

Accessible and Barrier-Free Mobility Workshop Transcript

13:06:45 **Laura Chace:** It is my pleasure to welcome you today to this workshop on accessible and barrier free mobility.

13:06:54 ITS America is very pleased to have this opportunity to partner with AVA and AARP on this research, which for the first time, links the vehicle design with the physical and digital infrastructure together.

13:07:08 At ITS America we often talk about how technology is a tool that can help produce better outcomes for people within our transportation system by improving safety, reducing harmful emissions and creating more mobility choice and access, and this research

13:07:23 is a really great example of how technology can help us provide improve mobility options and new access for people who currently don't have access to traditional modes of transportation.

13:07:34 We started this effort, about 18 months ago with AVA and AARP as a research project. And as we've gone through this we've seen organic growth to include more partners, including MCity who were thrilled to partner with, and they're working

13:07: group on accessible design, and the US Access Board, who has also joined with us in giving us some feedback so we can all work together collaboratively to advance concrete solutions, today's workshop just so you're all aware is the first in a four part

13:08:05 series. These workshops will occur over the course of this year, culminating in an accessible and barrier free summit at the ITS America Annual Meeting in December of this year.

13:08:16 Each workshop will dive into the research work to generate solutions and build upon each other to ultimately create a roadmap.

13:08:30 Today in just a minute you will hear all the good stuff from Tim woods, the general manager of the AVA to present the research results and outline the three key opportunity areas, then each of you will be directed to a breakout room for in depth conversation on that specific opportunity area.

13:08:41 We do encourage you to participate actively, again, engage your cameras. This is really a chance to dive into the results and provide some feedback. After the breakouts will reconvene in the main room and report out the key discussion points from each session. And this will inform our next workshop in the series.

13:09:01 Now, we appreciate your engagement. We look forward to a robust discussion. And now it's my pleasure to turn things over to Tim.

13:09:08 **Tim Woods:** Thank you Laura. We are very excited to be here today, reporting out on this research and I just want to start by thanking ITS America, and AARP who played critical roles in the beginning of the research. AARP actually funded the lit review, which acted as a basis for the research that I'm going to share with you today. I'm going to go ahead and share my screen.

13:09:35 One second, and I'm going to leave it open at this with my slides running on the left hand side because we're going to be jumping around this. This deck, pretty much, for the purposes of informing the workshops that we're going to be having.

Accessible and Barrier-Free Mobility Workshop Transcript

13:09:47 I want to tell you that these workshops are probably the most critical part of our day to day. We want your feedback we want to build off of this information that we've collected and that we've gleaned from talking with many stakeholders and end users.

13:10:02 But I want to start off by saying that this research is really a culmination of about five years of collective research that's been conducted by the AVA. Within the five years, we have talked with multiple US cities.

13:10:16 We've talked with the healthcare ecosystem, and we've talked with the aging ecosystem.

13:10:23 Equally, they all asked for, and said, there is a dramatic need for an accessible and barrier free vehicle.

13:10:32 When we took on this research we realized that from that collective desire to have that it was also important for us to look at infrastructure, and how infrastructure may play a role in helping drive the efficiency not only the vehicle but the entire journey for every end user.

13:10:50 I want to be very clear on something that when we started this research, it was not with an idea of a form factor in mind in other words we were not pressing for an individual or a passenger vehicle that we may be all familiar with today.

13:11:07 We weren't quite frankly even looking at any form factor the size of a bus or even a shuttle. But what we have realized is that this is about a SAV (a shuttle AV) that can integrate into the overall mobility mix, and this is extremely important to cities,

13:11:26 when we talk about SAV's or and any universally designed Slet's say that you're going to hear it if this percentage 85% throughout this piece of research.

13:11:38 It really is about how can a vehicle such as this, integrate with their fixed and non fixed assets with both public and private assets. How can we make this vehicle enable the complete journey.

13:11:52 The complete trip, everything from planning to your final destination.

13:11:57 But really what we're talking about is enabling equity mobility equity and accessibility by leveraging a universally designed vehicle. This is extremely important and something that we need to think about holistically as we start to move forward

13:12:14 we're in a very interesting point in time in history.

13:12:18 We have a very clear articulated need. And we also have an entire ecosystem around how we build vehicles, completely evolving in front of our eyes with autonomy, moving towards us at a rapid pace.

13:12:33 This idea of being able to think about this holistically and be able to deliver this experience is critically important to these three ecosystems, I want to make also clear that although we focused on municipal and healthcare and aging, this need for

13:12:48 this vehicle extends far beyond that into other ecosystems as well.

Accessible and Barrier-Free Mobility Workshop Transcript

13:12:54 So when we talk about an accessible and barrier free vehicle with complimentary infrastructure, it was commonly cited amongst these three different ecosystems, understanding what a barrier free accessible vehicle could be it is also evolving, because

13:13:08 we're looking at Universal Design we're looking at emerging mobility trends evolving technologies and transportation. So what are the varying uncommon needs between different customers and how many people have various abilities, interact with these vehicles

13:13:21 and infrastructure. At the end of this research we're going to share one of the journey maps which is really what we tried to define as a maximized experience of what the vehicle could act like and how infrastructure could interact with that vehicle.

13:13:36 So the AVA's accessible and barrier free research attempted to answer these questions from a very holistic viewpoint.

13:13:42 I want to show you the Table of Contents because quite frankly we have a lot of very interesting and critical key stakeholders that we ended up talking to.

13:13:53 And quite frankly, many of these stakeholders that we spoke to we're also end users.

13:13:57 So they had some form of disability themselves that they were dealing with were acutely aware of what was going on in their own communities, you'll see municipal and regional transportation authorities represented here disability advocates,

13:14:12 and we also spoke with end users.

13:14:16 So what is considered a barrier mobility is an important part of everyday life fundamentally impacting one's ability right to maintain employment attend school access goods and services and engage with the world, often issues of accessibility or discuss

13:14:30 with disabled community in mind, but we have to understand that this is a bigger opportunity, right, if we can solve for the disabled community if we can build a universally designed vehicle that can meet 85% of the needs of the general population.

13:14:47 We will have done something that has never been done before. But what are considered barriers right physical limitations or disabilities loss of hearing vision mobility dexterity cost is a huge issue financial barriers such as prohibitively expensive fares or membership fees.

13:15:04 This idea that we can create mobility equity that we can serve the needs of the unbanked, as it were, coverage, issues of distance or time gaps and transportation service or availability, safety, physical well being, data privacy, all of these and security

13:15:21 awareness limitations associated with knowledge or understanding of available transportation options related devices and services and eligibility for reduced fare programming, this awareness that this is available is critically important technological

13:15:35 limitations inability to access or use the technology due to the lack of a cell phone, or credit card, how can we still serve their needs, and then design and upkeep a system service capacity of function smoothly effectively for all users.

Accessible and Barrier-Free Mobility Workshop Transcript

13:15:50 Now, although this wasn't a market sizing study, and it's something that we would love to accomplish this year to really understand the magnitude of the opportunity to build a universally designed vehicle, the market size and the need is huge.

13:16:04 There is an increased population of vulnerable and underserved communities in the world, there are 703 million persons age 65 or older in the world today and the world's population of 65, five plus age group is estimated to double to 1.5 billion

13:16:22 by 2050. Currently 1 billion plus people globally are living with a disability and more than 60% of people with disabilities report major obstacles, as it relates to travel and mobility, an additional 2 billion people, and caregivers are directly impacted

13:16:38 by caring for someone with a disability. I often refer to these people as almost the forgotten group in here caregivers are really stressed, with this idea of dealing with mobility issues getting the people that they're taking care of from point A to point B, on a daily basis.

13:17:00 So I want to get into these individual sections I'm going to come back to the main slide, which will actually use for these three distinct opportunity areas but I want to get into kind of the meat of the research itself at this point.

13:17:17 So, personalization of the mobility experience, if the vehicle and infrastructure are designated as the physical world. How can we seamlessly merge with digital tools and software doing so would help everyone to be able to successfully navigate through

13:17:31 these challenges and make their experience more personalized. We start off with this example when I'm giving this presentation.

13:17:39 Steve Jobs did not invent the mp3 player. He didn't invent email he didn't invent the phone. He didn't invent text messaging, but what he did invent was a seamless user experience when he came out with the iPhone.

13:17:56 He thought about the digital world, from a very holistic standpoint, we need to do the same at this moment in time in history around mobility, we need to think of the experience holistically.

13:18:10 And by doing that, if we can personalize the journey, it makes everything better for every end user. So some examples of this what would the personalization journey look like so props.

13:18:21 Turn left when exiting the vehicle your destination is 100 feet on your right, we're going to get into the, the nuts and bolts of this but the bottom line is we have technologies that exist today, that can, in real time, in a relevant way give us the

13:18:36 information that we need, as we're making our journey from point A to point B, identify exactly where the vehicle will pick me up so I'm standing in the right place at the right time, not on the opposite side of the street, causing confusion.

13:18:50 We heard multiple horror stories of people who are in wheelchairs, who are on the opposite side of the street from let's say a lift or an Uber or even paratransit their ability to even contact that individual and to be able to make changes they're

Accessible and Barrier-Free Mobility Workshop Transcript

13:19:04 amends is extraordinarily difficult, we need to take that pain away, and take the pain away from traveling somewhere for the first time, I love this example because we spoke with the American Council for the Blind in the very very beginning,

13:19:19 and we sent them our stakeholder interview questions because we wanted their feedback. Two of the questions were, what is the easiest journey that you can make.

13:19:29 And what is the most difficult journey you can make. And they came back to us with an extremely eye opening and quite frankly relatable pain point.

13:19:38 And they said to us. Listen, if you're asking me to go to the doctor, or go to my job, or go to the grocery store, that's not going to be an issue because I've planned for that I'm familiar with that journey, I understand what the sidewalks are like,

13:19:54 and any obstacles that I'm going to have to overcome. However, when you ask me to go someplace for the first time, my efforts quadruple because of the stress and anxiety of planning that complete trip that journey.

13:20:13 We have the tools to take away that stress and anxiety. We have the tools to make the journey, more personal. We can create back ends. And when I say these back end management systems right for these vehicles that can literally take personal information

13:20:30 and turn it into a more frictionless, let's say, journey for them. So no matter you're going someplace for the fourth time or you're going someplace for the first time, we can make the journey simpler and quite frankly, if you're talking with an individual

13:20:47 who has blessed, all of their abilities. When you ask them to go someplace for the first time, it can be stressful. And it can generate anxiety. So when we solve for this, we solve for everyone, we make the journey for everyone, better incorporating audio

13:21:05 and visual prompts both from the physical world and appropriate digital devices and create a digital payment alternatives beyond apps with simple text such as wearables and RFID tags for the unbanked and for people with financial barriers.

13:21:20 Importance of audio cues. This is extremely important for people with visual impairments, people who do not speak English as a first language. So emphasis on audio enunciation is extremely important for clarity.

13:21:35 First time travelers what we were just talking about, first time travelers' audio cues can play a very very important role. And then people multitasking on board, quite frankly, how many of us get into a lift or an Uber and immediately get on our phone,

13:21:49 or we start text messaging and we start checking email right so we're disconnected from the mobility experience audio cues can keep us up to speed of where we are in real time.

13:22:01 People in crowded areas of the vehicle who may not be able to easily see displays all of these are helped by audio cues.

13:22:08 And then accessible real time information I want to say, accessible real time and relevant information, so stop information estimated time of arrival my current location.

Accessible and Barrier-Free Mobility Workshop Transcript

13:22:21 This information could also be available on the writers digital device if they have one, and could include an interactive component if the writer has a question almost like an onboard concierge, the use of different communications methods, providing the

13:22:32 same message, helps all types of writers easily comprehend the personal information. This is this idea again of creating an a back end, right, that can serve up individual needs and a very personal level so if I have a visual impairment, I may get my

13:22:50 information from this back end, from audio cues. If I'm using an individual who uses a wheelchair and individual who uses a white cane. I'm going to get directions and help in a means that's more personal to me.

13:23:06 Same back end, but served up individually and very personal, and then unbanked alternatives, although we didn't get heavily into this space. This idea of an easy to use payment system and ridership program will be key to address the needs of unbanked

13:23:21 riders, some options to help solve current ridership issues could include low costs well wearables RFID tags, when we get into the journey maps are going to see how that might work by leveraging sensors at the onboarding areas of a vehicle.

13:23:38 on demand booking extraordinarily important to aging population. Currently in many situations, it takes 72 hours to plan a trip. This does nothing for independence and socialization with that level of planning that far out.

13:23:53 We need to be able to create on demand booking this idea of mobility on demand and our friends at MODA, part of ITSA was extremely important as we started looking at this up front, and when we were doing our avian aging research this came up multiple

13:24:07 times. In addition to spontaneity this type of service, could be made available for use at a nearby location by a dial in number for those who do not own a smartphone, make the trip and even more personalized experience by allowing the writer to arrange

13:24:21 a set location ahead of time for pickup, such as northwest corner of Main Street in front of the supermarket, making the interaction quicker and more effective for everyone when the vehicle arrives and include personalization options in the system the

13:24:35 writer can specify their needs in their profile and the system can alert the driver or the vehicle of any special arrangements are requirements prior to pick up making the interaction, a seamless experience.

13:24:46 One of the things that I want to stop and talk about right now is when we talk about people who use wheelchairs, and they use mass transit, when they use public transportation.

13:24:57 The last thing they want to be done is teammate feel that they're different from everyone else. They want to exit and enter the vehicle and secure themselves they want to have a level of independence.

13:25:10 They want to be able to sit with the people that they're traveling with. We have the ability to make these things happen, and make this a much better journey for everyone quite frankly. Wayfinding for sidewalks, I love this quote from Eric Sinagra at Pathyu, we are pedestrians 99% of the time. This is

Accessible and Barrier-Free Mobility Workshop Transcript

so true. And quite frankly, needs to be thought holistically as part of the overall complete trip that journey that we talk about everything from planning to final destination.

13:25:44 When we talk about merging the digital world with the physical world this is exactly what we mean. We want to be able to integrate this, so the vehicle experience, the navigation is still part of the overall experience but having the ability to utilize

13:25:57 wayfinding for not only transportation. But while the user is also a pedestrian would make this a complete trip experience. This could be especially beneficial for users if they're in a new area, giving a rider, a way to get from point A to point

13:26:12 B in accessible way while feeling confident doing so can change someone's overall experience. This could also be accomplished by including the vehicle infrastructure design language into sidewalk directions, showing known facts about the surrounding areas

13:26:24 such is the sidewalk is eight feet wide, with a steep hill.

13:26:31 Vehicle interior features, right, was top of mind when discussing important vehicle qualities ranging from simple requests, such as flexible seating to keep riders from feeling excluded from the group and others, if the vehicle cannot accommodate the

13:26:44 rider and their group, it should not arrive as an option, grab bars for easy maneuverability, to more complex requests like being able to sanitize the vehicle in between rides.

13:26:55 I will tell you something extremely interesting about this. This piece of research, ran over the course, the entire course of 2020, we started this research, prior to COVID and completed it during COVID.

13:27:10 And as we were talking with municipal transportation authorities and they were talking about a drop in 80 to 90% of the ridership sanitization became an extremely important issue.

13:27:21 I'm going to stop here just for a second and talk about how incredibly important. Zero entrance zero entry is. Stairs are the enemy. We've known this for years, we've all known this, if you've been in this space you know that stairs are the enemy.

13:27:41 And quite frankly, ramps are great improvement of that but even the incline of ramps can be very difficult to maneuver for certain individuals. What we need to try to accomplish is zero entry.

13:27:55 In other words, getting in and out of the vehicle with no ramp, with no gap. This idea that we could.

13:28:04 As an example, measure the curb and have the vehicle, not just kneel but actually lower completely to the level of that and and bridge the gap between the sidewalk and the vehicle itself is extremely important.

13:28:16 And these issues stem from having a hard time stepping up and keeping their balance, having a large device with them, a luggage stroller and walker. This is not just for people who may have a walker who may have a visual aid cane or white cane who may have

Accessible and Barrier-Free Mobility Workshop Transcript

13:28:32 a wheelchair. This extends to mothers who are using strollers, this extends to travelers who have large bags that they are traveling with we have all been on the hotel shuttle to the airport right we understand how difficult stairs can be.

13:28:48 So, this literally benefits, every single rider, zero entry importance is a goal, that is that we believe is attainable, and is necessary as we move forward, the mobility device you're using doesn't allow them to easily maneuver in getting in and out of

13:29:03 the vehicle. Right, so for riders in wheelchairs, the issue is even greater. They must wait for the driver to open a special entrance and deploy ramp which is often not very wide and can be steep assist them with a board and then secure them and have their

13:29:17 wheelchair then continuing with the route, having an accessible vehicle with zero entry or level boarding could allow people with many different abilities the opportunity for freely enter the vehicle on their own, potentially lessening, their need

13:29:30 for extensive assistance, which can cause delays for everyone, and they're very cognizant of this, we don't need to have their boarding and onboarding point a finger at them.

13:29:45 High head clearance is probably my number two in all of the research.

13:29:49 While boarding in a standing room area and sometimes even while seated one in 10 riders have issues with head clearance designing for the majority of the general public and having a tall entrance and exit and adequate height from seats to ceiling is important

13:30:02 comfort factor for all riders. In fact, there are people out there that we don't even think of necessarily as in quotes disabled, but they have neck injuries they have back issues.

13:30:13 We're not counting them, but the idea of bending over and hunching, getting into the vehicle can be extremely uncomfortable by solving for this we solve for the majority.

13:30:24 And then vehicle design cues having a standardized design language for the vehicle interior could be intuitive and informal for all riders, the use of sound textures colors materials and lights, could be standardized across vehicles to help to know where

13:30:41 vehicles are supposed to stand, not stand or where they should exit the vehicle. For example, when you enter the vehicle standing room is in the green area rather than the yellow area.

13:30:52 And here's kind of the final one. Well, not the final one but near close to the end, designing for usability by 85% of the public right universal design is the design for buildings products or environments to make them accessible to more people regardless

13:31:07 of age, disability, or other factors. This is how we need to focus on mobility as we move forward in the future, because that's where the greatest opportunity is, and by opportunity I mean from a business model perspective, that is where the greatest opportunity

13:31:21 is the biggest issue overall and I love this quote from Graeme Masterson, the biggest issue overall is getting away from thinking about accessibility as being something targeted to a specific group, somebody with cognitive or physical disabilities

Accessible and Barrier-Free Mobility Workshop Transcript

13:31:37 and getting to solve it, as more of a universal application. If you made it easier for everyone to use would it solve 80 to 85% of the problem. The last 15% is going to take double the effort of the first 85%.

13:31:52 So we're not suggesting here that this vehicle will eliminate the need of let's say a specialty paratransit vehicle, but the, the need the percentage need of for that vehicle will be much less if we can build this universally designed vehicle and the

13:32:08 benefits include quality of life, self-esteem and then work in social. Coordinating vehicle and infrastructure design languages. We found this to be the big duh of the research, there is an opportunity for vehicles and infrastructure to work together as

13:32:23 one unified design language, one way this could be accomplished is using the same design cues from the vehicle interior, such as color, texture or lights at the onboarding areas as well.

13:32:34 The use of technology could also be a key factor to use in coordination of a universal design language sensors that the onboarding area could interact with the connected vehicle pickup vehicle before its arrival speeding up the onboarding process.

13:32:48 For example, the onboarding area sensor could utilize the riders phone app or connected wearable and note someone's abilities, then notify the pickup vehicle if extra accommodations are necessary before arrival, a clear path and seating area could be

13:33:08 made available using a light notification before the rider ever gets on board, making the pickups smooth for everyone. Beyond passenger vehicles, we believe this type of coordination could also be used for the delivery market.

13:33:16 Addressing curb opportunities in rural and suburban pickup and drop off. This was something that I wish we had more information on but it definitely needs to be delved into even further.

13:33:27 And what I mean by this is, we have suburbs without sidewalks we have rural areas with dirt roads. These are all real environments that we need to deal with around accessibility and barrier free.

13:33:40 Having a vehicle that can help accommodate this from an accessible ability standpoint and being able to bridge that gap is extraordinarily important.

13:33:51 All right before I get into the journey maps I want to stop here, because I think we're at time Laura, and take any questions that anyone might have before we move into the next section,

13:34:06 any questions at all,

13:34:12 **Laura Chace:** and participants should feel free to, you can put a question in the chat if you're more comfortable or you can, you know, raise your hand and ask it

13:34:30 **Tim Woods:** has to be some question.

13:34:33 Some challenge some, some top line thoughts anything.

13:34:47 **Audience Question:** I had a question that popped up for me, while you're walking through that last slide, you something that popped into my mind was like what happens if a vehicle that needs the personalized needs of a rider is not available.

Accessible and Barrier-Free Mobility Workshop Transcript

13:35:05 **Audience Question:** Like, how would that get triaged and how would we communicate that back to the rider.

13:35:16 **Tim Woods:** Yeah, so this really gets into the whole planning the journey, and the trip. One of the journey maps we have actually all of them, talk about how that journey map may look from the perspective of planning. I think that if a vehicle was not available, alternative means would need to be suggested or it could make arrangements

13:35:34 for an alternate time. That is not the best scenario.

13:35:37 What we would like to do is see these vehicles integrated into the overall mobility mix, so we can have enough vehicles available to be able to meet the needs of the general population.

13:35:51 In particular, of those individuals who need accessible and barrier free vehicles. I'm not making this as a blanket statement but quite frankly if we knew that we had people who are planning trips, who had accessible and barrier free needs that were extremely

13:36:05 important that the default would be to send those vehicles first to an individual versus sending those vehicles to somebody who may have all of their abilities, and quite frankly I think that's that.

13:36:16 Why, making the journey personal is so important, understanding who the user is so we can plan in someone in advance of the needs and to be able to send other types of vehicles that may not meet those requirements.

13:36:32 Does that make sense.

13:36:33 **Audience Participant:** Totally. Thank you.

13:36:37 **Tim Woods:** No problem. Any other questions.

13:36:43 **Laura Chace:** So Tim, there are a couple questions in the chat if you want me to read one or two out to you, I am happy to. Um, so, one question in the chat says, Are there currently any vehicles that provide the suggestions you have for vehicle design.

13:36:58 **Tim Woods:** I wish

13:37:01 **Tim Woods:** there are a lot of people working on it, and one of, in fact one of our partners is Laura mentioned up front we were working with MCity's Accessibility Working Group.

13:37:12 We're going to be working with AARP moving forward, one of these partners, and besides the US Access Board is CALSTART and CALSTART is actually attempting to build a vehicle that integrates a lot of the things that we're talking about today.

13:37:27 My understanding is that their goal is to have that vehicle available to view and understand its functionality and capabilities in January of next year.

13:37:38 I can't speak for CALSTART at this point in time, but that would be a wonderful goal to have the fact of the matter is, this vehicle that we're describing does not currently exist, and why we think it's such critical timing on this is because some very

Accessible and Barrier-Free Mobility Workshop Transcript

13:37:54 critical decisions are being made, related to shuttle AVs, and we want to make sure that this information gets out in an appropriate way. So we can start to think about these things in a more holistic vision, and we can start to integrate these different

13:38:10 levels of functionality and features into these vehicles.

13:38:15 **Laura Chace:** All right. Another question Tim and the chat says you're talking about designing for 85% of the total population. Do you want to address the fact that assuming 20% of the population has a disability, than this only includes a quarter of people with disabilities.

13:38:32 **Tim Woods:** So, I want to address. So the 85% is really kind of a goal based on how architectural and engineering firms view accessibility in buildings, that's becoming from Graeme Masterson

13:38:49 We believe this is actually from where we stand today is actually a great goal to meet 85% of the needs, leaving about 15% of the population with more of a specialty type of vehicle, more work needs to be done, digging into what the capabilities

13:39:10 of that 85% but we're suggesting here with the 85% zero entry and high head clearance and also being able to lock down wheelchairs and to be able to serve the needs of those individuals.

13:39:24 We believe we can do that, we're going to meet the needs of the majority of individuals, but as I said before, there may be 15% of the population where we need to build a specialty vehicle.

13:39:38 And what I mean by that is, leveraging everything that we've done for this universally designed vehicle, and then plus plus. In other words, taking into account very specific needs that they may have.

13:39:48 So we can build this vehicle in a way that meets their needs of that 15%.

13:39:55 **Laura Chace:** Okay and then one more I'll add here is. Do you know any current, excuse me any transportation providers that currently use wearables, or RFID tags.

13:40:07 **Tim Woods:** No, I do not know of anybody who uses wearables at this point in time, but I will tell you from our interviews with the stakeholders and end users. It seemed to us to be a very viable option, particularly for people who are unbanked this idea that you

13:40:22 could actually accrue the actual experience of writing the vehicle by having the wearable and having it automatically notify the city or whoever would be underwriting the cost of that journey.

13:40:39 Could be simpler than demanding that everyone have a let's say a transportation card or some kind of digital device right, with a particular signature on it.

13:40:49 It's not that we couldn't leverage those devices. What we're saying here from an unbanked alternative, the idea of a wearable would make a lot of sense for a lot of different people, particularly in socio economically disenfranchised urban areas.

13:41:05 **Laura Chace:** Okay and then let's do one more before you get to the journey map.

13:41:09 **Laura Chace:** Is there an estimated cost differential for universally designed vehicle, compared to a non universally designed vehicle.

Accessible and Barrier-Free Mobility Workshop Transcript

13:41:17 **Tim Woods:** Yes.

13:41:18 And we're going to basically say that it is going to be expensive. but here is the rationale for this.

13:41:27 Currently, cities, healthcare industry and the aging ecosystem are not customers of the major global OEMs.

13:41:38 So we're building individual vehicles.

13:41:42 We believe the opportunity is huge, to think of cities, and the healthcare industry and aging industry as customers.

13:41:51 When you do that, and you undergo a market sizing attempt and we believe the opportunity is in the millions.

13:41:59 It is incentive to pull out a clean sheet of paper and build this vehicle from the ground up.

13:42:04 What is happening right now in the world, is that we're redefining what autonomy is going to do to mobility and people that have already pulled out clean sheets of paper, and they're starting to design these vehicles.

13:42:19 We want to hit while the iron is hot, we want to influence the design of these vehicles, before they get designed and then we have to go back and retrofit, that is the last thing that we want to do.

13:42:31 We want to build these capabilities up front in a very clean sheet approach, because that's where the greatest opportunity is for these vehicles.

13:42:44 **Laura Chace:** Okay, I'm going to let everyone know if you do put questions in the chat and we do not get to them during the presentation we can absolutely follow up.

13:42:53 **Laura Chace:** Yeah, but Tim I think if you want to go ahead with the journey map just so everyone can hear that.

13:43:05 **Tim Woods:** Absolutely. So I'm going to read the journey map before we get into this last section which is really the three breakout groups that we're going to do because the journey map is a culmination of everything that we've just talked about. It is a maximize vehicle experience. It is a maximized infrastructure experience and how these two things could work together.

13:43:18 Now, I'm not going to even pretend that this is absolutely perfect. But what we did this is from a storytelling mechanism right so the following journey maps represent a maximize accessible and barrier free vehicle infrastructure and an enabling digital

13:43:34 back end, we have included individuals with various abilities and circumstances to call out functional details and needs in those areas. These journey maps represent a fully integrated approach to mobility and potential new customers for an autonomous

13:43:46 fleet vehicle. Now what I'm going to tell you is that this one that I'm going to read you this, and I'm only going to read one is an individual who uses a white cane, with a visual impairment.

Accessible and Barrier-Free Mobility Workshop Transcript

13:43:56 We have multiple other journey maps that are associated with this report and we are going to share this report with you at the end of this presentation.

13:44:06 So you will be able to go back in and read all of the other journey maps and we have several in there that are, I believe of extreme interest. One very focused on healthcare, one on aging.

13:44:19 I think you'll find them valuable as you read the journey maps, so let's go through this one Carly is a 32 year old African American woman living with a vision impairment.

13:44:29 She lives on the south side of Chicago in the Douglas neighborhood. Carly is a customer service consultant, she can recognize primary colors but is considered legally blind which results in Carly using a cane to navigate her way through the world.

13:44:41 Today, Carly is going to a new clients office for the first time, making this a new journey for her. Her new client is in Schiller Park and Chicago's Westside. She will be using for new CTA app to plan her trip.

13:44:55 This allows her to plan her journey door to door.

13:44:58 This trip is paid for through the app and is verified for payment by sensors installed at the entrance and exits to various vehicles. The sensor will pick up the user's phone or wearable that they have on them.

13:45:10 So at 7:30am Carly open her CTA app which allows her to plan for trip with audio prompts the CTA app is a fully integrated mobility platform and considers all forms of private and public transportation options.

13:45:23 The CTA app will aggregate those options to maximize the efficiency of her trip. The app asks, What is your point of origin, Carly responds by giving her condo address the app then asks, What is your final destination, Carly responds with the office address

13:45:37 of her client. Finally the app asks, What time do you need to be at your final destination. Carly responds 10am. Within 10 seconds the app responds with her itinerary letting her know an automated vehicle will pick her up at the curb outside of her

13:45:52 building at 8:45am. The app, then asks, Do you want to confirm this trip. Carly responds Yes, Carly can review for mobility options at any time during her trip.

13:46:02 The App will identify each type and mode of transportation. And for this trip, it will include an AV bus, train and end with another AV. At 8:45am at the designated time a four person AV shuttle owned by CTA pulls to the front curb at her condo.

13:46:19 The AV has the ability to move both up and down six inches. This helps the vehicle create a zero entry capability with a small slide out ramp that covers the gap between the vehicle and the sidewalk, because Carly has created a profile with CTA on the

13:46:33 app, the vehicle knows in advance that Carly is a person with the vision impairment and that she uses a cane to maneuver. As soon as the AV stops it laser measures the curb height and raises two inches to deploy the ramp, the vehicle also

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13:46:47 projects, a green square onto the sidewalk where the entrance to the vehicle is because Carly can make out primary colors. This helps her navigate into the vehicle.

13:46:56 The vehicle not only has a zero entrance capability, but also a high head clearance of about six feet, so she can walk right in without ducking. At 8:50am as the doors start to close behind her.

13:47:06 Carly gets an audio prompt through her headphones that the green arrow is on the floor of the vehicle indicating the seating areas, Carly uses her cane to identify an open seat

13:47:30 and sits down. At 9am Carly gets an audio prompt that her AV will be arriving at the bus stop in the next two minutes, and to gather her things.

13:47:41 At 9:02am Carly's AV arrives at the bus shelter, and she's instructed to wait for the bus which will arrive in five minutes, the shelter itself uses the same primary color scheme to denote safe areas to stand and sit the shelter also uses texture concrete

13:47:54 to delineate where the edge of the curve is this design language has been coordinated with the vehicles interior design language to help all passengers navigate easily. At 9:07am Carly's bus arrives and uses the same technology used in the AV laser measuring

13:48:09 the curve and deploys a ramp which is used by all the passengers for boarding. In addition, the bus projects the green entrance square under the sidewalk surface to mark the entrance to the bus.

13:48:21 At nine oh wait, no, I'm sorry, did I skip one, oh no, here we go.

13:48:25 Apologies, at 9:08am Carly's bus doors closed and she listened to the audio prompts and follows her primary colors to identify the seating inside the CTA app lets her know that she will arrive at the train station in 15 minutes.

13:48:40 At 9:21am, Carly receives an audio prompt that her bus will arrive at the train station in two minutes, and to gather her things, the audio prompts also inform her that the elevator to the raised platform is 25 feet to her left as she leaves the bus.

13:48:56 And at 9:23am Carly arrives at the train station and makes your way to the elevator as she's exiting the bus, the app lets her know that her train will arrive in three minutes. At 9:26am Carly's train arrives, the same design language used in the AV

13:49:09 bus and bus shelter are also used on the train platform, the same primary colors and floor texturing are used to denote all areas as the train stops on the platform, it similarly project screen squares onto the platform to show where the doors are.

13:49:25 At 9:26am, the doors closed behind Carly and she makes her way to a seat, the audio prompts informs her that her ride out to Schiller Park will take two minutes longer than expected, due to slow downs on the line, total time to Schiller Park is 20 minutes.

13:49:47 At 9:45am, Carly is informed that her train will arrive at the Schiller Park Station in two minutes. Carly gathers her briefcase and bag. At 9:47am Carly's train arrives and she receives an audio prompt that her AV shuttle is parked on her side of the street,

Accessible and Barrier-Free Mobility Workshop Transcript

13:49:54 50 feet to the left as she exits the train platform. At 9:49am, Carly enters the AV as she finds her seat she receives an audio prompt that the AV will arrive at her final destination at 9:58. At 9:58 Carly arrives at her clients offices, as she exits

13:50:09 the AV her audio prompt informs her that the entrance door for her client is 75 feet directly in front of her, Carly arrives at her final destination.

13:50:20 So we wanted to kind of share that with you because it really is kind of a culmination of everything that we're talking about. But as I said before, we have multiple journey maps that we want to share with you.

13:50:33 Now let's get into the meat of what we're going to be talking about in the in the breakout sessions. I just want to do a real quick time check here.

13:50:41 All right.

13:50:46 We're going to have some extra time in the working groups which is actually a really good thing.

13:50:47 So, if you look at section one, the way we broke this out, initially, you're going to be looking at merging the physical world with digital way finding tools right, this is the user experience that we're talking about understanding how universal design language

13:51:02 could impact AVs. This is about the vehicle, and then coordination of design languages between vehicles and infrastructure is really that it's about the vehicle and the infrastructure, what, what will that mean, what is what is that infrastructure opportunity

13:51:15 look like underneath each one of these bullets, you see the different kind of areas that we've broken out into those different groups so personalization of the mobility experience is in the merging the physical world with digital way finding tools, the

13:51:30 importance of audio cues accessible real time information unbanked alternatives and wayfinding for curbs and sidewalks.

13:51:39 What we'd like to make sure that we do when we get into the working groups, is that we're building off of this information that we're taking your knowledge as participants in this and building off of this sharing with us why these are pain points, sharing

13:51:55 with us what the opportunities could be, and quite frankly building off of every single one of these points is going to be extremely important as we start to move forward because as Laura said in the very beginning, all of the information that we will

13:52:08 be gathering here today. By the end of the day it is going to be shared with the US Access Board, it's going to be shared with MCity, who are going to use this as the basis for their meeting in June.

13:52:18 On June 8 of this year. So section to understanding how universal design language could impact AVs, we're going to talk about the vehicle interior features, right.

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13:52:28 What is, the vehicle look and feel like on the inside. zero entry importance, again, our number one. How can we accomplish that, what does that look like in suburbs, what does that look like in rural areas, how can we accomplish this. head clearance

13:52:44 imports, extremely important vehicle design cues, and we start to kind of thinking about that as we start to merge with vehicle and infrastructure, and then designing for usability by 85% of the public.

13:52:57 Last section, which is I always call the duh section because it, it just became so evident as we were having conversations with municipal transportation authorities is coordinating the vehicle and infrastructure design language.

13:53:09 What could that look and feel like why would that be important, how could we leverage universal design to make this as seamless a journey, no matter where you are in the country.

13:53:20 And the vehicle creating its own infrastructure we're needed. What are other examples that we could have the vehicle, you know, are these arrows that we're projecting are these colors.

13:53:28 What does it mean from ramps and all of these other things that we're talking about. And then to addressing curb opportunities and rural and suburban pickup and drop off.