Hello, welcome to the InfraTalk Podcast brought to you by Infrastructure Ventures. Come listen in as we talk with policy experts on how we can advance the use of innovative technologies in the infrastructure and transportation industry. Why? Because we know we can do better. So, sit back or walk the dog. Go for a run. Or grab a cup of coffee and join us for this episode of the InfraTalk podcast.

Greg

Hi, I'm Greg Nadeau, publisher of InfraTalk America. Digital Project Delivery is transforming how infrastructure projects are delivered by state and local agencies in America. Recently, I had the pleasure of speaking with Cyndee Hoagland, a senior vice president at Trimble, a global leader and provider of connected construction and technology solutions.

At Trimble, she oversees their owner and public sector division. Listen in as we discuss the role technology plays in streamlining construction projects, addressing workforce challenges, and building more sustainable, resilient infrastructure. This is the InfraTalk America podcast.

Cyndee Hoagland welcome...

Cyndee

Thank you very much.

Greg

…to InfraTalk America. We're so pleased to be having this conversation. I'd like to start by just asking you to begin– to share your role at Trimble and your background and your experience and what got you here.

Cyndee

Sure, happy to do so. So, it has been an amazing journey over the last 17 years, and Trimble is an incredible organization. And I am responsible for the owner and public sector, which means that I look after government agencies, both federal, state and local government, as well as some very large strategic infrastructure owners globally.

Greg

And your background? Start with your education. Is this a field or a role that you've prepared for? Is it one opportunity after the other? Just give us a sense of what got you here.

Cyndee

Sure. So, my background is not in engineering, and yet I work for a very strong engineering technology company today. My journey here has been through sales, and I started at a small startup in Cambridge, Massachusetts, when I was very young, which brought me to a company that Trimble then acquired 17 years ago. And then I began my journey with Trimble from there.

And I'm responsible for helping our customers to leverage technology and use technology in order for them to be more productive. We help them through technology to provide a safer environment for

them to work and allow them to reduce their costs and to streamline the workflows that they have today.

Greg

Give us a sense of the scale of Trimble in this field, just some numbers that we can sort of process.

Cyndee

Yeah, sure. So, when I started with the company 17 years ago, we were 2500 employees, and now we are 11,500 plus. We're a global organization. Half of our revenue is software based today. Although our genesis and where we came from was really from GPS and surveying technology is where we came from.

So, I have been very fortunate in my career here at Trimble, and I've had a few terrific mentors and that includes the former chairman and CEO of Trimble, Steve Berglund. And Steve really allowed me to be curious in the pursuit of innovation. And he built a really strong leadership team around innovation, but around performance as well.

And so, he really has allowed me the opportunity to come in and work with the government sector, the public sector, with a sense of patience, because, as you know, it takes a while to transform government agencies. But once you do, the benefits are tremendous, both for the community that can benefit from the technology that's actually used, but also for us as taxpayers.

And so, I thank Steve for the ability to do what I wanted to do, for the importance of community. And also, our third CEO only, who is our current CEO, Rob Painter, has really taken it to a next level. And so, I'm very excited to work with him.

He's transforming the organization that we have today and leveraging technology like AI, as well as machine learning, and taking the data, the massive amount of information that Trimble is responsible for in the markets we serve and bringing it to industry so that we can make better insights and decisions.

Greg

Can you talk about scale? What Trimble is, really in many ways, a steward of data?

Cyndee

Trimble Technology is used to manage millions of assets. Today, we manage over $1 trillion in capital spend. We also manage over 500 million in projects that are managed through our ERP technology today. On top of that, we manage 144 [million] lane miles in the United States. On top of that, 180 million acres of farmland has been managed through Trimble technology.

Today, over 90% of the top 200 logistics transportation companies in the country leverage Trimble Technology to manage not only the location of those vehicles, but actually the supply chain impact of what's being carried across the United States. Massive amount of information that we're actually managing across this country today.

Greg

All right, that's certainly a sense of scale. So, yeah, you're talking about massive amounts of data. I've heard the term data lake, which I'd like you to explain to me. But lastly, you're talking just the US. You're a global company, so when you're talking about everything you manage, it goes beyond even the numbers you've just described. How do you store, process, and importantly, secure the data that you're responsible for?

Cyndee

That's a great question. So, at the top of the list is Microsoft, who their domain expertise is in the cloud and managing this massive amount of information and storing it and being able to parse the information to deliver what a customer is looking for. And so, if you marry the relationship with Microsoft and their domain expertise in cloud and Trimble's domain expertise in construction, we'll just take the construction industry.

We put together a strategic alliance with Microsoft in April to basically work in partnership to provide for federal, state and local agencies that data lake, that construction cloud that is where all that information could come together and then be served back to those agencies.

Greg

Excellent. Our audience that we like to really focus on is our policy makers. One thing that's always impressed me about Trimble is its history and really much origins in the agricultural sector. And you just talked about the construction sector. Can you talk about that geospatial, agriculture and now civil engineering sector, that sort of growth trajectory?

Cyndee

Sure. So, in the agricultural industry well, let me step back. So, Trimble really sits between the intersection of the physical world and the digital world. And so, the markets that we are serving are truly impacting the way that we work, the way that we move, the way that we build and construct, and the way that we eat. So, the markets that Trimble has specifically been working and transforming is in construction, agriculture and in transportation.

And in all three of those industries, there are massive ecosystems of stakeholders that need access to grain. They need access to bridge data and information. They need access to supply information that's in those 18 wheelers themselves. So, Trimble has the ability, the unique ability to actually be able to manage that data throughout that ecosystem and that lifecycle of where that information needs to go.

If we think about that intersection of the digital and the physical world, Trimble started from location. The location of everything is what's relevant and what's important. The location at the farm, the location of the truck, the location of the bridge. From there, we have been supporting our customers to allow them to take not only the location information, but asset related information relative to that location and then be able to provide more value and insights relative to that asset.

Greg

And if you can give me just sort of an owner's perspective, why is that important to a state DOT, for example?

Cyndee

Yeah, it's a great question. So, our experience in working with state DOTs is that they've been fairly siloed into their own departments. So, you have a department for design, a department for planning, a department for right of way, and a department that's responsible for maintaining that asset. And so, what we've been working on with the DOTs, through the use of technology is that you can start to bring all these separate departments together with a core focus on the data.

The data, starting from how you are designing the bridge to when you've constructed the bridge to now where that bridge is located, the materials that made up that bridge to the partners that developed that bridge and designed that bridge to now handing the asset of that bridge over to a DOT who has to now maintain that bridge for 30 to 50.

Greg

Or one hundred.

Cyndee

And you and I know where the big costs come in are not on the construction side. They're on maintaining that asset long term.

Greg

It's an interesting observation. It's rare in these conversations that I hear maintenance even discussed, and you're right in terms of the life of the asset, it's at least as costly as its initial construction is my guess, if not more. We've worked together for years trying to advance the state of practice of the industry. So, through that experience, what do you see as some of the barriers to adoption of digital project delivery by particularly state DOTs, but other infrastructure agencies as well?

Cyndee

Sure, it's a great question, and it certainly is not the technology, because the technology is here and the technology is readily available. I think one of the big challenges for federal, state and local agencies really is labor and the shortage of labor that we have today and also labor that's aging out. We have individuals that have worked for these government institutions for decades and are now getting ready to retire. So, we not only have a labor shortage, but we also have a lot of talent that actually is leaving these organizations.

On top of that, we have record project volume coming down with BIL (Bipartisan Infrastructure Law) and the infrastructure funding that's coming their way. And so, they have to manage massive amounts of new projects that are coming on board, massive amounts of new work orders to maintain the infrastructure that we have today with less labor.

And that is where technology can really make a difference. Technology can come in and streamline process that was paper based and allow it to be digitized to make it more efficient because you have less workers to do the work in the field. So, let's start to automate using a lot of different technologies that exist today. So that's probably one of the biggest barriers of adoption, is just the labor of the talent pool and helping them to see and to embrace technology as a tool that can help them to do more with less.

Greg

So, workforce is really a central issue to advancing digital. I've asked this question to several of our, particularly our Women in Leadership series, and that question was essentially particularly you in your role, in your experience, is technology potentially a strategy that agencies across the country can use to recruit and retain the sort of the next generation workforce? Which is kind of what I think you're explaining to us.

Cyndee

We always joke construction is cool. So, to be in construction is cool. There's a lot of technology that's being used, augmented reality. We're using a lot of mobile devices. We're doing a lot of machine learning. We have a lot of autonomous capabilities that exist today. And so, we feel that it's one of our responsibilities in the industry to help to educate the younger generation on why construction is cool, why agriculture can be cool.

Why transportation is an innovative and technology intense industry to be a part of. One way that we do that is through Trimble's educational program where we provide technology globally to universities to

help to support what teachers are trying to teach in regard to building information technology and using 3D models to actually design a bridge or design a building.

And so that's a big part of this workforce development for us, is making sure that we're helping these schools along, that we're helping the industry to get the new talent. As excited as I am about the industry that I'm in.

Greg

And add to that the demographics that everyone is dealing with. That without, particularly in the civil engineering discipline, without women and as a source of workforce supply in the future, we simply aren't going to meet the demand. From the standpoint of creating some level of interest with young girls in sort of middle school where it really has to begin. And obviously, as they progress in their education through high school, early college.

Can you just describe Trimble's view on how do you sort of harness that talent? How do you interest them in the kind of business that you're in? It's so integral to future workforce development in public agencies and the private sector. How do we get more women interested in fields like civil engineering and the technology fields that are rampant throughout your company, I'm sure, that support all the work that you do.

Cyndee

That's a great question. And I have a 14-year-old daughter myself, so it is very important to me that I teach her that she can be anything that she wants to be, regardless of the industry. I would credit Rob Painter, our CEO, for the diversity that he's brought into our organization and that he has made that one of his priorities and one of his missions.

If you think about the industries that Trimble serves construction, transportation, agriculture, fairly male dominated industries that we've been in today, and yet I have never felt hindered in the Trimble organization. And I've had tremendous managers and mentors, as I mentioned to you before, that have allowed me to have a seat at the table and a voice on what we're doing for our customers.

As a result of that, you've seen a transformation in the construction industry with women in construction. You're seeing it in engineering. You are seeing women coming into project management and civil engineering roles and responsibilities and really embracing their voice. That is extremely important to the digital transformation that's taking place in our businesses today.

Last point that I'll make is that I have the fortune of being the executive sponsor for Trimble's own Women's Network globally, so that we have a voice not just on what is going on in the workforce, but actually that work life balance. And how do you do it all? And how do you raise the family? How do you manage your career and where you aspire to be? And I believe that you can do it all.

Greg

That was great. And I love the fact that workforce issues are kind of a centerpiece, certainly to you and Tribble, but really the entire industry and the public sector. It's a topic at almost every transportation conference I attend. I think some real aggressive and innovative strategies are going to be needed for both public and private sectors to deal with that workforce issue in the future.

But can you talk about sort of other barriers that you faced or the industry faces going forward and how we can continue to bring that partnership between the private sector and the public sector together to advance and accelerate the use of digital?

Cyndee

So many agencies are hamstrung by antiquated technology, number one. Number two is legacy proprietary data formats and then manual processes. So paper is still a big part of the process within these agencies today. So, what that creates is silos of data and information that is collected at one phase or another but is never shared among the agencies.

So, you have information that's getting collected on a bridge, but that information relative to that bridge is never making its way down the hallway to those that have to maintain and operate that bridge long term. And so, what we have been working on, and this is a significant cost issue for agencies today because they end up replicating and doing the work over and over again.

And in fact, Deloitte Consulting came out with a quote that up to 15% of cost operation overruns are due to the fact that you have this siloed information and you have these departments that are just truly not collaborating in the same way that they should be today. Which is the reason why, now more than ever, delivering reliable and resilient infrastructure is going to require systems and technology and process that allows for that siloed data to then be shared across the lifecycle of that asset.

And so, the increasing demand, think about it, the increasing demand of digital project delivery that's coming down the pike. And also, Enterprise Asset Management and then the shift from proprietary data formats, this legacy side, to really asset centric projects is what's needed to really help the DOTs and other asset owners to actually make better, more informed decisions.

Greg

I think I'd call it a fairly common misconception that let's just say an infrastructure organization needs to have a complete soup to nuts plan. The entire system digitized before they can launch, to put it simply. Can you react to that?

Cyndee

It's an agonizing common misconception that we have to wait until everything is put into place in order for us to digitize. And so, it's a transformation, it's a process. It may take years to do it, but you have to start somewhere and begin that process. Where we've seen the most success is within agencies where they have forward leaning leadership that recognizes that technology exists today. It can improve process, we can streamline, let's go. And so they actually are empowered and they're taking a hold and leveraging technology to get them more efficient in their delivery of projects today.

Greg

There's a massive effort going on across the country. Federally, nationally and in certain states and regions to tackle the issue of standards, open standards. Really a common language that software developers can all speak to. Can you explain the role that those standards can play in the context of what you've just discussed, in the context of these barriers? How important is that?

And you can compare that to what's happening globally in the context of what we need to do. There's one sort of the Federal Highway Administration (FHWA) published a report a year or so ago and it was basically a BIM for infrastructure roadmap. And for our audience, BIM is Building Information

Management Systems and it's kind of the acronym that is used to discuss the broader digital project delivery systems.

And they estimated, based on current state of practice, that it will take ten years to get to where certain countries in Europe are today. So, can you sort of start talking about your reaction to those observations?

Cyndee

I guess yes, we can do it in less than ten years. We can do it now. And to your point, we are doing it in Europe. Europe is probably three years ahead of where we are in terms of adoption of standards, data standards that essentially allow it to be much easier for stakeholders from design organizations, to engineering, to general contractors, to operators of assets, to work more collaboratively together.

It is certainly a barrier here in the United States today in terms of the acceleration and adoption of technology is the fact that we have 50 states and we have to then look at data standards and formats of how 50 DOTs do business today. And so, the ability to streamline and to have more of an aggregate look at what data formats would be most relevant and most important across all those departments within a Department of Transportation is really where we're trying to get to.

And what we've seen in Europe is that they're there and as a result, they are building faster, they're building cheaper, they're building greener and they're building safer because you have more of a collaboration that's taking place. And so, this shift that's taking place here in the US. From proprietary data formats to open standards is starting to gain traction.

And so, I like to look at our friends from California DOT, Caltrans, and what they've been doing at actually bringing vendors like Trimble and others to the table together to make sure that our technologies all can communicate and work together.

Greg

I had an opportunity recently to interview Mark Countz and Aaron Chamberlain, who are two of the leaders at a frontline career level in their responsibilities to really advance digital project delivery at Caltrans, and doing so by breaking they're silo busters. And they accomplish that by engaging with their counterparts in those other offices that you talked about.

So, it's so important to engage your colleagues within your organization. But what Mark Countz said, and I'll give a sneak preview quote before his interview airs. He said once they've gone through the process of competition and procurement and have selected contractors to help them with their project, which they've done and Trimble is one of the companies that is involved in their effort.

They said, we prohibited the term vendor in exchange for partner. And my question was essentially, how important is partnering with the private sector in the context of this digital world? Could you share your observations as to why that's important and the experience you and your company have had in partnering with public agencies as you help them advance their digital objectives?

Cyndee

Yeah, I think Trimble success has been because we are customer centric, and so our success has come working with customers that are looking to innovate. And Caltrans is one of those such customers that

they are driving innovation. And so, Trimble thrives on our customers that are also driving innovation so that we can share.

Tools and technology will get you so far, but it's really partnerships, and it's the people. And you have to have the people within any organization that sees the value of technology and sees where they can use it to get to where they need to go. And so, Caltrans is one of many that is forward leaning in bringing organizations together for a common good of making our infrastructure safer and more resilient for the next generation.

Greg

It must be a little over five years by now, remarkably, but we first met and began to work together in the strategic objective of advancing digital project delivery to the Federal Aid Highway Program. And why that's important is from the standpoint of public infrastructure. Obviously, the Federal Aid Highway program specifically focuses on highways and bridges, but the Federal Transit Administration focuses on transit investment and projects with their grantees.

So, there's a wide array, to say the least, under the transportation sector of a variety of infrastructure needs. But focusing on the Federal Aid Highway program. But five years ago, Infrastructure Ventures and our alliance partner Trimble got together for the purpose of really advancing strategies to achieve state of practice as quickly as possible.

And I love to quote Trimble's current CEO Rob Painter, who has at least said to me, and I think he said it more than once publicly, that the rising tide will lift all boats. And the philosophy was, let's work together to advance the state of practice of the technology, and everybody can. As Rob says, he's happy to go compete in the marketplace.

That presented an opportunity. And there is something in the Bipartisan Infrastructure Law (BIL) included a program specifically designed to help state DOTs and local agencies apply for funding to assist them in utilizing digital project delivery technology on a project. One of the most persuasive ways of creating a comfort level with technology is literally to utilize it. It turned out to be a three year effort, and owing really to the enthusiasm of a number of members of Congress and their staffs.

The process was really one of outreach and awareness building, and I was pleased to have the opportunity to sort of serve as a subject matter expert just from the standpoint of the impact that technology could have on a very traditional approach to project delivery. The Bipartisan Infrastructure Bill (BIL) included a program that Trimble was significantly involved in driving, frankly, and I was there and I know that for a fact because the effort was herculean.

It involved briefing a number of congressional offices from the actual members, in some cases to staff people who were in the process of really learning about the impact that these technologies could have on the delivery of the Federal Aid Highway program. And the program, as it was finally adopted in the Infrastructure Bill, committed $100 million of funding over five years, about $20 million a year, for the purpose of providing that assistance and that incentive for public infrastructure agencies that are involved in delivering the Federal Aid Highway program to utilize.

The actual demonstration of these technologies and projects is, in my opinion, the absolute most effective way to really get the point across. And a lot of state DOTs have advanced those types of pilot projects already, and many more will, we hope, with the availability of this funding. Can you just sort of share your observations about the potential for that program to impact what the industry is seeking?

Cyndee

Yeah, great question, and we're very proud of this accomplishment. As you know, it's been years in the making and we're most proud because of the positive impact that it's going to have on DOTs and other agencies so that they can better design, build and operate aging infrastructure that we have in this country today.

The funds that they will be able to compete for allow them to start to adopt proven technology that's used in the market today so that they can be more efficient. So that they can construct safer. So that we can have more resilient sustainable infrastructure across this country today. And it's not just for the DOTs, but us as taxpayers, because we benefit if they can actually design and construct new bridges faster than what we have today and replace the aging infrastructure that we have that benefits everyone in the community.

It also, from an equity perspective, allows us to improve upon equity, which is so critical in this country, by providing the right infrastructure to bring communities together faster. And so the whole purpose of this was to help agencies to move faster because the technology does exist today. On top of that, we also are very excited for the industry as a whole because everyone benefits from this, not just Trimble, but everyone in the industry will benefit from this because it allows us to innovate. It allows us to do even more. It allows us to leverage machine learning and AI with all the massive amount of data that's being created in this country and to help agencies do more and provide more insight into that information.

And you are correct. Much of what we've done over the many years has been in raising awareness for policymakers so that they've recognized and they understood that the technology is here. We don't need to wait. We need to move. We have a generational opportunity of funding in front of us and we need to move faster. And so, the whole point of the grant program was to help everybody move more quickly so that you and I could benefit along with our kids on this new infrastructure.

Greg

Asset Lifecycle Management is a term that I hear a lot from Trimble in the context of this digital project delivery context we've been talking about. Can you explain Asset Lifecycle Management, what it means to Trimble and what you'd like our audience to understand about it?

Cyndee

So, Trimble's domain expertise has always been in capturing and processing data and information, both in the field as well as in the office. Coupling that with geospatial, location-based information, add in capital improvement, planning, funding information and then finally asset management and maintenance data. You bring all of that information together and you can create a living digital twin of that bridge or of that building.

That living digital twin then moves from design hand over to construction hand over to asset management and operations and maintenance so that you can better maintain and you have all that information relative to that bridge. That is where DOTs are going from an Asset Lifecycle Management approach. So, a DOT would approach a project, a single project. Now they're moving towards and shifting towards asset Lifecycle Management, which is everything that encompasses that asset.

Why? Because 80% of the cost in what we actually spend our taxpayer dollars on is maintaining that bridge. And so having an Asset Lifecycle Management approach to that asset is really where Trimble's platform, called ALM is allowing for that data and that information to flow from design to construct, to operate through a living model. And that is where Europe already is today. And that is where we are helping to bring the United States.

Greg

Cyndee Hoagland, thank you so much for taking the time to participate in this interview. What you're involved with, what Trimble's involved with, what we're all involved with across the spectrum is really doing all we can to accelerate the advancement of these technologies. From the standpoint of time it takes to deliver a project, costs of delivering projects, the evidence is clear.

One statistic that jumps out at me every time I have this conversation is the actual experience in Europe is upwards of a 90% to 95% reduction in change orders. And for those of our viewers who are not involved in the business or in the construction sector, that is critically important from the standpoint of the time it takes to deliver a project and the cost.

If you build a retaining wall, someplace where a utility pipe is actually supposed to be, and you go ahead and build that wall, then that's what they call rework. You've got to destroy what you built, rebuild it in the right place, and that adds tremendous time and cost, 90% to 95% reduction in change. That alone, that statistic alone, is the compelling reason why agencies that are responsible for constructing infrastructure need to accelerate the pace of getting to where we've got to get to.

Cyndee

And I think to that point, observation, 50% of that rework can be reduced using technology. We know that today because it's happening today. And so, it is not just about the technology, but it is about getting leadership. And those to actually know that the capabilities exist today. They have to change some of their process, but for the better.

And part of our mission at Trimble is to help, to design and to construct and to operate our infrastructure better, faster, safer and cheaper and more sustainable than ever before. And I want to thank you for your leadership, because this doesn't happen without industry getting involved and actually championing the way and paving the way to get individuals to think a little differently and to be a little more bold. And so you sit at the forefront of that, and I just appreciate all that you've done.

Greg

Thank you so much for saying that. And thank you for taking the time to have this conversation. It's an important conversation. It'll be going on for quite some time. But as you said, we don't have to build the entire house. We can build a foundation, then we can frame a building on top of that, and we can populate that building with lots of digital tools.

Cyndee

That's right.

Greg

The process has to begin somewhere. And so, I thought that was, in this conversation, the best advice. Let's begin.

Cyndee

Yes.

Greg

So, thank you again for taking the time and keep up the good work.

Cyndee

Thank you.

Greg

Thanks.

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 InfraTalk Podcast on your favorite listening platform to be notified of all new episodes and features. And remember, every innovation starts with a conversation. So, let's start talking.