

Noblis Autonomy at Scale

Finch Fulton Transcript

Good morning, everybody. My name is Finch Fulton and I'm the Deputy Assistant Secretary for Transportation Policy. I've been at the Department for about two and a half years and, somehow, I landed the innovation portfolio, which includes automated vehicles, drones, and some of the big data initiatives...all the fun, shiny things you can possibly get your hands on. Somehow, I got lucky enough to work on all of these things. So today, I'm going to give a high-level overview of all the innovation initiatives the Department has going on.

Also, I know that this is sponsored by Noblis. Thank you very much for having me, by the way; I know we have a great partnership with Noblis, all the work that you're doing with the ITS Joint Program Office. Ken Leonard's here; he's the head of the office, he'll be talking more about all those initiatives right after me. But I know it's a wonderful partnership and we're able to do amazing things with technology.

I know that this is a very sophisticated audience, so I don't have to explain to you the importance of automated vehicles—the impact they could have for safety, removing some of the human error that goes into the over roughly 37,000 deaths that happen a year on American roadways and the greater number worldwide. You all understand this, hopefully. So, I'm going to talk about that, but I also want you to understand how we got where we are today, so I'll briefly touch on that.

Back in 2016, recent history, the previous administration put out a fascinating document: the *Federal Automated Vehicle Policy Guidance*. This document explored some of the big-picture questions and challenges around automated vehicles, including the authorities we can bring to bear and the big-picture questions that remain). It was wonderful and thought-provoking work in its own right. At the beginning of this administration, we put out a document trying to clarify and shape the path forward. It was *Automated Driving Systems 2.0* (ADS 2.0). This document focused on safety first as the cornerstone of all of our efforts—how will we prove safety for automated vehicle systems?

Now, this did put a focus on voluntary self-safety assessments, which, you know, there's been some skepticism about whether or not a voluntary regime works. This was important, especially since we are in the beginning stages of engaging with these new and emerging technologies. Today, we do have 17 of these that we've gotten in. We just got two more this week; we see more coming in the near future. And it's wonderful to be able to take in all of these inputs and directions on how industry partners are seeking to ensure the safety of these technologies. We can all compare them, learn from them, and build from them.

We see different companies and different approaches, learning from each other by participating in these voluntary self-safety assessments. In ADS 2.0 we highlight the specific 12

areas [pointing at PowerPoint slide] areas that we ask them to focus on. But, because ADS 2.0 focuses on safety first, this approach serves as the cornerstone for the entire Department around how we address automated vehicles.

So, from this safety cornerstone we've built out our updated *Automated Vehicles 3.0: Preparing for the Future of Transportation* (AV 3.0) document. This is the guidance that we put out at the end of last year. This incorporates and expands our approach, laying the foundation for all of our work going forward. It is multimodal, so it's more than just the NHTSA approach to ensure the safety of the vehicle and vehicle equipment itself. This includes Federal Motor Carrier Safety Administration authorities around operations of trucks; the efforts of Federal Transit Administration, which funds transit vehicles allowing them to shape what the future of transit vehicles looks like; as well as a lot of our other partners that include automation, such as the Maritime Administration with ports and shipping. The Federal Aviation Administration provided a lot of expertise with their experience of automation. Obviously, they have decades of experience with planes being automated hitting greater levels of safety and improving aviation operations.

We brought together the entire Department to make sure we had a holistic approach that would be consistent and steady for years to come. We wanted to ensure you got the same answer to your questions regardless of where you looked in the Department. And, as you can see [indicating the slide that discusses USDOT AV 3.0 principles], we laid out a number of key principles for how we address these things. We'll touch on that in a second. We also discuss strategies for how we're going to be engaging with you, and how we'd like you to engage with us, so that we can make sure we build something that works for all of our partners.

AV 3.0 did provide new safety guidance, building upon what we already knew and expanding it to new modes of transportation. We hope it has done a good job reducing some of the policy uncertainty our partners face as we approach these questions, these big, hairy questions, and move forward and then, again, outlining the process for working with the Department of Transportation.

So first and foremost, in everything we do, we will always prioritize safety. This is important and, without safety coming first, the people will lose trust in this technology. They will lose faith in its promise. The technology will go nowhere, and all of the potential that it has will go away. So, this **has** to be our North Star, guiding everything we do.

We've heard a lot about our technology-neutral approach and this means for connected, automated, accessible, electric and shared services. You name it. But, we want to be tech neutral. We're not going to mandate, we're not going to prematurely force these things. We have to let these technologies develop. We do want to, for example, protect the spectrum that is needed—the 5.9 gigahertz “safety” spectrum that is needed for vehicle communications so that they can coordinate so they can help improve safety there. But we don't want to say it must be DSRC, or it must be C-V2X, or it must be some future 5G technology that's being developed. We need to

give the innovators and all of you the opportunity to come together to find the best technology that works in the long run. We do not want to be the chooser of technology, because the government doesn't have a terrific track record in that.

We are going to modernize our regulations. We have to do that. You cannot put an automated vehicle without a steering wheel on the road today. We have to update the regulations to show how to do that safely. And so, we have a lot of work to do there.

We're going to be consistent in everything we do. That's why it's important to come together as a department to ensure that we all are on the same page so that, when you ask ITS-JPO a question, you'll get the same answer as you would with NHTSA, as you would with OST. We have to be consistent; we have to drive that “One USDOT” approach.

We're going to prepare proactively for automation, and you'll hear us talking more about this, but this includes not only the critical path of updating the regulations to allow these technologies on the road, but also thinking through the workforce impacts, the privacy and security impacts, and all of the other impacts that people are worried about. If we don't play a proactive role in addressing this; we will not have the opportunity. If we don't focus our efforts, the government will act as an unnecessary hindrance, and things will not move as quickly as possible.

And, then, the sixth principle seeks to ensure that people understand we're not going to take away their ability to travel and to choose options on their own. We want to protect the freedoms that people know. People get very scared of these technologies, mostly because they're not on the road. We have some levels of automated driving assistance technologies on the road today, but we don't have truly autonomous vehicles on the road. People get scared, and so you have to make sure they understand that they will be able to drive their own vehicles. I could drive my 2004 car as long as I want. It's not going to be automated ever. We know that this is a future, mixed fleets of automated and people driven vehicles, that we think makes sense.

So, I do want to focus on the cross-cutting issues. One of the main things that we took a lot of effort ensuring that we had clarity—amongst ourselves, even—was shaping the Federal role in these technologies. We are not the innovators ourselves, we are not the ones creating these technologies. We're the ones working with industry on these technologies. So that means we shouldn't try to develop the technologies, we shouldn't replace private-sector businesses, but the Federal government does have a role in a number of cases where there are market failures or where the problems are so big that we have to have a full approach—and the key area that I like to point out is with accessibility and ensuring that these vehicles can work for people with all sorts of disabilities.

So, one of the things we made sure to get out before we put out *AV 3.0* and then we included in it is, the *Travel Patterns of American Adults with Disabilities*. The point of this is the majority of Americans will have a disability at some point in their lifetime, whether it's visual,

hearing, cognitive, mobility...well, you name it, or through simply becoming older and then losing mobility options. These technologies can open up new labor opportunities that can help people connect with their family—people with disabilities suffer higher levels of loneliness, even, because they tend to be stuck at home. So, we have to make sure that, as we work on these vehicles and as we work on these initiatives, we're thinking through all types of disabilities and working towards the North Star of universal accessibility and universal design.

So, this is a great opportunity to take all the research, the billions of dollars in research going towards automated vehicles to ensure we're shaping that and working proactively so that these technologies can work for people with cognitive, visual, auditory, mobility disabilities, you name it. This is not a silver bullet, but we do have a wonderful opportunity. If we can use this excitement and build on the research, maybe we can even find new ways to address some of today's systems and today's vehicles and today's challenges—we can address them by using the research, by using this momentum to leverage greater accessibility and inclusive designs for vehicles in the near future, not waiting for the silver bullet of an automated, truly universally designed automated vehicle.

We have a number of wonderful initiatives and you're going to hear a lot from the Department in the future focusing on these issues. I think we have some great research projects going on, whether or not it's the ITS for the Underserved Community project or through the millions of dollars of spending through ATTRI, or through some of our vehicle design initiatives through NHTSA or just through the Department's efforts as a whole. This is a focus of ours, so you're going to hear and see more from us. We believe this is part of the Federal role. We belong in this space, helping these technologies develop in these ways.

One of the places where we focus this on accessibility is in the \$60 million dollars we put out for the automated driving systems demonstration grants. We received 73 applications—the application window closed in March—and we hopefully—I keep learning that “soon” in government doesn't mean the same thing as it meant in my previous job, but—soon, I think we'll be able to make some awards.

The key focuses with these grants are, I should say, first and foremost, it's the ability to demonstrate these technologies safely so people can see them, touch them, understand them, learn from them, develop a community for all that will be involved in these technologies to work together to allow the type of operations they feel comfortable with to happen in their communities. This was a key part of the applications: they had to show everyone was on board.

And this is something we learned from the Drone Integration Pilot Program that the FAA has been conducting for a year and a half, two years now, where the key factor there was having to bring in the community to engage with these technologies. The FAA could probably preempt communities on everything in the air that they wanted; but that doesn't mean people will accept it and, then, if you don't get the acceptance of the actual public, they will revolt against it, they'll work with Congress to protect their rights, the technology could unnecessarily fail, and all the

potential will go away. It is critical to let these technologies be introduced to the communities that are eager for them in ways that they want, that it's collaborative, so that they are not rejected. So that's important, and that is something that you'll see across all of these new technologies where the USDOT is involved.

Also, the data that we need, it is critical: the reason we do these programs is so that we can update our regulations, so we can update our standards. If we're not getting data that helps economists or that helps the lawyers making the rules prove the cost-benefit or safety of these technologies, there's no reason to spend this money—if we cannot get data we need to accelerate the path forward what are we doing?

And this is one of the things that I'm excited about: we got 73 applications, they all offer different types of data that they would be willing to provide. So, as we talk about data sharing and, as we talk about having a safety goal that we're working towards, knowing what data is feasible, that people are willing to offer —granted for millions of dollars—but it's a starting point, right? What is the data that is feasible for them to offer today that could help us make these rulemakings so they can help us with this.

So, this is something I want to make sure we can get it out in people's hands to understand: here's what's offered now, here's what is feasible today. That's at least a good starting point so we can all have a common menu to start from.

These are the three focuses of the ADS Grants, but, circling back, we also ensured that one of the key requirements that we sought in the grants was vehicles that can address accessibility concerns and that can be used to help us learn how to improve accessibility.

So, I understand truly, highly autonomous vehicles don't exist today in the way many people think about them, but how can we improve using today's technologies? Paratransit is a good example that we've seen around the country, or some of the accessible vehicles that you see even driving around nearby: how can we use those and learn from those? So, we see that and we call specifically for people that need wheelchair restraints, because that is a novel one that, if you don't call it out specifically, people often don't quite think through the entirety of what that means. So, you saw that in this notice of funding. I hope that we will get everything we want, but we'll see. This is a tough program, these are high-profile dollars. They have to be “Buy American” compliant, because these are American taxpayer dollars that need to support American innovation. The data requirements are tough, I mean everyone has known that receiving actual, valuable data has been a big problem. It is tough to make sure that what people promise can actually be delivered. And that's something that Ken and his team have been working closely on for the entire Department, through this initiative. That's tough and so it's very interesting.

One of the other areas that Congress has been keen on, that the community has been keen on, that our union partners have been keen on, is ensuring that we're preparing for and thinking

through the impacts to the workforce of these technologies. So, we're conducting a study alongside the Department of Labor, Health and Human Services, and the Department of Commerce, which will come out “government-soon”, but we're close, I think. This is focusing first on the impacts to truckers and then, second, impacts to transit operators. We could address things like package deliveries that aren't true, long-haul trucking; things like ride-sharing, taxi services, in a second part of the study that will come after we get the first one out and receive feedback on it.

But what we've seen—it's been interesting, and I'd just highlight that there's six things in general that I think will impact the nature of workforce impacts of automated vehicles that people need to consider, specifically to truckers. One, is the technology has to be there. We can't predict when that will be; depending on who you ask, they may think it's very soon or they may be like it's going to take some time, but the technology is not there today. So, if you're looking at workforce impacts, the starting point is not today. The technology has to develop.

Secondly, the shape of what the trucking industry looks like: only 10% of the trucking industry are these major companies that do—I don't want to name-drop, major companies that have more money to invest in fleets of trucks, so—only 10% are these major companies that will probably be the first to invest based on what we hear, in these technologies, so that makes up a small part of the trucking fleet. Ninety-percent of the industry are those 10-trucks-or-less, mom-and-pop shops: they buy their trucks typically from the major industry partners after...7 years, 10 years, 13 years after they've been used significantly. That's when the fleet turns over to the secondary market, the 90% of the market, so go ahead and add a decade to what you may have already been thinking and expecting about when that might happen.

By the way, I say things like “a decade,” [but] we're not trying to predict when this is going to happen. We know we don't know, so...think through that time period and then look at who mans those trucks or, look at who the truck drivers are themselves. They tend to be people that are choosing this as a second job, they tend to be in their 50s and 60s. So, we're not talking about a trucker today being impacted, and we're talking about somebody that's choosing this as a second career that has options, or can get training for this. The Department of Labor has tons of programs that they're making sure are included in this report, to ensure people can get the training they need, either for a different complexity of trucking or different types of jobs.

One of the things that we've seen is new technologies; ATMs are an easy one, they certainly changed the way banks operate, but there have been more people employed by local banks because of ATMs that have initially displaced jobs, so jobs actually grew because of these technologies.

It is possible that these people, choosing this industry, these opportunities, will be able to choose different types of jobs or the same type of job with different features. We don't know when that turnover will be, but the point is, we should have an opportunity to engage people making choices, not worrying as much about somebody having something pulled out from under

them. It's also worth noting that because truckers are today averaging 50 or 60 years old they might decide to retire before these technologies come on board anyway, so that's something that the Teamsters and AFL-CIO and our partners that we've brought into the room have been telling us and thinking through these problems with us.

It's also worth noting that we have a shortage of truckers. The scope of it is different depending on who you ask, but the American Trucking Association says it's a 50,000-trucker shortage today. That number is projected to go up to... I can't remember if it's 130 or 160,000 by 2028, but the point is there's more demand—the demand for freight is increasing, the demand for package delivery is increasing. Federal Highways put out their household goods survey and we just see that the number of freight-related trips are increasing dramatically to the point where people are taking fewer trips from their home to go get goods because they get packages delivered straight to them. People travel less to go pick up goods because it comes to them. This impacts the amount of demand for freight, for trucking, for logistics—that demand is only going up from what we see. We don't know if that'll continue, but these are things you have to keep in mind as people who are concerned as we talk to our partners about what this technology could mean.

So, this is interesting to me, I think it'll—hopefully, we'll get this out this summer, in the near future, but one of the things that we included in *AV 3.0* and one of the things that's important is this is, not the first time the Department has faced concerns over people losing their job because of automation. The FAA has dealt with this going back to the 70s, 80s, 90s as these technologies have developed. And what do we see today? Pilots are still very highly valued, they're very highly respected, there's still a shortage of pilots, they're well-paid; automation improved their lives in many ways. It improved safety and improved the quality of their jobs and they still exist. So, we don't know exactly what will happen, but we have seen this before, we've seen echoes of this and we try to learn from the past.

I did already talk about the spectrum, but I cannot emphasize enough how much focus that we've put on this because it is very important that all of our industry partners speak up about the potential for safety, the potential for connectivity, the potential for efficiency that this bit of safety spectrum can play in the technologies that are being developed and are in place today to take advantage of it. We do need to see greater, widespread use of this of this band. It's not enough to say that the \$700 million dollars the DOT has put in place to support this, the massive amount that our State and local partners have put in, all the projects that our industry partners have put in that utilize this band, that alone doesn't justify preservation of the safety band. We need to see more deployments, we need to make sure that this band is preserved for traffic safety purposes. So, if you're also interested in this, you might want to pay attention, and pay attention to opportunities with our other Federal partners to make sure that your voices are heard on this subject as well.

This is the map [pointing at a PowerPoint slide] that is included in *AV 3.0* that points out where around the country what deployments are today and are planned. It reinforces the message that it's not like this isn't being used. The people who are developing the technologies want to deploy, and soon you'll hit that tipping point where all vehicles are included in the map potentially. Our industry partners are interested in including these technologies on their own.

So, as we look at everything the government's doing, we do have a number of initiatives. How do we tie them together? One, is we have our comprehensive plan that Congress has been urging us to put forth. As part of any comprehensive plan, you have to look at all of the actions that the Department needs to take, all the actions that our industry partners need to take, all of the actions our state and local partners need to take, but in all of that you have a critical path that will dictate the timing—because we can do everything we want, but for us, if we do not update our regulations we will not get there. So, we have actions but we also have critical paths. We're developing a comprehensive and that puts all this together. It will include your input. We have to have the best minds in these technologies give us their best guess as to what the step-by-step progress looks like, these are the building blocks that we're working from [indicates slide with current regulatory actions].

The first one is the FMCSA one: this is a big, comprehensive notice of proposed rulemaking. For FMCSA's regulations, it made most the most sense for them to put it all together in one package---discussing the challenges and potential solutions to their regulatory challenges. So, this is a document that is really important for the future of commercial motor vehicles, with how we're going to address automated vehicle technologies and what that means for those that do the inspections, what that means for operations and so on.

The other one that I wanted to point out is NHTSA's efforts to remove some of the regulatory barriers around the Federal Motor Vehicle Safety Standards (FMVSS). So, I love NHTSA's approach, they're doing it two ways at the same time: one, you have the step-by-step approach that goes into each and every single FMVSS; this is something we've been working with Virginia Tech on for a number of years, and probably with a number of you in the room, for a number of years. But this is going piece by piece and looking at every single comment, every single period, every single word and figuring about what needs to be changed and what do we need to prove so we can make these updates. This will take time and we see how fun this is with our drone initiatives to go into every single reg and update them piece by piece, this is important.

And we're going to continue our focus on this, but one of the things that I also love is—we call it “Heidi's principles,” this is for Heidi King, our Deputy Administrator of NHTSA. And what this rulemaking is trying to say is, if we know we're going to have to make performance-based rules, we know we're going to have to do variable testing to figure out how to do it, we know we're going to have to do research to figure out how to do that, and we know the technology has to develop with us along the way so that we can get there. Well, what are the things...what are the performance-based rules we need to follow?

If we are developing a regulatory approach from scratch, what are those things? There are four: 1) The vehicle has to get from point A to point B. 2) It has to protect the passenger. 3) It has to not hit people or things on the outside of the vehicle, and 4) it has to follow all laws. Well, that sounds a lot simpler, obviously. It's complex in the way you have to actually prove that a vehicle can perform at these levels, but we're also trying to get comments and build pathways there so we can figure out how we incorporate something that's simple, that the average person can understand, the rules—how these things operate.

How can we look at the rules so we're not just taking the step-by-step, comma-by-period approach, but instead saying, “let's look at a new way to do this, maybe there's a better way.” Maybe we decide it's all for naught, we need to do it the FMVSS-centric way anyway. But we're exploring both pathways because we want to make sure that we have a system so that these vehicles can continue to evolve over time and not be stuck with prescriptive requirements that limit safety, where you have to go back again and again to update the rules as the technology develops.

One set of items that are on the critical path, and will shape part of the way our approach will develop—we have two opportunities in front of us that we've received comment on. One is the Nuro petition around package delivery vehicles. So, if you have the big, complex, hairy set of rules around moving people, what are the rules and what are the requirements that can change if there's no person in the vehicle? You don't need rearview mirrors, you don't need a lot of things to protect passengers, you don't need to put a seatbelt in there if no one's ever going to be in there. But, right now, the rules don't allow for it, because they're not performance based and they were written at a time when we never considered vehicles without people. So, this is a great opportunity to take comment on providing exemptions. When you provide an exemption to the current FMVSS, you put a number of requirements on things in areas like safety, and include data sharing in them and the like. This means that if you follow these requirements, we will allow a limited number of these vehicles to operate on the road.

We can learn from these operations and use the data and experiences to create new categories for types of vehicles or types of operations where it doesn't make sense to put every requirement for humans on. This is also something we learned from our drone world, where they're looking at all the requirements that don't make sense for aviation when you have a small drone instead of a plane that's landing in front of us here, you don't need all those rules, so how can we do that? The goal is to use these exemptions to rewrite the rules so they can accommodate technological growth over time, and users will not need to request additional exemptions in the future.

The other exemptions request is from General Motors. This is more of a...I guess it's not right to call it a “classical” vehicle, but this was with the first petition for exemption for an automated vehicle that we got in. And the reason that's been helpful is because it helped us figure out, all right, as we go through this process, what doesn't make sense at USDOT anymore?

We've already taken action to fix the process last year by changing the rule of "completeness." What this rule essentially meant was, that any time the Department receives a petition for an exemption, they get to decide when it's "complete" and the clock doesn't start till then. Well, if you have clocks and you have these deadlines and you're supposed to put the emphasis on timeliness for complex questions, you just don't ever declare it 'complete.' And so, we've had petitions that sat in the Department for seven years, ten years; they just never declared them "complete". People just didn't want to work on them, and that's not the way government's supposed to work, so we removed this requirement.

When we get these requests in now, the clock starts and we've got to start working on them. We quickly put them out for public comment... When people come to us for an exemption petition now, it's going public right away, so they better be ready, that it. You are going straight to the final exam. The public will know how serious your request is. And I think this is good, this is a way we have improved government by removing unnecessary burdens and streamlining the system. And it makes sense when people see real ways we're improving the process. So that petition has been super helpful, it's been on our dockets for too long but it's because we have changed the system itself to make sure we can handle these in the future.

So, I've talked through our approach—taking that cornerstone of safety, laying a foundation so we have a "One USDOT" approach—as well as looking at both the critical path and all the other things that are vitally important to gain public trust and to ensure that we're proactively thinking about these technologies.

One other thing that I want to bring up is—it's fascinating how much we don't know about what the Federal government's already doing to support these technologies. I can talk pretty knowledgeably about what DOT's doing, Ken could talk even more knowledgeably, I'm sure, about what DOT is doing, but I couldn't really tell you what DoD is doing now. I have a hard time telling you how DOJ addresses their set of issues. We've been working with Labor and Health and Human Services and Commerce...so we know a little there. No one really knows what all the United States government is doing.

So, what we've done is we're starting to work in an interagency fashion through the White House. We're going to start simple. We have to take an inventory of all the actions the Federal government is doing around rules, around research, around initiatives, pilot programs and so on. We need to put it all in one place so everyone understands the entire ecosystem of the actions of the Federal government for what's going on. We can align these things, we can ensure we're all on the same page, we can accelerate initiatives together.

For example, the Department of Energy has hundreds of millions of dollars that they're spending on technologies that can enable automated vehicles in the way industry is thinking about creating them, electric. Wouldn't it be great if we're all better aligned so that their 100 million dollars—we could put two million dollars on top of it and suddenly get something that's fascinatingly useful for our rule makers and for our industry partners?

So, we're doing this right now, we already have people over at the White House, it's a big effort. It's an interesting effort but, as we talk about the comprehensive plan, the critical path and the other things—it's important for everyone to have all the pieces. To know what needs to go in this and that, and to know what makes sense to do, and in what order. This is something that we don't have today, and this is a great effort that, hopefully, we'll get out “government-soon.” I still don't know what that means. But, this is something we're working on in real time and it really, I think, will help shape the path forward,

So, the Department is doing so many tremendously interesting, exciting things, and I'm just excited to work with you all on them. I have like a minute left to take questions, but if you have hard questions, Ken's coming on a minute after me, so you can ask him those. Thank you all very much.

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