WEBINAR TRANSCRIPTION

Working with USDOT UTCs: From Conception to Implementation

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Auburn University Transportation Research Institute
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Opening Introduction – Dr. Laurence Rilett

So, we're going to take another few seconds to let everyone into the webinar, and then we'll begin.
Okay, so we'll begin now. Hi, I'm Larry Rilett. I'm Director of the Auburn University Transportation Research Institute. It's my pleasure to welcome everyone this afternoon to the webinar on working with USDOT UTCs: From Conception to Implementation. We have a great panel today. So, we're just going to drop right in, and then we're going to hold all the questions to the end and give everyone a lot of time for Q&A. So typically, what we do is do about half an hour of presentations, and then we have about half an hour of questions and answers.

But by way of introduction, our 1st speaker I'm pleased to announce is Dr. Robert Hampshire. On January 20, 2021, Dr. Hampshire was sworn in and performed the duties as Assistant Secretary for Research and Technology at the United States Department of Transportation and served as the Department Chief Science Officer, becoming the first to fill the role in over 40 years.

In this role, he led the 2 billion research and technology portfolio of USDOT and agenda across all modes of transportation. His office includes the Volpe National Transportation System Center (Cambridge, MA), Transportation Safety Institute (Oklahoma City, OK), Bureau of Transportation Statistics and the Intelligent Transportation Systems Joint Program Office. Quite a combination of things Dr. Hampshire, including the SMART Grant Program, and what's particularly important for this webinar, the University Transportation Center's Grant program, as well as the Advanced Research Projects Agency for Infrastructure (ARPA-I), Climate Change Center, Office of Position, Navigation and Timing (PNT) and Spectrum management and the Highly Automated Safe System Center of Excellence.

Again, that's a lot. On January 21, 2025, Dr. Hampshire returned to his faculty position at the Gerald R. Ford School of Public Policy at the University of Michigan. His research applies a blend of public policy operations research, data science, and systems approaches to analyze novel transportation systems, such as smart parking, connected vehicles, autonomous vehicles, ride-hailing, bike sharing, car sharing, as well pedestrian and bicyclist safety. His research focuses on environmental impacts, equity, and access to opportunities. His work has been cited widely and covered by major press outlets, and he has worked extensively with both public and private sector partners worldwide.

He's been a faculty member at Carnegie Mellon University, and a visiting professor at MIT. Dr. Hampshire received a PhD in operations research and financial engineering from Princeton University.

Robert, glad to have you here. I'm going to turn it over to you now.

1st Presentation – Dr. Robert Hampshire

All right, Dr. Rilett, Larry, thank you for having me here today. You listed a lot of things there, but really the true pleasure has been working with many of you all on this call in my role at leading, my former role, leading the office of the Assistant Secretary for Research and Technology. It really is a great, true pleasure to be here and have represented this community, advocated for this community, the transportation research UTC community. And so, it just brings a smile to my face to see the names of folks on here today, you know.

Also, I'd really like to thank the USDOT staff from OSTR, the UTC staff at OSTR, and more broadly Federal employees. And I'm just really appreciative of all the terrific energy and passion that you all brought to the work and continue to do that. So, thank you.

For today, Larry, what I wanted to do is really…we'll talk about UTCs and their reflection on from conception to implementation. But I'll focus my remarks on impact, particularly around tech transfer and impact, because particularly now, more than ever, I think, for many of, for our research to have societal

impact is important now more than ever to show value and demonstrable value. And so, we know that the UTC program is one that we led the reauthorization recently, and we put a few new things in there that particularly around tech transfer. And many of you saw that for this round of UTCs, there's an increased emphasis on tech transfer. Now I'll note that anything I say now is, I'm speaking on my own personal behalf as a faculty member at the University of Michigan. I certainly don't speak for the department or OSTR anymore. So, I'll talk about my reflections from that standpoint.

From the UTCs, we put in particular examples where we wanted tech transfer. We wanted impact. And in fact, the infrastructure bill required DOT to conduct a study of what we call the "incorporation of research". So really, how research is moving into practice is of utmost concern. And so, moving research and technology into practice, as many of you guys know and I saw firsthand, is a very complex process with many stakeholders, many oftentimes with competing views and priorities.

So, what I want to do just briefly today is to discuss some examples of moving transportation technology into practice, particularly when they're moving into practice in support of a very worthy mission like transportation safety. And you'll see many of these examples have UTC lineage. And I wanted to point that out.

I believe, to really move things successfully to tech transfer, something into real life. It requires increasing what I call the social capital of transportation researchers. So, by social capital I mean the networks and relationships that we're in, building trust, having a sense of like reciprocity with other members of the transportation sector and beyond, and anchoring on shared values. So, you need to think about participating and being a member of an ecosystem, not simply just doing tech transfer.

It's not a 1-way street, it really isn't. You're embedded in an ecosystem for impact. And so, using this ecosystem perspective, I really like to give some examples from my time when I was leading OSTR to kind of give you an example of what I what I'm talking about. The first for SMART grants. So SMART, as you know, is built creating the infrastructure bill, the largest ever funding in the U.S. for transportation technology deployments. There's a 100 million dollar a year program and I'm happy to say that over a 3rd of the projects within SMART, at the time, we made over 120 awards in the SMART grants. Over a 3rd of those projects had a university partner attached to them, together with local governments, or had a UTC lineage. So, universities and UTCs really stepped up in a big way to participate in the SMART program.

And so, here's a couple of examples of how really some of those UTC based innovations really are moving into practice. And I think that's a really important point I want to make today, you know. And all these projects really do leverage deep partnerships, collaboration, building trust and shared values. So, the first project I want to talk about is the Curb Management Collaborative within the SMART grants. So, this was led by an organization called the Open Mobility Foundation. OMF brings together cities, transportation sector, local communities, technology providers, data privacy advocates to holistically tackle the challenge around curb management.

So OMF can convene a group of over 10 cities from around the country to share insights, best practices. They had a data standard, that's important, a data standard to help tackle the issues around difficulties with parking, managing the way cities manage parking, but also food delivery, ride pickup and drop offs, and all the various other uses of curbs, you know, and that really is a great model of building that social capital.

There are several universities that are involved in this SMART grant collaborative and many of them, some of them are UTCs. That's sort of a transition from UTC technology to deployment. These cities did receive a Phase 1 SMART grant. And really, then that phase, they're developing their plans and identifying barriers to implementation.

And by barriers to implementation, what I mean is that those barriers to implementation are implementation risks, not necessarily technology risks. This is assumed already in SMART grants that technology works.

What SMART is really trying to do is say, “okay, what are the barriers to implementation?” So, for example, in this curb management example, the cohort identified that local procurement rules were a major barrier to implementation. So that's procurement. So, what they did is they joined together as a collaborative to create a shared procurement vehicle. So now that that shared vehicle is there, any of the cities can purchase off of that vehicle. That's an example of, you know, really convening, learning from each other, and then building something that's more than the sum of the parts. So that's for curb management.

Also, you know, for SMART grants, another one, a big category is around drones and UAS. And again, this one has university UTC lineage to it, even though it's in this case, is aviation or drones that still has a strong university participation. We know that you know many people who live in rural areas do not have ready access to healthcare or prescription drugs and so this set of SMART grants pulled together a really great team and consortium from the local hospital system to the local pharmacy and retail outlets to deliver heart and diabetes medicine, particularly the rural areas in Maryland, the eastern shore of Maryland and Virginia. And some of those folks live on remote islands. This is an amazing part of the country if no one's ever been there. But I had the opportunity to go and witness firsthand a delivery of medicines delivered by drone to particularly elderly residents in rural areas.

So, there's a woman, Emma, she's like someone off of leave it to beaver. She was really terrific, who was one of the participants in the program, I got a chance to talk to her as her medicine was being delivered by drone. It was heart medication. And so that kind of thing where you have shared impact. Everyone on those teams understood that the safety and health of people who live in rural areas was at stake. And so, all those stakeholders had a way in which they could work together towards that end.

I'll give you a couple of other examples, and then I'll close. I know we have a lot of other speakers and Q&A. But I do want to point to ARPA-I. The Advanced Research Project Agency, which again was created in the Infrastructure Bill and it's a game changer for the transportation infrastructure sector in this country. It was really created to tackle some of the largest and most outstanding and longstanding challenges in transportation infrastructure.

Unlike the UTC program, where each center and PI pursues somewhat individualized research, ARPA-I really directs research teams to tackle specific challenges. In this way, the individual pieces can add up to more than the sum of the parts. I think that it’s incredibly important for us right now in the research community that the parts add up to more than the sum of the parts. And we can show impact.

And so, ARPA-I is a mechanism to help do that. And under that mechanism we had, you know, 2 challenges. One was the Intersection Safety Challenge. It kind of pulls together this sort of this holistic perspective of problem solving for impact.

We know that over 25% of fatal vehicle crashes happen at intersections, be it signalized or unsignalized intersections and so the intersection safety challenge really serves to develop and deploy integrated intersection safety systems that really use the latest in LIDAR, communications technology, sensing, haptic to help dramatically reduce the number of fatalities at intersections, but to do it in a way that's dramatically cheaper.

And so, we named, this past TRB, we announced the 12 of the winners for phase 1B. It was a very competitive challenge process that they each got around 2 to 3 million dollars. And I, proud to say that several of the winners were, in fact, UTCs and or utilizing technology that was developed by UTCs. So, these kinds of pathways where you have UTC work that's being deployed and tech transferred through SMART, through ARPA-I, or through other means, is a way, I think, to success and to show impact.

One other ARPA-I program that we started and is currently still going is called the AI Complete Streets

Initiative. It's part of a small business innovation research program, SBIR. And so, we know that you know, DOT publishes many safety countermeasures, complete streets guidance, and the highway safety manual. You have all these different regulatory manuals about how roads should be designed to be safe. In fact, it's a dizzying array of guidance and regulations that traffic engineers really need to wade through. So, the AI Complete Streets initiative really asked small businesses to develop AI based tools that incorporate the latest sensing and geospatial data, together with this big stack of regulatory and guidance, to help design roads. So, think about a generative AI that can create roadway designs that are safe.

And so that challenge, again, is one that we announced at TRB in January, the 9 winners of the AI Complete Streets. Again, this was a small business SBIR program, but again several of the awardees had UTC lineage, meaning they are spent out from a company that was UTC, from a university that has a UTC or university center. And so, I think these mechanisms for impact that are based and rooted in UTC work have been really important.

And as I come to a close here, I want to point out that for that, particularly AI Complete Streets and all these projects, is that not everyone that was convened together have the set, to get the implementation, you need a lot of stakeholders. And again, all of them aren't going to have the same perspective. And so often times you have got to find a middle way, some way to synthesize the shared values and perspectives on your team. And so, in this AI Complete Streets example, many of the transportation safety advocates are very skeptical about deploying AI in the transportation system, as you might expect. And they rightly point out that countries like Sweden and Denmark have dramatically lower number of people who die on their roads, and they're not deploying some high-tech solutions at scale. Right? And so, you have this sort of difference, or different way of looking at things. But in the AI Complete Streets program, what we end up doing is, I call it the middle way. We said, “Well, can we use generative AI to assist those engineers and safety advocates who are designing safer roads?” And in that way, you have alignment based on a shared value of safety.

And so, in closing, I you know, I really do think that now is a terrific time and the right time that we need to improve what I call our social capital as researchers in transportation. You know, that's improving our network’s trust, making sure others in the particularly around comes around technology that communities trust us. Other stakeholders in the transportation community trust that we have the trust, shared values that we're appealing to safety.

And there's a few ways you could do that practically, particularly when I was leading OSTR, that I was really focused on improving the social capital for the whole research enterprise. But some things you could do make sure you identify your stakeholders for your work.
When I say stakeholders, I just don't mean the allies, I mean all those who have a stake in the success or failure of your work.

Convening them, maybe, host a convening is a great way to do that with all those folks. When you convene, listen, don't just simply talk at them, you know, get to know their perspectives. And something I learned, too, is, it could be personal, you know, like individuals, you may want to just have coffee or lunch with someone who has a different opinion than you or is seen as a roadblock. That really does help.

And finally, I'll say, if you can find a middle way, some alignment of perspectives that are grounded in shared values, be it safety, be it other economic out efficiency and then use that as the guidepost.

And the question was, you know, typically like, “do you want to be right in your perspective? Or do you want to be ultimately effective in what you're doing?” Sometimes it's not always straightforward. But you may want to be effective, meaning that you might have to find a different way to implement your research and solution in practice by working with others in a holistic way.

So, with that Larry and all the participants today, I want to thank you all for hosting me today. And again, it's been an honor of my life, you know professional lifetime, to have led OSTR in the last administration. I look

forward to continuing all the great partnerships and friendships that are represented here today. So, with that Larry, back to you.

2nd Presentation Introduction – Dr. Laurence Rilett

Appreciate it, Robert. That was excellent. As we said, we're going to hold the questions to the end. We're going to go to our next section. What's great about the, I'm biased, but what's great about this webinar is we have a lot of different perspectives. Obviously, Robert just gave us the view from OSTR.

Right now, we are lucky enough to have both state DOT representatives and a university representative who work together on crafting a UTC.

And so right now, I'm going to start with the North Carolina folks. I'm going to introduce two people. The first is Dr. Curtis Bradley, who is the Manager of Research and Development for the North Carolina Department of Transportation, where he's responsible for the oversight Research, Development and Technology Transfer initiatives.

Prior to his time at NCDOT, Dr. Bradley was a Manager of Research for the Massachusetts Department of Transportation (MassDOT), a Project Engineer at HNTB Corporation as well as a Site Engineer at M.B. Kahn Construction Company.

Dr. Bradley received his Bachelor of Science degree in Architecture and Environmental Design from Morgan State University, a Master of Science degree in Transportation Planning from South Carolina State University, as well as his Doctoral degree in Civil Engineering: Transportation Engineering from the University of Massachusetts Lowell. His research interests include research implementation, transportation financing, multi-modal initiatives, high speed rail planning, as well as statistics and econometrics.

He is going to be joined by Sarah Searcy, who is an applied research professional and program manager, with over 13 years of experience serving North Carolina to advance safe, equitable, and innovative multimodal transportation throughout the state.

As the Emerging Technologies and Innovation Manager in the North Carolina Department of Transportation (NCDOT)'s Office of Strategic Initiatives and Program Support (SIPS). She serves as a dedicated lead for Connected and Automated Vehicles (CAV) and manages NCDOT's innovation program. Sarah previously served as a Senior Advisor for Innovation in North Carolina DOT's Integrated Mobility Division, where she directed projects and programs that improve shared mobility options and promote transportation systems that work for everyone.

She managed the Connected Autonomous Shuttle Supporting Innovation (CASSI) program for North Carolina to pilot CAV in partnership with communities across the state. Prior to joining North Carolina DOT in 2021, Sarah was with the Institute of Transportation Research and Education (ITRE) at NC State University for over eight years, most recently as a Bicycle and Pedestrian Program Manager.

Sarah is a Fulbright award recipient and two-time East Carolina University alumna, with a bachelor's degree in art and anthropology and a master's degree in sociology. Very sincere welcome.

2nd Presentation – Dr. Curtis Bradley and Sarah Searcy

Dr. Curtis Bradley

All right, Larry. Thank you so much. Can everybody hear me okay?

Good. And can everybody see the screen?

Alright, good deal.

We're halfway there. Thank you. Thank you again for the warm welcome. once again My name is Curtis Bradley, and my co-presenters are Sarah Searcy and Dr. Karimoddini, and we will be presenting basically kind of our story of our UTC engagement.

And so, what I'll do is I'll start it off with a general overview of the UTC engagement, basically how we got to this point. I'll then turn it over to my colleague, Sarah Searcy, who is the NCDOT subject matter expert, and she'll give her point of view of lessons learned during the process, and then we'll turn it over to Dr. Karimoddini. He has a separate presentation, and he'll go over his experience with our UTC engagement.

Overview of our University Transportation Center program. So the way we fund this is through our primary source to fund the UTC program or to provide a match comes from the Federal State planning research part B, which, or better known as SPNR part B, which is outlined in the United States Code title 23, section 505.

And so, when we're thinking about our engagement with our UTC partners, we actually look at it from the same perspective as we look at any good research project. First thing we want to look for is that we want to make sure that there is an NCDOT sponsor or subject matter expert that is able to engage the project. And the reason why we want to do that is that we want to make sure that the research aligns with ongoing initiatives and goals and missions, the mission and goals here at NCDOT.

We want to make sure that there's a clearly articulated methodology, so that the research approach that's being done, even though it may be a little more of outside of the what we normally engage in, we want to make sure that it's still applicable and usable to what we do here at NCDOT. So, when we're thinking through the match goals, and we're actually thinking through our program, this was one of the 1st years that we've included a UTC match in our actual work program, and the thought behind that is actually threefold.

One, we wanted to be very intentional about investigating disruptive methodologies and technologies. And the reason being is that we are an applied research program. So, most of the research is really, by nature, can be very responsive. We do look at futuristic technologies and things of that nature at times. We're really looking for research that can be applied tomorrow. And so that really, at times, can constrain the type of research that we do so we want to be very intentional of looking at disruptive technologies.

But then we also wanted to leverage university led research. We understand we believe that we have some of the greatest minds here in North Carolina and so, we wanted to leverage the ideas and innovations that came out of those universities from the students and the researchers.

And then also, we don't look at the projects that come out of the UTC programs as necessarily in progress, but we think that they can be promoted to further and future research ideas and projects. So instead of just looking at it as like a one and done type of initiative, we're actually thinking about it as a funnel to say, "Okay, we can take certain aspects of the research that comes out of the UTC and let it be and let it go into more of an applied platform that can be for future research ideas and proposals".

So, what type of match does NCDOT provide? We have 3 types of matches that we will consider. The first one is probably the most popular, and what we're most used to, it's a passive or a soft match, and essentially a university will reach out to us, and they're going out for a UTC, they will ask to use one of an existing project as a match for that. And so, we will give them a letter of approval that we will do that.

But then there's a second kind, which is an in-kind match, which basically means, and we define that as whether we have a subject matter expert that will commit staff time, maybe allow the universities to use one

of our labs or resources, or something of that nature. So that's another type of way. But this year, one of the things that we applied was what we consider a hard match or a monetary match, where we would provide actual dollars from our work program to be applied to the UTC program.

And so, in order to get access to that access to those resources, this is not an exhaustive list, but these are just some of the ideas that we think about. So, whenever a university is reaching out to us and say, “Hey, we would like for you all to support this, even our UTC”. As we noted before, that has to be a subject matter expert, and they could be engaged in one of a couple of ways.

They could review the proposal; that's something that we suggest. They could be a part of the board of directors or the steering committee. But essentially what we want to do is to make sure that someone at NCDOT is engaged in the research in such a way that they can speak into that. But one of the things we want to make is very, very clear, we're not looking to take over the research or necessarily to direct it in a way that the researchers didn't intend. We just want to be able to speak into it and find if there's some common goals and things that we can get out of it, and if there is, then we do not have a problem with support.

So now I will turn it over to my colleague, Sarah Searcy, and she will go over her experience.

Sarah Searcy

Thank you, Curtis. Good afternoon, everyone. My name is Sarah Searcy. I'm the Emerging Technologies and Innovation Manager in NCDOT's Office of Strategic Initiatives and Program Support. I serve as the State Champion in Steering and Implementation Committee chair for multiple NCDOT sponsored research projects that are led by Dr. Ali Karimoddini and his team at NC A&T State University, who you'll hear from in a few minutes. I also serve as the advisory board chair for the NC A&T-led region 4 University Transportation Center.

So, I'm going to share my thoughts on the keys to successful partnership between the State DOT and universities based on our experience in North Carolina. I will provide an example of a real-world transportation problem and priority area at NCDOT, centered on exploring emerging technologies for public transportation and I will conclude with how NCDOT partnered with NC A&T on a series of research projects to investigate the problem that became the building blocks in support of their UTC.

So, alignment of needs and priorities is critical to a successful partnership between the State DOT and universities. At NCDOT, we ask how does the project align with the agency's mission, vision and values to connect people, products and places safely and efficiently, support cost savings through better use of infrastructure and resources, promote the development and use of new and better solutions, or provide reliable data analyses and tools to inform best practices.

We collaborate with our university partners and our local communities to identify real world transportation problems in search of solutions rather than solutions in search of problems. For emerging technologies, we partner with the clear goal of research, testing and evaluation to determine capabilities and limitations, how well the technology works compared to existing solutions, and if the technology meets transportation needs. Successful partnership means assembling the right team, including the project champion, who mobilizes resources and assures alignment with the agency's needs and priorities, internal and external stakeholders with a vested interest in project outcomes, and subject matter experts with in-depth knowledge and practical experience in the focus area. The champions, stakeholders and subject matter experts work together to provide guidance, oversight and course correction.

Successful partnership is supported by frequent consistent communication between the collaborators. This ensures that everyone involved is aligned and informed on goals, timelines, and progress to build trust, reduce scope creep, and proactively address potential problems. NCDOT and our university partners have

used a strategic building block approach to incrementally increase the complexity of projects and build on successes and lessons learned.

This approach includes using short-term technical assistance projects as a starting point for investigations toward larger one- or two-year research projects with the potential of further support under technology transfer.

NCDOT and its university partners work closely to track project outcomes and lessons learned to ensure appropriate and effective implementation. As Curtis mentioned, oftentimes when a project concludes, you end up with more research questions, more areas of investigation and we want to make sure that we document those, keep track of them, and determine further avenues for exploration. Next slide, please.

An example of a real-world transportation problem and priority area in NCDOT is the use of emerging technologies for public transportation. Key questions include: how can connected and automated vehicles be used for public transportation? What are the capabilities and limitations of these vehicles for public transportation? How can the technology be developed to better serve riders with different needs and in different environments, such as general population or paratransit, fixed route, circulator or on demand curb to curb, urban, suburban, or rural environments.

NCDOT has followed a process to rigorously assess emerging technologies to determine if they meet transportation needs and can be integrated and scaled as an option in the existing transportation system. Through this process, NCDOT supports research demonstrations and pilots to investigate and test new technologies. We work to document, synthesize and communicate our findings and then support large-scale implementations towards mainstream adoption based on the documented usefulness and benefits of proven solutions. Next slide, please.

NCDOT has used this process to guide our exploration of connected and automated vehicles as a shared mobility option, first, through establishing an automated shuttle pilot program in 2019, that is led by NCDOT’s Integrated Mobility Division, with support from teams across the department and further through our partnership with NC A&T to develop their Aggie Auto program.

The 3 images at the top are projects that were completed under NCDOT’s Connected Autonomous Shuttle Supporting Innovation Program, or CASSI, that tested purpose-built, low-speed automated shuttles at the Wright Brothers National Memorial, in partnership with the National Park Service in the town of Cary's Fred G. Bond Metro Park, and at the University of North Carolina at Charlotte. In parallel NCDOT supported NC A&T to develop a fleet of automated shuttles, an innovative rural test track and automated shuttle pilots under the Aggie Auto program. This was supported through multi-year research projects, a state level transportation center of excellence and technology transfer projects with the most recent to develop and test a proof-of-concept teleoperations platform. So, you can see the Aggie Auto Shuttles surrounded by the orange box in the lower left image.

Both the CASSI and Aggie Auto programs have advanced activities related to testing and evaluation, public engagement and education, and ensuring the State's readiness for automated vehicle technology. NCDOT’s partnership with NC A&T for the projects that established the Aggie Auto program served as foundational building blocks for the Region 4 UTC, that center for regional and rural connected communities that Dr. Ali Karimoddini will share more about in a few minutes, so I'll hand over the presentation now to Dr. Karimoddini. He's going to provide his thoughts and perspective and go more in depth on the UTC's purpose, structure, team and projects.

So, thank you all for having me.

3rd Presentation Introduction – Dr. Laurence Rilett

Thanks, Sarah. I'm going to step in just for a second. I realized I hadn't introduced Dr. Karimoddini, and then we can turn it back to him.

So, Dr. Ali Karimoddini is a Professor at the Department of Electrical and Computing Engineering at North Carolina Agriculture and Technical State University. He is Director of the CR2C2 Regional University Transportation Center, a Federal UTC, the director of the NC-CAV Center for Excellence on Advanced Transportation Technology and the Director of the ACCESS Laboratory at North Carolina A&T State University. His research interests include autonomy, smart transportation, Urban Air Mobility (UAM), connected and autonomous vehicles, cyber-physical systems and multi-agent systems. His research has been supported by different federal funding agencies and industrial partners to conduct research on the development of autonomous vehicles and their applications.

Ali, I'll go back to you. Thank you.

3rd Presentation – Dr. Ali Karimoddini

Great. Thank you so much for the introduction. And before I start, I want to make sure that you do see my screen, and you can hear me well. Perfect. So, thank you again for the introduction.

Today, I'm going to discuss how our UTC, which is the Center for Regional and Rural Connected Communities Region 4 UTC, is working with different stakeholders, particularly State DOT and North Carolina DOT in particular.

A little bit of background about what our center is about. Our center is about developing and adopting emerging transportation technologies to enhance mobility solutions for people and goods in rural communities. We have formed 3 major research initiatives.

The first one is integrating emerging technologies into transportation planning and policy. The second major research initiative is about developing technology solutions for connected, safe and reliable and secure transportation services. And the last major research initiative is about how we can provide innovative technology driven mobility services for people, particularly in rural communities. Along with these major research initiatives, we have huge campaigns on education and outreach and technology transfer and collaboration. The center brings several universities across region 4, including University of Tennessee, University of Kentucky, University of Alabama, Florida Atlantic University, University of Georgia, and Clemson University, as well as North Carolina A&T State University as the lead institute in this consortium.

So just we were talking about impact. Dr. Hampshire was talking about the impact. This is impact only for year 2024 of the center: 14 projects, 48 events, 217 contributions (whether publications, patents, journals), 2,000 attendees in our events, ranging from K12 all the way to the practitioners and professional communities and university students, and 6 million dollars new funding that we have received. And that was the first year of the center. We don't have yet the out of, we're collecting the data for year 2 of the center, but that's impressive.

I wanted to give credit to the entire leadership of the Center across all those consortium members, but also the army researchers that we do have. Researchers, students across this across these universities, and on the top of that our stakeholders, which we're going to be talking about them today more. And these are just some of them, a subset of stakeholders, that we have been working government and public sector, national labs, nonprofit community-based organizations, industry partners and academic institutions, of course. So, these are the stakeholders that we have been working with in different capacities, whether being part of the steering committees, helping, collaborating, or helping us with matching funds, and so on.

Through collaborations with some of these stakeholders, we have been also identifying the advisory boards of the Center as well. Sarah Searcy is the chair of the Advisory Board. We do have other Advisory Board members from other State DOTs, federal partners, industry partners and other organization nonprofit organizations as a part of the steering Advisory Board of the Center.

So now about today's talk from conception to implementation and one step further, technology transfer. Here is a cycle that I think we need to implement these concepts. We're going to go through problem identification: what problems the center is going to be focusing on, conceptualization, implementation, and then eventually technology transfer. And the question: where and in what stage the stakeholder engagement is appropriate to be approached and being engaged in in this process? And the answer is throughout the entire spectrum from problem identification all the way to technology transfer. Not only during each of these stages, but also through the stage from conceptualization, the path to implementation and also the path to technology transfer.

So, I'm going to be talking about each of these steps in a little bit more detail. As far as problem identification, you can think of short-term horizon problems that address short term horizon issues, or near-term horizon or long-term horizon. State DOTs by nature and by mission are addressing a short-term horizon, the problems of today, but also the emerging technologies, the emerging opportunities and innovation adjustments.

But UTC programs, the mission is toward the near-term horizon all the way to long-term horizon. Innovative solutions are kind of R&D based. Academia also is thinking about future futuristic solutions, which may not be addressing the problem of today, but they are still helpful, and we need to innovate, even though it may not be getting to the high maturity level today or in the next few years.

It is going to be kind of a mistake if the UTC program is going to be addressing a problem of, let's say, short horizon or problem of today and at the same time, the state DOT's mission is not going to be considered funding a problem that is a little bit futuristic and it's not even addressing a near term horizon or emerging technology. So, what is the solution?

The solution is meeting halfway through. Right? So that's the area where the technology transfer opportunities are emerging, engagement opportunities, collaboration opportunities. So that's the area that we can collaborate, and we have been focusing to see where we can work together with the State DOTs and other stakeholders that we have had here.

Now, going from problem identifications that we identify several problems, the next idea is how we can develop some concepts. And we have been going through this cycle of divergent thinking and convergent thinking. So initially, once we started collecting the ideas from the team, and at that point we let the ideas creatively emerge and see what ideas that we can think of. And at some point, we also have to then start converging to analyze the data and see what sort of synergetic solutions that we can provide to address these problems.

So, the solution has to be problem driven solutions. And here is the translation of this method is reflected on the bottom of this slide: the team building problem identification, then collecting and generating ideas, narrowing down the ideas, proposal development, proposal refinement, and finally the submission.

So that's not about the time that the UTC is awarded, I'm talking about before UTC, where we put the ideas together to submit a solid proposal together. And, to give you a sort of insight into how long these stages took for our UTC, here is the timeline: 3 months - team building, 3 months - generating ideas, and 3 months - narrowing down the ideas and then proposal development, and then proposal refinement. You can see that it was about one year effort that we put together, and again, where engagement stakeholder engagement happened almost throughout the entire spectrum where we were starting to team, when we were talking about

ideas, narrowing ideas, and where we were reviewing the ideas and the proposal and got feedback throughout this whole process.

After the UTC is funded, it is about implementing the idea and how we can implement the ideas. And I will talk about 2 cycles. The first cycle is within our center, we have so many projects, and then also the holistic picture within the center. So, let's talk about the projects. For each of the projects within the center, we do have immediately after selecting a project, forming a steering committee, having a kickoff meeting, progress reports continuously received, close out, and then technology transfer. And again, the stakeholder engagement is happening throughout the entire spectrum. When we were forming a steering committee, we were reaching out to our stakeholders and our partners and advisory board, and asking if they could, if their time allowed to serve in the steering committees, inviting to them to the kickoff meeting, sharing progress reports and getting feedback and close out again. They're going to see the output of this center, how potentially that idea can be transferred to another level of implementation and technology transfer support that they can be providing.

And now, as far as the center as a holistic feature. So, we have gone through and are considering 3 phases. The 1st phase is exploration, where the ideas are emerging. The second phase is going to use cases, identify some use cases, develop tools and prototyping. And finally, pilot projects that we're going to be considering. So roughly, the first two years of the center are about exploration, the second 2 years are about use cases, tools and prototypes, and finally, the last year is about pilot projects.

So, in fact, this is helping us to improve the technology readiness levels of the ideas that we are developing. Going from the ideas from the lab, going to the test tracks, and then developing the tools and finally implementing the tools. And I'm not talking about the last TR level. Hopefully, all these solutions will get to the point that we'll initiate business development, commercialization, industry partnership and licensing. But that might be a little bit beyond the scope of the center. But hopefully, we're going to get all the way to TR level 7, or maybe a little bit of a stretch beyond that level as well.

To implement this sort of idea, these phases, we need to create a technology transfer pipeline that goes from the simulation and digital tools and prototyping and laboratory setups. So, a lot of infrastructure is needed here. But then we cannot say in the laboratory, we have to bring it to a little bit more kind of an environment that is close to operational environment, a closed test track, a proving ground and then living labs so validating the technology and the solution in that environment and finally doing piloting this technology in operational environment and see how that technology can be tested in operational environment and hopefully that paves the pathway toward the commercialization.

And here is the infrastructure that we have created. Again, support from stakeholders, the simulator that we have created, the different laboratories that we have set up, the closed test track, living labs, and finally piloting that I'm going to be talking about shortly.

Here are the 2 technological developments that one research funding that we received from NCDOT to develop and operationalize a test of autonomous vehicles. And finally, a technology transfer that we received to pilot the technology in downtown Greensboro, where our autonomous vehicles were serving the public for about a month. And here is the pathway, the track that our autonomous vehicle was running from East Greensboro, from the campus, all the way to the downtown area.

So, I know that we are running out of time, so I’m skipping some of these slides. We have had great collaboration, not only with NCDOT, but also with other stakeholders, including, for example, first responders piloting, they were able to observe how our town vehicles are working, and from their perspective, how they can be prepared for such kinds of emerging technologies.

Here is another workshop that we had on bringing different stakeholders together to talk about lessons learned from that pilot program that we had. And now we have another technology transfer, how we can

bring even the technology, one level further in terms of removing the backup driver and replacing it with the remote driving technologies that that we do have here.

A few weeks ago, we were putting workshops to bring in different stakeholders together, including Federal and State industries and transportation industries, to talk about how generative AI could benefit the transportation community. That's another example.

And finally, the last one is the data competition. We put together 3 months data competition where students and their mentors were working together to develop an idea for a specific community, Rockingham County, and which is a rural community in North Carolina. So, the team, the students, were encouraged to develop an idea, present that idea to the community partners, and get feedback from the partners. So that was very rewarding. And that was another way that our students, our researchers, their mentors, engaged with the community.

With that, with these examples that I provided. So, I would like to thank all the UTC program, North Carolina Department of Transportation and all other stakeholders, as well as the entire team who helped us to go through the UTC program so far and in a successful way. And hopefully, we're going to make it a very impactful program at the end of the 5th year. Thank you so much.

Q&A – Dr. Laurence Rilett

Great. Thanks, Ali. So right now, we are going to go to question and answers. Let's share my screen.
But if you could put your questions in the Q&A box that would be very helpful for us. So, it looks like we do have one question in the chat. Okay. We have a question for you, Ali.

Question 1 – Dr. Laurence Rilett

Does CR2C2 expect the test tracks and living laboratory to be only in North Carolina? Maybe one of the other University states can host test tracks or demos. Should other State DOT folks be part of the CR2C2 advisory board that Sarah chairs? It looks like she is the only State DOT rep.

Question 1 Answered – Dr. Ali Karimoddini

So, I will start with the last question. No, actually we have, in addition to Sara, we do have a representative from the Georgia DOT as well. So, we were making a balance and making sure that a few of the State DOTs in our region are part of the center, but not the entire Advisory Board to be a state DOTs, so that was the way that I think that we were following.

As far as the test track, that was an interesting question. We are now working with another, with one of the projects in the center to see how we can have short pilot programs across the states in region 4. So that's part of the program. We don't know. We are still investigating the logistics, discussing with State DOTs in other states, and seeing how we can have demonstrations in other states, within the region as well.

Question 2 – Dr. Laurence Rilett

Great. Thank you. We have another question.

What roles do municipal DOTs and MPOs play in the partnership discussed?

So, I guess that could be for you, Ali, or I guess it could be for Curtis as well.

Question 2 Answered – Dr. Ali Karimoddini

I think I did explain it to some degree, and then I will pass it to Curtis. Serving in the Advisory Board, serving in the steering committees of the center, helping with the technical support and feedback and reviewing and supporting the technical team, helping the researchers from academia to understand the issues that might be out there in the practice domain and then helping be the connections across other stakeholders. So, these are the things that we have been hoping to work with different DOTs and MPOs. But I pass it to Curtis for further insight.

Question 2 Answered – Dr. Curtis Bradley

No, I think you covered it pretty well. I think one of the things that we are trying to cover is a more encompassing group of people. So obviously, we want our local municipalities, federal, state, local as well as private sector to be engaged, but I think Sarah will probably be better suited to answer this as far as like the tangible outreach and things of that nature because in the R&D unit, we really lean on the subject matter experts to develop their team on who they want to be engaged and what type of engagement they want. So, Sarah, I'm not sure if you have any other points.

Question 2 Answered – Sarah Searcy

I think the different purposes have been generally covered. I think a good example is, Dr. Karimoddini had mentioned, the one-month pilot of the Aggie Auto shuttles on a route between the University and downtown Greensboro, and Greensboro Department of Transportation was very closely involved in the selection and planning of that route, ensuring that any adjustments that need to be made to accommodate the vehicles were made, ensuring the safety of the route. I mean, Ali, you could speak more to this.

And another good example is Rockingham County. This is a recent partnership with the potential of doing a pilot of the shuttles to connect rural communities to services, and that would include engaging the local transit system because the local transit system and their staff know about the transportation problems on the ground. It's really important for them to be a part of the scoping process for the project and to help plan effective routes that help serve their citizens effectively.

Question 2 Answered – Dr. Robert Hampshire

Can I jump in here and just say? For UTC particularly, we know state funds are really used for matching SPR funds for the research part. But MPOs might have planning money as well to help contribute more than that. MPOs and locals are eligible for certain grants, maybe that states aren’t or in addition to states. So, like SMART, Safe Streets and Roads for All, and other grants are technology deployment grants that locals are eligible for. And so, we've seen universities partnering with locals and MPOs to deploy some UTC technology.

Question 3 – Dr. Laurence Rilett

Great. Thank you. I have a follow-up question. I think you did a great job, I think everyone did a great job explaining how you go from the beginning process to the end, getting at implementation. That's obviously

key. I appreciated Ali's graph of it takes a year to put all this together, and we all know the NOFO is like 3 months, so you really have to be working well ahead of the time before the NOFO comes out if you want to follow the pattern that Ali and North Carolina did.

Robert, I did have a question for you. *A lot of times, and this is probably a two-part question, a lot of times there's some opaqueness in how the program is analyzed or the proposal is analyzed. Would you mind going over that? How do you get reviewers? Do they? Is it one giant box of looking at reviewers? What is the process for these proposals once they go in?*

And I should remind everyone. This is a very popular program. We probably had well over 200 applications on the last one, and they all have to go through reviews. So, Robert, if you wouldn't mind just talking about that process.

Question 3 Answered – Dr. Robert Hampshire

Yeah, I'll talk about that. Again, I say nothing about forward looking competitions. This is what I can say about the way we ran the program. The staff, certainly UTC staff, are just really terrific in doing and executing this program.

We got a lot. It was very popular. There were review panels. Folks came from within DOT. I think there's also possibly some non-DOT SMEs and folks from the states, and others that were involved, maybe involved in the review process. I mean the NOFO, well, we'll start with the legislation.

That's where it all starts. The legislation lays out the purpose and goals of UTCs, the categories, the national, regional and tier one criteria. And so, we adhered to the statute and the law as the first, that for sure is the review criteria. Now there's some flex, a little bit of flexibility in the statute in it to provide some priorities. And so that will be in the NOFO. And there will be an implementation, I mean a review. I think we called it a review guide. Basically, it'll say, here specifically is how you will be reviewed. That will be laid out very clearly in the NOFO. And we adhere to those review criteria.

Again, it's a very popular program, it's highly subscribed. And so, there's going to be probably a lot of really, really great proposals that rated highly, and then we have to go through those and pick the best of those. And so, it's a very tough process to decide. And to put the proposals together, I would say start with the statute. Understand the statute inside and out. And then in the NOFO will give clear criteria about what the review process would be.

Closing Remarks – Dr. Laurence Rilett

Great. Well, thank you. I noticed that we've gone to the limit of our time. We want to be respectful of everyone's time, so I think I'll finish it here. I do want to thank all the speakers: Robert, Ali, Sarah, and Curtis. Let me just share my screen just for a second. I have some bookkeeping to do. SO we've done the Q&A. I want to acknowledge the AASHTO RAC Coordination and Collaboration Task Force who put this on as well as CUTC, Council of University Transportation Centers and the TRB AJE35 RIIM Coordination and Collaboration Committee, who actually put this on. And then the acknowledgments for AASHTO RAC and CUTC. This is the 4th one. You saw we just finished 'Working with USDOTs UTCs'. All of these are online, so feel free to look those up. We have the recordings as well as the slides. We're going to put this one on as well. The next one is 'Leveraging Your State Research Funding with the Federal Research Programs' webinar. We are going to wait until things sort of become a little bit stable across the country. So, we'll probably be doing that in the fall. So, we look forward to that.

As a reminder, all this is licensed under and it's free to use, but we'll have the license on there. So, you're free to use all this, you just have to acknowledge where the information came from.

And then lastly, PDH certificates will be provided following the conclusion of the webinar via the email used for the registration. So with that, I'm going to end this webinar. I want to thank everyone again, the participants as well as the speakers. I thought it was very useful, and we look forward to connecting with you again. Thank you.