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Transit Asset Management
Using TAM to Support Decision-Making Webinar Transcript

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Introduction

Rachel Galton: Good afternoon, everyone. And thank you for joining us for the FTA TAM webinar on using TAM to support decision-making.

My name's Rachel Galton with the U.S. Department of Transportation and I support the FTA program and will be helping facilitate the webinar today.

To get started with a few housekeeping items. I'll get a few updates from FTA, we'll hear from our presenters and we'll have all questions at the end.

Feel free to add your questions in the chat pod throughout the presentation, but please identify the specific presenter you're addressing for when we return to the questions at the end.

At any time, you can download the presentations in the top left corner of the screen, and a recording will be posted on the TAM web page in the weeks following the webinar.

Our speakers for today to be Sharon Okoye and Terrence Boylan of the Greater Cleveland Regional Transit Authority.

First, a few updates from FTA.

We have registration for our summer roundtables under way. Consider registering as soon as possible as space is limited. The draft agendas have been posted, so feel free to take a look at those at the link on the screen.

Second, APTA and FTA are currently holding a joint webinar series. The first webinar was held in the spring. There will be another one held this summer. More information on that will be forth coming and also will be able to be found on the APTA wide.

In terms of TAM projects, the TAMplate is being updated. The one-stop shop will link the inventory module to the TAM template. The update will be ready in the fall.

In addition to that we are developing a training course on asset life cycle and risk which will be available in spring of 2020. Just as a reminder, as always, the peer library is still accepting documents.

We can go ahead and get started with our first presentation which will be from Terry from GCRTA.

Terry Boylan

Terry Boylan: Good afternoon, everyone. My name is Terry Boylan. I'm the asset manager on configuration here at the Greater Cleveland Regional Transit Authority in beautiful Cleveland, Ohio.

A little bit about us, we currently have about 360 buses which are CNG, diesel, some articulating, we have a BRT line, commuter buses and trolleys. We currently have 98 trains

which are 68HRV and 38LRV. We have an on demand which we call our paratransit which has 30 cutaways and 38 vans.

Here's some pictures of some of the vehicles that we have, our trains and buses and our trolleys.

A little background on it. In 2015 we started predictive maintenance which we call PMP. The reason we started predictive maintenance, we had a lot of fleets that weren't too reliable.

So we did -- started predictive maintenance on it, but we didn't see much improvement in reliability because at the time the bus was eight years in service.

Our miles between service interruptions stayed around 4,000 miles. We define a service interruption as anything greater than five minutes. I know there's different definitions out there, but that's the one we use.

In 2016, we started on our -- predictive maintenance on our brand-new fleets. Reliability stayed over 15,000 miles between service interruptions.

The great thing about this is we created kits that a vendor sends to us or comes in as one package and it goes right to the bus and the bus gets worked on.

When doing this, there's some things you're going to need to consider. It's going to increase your parts inventory.

The thing we found that's very helpful is to get the right group involved. So our inventory, planning, engineering, our shop supervisor, mechanics and our Q&A department, we meet to go over everything.

We also started creating prototypes. So when there's a first interval to do something, we know that the task we're doing are correct and the parts on there are correct.

Our group meets regularly once a month right now and we discuss all the good and the bad just to make sure we're going down the right path.

Some things you also want to consider is review your starting point. Where do you want to start with this program and the big thing is review the labor you need. It's a big change in thought and right now that's one of the things we're doing, looking at our labor force to make sure we're staffed correctly.

For us, predictive maintenance was a big paradigm shift.

In the past, we have run a bus until a service interruption. The bus would come back into the garage whether on a tow or limping back in. We fix the defect, whatever was wrong with it, send it back out on the road.

We were 100% focused on service, which isn't bad, but we were having too many interruptions in our service. By changing to predictive maintenance, we set intervals where parts are changed before they fail.

I look at it this way. You get your car and it says to change the oil every 5,000 miles, but there isn't anything in there that tells you when to change your water pump. And your water pump's going to fail at any time. We predicted when that's going to fail and we replace it before it fails.

Another thing we do is, when a bus comes in, we fix all the defects that are on the bus. What that led us do is get a 50/50 split on service and reliability which is helping us and the customers. The big slogan we have here is, we schedule the bus, and the bus doesn't schedule us.

Currently, we are about 50% of our fleet is under PMP. And those that are under the PMP process, our miles between service interruption is just over 17,000 miles.

The rest of the fleets that aren't under PMP were sitting around 6,000. So we're trying to manage those fleets out by looking at what systems have failed on the bus and we're looking to correct those systems when it comes in for its regular oil change or whenever PM work is scheduled next.

So as you can see, we're moving away from reactive maintenance and moving toward a more proactive maintenance. As I said, it's improved our service and reliability on those fleets.

Another thing we saw with this was our corrective maintenance has been consistent with those buses under PMP.

We're under one hour of work, one hour per work order, and we're averaging nine work orders per bus for corrective maintenance. And for non-PMP buses, we average two hours of work and there's 12 work orders per bus per month.

So we've gone from 24 hours per bus down to nine. So that's definitely switching where we're being more proactive on our maintenance approach.

So currently the fleets we have under predictive maintenance, our first fleet is approaching 200,000 miles.

So we have a 12-year projection. That's what we keep a bus here. That's going to put us at 600,000 miles. We also went and did a 15-year projection. And that would put us at about 800,000 miles.

Right now, we're looking to start replacing fleets that are under predictive maintenance at 15 years instead of the normal 12 years. This could make our ULB number look bigger when we report it, but the data is telling us we can go to 15 and everyone here at the RTA is fine with that because we see there's a financial savings across the board by doing that.

So as far as tracking goes, we have created weekly dashboards in Excel which show us the percent completed at each PMP interval. Currently our intervals are set at 50,000 miles and that's about a year's worth of miles for the average bus in the fleets.

We also look at the regular preventive maintenance compliance because we want to make sure the smaller intervals are hit before we get to the big interval.

We also track defects, upcoming work, and buses with most open work orders to determine what's going on with that bus.

Here is a snapshot of our predictive maintenance dashboard.

You can see the green is what's been completed. The yellows are in process. And the blues there are need to be completed. So you can see the 50,000, 100,000 are the milestones we are at.

This gets sent out every Friday and everyone at the bus district gets to look at it and review, see what's going on.

And this is a snapshot of our PM dashboard, so our preventive maintenance, oil changes, our time PMs, our electronic repairs. This also lets us track at a smaller level what's going out with the bus just to make sure like I said, the small intervals are captured and on time as they're supposed to be.

So with -- you know, PMP, we're just starting our fourth year with this, and we're just getting good data to know what is working and what is not.

So about six months ago we ran a report to see if there are any parts being replaced -- currently being replaced on our predictive maintenance. And making sure they last between their cycles and so far they have been. There's been really no need for extra parts or replacements of things we change predictively.

The flip side of this, we're currently looking at the parts being replaced and make sure that's the right intervals replacing in that.

So the parts that we're starting to take off, they're going to engineering to do some analysis to make sure we can push the envelope, so to speak, a little bit to save us a little money while we still keep our reliability on the bus fleet.

Any questions? I guess we're going to wait until the end?

Rachel Galton: Yeah. That's correct. Thanks so much. That was really helpful overview.

I think we're going to have a quick poll. If we want to switch to that screen.

So there are some polls up on the screen. Feel free to look at the questions and take a few minutes to answer.

Great. Thank you, everyone, for participating.

It looks like a few answers are still trickling in.

At an immediate glance, it looks like we're kind of split between some agencies having predictive maintenance practices, about 43, with about 35 saying there are no predictive maintenance practices. There's a split there.

In terms of asset prioritization tools, it looks like most agencies on the webinar use an in-house tool, and most agencies use the FTA TAM website to get TAM information, which we always appreciate hearing.

Sharon, are we ready to switch over to your presentation? Is Sharon still on the line?

Sharon Okoye: I'm still here. I can't see my presentation.

Rachel Galton: Okay. Seems like there's some connectivity issues. Would you want to just kind of go through your presentation and we can advance the slides on the screen if you have it pulled up on your computer.

Sharon Okoye: Okay. Hold on a second. Okay. All right. So you want me to go ahead?

Rachel Galton: Yes. Thanks.

Sharon Okoye

Sharon Okoye: Okay. Yeah, so again I'm Sharon Okoye. I'm the Transit Asset Management lead for the department.

I've been in my role about five years now, and I represent the Bureau of Public Transportation and the agency-wide asset management program initiative.

ConnDOT has completed two TAM plans, and they were finalized last year in October.

During our TAM plan development process, we utilize a decision support tool to perform predictive analysis for capital needs for our investment plan. Next slide, please.

ConnDOT completed -- ConnDOT is a tier one agency and we completed our own plan. The assets included in our tier one plan is from our major transit system which consists of two commuter rail lines, a bus rapid transit system as well as two ferry services and a statewide bus system. Next, please.

So the capital assets under our tier one plan are valued at a little over \$8 billion with our rail guideways that make up 65% of the system value. Next slide, please.

And also we are a sponsoring agency for the tier two group plan for Connecticut. And in this group plan, we have 12 transit districts who provide ADA, paratransit and local group services in regions throughout the state. ConnDOT has capital responsibilities for these assets.

The plan also includes FTA sub-recipients with non-Connecticut DOT-owned assets, and these include 54 of our open-door service providers for our 5310 plan disabled program as well as the tribal nation provider and the town of Mansfield who owns and operates an intermodal center. Next slide, please.

The asset portfolio for these capital assets are valued at a little over \$200 million, which is a little bit more than 50% of these assets are revenue vehicles. Next slide, please.

So ConnDOT utilized a transit asset prioritization tool, better known as TAPT, that was developed by our agency consultant for the TPRFPI72 project. They customized a tool for ConnDOT including expanding to capacity of modeling to analyze more assets as well as its capability of the model to pull in assets from a separate database as opposed to developing -- one having to develop modeling groups within the tool's parameters.

So the tool itself produces life cycle models for each asset type, specifying at which point replacement or rehab is needed to minimize life cycle calls.

And for our analysis, ConnDOT utilized the age-based tool as well as the condition-based model for the tool. The age-based model and the condition-based model for the tool, for our analysis.

So in addition to generating life cycle models, the tool has a prioritization model that integrates the life cycle models and simulates allocation of various budget scenarios to reduce, prioritize potential investments for candidate rehab and replacement actions. Next slide, please.

So as part of our TAM development process, we developed a state of good return database which integrated data from all of our operator systems as well as databases and systems within the department, and we utilize this database in conjunction with the TAPT model to determine a capital need for three different budget scenarios over a four-year horizon period.

And to keep in line with our capital planning process, our bus and our rail assets were modeled separately. For the bus assets, the tier one and tier two provider assets were modeled together, and for the rail model we modeled our tier one asset -- rail asset. Next slide, please.

So as far as the funding scenarios or the budget scenarios, we started with a federal -- scenarios using federal funding with a state match and -- with each progressive scenario, we incrementally added state funding.

For scenario two, we added state bonding and for scenario three on top of that we added budget -- Let's Go CT funds that was a governor initiative to enhance Connecticut capital programs.

So the budgets we used were for preservation work on the -- didn't include enhancements.

And how we determined the percent of the total fund, we looked at what available funds that were utilized for each mode. And we found that 36% of the available funds for bus mode were used for state of good return needs, and 98% of the available funds for the rail mode was used for state of good return needs. Next slide, please.

And also during our planning development process, we reviewed FTA default use for life value and we decided we had to customize some of the ULB to be in line with our current operations.

So, for example, for our statewide bus system, we replace our buses at a 12-year interval. So we had to utilize a customized ULB of 12 years instead of the 14 recommended by FTA.

And also another example is for our cutaway -- cutaway -- cutaways we utilize for paratransit services, that was more of a factor for replacement. So the replacement that -- that takes place where these vehicles are -- at a lesser interval than every ten years. We actually replace them every five years.

So these ULB s were -- are used as part of the modeling process. Next slide, please.

This is an example of the output list of the prioritized list generated by runs from the model. And as you can see, there's recommended work for each asset and it starts with the highest asset that has -- asset that has the highest risk for failure. And it goes in descending order.

And other information included is the replacement cost in the year of recommended replacement. So what ConnDOT did with this list -- these lists that were generated, we compared them to our capital program and noted where some of the recommended investments were already programmed into our capital plan.

So just to compare to what we do now, ConnDOT generally invests based on factors such as safety, system modification, and capacity needs. But this tool can provide a more data-driven process to support investment decisions as well as it can be a guide to budgeting and programming for projects and procurements. Next slide, please.

And this is just a graphical representation of our scenario results for our bus assets. The graphs show annual recommended work by asset class as well as the need or the backlog that the work didn't address. Next slide, please.

So lessons learned, the tool has great value, but there are some limitations to its use.

One thing is the output of recommended cost may differ from actual project cost due to other work associated with project development and implementation in addition to replacement cost.

Also, the budgets for the model were presumed to be in a single funding stream whereas in reality various funding sources that are considered for investment have constraints on the type of work they can be used for.

And lastly, as ConnDOT -- ConnDOT current investment process other factors are considered for prioritization above and beyond the TAM parameters.

So one of the challenges we had with the model, though, is that we found that although our condition-based modeling was utilized at the component level for our station platforms, these assets were grouping for replacement in the same funding year.

So our runs had to be adjusted for this, and we realized that there needs to be -- the model needs to be adjusted to be able to model these specific assets at a more detailed level. Next slide, please.

So what are our next steps? Yeah, we just started a new assignment where we'll be conducting a user requirement exercise to look at the model to develop a process work flow that will link the model results to capital planning.

And we want to identify additional uses that -- for the results such as project development, using the results and the project development as well as tracking assets through the capital planning process. Next slide.

That's it for my presentation. So thank you.

Rachel Galton: Great. Thank you so much.

Yeah, thanks to both of our presenters for giving us a really helpful look at kind of how each of their agencies make decisions across the asset life cycle.

So we're going to move into our questions and answer session.

If we can't get to all the questions or if the questions are very specific, we will get back to you directly or help connect you to the presenters if the question is for them.

But I'm going to pass it over to Ursula to get started on the Q&A.

Questions & Answers

Alexandra Galanti: So the first Q&A for Terry, it's from Michael Smith who asks, what tools did you use to perform the analysis to implement your predictive maintenance program?

Terry Boylan: So we were looking at our miles between service interruptions. So we looked at how many times the bus was brought back in and how many miles between it. And that was our determining factor on what fleet we should be starting on.

Alexandra Galanti: Great. The next question from Sumner Handy is, is there more maintenance for PMP buses in the lifetime due to the accelerated PM schedule?

Terry Boylan: So our PMP happens every 50,000 miles. On average, some buses are going to be at 60, some are going to be at 40, but once a year, it all gets done. I'm trying to -- I'm trying to figure out where -- we're not too worried about it if things get accelerated in the predictive maintenance program unless there's some outliers. Then we need to look at why a bus has so many more miles than another one. But 97% are going to be in the windows we set up, so we don't foresee a problem with that.

Alexandra Galanti: And Michael Snow asks, why would the TAM plan ULB be adjusted rather than just the agency expected life? And there's a follow-up question about MPOs in relation to this.

Terry Boylan: So we set ours at 12 years currently. We're predicting to go to 15, but we're not there yet. So we're not changing anything until we know for sure the numbers tell us this is the right thing to do, but we're going to wait until we get closer to the 12-year mark to see what shape the buses are in and how they're performing before we make any changes in how we do business.

Alexandra Galanti: Great. And Joachim Bean asks, what was your starting point for the weekly PMP dashboard in Excel?

Terry Boylan: My -- so our starting point was at 50,000 miles. So we built the dashboard -- we have a software system that tracks the miles on the bus. And I think we started probably around 45,000 miles. Hindsight looking back, we should have started a little sooner on it. But we started at 40,000 miles with our -- the first wave of predictive maintenance with our 50,000-mile interval.

Alexandra Galanti: Great. That's all the questions for Terry. Thanks, Terry.

Terry Boylan: You're welcome.

Alexandra Galanti: Now we have questions for Sharon. The first one is from Jason Alexander who asks is it possible to share this tool? He's talking about the transit asset prioritization tool. Martin sent a link to the TRB website, but Sharon, can you answer that question as well?

Sharon Okoye: Yeah so the tool itself is on the internet. So yeah, you can go -- I can actually send a link as well for our tool. But it is available on the internet.

Alexandra Galanti: Okay. That's great. And Joachim again, is this -- can this tool account for changes and/or differences in the 5310 provider needs?

Sharon Okoye: Well, I'm not sure because we -- we only model the assets that we were capitably responsible for. We didn't -- although we did the group plan, we only had to inventory the 5310 program assets. They weren't part of the -- the modeling process. But I would think that you could do that with the tool. Okay.

Alexandra Galanti: Okay. Great. Thank you. And Martin Menninger asks, how often do you get data from each transit agency in your tool and what form do you receive it in?

Sharon Okoye: Well, we're actually going to set a process when to collect -- how often to collect data from our operators because for this initial use, we just gathered information from the operators for the asset management plan development process. So we'll have to work on -- work with them on the process to collect, you know, information, you know, either monthly or quarterly or however we think we can best collect it.

And also what we're doing with our database is we're going to put an interface on the database so when our operators either procure or retire a vehicle, they can enter it into the database themselves without us, you know, asking for information from them. So hopefully in the future this will make the process more easier.

Alexandra Galanti: Thank you. And then Sumner Handy asks, all of the ULBs have been revised down. Is that due to Connecticut's roadway conditions or something else? And that's connected to a second question asking you to elaborate on custom ULBs. Are the useful life reduced due to some condition or your replacement intervals?

Sharon Okoye: It's kind of both. It says they're cutaways. We accumulate so much miles for the use that we had to adjust the ULBs for that. As I explained for the statewide bus system,

we -- we just -- we had that program ongoing for years where we retire the buses at a 12-year cycle. But I think we're going to have to look at that again to make sure we can optimize the use of our bus funding, you know, for other assets.

Alexandra Galanti: So we're working on getting a working link together to get the tool working. There's a question for Terry for GCRTA. Did the older vehicles continue in the PMP program once the new ones were bought in 2016?

Terry Boylan: No. So we did some analysis on the older buses that we had started in the predictive maintenance program. And our miles between service interruptions didn't change too much. So that's where we decided to just manage those older buses out until they're out of service and focus on the new ones to keep them as reliable as possible.

Alexandra Galanti: Okay. And we had another question for Terry. Does your predictive maintenance, is that being done yearly regardless of mileage and does mileage apply to various bus manufacturers?

Terry Boylan: So all of our -- all of our buses under predictive maintenance happen to be under one bus fleet, but we do it by the average number of miles that fleet goes in a year. So all of our buses fall in that. There aren't too many buses that, you know, they're only sitting well below the 50,000-mile threshold. They all get done. So we've never run across not doing a bus because it didn't get to 50,000 miles. I think the earliest we did a bus was at 48,000. So they get done every year regardless -- almost -- yeah, at the rate we are, regardless of the mileage they're sitting at.

And if anybody wants information on this stuff, they can just e-mail me. And I have plenty of data to show or share with anybody that has any questions.

Alexandra Galanti: All right. And the final question is, are these TERM Lite models? So I guess the question is both for Terry and Sharon.

Sharon Okoye: I'll go first. I know they utilize the TERM Lite model as guidance for developing the TAPT tool. So in essence, it performs in a similar way -- you know, it uses deterioration curves for the life cycle modeling. So they just added more features for the TAPT model.

One of the enhancements from my understanding is that I guess TERM Lite only models the safe wear facility by age, but in the TAPT model, you can set up the model to run -- you know, model that condition -- the condition at a component level -- at component -- I can't even talk. At a component level as opposed to just modeling the whole facility based on age. But, yeah, TERM was used as guidance.

Terry Boylan: And we -- we didn't use TERM at all on ours. Everything we did was a home-grown process to figure everything out.

Alexandra Galanti: Okay. Great. So I guess the final question, were the tools that you used free or did you pay for them?

Sharon Okoye: Definitely free.

Terry Boylan: So we had a vendor come help us to start the process, but everything after that was all done by us internally. And we did ours for free.

Alexandra Galanti: Okay. Great. That's all the questions that we see.

Ursula Wright: This is Ursula talking. Thomas, if you go to that link, you should be able to follow it. And that will lead you to where it says guidance for developing on the actual sentence it says transit asset prioritization tool, you just click on that. And it will pop open for you. Seems like you got it.

Rachel Galton: Great. Well, unless there are any final questions, it seems we are going to wrap up the webinar.

Thank you, again, to both of our presenters.

And if anyone has any follow-up questions, their contact information is available in each of their presentations or you can reach out to FTA directly.

Thank you, everyone, for joining. Have a great afternoon.

Sharon Okoye: Thank you.