

Welcome to the InfraTalk podcast, brought to you by Infrastructure Ventures. The InfraTalk podcast is a program of InfraTalk America. InfraTalkAmerica.com is a multimedia platform designed to bring attention to advancing innovations in transportation infrastructure. The Infratalk Podcast invites experts in the transportation and infrastructure industry to discuss how we can advance policies more efficiently and effectively. Policies that make us work smarter, like digital delivery, e-ticketing, composite bridges and work zone safety. Because we know we can do better.

GREG:

Hello, I'm Greg: Nadeau, publisher of InfraTalk America. I was so pleased when Victoria: Sheehan, recently selected as the new executive director for the Transportation Research Board, commissioner of the New Hampshire Department of Transportation and former president of the American Association of State Highway and Transportation Officials agreed to join me to discuss mainstreaming innovation at State Dots. A topic she addressed in her keynote address to the 2022 Transportation Infrastructure Durability Conference, hosted by the University of Maine.

She spoke of her experience with composite bridge technology. We met at UMaine the next day to discuss innovation. Listen in to our conversation, on the challenges State Departments of Transportation face in advancing innovations and how agencies can work to overcome these barriers. I want to note, this episode was recorded before the announcement was made that Commissioner Sheehan would be the next executive director of the Transportation Research Board. She has InfraTalk America's most enthusiastic congratulation!

Commissioner Sheehan, welcome to the InfraTalk podcast.

VICTORIA:

Great to be with you.

GREG:

We're here at the Transportation Infrastructure Durability Center's annual meeting, and you keynoted last night's event. And I've sort of decided to have this conversation based on a theme that you struck in your remarks, and that's mainstreaming technology, which is a lot of the work that we do in our efforts to advance, to instate a practice, a number of what we call targeted technologies.

And the topic last night revolved around some of the visits you conducted during the day to some composite bridge projects that were occurring here in Maine. And obviously, a big focus of the durability centers efforts are composites and other more durable, longer lasting materials. Return on investment was a big part of the conversation, and one of the observations you made, reacting to a number of very successful deployments of composite structures around the country, particularly in this part of the country.

Some of the technology invented right here at the University of Maine that why give and this is basically a paraphrase of a quote. If it's not a quote, why, given the successful outcome we've seen on so many projects, have we not been able to accelerate the pace at which these technologies are adopted and mainstreamed? And then you went on to say, partly because, you know, whether it's the attitude of the industry. You know, if it ain't broke, don't fix it.

New things are hard. New things are challenging. New things take on some level of risk in the eyes of some, particularly in a public engineering sense. Being an engineer, obviously, having worked in state DOTs for a number of years, multiple dots. And now, of course, commissioner, and recently the national president of AASHTO, the Association of State and Highway Transportation Officials.

So, your role has been expansive and obviously one of a significant leadership role. Can you just react to what your mainstreaming technology and the challenges associated with it for industries like composites or other examples.

VICTORIA:

So, I think state DOTs often get a bad rap. We are very quick to embrace new technologies and innovation. We spend a lot of money on research and deploying pilot uses of various technologies. Where we do struggle is mainstreaming, and that is what I spoke about last night. There are numerous reasons why it is difficult to change our processes and our attitudes and make the use of technology part of our everyday business.

But what I think is imperative is that we have to change that rate of adoption because the world that we live in is changing at a much more rapid pace than ever before. There are disruptive technologies on the horizon. Every state DOT just submitted their plan on how to utilize the EV charging formula funds in the NEVI program.

So, we've got EVs coming. We have been working over the years to deploy new technologies. First, our ITS systems. Now, it's connected technologies to support connected and automated vehicles. There's a lot of disruptors on the horizon, and we as states have been preparing for those new technologies and new modes of transportation. But at the same time, we have our core infrastructure that we still need to maintain and operate.

And there's just as many opportunities to leverage technology when it comes to preserving that existing infrastructure. And so, I think that's why states have been challenged. There's so much coming at us at the moment from different directions. We're trying to pivot and staff up and have the resources to work in this much more dynamic environment. And at times we are risk averse, especially when it comes to changing something that, from our perspective, wasn't broken.

You know, we've been using concrete and steel and asphalt and the same materials in the construction of our transportation infrastructure for quite some time. And so, when there's other technology advancements and needs that we do have to react to, then that's why sometimes people are hesitant. Too much change at one time is a lot to navigate, and when we need to evolve, that's where we focus our efforts.

It's harder to encourage people to evolve. It's just part of ongoing process improvement. But that being said, you know, when it comes to using new materials or being here at the University of Maine and talking about composite technology, specifically a new bridge section types and such, we have done a lot of great work in this area. There are countless examples of state DOTs and other owners who are leveraging these new materials, and we've seen results.

Projects have been in place, projects were completed and this infrastructure has been in place for ten, 15, even 20 years in some cases. And so, the important thing to remember is that about 90% of the value of our transportation system is associated with our highways and our railways and our bridge infrastructure. That makes up the largest component of the system as a whole.

Last night, I discussed this. You know, there's a lot of opportunities to use technology like drones to improve our everyday business, whether it's for bridge inspection or construction inspection. The cost of pay is relatively small. You know, for about \$6500 you can buy a drone and fit it out with all the equipment that you need. So you use that piece of equipment on a handful of projects, you get that return on investment.

We are much more nervous when we're making investments in the physical infrastructure that's going to be in place for 50 or more years to deviate from the tried and true. Because even if we believe what we're being sold with the innovations that are occurring, there's just not that same in-service experience to be able to guarantee that that material is going to deliver in the way that the innovators and researchers of the industry might be presenting. And so, it's overcoming now that we have some data, that hesitation to use newer materials and new approaches. We're at that tipping point where we can now mainstream.

GREG:

Thus, the challenge.

VICTORIA:

Yes.

GREG:

When we rolled out InfraTalk America, we rolled out #WeCanDoBetter. It's kind of a theme that we're developing through our conversations and our analysis and the articles that we publish. And my hope is, as we develop an audience that includes policy folks in infrastructure and in the non-infrastructure world. Because needless to say, investment in infrastructure is critically important to the leadership of our country, whether it's a president or a governor or members of Congress or state legislators who have the frontline responsibility for ensuring that you have the resources you need to get the job done.

So, the questions that we're working hard to beg is, first, are we doing this? And the second follow up, why aren't we doing this? So, to what extent is a higher level of awareness among policymakers going to help influence decisions made at the program level? At a state DOT? How does that bridge engineer become compelled or encouraged or incented to take that risk and go out on that limb and try something they've never tried before?

What in your experience... What has been your observation?

VICTORIA:

The biggest barriers to mainstreaming technology is uncertainty around available funding in the future. And so we're very appreciative within the state DOT community that Congress was able to pass the infrastructure investment in jobs that they gave us five years of funding. So now we have some predictability. But some would argue that five years isn't even long enough for us to be able to make sound investments.

The challenge I see is working with industry. They want predictability as well. And so, it's not just about providing the Department of Transportation with certainty around what funding we have so that we can manage our work most efficiently. It's also about preparing the consulting industry and the contractors and the fabricators to ensure that they are ready to deliver on the projects that we select.

So, the more certainty we have around available resources, the more forward planning we can be doing. And then we're having those tough decisions around investments. So, if I have a technology or a material that I believe is going to have a lower life cycle cost over its deployment, I might still not be able to select that product if it costs slightly more in today's dollars, because I only have certainty around available funding for the next two to three years.

And if I'm undertaking projects that are even slightly more expensive, it's limiting my capacity and I'm not able to have the impact and address perhaps all of the safety or structural deficiencies that we're really trying to get to. And so, the more predictability we have around resources, the further out we can look into the future and ensure that we're making smart decisions.

I think with the implementation of previous federal bills like Map 21 that implemented the asset and performance reporting requirements. That really was a game changer for state DOTs. Having to report that data to the federal government, but also use that data to drive decision-making within our organizations has allowed us to make the case for certain investments. It's very challenging.

If you sit down with an individual and they're living on a roadway where the pavement is in poor condition, or there's a weight restriction on the bridge down the street from their house, and they're having to have, you know, fuel trucks that otherwise take detours just to access their property. It is very hard for them to be patient. And if you sit across and say, I'm sorry, your project's on the list. I'm not getting to it for one year, two years, three years, because here's my program, here's our portfolio. I think intellectually they sometimes get it that you're trying to make the best long term financial decisions, but we're impacting the quality of life for that person each and every day.

From a practical perspective, they're driving their vehicle on a roadway that's in rough shape, which puts wear and tear on their vehicle and may potentially incur costs. So, even when we crunch the numbers

and from a dollars and cents perspective, we know we're making the most prudent financial decision. Sometimes these other factors have to be taken into consideration. And of course, public safety is number one.

GREG:

Right.

In the topic today, obviously being at a durability conference and so much of the focus being on composites. You know, if I told you, you could install a bridge or utilize concrete reinforcement in the form of rebar and that you're utilizing a material that doesn't corrode, therefore reduces, if not eliminates maintenance over the years. So not only are you building something that will last longer, you're building something that will cost less to maintain.

You made a very, very important point in your remarks last night. You used in an example of a bridge that straddled the state line. One state had reasonable resources to do proper maintenance, the other didn't. And the visual of that dynamic was pretty evident. So, maintenance is a very big issue, particularly if it's a structure that's owned by a county or municipality who are notoriously underfunded for things like maintenance.

So, a 75-year bridge will last only 40 or 50. From a sustainability standpoint, that's obviously a significant negative. So those are the those are the conversations we've heard extensively in the last you know, last evening and during the course of today. The bridge engineer and I used to say back in the day when I was speaking to bridge audiences, the last thing I want is a cavalier bridge engineer.

But Every Day Counts counts for you too. We've got to constantly be pushing the envelope and finding those innovations to ensure that what we're producing meets the test that you really articulated quite effectively. How does that industry engage with the bridge engineering community in a way? And do you see a difference generationally? Do you see younger bridge engineers who've come up during the age of technology more receptive than maybe engineers who are closer to the end of their career than even the middle?

VICTORIA:

So, I don't want to perpetuate a bias that the younger generation is quicker to adopt technology and new solutions. I don't believe that is the case. I think where we've struggled in the past, and I sort of chided some of the industry folks in the room. They have been fixated on the bridge engineer for taking the example of composites. And how do we get our material selected during the design phase?

So, how do we win out in terms of product selection? But it's not about just appealing to that bridge engineer. You really have to talk to all of the individuals who are involved in every aspect of the lifecycle of a piece of infrastructure. And so, it's not just about, you know, selling the bridge engineer on how your product might be lighter and, you know, more easily installed or it's going to be more durable.

It's talking to the maintenance folks as well. What happens when that bridge gets hit by a truck? Prove that you've done the testing to ensure that that girder will 1. hold up and perform and that you'll, you know, preserve public safety. But then 2. how can it be repaired? We as state DOTs have a great tradition of self-performing a lot of emergency repair work.

We want to be nimble and react when things go wrong. We don't want to be at the mercy of the private sector necessarily. So how are you going to train our folks to be able to do that repair when a bridge is struck by a vehicle that was too high to travel under it? Or likewise, heaven forbid you have a car fire in the vicinity of a structure demonstrating that you've done the testing and that that structure is going to perform just as well under high temperatures as steel or concrete or than more traditional alternatives.

I think the industry has focused a lot on product selection, getting your materials specified, but it's more than that. It's reassuring the state DOTs and other owners that not only is your product going to last longer, but even as it becomes end-of-life, because that is inevitable, you know, how are we going to maintain it and repair it and keep it in service?

We know how to plate steel. We know how to repair concrete. We want that confidence that we'll be able to patch and keep in service those structures in the same way that we've been doing for decades with the more traditional materials and design approaches.

GREG:

So, very insightful point. So, the industry really needs to engage with the agent and owner agencies and really from the design phase to their construct ability to the maintenance because the maintenance engineers are not naturally who you look to to engage with an agency on utilizing your technology in the first place. So very interesting observation. I appreciate that.

Another topic, not the subject of this conference, but one I've heard you speak eloquently about, particularly in the last couple of years, and that's digital project delivery, which is another focus of ours in terms of advancing innovation in what I call the federal aid highway program marketplace, which is, of course, the driver. I mean, when you look at what the federal government invests, the leveraging of the state and local match dollars, we're talking about a program that will far exceed a couple of hundred billion dollars year in, year out, for years to come.

So, the investment of the owner agency in developing digital project delivery capabilities has been demonstrated to be certainly cost saving, efficient, expedite project delivery, all the good things that that the industry looks for and the owners certainly look for in delivering projects. So, the Federal Highway Administration produced a what they call the BIM for infrastructure roadmap.

And shortly after it came out, you and I happened to be having a conversation and I was reacting to the ten-year estimate that they had identified. And I've since had conversations with the author and with a number of Federal Highway officials about this. And the road map and the ten-year element of it is really based on current state of practice.

And I was sort of making that observation and you had sort of educated me about the workforce elements that are so integral to advancing and accelerating the adoption of those technologies and practices. And largely practices, giving you really have to retool the way you think and the way you do

business. So, can you talk about that? You've talked extensively about workforce development generally, but also the point you made to me was you need staff who are expert, who are competent in this area.

If you're going to turn your project delivery apparatus over to software and private vendors. How do we tackle that if that's a major obstacle? So, the racks and the question is, is a ten-year roadmap acceptable? And in the #WeCanDoBetter concept, what would it take to accelerate that timeframe? Because every year, you know, the faster we get there, the benefits of that technology will accrue to agencies, owners and taxpayers.

VICTORIA:

So, I've talked about how, you know, DOTs are really in the asset management business, but the latest asset for us to manage is data and electronic information. So it started really with moving towards electronic processes, you know, with Every Day Counts initiatives from federal highway like e-construction and trying to go paperless and just taking all of our existing paper processes and converting them into electronic workflows so that we could speed up decision-making.

As part of our transportation asset management plan development, you know, data management, making sure that we're collecting location information, condition information, that we're using that data and analyzing it to drive decision making, to prioritize projects.

You know, there's a lot of nontraditional skills that are necessary to be successful in the transportation space. And now as we look to the future and in full deployment of BIM, we're going to have even more data about the various assets within our right of way that we need to manage. And so, yes, the first challenge is how do you collect all of that data? But equally important is ensuring that we have good data governance and that the data can easily be digested and used by all of the various bureaus and areas of our departments, as well as by the private sector partners who are critical to the delivery of our work. So, you know, in the past when resources have been limited, we've been quick to invest in our physical infrastructure and we haven't always invested in the tools that could help us be more efficient.

And finally, I think it's the 21st century. We've just come through a pandemic. And what has really helped us move forward more aggressively with deployment of technology and the solutions that help us manage more effectively was necessity. And so even when we work with our elected officials and we're talking about budgets and priorities, I think there's much more acceptance of the need to invest in not just the technology and the physical infrastructure, but also to invest in the resources to help us all be more efficient and effective.

Your question about, you know, is the ten-year horizon acceptable horizon? What you're able to do with these technologies is identify potential conflicts, look at all of the different aspects of a project and potentially save significant cost and time by mitigating for those impacts, because you have all of the data and information to make informed decisions. And so, of course, everybody wants to have that data collected and in place today because we recognize what the potential benefits are.

But from a practical perspective, it will take time. We don't have unlimited resources as you indicated, within state DOTs. It can be costly to go out and do data collection. And so being more practical, it is likely that as we do projects, as we upgrade corridors, you'll be building out your understanding of the infrastructure associated with those projects. And then eventually, probably over that ten-year horizon, we'd have that complete picture. So, it's a long path potentially, you know, to cross the finish line. But once we have that, it's transformational in terms of what the next decade and the decade after that will look like and how much more effectively we'll be able to scope and deliver work.

GREG:

Is the ability to recruit and retain the workforce talent with the necessary expertise to oversee and implement these types of technology use, whether it, you know, often contractually delivered from private vendors. And first is that, do you see that as a sort of near-term obstacle to advancing the utilization of these types of technologies?

VICTORIA:

Traditionally, when DOTs don't have capacity internally, what do we do? We outsource. But even as we talk to consultants and vendors in this space, they are equally resource constrained. And so, I think as an industry, we need to do a better job of helping people understand all of the various career paths and opportunities within the transportation sector as a whole. Gone are the days when, you know, we're just hiring civil engineers at State Department of Transportation and maintenance workers to drive trucks.

GREG:

Which is getting more difficult by itself.

VICTORIA:

Yes, you know, definitely we need those people, but we need this much more diverse set of skills. And we need those folks who are pursuing careers in technology and information technology specifically to want to work in the transportation space. The work that we do matters. We impact people's daily lives. You can't get to work. You can't get to school. You can't get to your health care appointment without the transportation system. And yet many people take it for granted. And so, when you think about a State Department of Transportation, I joke all the time. You know, you think of in the case of New Hampshire DOT, it's orange trucks in the winter plowing the roads and it's orange barrels and cones and constructing projects in the summertime.

A lot of individuals don't understand the work that we do. I talk to colleagues who work in the financial industry or work in the IT industry about our exposure as transportation professionals to their fields. You

know, we have to bond and finance our projects to gather all this data and make informed decisions. We're using very sophisticated software these days. And so, we need to attract more young people into the industry, not necessarily work for state DOTs, but certainly to ensure that we have the vendors and the consultants and the contractors who are equipped with the talent and skill sets to support State DOTs and other owners of infrastructure.

GREG:

What warmed my heart in your remarks last night when you spoke of Every Day Counts and what I've always referred to is the everyday counts partnership with the state. And during the years when that program was being developed, a very big focus on engaging the private sector into that process. And you had mentioned the State Transition Innovation Council's, which was really an extension of that. The motivation behind that was to have that dynamic taking place in each and every state. So, engaging the private sector at that level, at a high level to talk about innovation and how to explain these things.

So, do you do you see that occurring? Because, in my observations and some of the commentary I've heard is the industry's ready. The industry is prepared to move ahead into this great digital world but can't do so without the full participation and leadership, really, of the owners who are sort of in charge of specifications and practices. Is that conversation taking place at a high enough level?

VICTORIA:

So, if we as the owners don't move forward quickly enough, the private sector partners are still using this technology. We're just not using it as efficiently and we're paying for them to still use the same tools. But because the data in these models doesn't pass seamlessly from the designer to the owner to the contractor, we're actually incurring additional cost and overhead potentially if we don't come up with solutions that work for all parties.

And so, I do think that we can continue to use that model of the STICs, the State Transportation Innovation Councils, to ensure that as we're preparing and continuing to deploy newer technologies and solutions on a larger scale, all those players are around the table and we can talk about the various challenges that they're facing with respect to implementation.

GREG:

So a good note to close on is to give you a chance to remind people of your three CS.

VICTORIA:

By three CS. Well, first and foremost, it's the collaboration and making sure that everybody is around the table and has not only a seat at the table, but a path to the table. The other great thing about the STIC model is that it's not just the state DOTs. You have a lot of your local partners, municipal and county infrastructure owners are also there. Communication is key.

So, I talked about the need to not just sort of pitch new technologies to the decision-makers on the upstream end. We need to be doing everything we can to educate and communicate the benefits of these different approaches to all of the individuals involved in the various aspects of the lifecycle of transportation infrastructure. And then the last piece is the coordination. We need to make sure that we are all moving forward together. So, it's not just a collaboration and having the people engaged, it's truly coordinating the efforts and making sure that we're aligned. Otherwise, there will be those inefficiencies that I mentioned. We'll be moving forward, but we won't be realizing the benefits as quickly as we could.

GREG:

So, I was going to say that your three CS are really sort of the secret sauce behind innovation, but it isn't really secret sauce. It's hard work and it's making a commitment to do it. One of the things I think the Every Day Counts philosophy was exactly that. It takes work to be innovative, so you've got to make that level of commitment which you clearly have done. And that philosophy is really something that should be shared. So, the communication element of that is what InfraTalk America is all about. So, we're going to continue to try and help communicate. We want to celebrate innovators. We want to celebrate those on the front lines that are making it happen. And that happens at the state level, by and large.

But the leadership of Federal Highway, the Everybody Counts initiative, a good example of that in the specific initiatives that they're leading on technology innovation are really catalytic in many ways. But at the end of the day, it's that state DOT at the local level making those decisions and the people within those agencies. So, congratulations and thank you for the leadership you've provided not only in New Hampshire, but certainly across the country in your national leadership roles.

And now that the means are there, including a 27 and a half billion-dollar bridge investment over the next five years, historic bridge investment. Now is the time to begin to look at how we can leverage that investment more on longer term sustainable approaches to building our structures. And last night I thought your remarks were right on point and thank you very much and I'll offer you any closing thoughts you might want to share.

VICTORIA:

I think it's really terrific that your starting this podcast and trying to highlight the ongoing work of infrastructure owners. As you said, we're going to see significant investment in the nation's infrastructure over the next five years. Telling the story of those successes, and especially highlighting when we are doing things new and differently and are able to, you know, stretch the value of those dollars and have more of an impact. And that's critical to fostering public support, but also reassuring our elected officials that when they choose to step up and fund infrastructure in transportation, we in the industry can and will deliver.

GREG:

A wonderful thought to close on. These are not your father and mother's DOTs.

VICTORIA:

That is correct.

GREG:

Thank you so much, Commissioner, for being here today.

VICTORIA:

Thank you.

Thank you for listening to this episode of the InfraTalk podcast. We hope this discussion inspires you to ask your own questions and encourages you to have discussions with policymakers and your peers. If you want to know more about InfraTalk America, visit us at InfraTalkAmerica.com. Follow us on social media @InfraTalkUSA or subscribe to the podcast on your favorite listening platforms to be notified of all new episodes and features.

And remember, every innovation starts with a conversation. So let's start talking.