Andrew: Good afternoon, everybody. Good morning for our friends out west, including our speakers here. And so welcome to the next installation of the National Center for Applied Transit Technologies Webinar Series. So today we're talking about g GTFS Flex. So, I am very excited to get to have a front row seat to this webinar since I've been looking forward to it since first hearing about it a couple of years ago when I started at CTAA.

And so now we have something. We're close and so this will be a great tool that comes out soon. A couple of housekeeping items before we get going, the Q & A box in your toolbar is where you can submit questions for us. So, feel free to send them in and I will keep an eye on that Q & A box while we go through the webinar and we'll have a time for questions and answers at the end. So, I'll make sure that our panelists have an opportunity to answer the questions you submit throughout.

So, you can feel free to submit these the whole entire time and we will get to them. And if we don't have a chance to get to them in the webinar, we'll go back and look at them later. So, with that, a little bit of background on N-CATT we are FTA’s newest technical assistance center. We launched late 2019. It's operated by the Community Transportation Association of America through a cooperative agreement with the FTA. And so, we are here to help small urban, rural and tribal transit agencies think about and understand and apply technology to their systems. And so, we noticed that there is a lack of kind of scaling down from the larger transit systems that have the staff and ability to try a new technology.

So, we wanted to be able to bring it to more systems to help them do their jobs and so we are analyzing information, communicating it, and helping with planning and encouraging implementation by thinking strategically and methodically about what to do when and how. And so, one of the efforts and doing that is through this webinar series and so GTFS flex will be an important part of it and of applying technology across different agencies. And so, the slides for this will be saved and posted, as well as the full recording and a transcript at N-CATT n-catt.org, N-CAT without a dash is a different website. So, don’t go there, go to n-catt.org.

And so, you can find this webinar as well as all of our past webinars and then we are working on various resources at the moment that we will start posting throughout summer. These will include videos, white papers, fact sheets, and a whole host of resources assist transit agencies in approaching technology and applying it to their systems. So today I am honored to host these three panels that are going to talk about GTFS Flex. Their definitely experts in this field. The first we have Craig from Trillium. he is Trillium CEO responsible for the direction of the overall business and he works with Trillium’s general manager, support manager and development team to provide guidance for and communication and coordinate between the different business lines in the company.

He's also the lead project manager for custom and large-scale software data deployments such as GTFS implementations and GTFS Flex data creation, as well as urban trip planning and so Thomas is a member of the Open Trip Planner Project Leadership Committee. Next we have Marcy Jaffe, Marcy Sports Tribal Intercity Rural Transit Partners. It was technical assistance for GTFS Builder, no cost and simple toolkit in Excel to generate digitized timetables that also offer online trip planning at Google Transit, Apple maps and on the Transit app. GTFS Builder generates agencies timetables for their websites.

And in 2016, balance of Maryland's statewide transit network was built on GTFS Builder. So, for agencies with limited staff time, Marcy offers GTFS software solutions that generate GTFS in just a few clicks. And so Marcy is passionate about offering writers an integrated and digitized national transit network. And Marcy has worked with Washington state Department of Transportation as well a San Francisco's Regional Planning Agency, Metropolitan Transportation Commission. Marcy has both a Master of Public Administration as well as a Master of Business Administration from the University of California, Irvine.

And finally, we have Dr. Caroline Rodier, Dr. Rodier is a Researcher at the Institute of Transportation Studies for the University of California, Davis. Her primary areas of research include transportation, land use and environmental policy analysis. Her current modeling research involves travel effects of alternative new shared mobility systems, such as transit based and regional ride hailing and ride sharing. And those includes autonomous automated vehicles. These studies used the agent-based models that Dr. Rodier developed for but the San Francisco Bay Area and Southern California region.

And she is also the implementation and evaluation lead for a car sharing volunteer, ridesharing and MaaS pilot projects that will serve rural disadvantaged populations in the San Joaquin Valley. Caroline also recently authored a report on how autonomous vehicles and shared mobility can address driving challenges for people with developmental disabilities. And she holds a PhD in Ecology from the University of California at Davis.

So, with that I will step back into the background and I will let our experts go forth. And, so take it away. Thank you all.

Thomas: Thank you so much, Andrew. And thank you N-CATT for sponsoring this webinar today the subject of this webinar is GTFS Flex, a proposed extension to the general Transit feed specifications. We'll talk today about what GTFS Flex means in the present and hopefully what it could mean in the future. This is going to be an interesting webinar. It will be concrete at times. It will be very abstract at times. As Andrew mentioned, GTFS Flex is still to come to a degree. It’s something that does exist and has current applications but is not in its final form and is still in evolution.

And so, we'll talk about some of that evolution, where it's going, and the broader movement around what GTFS Flex means for transit. So, the webinar agenda will have basically four segments, and we'll kind of have about 15 minutes for each segment. We'll talk about what GTFS Flex is. We’ll define it and talk about exactly what how it relates to GTFS. We'll look at some examples of how GTFS Flex is used today. We'll talk to a few different audiences that might be on the line right now, watching this webinar about what particular types of organizations can do right now?

What are the options to participate in GTFS Flex right now? What are the products that you can purchase and implement? And finally, we will think about how we achieve the long-term goals of GTFS Flex. We’ll be defining some of those roles in this first segment that we’ll get into here in just a second. Then at the end of this presentation we’ll go back, and we'll think about those goals and for the long term and how we're going to get there as a community. So to start, what is GTFS Flex the General Transit Feed Specifications, or GTFS, of course, is the data behind transit in Google Maps, for example, there is GTFS data that represents transit services on six continents probably over 7,000 cities.

More than a million transit stops around the world are described in various GTFS feeds. And GTFS, of course, is used not just in Google Maps but in hundreds of apps around the world. In open source applications like One Bus Away, other private applications like Move It Transit, Room to Rio being Apple and, of course, various custom agency apps and planning applications as well. But trip planning isn't available for all transit riders today. Trip planning is an option if there is fixed transit routes, fixed times and fixed stops where the transit vehicles visit. There's also, of course we should note various limitations to access to software and hardware that might prevent users from having access to trip planning for their transit service.

We're going to talk around the limitations around service type today, but of course, there's also a whole host of limitations around trip planning that are really about social and technological barriers that also need to be addressed in order to achieve the vision of trip planning that we’ll talk about in today's presentation. And as a community, and as an industry of transit providers, we need to provide equal access to this ability to plan one's trip with ease. Fixed route users today with smartphones who have access to smart phones, get a really simple process to plan their trips. They enter their origin, they enter their destination, they get on their way.

So, 1, 2, 3 step process that everyone using fixed route transit can utilize within Google Maps or some other app in order to bring ease to the trip planning process. And I would propose that all transit users, all those who need mobility really deserve that same ease with the new trick planning experience. So, what about users who rely on hail and rider flag stop services that don't have definite fixed stops? Deviated fixed route users for routes that will go off of their path in order to pick someone up at a different location or drop them off in a different location off the core route. Point Deviation or Checkpoint Services and, of course, Zone based style arrived services that will pick you up and drop you off anywhere within a certain area.

The problem we see today is that many transit riders don't even know that these flexible services exist. They're not represented in trip planners online, and it's not easy to find out exactly where it is that they're available. And so one of the Solutions were looking for with GTFS flexes to make those demand responsive transit systems more discoverable to help riders have access to them, understand them so that they can get on and ride.

So, what GTFS Flex is is just a proposed extension to the GTFS data specification. You can go to gtfsflex.com and it will forward you to the get hub repository where GTFS Flex is defined. But basically it adds a couple of files to the core tables within a GTFS feed that provide information about the areas within which demand responsive services operate, the travel speeds that you can expect within those areas, the service hours, and the message is that riders are going to need in order to actually get on and utilize a flexible service whether it's a phone number they have to call or an indication that they have to wave down the bus, etcetera.

And by putting these flexible services within the same data set, the GTFS data set that can also contain fixed route services and speaking the same data language between dial-a-ride and fixed route services, one of the things that GFS flex in particular allows for is the combination in applications of demand responsive services and fixed route services. So, this is a type of trip plan that really exists in a very, very few trip planners today and really exceptionally few within the US context, a few more in Europe. But this connection between a dial-a-ride service into a fixed route service where if one were to use a publicly available fixed route-based app today and request these origin and destination coordinates, that app would tell you no service exists.

But in actuality, if you just take a short dial-a-ride trip into the center of Saint Johnsbury in this town and in Vermont, you can connect easily to a fixed route service and then travel many miles across the state. So that combination and connection between the demand responsive network and the fixed route network is one of the core concepts behind GTFS Flex. Another one of the goals is to be able to actually understand a complex dial-a-ride system like this system in Sedona, Alaska, the cart system where there's a number of different dial-a-ride zones and different fares depending on which zone you're in.

To be able to visualize, understand what zone you're in and easily calculate the type of fare that you have to deal with or pay in order to use the service is something that we can set up and demonstrate through GTFS F7lex. And additionally, GTFS Flex also seeks to allow for visualization and analysis of demand responsive services by analysts, by state planners, other entities that want to understand what the gaps in their service network are. Finally, we have a secret agenda that obviously is not too terribly secret that there's a goal within GTFS Flex to represent all sorts of different services including demand responsive services like Uber and Lyft or TNCs.

Because the goal is to make basically to ensure that community transit can compete on a level playing field with these other types of services. So GTFS Flex can define a TNC like Uber and Lyft. It can define a taxi service, a paratransit service, a general public dial-a-ride service and then of course through the GTFS specifications itself. A fixed drop transit service. All in one specification. And by providing all of that data within one specification, we can create a scenario in which any app that can display Uber or Lyft can also display those community transit services right alongside it that are also alternatives for customers to consider.

So, in a sense, GTFS Flex is a technology, but it's also a movement. It has social goals behind it and wants to see changes to how it is that we deliver trip planning as a service within transit around the world. Want to broaden access to trip planning, help planners and analyst measure demand responsive service and ensure that community transit can market itself to users widely just like companies like Uber and Lyft can. So that is what GFS flex is and what it's trying to do. Let's look at some current projects that actually use GTFS Flex and see sort of how it is that GTFS Flex can be utilized today and as being utilized today.

So GTFS Flex, in a sense, was first introduced in Vermont. The first GTFS Flex data sets that were widely publicized and involved in mod sandbox demonstration project that I truly and participated in with the Vermont Agency of Transportation in 2016 but the code that we developed for open trip planner and the related algorithms to use GTFS Flex was all open source and other agencies have and companies have come along and you utilized this work to take it further, admin features and try to work it into their own operations. There are two GTFS Flex consuming applications today.

One open trip planner is an open source software application. Andrew mentioned in the introduction that I'm a member of the Open Trip Planner Project Leadership Committee. This is an application that can be utilized by any agency or organization. It is utilized by about 50 or so different cities in regions around the world at least and provides basically transit trip planning and multimodal trip planning in a software application that you can download, install yourself and use. It is a free. But of course, open source software is free like kittens. Takes a lot of maintenance. It is not trivial to set up an open trip planner instance and provide trip planning.

It's not something that you could just do with a few clicks. Takes development, experience, understanding of job, etcetera in order to set up this software. But open trip planner does ingest GTFS Flex data and provide multimodal trip planning for demand responsive transportation, dial-a-ride, hail and ride, and deviated fixed. Additionally, coming very soon and we will be able to demo today for a few feeds, Google Maps has now done a partial implementation of the GTFS Flex specifications. And Marcy later on will show us some trip plans of continuous stops within Google Maps.

Open trip planner can be utilized as the back end of a trip planning interface within a transit agency website. So, this is something that Trillium has done with the a few websites ridetcat.org. The trip planner shown here is one of those. We’ll soon be launching an open trip planner, base trip planner on the Northwest connector website in Northwest Oregon as well. To date, to my knowledge, the websites that are utilizing this trip planner code in GTFS Flex are all Trillium websites. But all of this work is open source and is something that any web developer could go up and set up this technology to provide, as you can see, dial-a-ride transfers to fix drop systems right on the trip planner within their website.

Open trip planner can also be used as a back end for trip planning within a mobile application. And I'd like to hand the webinar off here to Caroline, who will talk about the Vamos project in the San Joaquin Valley of California that she had been working on and leading here for the last a couple of years. Caroline?

Caroline: Hi, thank you, Thomas. So, I this is a part of a pilot that was funded by California Cap and Trade Funds. It's a Mobility as a Service, or MaaS. And it serves [0:22:46] County and San Joaquin County and basically the Northern San Joaquin Valley of California. And we've called Vamos. Thomas, do you mind moving forward? Thanks. So, I'm sure you're all familiar with these challenges to rural transit service. This was kind of the motivation for the development of the pilots. We've got the San Joaquin Valley is very rural. We have development patterns that are very disperse, long travel distances, low transit ridership, high transit costs, and ultimately transit services cut.

So, this is a real problem for rural households who are living in poverty and the San Joaquin Valley of California is there is a high level of poverty, many disadvantaged areas in the region. So low transit service, high cost of auto ownership for these households really leads to low access to opportunity. This is kind of the problem that our project was trying to address. So, we started with community-based planning. We did a lot of stakeholder engagement. We use data that was available for the region. A lot of come GTFS type data and then census and all that GIS type data for analyses. We inventoried their problems.

We were specifically looking at inner city, inter city transit service gaps, we have a lot of farm worker communities that are in the outskirts of major cities and we were really working on how we could get those folks to opportunities when sometimes they had maybe one round trip route a day. So, we have as a result of these challenges, many of these transit agencies face very high transit service costs and low fare box recovery. And they wanted to try to look at alternatives to address that. We're really looking at what we could do to reduce costs and expand transit access and our partners were really motivated to look into new technologies and shared mobility.

So basically, mobility as a service is one of the three pilots that were recommended, and its really kind of the backbone of kind of our vision for rural transit and mobility in the Valley. So, what was appealing about mobility as a service, is it would increase awareness of transit service. It also allows integration of transit services by connections across different transit agencies. So, like any other area we could have 12 transit agencies in one county and then 12 transit agencies in another, and we wanted to have cross county -- we wanted to make cross county services more available and gaps more available, and we felt that this could help facilitate better planning, better Intercounty planning.

We also integrated fixed route with demand responsive transit. As was just discussed by Thomas. Basically, you can now see the dial-a-ride, deviated transit and micro transit that will feed into your fixed route service and in some cases for micro transit it might in San Joaquin County accomplished all your transit service. We did face a problem. We were only able to provide phone calls, phone numbers for people to order these services.

The original concept was that we would integrate Vamos with these services, but because of issues related to open API and data standards, which I think we'll talk about later, those created barriers and issues of privacy and competition that made it difficult for us to do that right now. Most of the public dial-a-ride is contracted out. But we still are working on it. We're not giving up and we'll see what we'll be able to do this year. So the second of the three pilots recommended was volunteer ride sharing program. So, we wanted to integrate transit with more community based shared mobility.

So, volunteer ride sharing is basically you recruit volunteers, you pay them round trip travel. It's like 58 cents per mile. We're working with volunteer transportations that are using their high-volume back end and routing and dispatching services, trying to make our service work at a very low cost per mile. Again, we're looking at this 30-mile one-way trips. And then we also -- this is a third of our pilots was an electric vehicle car sharing project, called me Mio Car and that is located and affordable housing projects in the Southern San Joaquin Valley.

But just kind of backing up a minute, mobility as a service was and GTFS Flex we’re trying to connect all these services together. There's a lot of cap and trade money going into some of these shared mobility solutions at a grassroots level in the Valley. And we wanted to start to develop a framework where we could really integrate those different services that integrate and connect those different services that we're developing. And then, most recently, we were able to streamline transit payments and subsidies.

So, in the San Joaquin Valley, very soon you'll be able to plan your trip and pay for your trip for all transit agencies and all transit travel throughout the San Joaquin County. Okay, am I running out of time? So, we see this is as a first step for public vendor, NUTRO MaaS Transit Planning with OTP for 11 transit agencies, fixed route, demand responsive transit. Again, Micro transit. We have more walk access as well as real time arrival and departure times when available. And we were also able to include bicycle trip planning. Okay, this is our example of Bakersfield to Modesto Transit County.

We've got deviated bus with real time information and walk combination. You can also see route and directions.

Thomas: You can see here the Route 60 connection from Riverbank that's heading into Modesto is a deviated fixed pickup for ADA pair transit passengers where they're given the phone number to request a ride and then an indication that they can connect with the fixed route service after using the deviated fixed service.

Caroline: Thank you, Thomas. Oh, sorry. Got to stop this. How do I stop it? There we go. Oh, you have it. Did you want to show that again? I'm sorry.

Andrew: Nope, go for it, Caroline.

Caroline: Okay. So next step, as I mentioned before, you will be able to reserve a ride for the volunteer ride sharing program, which we call VOGO. If your trip touches a disadvantaged rural area which we specified and does not compete with viable transit service in the area. We are integrating fare payment in San Joaquin County with Moussavi and Vamos transit payment. And we should be able to see those programs operating within the next few months. That's it.

Thomas: Awesome. Thank you, Caroline. And I'm going to try to now correct and get back to a full presentation mode, but of course, you know technology being what it is, Google is not giving me that option here. Okay, I guess I'm just going to keep going because the presentation does appear to be big enough unless one of the other presenters tells me that the current set up is not working. So, what can you do right now? What are the options for agencies to actually participate in GTFS Flex for DOTs, municipalities to participate, use GTFS flex or help it along right now, on its current trajectory and mission?

It really depends who it is that you are, what type of agency you represent. And there are certain things that some types of organizations can do and that are practically speaking probably out of the reach of other organizations. So, we’ll talk on an organization by organization basis about sort of what it is that is the best course of action for each type of organization. And excuse me. Sorry. It's just going to bug me this entire time if I don't get back to full presentation mode. I thought I figured this out before the presentation began, but great. Okay. Escape works this time. Great.

So, if you are a DOT or an MPO, the problems that you're dealing with right now are some of the problems that you're dealing with right now related to GTFS Flex. You have no way to have a standardized directory of all of the mobility services within your state or within your region. There's no easy way to sync up some type of data set into a directory and just have a list of services and what they do. It's also not easy for you to compare different demand responsive services in different areas on consistent KPIs. There are some ways to do some comparison, but there's no standardization in the way that the data is being provided by those various agencies for their service parameters.

And finally, of course, riders who don't know about the availability of shared services may not be utilizing those shared services leaving seats empty and making the services that you provide funding for less efficient because those costs are being split across more riders. So the solutions that are available here through GTFS Flex and related technology, one GTFS Flex could be the backbone of a directory that provides access to information about various mobility services with an estate or within a region that GTFS Flex can contain the metadata about the service area, the time of day and help be the backbone of the data directory that provides an easy list of the service opportunities within a state.

And open trip planner does offer the opportunity for statewide or regional flexible trip planning. There are a number of firms that exist within the US that can host and deploy open trip planner and different flexible transit approaches within open trip planner. These can be expensive projects for a single agency, but within a statewide or a regional context, where that cost is shared across a number of agencies, that is an opportunity where a state DOT or an MPO today could a seat to procure an opened trip planner based system that has true multimodal routing that is vendor neutral includes access to all of these various services that could be related or represented within GTFS Flex.

So if you're a DOT or an NPO I would propose these next steps is really where to focus your energy because there's still further investment that needs to be made in order to make GTFS Flex something truly scalable that can work within any agency to bring the price down of GTFS Flex related projects and have more different types of services to be able to be integrated in a MOS platform like the one that Caroline showed off. And so I would suggest to tell ASHTO and the US DOT to get involved and encourage GTFS Flex as an effort at the national level.

Both of these organizations do have programs that are investigating GTFS, or GTFS Flex so raising desire to hear more investment within multimodal trip planning at the federal level is an excellent idea. Also just make sure that your GTFS fixed route data is in order. GTFS Flex is an extension of the GTFS specifications. So if you have a complete statewide data set of all the fixed route operators within your state, you are getting closer to the goal of a statewide GTFS Flex data set as well. So, if you don't have a list of all the GTFS feeds for the fixed route agencies within your state, that is an excellent place to start.

Reviewing and making sure that you have a high quality, flexible service inventory that you know each of the agencies that you need to reach out to and ask for GTFS Flex data in the future or who could potentially provide GTFS Flex data in the future. Making sure that you have that list and contacts is an excellent place to start to know all of the mobility services within your state or region. If you are an individual, dial-a-ride or paratransit provider, or maybe a deviated fixed route provider within a rural area, you have a different set of problems. Right now, there's no good way to allow your users to book trips themselves.

There do exist trip booking platforms and scheduling software applications for dial-a-ride or paratransit services that allow users to go in and have accounts and make trips and set parameters and change those trips. However, there's no scheduling software out there that I am aware of that publishes data that allows those trips to be published elsewhere easily or book elsewhere easily. Those APIs tend to be proprietary; they tend to be closed off, and an integration with them is on a case by case basis.

So that vision of just like being able to allow an easy access to booking trips through any app that a rider has available to them is just not something that you have as an option on the market for you right now as a small transit agency providing demand responsive service. And you don't have extra budget to spend on expensive technology building a custom open trip planner instance for just your agency is likely not a practical expense within the budget that you have, and you can’t easily collaborate with the fixed route services that connect to your demand responsive service.

GTFS Flex proposes a solution to this where your service can show up in all of those trip planners that already exists. But those trip planners don't actually read GTFS Flex today. That's a major gap in the market right now where you can't actually take this GTFS Flex data and give it to Google or give it to the transit app and have them show dial-a-ride or paratransit services. That's a gap that we need to address as a community, and we'll talk about that later. So, if you're a dial-a-ride or a paratransit provider, I would basically just say that your next step is to complain.

Your riders should have access to trip planning too just like fixed route transit riders. And there are state and regional and federal organizations that help fund your services and help provide those services to riders that really have the responsibility to help ensure that your riders have easy access to information. So, there are investments that can be made and your complaints and your desire to see easy trip planning for your riders do help with that, and we'll talk with more specificity about what the language we can use on that is later on in this presentation.

So GTFS Flex is just a partial solution. There's more software, there's real time data that we'll talk about later that is needed and so really, we should expect that larger organizations with access to funding and money help lead, and we should organize with other demand responsive providers to work on collaborative solutions. Now, what if you're a small municipality or any municipality or transit authority who is considering a contract with the TNC like Uber and Lyft or a MaaS software provider? What can you do during that negotiation to think towards GTFS Flex and improve the outcome of this process?

Remember one of the problems that you have is that every system on the market right now is going to describe itself as the perfect, unique multimodal trip planning app. And it's all marketing language. It's all marketing lies for the most part. There are very few truly multimodal applications out there in the sense that they provide trip plans that include not paratransit as one option or dial-a-ride as one option and fixed route as a separate option, but actually integrate those two types of services together and show the broader network that contains all of those services.

There's a lot of people selling things that sound like that that don't actually do that and there's additionally very few best practices for the right terms of service or contractual relationship that you're supposed to be looking for in coordinating with the TNC or a MaaS company. And the solutions here -- there are no solutions short term. The market we have to understand when we approach these types of contracts, whether they’re front ends for a MaaS system or a TNC partnership that the market has not figured out how to effectively deliver this service in a way that's really good for both the company and the public agency yet.

There are no near-term easy solutions to ensure that you're getting exactly what you want and that the data sharing relationships between all the parties are totally what's going to be beneficial to the public in the long run. These are still things that are being developed and researched and we should enter entities, negotiations, and contracts understanding that. So, what can you do right now if you're looking to purchase services from Uber or Lyft or looking to purchase a MaaS platform app? One is just to keep contract terms short. Understand that the market is changing very quickly right now, and everything is a pilot.

Remember that ultimately, we need to provide essential services to our essential riders and we want to make sure that we continue to provide that service. So, we should be prioritizing the continuation of service to those riders more than anything else. And finally, again please complain because just on a fundamental level, a small transit agency should not have to be at the negotiating table with Uber. It's not fair. They have more resources, more information, more legal, more lawyers, etcetera. There should be best practices. There should be coordination by state regional federal entities to help make this an easier process for you and give you those best practices and set the terms of that negotiation.

Because you can't be expected to understand the ins and outs of this very complex field of different technologies coming together. So if you're a hail and ride service, if you offer a service that has a flag stopping along a route, there is an action that you can take in the short term to update your GTFS and likely get this service shown in Google in the near term. And I'm going to hand over the presentation to Marcy to talk about continuous stops in Google Transit and the National RTAP GTFS Builder. Marcy?

Marcy: Thank you, Thomas. And thank you, Andrew, Cheryl, Amy and the team at N-CATT and Thomas for welcoming us as a partner in this discovery phase of being able to help small rural agencies participate. And we might be able to call this GTFS Flex Light. A no cost trip plan toolkit is available from National RTAP. You'll get a few quick screenshots in a moment where we can add this feature that Thomas is talking about. It's an absolutely hot off the presses in the last 2 to 4 weeks become available that riders can see their flexible drop off and pick up.

And if we're creative with this tool, while GTFS Flex matures, we’ll be able to get more agencies hopefully at the statewide level, more partners into the game participating, allowing us to see where their services. So next slide, Thomas. In this particular example, we're in California, and there's this very nice long-distance route, the section in yellow is anywhere along that portion of the route a rider can be picked up and dropped off. These are long distances. Rider in the heat of the summer and the chill of the winter don't want to be walking for 2 to 20 minutes to find out that they could have just stood where they are to be picked up. The section of this particular route with the red doesn't allow it. It's along a freeway.

It's not a safe location. So we have an opportunity now to use the continuous drop off and pick up and so on that slide below it's a little bit difficult to see, in the past the riders would have had to hike themselves to a bus stop either on the right side of the left side of the screen. And now, if they're just anywhere along the route they could be dropped off or picked up. While this seems very straightforward, it was not available before and could have been a barrier for many flexible general-purpose dial-a-ride to participate in GTFS.

So, on that screen is a sample trip plan. If you do get interested in playing with a little bit, you could do that. Next screen. Thank you, Thomas. So, we just wanted to open up the door to explain that until we have more tools and more needs, there's a simple toolkit. It's in Excel from the screenshot that you saw before, where that yellow section and the red section are developed. We would build a schedule with the 6 or 8 trips in the day and the next screen use the feature in the toolkit that would allow for continuous pick up and drop offs specifically based on the specifications whether it's allowed or not allowed.

So, what we're looking for here is the opportunity for discovery of these flexible transportation services with a very simple tool kit. If they decide they can only offer two trips a day during COVID and then go back to their 6 or 8 trips a day, they're literally modifying rows and columns in an Excel spreadsheet that they can very easily publish and Google is now publishing this data within 24, 48 hours updating the data very quickly, allowing these agencies to be more nimble. Does it require real-time information? No. An agency can participate in GTFS Flex without mandating or gathering real time information. Would that be helpful? Of course, but it's not required at this time.

So, Thomas, that next slide just offers for someone who wants to go back in at the state DOT MPO level and learn more about GTFS Builder and our no cost toolkit to reach out to us at National RTAP. And we're available to do all the hand holding at the agency level and bring them on board. And then as we get GTFS Flex more mature, these agencies would be ready to go. I'll pass it back to you. Thank you, Thomas.

Thomas: Awesome. Thank you, Marcy. And indeed especially if you are a state DTO or MPO, where you know there are agencies in your region that already used GTFS Builder or you're an agency that uses GTFS Builder and you have hail and ride service any service where the rider can flag down the bus along the road, really strongly encourage you to reach out to Marcy and National RTAP right after today's webinar, and see about creating that continuous stop status that we can continue to get more agencies using GTFS Flex and Google and make that data more popular.

So, what are the long-term goals that we talked about earlier for GTFS Flex? Providing access to trip planning for all transit users whether they are utilizing fixed route services or demand responsive services. How are we going to achieve those? I think I'd like to propose first that we look at what the gaps are between where we are and where we'd like to be and then I'm going to suggest basically some suggestions of how it is that we should think about our communal action, collective action towards achieving those long term goals?

So, the gaps that exist right now are with data producers of GTFS Flex, data consumers of GTFS Flex, the need for real-time data and specifications that provide more actionable real-time demand responsive information. and finally, eligibility verification and payments. On the data producer side, we need scheduling software to export GTFS Flex so that various dial-a-ride services that schedule softwares and have all of the system parameters as far as the areas that they'll serve and the times they'll serve set up in a system. We need those software applications to start exporting that GTFS Flex file.

Basically, none of them do today and that is a major gap to being able to push these specifications forward. We also need commercial software, the consuming apps. Excuse me. Sorry there also needs to be consuming commercial software to allow, for example, and MPO or DOT to make a large number of GTFS Flex feeds for a bunch of different demand responsive providers within their area that maybe don't utilize a scheduling software platform. Then we need data consumers like Google Maps, Transit, Bing maps and others to actually incorporate that GTFS Flex data not just the continuous stops part, but also the area's and dial-a-ride services and deviated fix services.

We need our GIS and other geographic information analysis tools to incorporate like they have for GTFS fixed route features that Poland GTFS Flex areas and times so that we can actually understand the extent of demand responsive services. There's a big gap with real time information because, really a high-quality flexible transit scheduling necessitates some communication with users in real time. Plans change, maybe there's a new pickup added to the route, and we need to let the user know that the time of their pickup is going to change to adjust for that.

Riders increasingly expect the Uber experience of just being able to pick up the app and plan a trip in real-time. And so, with only discovery data, we're really not fulfilling all of those user needs. And GTFS Flex right now is just static data. It's just discovery data. There's no standard data standard that describes sort of the GTFS Flex real-time information that is needed by consuming apps and that’s ultimately just a specification that still needs to be drafted and adopted. Then additionally, demand responsive services bring up the question of eligibility and payments. Many different types of services demand responsive services have eligibility restrictions, and we need to have an easier way to understand whether a particular user is actually able to utilize a service being presented.

I think the question came up in the Q & A earlier about how ADA and eligibility is handled now in apps like Vamos, the open trip planner application that the code that we wrote in the Vermont project does have a basic eligibility fielded it where each service has just indicated as either general public or not general public. So, there's a capacity for a trip planner like Vamos to have a toggle where the user says, do I want eligibility restricted services or not? But it's just a binary. Yes, no. There's no examination of what users age is, etcetera. There's also a need to think about payment. Payment doesn't happen necessarily at the time of boarding for flexible services like it often does for fixed route services.

And there’s often times many different funding sources involved. So thinking about how it is that we're going to ensure that if we're providing an electronic way for riders to book trips that we also provide an electronic way for them to pay or for other funding streams to pay for their trip is something that we need again to basically design and implement an entire specifications for that does not yet exist. So how do we, as a community managed collective action to address those gaps? I proposed some strategies for success and really these are just about sort of how we talk about and how we work with each other and our vendors.

How we talk about flexible trip planning and trip planning as a tool for our riders as we move forward over the next few years because we do have a lot of work to do in order to see these goals achieved. So, first, you know, I would propose that we, as an industry want to start understanding that customer information is part of service delivery and that if riders don't have access to information about the service that we really aren't providing them the service. And we need to be ensured that we're actually providing equal access to those tools as well. All riders should have access to multimodal connections to understand the full network in front of them.

So I think the first strategy for success here is simply to maintain the standard as an industry that multimodal trip planning electronic trip planning for demand responsive services for all services and making sure that all riders have access to those services is really a community standard that we strive for. Second, we need to lobby those with money because the community transit organizations that really need to be able to have access to this type of trip planning technology don't necessarily have the financial capacity to invest in these tools themselves.

So we reach out to our regional state and federal leaders and we ask them to continue to make investments that provide simple concrete enhancements for agencies and riders, not big ribbon cutting ceremonies and promises of great new perfect multimodal tools, really just focus on what is the simple concrete enhancement that we need right now in our community and how can our region, state or the federal government help us make it happen? They should be looking to reduce costs for agencies and relationships that don't lock agencies into working with particular vendors, ensuring that the products that come out of various projects can work in many different commercial relationships.

And along that line, we need to start really seeking active vendor collaboration in our industry I'll say, basically, one of the one of the things that we can do today to continue to push towards are goals of a multimodal future where all of our riders have access to trip planning across the entire network is that if you have a vendor who won't collaborate with other vendors and other systems to deliver desired results and can't express the clear technical reason why that's the case, I don't think you should work with that vendor.

We should force our vendors to collaborate and we should point to data standards and ask for standard data and standardized formats that can be exchanged between vendors and expect in the industry that vendors are willing to play well with each other and collaborate to create, to integrate their products and move forward you as an agency and the services that they're providing to your riders. So, we can call references and expect enthusiastic endorsements of how that collaboration has gone and really have that effect our purchasing selection.

Finally, we can use this buzz word of mobility as a service or MaaS. I think, very fruitfully within this discussion, because the concept of MaaS is exactly what it is that we're trying to get to of the ability for any transit user to have easy access to all the options they have to get from point A to point B. That's really exactly what we want to strive for community transit riders. And GTFS Flex can provide a foundation for MaaS ecosystems similar to how it does for the Vamos platform where each of those various apps or various services are represented in a GTFS Flex data set. But we also need to remember that MaaS isn't something you buy. It's something you build.

There's always going to be concrete enhancements that we can add on to improve the services that we're providing to our customers and the information that we're providing to our customers. But there's no one company that we can go to and just say please give me a MaaS system. Just like in that Vamos situation. It begins with community organization with collaboration with understanding exactly what it is that agencies need and then lobbying those state regional partners and encouraging concrete investments that help you bring tools to riders, not some perfect magic one size fits all app, but really tools that provide that are tested, demonstrated and are providing something specific to your riders.

So, each purchase we make can support better technology in the future. We could be building that mobility as a service future. With each technology purchase we make and to kind of sum up the sort of take away points basically of how we can push towards that mobility as a service future and the goals that we're seeking with GTFS Flex. We could insist that vendors work together, that they collaborate over data standards and exchange information between the various systems and we advocate for and encouraging our state and regional and federal leadership thoughtful action provides concrete benefits to our riders.

So, I know we're over time. But not all that much, I guess. So, we have plenty of time for questions and answers here. And I'm going to hand it back to Andrew to do the moderation of that session.

Andrew: All right. Thank you, Thomas and Marcy and Caroline. I definitely learned a lot from that. So first I wanted to build off of the question from Elizabeth Sampson. Who, Marcy, you did answer that specific question of how difficult is it to change information in GTFS Flex but that made me wonder sort of how easy or difficult is it to kind of maintain a GTFS and GTFS Flex spreadsheet or tool as a transit agency?

Marcy: Thank you for asking. Certainly, from our perspective where these are rows and columns of data, we don't have a lot of surprises because we'll copy paste those rows, we’ll delete some columns, we’ll add some rows and within an hour a quarter we can maintain data when its regular seasonal changes. If it's COVID and we're just all hands-on deck, what's nice about these spreadsheets is we can share them between different members of our staff, and most people are quite nimble with them. So, it's easy to get data up to date and the publishing at Google used to be a long, cumbersome process in terms of it took time.

It wasn’t cumbersome from the agency's perspective. But you were biting nails wondering when the rider would actually see it. And now, literally sometimes same day data is getting published. So, it is not very difficult and maybe much more worth the value than we had years before that when an agency updates their data, has a platform like a GTFS Flex, GTFS continuous stops being able to be published at Google Transit app and others. Those riders are no longer having to call in and ask the question, “Is this schedule up to date? What does this note mean? Are you stopping at my stop?”

All of that could be managed very quickly and easily within the GTFS Builder tool from National RTAP. And I'll pass it to Thomas. I'm sure the tools that he offers his agencies to keep their data up to date is as easy or possibly easier from his perspective.

Thomas: Trillium as a commercial entity does provide GTFS Flex creation services and we have an internal tool set to maintain a dial-a-ride data, deviated fixed data, etcetera. Similarly, I totally agree kind of with continuous stops and maintaining that battle, it's a pretty easy process. We have worked with three states now to build out large GTFS Flex data sets representing demand responsive services and I'll say that the maintenance effort has been generally speaking lower than we expect it to be. Demand responsive services don't tend to frequently change.

And so usually this is an in-depth interview to understand what the service parameters are, tracked those to find them in detail, and then they don't change for very much for a long time and so the maintenance is not super expensive. However, I would say that we've also found that flexible transit agencies often don't have all of the information that needs to go into a GTFS Flex data set within at the level of specificity or precision that really is needed to set that up in in a machine-readable data standard. Something like a service area has to be explicitly defined. There has to be an exact polygon, an exact county boundary, an exact radius.

And sometimes agencies are willing to go a little bit outside their boundary. And sometimes not. Sometimes that boundary isn't exactly drawn. So we have found in the projects that we worked on that while there aren’t exceptionally high maintenance costs, there are long term costs in in one that it takes a long time to build the data. Your first interview with the agency doesn't get all of those specifics. You have to keep working on it and the data quality increases over time. And then second, there is the issue of turnover and staff changes at agencies where if you’re looking to run a GTFS Flex program, your state or regional level.

There's budget involved in just ensuring that all of those services are still providing services exactly as they told you they were a year ago to maintain that contact, make sure that you're communicating with them and that all the data is fresh even if there aren't many changes.

Andrew: All right. Thank you both. And so, a question from Steve Yaffi. He is wondering about how can GTFS Flex integrate in the standard demand response data structure proposed in TCRP report 210.

Thomas: I think at a high level, and I'm not familiar with the specifics of the 210 proposal. I'm more familiar with the G16 report that came out more recently that mentions GTFS Flex within it. There's no direct integration there. Happy to take the question in a discussion. And would love to hear from you, Steve, after the webinar to kind of hear more of the concept there and figure out whether there's a more direct connection we can make in the near term.

Andrew: Okay and a question from Pedro Rodriguez. What have AASHTO and US DOT done? Where are some examples of their investigating GTFS Flex that we could point to?

Thomas: Yeah. So, I should – one, I should note that I am a contractor for the Bureau of Transportation Statistics. Trillium is a contractor for the Bureau of Transportation Statistics, and we're performing the GTFS-related outreach project for them and so part of my comment of US DOT comes from that contractual relationship where I know about the internal conversations of US DOT investigating and promoting GTFS data as a tool that can be integrated into the national transit map and looking into the future of intercity bus and flexible services.

So, on the US DOT side, that is with regard to Flex that is a currently just long-term thinking. And one thing that's within the broader research around GTFS data and the integration into the national transit map. For AASHTO, I'm so bad at these all the various committees and how this all works. But basically, there's a committee of state DOT representatives from each of the 50 states as well as the district and that there was a number of problem statements put before that AASHTO Committee on Transportation last year. I and a number of different consultants proposed a problem statement related to flexible trip planning, and that problem statement was shortlisted for research possibly during the fiscal year ‘21 is my general understanding.

So there is a problem statement out there related to flexible trip planning that is being considered by representatives of state DOTs within AASHTO and if you contact me after this Webinar, I'd be happy to provide the exact name of that problem statement and the exact committee, I apologize. I don't have that answer off hand.

Andrew: All right, and let's see. So, one more question Cheryl Heads bounces off of me yesterday when we were chatting about this. She’s wondering, will GTFS Flex be a planning tool that would enable map visuals for comparing transportation services such as overlapping service or where there are demand response desserts. Can you see that going that way?

Thomas: Absolutely. I think this has been a core use case for a couple of the state DOTs that we've been working with on GTFS flex data. It is Oregon DOT. I know I saw Sarah has joined this called stay. But Oregon DOT has a planning application called TNExT that ingests GTFS data, and they could do things within that application like identify the number of residents within a certain distance buffer zone around a fixed route stops and so they can understand the accessibility of the transit network and in different regions. But there isn't a tool set for them to be able to then line up all of the dial-a-ride information as well and understand it is there a demand responsive service that could provide access to that rider.

So being able to understand where that service exists, where it doesn't exist, where there's duplication of service is definitely an important use case, I think within, for example, that application or context. There's a lot of complications there, though, because it's just knowing the service area isn't necessarily quite all the information you want in that context. It makes a big difference whether dial-a-ride service provider has 40 vehicles within a 40 square mile area or four vehicles within a 400 square mile area. The number of vehicles and capacity of a system to move people around, I think, is also a very important factor in that type of analysis as well as the terms of service for those vehicles.

So, there's a lot of there's a lot of information that needs to be gathered there, and some of it is not yet spect within the GTFS Flex proposal, but certainly could be.

Andrew: All right. That is fascinating. Just trying to think of how one could kind of grapple all that into one map. All right, so we are just about out of time. So, if anyone, if I have missed your question, we will chat later to kind of give you an answer and send it out to everyone else that has registered. And other than that, all of our contact information is on this slide here as well as the N-CATT website again. So, you can feel free to reach out to us at any time with questions.

And again, our slides, the recording, and the transcript will all be up on the N-CATT website shortly. So, thank you again, Thomas, Caroline and Marcy and I look forward to chatting with you again in the future and hearing from everyone that joined us.