



# Advisory Committee on Automation in Transportation

## Advisory Committee on Automation in Transportation

### Record of Meeting

January 16, 2017

U.S. Department of Transportation, Washington, D.C.

### Public Announcement

The U.S. Department of Transportation (U.S. DOT), Office of the Secretary of Transportation announced this public meeting of the Advisory Committee on Automation in Transportation (ACAT) in a Federal Register notice published on December 29, 2016 (81 FR 96200).

### Committee Members in Attendance

(\*via phone, ++ Unable to attend; provided comments separately)

Name	Affiliation	Title
Co-Chair: Mary Barra	General Motors	Chairperson and CEO
Co-Chair: Eric Garcetti*	City of Los Angeles, CA	Mayor
Vice Chair: Dr. J. Christian Gerdes	Stanford University	Professor of Engineering
Gloria Boyland	FedEx	Corporate Vice President, Operations & Service Support
Robin Chase	Zipcar; Veniam	Co-founder of Zipcar and Veniam
Douglas Chey	Hyperloop One	Senior Vice President of Systems Development
Henry Claypool	Community Living Policy Center (CLPC)	Policy Director
Mick Cornett	City of Oklahoma City, OK	Mayor
Dr. Mary (Missy) Cummings*	Duke University	Director, Humans and Autonomy Lab, Pratt School of Engineering
Dean Garfield	Information Technology Industry Council (ITI)	President and CEO
Mary Gustanski	Delphi Automotive	Vice President of Engineering & Program Management
Debbie Hersman*	National Safety Council	President and CEO
Rachel Holt	Uber	Regional General Manager, United States and Canada



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Lisa Jackson	Apple	Apple, Vice President of Environment, Policy, and Social Initiatives
Tim Kentley-Klay	Zoox	Co-founder and CEO
John Krafcik	Waymo	CEO
Gerry Murphy	Amazon	Senior Corporate Counsel, Aviation
Keller Rinaudo*	Zipline International	CEO
Chris Spear	American Trucking Association (ATA)	President and CEO
Chesley “Sully” Sullenberger <sup>++</sup>	Safety Reliability Methods, Inc.	Founder and CEO
Dr. Bryant Walker Smith	University of South Carolina	Assistant Professor, School of Law and (by courtesy) School of Engineering
Jack Weekes*	State Farm Insurance	Operations Vice President, Innovation Team
Ed Wytkind	American Federation of Labor and Congress of Industrial Organizations (AFL-CIO)	President, Transportation Trades Department, AFL-CIO (TTD)
John Zimmer	Lyft	Co-founder and President

### Other Officials Present

Name	Title	Affiliation
The Honorable Anthony R. Foxx	Secretary of Transportation	U.S. DOT
Vinn White	Acting Assistant Secretary for Transportation Policy	U.S. DOT
Mark R. Rosekind	Administrator, National Highway Traffic Safety Administration (NHTSA)	U.S. DOT
Michael Trentacoste	Associate Administrator, Federal Highway Administration (FHWA) Office of Research, Development & Technology	U.S. DOT
John Augustine	ACAT Designated Federal Official (DFO)	U.S. DOT
Robert Anderson**	Vice President, Research and Development, Safety & Graphics Business Group	3M



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## Call to Order

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The inaugural ACAT meeting was held at the U.S. DOT Headquarters in Washington, D.C. on January 16, 2017. Professor J. Christian Gerdes, Vice Chair of the Committee, called the meeting to order at 9:20 a.m. and introduced the Honorable Anthony Foxx, Secretary of Transportation. The Committee Co-Chairs, Mary Barra and Mayor Eric Garcetti, presided over the meeting. The meeting was open to the public.

## Welcome and Kick-Off to the Inaugural ACAT Meeting

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Stanford University Professor and ACAT Vice Chair J. Christian Gerdes welcomed all of the Committee Members on behalf of the co-chairs and Secretary of Transportation Anthony R. Foxx. He provided some introductory remarks to the Committee reflecting on how close the future seems given the current applications of technology. For example, cars are driving themselves today in tests and deployments on our streets; drones have moved from the military to a hobby to surveying in agriculture; automation has even moved towards opening up new modes of transportation.

Vice Chair Gerdes also noted his experience over the last year serving as the USDOT's first Chief Innovation Officer. During that appointment, he experienced some of these challenges firsthand from within the government and recognized the growing need to have good data to ground public policy. Vice Chair Gerdes concluded by thanking the committee members for agreeing to serve on the Committee.

*Vice Chair Gerdes then introduced Secretary of Transportation Anthony R. Foxx.*

## Introductions

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Secretary Foxx thanked the Committee Co-Chairs Mary Barra and Mayor Eric Garcetti and Vice Chair Gerdes for their willingness to serve and for their leadership. He also thanked the USDOT Policy team for their support in forming the Committee and thanked NHTSA Administrator Mark Rosekind for his time. Finally, Secretary Foxx welcomed Robert Anderson of 3M.

Secretary Foxx commented that USDOT recognizes how much transportation technology is changing and evolving. ACAT was created to be multi-modal because automation is not limited to



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cars, it goes well beyond that to touch many areas. He encouraged the group to find lines of symmetry across transportation modes, and to think about second, third, and fourth order impacts of automation and how to plan for those impacts. He stated that USDOT believes there is transformative power in automation – for land use, safety, security, and more - but there are challenges, too. These include: impacts to labor markets, impacts on society overall, and all of the changes that impact cities in particular. This committee can ensure that the public reaps the benefits of automation with none of the downsides.

Secretary Foxx also focused on safety, noting that 94% of automobile fatalities are due to human factors. Data suggests that automation can lead to an 80% reduction of these fatalities. He stated that USDOT has done a lot to move the dial in this area, including: the Smart Cities competition, Congestion Mitigation and Air Quality (CMAQ) awards to cities, the Safety Pilot in Ann Arbor, the three Connected Vehicle Pilots in New York, Florida, and Wyoming, and most recently the automated vehicle proving ground winners. NHTSA has published autonomous vehicle (AV) policy and guidance, and cybersecurity practices for modern vehicles. And, many at USDOT have worked to advance Intelligent Transportation Systems (ITS) and automation research across the Department.

He concluded by expressing his excitement about the Committee and noting that "what will come from this conversation will inform both the outside world but also the Department itself."

*Secretary Foxx then introduced ACAT co-chair Mary Barra*

### **Remarks by the ACAT Co-Chairs**

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#### **Mary Barra, Chairperson and CEO, General Motors**

Ms. Barra began by acknowledging the Secretary for his vision in establishing the Committee and building a strong foundation for the next administration. She noted that she looks forward to working with Secretary Foxx's successor in a collaborative spirit. She also thanked NHTSA Administrator Rosekind and his leadership in issuing USDOT's AV Policy and added that she has enjoyed working with his team.

In welcoming the Committee members, she stated that the group will have the ability to give the Department their insights in automated vehicle technology and its potential impact on society. There are so many possibilities: Cars, truck, bus, train, plane, and drone. Automated vehicle technology – coupled with electrification – has the ability to transform the way we live. It will lead to cars that are smarter, more efficient, and safer. She added that she and Mayor Garcetti are committed to collaboration as a model for the committee. They need everyone's ideas to be shared and see a wealth of knowledge and passion to drive this technology forward.



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*Co-Chair Barra then introduced Mayor Eric Garcetti, who addressed the Committee by phone.*

### **Mayor Eric Garcetti, City of Los Angeles, CA**

Mayor Garcetti began by welcoming everyone and stating that he looks forward to co-chairing this Committee and working with all of its members. He thanked Vice Chair Gerdes and thanked Secretary Foxx for his leadership. Mayor Garcetti noted that Secretary Foxx has been a friend to cities nationwide, and will be missed. The Mayor stated that he is looking forward to working with the new Secretary, who has a great record across a number of different incarnations.

The Mayor remarked that he was speaking to the group from the largest city and the largest state in America. For as long as many can remember, Los Angeles is indelibly associated with the automobile. The recently released movie and Oscar-contender “La La Land” opens with hundreds of frustrated Angelinos, who get out of their cars and start to dance. He explained that Los Angeles is often seen as being built around cars and while people may not be encouraged to get out of them in traffic to dance, we do need to be looking at solutions to reduce the frustrations people feel with their cars and traffic.

The automobile was invented in 1885, and cars have long been the heartbeat of American prosperity, especially in Los Angeles. In 1929, the city had the busiest intersection in the world – Wilshire and Western. When the Olympics came to Los Angeles in 1984 – they piloted the first computerized traffic signal system in the world. However, not everything about the automobile was good for Los Angeles. They had their first smog attack during World War II, and residents feared it was a chemical attack instigated by Japanese Forces. The public health dangers of automobile were clear, and things have gotten a lot better over the years from technology improvements. The City has reduced greenhouse gas emissions by 20% since 1990. But, he noted that the air didn’t get better because of less driving. The pollution solutions came from investments in green technology to improve the health of economy and ourselves.

Mayor Garcetti also recognized his colleague on the Committee, Mayor Cornett. As city Mayors they don’t settle for stopgap solutions, but instead need to be looking at long-term solutions that keep the people of our cities on the move. Mayor Garcetti described the following frame for thinking about how to prepare for a future with new technologies:

When Uber and Lyft begin to change the way our cities manage mobility, along with Amazon changing the way we buy things, we can put up roadblocks and be *future phobic* but that is the wrong approach. We can build walls around how we approach new technologies, but those walls keep us in.

A second approach is to be *future accepting* – we can be happy or accepting of new technologies but inactive in how we approach them.



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Or, we can be *future guiding*. If we take this approach, we can add value to new technologies like automated vehicles when we look at their human aspects, their urban planning aspects, and their safety aspects, while learning from our industry partners developing these technologies and lending a hand to them when it is needed.

He concluded by sharing that he is happy to see a national effort take shape for automation and to find agreement on some national standards rather than the current patchwork approach across this country. He added that in this past November's elections, Los Angeles voters passed a ballot initiative that will raise \$120 billion to help ensure that roads and transportation lines get built and get better. He is looking forward to working with the incoming administration to create jobs and solve the first/last mile problem with automated vehicles.

*Co-Chair Garcetti then deferred to Co-Chair Barra, who then introduced the ACAT Designated Federal Official, John Augustine.*

### **Administrative Briefing**

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John Augustine, ACAT DFO, welcomed members of the committee to the Department of Transportation. He provided an administrative briefing about his role as outlined in the ACAT charter and reminded Committee members serving as Special Government Employees (SGEs) that they must complete ethics training and return financial conflict of interest materials. After offering to take questions from ACAT members on ethics, Mr. Augustine concluded his remarks by thanking Committee members for their willingness to serve on the ACAT.

*The DFO turned the meeting over to Co-Chair Barra.*



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### ACAT Member Introductory Remarks

Co-Chair Mary Barra asked each member of the committee to briefly introduce themselves and offer their perspectives on automation:

Member	<i>Background and Perspective</i>
Mary Barra	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• CEO and Chairperson of GM, automation is a daily focus of company</li> <li>• Automated vehicle technology – coupled with electrification – has the ability to transform the way we live. It will lead to cars that are smarter, more efficient, and safer</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• The safety benefits of automated vehicle technology are extraordinary. Will significantly reduce <b>fatalities</b> and <b>crashes</b></li> <li>• Will expand <b>mobility options</b> for people of all ages – unprecedented freedom to move and to engage with their communities</li> <li>• Committed to collaboration as a model for the committee. We need everyone’s ideas to be shared</li> </ul>
Mayor Eric Garcetti	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Mayor of Los Angeles, the largest city in CA and indelibly associated with the automobile</li> <li>• Public Health implications of cars have long been challenging. Our air didn’t get better because of less driving – our pollution solutions came from investments in green technology to improve health of economy and ourselves.</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Solutions to reduce the frustrations people feel with their cars and <b>traffic</b>, especially long-term solutions that keep the people of our cities on the move.</li> <li>• When thinking about new technologies we should try to be Future Guiding – adding value to new technologies like automation by thinking collaboratively with industry about <b>safety</b> and <b>urban planning</b></li> <li>• If we get automated vehicles right, we have the potential to transform downtown Los Angeles from 40% parking lots into <b>green parks</b> and <b>affordable housing</b>, to make transportation <b>accessible</b> to everyone</li> <li>• Excited to be a part of a national effort and working toward national standards rather than our current <b>patchwork</b> approach. Government should have a light touch in early days of automation.</li> </ul>
Chris Gerdes	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• As the Chief Innovation Officer at USDOT last year, experienced the challenge of how to grapple with the changes offered by automation</li> </ul>



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	<p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Automation is more than just a technology – it has the potential to change everything we know about transportation             <ul style="list-style-type: none"> <li>○ How do we think about <b>safety</b> and <b>cybersecurity</b>?</li> <li>○ How do our concepts of <b>liability</b> change?</li> <li>○ How do we <b>ethically</b> merge with existing vehicles?</li> <li>○ How do these developments influence people who earn a living?</li> </ul> </li> <li>• We need good <b>data</b> to ground public policy</li> </ul>
Gloria Boyland	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Corporate Vice President for Operations and Service Support at FedEx, a global transportation and logistics service provider</li> <li>• Role is to understand major technologies and systems trends to help the company transform itself and our industry for our communities</li> <li>• FedEx has 650 airplanes that travel 500,000 miles every 24 hours; that pales in comparison to our over 100,000 motorized vehicles that travel over 2 billion miles every year.</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Automation is an opportunity to transform the <b>safety, efficiency, and services</b> they provide</li> <li>• Automation on airplanes – autopilot – already contributes to the safety of every flight. We see the same opportunities on our streets and highways for other automation technologies.</li> <li>• Automation provides an opportunity to engage the future and tackle challenges are real but addressable</li> </ul>
Robin Chase	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Co-founder of Zipcar; Built the technology for Zipcar 16 years ago</li> <li>• Entrepreneur with other projects including co-founding ride-sharing and car-sharing companies</li> <li>• Co-founder of Veniam, which builds networks of connected vehicles and offer fully managed services</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Interested to see how AVs play out in cities and how they will impact <b>congestion, land use, infrastructure, revenues, and labor</b> <ul style="list-style-type: none"> <li>○ AV will move quickly in cities, and wants to <b>minimize labor impacts</b></li> <li>○ When the agriculture sector became automated it was adversely impacted</li> </ul> </li> <li>• Would like to see more electric AVs. Concern around how AVs will affect <b>funding revenue</b> for cities for parking, speeding tickets, fuel tax, etc.</li> <li>• Concluded by adding that the country is still moving metal boxes on roads and that impacts <b>congestion</b> and other issues we have not yet solved</li> </ul>



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Douglas Chey	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Senior Vice President of Systems Development at Hyperloop One</li> <li>• Vision for the future is an interconnected, mega-city environment where people can move seamlessly within mega-regions with minimal travel time</li> <li>• Background in systems design and integrated control systems, and can speak to safety and regulatory issues as well as issues in software development.</li> <li>• Before Hyperloop, was at HP for 10 years as a Chief Technology Officer (CTO) for software development for transportation</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• How to create and maintain <b>integrated transportation ecosystems</b> and work to make them autonomous</li> <li>• How this group can help make systems of <b>transport work from suburbs to cities seamlessly</b>, and then extend that across the entire world</li> <li>• Other interests include <b>safety</b> as well as identifying <b>regulatory efforts</b> that can contribute to adoption of automated systems.</li> </ul>
Henry Claypool	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Policy Director of the Community Living Policy Center at the University of California, San Francisco</li> <li>• Work focuses on older adults and those with disabilities have quality lives</li> <li>• Provides advice to policy makers on how best to meet the needs of these populations given the constraints of government programs</li> <li>• Appreciates the opportunity to make progress on addressing transportation barriers for these populations (e.g., design challenges, addressing transportation needs, increasing the mobility of population)</li> <li>• Most work is on health care delivery system; so this work is complimentary to achieving better health outcomes.</li> </ul> <p><i>Member Perspective:</i></p> <ul style="list-style-type: none"> <li>• Would like to see the group think through the <b>strategic demonstrations</b> that help the public understand how beneficially <b>safe</b> this technology can be to address long-standing problems in communities - e.g., older adults losing license because they can't see well</li> <li>• This innovation can help older adults stay in their homes and part of their community for long as possible, and help the general public start to understand how this can be done</li> <li>• The Community Living Policy Center has embarked on initiatives with industry to think through <b>design challenges for disabled population</b> (e.g., <b>wheelchair</b> in car or vehicle, <b>blind people</b>); this</li> </ul>



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	<p>needs to be thought through and not inconvenience individuals but still help innovation scale up so it can be available</p> <ul style="list-style-type: none"> <li>• Tapping into those individuals who have a need will help ensure that AVs are <b>designed to be accessible</b></li> </ul>
<p>Mayor Mick Cornett</p>	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Mayor of Oklahoma City, Oklahoma</li> <li>• President of the Council of Mayors</li> <li>• Citizen interaction is key to the role of a Mayor – change drives these interaction. Changes can seem small at first but can have big effects and get a lot of people very excited very quickly</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Hard to imagine a change that when implemented will be bigger than automated vehicles: how it affects a <b>city’s planning, economy, and re-training activities for employment</b></li> <li>• Committee should focus on <b>unintended consequences</b> of automation             <ul style="list-style-type: none"> <li>○ For example, the built environment and changes to city planning, retraining of millions who are engaged in employment that may not be necessary going forward</li> </ul> </li> </ul>
<p>Mary Gustanski</p>	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Leads Engineering team at Delphi</li> <li>• Has been with the automotive industry for 36 years and as an automotive supplier</li> <li>• Started in automated area to drive awareness of active safety</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• A vehicle is the most sophisticated piece of technology that people own</li> <li>• It should serve as a safe, green, and connected technology – <b>safety</b> is really the goal of all three but it requires convergence</li> <li>• Noted that by the time you reach level 2, 80% of technology is available at only 20% of the cost of full automation             <ul style="list-style-type: none"> <li>○ These technologies are available today</li> <li>○ The quicker they go out, the sooner we will see safety benefit</li> </ul> </li> <li>• Automation brings opportunity for automated <b>mobility on demand</b> model; helps with <b>congestion, permits electrification</b> for cleaner environment</li> <li>• One area to start to address is the <b>Federal automated policy</b>– 15 different areas asking for safety assessment (very broad and very deep)             <ul style="list-style-type: none"> <li>○ ACAT can help create pilots with available technology and create a roadmap for what safety assessment means</li> </ul> </li> <li>• Sees two goals for ACAT             <ul style="list-style-type: none"> <li>○ Support certification processes that will enhance future guidelines can be implemented to be beneficial</li> </ul> </li> </ul>



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	<ul style="list-style-type: none"> <li>○ Enable automated innovation but deploy it in <b>safe and effective</b> manner for all consumers</li> </ul>
John Zimmer	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>● President and Founder of Lyft,</li> <li>● Emerged from an interest in transportation hospitality and offering alternatives to car ownership</li> <li>● As a new parent wants safety for young drivers</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>● Would like to see the creation of a <b>national framework</b>, while recognizing that government compliance is key to operationalize</li> <li>● <b>City planning</b> – this is a once in a lifetime opportunity to look at <b>infrastructure</b> that was centered around car ownership; create policy suggestions to change infrastructure and the canvas of a city to make it more <b>livable, higher quality of life</b></li> <li>● Recognize the <b>job opportunities</b> that should be created by automation – Uber and Lyft are only 1% of employment</li> </ul>
Ed Wytkind	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>● President of the Transportation Trades Department of the AFL-CIO and a voice for unions for 20 years in Washington</li> <li>● Work to contribute to policies that lift workers up, on collective bargaining and giving workers a voice in halls of congress and in DC</li> <li>● Freight and passenger transportation workers have lived through innovation – and mass dislocation – for over a century</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>● Address implications of <b>innovations that will collide with federal safety priorities</b></li> <li>● Address <b>safety</b> implications of automation and hazardous cargo to maximize <b>public trust in safety and regulations</b></li> <li>● Work to ensure that front line <b>workers</b> will be the beneficiaries of technologies when it makes <b>jobs safer</b></li> <li>● Millions of workers may be unemployed when automated technology comes online and they can't be ignored</li> <li>● Work to <b>balance technology advancement with equity considerations</b></li> </ul>
Bryant Walker Smith	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>● Teaches the “Law of the Newly Possible” including legal aspects of automation – the way law affects technology and technology affects law, including unmanned aerial systems and Hyperloop.</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>● ACAT can provide value identifying areas that regulators and developers are not thinking about or working on as much as they should be</li> </ul>



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	<ul style="list-style-type: none"> <li>• High profile technologies will get a lot of focus, but some of the less sexy technologies need focus, too (<b>simulation, validation and verification, regulation through technology</b>)</li> <li>• Not just monitoring and identifying; we can use technology to service broader public goals; the committee can advise government on what the goals could be and how technology can help (active, assertive role)</li> <li>• Acknowledges the public’s great hope and great fear – we need to look at the issue of <b>trust in technologies</b>. Not just how to evaluate a technology, but how do we establish and earn trust in technology AND in providers and regulators so public can benefit</li> </ul>
Chris Spear	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• President of the American Trucking Association (ATA), an 83 year old association representing trucking in the United States</li> <li>• We represent 7 million employees in the U.S. economy – 3.5 million of which are drivers. In 29 states, trucking is the most prevalent job</li> <li>• Industry loses 49.6\$ billion by sitting in traffic congestion each year – it harms driver morale and costs money</li> <li>• Freight contributes nearly ½ of the money in the highway trust fund</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Look forward to shaping the <b>regulatory framework</b> that governs how automation is used in federal, state, and coal sector</li> <li>• Automation technology has benefits for <b>safety, environment, &amp; productivity</b></li> <li>• To embrace automation thoughtfully, so that it doesn’t impede our <b>employment</b> base in trucking sector</li> <li>• ATA will bring different experiences to the committee, in particular a Business to Business (B2B) perspective on how to adopt technology quickly             <ul style="list-style-type: none"> <li>○ Already today, truck OEMs developing connected and autonomous technologies are marketing them to carriers, <b>speeding adoption</b></li> </ul> </li> <li>• Take hazardous cargo as an example; we will need to work with the Department of Homeland Security as it’d be unnerving to have trucks without drivers moving hazardous cargo</li> </ul>
Gerry Murphy	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Senior Corporate Counsel, Aviation at Amazon</li> <li>• Regulations should increase <b>safety</b>, provide consistency, and be sufficiently flexible to keep up with innovation</li> <li>• Prime Air is developing a service using unmanned aircraft systems (UAS) to deliver packages to customers in 30 minutes or less that is safe and environmentally sound, and has recently briefed USDOT on its vision for automated technologies.</li> </ul> <p><i>Member Perspective</i></p>



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	<ul style="list-style-type: none"> <li>• Safety is the primary aim and benefit of automation.</li> <li>• ACAT should support the creation of a <b>common regulatory structure</b> based on a comprehensive discussion on issues like <b>safety, cybersecurity, sustainability and spectrum</b></li> <li>• The goal should be to avoid a <b>patchwork</b> quilt of regulations; we need <b>uniform federal rules</b></li> <li>• Existing regulations need to be reviewed to foster innovation</li> </ul>
<p>John Krafcik</p>	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• CEO of Waymo; a self-driving car company that was formed last month after spending eight years as Google’s self-driving car project</li> <li>• Our vision is to make it safe and easy for people and things to move around the world. We are committed to fully self-driving technology.</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Our goal is to <b>build a better driver</b>. One with perfect 360 vision in all weather and who is never tired or distracted</li> <li>• Goals for the committee include:             <ul style="list-style-type: none"> <li>○ Work to advance a <b>flexible, national, voluntary framework for the safe testing and deployment</b> of automated technology. Continue USDOT guidance process &amp; address the regulatory barriers that NHTSA has identified</li> <li>○ Work to <b>bolster expertise and spur involvement by all DOT agencies</b> in automated technologies</li> <li>○ Make <b>technology-neutral recommendations</b> that will drive <b>common policy</b> recommendations</li> </ul> </li> </ul>
<p>Tim Kentley- Klay</p>	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• CEO and co-founder of Zoox, which was founded on insight that automation in transportation doesn’t need to be incremental and can get to full realization quickly</li> <li>• Zoox was 5 people 2 years ago, now 200 employees</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Would like to see ACAT identify what changing into AV means and <b>safely</b> bring it to fruition</li> <li>• Like at Zoox, would like to start to think about the full realization of automation in transportation – what does it look like? Can we build it in 10 years?             <ul style="list-style-type: none"> <li>○ Considering <b>regulations</b></li> <li>○ Doing it <b>safely</b></li> </ul> </li> </ul>
<p>Rachel Holt</p>	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Regional General Manager for United States and Canada at Uber</li> <li>• Uber was founded 6.5 years ago, and we believe in connecting everyone to affordable transportation at the push of a button</li> <li>• 75% of the U.S. population today lives in counties that have access to Uber</li> </ul> <p><i>Member Perspective</i></p>



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	<ul style="list-style-type: none"> <li>• Automated vehicles have the potential to make transportation more <b>affordable</b> and <b>safer</b></li> <li>• Currently have automated UberX vehicles transporting riders in Pittsburgh</li> <li>• Working to build <b>consumer trust</b> in automation</li> <li>• Shared automation is the ultimate vision, as it will allow more people to <b>access safe, reliable, and affordable</b> transportation</li> </ul>
Dean Garfield	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• President and CEO of ITIC</li> <li>• Global organization with a 100 year history focused on advocacy for technology companies             <ul style="list-style-type: none"> <li>○ Members include OEMs, Amazon, Google, etc.</li> </ul> </li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Dealing with implication and impact of transformational change is not easy</li> <li>• How do we enable and allow <b>state experimentation</b> in this area without having <b>hodgepodge of regulations</b></li> <li>• <b>Cyber security</b> – How do we ensure integrity of systems being integrated into mobility without making sure we are not constraining innovation?</li> <li>• Intersection of <b>infrastructure</b> and <b>innovation</b> – How do we leverage innovation so we have access to latest data (like sensors)?</li> </ul>
Mary “Missy” Cummings	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Professor of Mechanical &amp; Electrical Engineering and Computer Science at Duke University</li> <li>• Director of Humans and Autonomy Lab and the director of Duke Robotics.</li> <li>• Former fighter pilot in the U.S. Navy - saw firsthand how the transition to digital systems and the introduction of automation affects people’s jobs</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Conducts research on human interaction with <b>safety critical systems</b>, especially those that rely on <b>Artificial Intelligence</b>, which touches on all transportation sectors: Aviation, UAS, FRA, and autonomous vehicles</li> <li>• Sees the main issue for the committee is how to <b>test and evaluate technologies</b> with embedded artificial intelligence, which all companies struggle with.</li> </ul>
Debbie Hersman	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• President and CEO of National Safety Council, which has 13,000 member companies, and 20 chapters across the nation</li> <li>• Our vision is to eliminate preventable deaths in our lifetime; we work to save lives every day</li> </ul>



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	<ul style="list-style-type: none"> <li>• Served as chair of NTSB and saw first-hand how technologies can offer safety improvements across all modes</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Working to get to <b>zero deaths</b> on the road as Chair of Road to Zero coalition launched by NHTSA last October (currently comprised of 16 Steering Group members and 100 members).</li> <li>• NSC is working with RAND to create a future scenario of a zero death road system</li> <li>• <b>Safety and saving lives</b> should be the first priority for this committee</li> </ul>
Lisa Jackson	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Vice President of Apple for environment, policy, and social initiatives, which includes worldwide government affairs functions, product accessibility, and education and policy</li> <li>• Apple’s focus is that technology should empower all people to live better and use technology to do what they love</li> <li>• Served as EPA administrator between 2009-2013, and has Federal and state government experience</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Impact of automated transportation on the public good includes multiple human impacts, including on: <b>employment, public spaces, accessibility, and the environment</b></li> <li>• Automation technology needs to serve people and must be <b>accessible</b> to all, which requires a commitment and dedication to accessibility</li> <li>• On the environmental front, a need to be mindful of the potential for induced <b>demand in transportation services</b></li> <li>• <b>Privacy</b> is a challenge; ensuring protection of information used for automation and of transportation data will be important for public acceptance and is an ethical challenge this committee can help address</li> <li>• We need <b>ethical framework</b> for how algorithmic decisions made to optimize safety and legality of all transportation modes</li> </ul>
Jack Weekes, as shared by Ryan Gammelgard	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Operations VP for State Farm, which is the Nation’s largest auto and home insurer</li> <li>• Understand benefits and risks of AV technology</li> <li>• Participates in many research opportunities and thought-leader on risk impacts             <ul style="list-style-type: none"> <li>○ Participates in many university initiatives, with the NTSB, and in SAE industry meetings</li> </ul> </li> <li>• Ground-based, also interested in aerial benefits</li> <li>• First insurance company to get FAA approval for drones</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Wants to further utilize <b>drone technology</b></li> </ul>



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	<ul style="list-style-type: none"> <li>• AV technology can <b>save lives</b>, clearly support <b>research</b> in this area</li> <li>• Will continue to play a leading role in understanding how <b>insurance</b> can continue to protect individuals, families, and businesses from financial loss</li> <li>• Committee should consider <b>risks, liability, and loss</b></li> </ul>
<p>Keller Rinaudo</p>	<p><i>Background:</i></p> <ul style="list-style-type: none"> <li>• CEO of Zipline – a drone-focused medical delivery start-up</li> <li>• Zipline is an instant delivery system for medicine, using a small, autonomous, aircraft weighing just 22 pounds and that is fully electric</li> <li>• Currently the world’s only drone-based delivery service operating at a national scale in the nation of Rwanda, servicing 21 infusing services and hospitals</li> <li>• “We’re delivering blood on a daily basis and saving lives on a daily basis.”</li> <li>• We often think that the United States is a world leader in innovation and technology, but from my experience as a startup, over the last 4 years, where tech meets regulation we’re running the risk of falling behind</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• Wants to see how we can encourage <b>experimentation</b> by start-ups and others at a small scale and learn from them</li> <li>• If we can be successful at making experiments successful at a small scale without regulatory barriers, and then working to scale those, that will be an environment where startups can thrive, and that can advance solutions at 1/100th the cost</li> <li>• Would like the group to think less about advocating engineering trade-offs aimed at incremental <b>safety</b> improvements and focus on <b>big-picture benefits of automation</b></li> </ul>
<p>Chesley “Sully” Sullenberger [Unable to attend; provided comments separately ]</p>	<p><i>Background</i></p> <ul style="list-style-type: none"> <li>• Former commercial airline pilot and best known for the water landing of US Airways flight 1549</li> <li>• This not a random occurrence but rather the result of the development of human skills and a <b>systems approach</b> to aviation safety that incorporates the <b>human and the machine</b>.</li> <li>• Has worked towards this systems approach for the past 40 years including assisting on NTSB investigations, working with human factors experts to determine the human role and developing teambuilding and leadership courses to enhance <b>safety</b> culture.</li> </ul> <p><i>Member Perspective</i></p> <ul style="list-style-type: none"> <li>• How do we account for what we do not or cannot know? The goal should be to make the <b>system robust and resilient</b>.</li> <li>• What part should the human play in the system? If we expect a human operator to intervene, we need them to be meaningfully engaged throughout the entire process. Systems need to engage all</li> </ul>



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	<p>the way through or have automation to the level to not need human intervention.</p> <ul style="list-style-type: none"><li>• Need to use <b>big data</b> to learn. Aviation offers a 40 year history of self reporting. Stakeholders will learn from bigger data sets if they can <b>trust the system</b> and safeguards are in place.</li></ul>
Robert Anderson [**Guest of Secretary Foxx]	<p><i>Background</i></p> <ul style="list-style-type: none"><li>• VP of R&amp;D at 3M, which has over 75 years of experience in contributing to transportation safety</li><li>• A lifetime 3M guy with over 30 years of background in these areas, with a particular focus on how policy will interface with advanced technology</li><li>• 3M harnesses science and technology to improve safety and we're excited to contribute to accelerating the transition to AV</li></ul> <p><i>Perspective</i></p> <ul style="list-style-type: none"><li>• Sees two <b>customers</b> in the future of automation – the humans who will still be driving for the foreseeable future, and the machines behind AVs</li><li>• The <b>interface between the material and digital world and the systems</b> in play that connect them is a key focus</li><li>• Automation is a vision of the future that's upon us right now</li></ul>



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## Major Themes from ACAT Members' Remarks

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The following summary identifies some of the major themes stemming from the remarks described on the previous pages:

### **Safety**

Most members addressed safety in their comments, and some explicitly noted that it should be the committee's top priority to ensure that automated vehicles do not compromise safety, but are deployed to improve transportation safety. Overall, members felt that automated vehicle technology can significantly reduce crashes and related injuries/fatalities. Some also noted the challenge of balancing the time it takes to achieve thorough research results with having timely deployment, even if incremental, in order to start introducing safety measures sooner than later.

### **Regulatory Framework**

Many members expressed a desire for a cohesive and comprehensive regulatory framework rather than a state-by-state "patchwork" approach. A few members suggested that the federal government should have a light touch—providing guidance and addressing regulatory barriers to encourage experimentation by states and private industry. Others noted that there must be harmonization across local, state, and federal regulations. They would like to see a flexible, national, voluntary framework for testing and deployment of automated technology. Several members suggested that ACAT can identify high-value areas for regulators and developers to consider, as well as inform next steps with respect to the federal automated vehicle guidance.

### **Labor and Workforce**

A few members spoke on the potential impacts of automation on labor. Training was mentioned as an important element of planning for automation—both for those displaced by automation, as well as those who will work to support new systems that enable automated vehicles. Two members noted that previous automation technologies have led to dislocation of workers. Thoughtful planning is required to minimize labor impacts, ensure that workers benefit from new technologies, and realize potential job creation opportunities of vehicle automation.

### **Equity and Accessibility**

Several members noted that vehicle automation has the potential to make transportation reliable, affordable, and accessible to everyone if the gains from automation are equitably distributed. Automation can address long-standing problems in communities (e.g., providing access to older adults, those with disabilities, or others with mobility limitations). Vehicles and business models need to be designed with equity and accessibility in mind if to ensure that they can meet the needs of all.

### **Infrastructure and City Planning**

Several members commented that automation presents an opportunity for new approaches to city



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planning. Infrastructure has been largely designed to cater to car ownership in many cities, and a transition to more shared automated vehicles may change many needs, possibly opening up land to new uses. Changing the infrastructure could provide an opportunity to make cities more livable, and result in a higher quality of life for citizens. While automation comes with many opportunities, it could also create challenges—one member pointed out that automation, combined with other technologies, could reduce funding revenues, such as those that come from parking garages, parking and speeding tickets, and fuel taxes. Infrastructure is also important in terms of its ability to interact with automated vehicles—smart infrastructure could enable new business models for automated vehicles and allow cities access to greater quantities and new types of data in real-time, improving planning and operations functions.

### **Congestion**

A few members noted the potential impact of automation on congestion. While automation has the potential to increase congestion if not carefully implemented, some members expressed optimism that automated vehicles could aid in decreasing congestion. Overall, automation could help drivers cope with congestion; this may be especially true for truck drivers.

### **Environment**

A few members referenced the potential environmental impacts of automation. Some members drew a connection between automation and electrification and noted that while miles traveled may increase, those miles can be powered by cleaner energy sources.

### **Public Trust**

A few members discussed building public trust in automation. Part of building trust lies in addressing safety, security, privacy, and other public concerns or perceptions through policy and regulation as well as through pilots and demonstrations. Early deployers should work to build customer trust in automation by slowly scaling up pilots in selected cities.

### **Cybersecurity**

Two members brought up questions related to cybersecurity in automated vehicles. In order to successfully deploy automated vehicles, providers and regulators must be able to ensure the integrity of systems.

### **Innovation**

Several members addressed the need to adopt policies that foster innovation rather than constrain it. One member voiced the concern that the United States is running the risk of falling behind, particularly due to regulations. Start-ups with smaller experiments that can be scaled up are key to innovation leadership. Another member noted the need to make sure that ACAT recommendations are technology-neutral.

### **New Mobility Services**

Several members discussed automation as an enabler for new mobility services, including shared



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mobility. Shared automated vehicles will allow more people to access safe, reliable, and affordable transportation. These services can also present new opportunities for individuals who may not own or be able to drive a vehicle.

### **Multimodal and Multiagency Stakeholder Engagement**

Some members explicitly addressed the need for engagement and collaboration across USDOT's various modal agencies as well as between different federal agencies. Other than USDOT, other agencies mentioned included the Environmental Protection Agency, the Department of Homeland Security, and the Securities and Exchange Commission. A few members noted that there are also important roles for different levels of government—federal, state, and local.

### **Discussion**

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Vice Chair Gerdes thanked members for their perspectives on automation. He noted that members are here not just as representatives of individual companies, but also based on their broader experience with automation. There were points raised in common, and points raised by a few – and it is the Committee's role to raise all of those issues, including those where the government may not be thinking about them, for consideration. He then asked the Committee on their thoughts in response to hearing everyone's statements, and answered questions on the process.

*Question:* How will the Committee operate? How are you intending to prioritize or elevate these issues?

*Answer:* Vice Chair Gerdes explained that his style is to let the committee speak and come up with areas they think are important, and listen to incoming advice about areas they need help in. He wants the Committee to be flexible but also keep moving. For example, one approach would be to take an issue – e.g., safety– and begin to discuss it. What are proper regulatory frameworks? How do you address the need for prototyping while ensuring safety? And continue to have conversations between meetings.

*Question:* Are there examples of Federal Advisory Committees (FAC) that have been successful by some metrics, and how and why they are successful?

*Answer:* Vice Chair Gerdes noted that FAA Administrator Huerta had used an FAC effectively in developing a small UAS rule and expanding the operations envelope for commercial UAS. The DFO added that the Committee is an independent body. Decisions on how to be effective are up to the group, which gives them flexibility, but also means they are in charge of any activities. He also described the following possible functions of the Committee:

- The Committee can provide recommendations or advice to the Secretary in the form of a memo. When a FAC provides a recommendation to the Secretary, the Department is bound to respond to that. Written recommendations are often the most effective means of communicating with the Department, but it is up to the Committee as to how they want to engage the Department.



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- The Committee may also decide if they want to hear about activities within the Department, whether research, existing or planned pilots, or other activities.
- Meetings of the Committee can be held at a location of their choice. Vice Chair Gerdes suggested that the group think about multiple meeting locations for the future, and even creatively network locations together so that some members can meet in person while others can still participate.

Co-Chair Garcetti added that instead of just a report, he envisions the creation of blueprint with real metrics and accomplishments the Committee wants to achieve in two and five years. Those would be suggestions to pass along to policymakers in the new administration and used by state and local officials. When talking about safety and innovations, The Committee should look for places to conduct pilots. He stressed that this Committee is not just a body to talk but instead to develop a document to work off of with pilots to have, regulations to see in place in a year or two from now, etc.

*Question* Do we know how frequently the Committee is going to meet?

*Answer:* Vice Chair Gerdes stated that this has to be decided as a group, but that 2-3 times per year is normal for a FAC. It's important to leave space for work to go on between meetings – for members to pursue work in specific areas and having back-and-forth between meetings.

*Other comments included:*

- A critical issue for the Committee to consider is how do you balance prototyping with safety and risk managed deployments? The NHTSA guidance has a section on bounding the problem by using data to show you are safe. And there is a way of using safety through simulation to show how these advanced technologies can be safely deployed in the marketplace.
- Common areas heard across the members' responses, including: development of technology, safety, and harmonization of recommendations, experimentation of prototyping of frameworks, and identification what should be happening at federal, state, and city levels.
- As someone who's spent a long time in DC, they have seen least successful FACs avoid difficult issues (like job loss) without coming to terms about how to address them. The consumers of the FAC will take those recommendations and run with them.
- Market forces create challenges in meeting the needs of underserved populations, where economic interests aren't aligned to do that, especially in early stages where technology is just being brought to bear on these problems. This can preempt overly restrictive rules placed on a market before it can meet the needs of these populations, but still begins to address the challenges of these underserved populations. The urge to regulate may overwhelm new approaches that align economic incentives to meet the needs of small populations without the unintended consequences.
- There is concern about market forces, failures, and distortions. Part of coming up with a concrete action should include multiple visions of the culture and pathways toward those



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visions. Pathways necessarily have forks, and we will need to identify key choices (including default choices) which may be avoided but at least we can spell out the costs of getting them wrong (and right).

- There are three buckets that may capture the themes discussed at the meeting:
  1. Innovation - We need to harness it and use it as a catalyst – it's brought us to where we are today. There are measurable returns for advancing connected automation technologies throughout our transportation system. We should not lead with regulation. We will have it, so long as regulations are clear and concise and can be complied with. And if innovation drives us, we can get there.
  2. Value proposition - Whether it be safety, environmental gains, or productivity gains, technology can bring to light all the value. We need to balance that with the human elements (3.5 million drivers) beyond navigating cities, where there is true value in making their jobs better and safer. The long-haul is where the technology can bring measurable returns.
  3. Framework - Everyone is looking for their role (fed, state, local). This Committee has the ability to shape guidance to these levels but also to Congress, which influences autonomy in multiple industries and other departments, and we can provide value to those other departments in the way that moves all of the efforts forward.
- There are groups outside this FAC working in this area who could report to the committee on these issues, too. Automation is going to have to play a strong role in that, and there could be overlap in those conversations. The National Safety Council, for example, has grant programs that may also have automated components. If there are other groups, we should figure out how to draw on those to avoid duplicating effort.
- During the discussion, Mary Gustanski volunteered to work with Tim Kentley-Klay on how we experiment and deploy systems safely, including discussing the AVs that they are testing with, comparing notes with other members, and to add some context around the safety assessment letters in the guidance and the conditions around safety deployment.

*Vice Chair Gerdes then welcomed comments from the public.*

### Public Comment Period

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The Committee received three public comments:

***Athena Kan, a sophomore in Computer Science at Harvard College (and incoming software intern at Uber)***

Ms. Kan remarked on her excitement about the future of automated vehicles for providing transportation for populations who do not have access to it, in particular those who are low income, rural, and disabled. She is also excited about AVs transport for hospitals and healthcare – patients



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who can't make appointments because of cost or long travel times, or who take ambulances because other sources are not available. Each missed appointment is worth \$150 and she is excited to see how AVs can contribute to a better healthcare system. It was noted that Lyft has partnered with hospitals and Uber has partnered with MedStar in Washington, DC.

### *Amitai Bin-Nun, Ph.D., Securing America's Future Energy (SAFE)*

Dr. Bin-Nun commented that the Committee has an opportunity to not just advise the USDOT, but to also convene stakeholders – industry and the public at large. SAFE is an advocacy group trying to reduce the U.S. dependence on oil and is led by retired generals and Fortune 500 CEOs. The SAFE AV initiative is advocating for AVs because they put us on a road to reduce oil dependence. He added that a report would be coming out tomorrow featuring the risks behind public acceptance and regulation failure. The goal is to create an objective set of metrics to create safety assurance for AV performance. This gets to the heart of creating standards for companies to aspire to, and give public visibility into performance of cars on the roads. He concluded by supporting a public discussion on how safe these types of technologies need to be before widespread deployment.

### *Delanne Bernier, Automotive Recyclers Association*

Ms. Bernier introduced another angle to automation: the environmental impact on end-of-life vehicles. The average age of a car today is 11.5 years (soon 11.6); there is a standardized way of dismantling light vehicles, but this will need to be re-thought for when new technologies are introduced. There are economic benefits of these technologies, but consumers also need ways to replace parts in a safe and environmentally effective manner.

*Vice Chair Gerdes closed the public comment period.*

## Closing Remarks and Adjournment

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Vice Chair Gerdes thanked everyone for their time today, and for time devoted in the future. He has compiled a list of action items, including getting a safety sub-group up and running, and looking at taxonomy of organization starting from what Robin Chase and others suggested and the committee's approach to these issues. Vice Chair Gerdes wished everyone a thoughtful, happy Martin Luther King, Jr. day.

*The DFO adjourned the meeting at approximately 12:00 p.m.*