

SunGuide Software

User’s Group

Meeting Minutes

**Date: June 18, 2020**

**Time: 2:30-3:30 EST**

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| Agenda: |  |
| Topic | **Led By:** |
| Item 1: 4089 – Enhancement to allow multiple links to be combined as one for travel time calculationsItem 2: 4209 – Use Polyline instead of single point for road closures | John HopeTucker Brown |

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| Attendees: |  |
| Robbie Brown, D1Justin Merritt, D1Jason Summerfield, D2Jason Evans, D2Tanesha Sibley, D2Aven Morgan, D3Kevin Mehaffy, D3JJ McFadden, CoTDee McTague, D4Adrenamae Rolle, D4Jay Williams, D5John Hope, D5Mark Laird, D6 | Daniel Buidens, D7Mike Crawson, D7Kelly Kinney, FTECherie Phillips, FTEBrent Poole, CFXTucker Brown, SwRIAJ Skillern, SwRIChristine Shafik, COMark Dunthorn, COAlexander Brum, COGreg Dudley, CO Jennifer Langford, COBrenda Murphy, COKarthik Devarakonda, CO |

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| Discussion: |  |

Christine Shafik: Thank you for joining us today. We have a couple of interesting topics to discuss today and we are excited that not only the Central Office and SwRI but actually Districts will be presenting as well. If you have your mic not muted, please mute yourself. One other thing that I really request is kindly say your name first before you have any comments or discussion for the meeting minutes. And again, this meeting is being recorded for the purpose of taking meeting notes.

**Item 1: 4089 – Enhancement to allow multiple links to be combined as one for travel time calculations**

Mark Dunthorn: Yeah, this is something we actually talked about last November. It’s pretty complicated when involving travel times and John has a lot of experience, so we asked him to step in and talk about ITSIQA.

John Hope: This is ITSIQA. This is a product that District 5 had put together. So, it is available to all the FDOT Districts. This is designed to integrate multiple sources together form SunGuide and center-to-center (C2C) and it also includes WAZE data. It took advantage of the standard format. It flags possible issues with traffic detectors and also to generate trouble tickets within MIMS. It assigns quality values to data received. So, the output that you get, it actually tells you a value of how much to trust the data. It also generates trusted travel time, speed, occupancy, and volume data. It also pushes traffic data via C2C, which SunGuide is able to receive those messages. This is an overall design schema of ITSIQA. As you can see, it receives data from detectors and external systems, does some processing, has its own database, and it pushes it for the long-term storage of the data received and the output generated. It has an administrative interface and that outputs the data and it has a loading feature that ties it in.

So, looking at the data inputs, I can mention that there are several different kinds of inputs from SunGuide, center-to-center (C2C), WAZE. It also has a portion that receives turning movement counts from various systems including ATSPM, and more detailed systems including Miovision and Gridsmart. It generally handles two types of data, one is the traffic data, which includes the speed, volume, occupancy, and travel times, and then it includes the turning movement count data that basically includes the volume data per lane per road.

The detector analysis performs specific checks on incoming data once per minute. A check must fail for a certain amount of time for it to be triggered. The checks, if they are triggered, reduce the quality value that gets reported and some checks trigger a MIMS ticket. The following slides get into details on what gets checked.

So, this is the first set. I won’t get into too much details but there are various configurations for each one of these. It is basically checking for different forms of data that seems either impossible or suspect data that would indicate that the detectors are malfunctioning or are just reporting in a way that just doesn’t seem possible or just doesn’t make sense at all. Some of these are pretty straightforward. The lane speed differential is a little more complicated. It’s looking at the difference in speed between lanes.

The next slide gets into little more details. Inconsistent values: There are actually four different checks involved here that compares the volume, speed, and occupancy against each other to see if the values make sense. And then we are seeing sequential volumes, whether the same volume reported for X minutes. Duplicate values: same volume, speed, or occupancy reported for multiple lanes. That would probably indicate a configuration issue. And then there are directional checks that indicate whether or not the detectors are actually reporting the correct direction of travel. For example, if you have the westbound lanes reported as eastbound and vice-versa.

Reported lane counts: This is just one of the configuration checks. AADT check: Reported average daily volumes calculated over the course of the year, if it is either above or below a certain percentage. And then communication failure is pretty self-explanatory.

For data outputs, there are a number of outputs that are reported: traffic link data, traffic per lane data, traffic classification data, a concept called super link (which is a combination of individual links) and turning movement count data. Much of this gets fed through C2C into the other two there. And then there is additional SunGuide interface that pushes DMS messages directly to signs and that’s really just to expedite the reporting of travel times to DMS signs.

The overall benefits to this system are that you have a quicker response to detector issues/failures. So instead of operators or maintenance personnel finding detector issues, you have an automated system that catches problems and reports to you immediately. It adds intelligence to the selection or calculation of all the available traffic data and it’s just a second ticket really that addresses the geo-ticket that Mark had introduced in the beginning of this. It standardizes reporting of roadway link information using FDOT Central Office’s All Roads Base map. What it essentially means is that you can swap out detectors, add detectors, move them around, and that’s not going to change what it is reported out (those links stay the same all the time) and that helps any kind of long-term issues of reporting (report comparison today vs some years ago because the output data is always going to be the same links). And it also handles all the “heavy lifting” of the data consolidation. We have seen dramatic improvements in District 5 because now instead of all C2C data or all the massive amounts of data being handled within the Operator Map (it’s more or less still training out, consolidating all that data out), so then what SunGuide actually receives is a much larger dataset. So, the overall performance of the SunGuide actually improves because of that. Does anybody have any questions?

Mark Laird: Your map then would show the output of this on your Operator Map, and would not break it down into TSS data, C2C data and WAZE data, correct?

John Hope: Well, SWIFT data is coming in to SunGuide through C2C, but instead of having multiple C2C data sources, you are only going to have one. And that one would be labeled as ITSIQA data.

Jason Summerfield: Can you go back a couple of slides to the input slide? So, SunGuide is still collecting all the detector data and then piping it back over to ITSIQA?

John Hope: Yeah, you will still see all the detectors on your map as usual. So then, your ITS maintenance personnel can still use SunGuide to set devices on/off or if you wanted to look at specific detectors, that is still in there. What this is doing is more or less cleaning up this data and instead of using the raw detector data for archiving, you are using this cleaned up data.

Jason Summerfield: This might be more of a technical question, but how are you handling mapping the detector locations to different types of links? For example, HERE link is not directly mapped generally from interchange to interchange. Or you may have X number of detectors in that area.

John Hope: There is a fairly complex algorithm within that figures that out. It takes the incoming TSS links and narrows them on the All Roads Base map links and it will break up those links, or in some cases, may include mobile detectors on a base map link. It really depends on how long those links are, the source data and how long the configured base map links are. It kind of does that automatically and you don’t have to assign them yourself. As it receives data, it will kind of realign everything on an automated basis. To further explain the algorithm, it largely does it by roadway, direction, and latitude and longitude and make links. It uses all the data that it can receive and figures out how to make that comparison or the association. Does that answer your questions?

Jason Summerfield: Yes, that has always been one of the biggest things about merging different datasets is that detectors are put wherever somebody sticks a pole and everyone else seems to, especially the HERE, Nokia and INRIX have standardized on their TMC codes and there is not really a horribly direct relationship between the two sometimes.

John Hope: Yeah, in order to make this association process, the source data has to be correct. Like you can’t have a detector risk placed on a map because it will assume that the detector is sensing data from a different area. So, the incoming data needs to be configured correctly first, and if you already have problems in that area, it’s not going to work properly.

Jason Summerfield: There is also time skewed among all these data sources, right?

John Hope: Yeah, that’s another piece ITSIQA does. So, the refresh rate within ITSIQA is 60 seconds, and it is standardized for all incoming data. For example, like in District 5, the pulling rate of detectors is every 30 seconds, so it actually receives few steps of data for one ITSIQA interval. On the other hand, for HERE, the refreshing rate is every 5 minutes, so it has to divide/spread the data for five ITSIQA intervals.

Jason Summerfield: So, validation of the data, one thing against another, has to be at a fairly gross level because of both the sampling intervals and the time skew between them.

John Hope: Correct, and that time also affects the quality value because the older the data gets, the lesser it is trustful. So, when it first receives HERE data, for example, the first minute has the highest quality but then the next minute the quality actually diminishes. So, for the 6th minute, you actually trust that data the least.

Jason Summerfield: That means it waits for the next. Is that how it is?

John Hope: Yes.

Jason Summerfield: I have a question for you about the travel time messages. Did you say that they are set to the signs in SunGuide?

John Hope: Correct.

Jason Summerfield: Okay, and what about reporting? We have a bunch of travel time reports in SunGuide. Does that affect SunGuide travel time messaging and message reports?

John Hope: So, the archiving that happens within the SunGuide, it uses the current archiving mechanisms of archiving C2C data. It does come in SunGuide in two different ways. It comes as it is coded on the DMS signs where SunGuide does record what is on the DMS signs, but usually when you run those travel time reports, they have more to do with the raw data that they are receiving and there is C2C data that is archived. The problem with that is that there is not too many currently major ports that actually run against the archived C2C data. So, there is a current enhancement that I am working on that is going to take that super link that I mentioned, which is driven a lot by TET data. And write it directly in to the SunGuide database.

Jason Summerfield: Okay, some reports were developed to extract that, right?

John Hope: Yeah, and once this enhancement is done, you can just run travel time link reports in SunGuide, and it should just work. Does that answer your question?

Jason Summerfield: Yes, could you repeat the last part again? I didn’t quite understand how travel time was going to work.

John Hope: Yeah, it’s kind of going to duplicate the functionality of data archive in SunGuide, which it is going to rule up the data to minutes, hours and daily intervals and archive that in the same way that SunGuide data archives.

Jason Summerfield: Is it going to insert them into SunGuide tables?

John Hope: Correct.

Jason Summerfield: Yeah, so when someone says I think my data is wrong and I go to troubleshoot it, how do I tell the difference between what SunGuide is doing and what this approach is doing?

John Hope: Well, it depends on the links.

Jason Summerfield: So, it is based on the links that is being archived.

John hope: Yeah.

Jason Summerfield: Is it also going to do the travel time archiving?

John Hope: I believe so.

Jason Summerfield: Okay, so it is going to insert into the raw data tables and is it going to perform the roll ups?

John Hope: Yeah.

Jason Summerfield: So, my issue here is that there a lot of pieces there that have to be exactly right for those to work because there are different tables that deal with the configuration and SunGuide reads those to make the configuration correct. It’s the first time I have heard of it. It’s a lot of moving pieces here that if not done exactly right, one thing can overwrite the other.

John Hope: Understood. So, this piece isn’t functional yet and under development. We are obviously going to go through the test database. We are not going to move anything over until we are sure that it’s actually functioning properly.

Jason Summerfield: So, SunGuide can archive the COP data already and SunGuide can also create travel time and archive them correctly. Is there a reason why we wouldn’t build them into a table and archive those? I mean you are already producing those outputs.

John Hope: Yeah, it’s already doing that piece you just said. It’s already archiving the C2C data. The reason behind this automated insertion is to help out some other type of reports that our TMC is generating.

Jason Summerfield: That’s what I am getting at is that if it is doing the same thing, why are we trying to duplicate the functionality instead of just archiving?

John Hope: We can talk about it over in detail later. There are certain objectives that District 5 has that they are reporting, and I am sure there are different ways of handling this. I mean the piece that we are discussing hasn’t even been implemented yet.

Jason Summerfield: Okay. The other question I had is that you talked about the waiting system for the links that get fused together and you mentioned that one of the inputs for that is time-based. Can you discuss a little bit more about how links are fused together? I am trying to get more specific. I have data coming in from SunGuide, BlueTOAD, HERE, and they all come at the same time. How does it fuse those together? And you mentioned that they are time-based, and they are weight-based, so what exactly does it mean? Is there a hierarchy of data that they trust more than others, or they wait on it until time becomes a factor?

John Hope: There are several parts to that. You do assign a default quality value to the incoming data and that default is the maximum quality that that incoming data is going to have. As the data gets older, or if there are problems that you detect with the incoming data, it will call to that quality value. And once it has an actual quality value for that incoming data, it will average the incoming data together and wait it based on the quality value.

Jason Summerfield: So, you mention the quality value for different types. Are they default per type? Like SunGuide data gets a quality value, HERE data gets a quality value

John Hope: Yeah. It organized based on the network identifier. So, if it is getting more resourceful through C2C, it could be in different networks, and each one would have a different quality value. And then the data that comes from SunGuide is on a different network.

Jason Summerfield: Right, so everyone gets their default value of some kind. And then when you essentially fuse them together, that quality value is the part that gets averaged in or weighted together?

John Hope: Yes, the quality value is the weight and it will vary that on a per weight basis. So, the quality value ranges from 0 to 10 and right now, District 5 values its own detector data the most. By default, all data from SunGuide is all what I had but it looks at every single detector and if it finds problems with one detector, it may decrement that all the way down to 5 or 4 or even 0 depending on what problems it finds. Does that make sense?

Jason Summerfield: Yeah, so I have a link that comes at 10 and then I have a piece of HERE data that comes in and let’s say the default is 5 and I attempt to fuse those together. Does that mean 66% SunGuide link and 33% HERE link.

John Hope: Yes, but it suspects something fishy with the SunGuide detector data, it may decrement to 5 in which case it would give to 2. That way the HERE data would be heavier.

Jason Summerfield: The checks are performed against all the links, like the SunGuide link, etc. that decrement the way of other types of data as well, right?

Joh Hope: Not all the checks are done for all the data. All the checks are done against the SunGuide data and that’s because it’s getting raw detector data. It assumes that the data it is receiving through C2C is not raw, it’s more processed data. So, there are a lot of checks that it really doesn’t make any sense to do.

Jason Summerfield: Yeah, that makes sense. The other question I had is on the slide, the WAZE interface coming in, the WAZE provides traffic data kind of against the segment and it’s kind of moving. Is that mapped to that base layer and then just included as another link to that bigger layer?

John Hope: Yeah, there are two things. So, for all the other data, the network configuration doesn’t really change that often, but for WAZE, it changes all the time. So, it’s constantly figuring out which outgoing links it is mapped to. However, what we have found in the past couple of years is that the WAZE data has not been very useful. There is either that nothing is recorded for majority of the time or if what is recorded is generally not trusted very well. So, you know, there is a WAZE interface that is not actually used predominantly.

Jason Summerfield: Okay, I think that’s all the questions I had. Thanks, John.

Mark Dunthorn: So, John, is there a documentation online or anything like that that you can share with us.

John Hope: Yeah, I have a pretty detailed document that I can share with everybody that explains the various configuration settings, the data inputs and outputs. It is fairly configurable. If anybody is interested in that, I would actually advise to hold off on testing that out in your District because right now, we are in the process of incorporating a new version of the All Roads Base map that was released by the Central Office. There is a bit of the process to kicking the right map into ITSIQA. Once we do that, the All Roads Base map data should cover the entire state of Florida, which would be useful for everybody. So, I would suggest that we wait for a couple of months before we can do that process.

Mark Dunthorn: Actually, that raises one more question for me. I know you guys have some extended GIS capabilities. Are there any dependencies of run time on that infrastructure?

John Hope: No, it just depends on the existing system of C2C and SunGuide, and you see that it ties ends to Miovision and Gridsmart, but you don’t need to have the systems running. You can always turn them off, so you can use pieces or parts of it as needed. It is currently deployed in District 5 and CFX. CFX is not using the turning movement counts; it’s really only using SunGuide and C2C.

Mark Dunthorn: That is very good. Thank you, John.

John Hope: Now because there is a lot of data processing, you do need an approved DC server to run this. So, it does depend on that.

Mark Dunthorn: Yeah, that makes sense.

**Item 2: 4209 – Use Polyline instead of single point for road closures**

Tucker Brown: Yeah, so this is actually another topic that we have discussed before. So, this is the use of lines as a part of event. Specifically, the request, in this case, is about WAZE being able to put road closures on their feed, and to do that, they need the start and end point, and more than likely, they would like a set of midpoints too just to better follow the roadway. We had discussed this before and we came out with a couple of ideas in that meeting and it kind of dropped off, so we are bringing back now. I put together some things that we might be able to do, talking about it internally, might be easy to implement and we can see if that covers the people’s needs based on our last meeting, and then we can talk about future needs from there.

So, right now, the users can select the start and end point. You do it something like a congestion head and tail already. So, technically we are selecting two points and we would be able to already know where those two points would be. So, in 8.0, there is already an addition to help to do the sort orders of roadways, especially between counties, and so you should have those consistent sort orders along that roadway, and with that we would actually be able to automatically detect all of the locations between two points that you selected. What we can do there is have the system automatically capture all of those points and then we can actually draw a line and call it like yeah, this is a line event and not a point event. Basically, there would be a toggle in the event in the dial, which will call it a line event. And we pick up all those locations. To make it a better-looking line, we would probably not use the ramps and probably only use the before, at and beyond type things that would be along the roadways. So, in terms of just the line, we might be selecting those types of points. Now, the intent here, especially to be able to send out to other people, is here is the start point latitude and longitude, here is the end point latitude and longitude, and then here are the latitudes and longitudes along the way. It’s using those locations to actually pick those points. The other option for actively selecting points for that would be option 2, which is we have a start and end point and then the user clicks the buttons and then start clicking points on the map where they actually want them to be. That is something more manual as they would have to do but instead of relying on the fact that there are locations set up between the two points, they would have their control about where those points have to be set up on the roadway. Option 3 is basically making both those options available. So, by default, they could pick up those and if it looks right, you can continue on with that. If it looks wrong or you don’t have locations between the two and you make more mid-points, option 2 would actually allow you to manually set those. So, that’s kind of how we could create where it is located, its start, end and midpoints along the way.

The other part of this is that there is probably a list of people that actually want to know what type of locations would be between the start and end points that actually would be affected. Because these are closures, it’s probably going to mostly ramps that we care about. And it would be something where you could again, if you have locations in between those, like here are all the locations that you have, we could default to selecting all of those locations or if you only want to have the on-ramps first or something like that. So basically, you would have a default condition where we select locations between the start and end point and include that with the event sent to 511. So, if you are closing a particular ramp, you have the closures as a line event with start and end points and ramps between it. And we can close all of them with a single event as opposed to setting up multiple events for each one of the on-ramps. We are talking a lot about closures here, and this part specifically, if we get into more of an architecture where we are using line events for closures, maybe one-lane or two-lane, and maybe off for construction but just for general event, we might want to have different sets of locations that are selected automatically. The idea here is to be able to have an event with multiple locations that at least rider can know about and say that the same blockage that applies to this event applies to all of these locations. So, if you have people looking for that information, you can send it out. That’s all. I will open it up for questions, additional functionality, anything like that.

Unknown: What happens if it’s a single point event?

Tucker Brown: Right now, they won’t display it as a closure by my understanding. It needs a start and end point at minimum.

Mark Dunthorn: That’s right. They are already displaying the single point events right now.

Tucker Brown: Does anybody see any issues with that implementation or need other functionality? The functionality that I did on that was based on our last discussion and needs. I don’t know if they changed them or people operate differently now.

John Hope: Is there enough information in the data received to indicate which lanes would be closed? Or are you only concerned about full road closures?

Tucker Brown: So, the immediate request talks about full road closures. That’s where it gets tricky is once that selects a point where it started at 4 lanes, moved down to 3 lanes or back and forth. Having a single set of blockages that applies to all of them will be a lot more tricky. That’s probably something we would want to look at further is kind of what we talked about. How do you apply different land blockages to different locations along a line-based event?

John Hope: Does it require operators to do this? Or could we still do point event?

Tucker Brown: No, a point event would still be supported and this line event would be something you would have to jump it into, like set a start point and an end point and then say like yes, I want it to be a line event and not just that here’s a congestion.

John Hope: I was discussing this with Alex before the meeting and he said that one concern was that ramps might close at different times and that they probably would want to treat those as separate events in most cases anyway.

Tucker Brown: So, in my head, I have it as that the start point and the end point would enclose the areas where the ramps are, but are you saying in the middle of the closure of this particular section of the roadway, someone might be allowed on to enter when the ramp has not been closed yet? Would they move the start and end points? Or would they just have a point where people can get through right in the middle of the construction?

John Hope: Maybe the reason he raised that was because he wasn’t thinking of full closures. I am not sure.

Tucker Brown: Yeah, I get that the initial request here is in a full closure scenario for line-based events. Obviously, we want to not limit it to that in terms of design just because in the future, we might be more willing to do it in other scenarios. But for now, that’s really the only thought is full closures.

John Hope: It may also try to derange some traffic off the ramps.

Alex: I also had some concerns about that happening alongside roadways where you have parallel roads. Like you have the express lane corridors and I don’t know how specific quantity the polygon would be when it just says that this area is closed. Maybe the general-purpose lanes are closed, maybe the express lanes are closed. I had concerns about lack of specificity.

Tucker Brown: So, in that case, I think my initial thought actually was to say which roadway and direction to pick the location. And so, you would actually have two different events if you were closing the express lanes vs. the general-purpose lanes. Because I believe you will find them as separate roadways.

Christine Shafik: Any more questions for Tucker Brown?

Aven Morgan: Can you go over the part where you described multiple locations within the line again?

Tucker Brown: To define the actual line or to be able to send a 511-notification involving the location?

Aven Morgan: Yes, what would be the person doing that vs where you are saying that this roadway is affected from this point to this point and understood that all points in between are affected?

Tucker Brown: SunGuide doesn’t actually have the concept of a way to traverse the roadway. So, if I just told that this is the start point and the end point, I would exactly not know what that means unless I tell them that all these points/locations also apply to this event. And now we can pick those up automatically. And what I was getting there essentially at was that we may be picking up all of that automatically but there would be a way to look at that list before you send it and say this may or may not apply to this specific location. And Mark, let me go back to your original one and if you want to not include the particular ones and say that they are open, that would be a possibility under that scenario.

Aven Morgan: Okay, so when it is displayed on 511, would it have to list? I mean you can potentially have 5, 6 or maybe 10 VM locations in one 511 post, correct?

Tucker Brown: Visually, I would assume that they would draw it as a line made up of multiple latitude longitude points that we sent.

Unknown: These options to the operator, is that a list of VM locations, is it locations highlighted on the map, how would that happen?

Tucker Brown: In my head, I kind of had that as essentially a part of the event detail catalog where you can select and it would either be inline or you could bring up a small dialog that says here is all the list and there is a checkbox next to each one of those that says yes this is included in what I am about to send or not.

Unknown: So, it is based on the text description of the VM locations.

Tucker Brown: Correct.

Unknown: Real quick, I know you said SunGuide cannot differentiate but doesn’t it already do that with the congestion?

Tucker Brown: It does that like if it is a sort order and if we have the system configured, we basically go from one sort order to the next and that is the implied order of locations between those two points. And we just send that information to 511, so if they want to make the same assumption then that’s fine. It then doesn’t give you the possibility of de-selecting particular locations if they are not full closures.

Christine Shafik: Well, that was a very good discussion on both the topics. Seems like we are running out of time. We won’t be able to cover any more topics today, but we will leave the next two issues for the next SSUG meeting. We have 4 minutes, so any further questions on the topics we discussed before. Any questions for John Hope or Tucker on the topics they presented today.

Unknown: Does ITSIQA now support the entire state even though it isn’t the current latest map?

John Hope: No, and it’s really because it was necessary for District 5, so intentionally, the links were filtered out to District 5. Since we are moving to a new layer of All Roads Base map, we decided to do it for the entire state of Florida in order to make it more usable for everybody.

Unknown: Okay, I just wanted to say that we might want to take a look at it even though it’s not the final version if it already supports. If it doesn’t it’s better to wait.

Christine Shafik: Alright, if there are no more questions on any of the topics discussed, then thank you guys for your time and we will discuss the two issues left on our next SSUG.