

Nina Wollman: One of the things that Jacobs is doing is using edge computing and AI. So instead of having that workforce go out daily and touch equipment and walk the field, walk a mechanical room, or walk any particular asset, now, you've got the sensors out there that are doing literally the leg work, and you're just sitting in a control room, monitoring it. And you've got technologists that understand those algorithms, understand the performance, and understand the implementation of AI, so that information is coming quicker.

Stephen Ludwig: Welcome to Inflection Points, a podcast series from Jacobs. I'm your host, Stephen Ludwig. That was the voice of Nina Wollman, Vice President Global Director of Strategic Consulting. We sat down with her and Vice President Global Operations Management and Facility Services, Steve Meininger about asset management. It was a fascinating discussion of how businesses and municipalities use asset management as a strategic part of their operations to control costs, increase efficiencies, and mitigate risk.

Inflection Points is where we meet the people at Jacobs that help create solutions that deliver a more connected, sustainable world. Just a quick note, we recorded today's episode at a conference, so you may hear some background noise. With that out of the way, it's on with the podcast.

What's your background, Nina?

Nina Wollman: How far back do you want to go background? When I was a child?

Stephen Ludwig: Sure. No, like professional. Are you an engineer by training?

Nina Wollman: No. Actually, I'm an environmental scientist.

Stephen Ludwig: Okay. How'd you become an environmental scientist?

Nina Wollman: School.

Stephen Ludwig: But is there a passion there?

Nina Wollman: Yes. It came from the love of science. It started with loving data and turning into information for decision making, and showing patterns, or finding patterns. I just love that deep dive analytics. But if Steve's in the same position I am, we don't have much time for that anymore these days. So no, now it's just about the people. I love the people, I love the business, I love thinking through the big picture and coming up with new ways to do the same things.

Stephen Ludwig: Great. Steve-

Nina Wollman: Doing different.

- Stephen Ludwig: Yeah. How about you? How'd you get into your line ... You're trained as an engineer, right?
- Steve Meininger: Yep. Civil engineer and environmental engineer. I like to be able to see the output or outcome of what I was doing. That's why I started in civil engineering. And then being able to ultimately get into water treatment and wastewater treatment was where I started my career.
- Stephen Ludwig: That's a strange thing to be excited about, wastewater treatment. Don't you think?
- Steve Meininger: Well, when you actually see what it starts as, and see what it comes out the other end as, it's pretty incredible. In fact, in a lot of cases, the water coming out at the end of a wastewater treatment plant is cleaner than the water going into a water treatment plant, drinking water treatment plant. So it's pretty incredible what's accomplished through those processes.
- Stephen Ludwig: Nice. Now, we're talking a little bit about asset management today. Nina, can you explain what asset management is?
- Nina Wollman: Whenever someone asks this, I try to make it as familiar to someone as possible. So I start with a very basic concept. If you were to Google asset management, you find that nothing but financial firms come up. But it's the same concept with a built environment. When a financial investor is trying to take whatever investment portfolio you have and give you a return on investment, for as small as possible investment, we want to do the same thing with the built environment.
- Stephen Ludwig: So for people that don't know what a built environment is, what are you referring to?
- Nina Wollman: Buildings, roads, bridges, utility, infrastructure, little bit of everything. It can be fences. It can be signage as well. But we're helping our clients understand what they own, how to take care of it, so they get a return on investment or reduce their total cost of ownership.
- Stephen Ludwig: So basically, you help me, if I own something, you help me get a longer run cycle so I have that thing for longer?
- Nina Wollman: Yeah. Extend useful life.
- Stephen Ludwig: Okay, great. Does that mean the same thing to you, Steve? Are you on the same page or do you want to tell Nina that she doesn't know what she's talking about?
- Steve Meininger: Yeah, no. I'm completely aligned with Nina. One of the things that we find some people struggle with, is they think about asset management as a thing or a

program that they can just implement and track maintenance activities, where I view asset management more as a process, a process to be able to make the best decisions about how to extend the life of assets.

Stephen Ludwig: Okay. So walk me through that. So let's say I own a building, and I've engaged you. What are you going to help me look at from that process point of view?

Steve Meininger: Yeah. So instead of just working on scheduling maintenance activities for the building, we would do a condition assessment to assess what's the current condition of the assets, and then we would look at the consequence of failure of the different assets. And we can use the combination of those two to rank the importance of the asset, and then that factors into decisions around do you repair? Do you replace? How do you extend the life? And there might be certain assets that you run to failure. It may not make sense to invest a lot in [crosstalk].

Stephen Ludwig: Not the elevators, we hope.

Steve Meininger: Not the elevators.

Stephen Ludwig: Okay. Yeah, yeah.

Steve Meininger: But then-

Stephen Ludwig: We hope not knows. Yeah.

Steve Meininger: But then there's assets that you're going to want to maintain more frequently than others because they're so critically important, like elevators is an example.

Stephen Ludwig: What are some trends either one of you are seeing right now with your clients around asset management?

Nina Wollman: We were talking yesterday about this, and I'll tell you that I see four major trends. Many of our clients are wanting to start with a strategy. There's a great set of articles that comes from another speaker starting with why. Why do our clients even own the assets that they own? And if, around the example you just gave with a building, if the building is not going to support their primary mission, should they even own the building? So starting with why. Why this asset? Why not taking another approach to ownership? To funding? So you're starting with a strategy as to why asset management. Defining what it is, defining what success looks like.

I would tell you there's technology. Every aspect of our life, whether it be our smartphone, our vehicle, or other forms of transportation or communication, we're looking at new technologies, and it's no different in asset management. Whether it is smart metering, whether it is technology to help with the work orders and the maintenance management with the staffing or with the data analytics of how assets are performing. I'm a firm believer that technology is an

equal and opportunity enabler of good and bad decisions. So it's not about just technology. It's why technology, going back to that starting with why.

I would tell you another one has to do with change management. As organizations are trying to adopt technology or adopt asset management as a principle, you have dynamics changing in workforce, you have dynamics changing in business processes, you might have dynamics that change in policies and procedures. So whenever you have these kinds of changes, people innately are not in tune with wanting change. So thinking about what that change is and how to adopt it, having change management, be a part of any asset management organization is becoming a pretty big aspect.

And I would say last but not least is the workforce development. Workforce demographics are changing. Who's coming into the workforce, what they want in the workforce, the talent that's needed to deliver the work that comes with asset management and the maintenance and operations of assets. Who's going to do that and how they're going to be trained up, especially with the introduction of technology and new processes.

Stephen Ludwig: So Steve, or either one, please walk me through those four things and how it applies in ... So we're talking in the abstract. So we have why, we have technology, we have change management, we have workforce development. So if I own a building, those seems abstract to me of why I would think about those things or a road or an airport or a wastewater, whatever the thing is. So how would those things apply? Just take one. Let's take technology. You mentioned, Nina, that technology could be a bad decision as well as a good one. Where would that be?

Nina Wollman: Well, I would say that technology's neither a good or a bad decision. It's how you adopt it and how do you choose to use it. Sometimes clients think technology is going to end all, be all, fix everything, and they have a tendency to say, "Well, if I could just have this, [crosstalk]-"

Stephen Ludwig: What would this be?

Nina Wollman: It can be a work order management system. It can be metering. It can just be more data. And sometimes, I refer to data as the Sunday morning buffet. You walk in, you see a lot of great stuff on the buffet that you've never tried before, and you want to try it. You load up your plate, you sit down and you eat just a mere fraction of it. And then the same thing can be with data. It's just because you've never had it before, it doesn't mean you need it today. You really have to think about what I said in the beginning. What does success look like? What is the decision you're trying make? What is the data you need to support that decision or the information that you need, and then what technology do you implement to get that?

And there are a lot of philosophies on adult learning that starts with you don't know what you don't know until you realize what you don't know and how do you learn it. And then what you, the learned behavior becomes an unconscious behavior.

It's similar with asset management and the implementation of data. If a client has never had that data before, they don't know that they need it. But once they realize they need it, they might just go get it. But if they're not mature enough as an organization to learn how to make decisions with that data, or more importantly, how to maintain that data, then they're going to be in a stance where they're getting more than they know what to do with, and they're actually wasting their money in getting more data. And the same thing can go with technology. You might just be building up technologies, but are you really thinking far enough advance of what does success look like to know that you're getting the right technology at the right time for what you're trying to accomplish?

Stephen Ludwig: So back to this. That's very, very interesting. Steve, this idea that Nina talked about, these four major trends, how are you helping your clients with the specific things? Because what you're describing is a very sophisticated strategic approach to managing things that I would assume a lot of people aren't up on yet. Yeah. Nina's nodding yes, which doesn't really work in a podcast-

Nina Wollman: I'm sorry.

Stephen Ludwig: ... but I point at yes.

Nina Wollman: Yes.

Stephen Ludwig: Yeah, yeah.

Steve Meininger: Yeah. So one of the trends we're seeing, our clients are always wanting us to do more with less. And we're in a very competitive marketplace, so as we look for ways to be more efficient in managing our assets, one trend that we've seen is moving more towards condition-based asset management. So using all this information that Nina talked about in sensors and other technology to understand what's going on with the individual asset, whether it's a pump or a blower or some other piece of equipment, so that instead of just going with a more schedule-based maintenance approach, where you would send people out to do something every day, week, month, you only go when you need to go. And it allows us to also help address the workforce development issue, where we're seeing across our industry, there's less and less people going into some of these craft-based jobs that are supporting-

Stephen Ludwig: So craft, meaning maintenance and welding and all that sort of thing?

Steve Meininger: Correct.

Stephen Ludwig: Yeah.

Steve Meininger: Correct. People are gravitating more towards technology and other things, which is really nice in our industry because more technology is being brought in. Some of the new people moving into the job market are used to technology. So it's blending the craft skill sets with the ability to use technology to be more efficient in how we do things, which is really the only way we're going to survive as we move forward, where people are moving into other career paths. And these are really great careers in these related fields, and so we want to encourage people to really consider them for their kids and family members and people they know to really look at these as career opportunities.

Stephen Ludwig: I don't think most people actually think about what you're talking about. We're in a hotel recording today, but if I go into a building or a government building or anything, I don't think most of us think about, wow, how do you maintain, outside of our own homes, right? How do you maintain this? And so what you're sharing now is this shift from I need to have a spreadsheet saying you fix the boiler every six months. It's like an oil change, right? You need to bring it in at 10,000 or 5,000, whatever the miles is. So how is the market in the government and the for-profit world changing their mindset that you're seeing? Are they catching up with this shift? Because it sounds like it's a new way of thinking about things.

Steve Meininger: Yeah. I think, in a lot of cases, it's being driven by the industry. So they're the beneficiary of this trend and these advancements. So as an example, there's new technology around being able to measure the vibration on a blower. And so we-

Stephen Ludwig: Okay. What does a blower do?

Steve Meininger: So a blower would add air, as an example, to a wastewater treatment plant to help treat the water. And it's a very large piece of equipment. And what we're able to do now is measure the vibration, send it to the cloud, where there's an analytical process to analyze that reading. And they can assess, depending on the frequency of the vibrations, what is going on or might be a problem with that blower. And it's amazing what that you can learn through that process versus what you cannot hear through just listening to it. And so moving up the curve of addressing problems with equipment before it becomes a problem. So you're addressing it so early on that you're not allowing a piece of equipment to go a long period of time and then turn into a bigger, more catastrophic failure situation.

Stephen Ludwig: As you're describing that, I couldn't help but think we're in the world of science fiction, right? Maybe 10 or 15 years ago, 20, who would have thought you would have a monitor on your blower that would send a thing into this vaporware and then I would kick back a report saying you need to go fix it?

Nina Wollman: Or who thought that you would be applying artificial intelligence to help with these kinds of decisions and monitoring performance? Because as we're having these changing demographics and dynamics with the workforce, you need to find a new way to implement technology. And so one of the things that Jacobs is doing is using edge computing and AI. So instead of having that workforce go out daily and touch equipment and walk the field, walk a mechanical room or walk any particular asset, now you've got the sensors out there that doing literally the legwork, and you're just sitting in a control room, monitoring it. And you've got technologists that understand those algorithms, understand the performance and understand the implementation of AI. So that information is coming quicker.

Stephen Ludwig: How does AI work in this area? Is it like machine learning where we recognize the patterns and then it kicks out something for us?

Nina Wollman: Exactly. As it relates to, as Steve was talking about, condition-based maintenance. The way maintenance used to be is you had technicians that would walk through a building, any particular asset, and they would know the hum of that motor has changed, or I can feel the vibration has changed, or I can feel there's a temperature change on an asset and something needs to be done. We need to investigate. In those instances, you might have had days to hours to fix a component once you start realizing that. As someone who becomes more mature in a technician standpoint, they might be able to read those kinds of changes, days, weeks, now even months out, right? So then at one point, industry would only do predictive maintenance and saying is exactly. The manufacturer specifications says you change the oil every 10,000 miles. You change a fan belt. You do something to a component on a routine basis. But think about it.

Something that's not touched doesn't have the intervention of human error. Once you start touching it, you create human error. Not that anyone is being malicious in the intent, it just happens. And sometimes, actually those manufacture specifications cause us to over maintain an asset. Maybe you add too much lubrication to a component that really didn't need it, which again, introduces more faults. So when you start doing more monitored and introduce AI, AI's coming in and saying, "This is the variable of difference." So that vibration would be way outside that variable. And so now with predictive maintenance, you might have gone to weeks to months, but with this condition-based, performance-based monitoring, we build algorithms and AI slowly narrows that margin of change so that you are maybe just going and doing a tweak in performance. You're changing a temperature. You're slowing down a cycle. You're making minor changes from dashboard, from a keyboard, if you will.

And now you've extended, back to the beginning of our conversation, the useful life of an asset. You are maintaining it less, it's less cost. Yes, you have to do the upfront monitoring, but you don't have the people walking the field. So you

have less labor that you need. And like Steve says, our clients are actually looking for us to do different with less, not just more with less. And so this is a way to do different, with AI and changing those parameters.

Stephen Ludwig: So some people are going to see, wow, that's a pretty big upfront chunk of change, but how much money are you seeing people saving from this approach? It sounds like what you're describing, there's significant savings if we invest upfront in these more sophisticated ways of managing what we own.

Steve Meininger: Yeah. Just from a O&M standpoint, we-

Stephen Ludwig: Operations and management. Yeah, mm-hmm (affirmative).

Steve Meininger: Yeah, operations and maintenance, we would typically save our clients 10 to 20% over how they were operating prior to us coming.

Stephen Ludwig: For some organizations, that's probably a massive amount of money.

Steve Meininger: Yeah. Public agencies, private agency, everybody wants to save money. So 10 to 20% of a large budget is a lot of money. That's just the entry to get in the door. And then the expectation is to see additional savings from there.

Stephen Ludwig: Where are you seeing adoption of this asset management approach? What industries are really taking that up and is that limited to North America, or are you seeing it globally?

Nina Wollman: Well, I'll say right now in Europe and Australia, there's actually government regulations related to asset management. So you see it readily adopted from the high level strategy, to the technology, to operations and maintenance strategies quite regularly over there. You're going to see here in the US that it varies, to your point, by industry.

There are some industries, like the water industry, transportation, aviation, that are adopting this quickly. I would tell you most clients, their assets are a cost center, not a profit center, so they're always trying to narrow those margins of cost. But when it does come to the profit center, our commercial real estate industry is also adopting asset management because it does allow them to change their profit margins as well.

So it does vary from that perspective of a geography and by market, but I think there is still a dynamic that's changing in the market space where how you planned an asset, how you designed it, construct it, and then how you operate and maintain it all have been siloed organizations within a client's environment. And so we're starting to see those become more integrated or asset management being aligned more to a CFO of an organization because it is driving that financial change. And so asset management is starting to drive that planning, that design and construction because the sooner you plan for asset



management, the greater that return on investment and reduction of total cost of ownership.

Steve Meininger: Yeah. In addition to market, the sophistication of the client comes into play as well. So the larger cities, larger private sector clients tend to be more advanced when it comes to asset management. They have more resources to spend. When you get to the medium-sized, smaller communities, they may or may not invest as much or think as much about it, which is, again, where we can add a lot of value to be able to bring some of these advanced approaches to their communities that maybe haven't been able to invest in it previously.

Stephen Ludwig: There's a phrase in the business called resiliency in asset management. What's that mean?

Nina Wollman: Well ultimately, when I think about resiliency, it starts with how can anything weather some kind of significant incident. And I don't mean to use weather as a pun because weather can be one of those incidents. But a truly strong asset management or a well-implemented asset management program ultimately does relate to resiliency. Because if you have trained your people to respond to various levels of incidents, whether it be man-made or not, then your program is going to be more resilient and your assets are going to be so as well. And as if you have a better inventory of what you have, what condition it's in and how you're maintaining it, then you know what is going to be susceptible or you're going to harden the defenses or create redundancy around those assets that are highly mission critical.

Stephen Ludwig: So let's take that out of the abstract. Give me an example, please.

Nina Wollman: So since we're running with a building, let's say you've got three different buildings. You may have an office building, a warehouse, and a data center. I would say, depending on any client's organization, the data center is going to be more critical. Depending what's in that warehouse, maybe somewhere on the moderate scale, and the office building, you may-

Stephen Ludwig: Office workers. No, they're fine.

Nina Wollman: Well, you can go-

Stephen Ludwig: Yeah, they're fine.

Nina Wollman: ... rent space somewhere else, or you can put trailers or you can ask people to work from home. But that data center can't go down. So you're going to change your maintenance strategy around the data center. You're going to make sure it has more redundancy within the capacity, the building systems, in its electrical systems, it's HVAC systems, it's backup power. You're going to make sure it has a higher level of security. And so in the case of an instance where it is manmade or not, that may be the first place that you want to get back up and running.

Stephen Ludwig: Got it. Steve, how about a wastewater treatment plant? How would they plan for resiliency? A building goes down, data center goes down, that's a serious thing for a business, but it's a serious thing for a community if a wastewater treatment plant goes offline.

Steve Meininger: Yeah. One of the biggest areas of concern for me is when there's a major weather event coming. So take major hurricane, we operate about 25 water and wastewater facilities in Florida. We operate a hundred million gallon a day facility, water treatment facility, in Puerto Rico. So 2017, when we had Irma and then Maria come through, when everyone else is leaving Florida, we're sending resources in. And some of the things we're thinking about ahead of those events is our backup generators, our emergency response plans, our spare parts, our connectivity to remote generators and support. And we were on calls 24 hours ahead of those with support resources off the projects too to make sure everything was in place.

In one particular case, we were on backup generation even before the storm came through because we knew we were going to lose power. And so being able to think holistically around how do we respond to those uncontrollable circumstances, with respect to our assets and how will they respond. So extremely important to being able to provide drinking water and being able to manage the wastewater during those kinds of events.

Stephen Ludwig: So some people might not know that Jacobs runs and operates wastewater treatment facilities for our clients, correct?

Steve Meininger: Yeah. So we operate over 250 water and wastewater treatment facilities within the company and other related asset management, long term contracts. We have a number of highway O&M contracts that we perform. We do facilities services.

Stephen Ludwig: Sorry, before you go on, how do you operate and manage a highway or a road?

Steve Meininger: So-

Stephen Ludwig: Is that a toll road or a-

Steve Meininger: Yeah, a toll road.

Stephen Ludwig: Okay.

Steve Meininger: So the Florida turnpike system would be one example. We've got a couple traffic management systems that we operate to help monitor the traffic flow and the signage that would potentially cause people to take different routes. Also, the maintenance of the roads themselves. Other things we do in this area is facility services. So for example, we operate all the building facilities at the Atlanta airport.

Stephen Ludwig: Oh, very interesting. Yeah.

Steve Meininger: Which again, get back to resiliency and just being able to, again, adapt when conditions arise, that we lose power in the airport, we have some emergency of some kind, and managing all the ... We talk about assets, but just managing all the people that are flowing through the airport and how do we move people around when something major happens or power's lost? And there's a lot of complexity to that as well.

Stephen Ludwig: It sounds really interesting. Both of what you're doing sounds really fascinating for the clients and for the company. How important is this to Jacobs? What you're doing?

Steve Meininger: Yeah. I can talk from the long term operations maintenance facility services perspective, critically important to Jacobs as a company in terms of the vision of what we want to be as an organization. We want to have a stable growing platform and having these sustaining services and being able to provide the full end to end solutions to customers, both the front end and the back end and everything in between is a real differentiator for us as a company. And we're smarter on the front-end design and planning phase because we're doing the long term operations and maintenance within the firm. And it's one of the things that our clients really appreciate, is that we can bring that integrated service offering and it's really been a differentiator for us.

And we put it into practice. It's not just words. When we get into say a 20-year design, build, operate water wastewater treatment plant, we bring operators into the front-end design so that as we're making equipment selection, and as we're thinking about the design of the facility, so that it's actually operable, we can drive a lot of efficiency into the long term, true, full lifecycle cost of ownership at the front end and then also at the back end. As that's operating over time, we keep engineering designers involved so that when issues arise, we're making better decisions on the repair versus replace versus is there a new technology out there that we should be considering? Versus just focused on the O&M itself?

Stephen Ludwig: Great.

Nina Wollman: Well, and I would add to that, with our consulting services globally, it gives us an ability to meet our clients where they are, and help them anywhere they are on this journey and help them define success and achieve success. So it's exciting for us to see, we can help Jacobs go into new markets, get into new clients with just some basic services before we do get to those long term, 20-year contracts because that's a marriage. And so we give the client the ability to date Jacobs along the way with some of our consulting capabilities.

Stephen Ludwig: Very nice. Now, we're just about done with our time. Is there anything I didn't ask that you'd like to add that you think we should know about? Excellent. How

could people contact you or look up, if they have more questions or want more information?

Steve Meininger: There's lots of ways to reach out to us, but we've got a website, [jacobs.com](https://www.jacobs.com). All our capabilities are on that site, and there's contact information there.

Stephen Ludwig: Great.

Nina Wollman: No, and I was about to say, and don't forget our other social media forums with LinkedIn and Twitter to find us there.

Stephen Ludwig: Great. Thank you so much. This was very interesting.

Nina Wollman: Thank You.

Steve Meininger: Thank you.

Stephen Ludwig: Thank you for listening to Inflection Points, a podcast series from Jacobs. To find out more, please visit [jacobs.com](https://www.jacobs.com). Jacobs, challenging today, reinventing tomorrow.