

**Pedestrian Connections: Planning for the Walkability Needs of Older Adults and People with Disabilities from Current Conditions to a Future Environment with Automated Vehicles**

**Webinar Transcript
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KRISTI MCLAUGHLIN: Thank you for calling in to the NADTC seminar on pedestrian connections. So in about five minutes we’ll get started. You are in the right place. Unfortunately we don't have hold music. So just know that we will get started here very briefly. Thank you so much.

We are going to get started in just a couple of minutes of we usually have several people trying to join right at the top of hour. We are going to wait until one minute after to get started to give them a chance to get connected. But we will get started very shortly. Thank you very much.

KRISTI MCLAUGHLIN: Thank you everyone for joining us for the NADTC webinar on pedestrian connections planning for the walkability needs of older adults and people with disabilities from current conditions to a future with automated vehicles. We are very happy that you are able to join us today. A few housekeeping items that we are going to get out of way before we get started. We are recording the webinar today and the recorded webinar as well as presentation materials will be posted to the NADTC website within a few days.

As soon as we are able to get that ready. If you are connected both by phone and Internet this is a great time to go ahead and mute your computer speakers. If you have not already experienced feedback, you will eventually experience that having both of those going at the same time. So please do go ahead and mute your computer speakers to eliminate that feedback.

If you are on the phone but having trouble joining the blackboard webinar room, you have two options for technical assistance. You can contact the Blackboard technical assistance line at 877‑382‑2293 or you can e‑mail me Kristi McLaughlin. And we will get you connected. And just a reminder, though, you do not have to be connected to the webinar room. We did e‑mail the presentation to all of the registered participants about 45 minutes ago. You can print that out and participate just by calling in on the phone if you would like to do that. You are not going to lose any functionality by participating that way versus being connected to the webinar room.

Next, we will have a question‑and‑answer session during the webinar at the end of the webinar today. You can submit your questions or comments at any time either by entering them in to the chat box or by sending an e‑mail with your question or comment to Rachel Beyerle at rbeyerle@easterseals.com. Captioning is provided for the webinar today. You can access the captioning by either pressing control and F8 on your keyboard or by clicking on the CC icon that is the top left of your screen. When you do this a separate screen will pop up for you to resize however you would like and you can set the font and type size to your liking as well.

So with that I'm not going to make you wait any longer and I am going to turn the session over to Rachel to get us started. Rachel.

RACHEL BEYERLE: Hello. Good afternoon or good morning, depending on what time zone you are calling from and again welcome to the NADTC pedestrian connections webinar. As Kristi said, my name is Rachel Beyerle. Today we are excited to welcome our guest speakers. Our first speaker is going to be Dr. Meg Traci who is a research associate professor at the University of Montana and also representing the work of the Montana Disability and Health program and the Rural Institute for Inclusive Communities. And we have two speakers from the Pedestrian Bicycle Information Center. They are Dr. Laura Sandt Director of the Collaborative Sciences Center for Road Safety and also Director of the Pedestrian and Bicycle Information Center. And Dr. Michael Clamann who is Senior Human Factors Engineer at the Highway Safety Research Center and both of those are located at the University of North Carolina. Our presenters will show a little bit more of their roles and work during their presentations.

And before we move on to those presentations I just wanted to provide a brief overview on the NADTC. We are a U.S. Department of Transportation technical assistance center and we receive our funding through the Federal Transit Administration with guidance from the Administration for Community Living which is part of the U.S. Department of Health and Human Services. We are co-hosted by Easter Seals and the National Association of Area Agencies on Aging and our mission at NADTC is to promote the availability and accessibility of transportation options for older adults and people with disabilities as well as caregivers. We do this by providing technical assistance through information and referral, we have a toll free 800 line or you can also e‑mail us questions if you have them. We also provide training and education such as this webinar, communication and outreach. We have a monthly e‑newsletter and if you are not subscribed you can do that via our website, and we also provide community grants. We will be sending out announcement this afternoon about our 2018 grantee communities.

In terms of pedestrian topics, pedestrian accessibility is just one of several areas we focus on within the realm of accessibility and livability. And we particularly want to emphasize the importance of walkability to public transportation especially for older adults and people with disability. But we want to focus on accessibility for all. And pedestrians related resources we offer include the accessible pathways guide, the access to transit assessment tool, the driver and pedestrian safety guide and we also have a neighborhood wayfinding guide and assessment form, and if any of our listeners today are participating in our accessible pedestrian pathways online course you are familiar with that guide because you have used that for your walkability audit as part of the course. And we also have a snow removal guide if you live in regions of the country where this is an important issue.

In the past we participated in some pedestrian related Twitter chats, and you can find archives from an April 2017 chat and a more recent February 2018 chat that we participated in and all of these resources that I just mentioned are available on our website which is [www.nadtc.org](http://www.nadtc.org).

That provides you just a brief introduction to what we do related to pedestrian walkability at NADTC. And with that as a background I'm going to turn it over to Meg Traci who is our first presenter from the University of Montana.

MEG TRACI: Thanks Rachel. I'm really happy to be a part of the conversation today. I'm representing the work that we are doing here in Montana on an inclusive interdisciplinary approach to making walkable communities.

Lots of folks to acknowledge. These are some. We have some funding from the national association of primary disease directors. We organize with our partners for that opportunity. And we are lucky to have Liz Harris. We have terrific partner coaches in both those communities. Karen and Scott representing public health and center for independent living as well as Karen Sullivan and Todd Horr representing public health as well as the developmental disabilities planning Council. And the ADA coordinator position. Mark Fenton who is a national walkability advocate is a national partner. Link provided on the slide. We wouldn't be doing this work without our centers for independent living. We are lucky to have strong CILs in Montana. Montana disability and health program organizers, one of our programs is disabilities advisor where we recruit, train and support disability leaders to be on our public health planning committee for the building active community initiatives, and Christopher has been playing the disability advisory role for several years now, organizing this CIL staff to work on improving sector accessibility, particularly those sectors that are part of the health determinant network. And these are some of the folks who have been really involved in the ambassadors project and walking at it in the last couple of years with us. The Healthy Communities coalition action teams have been integral throughout the state. And I want to acknowledge Walk Montana and Melinda Barnes and her leadership. The Montana Department of Transportation and many others. Lots of folks working together to make our communities more walkable in Montana.

Let's see, this is a slide, a map of research and training center on disability here in rural communities here at University of Montana. My colleague developed this map with ACS data from the 2012 to 2016, five‑year sample and I have included it here just to represent that people with disabilities live everywhere and in some of our counties the rate of population as high as 37% and it ranges quite a bit and in rural America we tend to see higher rates of disability. When we think about what makes a walkable community, that persons with disabilities have a part of the answer, and they are in all communities everywhere and highly engaged the disability team in our work is really important and I have included this slide which is a famous disability Civil Rights photo, featuring leaders like Justin Dart and Judy Huemann to say this work is a continuation of that movement.

Walkability for communities for all Americans depends on the solutions for its member including people with disabilities. And one more slide, to drive that home. Who is meeting at a confluence. The slide shows I‑90 running through on the background just east of Missoula where I live there in Montana. It is a healthy communities. The black river meeting the independent living movement. We are going to have a rich set of solutions to building walkable communities for all. And this is a way to represent universal design. We are not doing this work simply because we want people with disabilities to be included, be a part of the reach. We want communities to be better because people with disabilities have a sensitivity and a focus and solutions that are beneficial to all.

And I have included a link there, if you are interested more in universal design.

So this is the train I took from Chicago over 25 years ago to Montana, the Empire Builder. And I included it here as an illustration of how do we make communities walkable. What's the rationale. How are we including people with disabilities to drive us past our current boundaries? I would argue that a lot of our work in the walkable communities builds a rationale of comfort when increasing comfort in our communities, social capital, economic vitality. We started to build out and talk about health. Obviously safety and welfare. But by including people with disabilities it really are strengthening our engines, these three engines and able to go the distance by adding dignity, equity and freedom. I have included a little resource of an average, TEDx talk by Todd Rose that helped to make this point a little further.

One last slide, it is about environmental attributes that connect people with disabilities to their community to socialize, jobs healthy eating and physical activity. It is about what we know, what we know works like public rights, WAI accessibility guide lines and putting people in leadership roles so we can imagine more. On the left is another photo from Tom Owens, this is the 1988 action where people took hammer to the curbs of the Hollywood walk of fame. This is radical tactile urbanism. Some of the first curb cuts being imagined there. And on the right is a pedestrian bridge over highway 93 which goes north from Missoula up around Flathead Lake (?). And this is again nobody could imagine this until we really involve the whole community by you can see this is a nice accessible pedestrian ramp but also with a cultural values of that community.

So from the public health perspective, why do we do this? It is important to keep in mind the range of health disparity is experienced by people with disabilities that are ‑‑ can be addressed to environmental interventions. I have included some results from the Montana VRFS which is one of our public health data systems and we can see from the 2015 data where we had hypertension question that nearly twice as many adults with disabilities experience hypertension compared to those without disabilities. So if we are trying to reach HP2020 goal, we have to take this equitable approach. We have to be thinking with a disability community about solutions.

One more thought about inclusion is it is about partnerships. But it is also about leadership. So it is important to have the diversity and your partnership to include disability representatives. So you build a table. On the left you have picnic table and you have invited disability representatives. But you really are doing this because at the end of the day you want to fulfill leadership roles of people with disabilities. At some point this table has to be accessible and that's because the person who has bought the table is involved in spending those dollars who says this is advocate.

This is a screen shot from America Walks just showing that they have these memorandum of understandings with a variety of national organizations including the National Council on Independent Living. They are organizing for partnerships and leaderships to do more inclusive work. So those of you who aren't familiar with the National Council on Independent Living I have included a screen shot from their website and other organizations that America Walks is partnered with the National Center on Health Physical Activity and Disability and take the inclusive approach to building out the resources and supports for a more walkable community. NCIL is comprised of centers of independent living. They exist in every state. There are over 400 and this map again is from the RTC Rural and it shows just the range and density of the CILs. They cover in Montana and our centers for independent living cover county. They provide service throughout the state to find a CIL in your area I have included website for the IRLU directory.

And this arrow just shows those four centers I acknowledged at the beginning including public health and developmental disability and some work that I am going to talk about today. The important thing is when you think about a CIL they are poor services can be leveraged to this work. They are doing community outreach and they are building advocacy. And a lot of that can help you to focus a partnership in a way projects, policy, and other planning opportunities to realize inclusive outcomes. And on this slide I want to acknowledge (inaudible) for all the help in thinking of who you to bring CILs in to leadership roles in to this work.

So today I am going to talk about our walk audit model that Mark offered to us and is working with us to implement throughout the state in a more inclusive interdisciplinary way. If you haven't been on a walk audit, it is a facilitated group walk in an area to support active transportation and healthy food access. It is usually held as part of a workshop with introductory and planning sessions. And it is an effective tool for education inspiration and practical planning. And it is ‑‑ Mark really talks about this as active shared discovery. It is a lot of fun.

In this slide there are some pictures that Mark has shared with us from Louisville, Kentucky where there is some pedestrian planning going on and these are inclusive walks. But in a little bit different way than we are going to talk about today I think. So when you do a walk audit, I mentioned you do this as a comprehensive and project planning public input component. It is part of reviewing your policy for zoning design, guidelines and schools. When you are introducing infrastructure such as roundabouts, trails, et cetera. When you are thinking about events, big public events the infrastructure is being leveraged to be hopefully inclusive. Take a look by doing a walk audit.

If you are going to do walk to school or work or pop‑outs, there is open streets and the like. These photos are again Mark Fenton's photos from different work he has done throughout the country. So when we think about what's different about the usual walk audit and when we are trying to do in Montana, heart of the I2WALK is a trained interdisciplinary team that represents four entities. When we first started working with Mark it was these first three and he said let's solidify this relationship. Someone representing land use and planning and someone representing engineering or the Department of Public Works and infrastructure, and a disability expert. Defining a disability as a dynamic interaction between the person and the environment.

What makes the I2WALK interdisciplinary team exclusive? A little bit more on who is on this planning team. Who is leading these walks, these four persons at least team? These are people with disabilities who are decision makers and planning and implementation and evaluation of the walking audit. These team members have training with Americans with Disabilities Act and mobility orientation, and related codes and guide lines to provide technical assistance and healthy solutions for all.

And in this picture we have got photographs from the inaugural workshop with Mark working with the greater Helena area and some of our ambassadors from around the state to do the first walk audit that we are inclusive interdisciplinary plan with the community on that team. You can see Christopher's picture and Mark and Karen Lane and others walking around Helena. So this is a little model I have included of it is not easy doing these walk audits. You don't shut up and walk. It is a lot of work for the team and we are beginning to describe that in our tools and through experiences with our centers for independent living and community partners in Montana. Inclusive interdisciplinary team prepares to facilitate the workshop. And it is a three to four-hour workshop. There is an introductory session that needs to be planned and PowerPoint slide presentation that Mark has given to us and that we have been working on to make that template for the variety of different occasions that our partners are using the walk audit model for. And so that whole slide that is really tailored for what the occasion is and what the community is, and what that desired outcomes of the walk are.

And then you plan the facilitated group walk that's the area within interdisciplinary group of stakeholders. They are going out and looking at targets and then the final session is probably the most important session where people come back and say what did you see, what happened and we do some action planning and we really are thinking about the three Ps programs, projects and policies, who is going to do what and when and then the short and long term follow‑up that is important part of doing this kind of work.

Preparing for the I2WALK. So we want to identify the workshop location and it has to be an accessible meeting space. We want to scout the route with the team. We are going to choose the locations. There are targets on the route we want to identify as a team. We are using this new I2WALK targets checklist to gather team notes from this interdisciplinary and inclusive perspective. Everyone has a different view of the target and why it is good and why it is bad. We want to get those notes together for whoever is going to be facilitating. We want to make sure to be inclusive that when we have a route for people to walk we are also including text descriptions. It is not a map we hand out.

We want people who are blind to be on our walk. We are going to provide the information in a way that meets that expectation. Identify significant barriers, we are going to plan for alternative transportation. We just don't know what's going to happen. And so we want to make sure people can get back for that action planning session and it may be a windy day and it may affect people's eye gaze technology. It might be a variety of reasons that someone a disability may need to go back. So you plan for the transportation and when you do that others want to use it because they have to get back for a call or for a variety of reasons.

We also plan for a shorter alternative route for a lot of folks who may be de-conditioned or they have been sick. This allows them to spend a little bit of time in the same area that was a little more focused on some of the targets and getting at details of environmental design for providing access to those assets. These targets include schools, public transportation, bike shelters, trails, open spacing, recreational areas, diversity of residential developments, retail commercial settings, diversity of (inaudible), curb cuts and amenities and we are looking for inclusion attributes. One is the curb cuts of we want to put accessible surfacing of trails somewhere on this walk as possible. If there is a playground we want to at least be able to talk about (inaudible) surfacing and accessible entrances to businesses and other buildings and transportation shelters. What does that look like for accessibility. These are all the kinds of things that are hoping to highlight and have conversations about on the walk audit then be a part of our action planning.

This is a slide that Mark uses. Again this interdisciplinary approach is going to leverage all these perspectives to the conversation. So as you are planning and as you are holding the walk you are going to have people who are thinking about sections of the route from a land use perspective. Do I want to go here. And we are looking at how things are connected. This network of facilities. Can I bike there, walk there, is there public transportation. And looking at this site design, this is a place I want to go. And finally we are looking at the safety and basic standard accessibility of features that reduce injuries and fatalities. And as we are doing this work we are seeing, you know, that the inclusion is appropriate, disability community is bringing perspectives to all four of these. For example, land use, if we were looking for accessible housing development, and people point to the senior or a physically disabled housing unit, the housing unit for people with physical disabilities, oftentimes it is so isolated. It is not connected to anything. And it is really hard to build a route to include that unit. So it is really nice to be able to find affordable housing that is at least visible and has universal design elements that is within these destinations and comfortable enjoyable places and it is connected. Lots of photos on this slide illustrating these four areas or four elements for active design.

Preparing to conduct a walk audit, how we want to revise the presentation and tailor it for the events. It is really important with the team to think about evaluation, how much or how little can we do and should we do. It is important to think about the team roles, preferably you want to do that before the workshop with an in‑person planning meeting, who really can at least pretend to be someone as high energy as Mark Fenton for the walk audit and keep the conversation going and keep moving. That's really important to think through and to plan for. And got to send the participants invitation and agenda with the route information and sign in participants and offer those photo release forms of the photos are so important for the action planning that we want to make sure we can use them and then how we are going to conduct the workshop and then how we are going to follow up. All that is important to do.

Some of the evaluation we did with the Helena inaugural event was to sunlight open‑ended responses. What people were asked about what they would commit to after the event and they would do more walk events. And that has happened. Nice outcomes and continued walks in Helena. People are going to be educating people and family and friends. I will never be able to look at my community the same again. Improve public health.

It is really quickly my last couple of minutes. I want to show this is the route and there is some text descriptions for a short route, this is an introductory walk route that in Helena put together and it takes about ‑‑ it takes about an hour to meet with everyone and to walk this route, provide some accessible alternative transportation back to the start. And then people understand what it is about. And they are willing to engage their organization in the whole workshop. So you are going to see some photos from the winter, from when Helena did this walk with leadership Helena which is a businesses and organizations, this is a community of that group focused on health.

So this is Helena, Montana in the winter. And that comes with its own challenges. So excited to hear about NADTC's resource on snow shoveling and recommendations. These are the things that we planned for and wanted this group to see. And more photos of how the snow builds up on those curb cuts and how the streets are icy and snowy and the connectivity is affected by the snow in ways that can be isolating or dangerous for people with disabilities. Here is the snow and importance of snow shoveling. I have been a part of doing this walk with the Helena partners in the summer and it allow us to look at some of the other challenges for walking, for the Helena community when there is not snow. This is that added layer that we are to look at.

This is Helena. You should visit. It is gorgeous, and you can see its sleeping giant in the background. It is not always gray and snowy. Some photos that I included from some recent planning that we are trying to establish the route like the one in Helena where we can train some leaders and do introductory walks, and this is Travis Hoffman and Chris Seller who is a mobility specialist. And I included this photo to emphasize, if you can having advocates represent both experiences, people with ‑‑ who are blind and low vision they have whole different set of solutions for building out walkable communities. And as do people who use power wheelchairs and wheelchairs. And there is obviously shared solutions that each comes with their own perspective on the environment.

And it is to ‑‑ these are some examples from the walk that we are putting together in Missoula. There are some plans for accessibility but not for maintenance. That door is pretty narrow. Here is, you know, 2018. And this is right downtown Missoula. We still don't have curb cuts that are in our sections. And we build out beautiful parking and as an example for how the walk audit would go, some people might say oh, we like this section of the walk and there is a tree and there is lots of places to go. But the accessible parking is set up so that when you open your van the ramp goes in to the tree.

So ‑‑ it is bringing people together. And we also like the Bike Walk area. It is nice. But if we could have everyone thinking about this ahead of the time that would be better. And that's me. We did include some resources for you on this contact page, including on that last website, there is a webinar that Mark Fenton did for us. Thanks. Any questions?

KRISTI MCLAUGHLIN: Thank you so much Meg. We are going to take questions at the end. We ‑‑ you go ahead and post your questions in the chat box or e‑mail your questions if you have those already in mind but we are going to have a dedicated question‑and‑answer session at the end. So right now we will turn it over to Laura and Michael.

LAURA SANDT: Thank you so much. And so again I'm Laura Sandt with UNC Highway Safety Research Center, and my job has been on pedestrian and by cycle safety and public health. I am joined by Michael Clamann. He has recently joined HSRC from Duke's Human and Autonomy Lab. But he has been working on automation and technology for many, many years. We are sort of turning this conversation towards the next chapter in what the future challenges with safety and mobility are going to be and how we can be keeping a closer eye on some of the opportunities and challenges with vehicle automation.

So if you have been closely following the news over the past couple of years you can see that we are really in a midst of an arms race to see who can bring automated vehicles to market first. There is a lot of money being invested in making vehicles more highly automated, leaning towards self‑driving. And a lot of this investment is due to based on potential payoffs of this technology. But how automation can reduce some of the burdens of injuries that are experienced on our roadways by many different people. You may have heard a lot of crashes are attributed to vehicle behaviors or sorry, driver behaviors and many of these could be taken off the table by improved automation that might reduce some of the mistakes that drivers make behind the wheel.

We have also heard self‑driving vehicles and automation being offered as, you know, a new solution for mobility. In particular people who have trouble getting to certain destinations but want to have independent lifestyles and talk about how automated vehicles could help reduce energy consumption and lead to more efficient use of our roadways and land use. A lot of these potential benefits really require a lot of careful consideration in order for them to be realized and for the benefits to be shared by everyone who needs to use the road and not by the few.

And one of the things that we have noticed as we have been examining the literature is that there really hasn't been enough attention paid to pedestrian issues and to the needs of people with different disabilities. The figure in this slide shows results from a 2017 study that looked at more than 400 published articles from around the world and looked at the topics that were being covered around automated vehicles. And so you can see near the top of the list is road safety, legal and regulatory issues, kind of market demand and public acceptance, but only about 20 studies were identified out of these 400 that talked about the interaction with pedestrians. And about the same number that talked about on mobility for people with different disabilities. And very near bottom of the list is a number of studies that looked at accessibility and overall physical activity.

So this is something that the Pedestrian and Bicycle Information Center wanted to change. And to be able to support more of a discussion around automation as it relates to things that we really hold dear and so the work of PBIC in our broader centers that we work in really recognized that people have a strong need to be able to walk, roll, to bicycle so they cannot only be active but support their overall health and reach their destinations safely. And more broadly to be socially connected and supported.

We recognize that some road users are coping with different cognitive and spatial awareness deficits and they may have difficulty interacting with new technologies or they need special assistive devices and we recognize that many road users particularly pedestrians and transit users may are low or fixed incomes. And so we need to be mindful of the diverse range of road users needs as we begin to plan safe, secure, comfortable and affordable travel in the future.

So in 2017 we produced the PBIC Discussion Guide for Automated and Connected Vehicles, Pedestrians and Bicyclists. What we tried to do is provide a common language for talking about challenges. We included a glossary of terms and background literature and then we highlighted ten key areas in which automated vehicles in the future may be impacting road users outside of the vehicle. Namely pedestrians and people with various disabilities, and I am going to turn it over to Michael and he is going to touch on a few of these and feel free to reference our whole guide on our website.

MICHAEL CLAMANN: Thank you. So as Laura was pointing out there are a lot of promises for automated vehicles that have to do with mobility and safety, but despite some of the things that we read in the popular press, we are not quite there yet. There are a number of different challenges that we have to overcome of before I talk about some of the specific issues I want to ‑‑ what is the automated vehicle because there is some confusion over that.

What I have here is a slide that describes the SAE autonomous vehicles. That's your '69 Mustang and a car that can take you anywhere you want, requiring only limited interactions from users. These are cars with no gas pedal and no steering wheel. We are quite a long before we get to that point and what you see, what I have highlighted there or outlined in red over on the right is a number of these different intermediate levels which are getting passed some of the wordy descriptions. It is a question of who has responsibility for a few different tasks.

So who is operating the wheel from the pedals, who is required to pay attention to the road, and then finally who is responsible for responding to emergencies. And so what you can see the implication here is that on the way to full autonomy there is really a partnership between the automated vehicle and the human operator. Whatever level that may be. So really what the design of automation is.

It is not so much immediately this rush to make the vehicle full driving in the intermediate. It is a partnership and the development of a partnership that works for the human operator. So what you are saying as you start to read articles automated cars being on the road, you are seeing evidence of us being at a testing stage. So because we are not there yet. For the foreseeable future you are going to be seeing these cars on the road. So there is a number of different ways that we can test automated vehicles. There is the option for closed track testing for doing structured testing on open roads, customer driving Teslas and possibility for doing simulated environments. But what we are seeing a lot of is this need for doing testing on our public roads and this is what we see that Waymo is so proud of and a number of these other automated car companies that's what they are doing. They have their engineers sitting behind the wheel of the car while they collect data. The reason why this is so necessary is because of something called corner cases. If you want to see something that's unusual, if you want to fully understand real world driving you have to drive in the real world doing simulations, doing closed tracks gives you the ability to set up specific scenarios. We can't learn what those scenarios need to look like until we see them on the public roads and identify those cases.

So what is it that they are actually testing? If you look at our PBIC guide you will see that there are a number of different challenges and one of the main ones that we have to deal with is the detection problem. So how is it that we teach automated vehicles to see and understand other environment and that's a huge technical hurdle and there is two stages of this. There is the actual collection of the visual data which is done through a number of sensors but then converting of that data and information that we can use. If you have heard of driverless cars, we see cameras and we see the large spinning Lidars on top of the vehicles. There are radars and then ultrasound and each of these has their own strengths and limitations. You are going to see something called sensor fusion where you combine all these things together to make up for the strengths and limitations. So, for example, a camera is extremely inexpensive. That's why you see them on the majority of automated vehicles. The only type of detection device that can determine color. And they take a lot of processing power to work. Lidar is much better at cameras and detecting shapes and even high-resolution shapes but they can be spoofed by rain, by snow. And they are not always effective and extremely expensive and fairly large on the cars. So as you start to look at these different combinations, you see that you need to have additional sensors to make up for the limitations of other, if you are using all of them together you have a fairly rich picture of what's going on the road.

Okay. But all of that as I mentioned that's just data collection. The real art to this is teaching computers how to see the same way that we do and that means taking the visual information and actually processing it and turning it in to something that they can use to make navigation divisions. Then when a computer does this, this is very different from what we do as humans the computer is going to be looking at its landscape and separating images from the back ground to figure out what's relevant. It is going to segment them in to different parts and then compare them to a lexicon of images. And that's one of the other reasons why you see ‑‑ these vehicles driving all over the place collecting data is it is trying to find new situations and new images to add to its databases that it can interpret.

Now in contrast the way people interpret these is in what's called top-down processing. So we are very good at looking at something that we have never seen before and being able to conclude what it is. So, for example, people are really great at looking at other people and doesn't matter what shapes, what sizes they are and how old they are, what loads they might be carrying, the age, the gender, if they might have some kind of assistive mobility device, a person is going to have no problem being able to tell that's a person. A computer unfortunately needs to be told that in advance and we saw a fairly grim example of this back in March when the Uber vehicle struck the pedestrian because she was pushing a bicycle that was loaded down with bags and the Uber detect ion algorithm struggled with that. So needing to put in to a category is one of the things that slowed down and caused that really terrible problem. Whereas a person would have looked at that and been able to pretty much immediately recognize what the issue was.

Okay. So really to take them for the time being we are still looking in the transition we are looking at a partnership where we are dividing responsibilities between a person and a vehicle until we can get to the point where vehicle can operate on its own. Where we need to continue to get the people responsibility for the high-level goals for pattern recognition and automation for doing things that are repetitive and tedious and need to be precise. And in that meantime one of the things that also means since we can't completely rely on autonomous vehicles to do detection it is very important that the vehicle have a means of communicating it intent to the people around it. Whether that's through some kind of sound communication, visual communication or some intentional sound signature that goes with the vehicle, then that's something that actually has to happen in the transition to make sure that everyone can understand what's going on.

So I'll turn it back over to Laura at this point.

LAURA SANDT: Thank you. We often get in these discussions is, you know, what's going to happen to pedestrians in the future as more and more automated vehicles are entering our roadway system. And I really do love this quote from Paul Batalden that every system is perfectly designed to get the results it gets. Bottom line as researchers or practitioners or policymakers or stakeholders we need to be thinking about and defining the results that we want to see as more technologies become available and figuring out how these new technologies will help us get to where we want to go. So, you know, as Michael pointed out some of the challenges with current technology and testing we are in it is important that we be mindful of the limits of this technology and that we continue to invest in complimentary solutions and Meg did a nice job of giving the rationale to help build walkable environments.

With supportive land uses and universal design, place making for social inclusion are all critical pieces of the transportation system of the future. And we have to remember, too that some of the design principles that support human drivers will also be helpful to automated vehicles by defining clear boundaries on roadway, by having clear lines of sight between the pedestrians and vehicle and improved lighting for detection. Those are all things that will help drivers now as well as more automated technologies in the future. And I think it is also important that we continue remembering that machines will never be able to replace some of the human to human interactions that support travel and some seniors in particular, the people with disabilities may need. So there will always be a need for paratransit and transit and some of the other supportive services that we provide.

So one really nice example I like to call attention to is from Portland. Their smart automated vehicles initiative that's also connected to their Smart City Portland initiative. It is really a nice model where it is a community that's putting people first in thinking through their data and technology investments and there are many other cities, Seattle and Boston that come to mind, that express their core principles and can serve the needs of their communities with particular emphasis on traditionally underserved communities including people color and people with disabilities. One of the things that we see in those plans is that they are really working on trying to define and test what the appropriate role of automated vehicles is and how these new technologies fit in to their systems. Early partnership is a key to that. In particular at the design stage, when important decisions are being made about the technology display, the design, how accessible it could be for users and caregivers and think through the availability of the technology for end users those are all considerations that earlier we make in the design and development process the more likely we are to achieve the benefits in the long term. So we are seeing nice examples where communities are working with transit and with other partners to really invest in partnerships and pilot testing some of these. And I think many of the coalitions that Meg mentioned with the centers for independent living and other groups are really vital for collaborating in the space with the technology developers as well.

So I think the one thing to close with that note, there are certainly many other resources that you could find on this topic under the pedbikeinfo.org website. We can answer any questions in the meantime or we can follow up as needed as well.

KRISTI MCLAUGHLIN: Thank you so much. Laura and Michael, I am going to ask you had a little bit of issue with your audio. It was getting a little crackling. It got better so we didn't stop you. If you could hang up and call back in. I am going to give instructions on how everyone can ask questions. You have time. Just to try to make that see if we can get rid of it all together, hang up and dial back in and I will be giving instructions while you do that. All right.

Thank you both Laura and Michael. Laura and Michael and Meg for the great presentations. A lot of good information. Just a reminder you do have a couple of ways to ask questions or make comments. You can either type your question in to the chat box which is at the left bottom of your screen if you are in the webinar room or you can e‑mail your questions to Rbeyerle@easterseals.com. And we have a couple of additional slides just to give people the time to ask their questions and to get some things typed in to the chat box and I'm going to go ahead and talk about really quickly here.

We thank you so much for your participation. After the session today we are going to e‑mail a session evaluation. You don't have to write down this link right now. You will get that via e‑mail if you are a registered participant and we do ask that you give us your feedback, just a very short survey and it helps us to improve future sessions. I am going go back to the questions. I want to see really quickly if Laura and Michael are back with us.

LAURA SANDT: We are back. And calling in on a different line. Can you hear us?

KRISTI MCLAUGHLIN: Yeah. Perfect timing. So we did get a question in the chat box and it was while Meg was talking and so Meg I will address this question to you and then Laura and Michael if you have anything to add you are welcome to do that. Why is back end parking preferred over front end parking?

MEG TRACI: Can you hear me?

KRISTI MCLAUGHLIN: Yes.

MEG TRACI: Okay. So this might be a better question for our engineers. But I will say this is a great way for us to be thinking about why inclusive walk audits are important. This is something that Mark Fenton talks about a lot. It is meant to put people's eyes on traffic as they pull out in to traffic. It is meant to create better safer routes from the vehicles to the sidewalks. And so it is ‑‑ it is different and so some of the tactical urbanism projects that people do give experience. They try it out for a day. They will set up back end parking for awhile and get people over the hump of doing it. But if you think with it stripes for access aisles for vans or how we think about how people connect to the accessible route to the sidewalk, it is different. So it is not just restriping and reprogramming the back end parking when it comes to really making that inclusive options for folks. So when we have tested that with some of our partners who use accessible vans you will see that it is ‑‑ it is a little different. We have to think it through with that community. How will that option work in your community for everyone. And there is probably statistics on this that are ‑‑ our folks at the highway research center may have.

LAURA SANDT: Yes, I did share a link to some information that we have on back and angle parking from PBIC. <http://www.pedbikeinfo.org/data/faq_details.cfm?id=3974>

I am not the engineer on our team. But I know that back end angle parking when designed correctly can address key safety and kind of movement challenges. So happy to talk more offline about that question as well.

KRISTI MCLAUGHLIN: Great thank you so much. For those on the phone and not in the webinar room I will include the link that Laura provided in the e‑mail that I send out with the evaluation. So you will get that as well for your resource if you want to take a look at that.
All right. So we did get another e‑mail question that came in. And it was about lessons learned from the Helena audit. Can you talk about lessons learned and any take‑away recommendations?

MEG TRACI: I would say some that stick out in my mind when you have that interdisciplinary approach and you are looking at the cost of heated sidewalks. Some of the sidewalks I showed that are covered with snow and the intersections were problematic from the ice. There are federal buildings on that route and they are clear and dry as a bone. When you think about the cost of a fall to a person to their own freedom and to their health and think it all the way through to the third party payers and you put that in to the conversation with the cost of the heating sidewalks you start to get maybe it is a little more reasonable and then we started to look at some of the literature where I think there is a town in Michigan that invested in their downtown as heated sidewalks to compete with the mall and did so effectively. That really stuck out to me. That was a solution that someone on the walk really brought to snow management that was of interest to the disability community for sure.

Some of the other things that have come up is, you know, at the ‑‑ at the implementation level when public works partners some of those companies come in and do their work, even if the city like Helena has a complete street resolution, even if that's in place, that's partners may or may not restore. Every time you take down a curb cut or rebuilding the pedestrian infrastructure, the active transportation infrastructure you are supposed to be building it out to the complete streets guide lines. But there was a great example on that walk where it was restored as a curb and not a curb cut. So you have this beautiful truncated dome PROWAG design but no access to it. Those are a couple of lessons learned. I would say I have been working in this area for a while and one of my key partners representing people first which is a national advocacy organization for people with intellectual and developmental disabilities that person did the short, Mike Shaw who is a People First long time member in Helena he did the small section around the hotel, really listed all the amenities that the hotel had and he was able to think through the hassles not just the significant barriers but also some of the hassles some of the easy fixes and long term fixes for increasing the accessibility of those routes. And improving the access to those assets in that area. So I thought that was really important. Mike helped me really focus on that and worked with a couple of our healthy communities coalition partners in Helena on that route and brought back a lot of useful information in the planning session.

KRISTI MCLAUGHLIN: Thank you so much. We do have one more question before we close for the day. It is for Laura and Michael. Can you address to the extent to which the disability community has been involved in AV research and the discussion and then expand on any particular research focusing on the disability interaction issue.

MICHAEL CLAMANN: Yeah, this is Michael. There are different populations that are involved with some of that research. Unfortunately it is still early days for that. I can call out a couple of examples.

So Laura and a researcher from Virginia Tech's research institute organized a workshop at the recent automated symposium. There are a couple of workshops there devoted to mobility and disability issues. It was fairly well attended and a number of different stakeholders who were there. There was some representation from paratransit and also some specific very compelling research that was coming out of Norway on blind users. And so, for example, someone who is visually impaired was more of a discussion about some of the research issues that needed to be explored and not so much specific completed research topics. For example, it talked about what happen if somebody with a visual impairment on this vehicle and they get dropped off on their block. Do they know what their orientation is to their final destination. They are going to have to navigate to the exact entrance and then also at some point if you are getting in to or getting out of an autonomous vehicle there is some point, albeit fairly short where they are going to be stepping in to traffic. There is some kind of a hazard involved there of how do you make that transaction safe and there is the assistance issues. So anyway, there is a number of different issues. There are a number of examples of these populations being at the table but the research is still I would say in its infancy at this point for some of the resolutions.

LAURA SANDT: Just to add what Michael said, so I have been involved with the automated vehicle breakout sessions that look at not only pedestrians we were trying to coordinate some of the other breakout sessions with other disability topics and sort of work in parallel. The other thing—at TRB is there is a subcommittee now formed under the pedestrian as a parent committee on to look at pedestrian and bicycle interaction and nice representation at those subcommittee meetings from people representing people with disabilities particularly blind and visual impairment. And so I think those provide a forum for hearing about these issues but we need to get more active in addressing a research more directly. And they do an update pretty regularly.

The last I looked at that they were recommending I think it was around 25 different research projects and ‑‑ three of them seem to directly call attention to pedestrian issues. I think it would be useful to go back and look at ASHT and CRP's roadmap and identify explicit opportunities to better integrate people with disabilities in to the research before it gets funded and also for people who are interested and have a stake and need to be in a leadership role to be joining those panels. All of that HRP research is guided by panel s made up of volunteers.

KRISTI MCLAUGHLIN: Great. We do have one more question that came in while you were answering that one. I don't like to leave questions on the table. It is in the chat section. So if it helps you to look at it. It is what are the complimentary or synergistic opportunities available as AV sensory technology is placed in communities that benefit not only automated cars but also people who have difficulty with way finding?

MICHAEL CLAMANN: One of the opportunities here is also being worked on is with Vida, vehicle to pedestrian, vehicle to infrastructure, vehicle to device technology. So because automated vehicles at all different levels do so much data processing and they also have the opportunity to communicate all these messages to ‑‑ in a number of different ways. Whether it is to, you know, through signage or through audio signals but there is no reason why these same signals couldn't be done electronically. So if different people have various wearable devices, there is certainly an opportunity to have some kind of a customized wearable device that communicates a message in way that makes sense for that particular individual of the same way on via the web you have, you know, the data can be presented through text, through audio and so forth. And translated I would imagine that opportunity would still be present for wearable and portable devices as well.

KRISTI MCLAUGHLIN: Perfect. Thank you so much. So with that we will go ahead and end the session for the day. Thank you so much to Meg and Laura and Michael for the great presentations. If you have questions that come to mind later or if you just have a comment that you want to make feel free to e‑mail that to NADTC we are happy to field these questions after the session as well.

As I mentioned earlier please take a moment to fill out the evaluation for today's webinar along with that link for the angled parking question that came up. So I'll go ahead and get that e‑mailed to you in just a moment. But also keep in mind that you can contact the National Aging and Disability Transportation Center for a whole host of transportation topics. You can do that via e‑mail and as usual tech the NADTC website for upcoming events and additional resources. Thank you so much for your participation today and we hope that you have a great rest of your day.

LAURA SANDT: Thank you.

MEG TRACI: Thank you.

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