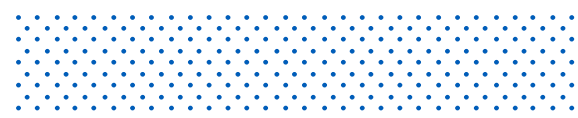




Empowering Utility Undergrounding Initiatives through VISTAR



CAPTECH TRENDS PODCAST | EPISODE 36



Vinnie

Hello everyone and welcome back to CapTech Trends. We have what I believe is going to be a very interesting conversation today. It concerns both augmented reality as well as a process called Undergrounding that energy utilities take on and the combination of the two. With me, I have Les Carter, who is a strategic advisor for Grid Resiliency at Dominion Energy, and Cristen English. She's a senior manager at CapTech and the account executive on that project. Welcome.

Les

Thank you. Good to be here.

Vinnie

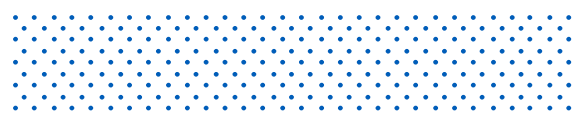
So in introducing you, Les and I kicked this off. I'm putting in air quotes for those not watching. I've heard the phrase Godfather of Undergrounding. So I guess to get us started, when did this first become a thing in your world? What were the early steps? What was the motivation, challenges, et cetera?

Les

Scary title. Yeah, I can actually take us back to 2011 and 2012. Those us who were in Richmond at the time, or were in Virginia at the time, remember two fairly big storms that we had, both summertime storms. One was Hurricane Irene, the other was a storm called the derecho. And in each of those storms we lost roughly a million customers. They had outages, and that's a nine-ish, 10 day-ish restoration process. So at the end of the restoration process of the 2012 storm, we were sitting around in the storm center talking about if we had to build the system again, how we'll rebuild it. And we would build it basically with mainline overhead and all the taps will be underground. That's where most of the outages take place. And a lot of it is tree related, especially in storms. So in late 2012, I was given the task to spend a year studying it, which I did for the year of 2013. Got to the end of the year, worked with a team of experienced people at Dominion, and we came up with a program. And in 2014 we started, we actually went to the General assembly and got some legislation passed that allowed us to get return on the program. And in July of 2014, we actually started our first project. So it's been going for... Really, I've been working on it for over 10 years.

Vinnie

So it seems like a huge undertaking. It sounds expensive because what you're doing essentially is taking above ground power lines and bearing them, which is going to involve people's property, et cetera. Obvious to me that this reduces outages, but given the cost, is there ROI as well because you have less people out there repairing?



Les

Absolutely, yes. The aim of the program is really to reduce the number of outages, which reduces the number of truck rolls. And there's a couple of different ways of looking at it. You can look at it from a local perspective. Obviously people who have their lines put underground are much less likely to see a power outage. But also the advantage does accrue to the wider system wide customers as well because we can redirect the resources that we have and get those people back on quickly. We've looked at this mathematically, statistically, and it would be possible if we had finished the 4,000 miles plus or minus that we're hoping to do that we could cut the time of restoration up to 50%. So yeah. So it is a big deal.

Vinnie

Great. Cristen, so how did our team approach Dominion with a solution involving augmented reality?

Cristen

Well, I think what we learned when we started engaging with the undergrounding program was that customer buy-in and customer belief in the solution was number one thing. So creating a way to show what this would look like on your property, you mentioned that it would impact people to underground their wires. So we created an application, an AR application that would show and allow people to see what devices would then be placed on their property if their lines were to go underground. That helps customers get in onboard with the success of the program of undergrounding.

Vinnie

Not everyone is going to have equipment on their lawn, right? So-

Cristen

That's correct.

Vinnie

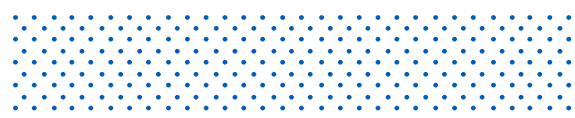
... a lot of them are just going to have cutting in the ground and bearing. So is this for them or is this for as well? Or is this just for people who are going to have physical assets on their property?

Cristen

It's going to show a lot of the assets, but it can also, as we've evolved it, have been able to address new needs with undergrounding, like digging or other aspects of the program.

Vinnie

Gotcha. And for those listening, if you're not familiar with this type of augmented reality as opposed to just having a flat picture that shows a piece of hardware, you're looking through the iPad to see



the device in space and you can walk away from it, you can walk around it.

Cristen

You can look out your kitchen window and see what it looks like in your backyard-

Vinnie

From a distance.

Cristen

It's very accurate. It's a storytelling of what will happen on your property.

Vinnie

Is there any way to put things around it like virtual plants or shrubbery or things like that, see how things could look in the future?

Cristen

Yes, that's definitely some of the add-ons that we've done over the course of the years to show how it would look in a real environment, including next to shrubbery and things of that nature.

Vinnie

Gotcha. So Les, when this idea came to you, were you originally interested, skeptical? Did you have to see it first or what was your thinking earlier?

Les

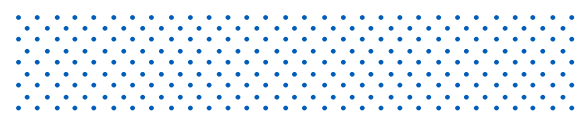
I was pretty excited actually. We had worked with CapTech prior on creating an app that we use. Basically it's a database app called SUMS that we use in our program. So I was familiar with CapTech, we had help from them. And we had seen the struggles and we had heard suggestions from certain people that there ought to be a way that we can show this. So when people from CapTech came and said, "Hey, I think we have a solution," I was actually pretty excited. There was no skepticism whatsoever when I saw it first, it was... Yeah, it's a game-changer. It's pretty mind-blowing to me. The ability to be able to drop a transformer in the middle of my office and then walk out of the office and take a look at it from-

Vinnie

Through the window.

Les

Through the window 15 feet away, and to have it scale in that manner was really, really good. That the kitchen window thing is just great. And this is something that our customers really, really appreciate. Their ability to become more engaged in the design process in citing a transformer. An underground transformer is a fairly large piece of equipment. And so you have to be able to use some sensitivity when talking to people about it. And we started off really with just having... I think



the very first iteration was a transformer and a shrub, and that was it. But we now have a lot more of our equipment on the app now. And one of the things, one of the upgrades that we did, which was really useful was the adapters that we have to use in order to be able to convert an overhead feed to a meter base into an underground feed. The wire still has to go in the top of the meter base, but it comes up from underneath. And so we've had adapters made that allow us to do that safely protecting the property owner from the electric current. But we now have the ability to show them customers what that would look like on their house too because there was some skepticism. So when we first started off, it really was only the customers who had to see the transformer in their property, which is probably one in seven or one in eight of the customers. But now pretty much every customer, especially those who are having some work done on the outside of their house, are interested in seeing something from the AR app.

Vinnie

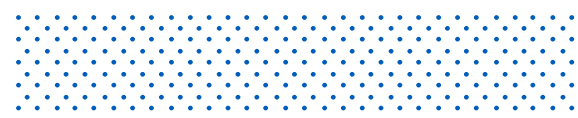
Now, I remember I was an early adopter of both AR and VR and with AR specifically when it first launched on Apple devices, there's a little bit of a learning curve in using it, it took a while for the first plane to be recognized. Now with LIDAR and other technologies built into the devices, it's much, much easier for a non, you know, engineer type person to just pick it up and use it, not even really appreciate the technology behind it. But you have employees who are in the field and they're outside and they're dealing with customers. What was the, I guess, the impression of the people using this day to day in the field? Was it intuitive to use? Was there a learning curve? Walk me through that.

Les

Well, if there was any learning curve, I mean, I would be probably the poster child for having a slow learning curve for something like this. And I found it very intuitive. People I talk to who actually use this on a day-to-day basis love it. And I don't think there was any real issue. And in fact, probably if there was any skepticism, it might have been on the side of our select senior management who weren't really... I don't think they really necessarily bought into it straight away. And then also on the customer side as well, until they actually see you do it, there's always a little bit of reluctance. They're wondering, are you trying to pull the wall over my eyes? And our ability to be able to cite something, take a snapshot and say, "Hey, this is what it's going to look like." And then months or sometimes even years down the road actually say, "Hey, this is what we said it was going to look like. This is what it looks like now." And for it to be an almost perfect match, it's a very, very powerful customer relations tool.

Vinnie

There's some interesting psychology here. There's a technology that I was aware of, gosh, I guess seven or eight years ago where let's say you're in a big box home improvement store. We'll call this



one A, right? And you go in and you pick up a hammer and it's more expensive than you thought it was going to be. It's \$23 or something. Like, gosh, that seems weird. Maybe I'll get into the car and drive over to the other big box store. We'll call that B because it's got to be cheaper than this. You get over there, it's actually a dollar more. You don't drive back to the first store, you just buy it.

So this technology was when in a store and it would integrate with the store's app. Go ahead and show the competitor's prices in town local, even if they're cheaper, because a lot of times you would say, "It's not worth the dollar I'm going to save. I'll buy it here." So it's the unknown that forced the negative behavior, not the known. So in this case, I see it in the same way where someone might not know how something's going to affect their property and they don't want to be sold on the idea because that's your job to be convincing. But to see it takes all that doubt away. So I think that's similar psychology there.

Les

And of course, I probably should say that sometimes taking their doubt away means that people say, "No, I actually don't want it on my property." That has happened. But I would say that's probably in the minority. I think most people are more comfortable knowing that it's not as big of an issue. If you stand right next to pad mount transformer, it seems like a fairly large chunk of machinery. But once you pull away from it by 50 yards or so and it's dark green and you can hide it with shrubs, yeah, it's probably not as big of an issue.

Vinnie

Gotcha. So Cristen, why don't you help me understand how we went from a point solution with a partner client of ours to something that's a product now?

Cristen

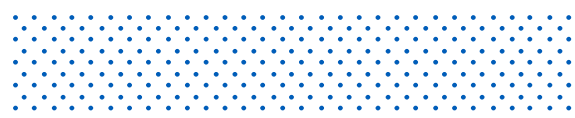
So I mean, that work that we were doing in that partnership definitely is how VISTAR was born. And in addition to being able to show the technology to the customer, we were also learning on our partner side, on our client side that there was a little bit of a gap in wanting to host the technology or wanting to keep it up to date or being able to have the maintenance and the bandwidth to keep it fresh and giving the latest greatest for the client. So VISTAR is a multi-tenant SaaS product that CapTech created to solve all of that. So we're able to still have a product, but then CapTech hosts it and we provide the updates to make sure that the client is getting the latest and greatest for the customers.

Vinnie

So what that means for an end user is as long as they have... Is it Android and iOS or just iOS?

Cristen

Yeah, it's both.



Vinnie

As long as they have tablet, phone or whatever that supports augmented reality technology, they download this from an app store?

Cristen

They can download it and immediately start using it. Yes.

Vinnie

Great. So it takes all the maintenance away. And I guess to be clear, I'm thinking about this in buckets. One piece of the technology is the mobile interface, which will improve over time, like any software as a service multi-tenant software solution. But also an inventory of hardware assets because they're going to have more of these things come up and new designs. So how does VISTAR ensure that for the different energy utility companies out there that you have the right super set of images captured? And how do you keep those up to date?

Cristen

I mean, that's just growth in learning what's happening in the industry and breaking into new technologies. We have a lot of energy clients that we partner with. Everybody has a goal of going to net-zero carbon emission by 2050. So using a tool like VISTAR, you can expand to solar programs, which people will want to see how solar is on their house. So we partner with solar teams now. As EV programs evolve electric vehicle, people want to see battery and how is that going to look in my garage? How is that going to impact my yard?

Vinnie

Right? And I was trying to-

Cristen

Trying to get to how do we make sure that they have the right images in their library?

Vinnie

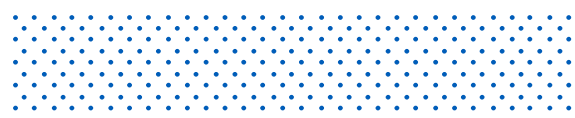
No, I think it's a long term maintenance. If you look at the images that are in the application now, those won't be the same images 15 years from now.

Cristen

It's up to date releases and staying on top of the product and technology and needs of our clients. And then instead of having to do individual maintenance and do a new bandaid and build on top of a existing solution, it's just being updated. You have any other SaaS product that you have a subscription to.

Vinnie

Great. And for this conversation, I was trying to keep it in the energy utility space. So I'll get out of it a



little bit and then try to come right back in. And that is at the heart of this application, it's just allowing you to see large, expensive, impactful pieces of equipment in physical space before making a decision. So I can think of manufacturing and transportation and all sorts of other ways to do that, but then pull it back into this conversation.

Cristen

I mean, we've talked to forestry, we've talked to planned communities that want to have streetlights, and just being able to see all of that in a way that how it would impact people.

Vinnie

Streetlights would be great. You could actually walk down the street and see them. Yeah.

Cristen

You can see how the light would hit your lawn.

Vinnie

Right. You could see how big the spread was.

Cristen

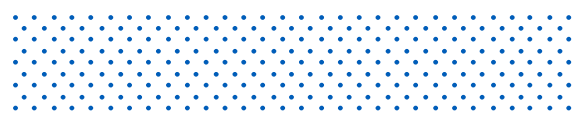
Yeah.

Vinnie

Yeah. That is really interesting. So I'll put that back to you, Les. Now that you've been in this, do you see other use cases for this technology, whether it's solar or battery or whatever in your world?

Les

Well, I think so. I think both of those things are pretty important now. A solar panel array is a pretty big thing. You've got to get a long way away from it. I think before the AR kicks in. But I've looked at it a little broader. I know that in our training at Dominion, we have started to use a lot of AR in order to be able to help the knowledge transfer. One of the things that the utility business in particular, and I think other organizations and industries as well are seeing a graying of their workforce and an inability necessary to attract as many young people to their industry as they would like. Knowledge transfer is a hugely important thing. And one of the ways that we're looking at trying to use AR is having people have visuals, visual comparisons, the ability to be able to see what we call see the invisible, which is their underground facilities and infrastructure. Well can AR help us understand where they are? And as our workforce retires, that knowledge base, which is not necessarily always captured in manuals and instructions and so on and so forth, is critical really to the safe and reliable operation of a utility system that's not going away anytime soon. It's not going to go away ever probably really. And so having that ability to do the knowledge transfer and use AR is I think really, really key.



Vinnie

Do you feel like your team and your organization, both in the original underground efforts you did, and now with this technology, how are you affecting other energy utility companies across the country? Are they seeing what you're doing? Are they talking to you about it? Are they-

Les

Oh, absolutely.

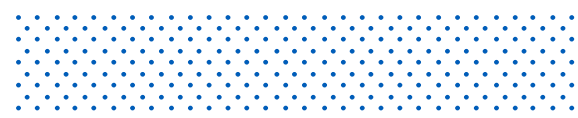
Vinnie

... following your footsteps. Yeah.

Les

Absolutely. All of the above. We are certainly pioneering as far as this kind of a program is concerned. I mean, we've been doing it longer than anybody else, and I think we've probably converted more miles than anybody else at this point. Obviously there are certain utilities out there who have very grandiose plans of putting way more miles underground than we will, but they're really just getting started. I think probably in our first two or three years, we met with pretty much all of the investor owned utilities up and down the East Coast. Once they realized what we were doing, they basically got in contact with us and we know we sat down with a lot of them. There's a North Carolina utility that we wrote the playbook for them, and they've certainly done some of their work. Utilities in Florida, utilities up in Maryland. The Pepco in DC is doing a program as well. And each of these programs has its own little idiosyncrasies. They're not all exactly the same as ours, but there are two or three key things that we always get asked the question about. First of all, how did you go about this from a regulatory perspective? That's key right there, because you're not going to necessarily do these kinds of programs if you can't actually get paid for them. So that was something that we figured out fairly early on. But also, and I think this reiterates some of the things that has been said earlier about customers is that if you don't have the customers on board when you're trying to do these kind of a program, then it's almost impossible to see it through. Even if you have support from the regulatory authorities and you have support from your internal resources at your company. If the customers are not on board, then you've got a real problem. And we're not successful with every customer that we approach by a long way. In the last few years, we've done conversions on way more properties than we ever would've done in the past. One of the things that we do is we don't trench, we do something called directional boring. And so there's really very little disruption on a customer's property. We have to dig a few little handholds and some handholds and stuff like that, but nothing really approaching what you would normally see with a ditch witch trencher. And that has helped. That was a decision we made very early on in light of the fact that we realized that customer sentiment was going to be very, very important to the success of this program.

Vinnie



Yeah. Not to get too much in the weeds, but I love the problem solving of this. If you need equipment every seven or eight homes and you're getting a hard no, is it just as easy as to say, okay, well make sure the house before or after that house says yes. Is there a range or do you actually have someone that's going to shut down something that's going to happen on the tree because you get a single no?

Les

There is a range. Yes. If you get a hard no on equipment in a property, then you will go next door either way and-

Vinnie

Put it right on the property line.

Les

Yeah. Well, we have sometimes been able to negotiate with people and say, "Okay, we'd like to put it here." And that's usually not the bigger problem. The bigger problem is just people who are not interested in giving you an easement full stop. And we have a couple of different approaches there. Sometimes we might bump out from their property and sometimes you can go into an existing right of way, a public right of way, for instance, or you might find an adjoining property owner who's happy to have you go in there. But there are plenty of program projects that we've done where we've had just had to say, "Sorry, walk away from it." Because a key property owner will not give you an easement. And that's that again, we don't have any problem walking away from it because we have plenty of other projects that where we have very willing property owners who we want to work with and we want to do the project with them.

Vinnie

You just put a Zillow alert out there so when that property sells, go back, start over again. So we talked before about the return on investment of Undergrounding and obviously the benefit to the service. I imagine it's harder to quantify the impact that AR has had because you're doing more than one thing at a time.

Les

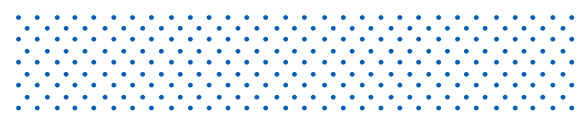
Correct. Yeah.

Vinnie

So how do you internally justify the additional expense or use of this technology?

Les

From a qualitative perspective, if you talk to either customers who've experienced it or more appropriately talk to the people that work with us who actually go out and secure these easements. And again, they describe it as it's irreplaceable, it's a game changer. Especially the people who



remember how they used to have to work in the first few years of the program where they weren't given this tool to use. They really tell us how important it is and how engaged customers become. I mean, lots of customers are very impressed. They've never seen AR before. And so for them, just the fact that they can hold the iPad, place something and then walk back from it, that's a really big deal for people.

Vinnie

It's a magical experience the first time you did it.

Les

It is a very magical experience for them.

Vinnie

Well, that changes how they perceive your entire organization.

Les

Yes. It really does, because Dominion probably had, and I think still has a reputation sometimes of being standoffish and basically, "Hey, we're a big dog in town and you have to do what we want to do." This is a voluntary program for our customers. As I said, lots of them say we're not interested and we don't have domain. We would never use that in this a program. But having the transparency that this brings, and we are trying to be forthright with people, we're trying to say, "Hey, this is what it's going to look like." We're trying to be upfront with them. And I think a lot of customers really appreciate that. They appreciate the face-to-face.

Vinnie

There's authenticity there for sure.

Les

Authenticity is a really big word there that we use, yeah.

Vinnie

So there's that and then there's also just being cutting-edge, right? So you're being... Right. So they're going to see that aspect as well.

Les

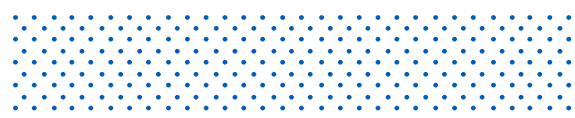
Right. Exactly. Yeah.

Vinnie

So Cristen, you've been talking to a lot of other potential clients, going to conferences and such.

Cristen

Yes.



Vinnie

What's the feedback you're getting? Are people excited to try it? Is there some skepticism? What's the general sense when people see this and play with it for the first time?

Cristen

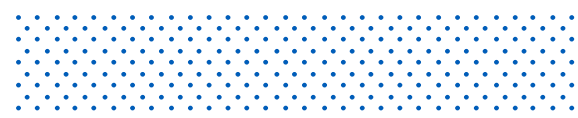
I mean, it's excitement and it really is taking what is talked about and known to happen on a property and then just be able to see it in reality and walk around and do the measurement. And just to your point, Les, it's just taking something that everybody thinks of is just a green box, but actually giving it a little bit of life and how it would impact your property and how it actually would maybe not impact your property. So clients, other utilities are very excited to see it become a little bit of a game changer as far as talking about undergrounding projects moving forward. It does give that customer edge. And then being able to support the client on the backend from CapTech's perspective of hosting it and keeping it fresh and up to date so you don't have to worry about it. You're just using it in the field and moving your projects forward is also a big excitement factor of it.

Vinnie

Gotcha. I'm going to shift gears a little bit Les, and I don't know to what extent this has had an impact internally, but in other clients that I've had, when you bring in something new like this, it can change the way the organization views other problems or they're looking at or other opportunities you're looking at. Has VISTAR had that impact internally where either you're changing your perception of how to use these technologies, more acceptance to it, less doubt? Or is this just you guys already on that path and this is yet another tool that you're adding to that arsenal?

Les

Well, I think that it's a bit of both of those things actually. I mean, I'll deal with the second thing first. I mean, our program was always seen as being innovative because we had to be innovative organizationally, regulatorily, legislatively, operationally with customers. We just had to think differently because it was a program that really was just born out of necessity, but there was no blueprint for it at all. And that's why I spent a year trying to figure out how to actually do it. So people were not surprised when we came up with something that was pretty darn whizzbang and innovative and hadn't been seen in Dominion before. But moving on from that, in 2018, this app won the chairman's innovation award, and that I think was the catalyst behind a lot of changes that we see from a technological perspective in Dominion now. I mean, I can remember when the cloud was almost like the C word in Dominion, and we're not going to talk about that. We're not going to use it. Well, that's changed enormously since that point in time. And I've seen our use of, certainly from the mapping technology from Esri and from our GIS, the strides that we've made there have been enormous in the last five years. And again, you can't necessarily pinpoint it to VISTAR or any one thing, but shifting cultures is very difficult. I mean, there's the saying, culture eat strategy for



breakfast, right. Derecho I think. And so making that shift and having these particular apps and the ability to use them from a customer-facing perspective changes the way that we see our relationships with our customers and our relationships internally with our workforce as well. We've just gone through a fairly large change in the way that customers will interact with Dominion through mobile, through social media, through their customer account. And I think that some of the things that we've done in terms of partnering with customers as opposed to saying, "Well, the customers are over there on that side of the fence and we're over here." It's, "Let's break the fence down, and let's just make sure that we both realize that, hey, reasonable electricity rates and reliable electricity are something that we all want." And so how do we work in partnership to me to be able to get those things?

Vinnie

I like that because it's not about the technology, it's about the relationships you're building through the technology.

Les

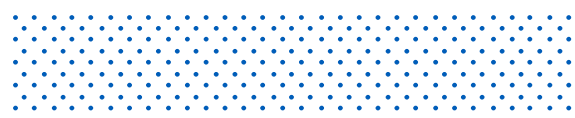
Correct. Yeah.

Vinnie

And back when mobile was first taking off, I would've clients come to me and say, "We need an iPhone app." I'm like, okay, that's not what you need. That's a solution to something you may need. What are you trying to do? Are you trying to have a more efficient eCommerce? Are you trying to have a better in-store experience? Are you trying to increase brand awareness? And then we can solve that partially with a iPhone app and probably seven other things too, right? And so I see this as a similar way of breaking those barriers down, having more direct authentic relationships with your clients. This is just one tool in a much larger toolbox. And to an earlier point, that's why it's hard to take any one of those tools and say, how impactful was my screwdriver versus my wrench versus my whatever. You know the tools are working together. Okay. So I just want to finish with one thing. This is for both of you. So if someone's listening to this, they're getting excited, what's your advice for them to get started? Who should they be talking to internally from an organizational structure standpoint? Should they just start down... Can anyone just download it and start playing and walk it into their boss's office? What would your advice be to get started? Either of you?

Cristen

For me. Okay. If you want to get started learning more about VISTAR, we have an opportunity to see it in action a little bit in our website on CapTechconsulting.com. But we also are going to be releasing some pilot programs and working with our clients to be able to test it for about a 30 to 45 day window so that you can actually experience technology, see how it is a game changer for your teams-



Vinnie

Try before you buy.

Cristen

Try it before you buy it. Yes. So we are definitely going to work with folks to ensure that it meets their needs and helps their customers.

Vinnie

Les, any advice?

Les

If you're a utility and you're thinking about either doing an Undergrounding program or even using something like this in your training, obviously you can get in contact with us at Dominion since we are doing this stuff. But internally you need to talk to the people in your IT organization who understand your infrastructure and what platforms you use, those kinds of things. I mentioned the GIS side of our business, and again, our GIS has grown enormously in the last few years, and our ability to view our infrastructure and our equipment is really key. And these kind of apps, I think augment that wonderfully, don't mean to pun there, but they really help in being able to visualize what we have out there. And again, it's always good to talk to people who've tried their path before. And as I say, we've spoken to so many different utilities over the past about an Undergrounding program, more than happy to have them look at what we've used AR for. And again, it doesn't necessarily have to be a utility business, I mean there are probably other industries out there that I think also could benefit from having the ability to site and visualize improvements that they want to make.

Vinnie

Sure. Great. Well, this has been very interesting for me, so thank you both for joining us. Les, thanks for coming in as an external guest. It's always great when we can have that. I appreciate your time.

Les

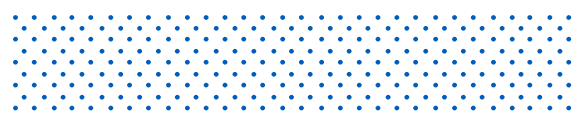
Thank you. Yeah.

Vinnie

And if anyone's interested in the product, they can reach out to Cristen or the process. They can reach out to Les and all the information will be on the website. Thanks everyone.

Les

Okay. Thanks. Bye.



The entire contents in designing this podcast are the property of CapTech or used by CapTech with permission and are protected under U.S. and International copyright and trademark laws. Users of this podcast may save and use information contained in it only for personal or other non-commercial educational purposes. No other uses of this podcast may be made without CapTech's prior written permission. CapTech makes no warranty, guarantee, or representation as to the accuracy or sufficiency of the information featured in this podcast. The information opinions and recommendations presented in it are for general information only. And any reliance on the information provided in it is done at your own risk. CapTech. makes no warranty that this podcast or the server that makes it available is free of viruses, worms, or other elements or codes that manifest contaminating or destructive properties. CapTech expressly disclaims any and all liability or responsibility for any direct, indirect, incidental, or any other damages arising out of any use of, or reference to, reliance on, or inability to use this podcast or the information presented in it.