ITS4US Enabling Technology Readiness Assessment Training Session Transcript (05-25-21)

Speaker: Deb Curtis

So, let us take a few minutes to review the program.

Speaker: Deb Curtis

Although most of you are already familiar with it.

Speaker: Deb Curtis

Next slide, please.

Speaker: Deb Curtis

So, this is a high-level summary of the complete trip ITS4US program.

Speaker: Deb Curtis

As you can see there are multiple partners involved with this initiative with the goal of deploying innovative and integrated trips to support mobility for all users with a particular focus on underserved communities.

Speaker: Deb Curtis

So, as you can see here, this involves the lead ITS Joint Program Office from the US Department of Transportation, but also involves the Federal Highway Administration and the Federal Transit

Administration. We are looking to make these large-scale deployments that are replicable and address the challenges of planning.

Speaker: Deb Curtis

And executing all segments of the complete trip.

Speaker: Deb Curtis

We would like to target all users across all modes regardless of location, income, or disability.

Speaker: Deb Curtis

Next slide, please.

Speaker: Deb Curtis

So, we have 5 program goals.

Speaker: Deb Curtis

And these program goals are spur high impact, integrated complete trip deployments nationwide, this first goal is to assist the transportation industry in tackling the difficult challenge of providing complete trips for all travelers nationwide by streamlining and expediting solution development.

Speaker: Deb Curtis

Through pilot deployment.

Speaker: Deb Curtis

Yes.

Speaker: Deb Curtis

High impact, replicable integrated solutions developed by these pilot deployments.

Speaker: Deb Curtis

Will reduce the cost of future deployments of these critical personal mobility enhancements.

Speaker: Deb Curtis

The second goal is to identify needs and challenges by populations.

Speaker: Deb Curtis

The needs and of the communities to support mobile mobility options for all travelers, regardless of location, income, or disability are important populations within each community have different needs and challenges for accessing transportation options to improve their quality of life.

Speaker: Deb Curtis

The third goal is to develop and deploy mobility solutions that meet user needs.

Speaker: Deb Curtis

This will allow us to take revolutionary steps to integrate advanced technologies, especially those that enable adaptive and assistive transportation technologies into the management and operations of the transportation network, including non-motorized modes.

Speaker: Deb Curtis

Here we are.

Speaker: Deb Curtis

Our goal is to engage key partners within the federal government.

Speaker: Deb Curtis

The research community, stakeholder organizations, and private industry to support development of potential solutions for all travelers.

Speaker: Deb Curtis

The fourth goal is to quantify and evaluate the impact of the integration of these advanced technologies strategies and applications.

Speaker: Deb Curtis

The improvement of safety and mobility of all travelers, quantified impact support, communication of technology benefits to future deployers.

Speaker: Deb Curtis

And decision makers.

Speaker: Deb Curtis

And finally, the fifth goal is to determine which technologies, strategies, applications and institutional partnerships demonstrate the most potential to address identified barriers to providing complete trips to all travelers in a variety of communities and build environments.

Speaker: Deb Curtis

This we also.

Speaker: Deb Curtis

The goal is to disseminate the lessons learned from replicable solutions developed by the deployment sites to catalyze additional deployment.

Speaker: Deb Curtis

The systems engineering process that we are going to talk about is critical to all of these goals.

Speaker: Deb Curtis

Next slide, please.

Speaker: Deb Curtis

The US Department of Transportation has awarded five teams with Phase One funding to support the development of their deployment concepts. These five deployment sites include the University of Washington, California Association of Coordinated Transportation, Heart of Iowa Regional Agency.

Speaker: Deb Curtis

ICF International in Buffalo, NY, and the Atlanta Regional Commission. Next slide please.

Speaker: Deb Curtis

There are three deployment phases, and one post deployment phase.

Speaker: Deb Curtis

Participants are currently in the first phase concept development where they will develop their ideas to ensure future success in later phases.

Speaker: Deb Curtis

They will test and evaluate their projects.

Speaker: Deb Curtis

The deployments are expected to sustain operation for at least five years after the program is completed.

Speaker: Govind Vadakpat

Thank you very much, Carlos and Jim.

My name is Govind Vadakpat. I am a highway research engineer with the Office of Operations at the Turner Fairbank Highway Research Center.

A little bit about myself. I have been with the Federal Highway for about 7 years now and most of the projects that I have been involved with so far are in the area of connected and automated vehicles.

And most recently I was the agency officer's representative for the connected vehicle pilot deployment project in Tampa. So with that, let's go ahead and get started with today's webinar.

Here is a brief agenda for today's webinar. So I will start off by providing a brief overview of the purpose and outcomes of the enabling technologies readiness assessment document.

I will also be walking through the various steps required to complete the enabling technologies readiness assessment.

And I will leave you with the resources and other material that you can refer to at a later time, that's going to help you in putting together this document.

As I mentioned, the purpose of this presentation is to lay out the requirements to complete the enabling technologies readiness assessment as described in the broad agency announcement.

So we are hoping after today's presentation you will get a clear understanding on the context setting of how ETRA fits into the overall project deliverables, and also provide you with a clear set of guidelines for the content within each section of this document.

I'm going to provide a brief overview of the various sections in this document. I believe Jim has already forwarded you the guidelines for this document, so this should just be a refresher for you guys.

So as with other deliverables for this program, the USDOT requires all sites to use the USDOT approved project deliverable template.

Note that the enabling technologies readiness assessment or the ETRA is the only deliverable required for task 7, and the final version will need to be 508 compliant and it will be published.

Please take a look at the timelines associated with the draft and final documents, which is going to be 27 weeks after the kickoff and 38 weeks after the kickoff for the final document.

So getting to the overview of task seven, we need to make sure that you document all the enabling technologies in the system and highlight the critical ones and how they work together and how you plan to acquire or develop them.

So once you have the enabling technologies determined, you will evaluate them for their technology readiness level.

Finally, you are going to document any risks associated with these technologies, which should be determined during the assessment process.

Please note that the ETRA audience is geared to be more technical, so you will need to provide geo assessment with that in mind, in terms of the technical content.

So here is the schedule for all the tasks and their deliverables in the ETRA, highlighted.

You will note that the team should begin working on the technology readiness assessment just when the project ConOps is almost complete, and just after the beginning of a performance measurement plan. The work ends after the system requirements has been completed.

So I'm just going to provide a big overview of the major components of the enabling technologies readiness assessment.

The first one, of course, is the framework which determines the readiness framework to be used to identify all the overall maturity of the specific technologies. Similar to the frameworks identified in ISO standard 16290 a space system, definition of the technology readiness level and their criteria assessment by NASA.

The second section is actually the identification of technologies, wherein you can identify each technology that will be utilized to meet the system needs and user needs defined in the ConOps and system requirements.

Each technology listed should also identify whether the technology may be procured off the shelf, whether it will be modifying an existing product, or it will be a completely new development.

The third phase is going to be the actual evaluation of the technology based on SMEs, data that you have, or that if you have any test results and other resources.

The fourth section is going to be the TRL level identification where you identify the technology readiness level for each ET based on the documented framework and evaluation process.

And the final section is going to be performing a risk assessment for each of the enabling technologies and how you plan to mitigate the high-risk technology elements as part of your project.

So looking at a higher level, let's take a look at how the enabling technology readiness level assessment relates to the other key deliverables within the projects.

So on the left you have the inputs which relates to their project inputs. So for inputs to the enabling technology readiness assessment, we have the technologies that will meet the user needs identified in the ConOps and system requirements.

You will note that the project teams will be working on the DMP and safety management plan, and also the Performance measurement plan at the same time as the enabling technologies readiness assessment. And these all will be considered as inputs to the document.

So on the right we have the outputs for the system. For the outputs we have these three deliverables.

The enabling technology readiness assessment which will be used to document the TRLs and mitigation strategies. The other documents will be the systems engineering management plan and the integrated complete trip deployment plan, and also the deployment briefing.

So I'm just going to provide a brief overview of the different sections for the ETRA.

So the ETRA will have five sections. The first is the introduction, and then second is the identifying of enabling technologies.

Third is the technology readiness level definitions. Fourth is the risk assessment, and if you have any appendices that you want to include that would be the fifth section.

And again, the template has already been provided earlier to you.

The first section is the introduction of the research project itself. Here you will briefly touch upon the various sections for the introduction, which includes who is the intended audience, providing a summary background of the project, providing the scope of your project, and then providing the goals and objectives of the project, and what references do you have for this project.

And each of these should stand on its own.

In Section 2 is where you actually identify the framework that you want to use, and you list all the enabling technologies that are going to be used by the system in the overall project.

So subsection 2.1 is where you would record which technology readiness framework you plan to use. Again, if you look at the references, there are multiple frameworks that are out there and most commonly used are the NASA, GAO, and Federal Highway Administration.

So we have provided guidelines on these three frameworks that you have access to. So if you are looking to use any other framework or a combination of framework, you should document that and provide a rationale and justification for why we are proposing to use that particular framework.

And subsection 2.2 is a list and description of all the enabling technologies you plan to use.

So talking about the enabling technologies inventory, so you will need to document a lot of information for that. The first, of course, is the general description of how this technology interrelates with the existing system, how it integrates with the existing system, and also you need to document the procurement considerations for this enabling technology.

Whether it's going to be off the shelf, whether you are going to be modifying an existing system, or are you going to be developing a whole new system from scratch.

And finally, you need to have a good handle on the traceability of this, how it meets user needs and the system requirements that this enabling technology is going to be part of the whole system.

So what do we mean by enabling technology?

It can be a software system that you are going to be procuring, so it can cover a wide range. This includes if you are developing a machine learning application, an augmented reality application, or a web-based application.

It can mean the hardware that you are preparing. Assistive robotics, IoT, connected vehicles. What is your solution that you are bringing to the table?

Or It could also mean the communications that you are going to be using, whether using DSRC, C-V2X, Bluetooth, Wi-Fi, or LTE.

Or it could also mean the service models that you are using for this project. So this could include trip planning and concierge service, military service, or trip replacement. This is an area that's often forgotten as an enabling technology, but this could serve as the key for several projects.

So let's talk a little bit about deployment and scalability considerations. So when we are looking at enabling technologies, you want to consider three things. First thing is how will the system work with the existing ITS systems.

Is this going to work seamlessly or is it going to cause any issues with things that are already in place?

The second thing you need to consider is the scalability. So consider technologies performance, power needs, bandwidth needs, or any other factors which could be potential limiters in future.

So look at phasing and technologies to better understand their impacts as more units come into play.

And finally, you need to keep an eye on performance measurement because with these enabling technologies support, you need to have an idea if these technologies support the metrics that you want to generate as part of your data collection plan.

So section 3 documents, the test readiness level for each enabling technology and any group of integrated enabling technologies in Section 2. So using your framework to determine the TRL scale to guide the discussions about maturity.

So Section 3.1 is actual TRL assessment process, and here you will document the steps and personnel you plan to use to follow the framework, making sure you get accurate clear levels for each enabling technology.

During your assessment consider technical gaps and questions pointing to next steps in the technology's deployment and development that may be uncovered.

Also think about the level of effort needed to move the technologies to deployment ready status.

So in subsection 3.2, you will actually do this scaling for each enabling technology. List all the ET documented in Section 2 with the determined TRL and the rational for the findings of the TRL level.

So here is a description for one of the frameworks for identifying technology readiness levels. In the early stages you might have a system where we are looking at that technology and a lot of work is done at the academic level.

So as the technology progresses through its maturation phase, collaboration between researchers and industry starts as prototypes and small-scale demos are developed. So that will be in the middle scale.

And finally, industry takes over these products as they begin to hit the market and full-scale implementations are put in place. So that will be the final state.

So here is another example of a framework for technology readiness level, developed by the Federal Highway Administration.

Such as documents from the lowest level of basic principles to the highest operational systems and everything in between.

So there are different frameworks as I have mentioned before, so there's different slight variations in the way each framework defines the technology readiness level. So based on your project, you can make that determination.

So I will follow up with more details describing the different frameworks and TRL level provided in the reference material listed at the end of this training.

Ok, what are some of the challenges that you can expect when you are performing your enabling technology readiness assessment. The first thing, of course, is one size fits all.

So consider the conditions of the project when determining the TRLs. So items with high TRLs used in the project system in an unusual or a new way could result in a lower TRL for that technology.

The second thing to consider is the limited TRL life. TRL values can change over time and may need to be reevaluated later in the project.

What are some of the challenges?

Evaluation bias.

So each group may have their own ideas on technologies based on what they have worked on before or know, which could sway them to a given technology which may not be the best solution available.

So take a look at using independent sources and evaluators to make an objective view of the information.

Another thing to consider is the evidence interdependencies.

Limit TRL evidence to technologies within the scope of the program and ensure mitigation strategies address potential issues with these dependencies or interactions with other technologies.

So in Section 4, we are actually going to be documenting the risks associated with the project.

So make sure you provide enough detail about the risk and clearly identifying what are the mitigation measures that you are going to be suggesting.

So when you are evaluating risks, make sure you rate the risks according to the impact. Whether it's a low, medium, or high impact.

So we have some references listed here.

So the first one of course is the ISO standard 16290 defined by NASA, and we have the GAO best practices for readiness assessment, and we also have the Federal Highway guidebook related to the technology readiness level.

So here is the contact information.

You are already familiar with Elina, who is the program manager, and my contact list information is listed here as well.

With that I think we are open for questions.