACE TRANSPORTATION
AND MERCHANT MARINE INFRASTRUCTURE,
SAFETY AND SECURITY

OF THE

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED FOURTEENTH CONGRESS

FIRST SESSION

MARCH 24, 2015

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ONE HUNDRED FOURTEENTH CONGRESS

FIRST SESSION

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TUESDAY, MARCH 24, 2015

U.S. SENATE,
SUBCOMMITTEE ON SURFACE TRANSPORTATION AND
MERCHANT MARINE INFRASTRUCTURE, SAFETY AND SECURITY,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 10:03 a.m. in room SR-253, Russell Senate Office Building, Hon. Deb Fischer, Chairman of the Subcommittee, presiding.

Present: Senators Fischer [presiding], Blunt, Wicker, Booker, McCaskill, Klobuchar, Blumenthal, and Peters.

**OPENING STATEMENT OF HON. DEB FISCHER,
U.S. SENATOR FROM NEBRASKA**

Senator FISCHER. This hearing will come to order. Good morning. I will now convene the Senate Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security for our fourth hearing, titled "Performance, Not Prescription."

This is the second hearing in a series on the reauthorization of our surface transportation programs. Today the Subcommittee is examining performance-based measures for our Nation's surface transportation programs. A performance-based system will require regulators to set target objectives and leave compliance strategies to the discretion of the regulated entity.

All too often, Federal regulators provide industry with prescriptive directions. Mandating specific designs or exact behaviors can potentially distort the ultimate goal of regulation. Not only do prescriptive regulatory mandates demand time and money from stakeholders, they require regulators to gain technical expertise that is often well outside of the given agency's original mission. Moreover, prescriptive regulations embolden rent-seeking behavior.

Performance-based regulations provide the opportunity for better collaboration between industry and the Federal Government. Regulators and stakeholders need to work together to achieve greater transparency and monitoring of progress toward performance targets.

In January, Lance Fritz of Union Pacific Railroad testified before this subcommittee. He noted that, quote, "the point of a performance-based goal is to focus attention on the outcome, not the method." He also explained to the Committee that there is little evi-

dence that rigid design-based standards have a positive impact on railroad safety, but prescriptive regulations hamper innovation and carry a high cost for the Federal Railroad Administration and to railroad companies.

Since 2008, the Government Accountability Office has recommended that surface transportation programs take a performance-based approach to achieve better outcomes and to allocate resources more effectively. In a January 2015 report, the GAO found that, while the Department of Transportation is progressing toward a performance-based approach, states and grantees face implementation challenges. These obstacles include inadequate amounts of data, impeded access to proprietary data, and insufficient staff resources for monitoring and evaluation.

The safety and efficiency of our Nation's highways and infrastructure could also benefit from a performance-based approach to regulations that offer flexibility and encourages innovation.

For example, had the Federal Motor Carrier Safety Administration focused on an outcome-based approach to address its most recent iteration of truck-driver hours-of-service regulations, it is reasonable to assume that the regulations would have enhanced safety while not adversely affecting business operations. Instead, the overly prescriptive 34-hour restart provisions that were implemented in July 2013 mandate the exact time that drivers should sleep. This rule disrupted supply chains and led stakeholders to raise serious questions about the overall impact on safety of the regulation.

At the same time, FMCSA is attempting to utilize a more data-driven approach with its Compliance, Safety, Accountability system scoring program. Although the CSA program is deeply flawed, implementing regulations that are informed by past performance and focus on future risk, it is a step in the right direction.

Today we will review the progress that the Department of Transportation has made in implementing performance targets into our Nation's surface transportation programs. I look forward to hearing about both the successes, the challenges, and the opportunities for encouraging performance-based standards as we continue to explore surface transportation reauthorization.

I would now like to invite Senator Booker to offer opening remarks.

**STATEMENT OF HON. CORY BOOKER,
U.S. SENATOR FROM NEW JERSEY**

Senator BOOKER. Thank you very much, Chairman Fischer, for having this important hearing and continuing our discussion of these important issues.

I apologize at the top. I have another competing hearing right now, so I will be leaving in about 30 or 40 minutes.

But I am very excited to be here, with a focus on a broad range of issues. One of the most important that we should be focused on is how our transportation system is actually performing.

It is actually struggling right now. It is not the high-performing system that we would all like to see. Each day, commuters are stuck in traffic or packed onto train cars. In fact, people are losing the equivalent of 5 vacation days sitting in traffic each year. That

is unacceptable. And our country's freight is stuck, too, at the ports, on our roads, and on the rails, costing our economy billions and billions of dollars.

The way we are going to make things better is that they are going—if we don't do anything, though, things are going to get much worse. And that is unacceptable. We have to do more.

So if we want to turn this around and get the train back on its track—pun intended, metaphor intended—it is up to us to make some big changes in how we invest in our infrastructure. The bulk of our Federal funding, about \$40 billion a year, goes to highways, while only \$10 billion goes to transit. Even less, just short of \$1.5 billion, goes to passenger rail. And there is no surface transportation program dedicated to port infrastructure.

Our Federal transportation funding overly prescribes how we fund the system rather than focusing on the performance of the system, which is obviously what we are here to talk about today.

For example, in my state of New Jersey, all of our connectors into New York are at or near capacity whether you are traveling by car, on a bus, or on transit. That is why one of the most important projects is to build Amtrak's Gateway Project, a tunnel connecting New York and New Jersey that will add desperately needed capacity, create jobs, expand our economy, and fuel our country's most productive economic region.

The Gateway Project will cost \$15 billion. And where will the Federal contribution come from when we are not even spending, or investing, \$2 billion a year in rail for the entire country?

Other cities and states around the country are facing similar problems, from Chicago, to San Francisco, to Florida. That is why I am committed to trying to find new ways to invest in rail, ports, and transit systems. Last week, I introduced the Railroad Infrastructure Financing Improvement Act to unlock more capital and improve the way we finance all of our projects.

And I think that is just the beginning of what we can do. We also need to be focused on how to improve the safety of our transportation system. Each year, more than 30,000 people die on our Nation's highways. That is an unacceptable carnage. We need to find ways to make meaningful reductions in these numbers.

The last transportation bill took steps to increase performance in both safety and investment through performance measures, which is a start, but only a small step toward what many experts believe we should be doing.

I believe there are lessons we can learn from that process to better understand how we can improve the performance of our transportation system and safety programs. I look forward to hearing from our witnesses today about how we should be thinking about the performance of our transportation system and what lessons we can learn from other efforts to improve performance.

Thank you, Chairman.

Senator FISCHER. Thank you, Senator Booker.

I would like to welcome our first panel of witnesses today: Mr. Peter Rogoff, the Under Secretary for Policy, with the United States Department of Transportation; Mr. David Nichols, Director, Missouri Department of Transportation, and Acting Chair of the American Association of State Highway and Transportation Offi-

cials, or AASHTO, Standing Committee on Performance Management; Dr. John Graham, the Dean of the Indiana University School of Public and Environmental Affairs and the former Administrator, Office of Information and Regulatory Affairs, Executive Office of the President; and Dr. Peter Sweatman, Director, University of Michigan Transportation Research Institute.

We do have two Senators from Missouri on this committee, and I would offer to Senator Blunt and then Senator McCaskill the opportunity to welcome their constituents here today.

Senator Blunt?

**STATEMENT OF HON. ROY BLUNT,
U.S. SENATOR FROM MISSOURI**

Senator BLUNT. Well, thank you, Chairman. I know that Senator McCaskill and I are both proud of Dave Nichols and the great leadership he has provided at the Missouri Department of Transportation. He went to work there 30 years ago and has held almost every leadership job in the department, 2 years now as Director, the 2 years before that as Chief Engineer.

And in our state, if you look at a highway map of America or a railroad map of America or a river map of America, focus in on where those three maps all come together, you are basically looking at where Senator McCaskill and Dave Nichols and I live. And he is the first Director of the Missouri Department of Transportation to ever come up with a plan that brings all of that together, looking to the future.

He is also the Chairman of the Standing Committee on Performance Management for the national group that works with highway and transportation issues. So he not only is recognized where we live but all over the country as someone who is a leader on these issues.

He is retiring this year, and my request of him today is to still be available to us, both on this committee and in our state, with the great expertise and dedication you bring to these issues.

So thank you, Chairman.

Senator FISCHER. Thank you, Senator Blunt.

Senator McCaskill?

**STATEMENT OF HON. CLAIRE McCASKILL,
U.S. SENATOR FROM MISSOURI**

Senator McCASKILL. I, too, want to thank Dave Nichols for his service to our state.

Many people don't realize, but somebody had the brainy idea way back decades ago that the state would take over responsibility for maintenance of thousands of miles of county highways in our state, which means we have the seventh-largest highway system to maintain in the country. And I think we are either 46th or 47th in revenue. We have one of the lowest gas taxes in the country. The gas tax in Missouri hasn't been raised in over 20 years.

And so I know that he didn't plan this, but he is going to be retiring at the apex of a crisis in our state. And I know he is busy working every day to try to convey to the people of Missouri that this problem is not one that is going to be solved in Washington. We do need to get our work done here, but we have a real problem

with Jefferson City with the amount of resources that are going toward this critical infrastructure that makes us the economic powerhouse we are in Missouri because of our transportation needs of both interstate and—we won't get on barges today, but trains also.

So thank you for being here, and thank you for your service. And thank you for being courageous as you lay out various alternatives for Missourians over the coming 2 years that we are going to have to face the reality of. Thank you very much.

Thank you, Madam Chairman.

Senator FISCHER. Thank you, Senator McCaskill.

We also have a member on this committee from the state of Michigan. And so I would offer time to Senator Peters if he would like to welcome his constituent here today, Dr. Sweatman.

**STATEMENT OF HON. GARY PETERS,
U.S. SENATOR FROM MICHIGAN**

Senator PETERS. Well, thank you, Senator Fischer. I really appreciate the opportunity to be here.

And thank you for your very kind invitation to introduce a person from Michigan and someone who we have very high regard for because of his incredible work that he is doing leading the Michigan Transportation Research Institute at the University of Michigan.

Dr. Sweatman, under his leadership, forming this institute, it is really going to be a leader in revolutionizing the mobility of people and freight. The institute will be working with industry, government, and academia. And the Michigan Transportation Institute will develop the foundation for a commercially viable ecosystem of connected and automated vehicles, work that could reduce vehicle fatalities and injuries as well as energy consumption and carbon emissions by as much as a factor of 10, which is really very, very exciting work.

Dr. Sweatman has also been—and I know you continue to be, Dr. Sweatman—a strong advocate for preserving the 5.9 gigahertz band of spectrum that was set aside by the FCC for V2V and V2I technologies. And I would certainly agree with you, Dr. Sweatman, and appreciate your advocacy, that the FCC should not move forward in opening that band up for shared use until it can be proven it can be done without harmful interference to this incredible life-saving technology that you are developing at the University of Michigan.

So I look forward to hearing your testimony today, as I am sure everybody on the Committee, in regards to how connected, automated vehicles and the data collected in their testing and deployment will play a pivotal role in shaping the future performance management for our nation's transportation system.

So, Senator Fischer and Senator Booker, thank you for allowing me to be here, and I look forward to working with you as you shepherd this legislation through the Senate. Thank you.

Senator FISCHER. Thank you, Senator Peters.

With that, welcome to our panel. We will begin with your opening testimony.

And, Mr. Rogoff, if you would begin, please. Thank you.

**STATEMENT OF PETER M. ROGOFF, UNDER SECRETARY FOR
POLICY, U.S. DEPARTMENT OF TRANSPORTATION**

Mr. ROGOFF. Well, thank you, Madam Chairman, Ranking Member Booker and members of the Subcommittee. I do appreciate the opportunity to appear before you today.

Before I begin my formal remarks, I want to pass along the condolences of Secretary Foxx and the entire administration to the families of the victims of Germanwings Flight 4U-9525. Our condolences go out to all of the people of Spain and Germany. And, as always, the FAA stands ready to assist those very capable aviation authorities in any investigation where we can be helpful.

Safety is priority number one at the Department of Transportation, so we commend you for taking the time to review the critical issues surrounding safety regulation enforcement and industry performance as you prepare to tackle the next surface transportation reauthorization bill.

This year, like last year, the administration will be formally submitting several important safety provisions for your consideration as part of our GROW AMERICA Act. Our proposed bill also includes several proposals intended to help our transportation system perform better, specifically by streamlining the environmental review process to get shovels in the ground faster.

And I would point out, Chairwoman Fischer, that many of the proposals that are in Title I of the GROW AMERICA Act are closely aligned with some of the streamlining proposals that Lance Fritz from UP did testify to you about earlier.

In summary, we would very much welcome this subcommittee's very careful consideration of our reform proposals, as many of them are in your jurisdiction.

Back in 2012, the department formally adopted the use of risk-based safety management systems as a best practice for our regulatory and oversight posture across all of our safety agencies. And consistent with that policy, the department strongly supports the adoption and the use of performance-based standards when appropriate. In fact, we believe that actual safety performance of operators and grantees should inform the entire oversight posture of the department, including the development of regulations, enforcement efforts, and even in some instances the allocation of Federal grant funds.

When approaching this tension between prescriptive and performance-based rules, it should be remembered that prescriptive rules have often served the American public quite well.

Nowhere are our rules more prescriptive than in aviation. Between our regulations, guidance documents, and airworthiness directives, the FAA tells our airlines and plane manufacturers pretty much everything, including how they must clip a wire to a plane's fuselage.

This huge volume of prescriptive safety rules has produced the busiest, yet the safest, aviation system in the world—a regulatory framework that continues to be copied by developed nations around the globe.

Similarly, in the Federal Railroad Administration, very prescriptive safety rules, in combination with stepped-up enforcement and

improved diligence by the nation's railroads, just yielded in 2014 the safest year on record when it comes to train accidents.

Even so, we should not use the success of existing prescriptive rules as a rationale to slow the progress toward performance-based rules, especially new rules that might further enhance safety, lower costs, or be better tailored to each operator's unique safety vulnerabilities. And, in fact, both the FAA and the FRA are building on their success by adopting performance-based approaches.

Transitioning to more performance-based rules must be done with great care. They should be pursued when there is strong data indicating that safety will be enhanced both for travelers and, importantly, for transportation workers who are on the front lines every day.

Such performance-based rules must also protect the public when it comes to low-frequency but high-consequence accidents. The current challenges facing the FRA are an excellent case in point. I earlier observed that 2014 was the safest year in railroad history, but, as this committee, knows well, we saw derailments in 2014 and 2015 involving crude rail unit trains that must be addressed because of the threat that even one catastrophic accident can pose to a local community.

A performance-based regulation, if poorly crafted, could declare victory based on aggregate safety performance while ignoring the rare but potentially disastrous impact of a high-consequence event.

Performance-based rules can only be successful through the continuous collection and analysis of a great deal of performance data. That requires both the operator and the regulating agency to have the necessary resources to collect and analyze the data to monitor compliance with a performance-based standard.

That, in turn, requires, as you pointed out, Senator Fischer, a heightened level of transparency and accountability on the part of the regulated companies for their day-to-day performance in meeting those performance standards.

We at the DOT strongly believe that the best performance-based safety systems are those that make the actual safety performance of regulated parties readily available to their customers and the general public. This real-life performance data is also critical to our department's ability to target limited oversight and enforcement resources on the operators and transportation corridors that pose the greatest risk.

Our experience has been that not all operators or industries recognize or respect the need for such transparency. Absent a commitment to such transparency, performance-based regulations cannot work and this cannot be pursued.

That concludes my statement. I apologize for going a few seconds over. And I stand ready to answer your questions.

[The prepared statement of Mr. Rogoff follows:]

PREPARED STATEMENT OF PETER M. ROGOFF, UNDER SECRETARY OF
TRANSPORTATION FOR POLICY, U.S. DEPARTMENT OF TRANSPORTATION

Chairman Fischer, Ranking Member Booker, and Members of the Subcommittee, thank you for the opportunity to appear before you today. Safety is the Department of Transportation's top priority, and I am happy to discuss with you the Department's efforts to improve safety across our transportation networks. The Department is using objective, data-driven decision-making processes to adopt new per-

formance-based standards and to heighten the transparency of safety performance of public and private transportation system operators.

The Department is committed to the vision of eliminating fatalities on our Nation's transportation system. Recently, the Secretary joined the National Strategy on Highway Safety Toward Zero Deaths, a vision for eliminating fatalities on our Nation's roadways. This is a significant step toward eliminating traffic fatalities. It also echoes a goal of the Department's Strategic Plan, to "work toward no fatalities across all modes of travel." Improving safety means we must aggressively use all tools at our disposal—research into new safety systems and technologies, campaigns to educate the public, investments in infrastructure, targeted oversight and inspection activities, public transparency and accountability, and collaboration with our government partners to support strong laws and data-driven approaches to improve safety.

Part of achieving this vision is adopting, to the greatest extent practical a performance-based approach for all new safety activities, including the development of new safety regulations, the enforcement of existing safety regulations, and other critical safety activities, such as public safety performance reporting.

In the Department's Strategic Plan for 2014–2018, Secretary Foxx established accountability around safety, including performance-based standards and reporting systems to improve the safety of the entire transportation system. In 2012, then-Secretary LaHood formally adopted the Safety Management Systems (SMS) methodology as the official policy of the Department with respect to addressing safety and risk management activities. Some agencies within the Department, namely the Federal Aviation Administration (FAA), have longer experience implementing SMS while others, specifically the Federal Transit Administration (FTA), just recently acquired safety regulatory authority and is moving aggressively to adopt a performance-based standards approach as it develops a comprehensive regulatory framework.

Using SMS as a framework, our priority is to use our safety programs and regulations as effectively as possible and direct Federal resources to address the most serious safety risks. Performance-based standards and the use of safety tools, such as improved data collection, hold significant promise to reduce crashes, fatalities and injuries for users of the transportation system. As noted in the recent Government Accountability Office (GAO) report on performance measures, the Department has initiated numerous performance-based approaches across many agencies and together with many of our grantees.

However, the shift to a performance-based approach can be challenging. It can be complicated to design, may require more and better data and risk models than currently available, and may require different skills of operators and regulators compared to traditional prescriptive (*e.g.*, design) standards. Overseeing a performance-based approach can be more complex than a more prescriptive one. The determination of "adequacy" of compliance with a non-prescriptive standard can be considerably more challenging than the simple "black and white" compliance of a prescriptive (*e.g.*, design) standard. Additionally, there may need to be a greater willingness by the operator to provide data not otherwise available to the regulator. Finally, performance-based regulations will function poorly when implemented in the wrong way, or under the wrong conditions.

Additionally, some modal administrations with a long history of oversight will have to balance their performance-based evolution while carefully examining existing practices for opportunities to move to performance-based approaches without compromising safety or disrupting current approaches that industry and the Department both agree are working effectively to promote safety outcomes. Nonetheless, the Department is committed to creating a performance based culture across our regulatory programs.

Ultimately it is the operator's responsibility to operate safely. However, given the vast numbers of operators of varying levels of sophistication, the Department has the responsibility to communicate, educate, develop new knowledge and technical solutions, and drive risks from any operation to as low as is reasonably achievable.

MAP-21 Performance Measures

The Department has made solid progress addressing the MAP-21 requirements intended to make the surface transportation programs more performance-oriented. For example, the Federal Highway Administration (FHWA) is developing a series of rules that will continue to transform the Federal Highway Program to a performance and outcome based program by increasing coordination, linking investments to outcomes, and improving decision-making and the efficacy and transparency of national reporting. We expect that the safety performance measure rule in particular, when completed, will provide us with a clearer picture of complex crash and road-

way characteristic patterns, and better fatality, serious injury and roadway data, thereby allowing policymakers at all levels of government to make better decisions about how to invest limited resources for maximum safety benefit as well as making them more accountable for their decisions.

As required under MAP-21, states that do not meet or make significant progress towards meeting their established safety targets will be held accountable. The FHWA published a Notice of Proposed Rulemaking (NPRM) last year that proposes to establish measures for State departments of transportation to use to carry out the Highway Safety Improvement Program (HSIP) and to assess serious injuries and fatalities per vehicle mile traveled, and the total number of serious injuries and fatalities. States failing to make significant progress would be required to use a Safety Implementation Plan to identify necessary steps to improve their safety performance and use HSIP dollars to address these safety concerns.

MAP-21 also required performance measures for one of the Federal Motor Carrier Safety Administration's (FMCSA) top safety rulemakings that will mandate the use of Electronic Logging Devices (ELDs) to ensure greater compliance with the hours of service rules for certain truck and bus drivers. As part of this rulemaking, FMCSA is proposing new technical specifications for ELDs and the Agency has focused on a performance-based approach to the greatest extent practicable. For example, the draft rule would allow for a variety of options for ELDs from systems that are hard-wired to the vehicle to use of smart-phones and tablets which communicate with the truck or bus via wireless communications. The draft rule also proposed options for presenting the driver's record of duty status information to roadside enforcement officials, including use of the display screen, printouts, e-mail, or ELD-vendor hosted websites. That rulemaking should be completed later this year.

MAP-21 also established program goals and mandated that FMCSA evaluate states' progress in meeting these goals for its primary safety grant program, the Motor Carrier Safety Assistance Program (MCSAP). MCSAP provides financial assistance to states to reduce the number and severity of crashes and hazardous materials incidents involving commercial motor vehicles (CMVs). To receive MCSAP funding, states must implement performance-based activities, including deployment of technology to enhance the efficiency and effectiveness of CMV safety programs. As a condition of receiving MCSAP assistance, states must develop and submit performance-based Commercial Vehicle Safety Plans (CVSPs). These CVSPs provide flexibility that allows each state to focus on the most serious problems unique to their state and allow the state to maximize limited resources while focusing on safety outcomes rather than outputs.

As required by statute, FTA is implementing performance measures to make optimal use of its relatively new safety oversight and standards setting authority. In February 2015, FTA published a NPRM to strengthen the authority of State Safety Oversight Agencies (SSO). The proposed SSO rule reflects the flexible, scalable principles of Safety Management Systems that focus on organization-wide safety policy, proactive hazard identification, and risk informed decision-making as part of risk management, safety assurance, and safety promotion (safety training and communications).

As FTA and the transit industry move towards a performance-based approach, they are working to make sure previous safety efforts are not discarded, and new standards are implemented in a careful and deliberate manner to ensure safety. The rulemaking process to advance the FTA's safety mission is progressing steadily and FTA plans to issue four additional NPRMs for safety plans and programs in the coming year.

GROW AMERICA Proposals

The Moving Ahead for Progress in the 21st Century (MAP-21; Pub. L. 112-141) took important first steps in advancing the Department's safety agenda. It established a streamlined and performance-based surface transportation safety program. The Administration's surface transportation reauthorization proposal, the Generating Renewal, Opportunity, and Work with Accelerated Mobility, Efficiency, and Rebuilding of Infrastructure and Communities throughout America Act (GROW AMERICA Act) seeks to build on the successes of MAP-21 with even stronger safety provisions that will include measures to make our surface safety regimes even more performance-based and data-driven.

As articulated in the budget, the GROW AMERICA Act nearly triples the budget of the Office of Defects Investigation (ODI) in the National Highway Traffic Safety (NHTSA) to enhance our ability to monitor data, find defects sooner, and strengthen NHTSA's ability to conduct investigations of vehicles with suspected defects. The proposal establishes harsher penalties for manufacturers that refuse to address defective and dangerous vehicles and equipment.

The GROW AMERICA Act also strengthens FHWA's Highway Safety Improvement Program (HSIP) to enable engineers to identify infrastructure and operational hazards to prevent the next crash. It bolsters the Department's safety authority by increasing civil and criminal penalties for FMCSA, NHTSA, and FTA and establishes emergency authority for FTA to restrict or prohibit unsafe transit practices. Further, this proposal provides more than \$3 billion over six years through the Federal Railroad Administration (FRA) to assist with commuter railroad and Amtrak route implementation of performance-based Positive Train Control systems designed to prevent certain high-consequence rail incidents.

The proposal provides more than \$10 billion over six years for NHTSA and the Federal Motor Carrier Safety Administration (FMCSA) to improve safety for all users of our highways and roads. The GROW AMERICA Act would also streamline our Federal truck-and bus-safety grant programs to make them even more performance-oriented while providing greater flexibility for States to address regional and evolving truck-and bus-safety issues. This means that our State partners will be able to use their Motor Carrier Safety Assistance Program funding for motor carrier safety in order to address local truck and bus issues while meeting national safety priorities. By consolidating our grant programs, our State partners will spend less time on administrative grant activities and more time on boots on the ground roadside safety. The bill would also enhance safety through stricter standards for vehicle operators and more rigorous inspections. The proposal also includes a \$5.1 billion increase in 2016 to address public transit's maintenance backlog to reduce bus and fixed rail system breakdowns as well as increase overall safety and reliability.

In addition, GROW AMERICA proposes to more than double available funding for the highly competitive Transportation Investment Generating Economic Recovery (TIGER) program, increasing available funding to \$1.25 billion annually. Merit-based selection of transportation projects using detailed economic analysis of project costs and benefits, coupled with meaningful performance measurement of all projects further strengthens the Department's performance-based focus and emphasis on measurable outcomes for all grantees. The TIGER program has made significant investments in safety related projects. For example, in the last round of TIGER funding, New York City (NYC) received a \$25 million grant to promote NYC DOT's Vision Zero approach, working to reduce transportation-related injuries and fatalities. The Administration hopes that this Committee will give careful consideration to the provisions included in the GROW AMERICA Act that will improve safety for the traveling public and strengthen our efforts in expanding performance-based approaches.

Data-Driven Processes and Safety Management Systems

A systematic use of data has facilitated FRA's performance-based approach to system safety and risk reduction rulemaking efforts, as mandated by the Rail Safety Improvement Act of 2008 (P.L. 110-432). Last month, FRA published a rule proposing to require each Class I freight railroad and each other freight railroad that FRA determines has inadequate safety performance to develop and implement FRA approved risk reduction programs (RRP). RRP is a comprehensive, system-oriented approach to safety that determines an operation's level of risk by identifying and analyzing applicable hazards and involves developing plans to mitigate, if not eliminate, that risk. In September 2012, FRA published a companion rulemaking proposing to require commuter and intercity passenger railroads to develop and implement system safety programs; a final rule is scheduled to be published this summer.

FRA intends these broader, system safety and risk reduction efforts to dovetail with other initiatives and make regulations more performance-based. Notably, in September 2009, FRA tasked its Railroad Safety Advisory Committee (RSAC) to produce a set of technical performance criteria and procedures to evaluate passenger rail equipment built to alternative designs, to ensure that trainsets based on international platforms can be built for and operated safely in the United States. FRA also tasked the RSAC to develop formal recommendations for addressing industry waiver requests for passenger equipment crashworthiness standards and alternative crashworthiness performance criteria into FRA's regulations. FRA will use the RSAC recommendations to inform a NPRM under development to seek public comment on allowing the industry greater flexibility to meet crashworthiness performance requirements. Similarly, FRA's March 2013 final rule on vehicle/track interaction safety promotes the use of performance-based standards to ensure the safety of the vehicle and track system, based on results of computer simulations of vehicle and track dynamics, consideration of international practices, and thorough reviews of qualification and revenue service test data.

Performance-Based Versus Design-Based Standards for Equipage

While the Department is committed to developing a performance-based culture across its modes, there are instances where it is more appropriate to adopt design-based or a combination of design-and performance-based standards. When appropriate, moving from design standards to performance-based standards does require careful consideration to ensure the new standards actually improve safety and do not unintentionally introduce unknown risks that could compromise safety. Ensuring the safety of the traveling public and transportation employees must be the overriding factor of all regulatory decisions.

For example, some dashboard warning lamps and hazard-related systems in vehicles are more appropriately design-based to ensure uniformity for driver understanding when switching between vehicles. NHTSA's standards sometimes mandate installation of certain systems or components, including headlamps, seat belts, air bags, rearview cameras, and electronic stability control, and at the same time include performance standards for those systems or components. Federal Motor Vehicle Safety Standard No. 208, "Occupant Crash Protection," is an example of a performance based standard. It requires that the vehicle restraint systems, including the air bags, provide protection in a crash as measured by instrument readings on test dummies during prescribed crash tests. Of course, the standard also requires installation of certain devices, including some air bags. However, it does not dictate design and manufacturing considerations, such as the deployment thresholds, the air bag size, or color of wiring or connectors associated with air bags.

Finally, with regard to packaging of hazardous materials, the Pipeline and Hazardous Materials Safety Administration (PHMSA) uses performance-based packaging standards for certain bulk and non-bulk packaging. These standards are based on United Nations (UN) Recommendations in which a packaging manufacturer must test a representative design type in accordance with standards stipulated in the Hazardous Materials Regulations. Once a design type has successfully passed a test, a manufacturer must mark every package that is represented as manufactured to meet that UN standard with the corresponding marking indicating the level of testing endured. These tests include drop tests, leak tests, a hydrostatic test, and a stacking test as well as other relevant tests based on the type of packaging. The benefits of this performance-oriented approach include industry's ability to apply innovative technologies (*i.e.*, packaging) or non-traditional methods to meet the stated performance-based criteria without waiting for regulators to modify prescriptive (*e.g.*, design-based) requirements to explicitly permit use of a new technology.

Performance in Safety Enforcement

In addition to utilizing performance standards in developing regulations, the Department utilizes performance metrics, to the greatest extent possible, to guide our safety oversight activities.

PHMSA's Integrity Management (IM) program is based on the fundamental premise that companies should be responsible for managing their own risks, with regulatory agency oversight of their processes, systems and performance. There is evidence that the IM program has been effective, based on the thousands of pipeline anomalies and defects that have been found and fixed as a result of the program—commonly viewed as "accidents avoided"—and to improvements in technology that have been spurred by IM. Performance-based rules provide latitude to private sector operators to customize their compliance programs. This is reflective of the fact that operators manage pipelines created of differing materials manufactured over a very long period of time (with vintage-specific issues) in widely varying environments (*e.g.*, differing soil types, weather) and near or remote from people and sensitive environments.

Further, PHMSA maintains a data portal of pipeline incident reports that provides the time and location of the incident(s), number of any injuries and fatalities; commodity spilled/gas released, causes of failure, and evacuation procedures. The reports are used for identifying long-and short-term trends at the national, state and operator-specific levels. The frequency, causes, and consequences of the incidents provide insight into the safety metrics currently used by PHMSA, state partners, and other pipeline safety stakeholders, including the pipeline industry and general public. PHMSA also uses the data for inspection planning and risk assessment.

The Department is also focused on making the information it collects and makes publicly available even more useful. For instance, PHMSA maintains a database with information collected when there are incidents involving hazardous materials, such as crude oil spills during rail transport. While the database contains valuable information about incidents, PHMSA has recently identified limitations to the information that impede its utility. For instance, sometimes the incident reports filed by

industry do not contain the full extent of the property damage, cleanup, and remediation costs of an incident. PHMSA is considering ways to address these and other limitations to improve the utility and transparency of this database.

FMCSA's primary large truck and bus enforcement program, Compliance, Safety Accountability (CSA), uses a Safety Measurement System that compiles motor carrier safety data through roadside inspections, investigations, and reportable crashes to measure a carrier's performance and prioritize carriers for follow up interventions. This is critically important as FMCSA has the resources to inspect less than two percent of all active motor carriers each year, so the Agency must target its resources effectively. FMCSA has sufficient performance data to make an intervention prioritization assessment for nearly 200,000 of the approximately 525,000 active motor carriers for which it has safety oversight responsibilities. More importantly, analysis reveals that those same 200,000 motor carriers are involved in approximately 93 percent of the crashes reported by our State partners.

FMCSA's deployment of SMS has significantly raised safety awareness throughout the motor carrier industry. In calendar year 2011, the public website that provides a motor carrier's status in the SMS prioritization system hosted nearly 30 million user sessions, up from 4 million user sessions under the prior public SafeStat system in calendar year 2010. FMCSA continues to receive feedback that this increased awareness and transparency has raised the status of safety within corporate cultures and we are seeing this increased awareness in improved safety compliance and performance data. For example, violations per roadside inspection were down by 8 percent in 2011, and driver violations per inspection were down by 12 percent. This is the most dramatic improvement in violation rates in the last 10 years.

Additionally, the FRA rail-safety oversight framework relies on inspections to ensure railroads comply with Federal safety regulations. FRA inspects railroad infrastructure and operations, identifies safety defects, and may, if warranted, cite the railroads for violations of Federal safety regulations. FRA has developed and uses a risk-based approach to direct these inspection efforts. Like FMCSA, FRA inspectors are able to inspect just a small number of rail operations annually, and the agency estimates it inspects less than 1 percent of the railroad activities covered in regulation. As a result, railroads have the primary responsibility for safety of the railroad system. FRA has two tools to help direct its inspection efforts—the National Inspection Plan (NIP) and the Staffing Allocation Model (SAM). The NIP process uses past accident and other data to target FRA's inspection activities, and the SAM estimates the best allocation of the different types of inspectors across FRA regions in order to minimize damage and casualties from rail accidents. The FRA has also implemented a risk based inspection program for tank car facility inspections. Risk scores are assigned to tank car facilities based on performance history and type of tank car serviced.

Further, FRA requires rail operators to provide monthly reports on all accidents and incidents resulting in injury or death to an individual or damage to equipment or a roadbed arising from the carrier's operation. This information is made available online and includes overall safety trends and searchable queries that provide specific information on exact location of incident, casualties, damage, cause of incident, and other operational data of the rail environment.

FTA maintains a National Transit Database for the public that contains summary information on the number of safety incidents such as collisions, fires, derailments, as well as security incidents that have occurred in a fixed number of categories. In addition, to ensure proper accountability, a transit agency's chief executive officer must also certify on an annual basis the accuracy of the safety and security data previously reported by the transit agency.

In nearly all of these examples, publicly available safety performance data is key to embracing a culture of safety accountability, providing transparent oversight and regulation, and ensuring that collective efforts are properly aimed at real risks based on actual data. PHMSA, FMCSA, FRA, and FTA provide specific safety data on publicly available websites.

Together, these efforts are designed to ensure that safety management and regulatory decisions are objective, data-driven and transparent to the public, decision-makers, field personnel, and executive management alike. This transparency and accountability serves as a cornerstone for achieving tangible and measurable safety improvements across many different modes of transportation.

Conclusion

The Department has made great strides to implement data-driven decision-making and performance-based standards where possible, while recognizing that design standards are still useful in certain circumstances. The Department is committed to continuing its efforts to facilitate industry technological innovations while still ex-

exercising proper safety oversight through thoughtful development and implementation of performance-based standards, and data-driven decision-making to reduce risk, maximize outcomes, increase system efficiency, and above all, maintain the absolute highest levels of safety for our transportation system.

Madame Chairman, Ranking Member, Members of the Subcommittee, thank you again for the opportunity to testify before you today. I stand ready to answer your questions.

Senator FISCHER. Thank you, sir.
Next, Mr. Nichols. Welcome.

**STATEMENT OF HON. DAVID B. NICHOLS, P.E., DIRECTOR,
MISSOURI DEPARTMENT OF TRANSPORTATION, AND ACTING
CHAIR, AMERICAN ASSOCIATION OF STATE HIGHWAY
AND TRANSPORTATION OFFICIALS (AASHTO)
STANDING COMMITTEE ON PERFORMANCE MANAGEMENT**

Mr. NICHOLS. Thank you, Madam Chairman Fischer, Ranking Member Booker, members of the Subcommittee. Thank you for this opportunity to provide input on the implementation of transportation performance management programs within the state departments of transportation.

Today it is my honor to testify on behalf of the Missouri Department of Transportation and AASHTO. My main message this morning is to share with you my state's experience, along with that of other state DOTs, in implementing transportation performance management programs. Performance management, if implemented in a logical and thoughtful way, can be a powerful tool in managing the performance of the entire transportation system.

This is not the first time State DOTs have implemented performance management concepts. The 12 national-level performance measures required as a part of MAP-21 are just the top layer of a much more robust set of performance measures state DOTs use on a regular basis to plan, program, and operate their transportation networks.

All states have implemented some aspect of performance management. Colorado, North Carolina, Utah, Minnesota, and Maryland have created programs to manage their physical assets and focus on the principles of transportation asset management as opposed to a worst-first approach.

Many other states have well-known performance management programs that go far beyond the management of just physical assets. For example, Missouri's *Tracker* is a tool to assess how well MoDOT delivers services and products to our customers. The *Tracker's* seven tangible results, which are the outcomes the public expects, guides us in everyday decisionmaking. To increase accountability, each of the seven tangible results is assigned to a specific senior leader, who is charged with meeting the department's goals and obtaining the associated metrics.

The *Tracker* tool's flexible nature has allowed MoDOT to establish a performance-based culture and evolve with changes in both leadership and policy. Through flexibility and accountability, the *Tracker* ensures efficient and effective decisionmaking.

Safety is a good example. Since implementing *Tracker* 10 years ago, the number of fatalities on Missouri's roadways has dropped from 1,257 in 2005 to 766 in 2014.

You may be aware that this week is National Work Zone Awareness Week, and in Missouri work zone safety is at the center of our culture. Staying safe in work zones is a partnership among MoDOT, our contractors, law enforcement, and the driving public.

Our *Tracker* follows the number of fatalities, injuries, and crashes in work zones every quarter. By placing the focus on reducing those numbers, we can take actions that make work zones safer for everyone. Over 10 years, we have seen the number of work zone crashes drop from 4,492 in year 2003 to 1,509 in 2013.

MoDOT has used this performance management system to create a results-focused culture among its employees and improve satisfaction and credibility among its customers. Performance goals and results may change over time, but I am confident our performance management system will remain tightly woven in MoDOT's organizational fabric.

The success of *Tracker* and performance management in general is not without its challenges, however.

The first challenge is the cost to implement. It takes money and resources to collect, store, manage, and analyze the necessary data. These are funds that cannot be spent on projects and programs to improve safety outcomes. However, the data will be a valuable tool to improve safety.

The second challenge we meet is the need to maintain certain minimum condition levels. State DOTs are concerned with the minimum condition requirements that were made without knowing what the full availability of funding is. AASHTO estimates that some State DOTs will not be able to meet certain minimum condition standards even if available funding were spent on improving bridge and pavement conditions.

The third challenge we face is target-setting. Funding levels vary, as do environmental conditions, population growth trends, and legislative and gubernatorial mandates and other priorities. State DOTs and NPOs will be challenged to establish appropriate targets that take into account their unique situations.

For the last decade, many State DOTs have developed and implemented comprehensive and robust performance management systems to balance investment decisions against resource limitations for a wide variety of areas, from safety to asset condition to the performance of the entire transportation systems. State DOTs are concerned with all these performance areas and must balance the funding of programs and projects across areas while meeting public expectations during a time of financial uncertainty.

Madam Chairman, thank you so much, again, for the opportunity to testify today, and I would be happy to respond to any questions that you may have.

[The prepared statement of Mr. Nichols follows:]

PREPARED STATEMENT OF HON. DAVID B. NICHOLS, P.E., DIRECTOR, MISSOURI DEPARTMENT OF TRANSPORTATION AND ACTING CHAIR, AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) STANDING COMMITTEE ON PERFORMANCE MANAGEMENT

Introduction

Chairwoman Fischer, Ranking Member Booker, and Members of the Subcommittee, thank you for the opportunity to provide input on the implementation of transportation performance management programs within the State Departments

of Transportation. My name is David Nichols, and I serve as the Director of the Missouri Department of Transportation (MoDOT) and the Acting Chair of the American Association of State Highway and Transportation Officials' (AASHTO) Standing Committee on Performance Management. Today it is my honor to testify on behalf of the State of Missouri and AASHTO, which represents the State departments of transportation (State DOTs) of all 50 States, Washington, D.C., and Puerto Rico.

I have been honored to serve as Director of the Missouri Department of Transportation for the past two years. I have spent the past 31 years in public service at MoDOT, starting in 1984, and have served in a variety of leadership roles, including District Engineer, Director of Program Delivery, and Chief Engineer, prior to becoming Director.

Three of my passions have been: safety on our roadways, for motorists, passengers, pedestrians and highway workers; innovation in everything we do in order to give our customers the best value for every dollar they invest in transportation; and diversity within our workforce, both for the MoDOT team and our contracting partners.

Missouri has been a leader among the State DOTs in striving for better outcomes through implementation of transportation performance management principles. And in my role as Acting Chair of AASHTO's Standing Committee on Performance Management, I lead the Association's work in identifying and implementing best practices and providing input and guidance on a number of Federal regulations that are currently being developed by the United States Department of Transportation (USDOT) in response to the important recent changes made in the Moving Ahead for Progress in the 21st Century Act (MAP-21) requirements.

My main message this morning is to share with you the experience of the State DOTs, including my home state of Missouri DOT, in the implementation of transportation performance management programs. Performance management, if implemented in a logical and thoughtful way, can be a very powerful tool to MoDOT and our peer agencies in managing the performance of the entire transportation system. However, I must also note that performance management is not a panacea and cannot be expected to improve the condition of our transportation assets or performance of the transportation system in the absence of a robust transportation funding platform. It is critical that everyone works together to establish a long-term, sustainable transportation funding framework to truly see the benefits of transportation performance management. Without this funding base, all we can do as State DOT directors is to merely manage the gradual degradation of our national and regional transportation system that underpins our economy and quality of life.

My testimony today will emphasize three main points:

1. State DOTs are already implementing performance management principles;
2. Experience of Missouri DOT in implementing performance management; and
3. Lessons to offer in implementing national-level performance management requirements.

State DOTs Are Already Implementing Performance Management Principles

It is important to have a basic understanding of the concepts involved in performance management. Performance management is an iterative process that requires good data and feedback loops that inform the overall decision-making process. Most importantly, it takes time for performance management to show results. At the broadest level, performance management is about linking agency goals and objectives with resources and results as shown in Figure 1.

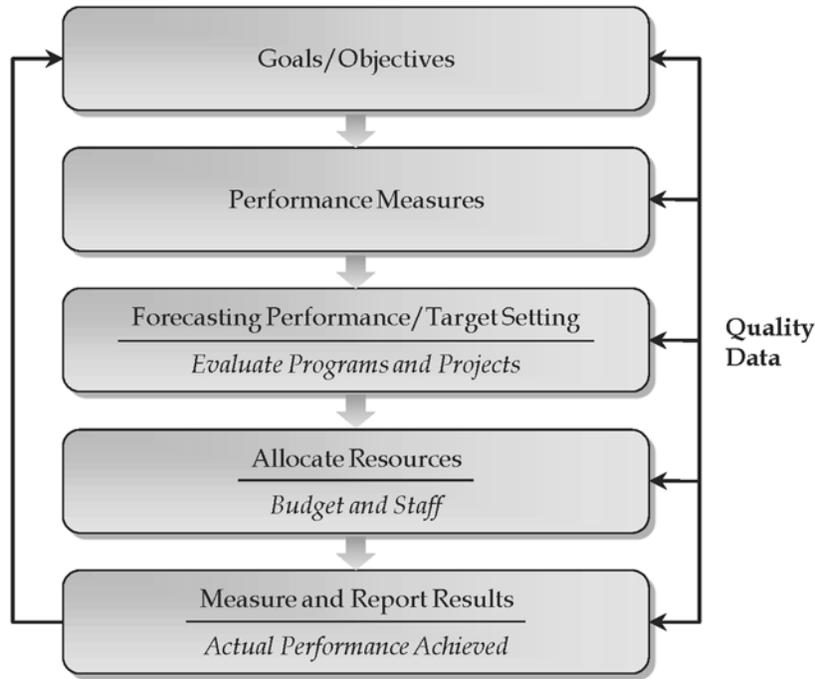


Figure 1. Performance Management Framework
Linking Goals/Objectives to Resource and Results

In the surface transportation context, state DOTs first establish goals and objectives. Goal areas may be developed within the agency or be directed to the agency from the governor, for example. Many State DOTs are now focused on linking the transportation system to improve economic development and growth. Other goal areas may focus on more traditional emphasis areas such as safety, operations, system performance and agency performance in areas such as project delivery.

Second, agencies establish performance measures that are used for both day-to-day and strategic management. Broader performance management measures might include travel time and delay, fatalities and serious injuries as well as specific measures of agency performance such as on-time and on-budget project delivery.

Third, an agency will make decisions on how to allocate resources within and across different types of investments based on an analysis of how different allocations will impact achievement of policy objectives and performance goals. For some goals, this may include forecasting the likely performance impacts of different strategies and setting performance targets. For example, a tradeoff analysis of reducing congestion may involve finding the right mix of capital expansion and operations strategies given the constrained funding resources available.

Fourth, state DOTs must allocate the limited funding resources they have to the projects that will improve the overall performance of the transportation system. The allocation of resources is not about identifying projects that are “wanted” versus “needed” but rather which projects must be funded now versus those projects that can be delayed until additional funding is made available. State DOTs have many different tools for assisting decision makers in conducting resource allocation from sophisticated quantitative econometric models to more qualitative assessments conducted by staff.

Finally, once the projects have been funded and built, the actual performance impact of programs and projects are tracked over time and provide the basis for evaluating the most effective strategies to achieve desired goals. Recognizing realistic timeframes for observing performance results and understanding that these timeframes will vary by performance area is important. For example, for many key per-

formance measures related to economic development, pavement condition, and safety, changes in performance will only be observable over a number of years. On the other hand, some aspects of system operations or agency performance changes can be tracked on a monthly or even daily basis.

One of MAP-21's key legacies is that it established a set of new national policy goals that aims to both focus and prioritize the Federal-aid Highway Program investments. While this is the first time that State DOTs, Metropolitan Planning Organizations (MPOs) and transit agencies are required to track, measure and report on transportation performance using a consistent, national framework, it is certainly not the first time that State DOTs have implemented performance management concepts. All states have implemented some aspect of transportation asset management, a subset of performance management. And, many State DOTs have implemented comprehensive and robust performance management systems to balance investment decisions against the varying resources and approaches provided by local, state and Federal Government.

States such as Colorado, North Carolina, Utah, Minnesota, and Maryland have created programs to manage their physical assets and focus on the principles of transportation asset management as opposed to a "worst-first" approach. Other states such as Missouri, Washington State, and Virginia have well-known performance management programs that go well beyond the management of physical assets. Missouri's *Tracker* is a tool to assess how well MoDOT delivers services and products to their customers (<http://www.modot.org/about/Tracker.htm>). Washington State's *Gray Notebook* is the Washington State DOT's quarterly accountability report that has been in existence since 2001 (<http://www.wsdot.wa.gov/Accountability/>). Virginia DOT helped to pioneer the transportation dashboard concept (<http://dashboard.virginiadot.org/>).

What MAP-21 requires of the State DOTs and MPOs is to report on twelve national-level performance measures that U.S. DOT can use to tell a comprehensive story about the status of the Nation's transportation infrastructure. Often, these national-level measures are referred to as a thin layer of measures that sit on top of a much more robust set of performance measures that State DOTs use on a regular basis to plan, program, and operate their transportation networks.

It's true that there have been, and will continue to be, many challenges to effectively implementing MAP-21. But I can also assure you that State DOTs are never one to shy away from a challenge. Over the past decade the States DOTs—through the National Cooperative Highway Research Program of the Transportation Research Board—have proposed, supported and actively engaged in applied research to advance the use of performance measurement to address complex management challenges and to enhance organizational and program effectiveness. This research has produced a series of comparative performance measures reports and compiled substantial know-how on successful data-and system-management techniques for performance measurement. More recently, the State DOTs, along with their MPO and transit partners, have been engaged with USDOT's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) in discussing, promoting and testing performance measures and performance-based planning and programming.

Experience of Missouri DOT in Implementing Performance Management

State DOTs have significant experience in implementing performance management. I would argue that Missouri is one of the leaders in this area. While Missouri will work with the USDOT in implementing MAP-21 performance management requirements, MAP-21 is focused primarily on national goals, national level measures, and the Federal investment. As the director of the Missouri DOT, I must also contend with a number of state goal areas and funding sources. I'd like to share with you some details about Missouri's efforts and how we document our performance.

*The Need for **Tracker**, MoDOT's Performance Management Tool*

In the late 1990s and early 2000s, the Missouri Department of Transportation began to consider performance management and data-driven decision making, but struggled with how to start. In 2004, the department finally set itself on a path to start collecting data and publishing measurements on which we could continuously build.

After establishing the agency's fundamental values and collecting the necessary data to develop performance measures, MoDOT published the first *Tracker* in January 2005. This publicly available report documents how MoDOT meets its goals and fulfills its mission and tangible results on a quarterly basis.

Focused on Customer Expectations

MoDOT originally built the *Tracker* around 18 tangible results which have since been refined to the current seven. These are the outcomes the public expects, and they guide us in everyday decision making. To increase accountability, each of the seven tangible results is assigned to a specific senior leader who is charged with meeting the department's goals and obtaining the various associated metrics.

The seven tangible results are:

1. Keep customers and ourselves safe
2. Keep roads and bridges in good condition
3. Provide outstanding customer service
4. Deliver transportation solutions of great value
5. Operate a reliable and convenient transportation system
6. Use resources wisely
7. Advance economic development

Accountability for Results

MoDOT uses a range of performance measures to focus and encourage progress in achieving the tangible results. Every performance measure in the *Tracker* corresponds to a specific tangible result. Just as each tangible result is assigned to one senior leader, every underlying performance measure is assigned to a single staff member. The "measurement driver" is the lead staff person responsible for collecting data and meeting the specific measurement's objective.

This model ensures accountability both internally and with the public. Each staff member must report on his/her performance measure to me, senior leadership and various statewide staff at quarterly *Tracker* meetings. The quarterly *Tracker* allows MoDOT to continually monitor progress and provides transparent information to the public.

Multiple Measures Drive Performance Areas

There are multiple performance metrics associated with each tangible result, in order to address it comprehensively. For example, "Keep Customers and Ourselves Safe" includes metrics on fatality and injury reports as well as lost work days and general liability claims and costs. All metrics are collected quarterly, semi-annually, or annually through various data systems and other reporting means. The *Tracker* details how measurements are calculated and analyzed. The *Tracker* report is highly graphical, using charts to present each metric in a simple format. The charts frequently include benchmarks to show how MoDOT compares to other states or private corporations measuring similar elements.

Driving Results for Any Challenge

The *Tracker* tool's flexible nature has allowed MoDOT to establish a performance-based culture and evolve with changes in leadership and policy. Through flexibility and accountability, the *Tracker* ensures efficient and effective decision making. *Tracker* has helped managers and employees at every level of the department make better daily decisions by providing the data and links to how those decisions will impact the agency's overall performance.

Safety is a good example. Since implementing *Tracker* 10 years ago, the number of fatalities on Missouri's roadways has dropped from 1,257 in 2005 to 766 in 2014. You may be aware that this week is national work zone awareness week, and in Missouri work zone safety is at the center of our safety culture. Staying safe in work zones is a partnership between MoDOT, our contractors, law enforcement, and the driving public. Our *Tracker* follows the number of fatalities, the number of injuries, and the number of crashes in work zones every quarter. By placing the focus of the performance measure on reducing those numbers, we can pursue actions that make work zones safer for everyone. Over ten years, we've seen the number of work zone crashes drop from 4,492 in 2003 to 1,509 in 2013.

Our tangible result on keeping roads and bridges in good condition acknowledges one of our core functions and Missourians' desire for smooth pavements and bridges that can safely handle growing traffic demands. With the seventh largest highway system in the country (almost 34,000 miles and over 10,400 bridges), Missouri ranks 46th in revenue spent per mile. We use performance data to focus our very limited resources to keep our most heavily traveled roads as smooth as possible.

Since 2005 the percentage of major highways in good condition has increased from 60 percent to 89 percent. But by 2017, we face a funding crisis that will make these stats nearly impossible to maintain. When our construction awards drop below the amount needed just to maintain the system in the condition it's in today, we will

struggle to meet these measures. But our performance management system will continue to help us make the best decisions on using every dollar we spend.

We are focused on providing outstanding customer service. Every single MoDOT employee is responsible for this tangible result, and we strive to be respectful, responsive and clear in all our communication. With data-driven decisions and public input shaping performance metrics, MoDOT's customer satisfaction has increased from 67 percent in 2005 to 85 percent in 2013. MoDOT's overall customer satisfaction has attained a level that exceeds the private sector—in 2012, Apple ranked at 83 percent, and the Missouri DOT hit 85 percent.

Advancing economic development is yet another of Missouri's critical tangible results. Missouri's transportation system has a direct impact on the state's economy. Local, national and international businesses depend on our roadways, rail, waterways, transit and airports to move their products and get people to their jobs. We believe investments in transportation create jobs and provide opportunities for advancement to all Missouri citizens. An investment in transportation provides a positive economic impact on both the citizens we serve and the communities in which they live.

One such performance measure we track is the economic return from transportation investment. Our customers and state decision makers can easily see how our construction program contributes to the economy through this measure. Based on MoDOT's 2015–2019 Statewide Transportation Improvement Program investment of \$3.5 billion, the program is estimated to create 4,000 new jobs. Transportation investments are expected to contribute \$10.1 billion of economic output during the next 20 years, resulting in a \$3 return on every \$1 invested in transportation.

The figures tell a powerful story of economic success, but are also a sign of missed opportunity. When compared to the previous year's STIP (2014–2018), the number of jobs created estimate decreased 40 percent. Also, compared to a period of sustained transportation investment in our state from 2005–2010, when many major projects were completed, our return on investment was at \$4 on every \$1 invested in transportation.

A year ago, MoDOT completed its long-range transportation plan. Utilizing a robust public engagement plan, we visited with thousands of Missourians where they live, work and play to learn their vision for Missouri's transportation future. Without question, one of the common themes they repeated over and over again was the desire for more transportation choices, and for improved integration of all of our modes of transportation. Because of our central location and because of the many transportation assets that we enjoy, this is important to our economic vitality and our quality of life. Our performance management system tracks the use and connectivity of our modes of transportation, and we also pay keen attention to our competitiveness in the efficient movement of goods.

Because we administer state and Federal funds that pass through MoDOT and on to local public agencies, we have worked diligently to help them develop and deliver projects faster and on budget. The performance metrics established to that end have helped us see dramatic results in just a few years' time.

MoDOT believes it is good business to support diversity, not just in MoDOT, but also among its contractors, subcontractors and suppliers. Contractors, subcontractors, and suppliers working on construction projects that receive Federal aid or Federal financial participation are required to take reasonable steps to ensure disadvantaged business enterprises have an opportunity to compete for and participate in project contracts and subcontracts. Here, too, we have made data-driven decisions, which have helped us improve our DBE participation by 78 percent over the past three years.

Looking Ahead

MoDOT has used its performance management system to create a results focused culture among its employees and improved satisfaction and credibility among its customers. It has provided an organizational framework for a decade of leaders to deliver results to meet any challenge. Managers and employees at every level of our organization use performance data to make better daily decisions. And while the pending funding shortfall will undoubtedly have a negative effect on many areas of performance, our performance management system will continue to help us stretch our limited funds. Performance goals and results may change over time, but I'm confident our performance management system will remain tightly woven in MoDOT's organizational fabric.

Issues and Challenges in Implementing National-Level Performance Management Requirements

AASHTO and the State DOTs are supportive of the MAP-21 performance provisions and believe that the continued implementation and maturation of performance management principles within the transportation industry will be a positive step towards a safer and more efficient transportation system. However, this is only the beginning of a long journey that the federal, state, and local governments will complete together as partners. There are some recognized challenges ahead and as such, AASHTO and the State DOTs will continue to engage with FHWA, FTA, the National Highway Traffic Safety Administration (NHTSA), and other stakeholders to address these challenges together. I would like to elaborate on three of the challenges State DOTs will face: funding, minimum condition levels, and target setting.

The first challenge is assessing necessary funding to implement performance management requirements. The cost to implement the performance management requirements: from data collection and management to analysis to reporting is not trivial. AASHTO conducted a survey of its members to gather additional input on the estimated cost of meeting new safety data requirements and came to the following conclusion for an average state:

Year 1 Expenses

- Information Technology Cost for entering, storing and reporting the data: \$4 million.
- Data Collection which includes additional counting equipment, vehicles, and personnel: \$6 million.
- Additional Staff to administer the data collection program: \$1 million.

Year 2 through 16 Expenses

- Annual Operations and Management: \$2 million.

Total Costs

- Total Year 1 Expenses for All State DOTs: \$561 million (\$11 million/state * 51 states)
- Total Year 2 through 16 Expenses: \$1.53 billion (\$2 million/state * 51 states * 15 years)
- Total Undiscounted Cost: \$2.091 billion

These costs are only estimates to implement the new requirements associated with the safety national-level measures. Additional costs, that are similar in order of magnitude, will be associated with the implementation of the bridge/pavement national-level measures and the system performance measures. It is important that we balance the need to collect the necessary and important data with the benefits of performance management. The more State DOTs spend on data collection, management and analysis means less money we can use to invest in safety programs, pavement resurfacing projects, and congestion mitigation projects.

The second challenge is the need to meet certain minimum condition levels established by U.S. DOT. An important aspect of implementing performance management is to provide the correct treatment at the right time in the life cycle of the infrastructure asset. This may mean not treating the worst item or segment of roadway first. State DOTs are concerned that the “minimum condition” requirements for National Highway System bridges and Interstate System pavement may force State DOTs into adopting a worst-first approach, since the State DOTs will be required to include in their overall performance management systems not only the federally-required assets (bridges carrying the NHS, Interstate Pavement and non-Interstate NHS pavements) but many locally and state-owned assets as well.

The third challenge is the area of target setting. It is crucial for the State DOTs to work closely with our planning and transit partners in developing and establishing targets and then working together to meet those targets. However, target setting is not a well-established science, especially when considered under political context. Every state and municipality faces different constraints and opportunities affecting their transportation system. Funding levels and sources vary, as do environmental conditions, population growth trends, and legislative and gubernatorial mandates and priorities. State DOTs and MPOs will have to face the realities of their individual contexts and will need to establish appropriate targets that take into account these unique situations. For many, this will be a challenge; but the traveling public will be rewarded with improved mobility outcomes.

Conclusion

Performance management, the development of performance measures, and establishing performance targets is not new to the State DOTs. For the last decade, many State DOTs have developed and implemented comprehensive and robust performance management systems to balance investment decisions against resource limitations. An important aspect of this has been examining performance measures for a wide variety of areas from safety to asset condition to performance of the transportation system. State DOTs are concerned with all of these performance areas and must balance the funding of programs and projects across areas while at the same time meet stakeholder expectations during a time of financial uncertainty.

I want to thank you again for the opportunity to testify today, and I am happy to respond to any questions that you may have.

Senator FISCHER. Thank you, sir.
Dr. Graham?

**STATEMENT OF JOHN D. GRAHAM, Ph.D., DEAN,
SCHOOL OF PUBLIC AND ENVIRONMENTAL AFFAIRS,
INDIANA UNIVERSITY**

Mr. GRAHAM. Good morning, Madam Chair and members of the Subcommittee. Thank you for the opportunity to be here.

My topic is safety regulation—first of all, the concept of a prescriptive standard, which is to specify technology, design, labor practice, or a set of human behaviors aimed at improving safety.

In the 1970s, this was the most common form of safety regulation around the world, but this particular form has come out of favor and has been replaced in many applications by the performance standard. The approach of performance is to specify a type and level of safety performance and leave the choice of compliance method to the company or the regulated entity.

This worldwide trend I mentioned has been documented in reports by the OECD, where they survey regulatory practices around the world.

Where did this idea come from? It has many parents, as many good ideas do, but one of the most important people to champion the idea was a young Harvard law professor named Stephen Breyer in his 1982 book, “Regulation and Its Reform.”

What are the advantages of a performance standard?

Well, the first and most basic advantage is it reduces the compliance cost to the company because of the firm has the flexibility to find the least-cost compliance methods for achieving the safety objective.

Second of all, the performance standard fosters innovation in the industry because it doesn’t lock in companies into any specific technology or labor practice. It allows innovation to occur over time as new opportunities are created.

And, third, it reduces the opportunities for what regulatory scholars call “rent seeking”—that is, the efforts of people who are inventors of a specific idea to try to persuade a regulator to mandate their specific tool or technology or practice rather than allowing competition to occur over time. So we don’t want to create a regulatory system that invites a lot of this rent seeking.

There are practical issues in making sure that performance standards work properly. The key premise is you must have a workable means of measuring performance, and the system must have two capabilities: You have to be able to distinguish performance of two different companies so you can say, “This company is

performing better than that company,” and you also must be able to distinguish performance over time with the same company. “This company was out of compliance; then they came into compliance.”

You must have a performance system that can accomplish these. If you don’t, then you don’t have any way to keep legally accountable the firm for its compliance. So you do have important obligations to design a performance system that can work.

Now, let me go further to risk-based performance systems. And here we are measuring adverse safety events directly, usually in terms of number of crashes, injuries, or fatalities.

But sometimes these events are so rare you can’t actually do a performance system using this data because they don’t happen frequently enough. In those cases, we use mathematical models and risk analysis that simulates safety events.

We often utilize data not just on the adverse events themselves but on the near misses, like in the famous airplane context. We track near misses as well as actual crashes. So these models we are looking at can then be used to include information about fatalities, injuries, accidents, but also near misses.

So in my written testimony, I make several suggestions to move along in the pathway toward more performance-based standards.

The first idea I put on the table is to amend prescriptive standards in a general way to permit alternative compliance mechanisms that achieve at least the same degree of safety protection as does the prescriptive standard. This is sometimes called an equivalency clause because the company needs to demonstrate that they can accomplish the same equivalent level of safety with this alternative method of compliance.

The burden of proof is placed on the company to show that they can provide equivalent safety. And there has to be a workable plan of inspection and enforcement that is embedded in an alternative compliance approach.

The agency, when they receive an alternative compliance plan, has an obligation to respond publicly to whether they are going to approve it or disapprove it. And, of course, that is subject to judicial review under something like the arbitrary and capricious test.

The second suggestion I make is that new regulations should be performance-based whenever possible, but even when they are not, you should include that equivalency clause that allows the industry to innovate and suggest better alternatives.

And, third, we have to keep in mind that our regulatory staffs in many of our agencies, they have not been trained in the performance- and risk-based approaches I am talking about. We will need to have some funds for staffing of people in regulatory agencies that get them up to snuff to do this type of work.

Thank you very much. I look forward to the comments and questions.

[The prepared statement of Mr. Graham follows:]

PREPARED STATEMENT OF JOHN D. GRAHAM, PH.D., DEAN, SCHOOL OF PUBLIC AND ENVIRONMENTAL AFFAIRS, INDIANA UNIVERSITY

My name is John D. Graham. I am Dean of the School of Public and Environmental Affairs, Indiana University (Bloomington and Indianapolis). From 2001 to 2006 I served as the Senate-confirmed Administrator, Office of Information and Regulatory Affairs (OIRA), U.S. Office of Management and Budget (OMB). Prior to serv-

ing at OMB, I was the founding Director of the Center for Risk Analysis at the Harvard School of Public Health (1990–2001). I have published ten books and hundreds of articles on topics related to regulatory reform, especially on topics related to health, safety, and environmental regulation. I earned my BA in economics and politics from Wake Forest University, my Master's degree in public affairs from Duke University, and my Ph.D. in public affairs from Carnegie-Mellon University. My doctoral dissertation was one of the early analyses of the benefits and costs of the automobile airbag.

My testimony today addresses a classic issue in health, safety and environmental regulation: whether a regulation should prescribe certain technologies, designs, practices and/or behaviors (“prescriptive standards”) or whether a regulation should compel achievement of a particular type and level of performance (“performance standards”), leaving the choice of compliance strategies to the discretion of the regulated entity (the “regulatee”) (Coglianese et al, 2002). Since the 1970s, when the law and economics literatures made a strong case for a focus on performance (Breyer, 1982), regulatory practice has shifted away from prescriptive rules toward performance-oriented standards, but the trend is faster in some fields of practice than in others. The trend toward performance-based approaches to regulation began in the United States but is now a global trend (Shapiro, 2013). In the diverse world of transportation regulation, regulatory practices vary considerably, not just between agencies but from regulation to regulation.

The Case for Performance Standards

Performance standards have several advantages over prescriptive standards (Mannan, 2012). I offer a concrete illustration of each advantage below.

First, a performance standard tends to be less costly to the regulatee because the regulatee has the flexibility and the incentive to find the least-cost method(s) of compliance. Under the Clean Air Act, EPA shifted from a mandate of pollution-control equipment (*e.g.*, scrubbers) to numeric emission limitations on powerplants. When given the flexibility of a sulphur-dioxide emission limitation (instead of a prescriptive standard), some owners of powerplants found that it was less costly to shift from high-sulfur to low-sulfur coal than to install expensive and energy-consuming scrubbers.

Second, a performance standard is more receptive to industrial innovation because the standard is not written to mandate certain technologies, designs, practices and/or behaviors. When a prescriptive standard requires that safety be accomplished by human labor, it discourages industry investment in labor-saving technologies that achieve the same safety outcome without human labor. Given the possible future of safer, driverless cars, it may be unwise for NHTSA to craft prescriptive regulations that presume that a licensed human being is driving the vehicle. A similar issue arises in freight safety regarding the optimal number of crew in the cab and the prospect of future implementation of automatic speed control technologies.

Finally, opportunities for “rent-seeking” (the inappropriate use of regulatory power to benefit some technologies/firms over others) may be curtailed when standards are defined objectively in terms of performance. If a regulator is permitted or inclined to prescribe specific technologies, there will be a temptation on the part of suppliers of safety equipment to lobby the regulator in ways that ensure that their type or brand of equipment is prescribed in the standard. A performance standard does not eliminate the incentives for rent seeking but it may diminish them since the standard is not defined in terms that specify a particular design or technology. Elsewhere, I have written about how lobbies favoring the electric car have succeeded in biasing recent regulatory systems in favor of electrification as opposed to other effective ways of improving fuel economy and reducing greenhouse gas emissions (*e.g.*, conventional hybrid engines, such as used in the Toyota Prius, and the clean diesel engines now marketed by German vehicle manufacturers) (Graham et al, 2014). The same lesson applies to requirements, such as inspection technologies, in the pipeline, trucking, railroad and maritime industries.

When Performance Standards are Impractical

There are situations when it is not feasible or practical to devise a performance standard, usually because a viable system of measuring performance and inspecting firms/products for their performance is not available (Metzenbaum, 1998). In order to be feasible, a performance-based system must be capable of distinguishing the performance of one firm versus another and must be capable of documenting changes in a firm's performance over time. Without firm-specific measurement capability, a regulator cannot hold firms legally accountable for performance.

A performance-based system must also be practical in the sense that it can be coupled with an inspection/enforcement system that can determine which firms are

in compliance and which are out of compliance. Since some companies are not averse to breaking the law when enforcement systems are weak, a performance standard must be framed in ways that inspection and enforcement systems can detect and deter violators.

One of the purported strengths of the prescriptive standard is that it can be framed in ways that facilitate inspection/enforcement (*i.e.*, an inspector may have a checklist of hardware or operational practices that he or she uses to determine whether a facility or product is in compliance with the standard). However, in order to have knowledge that specific hardware and operational practices are safer, a regulatory agency presumably has access to performance-related data. The question becomes whether such data can be utilized to inform a practical performance standard.

When the outcome of interest can be measured continuously on a day-to-day basis (*e.g.*, emissions from a smokestack), a performance standard is clearly feasible. When the outcome of interest is extremely rare and potentially catastrophic (*e.g.*, a meltdown of a nuclear reactor), it is not practical to define performance by measuring directly the frequency of meltdowns. A similar situation exists with low-probability mishaps involving transport of hazardous materials.

In the nuclear sector, it is practical to use as a performance measure a precursor of meltdowns such as the frequency of reactor shutdowns. In airline safety, performance-oriented analyses focus on near misses as well as actual crashes. My understanding is that FRA and the railroads have launched a pilot program called confidential close-call reporting that is similar to the concept of near misses (FRA, 2015). In my opinion, this is a constructive development.

Using Risk Analysis to Inform Performance Standards

When events are rare in frequency, the tools of risk analysis can be employed to define performance standards. With risk analysis, a predictive mathematical model is used to estimate the probability of an adverse event as a function of the technologies, designs, practices and behaviors observed in the industry (NRC, 2013). The inputs to the model are based on historical data, known physical/biological/behavioral relationships, and expert judgement. The performance standard might be defined as a threshold probability of the adverse event (*e.g.*, a small probability of an airplane crash, since zero probability is infeasible).

Compliance with the performance standard is demonstrated when the firm shows the regulator that, given the inputs at their firm, the predicted probability of an adverse event is below the threshold probability (“safety”) specified by the regulator. Some companies might comply with the safety threshold through investments in technology; others may invest in superior training programs for their employees. In either case, the firm must be able to show, through risk analysis, that their compliance approach meets the risk-based standard specified by the agency.

When predictive models of risk analysis are used in performance regulation, it is common for regulatory agencies to offer technical guidance to companies on how the models should be constructed, tested, and validated. Default values for certain inputs may be specified by the regulatory agency, unless a firm can supply valid data to support an alternative value. When a company submits their risk analysis, using the template suggested by the regulatory agency, it may be appropriate for the company to subject their analysis (choice of inputs and calculations) to independent peer review by qualified experts in the field. Alternatively, the regulatory agency may organize its own peer review processes, on the guidelines for models or on the risk analyses submitted by specific companies. In order to rely less on prescriptive standards, greater use of risk analysis may be required in the pipeline, trucking, railroad and maritime industries.

Suggestions to Accelerate the Trend Toward Performance Standards

My experience in regulatory reform around the world suggests that there is growing recognition of the value of performance-oriented approaches to regulation. In order to accelerate the trend toward performance standards, I suggest three directions for Congress and Federal regulatory agencies.

1. All prescriptive standards should be amended to permit alternative compliance mechanisms that are supported by performance information and achieve at least an equivalent level of protection.

When a regulatee can make an analytically rigorous case that an alternative compliance strategy provides at least equivalent safety performance to a prescriptive standard, the regulatee should be permitted by the agency to pursue the alternative strategy, subject to an inspection/enforcement regime that is established with the alternative strategy. Even if a regulatory agency cannot imagine a viable alternative

compliance strategy, rules should be written to permit regulatees to propose alternative compliance mechanisms, since specialists in industry may be able to innovate in ways that regulators cannot anticipate.

Given the large number of prescriptive standards that have already been codified at numerous regulatory agencies, it would take decades to amend each of the standards on a rule-by-rule basis. A better approach would be for Congress, in a generic regulatory reform statute, to authorize—at any health, safety or environmental agency—alternative compliance mechanisms that achieve at least the same amount of safety performance as the prescriptive standard. The language I am referring to is sometimes referred to as “an equivalency clause” because the regulatee is obliged, with their alternative compliance methods, to accomplish an equivalent level of health, safety or environmental protection. The evidentiary burden of proving equivalent safety protection should be placed on the regulatee but, in the event that an agency declines to permit alternative compliance, the agency should be required to state its reasons publicly, and the agency’s decision should be reviewable in Federal court under the “arbitrary and capricious” test. That test provides a measure of deference to the agency’s judgment, which I think is necessary to assure public confidence in the system.

With regard to new rulemakings, performance standards should be preferred whenever possible. If new prescriptive standards are enacted, they should be coupled with permission for regulatees to propose alternative compliance mechanisms that achieve equivalent protection.

2. When new safety regulations are proposed, agencies should be required to include, in their regulatory impact analyses, a plan for how they intend to evaluate the regulation after it is implemented.

The term “retrospective evaluation” is often used to describe the process whereby agency analysts evaluate how effective a safety rule has been after the rule is enacted. Regardless of whether the rule is prescriptive or performance based, the agency should describe what data they plan to collect and how they intend to analyze the data. My experience is that, if an agency does not know how they would evaluate a new rule, after it is implemented, then OMB and the regulated community should begin to ask hard questions about whether the resources invested in the rulemaking might be better invested elsewhere.

3. Congress should provide additional resources to Federal regulatory agencies for training in modern methods of performance assessment and risk analysis, so that agency personnel can transition more rapidly to the world of performance-based regulation.

Many of the professional staff at Federal regulatory agencies have extensive experience with prescriptive regulation but little to no experience or training related to performance measurement or the development of performance standards. The need for training in risk analysis is particularly acute because many of the existing regulations that are prescriptive address low-frequency adverse events, the types of situations where direct measurement of performance will not be feasible. In order for those rules to be redrafted as performance standards, the analytic tools of risk analysis will be required.

The cost of this suggestion is not large, as intensive courses in risk analysis for mid-career professionals have already been developed and are offered by the Society for Risk Analysis (SRA), a mission-oriented association of 2,000+ engineers and scientists. SRA is a nonprofit group dedicated to enhancing the application of risk analysis methods in government and industry.

In summary, the trend toward performance-based approaches to regulation is evident throughout the world (Coglianese, 2012). The advantages of performance standards are intuitive and compelling. If Congress does not act, Federal agencies will move in this direction but progress will continue to be slow and uneven. I have made three suggestions for legislative action that may accelerate the replacement of prescriptive standards with performance standards.

Thank you for your time and attention, and I look forward to questions and comments about my testimony.

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Senator FISCHER. Thank you.
And, Dr. Sweatman, welcome.

**STATEMENT OF DR. PETER SWEATMAN, DIRECTOR,
UNIVERSITY OF MICHIGAN TRANSPORTATION
RESEARCH INSTITUTE**

Mr. SWEATMAN. Chairman Fischer, Ranking Member Booker, and members of the Subcommittee, thank you for the opportunity to testify today about the 21st-century role of performance measurement in our Nation's surface transportation system.

And thank you, Senator Peters, for the kind introduction and for making a special effort to be here today.

The University of Michigan created a new transportation ecosystem of global companies to launch the Michigan Mobility Transformation Center to help revolutionize mobility through connected and automated vehicle technologies. I also chair the ITS America Leadership Circle, and I am representing them here today.

MAP-21 made reforms to create a more performance-based transportation system, covering safety, state of good repair, traffic congestion, and freight movement. To implement these reforms, state and local transportation agencies require access to better tools, including ITS—intelligent transportation systems—to measure and to operate.

As this committee considers ways to improve the nation's freight network, we encourage funding eligibility and an increased Federal share for projects that incorporate new and innovative technologies—that is, freight-related ITS.

But we must look ahead. The advent of connected vehicles, or V2X, automated vehicles, and big data will redefine performance measurement. Success in deploying more powerful technologies will drive the volume and relevance of available data. Metrics, therefore, need to become less prescriptive, allowing the operator to use the most powerful measures. The technology will ensure that the most powerful measures are also the most available measures.

The starting point for technology-driven performance is safety, with over 33,000 fatalities and 2.3 million injuries on our Nation's roads each year. Transportation Secretary Anthony Foxx has said that V2X technology represents the next generation of auto safety improvements.

A smart corridor is being deployed in Michigan by the Michigan Department of Transportation, Ford, and General Motors. General Motors CEO Mary Barra announced cars equipped with V2X technology starting in the 2017 model year.

V2X technology will unleash innovation, from crash-avoidance safety, advanced traffic management systems, and on-demand services to real-time traffic, transit, and parking information, and countless new transportation applications.

V2X communication utilizes the 5.9 gigahertz band of spectrum set aside by the FCC. We need that band for safety. There is no substitute. The FCC should not open up the 5.9 gigahertz band to unlicensed devices without vigorous real-world testing.

The 21st-century performance of the nation's transportation system depends squarely on V2X. Transportation companies, manufacturers, consumers, and agencies will be able to select the most relevant performance data and take performance measurement to a completely new level.

How do we get there?

The ITS Joint Program Office must be equipped for deploying V2X, as well as increasing vehicle automation, big data, and other next-generation technologies. We propose that the U.S. DOT's ITS research program be authorized at the administration's requested levels of \$158 million in 2016 and \$935 million over 6 years.

We recommend the authorization of funding for automated and connected vehicle technology corridors and pilot programs.

We recommend that a cross-agency automated vehicle research initiative be established within the ITS Joint Program Office to conduct collaborative research with private industry, state and local agencies, university research centers, and national labs.

And we propose that a 21st-century Transportation Data Center of Excellence be established in the form of a partnership between the U.S. DOT, the automotive industry, and research universities. This center should carry out data fusion and analytics for transportation performance and measurement, concentrating on the innovative use of ITS, V2X, and automated vehicle data.

We encourage U.S. DOT, as well as the states, to review existing automotive and commercial vehicle safety standards, regulations, and policies. We need to remove unintended barriers to the operation of connected and automated vehicles. And we need to ensure that the data flowing from the new technology is fully admissible for performance management.

Right now we have the opportunity to shape the future performance of our Nation's transportation system. That future is determined by technology and will be measured by technology.

Thank you again for this opportunity, and I look forward to your questions.

[The prepared statement of Mr. Sweatman follows:]

PREPARED STATEMENT OF DR. PETER SWEATMAN, DIRECTOR, UNIVERSITY OF MICHIGAN TRANSPORTATION RESEARCH INSTITUTE

Chairman Fischer, Ranking Member Booker, and Members of the Subcommittee: thank you for the opportunity to testify today about the 21st Century role of performance measurement in our Nation's surface transportation system.

My name is Peter Sweatman, Director of the University of Michigan Transportation Research Institute, or UMTRI.

The University of Michigan created a new transportation ecosystem of global companies to launch the Michigan Mobility Transformation Center (MTC), to help revolutionize mobility through connected and automated vehicle technologies.

I also chair the ITS America Leadership Circle.

Encouraging Innovation to Meet Performance Management Goals

MAP-21 made reforms to create a more performance-based transportation system. Covering safety, state of good repair, traffic congestion and freight movement.

To implement these reforms, state and local transportation agencies require access to better tools—including ITS—to measure and to operate.

Congress should ensure that ITS technologies are eligible within all the core highway formula programs and that a higher Federal match is made available.

As this Committee considers ways to improve the Nation's freight network, we encourage funding eligibility and an increased Federal share for projects that incorporate new and innovative technologies—freight-related ITS.

But we must look ahead. The advent of connected vehicles (V2X), automated vehicles and big data will redefine performance measurement. Success in deploying more powerful technologies will drive the volume and relevance of available data. Metrics therefore need to become less prescriptive, allowing the operator to use the most powerful measures. The technology will ensure that the most powerful measures are also the most available measures.

Performance, Driven and Measured by 21st Century Technology

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Advancing ITS, Big Data and Automated Vehicle Research

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We encourage U.S. DOT, as well as the states, to review existing automotive and commercial vehicle safety standards, regulations, and policies—we need to remove unintended barriers to the operation of connected and automated vehicles on public roadways. And we need to ensure that data flowing from the new technology is fully admissible for performance management.

Right now we have the opportunity to shape the future performance of our Nation's transportation system. That future is determined by technology, and will be measured by technology. V2X, automation and 21st Century data represent the path to that future.

Thank you again for this opportunity, and I look forward to your questions.

Senator FISCHER. Thank you, Doctor.

My Ranking Member is on an especially tight schedule today, so I would recognize Senator Booker to begin the questioning.

Senator BOOKER. I am so grateful for that, the generosity of allowing me to go quickly and go first.

Real quick, Dr. Graham, I really enjoyed your testimony, and so did my staff, your written testimony. And so let me just jump in real quick, if I can use 2 minutes, and then go to the Under Secretary on another topic.

So performance-based regulations obviously can have positive impacts, and you indicated that a lot. But there are a lot of concerns that are raised that, in some instances, performance-based regulations could have unintended consequences, especially when it comes to safety. And, for example, concerns have been raised about performance-based regulations could result in largely self-regulated industries with limited oversight.

And just for the record, can we drill down? As performance-based regulations are considered, how can we ensure that the proper oversight continues? And are there other concerns that exist with transitioning to a performance-based system of regulation?

Mr. GRAHAM. Great question.

In a performance-based system, each company that complies, they have to lay out what their compliance methods are, and then those are then inspected and enforced by the agency in the same way that a prescriptive standard is enforced.

So, in terms of the ultimate oversight, the process is not different. There have to be specific practices, technology, or whatever that is used to achieve the standard.

Senator BOOKER. Great.

And you made a very good point. I think both Chair Fischer and I were appreciative of the suggestions you made. And so part of that has to be the people that are providing the oversight, the regulators themselves, would need specific training.

And can you be a little bit more specific on what you think the regulators themselves have to be trained up on?

Mr. GRAHAM. Yes. So there is a professional society, the Society for Risk Analysis, that has existing training programs on how to use risk analysis methods for situations where the frequency of the adverse event is very rare but the adverse consequences are really bad.

Senator BOOKER. Right.

Mr. GRAHAM. OK? And a lot of these modal agencies, they have situations where they have safety concerns but they don't happen that often. They need to use risk analysis tools to develop a performance standard.

Senator BOOKER. So micro fissures in rail lines, for example. There is a lot of incentive financially not to do all the requirements because they are so rare, and when they happen, the industry—

Mr. GRAHAM. Then they are pretty bad.

Senator BOOKER.—says, "My bad."

Mr. GRAHAM. Right.

Senator BOOKER. And so you need to figure out some way to make sure that the appropriate steps are being taken. Correct?

Mr. GRAHAM. Correct.

Senator BOOKER. Great.

Mr. Under Secretary, just jumping real quick to an issue. You know, I have lots of concerns, 16 months down here, that the Fed-

eral Government doesn't seem to be moving at the pace of innovation, whether it is the backlogs at the Patent Office, whether it is FDA approvals. All of these things are growing in my frustration. I look forward to a hearing later today about drones.

But just going to ask you a quick question about autonomous vehicles. This is exciting to me. I am encouraged that the NHTSA is conducting research on automated vehicles and would be interested to know what further steps DOT plans to take to unleash what could be incredible benefits of this technology.

Mr. ROGOFF. Well, Senator Booker, our principal role, in addition to just trying to be as helpful as we can to all of the players in this very creative and important space, is to ensure the safety of whatever technologies emerge. And they are very dynamic technologies that could yield very different solutions.

It does yield itself, in many ways, to a performance-based approach. But I think, importantly, there are also concerns as it relates to cyber hacking and the security of an autonomous vehicle system. We are working carefully not just within the DOT but with other agencies, including NIST, the FBI, others, to make sure that whatever system is stood up is safe for the drivers and is resistant to hacking.

I have to say, I have an 84-year-old mother who is still on the road. Autonomous vehicles can't come fast enough for me because I worry about it all the time. But we will all be 84 at one point, and autonomous vehicles hold the promise for keeping us all on the road.

Senator BOOKER. Well, there is a saying, "b'ezrat hashem" that we all get to be 84.

Thank you very much, Chairman.

Senator FISCHER. Thank you, Senator Booker.

Mr. Under Secretary, we know that MAP-21 required the DOT to include performance standards for a number of programs and grants that are related to project funding. In fact, these performance measures follow the GAO recommendations to provide a strong foundation for holding grant recipients responsible for achieving those objectives and measuring those performances.

What steps is the DOT taking to progress toward performance targets for regulations? And can you provide us some examples, please?

Mr. ROGOFF. Well, sure. Let me talk a little bit about our performance measures that we are doing in MAP-21, and then let me talk about some of the things we are doing in other modal agencies.

As Mr. Nichols pointed out, we are along a progression right now in working with our state partners to establish for the first time in the Federal aid highway program performance measures that will be accountable by state. We are at various levels of development. We have NPRMs out on two of them. A draft NPRM is coming out on another one. We are in a comment period on a fourth.

We have wanted to work very closely, exhaustively frankly, with our states, because we need to have buy-in by all of them as to the system we are using. We are making good progress, not as quickly as some of us, or all of us, maybe would like, but we are going to get these implemented, and then we are going to have buy-in when we do.

In other agencies, I think we are making very good progress in certain areas that really lend themselves to performance-based approaches. Within the FAA, when it comes to general aviation, the FAA is about the business of rewriting the whole Part 23 aviation code as it relates to safety measures related to smaller aircraft.

Within the Federal Railroad Administration, individual railroads are being asked to produce risk-reduction plans that are all about the performance rather than any specific metric that they need to accomplish.

And one I am particularly fond of and proud of—earlier in the administration, I served as the Federal Transit Administrator, and we successfully got MAP-21 to include transit safety authority for the department. It overcame a prohibition that had been in law since 1964. This really lends itself to a performance-based approach because we are not burdened with several decades of legacy regulations that have been in place. We are starting with a clean slate, developing regulations for the first time, which is a great and rare opportunity to be performance-based from the get-go. And that is what they are doing at the FTA.

Senator FISCHER. In your past life as the FTA Administrator—you have just spoken about that—how do you compare the FTA's approach to safety to the FRA's approach?

Mr. ROGOFF. Well, the approaches are very different. Like I said, one has many decades of prescriptive measures that have been in place and have also, like I said earlier, made for the safest year on record in 2014.

FTA is dealing with a hugely more diverse universe of operators. Light-rail systems are not identical, whereas commuter rail systems largely are. They also, in the transit safety account, use different bus rapid transit and standard bus processes.

Transit is an extraordinarily safe mode of transportation that can be made even safer. And they have what Dr. Graham referred to as the risk of very rare but very catastrophic potential events, as we discovered in the Washington Metro incident in 2009.

So we are coming at it from a risk-reduction approach, and FRA is moving in that direction. But FRA also has a more uniform set of users in the form of the freight railroads and the commuter railroads.

Senator FISCHER. Do you think if the FRA was granted that safety authority today, would they still be regulating the same way they are? Would it change because of where we are at today compared to when these regulations were put in place?

Mr. ROGOFF. I think the FRA has, frankly, the ability, should it choose to move to a performance-based approach—

Senator FISCHER. You think they have—

Mr. ROGOFF. I believe—you know, I would want to review this with counsel's office, obviously, but I am not sure that—I mean, in certain areas, they have prescriptive rules that are in the statute. If you really wanted to move away from those rules, you would have to unwind them legislatively.

But I think in other ways, in other areas, we see FRA moving to a more performance-based approach, as I said, in these risk-reduction plans that they are having all of the railroads put together.

So I think progress can be made. As I said in my opening statement, it needs to be made carefully. You don't want to move to a performance-based standard until you at least know it is as safe. And that requires, as many of the witnesses pointed out, a lot of data collection, a lot of analysis, and willing partners to have all of their data be transparent. Absent that, we can't make progress.

Senator FISCHER. And we need to encourage people to be willing partners, wouldn't you agree?

Mr. ROGOFF. Absolutely. You can't get there without them.

Senator FISCHER. OK. Thank you.

Senator Wicker?

Oh, I am sorry. Senator McCaskill was here first.

Senator McCaskill?

Senator MCCASKILL. Thank you.

Mr. Nichols, in your testimony, you indicated that it is great to talk about performance management, and we all want performance management. I am a big believer in performance metrics. As you may remember, back, I instituted performance auditing—

Mr. NICHOLS. Yes, ma'am.

Senator MCCASKILL.—in the state of Missouri when we had never had performance auditing before.

But you also point out that it is a little bit like us talking a lot about an infrastructure bank without telling people that the money in the bank comes from tolling if we just talk about performance metrics without talking about funding.

Can you speak to the challenges that you are facing at the state level with the uncertainty of our fits and starts of funding of highway transportation from Washington?

Obviously, we have a deadline approaching in May, and I would like the consequences of us embracing another 6-month extension as opposed to what used to be noncontroversial around here, which was a multiyear, at least level spending amount for our Highway Trust Fund.

Mr. NICHOLS. Thank you, Madam Chairman and Senator. Again, great question.

And to begin with, performance management, as you know, is a process as much as it is a product and a tool. And it is a culture that one develops because we have to prioritize the very limited resources that we have so that we are focusing on achieving results that make a difference in specific areas. Again, I mentioned seven tangible results. I think we have provided a copy of our Tracker, and it is really our performance management document that we use to do our business with.

Things like safety—we have talked so much about safety here. But it is also about system condition, congestion relief. We have talked about freight, we have talked about ports, and all those different things of business that we do in our state. There is not enough money to take care of all of the needs that our customers are asking us to achieve.

So what we are doing with performance management, through an enterprise risk-management system, I will mention, as Dr. Graham talked about also, is prioritizing where those limited dollars go to achieve the most benefit of the results out of them.

And, obviously, the singular focus is safety and reduction of fatalities, which we have made progress on but not enough progress. You know, one fatality is one too many.

The issue of the national funding issue that we have—and, obviously, I speak for all of AASHTO and all the states, and that is that we do need a sustainable funding program, a long-term bill, for lots of reasons, which I won't take a lot of your time today, but it does provide us the time to do the planning, the long-term planning on our projects.

Because we are in fits and starts, and we need that time to get our projects ready. And we are always on this precipice of providing construction projects and then the funding stopping and then we are going to have to stop or prevent a project from moving forward, anywhere in our country.

Many states have reduced their highway programs just because they can't predict where the Federal funds are going to be after May 31 of this year. And so it is a big challenge that all of us are facing.

Senator MCCASKILL. Have we put a price tag on that, when we have to stop a project because we can't get our act together out here and get multiyear highway funding done? Has nationally, if any of you are aware, or if we have in Missouri put a price tag on what that is costing us in terms of these projects and costs going up because of delay and so forth?

Mr. NICHOLS. There is an increase. I do not have that number, and we can provide a number like that. But, obviously, the impact of contractors stopping their work and having to restart; closing out a project costs money for a contractor, or a consultant who is doing the engineering work for us also. So there is an impact to the restart of a project once it gets tabled or shelved.

Senator MCCASKILL. What is the—

Mr. ROGOFF. Senator McCaskill, I—

Senator MCCASKILL. Yes?

Mr. ROGOFF.—would just add one thing, because we have an added concern at the department that even goes beyond just the mechanics of the contracting. And that is that, having gone through 32 short-term extensions now to date, communities are really losing their ambition and their vision to actually make things better.

How do you actually plan for a major bridge replacement project that could take anywhere from 3 to 5 years if you don't know if the Federal Government is going to reimburse you 8 months later? And that is what people like Mr. Nichols have been put through now for a number of years. Even MAP-21 was only 2 years long.

That is why the administration is putting forward a 6-year bill, fully paid for with substantial growth, to provide that certainty as well as provide the level investment, where conditions might actually improve.

Senator MCCASKILL. Well, let me ask this awkward question so that we can make sure we don't forget that we have work to do in Jefferson City, as I indicated when I welcomed you.

Let's assume that something invades this place called "common sense" and we get a multiyear surface transportation bill done that will allow the kind of vision and planning that will make these

projects cost-effective and real to the states. Will Missouri have the resources to cost-share?

Mr. NICHOLS. No, ma'am. It is even worse than that, Madam Chairman—no, ma'am. We will not. In our state, Fiscal Year 2017, assuming that there is a solution for transportation funding, whether it is a continuing resolution or a new surface transportation act at the Federal level, at the existing funding levels we will not even be able to match the Federal funds that are coming in today.

So it is a big challenge that we are facing at the state level in Missouri, and it is quite common around the country right now.

Senator MCCASKILL. Well, I hope people in Missouri figure this out before the legislators in Jefferson City consider another tax cut. Thank you, Mr. Nichols.

Senator FISCHER. Thank you, Senator McCaskill.
Senator Wicker?

**STATEMENT OF HON. ROGER F. WICKER,
U.S. SENATOR FROM MISSISSIPPI**

Senator WICKER. Thank you very much, gentlemen. Appreciate your testimony today.

I have a question about TIGER grants and maybe a way to expand this concept to the state level. And I want to give you an example.

There were three small counties in southwest Mississippi who came together in a project called TRI-Mississippi—Claiborne County, Jefferson, and Franklin County. They submitted a TIGER grant application, 2014, to fund the replacement of 22 failing bridges and to repair 40 miles of roadway. This grant was awarded to TRI-Mississippi, and through this project we were able to create, we believe, 262 additional jobs in an area that was highly distressed economically.

So, good news for these three small counties; bad news for the counties that submitted equally excellent applications and weren't chosen. In this system, we learn that nearly 6,100 applications have been submitted and only 343 receive funds. This represents a project award rate of less than 6 percent.

Last year's competition alone had applications requesting 15 times the amount authorized in the program. As one of our witnesses said, the needs are out there, and we are simply not meeting the needs.

Now, that is why Senator Booker and I have developed a state-based competitive grant program that you might call state-based TIGER or a TIGER-esque program for states. We introduced it last year; we have reintroduced it again this year in the form of the Innovation in Surface Transportation Act.

And so I would ask perhaps Mr. Nichols to comment about this but also Mr. Rogoff and discuss this concept of a certain portion of funds being set aside for competitive, merit-based applications so more of these local communities are able to utilize funds in a way where they could not possibly submit a match.

And, Mr. Nichols, I guess we will go with you first.

Mr. NICHOLS. OK. Madam Chairman, Senator, thank you again for the question.

I will begin with a perspective of at least from AASHTO, which, you know, all 50 states, plus Puerto Rico and D.C., and the perspective, obviously a formula-based distribution where the states have flexibility on the distribution of Federal funds throughout the state, whether it is on the state system, a city or county system of highways, and the multimodal aspect of how those funds can be used.

A formula base provides an opportunity for long-range planning. And that is utilizing our relationship with our more urban areas through the metropolitan planning organization processes and then in the rural areas with our regional planning commissions on the transportation planning process, that they can look out forward, just as we do on the state system, on what are the transportation needs on the system, whether it is on the state system or local system, that there is a—and then a prioritization process, which is what we do in Missouri through the formula funds that come through Missouri. So there is a, I say, a competitive process, but it is a needs-based process that we have in our state.

Now, the TIGER grant component of it—as the Under Secretary will mention, Missouri has been, I will say, moderately or modestly successful with the TIGER grant program. And we work very hard inside that program to be able to capture this grant system that is available for states and local systems to use.

I will mention that the TIGER grant applications are one of the few areas where we can take a multimodal approach, the entire transportation system, to solve a transportation network of problems in our state. And it has helped us in some areas on some projects that we would not be able to use, necessarily, our formula-based funds to do those projects.

So, with that, I will pass it to Under Secretary—

Mr. ROGOFF. Well, thank you, Senator Wicker.

I would echo what Mr. Nichols said and also echo what you observed, and that is that the demand for TIGER grants is overwhelming compared to the availability of funding, which is why in our GROW AMERICA Act we actually more than double available funding for TIGER. And even then, we will not come close to meeting demand.

And, importantly, as Mr. Nichols also pointed out, the TIGER program has really allowed us to rifle-shoot some dollars to some projects to get them in the ground quickly that are innovative, that are multimodal, that gets dollars directly to a local community, sometimes bypassing the state DOT, and also to achieve sort of unique goals, whether it is ladders of opportunity for people who have been disconnected or communities that have been disconnected from the economy or unique innovations. We would like to maintain that uniqueness and that innovative aspect of TIGER.

Now, our increase in funding and your proposal need not compete with one another. I think there is certainly room for both. But I think there is value in a Federal program, where we could disseminate best practices. And if Mississippi also wants to mirror that with a competitive, innovative program that can go to local communities, more the better.

Senator WICKER. Well, let me just say that the Wicker-Booker proposal is really gaining a lot of speed among local and county

governments. They see it as a way to meet a need that has not been answered in a number of years. And the national organizations that represent these local governments, they are collectively very excited about this.

So I hope we can work together. I hope we, because of the needs, we can get a bigger pot of money out there for all of us.

And I think, Madam Chair, we all support innovation and best practices, but a lot of these things are—these are just basically, you know, bridges that need to be replaced, roads that aren't sufficient. And I don't know how modernistic we can be about that. The roads and infrastructure are falling apart in this country, and local governments don't have the money to afford these.

So I will leave it at that.

I wonder if, since there are only two of us, Madam Chair, if I could ask one—

Senator FISCHER. Certainly.

Senator WICKER.—other line—

Mr. ROGOFF. Could I just make one just very quick observation, Senator? I don't want to use up your time.

Senator WICKER. Oh, it is already gone.

Mr. ROGOFF. OK.

There are some things—you are right, there are times in TIGER grants where we are replacing projects that might be eligible for funding with other funding sources. But there are others, especially in ports—we do not have a funded alternative grant program for ports. And one of the grants we made to Mississippi was to the Port of Pascagoula, and that couldn't have been done through any other program that we have.

So there are some unique aspects for TIGER that really lend itself toward not only continuation but expansion of the Federal effort, as well.

Senator WICKER. Well, when you mention the critical need for upgrading our ports and making us competitive internationally, you get an "amen" from me on that.

Dr. SWEATMAN, let me just ask you about this V2X technology and the testimony that you have about that. You mentioned the smart corridor in Michigan, and I found this very interesting.

At what point will this be practical not only on the new expressways but in getting vehicles on the secondary roads and actually to people's businesses and homes? That is my question about something this smart and something this interconnected.

Mr. SWEATMAN. That is a great question. Thank you very much.

Clearly, this technology will be deployed in vehicles. It also needs to be deployed to a certain level in the infrastructure. So we can achieve quite a bit with vehicle-to-vehicle communication, and, as I think we are aware, that kind of platform will be provided in vehicles through regulatory action in the future. But we do need to make sure that we have the support in the infrastructure. And what we are doing in Michigan is finding a business model where this makes sense.

So there is a lot of value to be gained by this kind of communication, not only for safety but for many other aspects, including saving energy and even transactions that can be undertaken from the vehicle.

So, as we move forward, what we are interested in in deploying this in Michigan is to create day-one value from this V2X system. So we need consumers to be excited about it. We have around 3,000 consumers in the City of Ann Arbor using this technology right now and seeing a lot of benefit. So we are expanding on that, so we are going to many thousands. But there are other programs around the country, in California, in Texas, in Virginia, and others, who are doing a similar program.

So we think these regional deployments are very important to show the benefits, but we definitely do need not only the technology in the vehicles but in the infrastructure. And we believe that that business model will be apparent so that this can be done. There will be an incentive for this deployment to take place.

Senator FISCHER. Thank you, Senator Wicker.

Senator Blumenthal?

**STATEMENT OF HON. RICHARD BLUMENTHAL,
U.S. SENATOR FROM CONNECTICUT**

Senator BLUMENTHAL. Thank you, Madam Chair.

Thank you all for being here today on this very important topic of safety, performance-based, prescriptive measures to achieve it.

I think there has been some discussion of the goal of reducing truck fatalities and injuries and crashes to help with safety on our roads, and an important factor in reducing crashes and fatalities is to help minimize fatigue in the trucking industry through hours-of-service regulations, which are prescriptive, not just performance-based.

Last year's appropriations bills stopped enforcement of two important provisions of the hours-of-service rule until the Department of Transportation completes a study which the inspector general will review.

And my questions for Mr. Rogoff are: Number one, what is the status of that study? And, number two, has the inspector general reviewed your plan for the study?

Mr. ROGOFF. The study is currently ongoing, Senator Blumenthal. And, indeed, the inspector general has reviewed the study and has reported out their findings to us. Based on our briefing, they saw no problems with our methodology. I believe they also will be briefing the Committee in short order, if they have not already.

But we obviously thought the provision in last year's appropriations bill was misguided, but we are following the strictures of the law to make sure that we fulfill the statutory responsibility to bring a fresh look to this question.

Senator BLUMENTHAL. I joined you in the view that the provision was unfortunate, and "misguided," I think, is probably a good word for it. I am hoping that the department is taking steps to ensure that the drivers who are selected for the study are sufficiently representative or the sample sufficiently accurate to produce results that are statistically significant.

Mr. ROGOFF. We are working hard to do so, as is the contractor.

We do have a challenge, I should tell you, because the number of drivers that are actually likely to be subject to the restart requirements is a very small population. It is probably no more than

15 percent of the drivers that are out there. These are drivers that are driving more than 60 hours in 7 days or more than 70 hours in 8 days. And in order to find a sample where we could do an adequate comparison will be a challenge.

But our contractor is on it, and we are seeking to help them. And we are getting help from trucking companies around the country that are willing to participate.

Senator BLUMENTHAL. How soon do you anticipate the study will be done?

Mr. ROGOFF. The goal is to get it done by the end of the year. But, as with all of these things, we are going to get it right before we get it out, so I wouldn't want to be pinned to a timeframe. But please know our goal is to get it out before the end of the year.

Senator BLUMENTHAL. Well, thank you for your work on this issue. And please thank Secretary Foxx for his attention to all of the safety issues that I think are so important to the confidence and trust of drivers but also riders of the rail, where safety and reliability is a continuing challenge and where, in my view, the Federal Railroad Administration must issue rules and regulations that have been recommended by other agencies, as you well know. And I am hopeful that those regulations will be issued, because the law mandates they be issued.

And we can debate prescription, performance. In some ways, the semantics matter very little to the average American passenger on our rails or driver or rider on our roads, because the prescriptions—I don't know whether you would agree—for mandated technologies like seatbelts and airbags and electronic stability control, roof crush resistance, side-impact protections, all are saving lives. Whether you want to call them performance-based or prescriptions, safety demands that the government intervene and mandate measures that will save lives.

Mr. ROGOFF. I think those are very good examples, Senator Blumenthal, because it points up the fact that it is not necessarily an either/or. We have what are sometimes called parametric rules, which are kind of a combination of prescription and performance.

You used the example of seatbelts and airbags and roof crush standards. That is true, we have those more prescriptive standards, but we also have just an overall crash-worthiness standard or a rollover standard, something Dr. Graham worked on when he was at OIRA, that is performance-based.

So it is a combination of—we have required three-point seatbelts for decades, but we still leave to the automobile manufacturer the choice of how they want to design their vehicle to meet the crash-worthiness standard.

Senator BLUMENTHAL. Thank you.

My time has expired, but I want to thank every one of you for your being here today and for the excellent work that you are doing on this cause.

Thank you, Madam Chair.

Senator FISCHER. Thank you, Senator Blumenthal.

Senator Klobuchar?

**STATEMENT OF HON. AMY KLOBUCHAR,
U.S. SENATOR FROM MINNESOTA**

Senator KLOBUCHAR. Thank you so much, Madam Chair.

Thank you to all of you for being here.

I guess I will start with you, Mr. Rogoff, who has come to our state many times. Thank you. And I know you have been to our metropolitan area for some really good projects that the department has helped fund.

I want to just ask you a little bit about another part of our state; it is the rural area. About 27 percent of people in our state live in rural areas, but almost 70 percent of the motor vehicle deaths occur in rural areas.

And that is why I have a bill with Senator Sessions to have the department study high-risk rural road best practices. It was included in MAP-21. And the report identified challenges that local governments face when planning for and implementing strategies to improve safety on rural roads.

Mr. Rogoff, as we look to build on this report, what are your thoughts on what we should be doing to make rural roads safer?

Mr. ROGOFF. Well, thank you for the question, Senator.

We actually have an initiative and are very focused on just that point, because those figures in Minnesota are mirrored in other states across the country, namely that some of the highest-risk roads are the least traveled but they are also sometimes the least attended to when it comes to engineering safety improvements.

Mr. Nichols in Missouri lives this and breathes this every day.

Senator KLOBUCHAR. I saw him nodding his head in a very nice, Midwestern—

Mr. ROGOFF. And we actually, in our GROW AMERICA Act, quite deliberately boost funding specifically to states to tackle that rural road problem.

Certainly, even at the increased funding levels in our bill, it is not enough to complete the problem. Some of the issues are in the area of technical assistance because, as was pointed out earlier by Senator McCaskill, some of these most dangerous roads are county roads. But that doesn't make them any less fatal or any less of a concern to all of us.

Senator KLOBUCHAR. Exactly.

Mr. ROGOFF. So we need to kind of pierce through that and make sure they are attended to.

Senator KLOBUCHAR. Then the other thing I have been working on, which is a rural issue, also a metro issue, but that is the distracted-driving issue, something that Secretary LaHood made a priority and I know that Secretary Foxx has continued.

And right now, the way this works, too few states are receiving the funding. In 2014, and this is our grant programs, only one state received the funding, the state of Connecticut.

Mr. ROGOFF. That is right.

Senator KLOBUCHAR. They are smaller than our states, geographically; that is all I will say. And we think it is important that we be able to have those funds go out, as we are seeing these extraordinary number of deaths from distracted driving.

And Senator Hoeven and I have introduced a bill which would make it easier for some of the grant funding, and I am hoping that

we can include that. And I know the agency can't do anything about it until we include that change. But I am really making a pitch here that we put that in the transportation bill. And I am hoping Senator Thune and Senator Nelson, staff here, will listen, as well as Senator Fischer, so we can get that done. And just a point there.

Mr. ROGOFF. Well, we applaud your effort.

We actually have in the GROW AMERICA Act and will again when we submit it shortly a provision to try to free up those dollars and put them to work in a broader number of states. We sort of establish a two-tier system, where part of that money will go to the states that have made adequate progress to date, while still leaving funding for an incentive for states to do even more.

Senator KLOBUCHAR. Very good.

Mr. ROGOFF. But you are right, the challenge of it only going to one state resulted from the new requirements that were put into MAP-21, and it did freeze up a lot of money, such that only one state qualified.

Senator KLOBUCHAR. Yes. We will just not tell Senator Blumenthal that we are bitching a little bit.

Mr. ROGOFF. Oh, you know. He is not in the room.

Senator KLOBUCHAR. Exactly. Well, I am sure they will still qualify, because we want to extend it.

I wanted to last ask you about the Recreational Trails Program. I worked hard with several of my colleagues to ensure that the Recreational Trails Program was preserved in MAP-21. As you know, it is the foundation for state trail systems across the country. It provides support to states to construct and maintain thousands of miles of trails for both non-motorized and motorized users. And it is actually a nice coalition of both bicycle, cross-country skiers, people who have ATVs and all kinds of motorized vehicles as well, snowmobiles.

So I want to get your thoughts on the RTP program and its importance to trail users. Obviously, that is something else we are going to be working on in the transportation bill.

Mr. ROGOFF. We do support the extension of the Rec Trails Program. And, importantly, we also have sought additional funds in our TIGER program, through which we have funded a great many trails.

Trail use continues to rise.

Senator KLOBUCHAR. Yes.

Mr. ROGOFF. Demand continues to rise. And this is not an area where—I think it used to be highly controversial in—

Senator KLOBUCHAR. Yes. I remember those days.

Mr. ROGOFF. And I think, hopefully, we are turning a corner there, where states are seeing the benefit for the mobility of all their community members.

Senator KLOBUCHAR. Right. And I also think that the groups have found a way to work together on this—

Mr. ROGOFF. That is right.

Senator KLOBUCHAR.—Federal program that has been really helpful to show that all people can use—motorized, non-motorized—different kinds of trails for different reasons. And they have

been advocating together, and I think that has made a big difference, as well.

Mr. ROGOFF. Well, if we are going to get reauthorization, we are going to need every community behind getting something done.

Senator KLOBUCHAR. Right.

All right. Thank you very much.

Thank you, all of you.

Senator FISCHER. Thank you, Senator Klobuchar.

I am going to ask another round of questions to give any of my colleagues that are trying to get to this hearing an opportunity to do so within the next 5 minutes.

So I would begin with Dr. Graham.

In your testimony, you mentioned that prescriptive regulations encourage rent-seeking activities. Can you elaborate on those comments and explain how the performance targets alleviate that rent seeking? And, also, if we alleviate the rent seeking, does it encourage some innovation, as well?

Mr. GRAHAM. Yes, it does. It is a good question, Senator Fischer.

A performance standard is typically specified in numeric terms that are objective so that if anybody has a technology that they can demonstrate meets that standard they have an equivalent opportunity to make that case.

The difference with the prescriptive standard is you have a tendency to want to pick one of those and then write it into the regulation. So the lobbyists who are behind that, you know, they are trying to persuade that regulator to mandate their technology. And that is a temptation that exists with prescriptive standards that is lessened with performance standards.

Senator FISCHER. And in your experience as an administrator, what are some of the elements of the performance standards that you incorporate into the regulatory approach, particularly for transportation regulations? And where can we improve on those performance targets, to be able to incorporate those into regulations?

Mr. GRAHAM. Well, let's talk first about existing regulations. Ideally, I would like to live in a world where all of these existing prescriptive standards would be rewritten as performance standards, but that is not going to happen in our lifetimes because there are lots of those regulations out there. So you need kind of a simpler, more general fix.

And that is what I had proposed with this idea of just—Congress could just lay out an equivalency clause that applies to all these existing rules, and then it allows a regulated company to propose an alternative compliance path. So you don't have to rewrite all the prescriptive standards; you just allow them to make that proposal. But the condition is they have to be able to demonstrate that they can achieve equivalent safety to what the current prescriptive standard provides.

You are reminding me that I wanted to make a comment on the little analogy that was made with airbags and seatbelts about prescriptive standards. Not all airbags are equally effective, so you would like to have some performance requirements on airbags.

And, in fact, we have those. The performance standard that the Federal Government adopts for crash-worthiness protection is a nu-

meric standard that measures deceleration of the head in a crash. And airbag systems have to meet that performance standard.

So even when people refer to specific technologies, safety technologies, and say these are good things, a lot of them are there because there are performance requirements on those technologies.

Senator FISCHER. Thank you.

And how would you go about—if you change it and allow companies to use performance-based, which then they have to meet certain guidelines along that, be able to prove that, how would you have the DOT respond? And would you put a time limit on the DOT to respond to companies that are trying to move into the arena of performance-based?

Mr. GRAHAM. I think you have to look at the history of the particular agency on how well they are able to meet their timeframes currently. And if you have an agency that has a pattern of not meeting those timeframes, then I would, yes, be inclined to do that. But I think if the agency has a good track record of meeting prompt activity, then I don't even think you necessarily have to put in the statute the timeframe.

But we have to keep in mind that the burden of analysis and work to develop these alternative compliance schemes and to demonstrate equivalent safety, that burden would be on the companies. So they have a lot more work to do in this regard than the regulator does.

Senator FISCHER. OK. Thank you.

And, Mr. Nichols, if I could finish with you, in the written statement that you provided, you noted that fatalities on the Missouri highways and roads have decreased from 1,257 in 2005 to 766 in 2014.

Can you explain how performance-based measures within your department have contributed to those safety improvements that you have seen over the past 10 years? And I would like to congratulate you on those numbers.

Mr. NICHOLS. Thank you, Madam Chairman.

It begins with, first of all, identifying that that is an area, obviously, that we are going to—as we go through an enterprise risk management system, safety is really low-hanging fruit. And what we identified, again, is that that is an area where we are going as a state to take a systems approach as opposed to a high-crash-location approach, which historically state DOTs and traffic engineers have done for many, many years.

You look at an intersection that has lots and lots of crashes at it but very low serious injury and low fatalities, yet on—and we were just talking about rural roads. And, again, both of our states have many, many miles of those. And we were looking at, where can we make an investment of the dollars that we have that will make a difference on the system, that will reduce fatalities and disabling injuries?

And we began with an approach of looking at the roads that carry the most traffic. In Missouri, which, again, is a microcosm of many, many states, about 80 percent of our traffic drives on 20 percent of our roads—the 80–20 rule. Again, many states fall in that. And what we said is, are we doing everything we can do, with the

limited resources we have, to reduce and eliminate the types of fatalities that are occurring on these types of roads?

For example, on our interstate systems where we do not have a protected median, where we have a grass median, which much of the rural interstate has, we saw that we were having an alarming rate of fatalities with crossover-median fatalities. And we went in and put in guard cable. And there was a lot of debate about whether guard cable, at that time, was an effective tool and product to eliminate fatalities. Well, I can tell you that it has been a wonderful product that has—hasn't completely eliminated, but it has reduced crossover fatalities on our interstate systems tremendously.

The other areas are—it is lane departures issues, like putting what we call a rumble stripe, thing like that. It is an annoying product, but it is on the edge of the road, and you drive over to the edge and it alerts you. And it is that distracted-driving component.

Without having the issues associated with the autonomous vehicle components in right now, it allows us to do some things on the existing corridors that take care of those specific system of roads that has reduced fatalities. And there are a couple of examples there.

The challenge that we have, we are not making much progress now. And, as I said, we are at 766 fatalities last year in our state, and that number is hovering at about that level. Our challenge is it is going to that 80 percent of the roads that carry 20 percent of the traffic where we need to put similar-type features—shoulders on rural two-lane roads, more guardrail and guard cable on rural two-lane roads—and do things like that, widen the roads out. And those are the kind of things that we know systematically we need to do; the issue is we don't have the revenue to do that.

Senator FISCHER. How wide are your shoulders? Are they AASHTO standards, or do you have stricter standards in Missouri?

Mr. NICHOLS. No, they are AASHTO standards, ma'am.

Senator FISCHER. OK. Thank you.

Thank you all, gentlemen. I appreciate you being here today. It has been a very informative hearing.

The hearing record will remain open for 2 weeks. During this time, Senators are asked to submit any questions for the record, and, upon receipt, the witnesses are requested to submit their written answers to the Committee as soon as possible.

Thank you again. I appreciate all your information.

We are adjourned.

[Whereupon, at 11:24 a.m., the hearing was adjourned.]

A P P E N D I X

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN THUNE TO
HON. PETER M. ROGOFF

Question 1. To what extent does current statute require the Department of Transportation to mandate prescriptive standards when the Department would otherwise find merit in issuing equivalent performance standards? Across the Department, are there any cases in which an equivalency clause would produce a beneficial outcome?

Answer. Equivalency approaches authorize an agency to adopt alternative compliance mechanisms for a regulated entity, if the entity shows that equivalent safety protection would be accomplished by the alternative approach. The Department has found that use of alternate means of meeting standards is sometimes useful. Such a clause can be included as a provision of regulatory text, unless such a clause is specifically barred by statute. However, where statutes prescribe a design standard, agencies can authorize approaches that maintain an equivalent level of safety only where Congress has explicitly authorized such an approach in the statute. The Department has seen the benefits of equivalency approaches in the Federal Railroad Administration's regulations for braking technology and the National Highway Traffic Safety Administration's theft reduction measures.

Some DOT regulations allow regulated entities to submit petitions to operate outside the regulations. The Pipeline and Hazardous Materials Administration (PHMSA) special permits process sets forth a process to authorize alternative requirements, or variances, to the requirements in the Hazardous Materials Regulations (HMR). The PHMSA is authorized in statute to issue such variances in a way that achieves a safety level that is at least equal to the safety level required under Federal hazmat law or is consistent with the public interest if a required safety level does not exist. The PHMSA also uses approvals, or written consent, from a designated official to perform a function that requires prior consent under the HMR.

The Department also uses performance-based safety approaches to achieve safety outcomes, and industry has shown progress in voluntarily implementing performance-based safety standards. For example, the Federal Aviation Administration (FAA) has used performance as the basis of analysis, and improvements have resulted in the near-elimination of fatalities in our commercial aviation fleet. Performance testing has resulted in dozens of specific safety enhancements in our automobile fleet, saving thousands of lives.

Question 2. If Congress were to consider an equivalency clause—perhaps in limited instances—as part of the surface transportation reauthorization bill, or any other transportation bill, what do you view as the primary advantages and disadvantages? What potential challenges would arise from implementation?

Answer. As noted above, alternative compliance mechanisms can be included in regulation unless explicitly prohibited by statute. If Congress is prescriptive in its statutory language, a provision in statute that also allows the agency to evaluate alternative methods of compliance from the public could be useful.

The advantage of an equivalency approach is flexibility. Such an approach would allow for innovation and allow for more rapid adoption of compliance methods as new technologies emerge.

Performance-based approaches that specify performance outcomes may also have advantages. Such an approach provides flexibility to the regulated entity to achieve the performance outcome in the most effective, efficient, and cost-effective way. For example, FAA has adopted equipage standards and safety management systems that use a performance basis to achieve outcomes. A performance approach may promote innovation because only a final outcome is mandated, rather than a specific design, practice, or technological solution. Performance standards can also more easily be tailored to local circumstances.

However, a prescriptive approach may be appropriate in some instances. For example, industry and consumers can more easily understand and comply with a specific standard, especially small entities that may find compliance with an explicit

standard to be less complex and more affordable. Additionally, a specific standard may be more easily enforced compared to a performance standard.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. RICHARD BLUMENTHAL TO
HON. PETER M. ROGOFF

Question 1. A critical component of any performance-based system is data collection. I've been troubled in recent months as I've found DOT lacks data on several issues. For example, after a tragedy involving a rental truck in Connecticut in 2011 that killed a college student, I had language put in the most recent surface transportation bill, MAP-21, that required a study of rental truck safety. DOT returned that study to me in July 2014 and informed me there just isn't enough data out there to know whether rental trucks are safer than other rental vehicles or more dangerous. Likewise, I've sought information about guardrail end terminals on our Nation's roads and highways. I've been told that there just isn't enough data, that there are insufficient guidelines for data collection, and that databases are incomprehensive. And so I'm now demanding that DOT undertake a real analysis of the devices on our roads and gather this data. I'm alarmed we don't have that data already. What efforts is DOT taking to ensure we have better data collection efforts?

Answer. The Department strongly believes in the effectiveness of performance-based safety approaches. An essential component of performance-based safety oversight is the ability to base decisions on objective and accurate data. As such, the DOT Operating Administrations responsible for safety oversight have implemented data collection systems and have continuously sought to expand and improve upon these systems.

However, DOT is also frustrated by the lack of data in certain areas. In many instances, DOT is dependent upon users, states, and private industry to supply accurate safety data. All performance-based safety regulations must carefully consider the costs associated with implementing enhanced data collection and reporting requirements.

With respect to rental truck safety data, the Federal Motor Carrier Safety Administration (FMCSA) maintains the Motor Carrier Management Information Systems (MCMIS) database which contains information on those large truck crashes which are required to be reported to the Agency. The FMCSA relies on our State partners to report these crash data. The reported crash data contains essential, but limited, information about each incident. A detailed description of the data available to FMCSA for the analysis of rental truck safety performance was provided in the March 2014 report to Congress titled "The Rental Truck Safety Study Report to Congress."

In addition, FMCSA has implemented other data systems to monitor safety. The Compliance, Safety, Accountability (CSA) initiative helps improve truck safety by collecting carrier data and targeting companies for intervention based on that data. Since implementation in 2010, the Safety Measurement System (SMS) has been enhanced several times. The enhancements were a continuation of the Agency's efforts to provide law enforcement, the motor carrier industry, and other safety stakeholders with more comprehensive, informative, and regularly updated safety performance data.

The FMCSA will also be providing notice and seeking comments on proposed enhancements to the Agency's SMS methodology. Consistent with its prior announcements, the Agency is proposing changes to the SMS that are the direct result of feedback from stakeholders and the Agency's ongoing continuous improvement efforts. The Agency is considering several changes in this notice and is asking for comment on these issues and other possible areas for consideration. This set of enhancements would include changes to some of the SMS Intervention Thresholds to better reflect the Behavior Analysis and Safety Improvement Categories' (BASICS) correlation to crash risk, other changes to the Hazardous Materials (HM) Compliance BASIC, reclassifying violations for operating while out-of-service (OOS) to the Unsafe Driving BASIC, and adjustments to the Utilization Factor (UF). The FMCSA will provide a preview of the proposed enhancements allowing motor carriers to see their own data, enforcement to see the data, and an opportunity for all to comment prior to implementation.

With respect to guard rails, the Federal Highway Administration (FHWA), through its Roadway Safety Data Program, provides guidance, technical assistance, and informational resources to encourage and assist State and local agencies to improve the roadway inventory component of their safety data systems. The FHWA developed the Model Inventory of Roadway Elements (MIRE) which provides guidance on data elements that should be considered for collection on all public roads.

Also, FHWA developed an informational guide on how to collect those data, how to manage and assure the quality of data, and how to structure information systems containing those data. The FHWA provides technical assistance, including a Roadway Data Improvement Program that assists States in a thorough review of their roadway inventory data collection, management, and analysis efforts and provides recommendations on how to review their data systems. Information pertaining to roadway safety hardware is an important component of a roadway inventory data system, and these are some of the ways we are working with state partners to make it better.

Additionally, the National Academies' National Research Council has convened a committee to look at the in-service performance of guardrail end terminals. The committee will conduct exploratory work to look at whether the data is available in sufficient quantity and quality to allow for a meaningful study. Based on the results from the exploratory work, the Committee will identify appropriate next steps for either gathering data or advising states how best to conduct in-service evaluations of guardrail end treatments.

Finally, DOT and FHWA have evaluated FHWA's internal process for determining whether roadside safety hardware is eligible for Federal-aid reimbursement. This evaluation has identified several changes that will be made in the near term. Additionally, we are engaging Volpe National Transportation Systems Center to conduct an independent review of the entire process by which roadside safety hardware is developed and evaluated.

Question 2. While performance-based safety systems may be interesting to discuss, at the end of the day, we still need rules. The Rail Safety Improvement Act of 2008 required FRA to issue regulations ensuring that each passenger railroad (like Amtrak), commuter railroad (like Metro-North), Class I railroad, and any railroad "that has inadequate safety performance (as determined by the secretary)" develop and implement a risk reduction program that "systematically evaluates railroad safety risks on its system and manages those risks in order to reduce the numbers and rates of railroad accidents, incidents, injuries, and fatalities."

This would be a performance-based rule in many respects—and it ultimately should address many aspects of fatigue, a critical issue made apparent by crashes on Metro-North in recent years. The 2008 rail safety bill mandated that these regulations be issued by October 2012. FRA has clearly missed the deadline by almost 2.5 years. The legislation left open the opportunity for FRA to issue regulations in several pieces. FRA has thus broken the mandate into several components: FRA issued an NPRM governing risk mitigation and technology for passenger and commuter railroads in September 2012, but the agency has yet to issue a final rule. FRA issued an NPRM regarding risk mitigation and technology implementation for Class I railroads just weeks ago in February 2015—and is likely years away from issuing a final rule. FRA is likely even many more years away from issuing a rule on fatigue management as to either passenger and commuter railroads or freight railroads. What is behind the backlog and delay in putting forward the risk reduction rulemakings?

Answer. The Federal Railroad Administration (FRA) continues to work aggressively to complete its regulatory workload, placing a priority on rulemakings that will most effectively advance safety, particularly those required by Congressional mandate.

In the rulemaking process, FRA has to strike a balance between speed and quality. "Quality" includes adherence to demanding procedural and substantive legal requirements. All three branches of the Federal Government—Congress, the courts, and the Executive Branch—have established certain mandatory procedures and substantive requirements for the rulemaking process. With few exceptions, before FRA is permitted to issue a final rule, there must be public notice of the proposal and an opportunity for public comment; a reasonable response to any public comments; an articulated, rational basis for the rule; and consistency of the rule with any applicable laws. In addition, FRA must identify, analyze, and weigh the costs and benefits of proposed rules and final rules. This evaluation can be very complex, but provides critical information to decision makers, reviewers, and the public.

Additionally, FRA often utilizes the Railroad Safety Advisory Committee (RSAC) process, especially for difficult issues. This process ensures the highest level of transparency and provides the highest level of public input. A chartered advisory committee under the Federal Advisory Committee Act, RSAC includes representatives of stakeholders throughout the railroad industry (rail labor, rail management, rail suppliers, rail passengers, State rail safety programs, and other organizations). This ensures that FRA hears a wide range of opinions early in the rulemaking process so proposals are appropriately vetted early, clarified, and communicated. The RSAC process saves time—especially at the end of the process—by making the cost-

benefit analysis more accurate, minimizing petitions for reconsideration, and creating a rule the regulated community understands.

The FRA has utilized its limited resources to advance and address the safety needs of the country in as expeditious a manner as possible. Importantly, the complex nature of the administrative review process for rulemaking documents means that widening one part of the pipeline (e.g., by adding resources) is not enough to expedite issuance of a rule if the rest of the pipeline remains narrow; the delay simply occurs at a different stage of the process.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN THUNE TO
JOHN D. GRAHAM, PH.D.

Question 1. Equivalency Clause. During the hearing, you suggested that all prescriptive standards should be amended to permit performance standards achieving at least an equivalent level of safety. For instances in which regulatory agencies cannot imagine a performance standard, you suggested establish processes by which to receive and evaluate evidence and ideas submitted by regulated entities. Within current statute, what is the strongest example of an equivalency clause? How might Congress design such a clause for transportation safety?

Answer. I have not studied all of the equivalency clauses now in statute and thus could not pinpoint the strongest one. For a useful illustration of the issues, consider the equivalency clause in the National Fire Protection Association standards. A good discussion is provided by Charles Fialkowski, How to Invoke the Equivalency Clause in NFPA Standards. August 9, 2013, <https://blogs.siemens.com/burnermanagementsystems/stories/1266/>.

Question 2. In your experience, which agencies have the best processes for considering regulatory proposals and associated evidence from regulated entities? What makes those processes effective?

Answer. I would say the U.S. Food and Drug Administration has the best developed system for evaluating the evidence and regulatory proposals made by regulated businesses (typically pharmaceutical manufacturers and medical device firms). There are several factors that contribute to the success of FDA's evidence-based regulatory process: the industry's sustain investments in regulatory science, including contributions to academic programs that train personnel that can be hired by regulators, industry and consulting firms; the agency's scientific culture and commitment to third party peer review of the agency's key scientific assumptions/determinations; and the agency's knowledge that the industry can pursue litigation against the agency if the agency does not make a decision based on the best available evidence.

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