

Visionary Integration: Jon Berkoe, PE, on Transforming the AEC Industry with Tech-Driven Strategies at ARUP | Transcript

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Speaker 1

Welcome to Green Building Matters, the original and most popular podcast focused on the green building movement. Your host is Charlie Cichetti, one of the most credentialed experts in the green building industry and one of the few to be honored as a LEED Fellow. Each week, Charlie welcomes a green building professional from around the globe to share their war stories, career advice, and unique insight into how sustainability is shaping the built environment. So settle in, grab a fresh cup of coffee, and get ready to find out why green building matters.

00:34

Charlie

Hey, everybody. Welcome to the next episode of the Green Building Matters podcast. I've got an easy job. I get to meet awesome green building professionals all around the world. And today we've got Jon with us. Excuse me. Today we've got Jon Berkoe with us. He's a professional engineer. We're going to talk about the built environment, we're going to talk about sustainability, but we're going to talk about technology. We're going to kind of learn how to, Jon, really get into that side of the built environment. So, Jon, thanks for coming on the podcast. How are you doing today?

01:00

Jon

I'm doing great, Charlie. It's. Thanks for having me on.

01:03

Charlie

I know we've got some mutual friends. We saw each other, gosh, back in

January at the Design Futures Council event and La Jolla. All things technology, AI and the built environment. We'll talk about that. Before we talk about present day Europe and all the good work you're doing, let's go back. Jon, where'd you grow up and where'd you go to school?

01:23

Jon

Going back is a while. I grew up in the smallest state in the US, Rhode island. And I did go to college at MIT in Cambridge, Massachusetts. Got my bachelor's and went one extra year with a great internship program and great work experience and ended up getting the masters out of that mechanical engineering.

01:42

Charlie

Amazing school, of course. Did you know you wanted to be an engineer? What kind of influenced you to go that route? Was it geographic? I love engineering. How did you go that route?

01:54

Jon

If I look back, my interest was really in architecture. And then I kind of came to the realization that I was just really not a good artist and not good at that sort of part of it. I sort of shifted over to engineering because it kind of suited the way my brain worked. And I went into mechanical engineering because at the time, there was a lot of focus on computer science and electrical engineering and MIT. And everybody was going into that major, it seemed, and mechanical engineering was kind of being somewhat neglected. But in truth, they had great professors and some amazing classes and a great lab. It turned out to be a really good place for me to be.

02:36

Charlie

Man, love that. Well, I know those degrees can open some doors for you. Tell us, that kind of early part of your career, what was next?

02:45

Jon

The early part of my career was really focused on fluid dynamics and heat transfer, and I did first work for General Electric, but it was when I went to Bechtel that I started to get into what was known as computational fluid dynamics. Bechtel is a large builder engineer. They weren't doing that kind of simulation modeling stuff, but they had a lot of big projects at large scale. And the challenge there is how to sort of validate and verify that your designs are actually going to work, because there aren't comparable systems and projects in place that are easy to find in other places that would say, okay, we're going to build it just like that, and it's going to work. So you have to find other means and methods to do that.

03:26

Jon

And typically, it was costing the company quite a bit of money to run physical tests and try to do studies and do all these things to kind of support those designs. I sort of brought CFD to the company. I said, hey, if you model this stuff up, it's going to be a lot more accurate and cheaper, and we have a lot more flexibility. And at first, it took on with the mining group because they were having a lot of sort of interesting challenges around their ventilation systems and mixing systems. And then it kind of went into petroleum, and then it went into wind effects on airports and buildings, and then it went into nuclear repository projects for the government, and kind of went in all these kinds of directions, to be honest.

04:09

Jon

As the technology got faster, the technology started getting more easy to use and more capable, and so it ended up becoming more demanding. I

started to bring people into the company with this kind of expertise, and then we branched into more data visualization. So that's where my interest in visualization started really ramping up, was how do you communicate these complex analysis results and simulations to people that are project managers and other people on the project? And it's really about some of the data visualization tools that enable that to be effective.

04:45

Charlie

And that's exciting. All those industries, Bechtel is a huge contractor. I think they're technically the largest. When did sustainability show up? Were you doing any energy savings related to some of that work and modeling, or did it kind of start showing up a little later on?

05:00

Jon

No, absolutely. It's actually pretty early on in my life, based on what I see going on in the industry, because a lot of times, particularly with airports in, let's say, warmer climates, they use a lot of energy to cool the terminals and large spaces like that. And there was a lot of interest in figuring out how you could naturally ventilate some of these large spaces? And if you had to do that, how would you design the buildings or the terminals to be able to accommodate that as best as possible? And so computational fluid dynamics was and still is the perfect tool for that because you can identify and optimize locations of louvers and intakes and outlets, orientation of the building relative to the sun and the wind and stuff like that. We proved that out on a few airports in sort of tropical warm regions where it really made a huge difference on energy cost, all that natural ventilation.

05:54

Charlie

We do a little work in Latin America, and it's amazing. They can do net zero, quote, easier. They got a lot of humidity to deal with and moisture. But

you're right, that's amazing. As I read through your bio I see that you went from the engineering side to director of technology. Have you just always been an early adopter of technology or what led you to that?

06:15

Jon

I've always been fascinated in how to basically find a better way to do something. There's a lot we can talk about, but there's a lot of inefficiencies in the AEC industry processes, both on the design and the construction side, in my opinion. There's some great companies that have developed some great software programs and tools that can do a lot of things. They're not necessarily intuitively obvious, all the capabilities that they do. To kind of be the bridge to say, 'hey, there's a need to do something better, and here's a potential tool that can do that if we have the right set of skills to apply that and work with the project team in the right way.

06:56

Jon

I kind of have been fascinated with that whole aspect of simulation because it literally costs nothing to do rework on a computer as compared to doing rework anywhere else. And so it just seems obvious to me that the more you can do in the virtual space, the less cost you're going to have and the less burden of rework you're going to have down the line.

07:17

Charlie

Director of technology at Bechtel and continuing on to your career. But I like to ask about mentors. Jon, did you have any mentors along the way? Sometimes a mentor, physical accents too. Sometimes we look up to, we read their material. But did you have any mentors?

07:33

Jon

Absolutely. I'm super thankful for some of the more senior people that I've come across pretty much my entire career. They've either been other technology leaders in the company or in some cases especially later on in the career, some from other firms that I worked with who are clients to me. But especially at Bechdel, some of the senior guys, there's just some real talented, super intelligent people with great experience there. And those kinds of people tend to be open minded and interested in new tools and new ways of doing things because it's just their curiosity piqued by that. And so when I brought some of that to them and said, hey, this is new, this is something that, it's not going to answer all the questions, but I think it can answer some of them.

08:22

Jon

They were open to giving it a try and then broadcasting it to their business leaders and saying, hey, we got to do this more.

08:29

Charlie

That's great when they're open to that too. And I've heard it a couple times now from you, is a better way. Innovation, just because we did it that way doesn't mean that's the only way. That's a big part of the work we're doing. And you're right, this industry, a place I've made a career to, is really not as innovative. We could argue we have a leaf platinum, our regenerative building and all the bells and whistles, but our processes, I think you hinted towards that construction industry is one of the biggest parts of our GDP and there's still a lot of room for improvement. We'll talk more about that, just a little more as we look back. Then we'll get to the present day. But what are some of your proudest achievements so far?

09:09

Jon

In terms of the projects I've worked on, I would say one of them was around

2005, there were actually two projects around that time frame where one of them was Tacoma Narrows Bridge, which is Tacoma City, south Seattle. The original Tacoma Bridge, a lot of people are aware of it fell into the water. They called it galloping Gurdy. Then they built the Tacoma Narrows bridge in around 1940. Eventually the traffic got so hot, so much that they decided to build another bridge next to it. And that was about that timeframe and at the time, there were lots of unique challenges that happened because it's a long suspension bridge in a waterway with some strong currents going in both directions.

09:53

Jon

So the issue was that the existing bridge would create wake effects and turbulence that would make it very difficult to build the new bridge without some risk of the piers sinking during the process. It takes, like, three months to actually build a bridge pier to the bridge until it's anchored in the ground. So we used computational fluid dynamics, and we had to really push the envelope on the software, on the use of computers, on the assumptions we made, on the number of runs we had. We had to push the envelope in a lot of directions. And I had the support from our project managers, from Bechtel, and also keyword, who was our joint venture partner. And it ended up working out really well. This was reviewed by a lot of academia and all these kinds of experts in the field, and it came in to be an amazing sort of cost effective way to. To create an extra safety and risk reduction measure to that project. And another one was in Iceland, eastern Iceland. And this was an aluminum smelter, where there's very strong environmental concerns in Iceland around pollution. And so for the client, I think it was Alcoa, to build this smelter in eastern Iceland, they had to show to the local communities, there aren't that many people there, but there are communities that the emissions from this plant would not impact their environment.

11:14

Jon

Again, we used CFD, and it got great reception because the models were able to kind of show that everything was going to be okay, and it showed where the winds were going to take the emissions and how the plant was designed to prevent excessive emissions and so forth. And so those were really two interesting, novel projects that were large and sort of globally impactful from the sense of being unique. I would say those were a couple. And the other one would be presenting to the National Academy of Engineers on some of the environmental related work that we did with simulation based on either visualization or computational fluid dynamics, or even structural dynamics, and presenting in front of that forum and being awarded the best presentation that year in that context, and getting a note from Steven D. Bechtel congratulating me. So that was pretty cool.

12:06

Charlie

Hey, I love where we're going with this. And you have worked on all kinds of cool projects, and not just buildings. The bridge with the disaster in Baltimore recently, now people need to understand, like, this is why it takes so long to build and rebuild there and so you just gave us a peek into that as well. All right, so, yeah, let's talk about how you got to the era, how'd you get to where you are now and give us a peek at what's a day in the life of Jon right now?

12:34

Jon

I got to erupt through a few channels. Basically I shifted my career away from engineering more into construction. And then I became really interested in what they call virtual design and construction. And Bechtel was a member of what they call the Stanford Center for Integrative Facilities Engineering, one of the first sponsoring corporations that was a member. And through that, I became sort of involved in that program, got to know the people, got to go to their sessions and so forth. I could see that

really this was the way to work. It was all based on VDC. And it's not just about BIM, it's about the work process around deploying the BIM and the tools and the whole focus on organizations to work in a new way to create better value, better efficiency, more sustainability and better outcomes.

13:19

Jon

After I left Bechdel to join a software company called Synchro Software, I stuck with Stanford and we actually were developing a software that does the prediction of construction sequencing that actually models construction sequencing by integrating schedules with design models with BIM. And actually it's almost like a virtualization of the Lego building process where you just see pieces come into place and you see opportunities to create better ways of doing that so that you have less conflicts and you have a more streamlined process. And as part of that company, I got to meet a lot of my clients who were some of the big contractors and some design firms globally, especially in the US and the UK.

And through that, I got to just make so many great connections around the industry and learn about how different companies work and how they deploy innovation and how they pilot things. And I got into that whole content, what they call the whole construction technology space is just full of innovative people with new ideas, startups. It's a great field. And eventually I ended up working for a construction firm and then being connected to a couple of people at Arup who were starting up this big project in San Jose, California called the Bart to Silicon Valley project. And they asked me to come on board and help lead the digital implementation on that project. And so that's how I ended up in Arab.

14:39

Charlie

Love it. Small world, as they say. Let's talk about digital delivery. Let's talk about probably digital twins. Maybe you're seeing machine learning and AI

on the scene. What are some things coming across your desk first and then are there best practices that you try to get on as many projects as you can? Is there a certain internal standard, like how do you really run things there?

15:01

Jon

A lot of the challenges around implementing digital delivery on what we call major projects, basically projects that are complex, have lots of people working on them, maybe lots of firms. They run for a long time. The complexities there make it difficult to sustain the value of digital. A lot of it has to do with the organization aspects of how people deliver the work and communicate it and share it and work with the project teams. And so a lot of my focus has been, I call it the grind. It's really about getting everybody on the different teams to work in a new way and do it consistently and actually see the value and then want to continue to do it.

15:41

Jon

I find that in the industry there's a lot of hesitancy and sort of the fallback when things are, schedules get tight or things are getting a little bit chaotic, they kind of fall back on the old way of doing things. I think the tools are a key part of it. Obviously, you have to have the right software and there has to be a good bim foundation to the project. But I think a lot of it is really the working amongst how people work with it. And so part of my job is really bringing people onto the job and then educating them and making sure that they're working in close collaboration with the project team. And so that's my first and foremost thing is creating an organization structure that's going to increase the chances of success.

16:23

Charlie

When we adopt new technology. Do you have any tips on change

management? Is it a carrot or stick? Is it really praising those that are embracing it internally? Any tips on change management?

16:37

Jon

It is important to. The first tip would be continuous education. When you create a process, say it's going to be a common data environment.

Common data environment enables changes to happen collaboratively within a model, for instance, in a virtual space, so that all the changes can be easily recorded and shared and followed up on. It's a good way to work. You'd think that 3d is more natural than working, say, off drawings in 2d. It seems intuitive, but it doesn't work that way. In our industry, people are just used to redlining and markups and that's, in my opinion, an inefficient way to work. To create the regular practice of change management, that's based in the accommodated environment. It requires continuous education. It's not just let's do a training session and then hand it off.

You have to kind of keep at it and just reinforce the practice. And then when there's success in it, when there's a change that's managed well and there's a clear improvement in the productivity or efficiency, you have to broadcast that to the rest of the team and say, hey, look, this is how it works, so let's everybody do this more.

17:48

Charlie

Thank you for those pro tips. I know you're doing that there, Jon. Let's talk about if we could maybe AI and what's your take on it? We were at a conference together earlier this year, and there's different tools. Some may worry that AI is coming for architect and engineers jobs. I think you and I know that's not the case. It's an enabler, it's an augments. What's your take on it? Where are you seeing progress? Any predictions around it?

18:14

Jon

I think maybe there's. We'll focus on two areas, the right now, one and the one that maybe around the bend. But clearly the access to good information in an easier, intuitive manner is a great value for AI. We have project focused GPT type systems where it works like a chat GPT, but it's based on, say, the project documents, the project drawings, the project information, so anybody in the project can query that. And it's not just like a search. You're actually communicating with the system and it's reading off the way you ask the question and giving you insightful information that can help. It basically helps save a hell of a lot of time and finding the right person to get that information from. But it's a great way to be more accurate and precise in how you plan the work you do on the project because you're getting better quality information faster. I would say that where AI is going to impact what we do say at Arup we do design engineering, is we have to change our views on the future of what we deliver. Because why is a client going to pay high fees to do, say, an MEP design, when it can be done with an AI based system for, say, a healthcare facility or data center, and that work could be done at a fraction of the cost because the AI based system will understand how to place the pipes and the vents and the valves, etcetera. So we have to look at that as an enabling tool rather than a competitive situation, and figure out how we are going to enhance the value of what we do? And I think that's where sustainability comes in, because we could use these AI based tools to develop a better design and then use sustainability knowledge to make those designs produce more efficient buildings and enable owners to leverage that information, to actually put that into practice, let's say more cost effectively, but also just more organically, more holistically, really.

20:16

Charlie

Second, is that real time sustainability feedback too? As engineers and architects are designing buildings and getting more real time feedback, we usually have to have a design done to do the energy model or to do the

lifecycle model for embodied carbon. But as we're designing, what is this going to do to those impacts? I hear some of that. Plenty of data.

Sometimes firms don't realize that a lot of where they have data is actually sustainability. Maybe it's AIA 2030, maybe it's LEED, maybe it's energy models. It's a good place to start. We actually have a lot of data there. And you have these data lakes, if you will. If you can't tell, I'm a big fan of the technology side, and that's why I think you and I get along.

20:56

Jon

One of the sort of ironic things about AI is a lot of people view it as a separator, as there's this going to be this machine or some invisible entity that's going to be doing the work of other people. I see it as a collaborative tool. It creates a common denominator of information that's more easily shared amongst teams and so they can work better together and break down those silo walls that are traditionally, in my opinion, still part of how the EC industry works. AI will help break those walls down and create a common platform. And from there, that's where real innovation can occur, because now you got everybody really working together.

21:36

Charlie

Well said. Talking about the future, what does the Sci-Fi construction site look like, so to speak? What are you excited about that's coming at us in this green building movement, in this built environment? What are you excited about?

21:50

Jon

The thing I'm excited about is really the connectivity of the outcome to the day to day work process. Currently, the work process is task driven. Here's the task we have to do today, and there's some better tools to do that in the future, including robots and augmented reality tools, virtual reality tools or

dashboarding tools. And there's definitely tools and laser scanning tools and data capture. It's all there. I think the next step is really why is really the workers and the people doing this work, if they can get feedback from what this ends up producing in the outcome, in terms of here's a way to do it so that you're going to have better efficiency, or here's an adjustment to make, here's an opportunity to create less energy use, or here's an opportunity in what you're doing to create less spatial footprint, these kind of things. I think you'll get more people into the industry because it becomes more interesting and you'll get owners that are seeing the importance of the construction process to the outcome. It's pretty disconnected, and owners frequently are just looking at the cost of construction as a barrier to getting the job done rather than as an enabler to creating a better outcome.

23:03

Charlie

Every bit of that, man. Let's get to know you a little bit more. Kind of some rapid fire questions here. What would you say? What's your specialty or gift?

23:12

Jon

It's around. It's around leadership. I think it's impossible for somebody that's been around as long as me or anybody that's even been around less than that to keep up with everything. And people tend to want to keep up with everything. They're not comfortable with something unless they themselves know how to do it. I realized a long time ago that's never going to happen. Being able to just build teams and lead them and encourage them to bring out their own skills and interests and contribute to the project or to the group's efforts is how you get the best outcomes. And you have to have trust and faith in people's abilities to do that. Young people especially come into the industry with great abilities that either they've learned or practiced. I just love to give them the opportunity to just put the pedal to the metal and

push it. One of my sort of superpowers might be around just that. Innovation leadership. I think there's a sweet spot there on how to do it.

24:07

Charlie

There we go. Innovation leadership. I'm a big fan of studying leadership. Jon Maxwell, for one, here in Atlanta where I'm based. But five levels of leadership. Level one, people follow you because they have to. Level two, they follow you because they want to. Level three, they follow you because what have you done for the organization? Level four, what have you done for them? That's why they want to follow you in level five if your leaders are creating other leaders. And so you can go up and down through those, but you're right. It's that influence, that opportunity, seeing the best in others. That's what I heard from you there, Jon. That's amazing.

24:39

Jon

I love the way you said there, Charlie. That's really great. And it's true that there's some people that I've managed in the past or have been part of my teams that are now leaders in certain firms, and it's great to see their success.

24:50

Charlie

I'll send you that link. We'll put a link in the podcast show notes, too, that John Maxwell's five levels of leadership. Any good habits, routines, rituals that help you stay on point?

25:03

Jon

A lot of it is around. One of the key ones is around health and wellness. I think there's a lot more information out there about it, but I still think there's an opportunity for people to focus on it more. And I think people need to

take the time to take care of their bodies and exercise and eat right. And even in our company, they'll serve bagels and pizza. And it's like, okay, it's tasty stuff. But I think health and wellness is just crucial to sort of balancing a good frame of mind for work. And so that's one of the ones I think is really important. And I try to remind people, even in meetings that I'm in to say, hey what did you do last weekend? Or what kind of exercise are you getting?

25:45

Charlie

That's good. You need that peer accountability. It's moving your body, but also just nutrition. Some people look at food for comfort. Some look at it as fuel. Some look at it as medicine. It's okay to have a conversation around it, you know? I love that, man. Thank you for sharing. I'm a fan of a bucket list. Not everybody has a bucket list, but one or two things may be on your.

26:08

Jon

Bucket list would this be related to.

26:11

Charlie

It could be. Hey, do you want to write a book? Is there a certain place you want to speak? Do you want to travel, adventure, sail around the world? I don't know what comes to mind on the bucket list.

26:24

Jon

One thing is to be, I'm sort of in the lighter stages of my career, and one thing, I love working, but I want to be able to put in less hours. One of my bucket lists is just to be able to kind of fit, not phase out, but transition into a consulting situation where I'm doing some of the work that I like to do in helping people that really are getting value out of it in a good way and

doing it in a more flexible, relaxed environment. I think for sure one of those. And probably maybe the opportunity to kind of do some either lecturing at a university or sponsoring some forums that bring some of this sort of combined mashup of innovation, technology and AEC practice from my experience to young people that are entering the industry and motivate them to see why I think it's great industry for them to work it.

27:18

Charlie

Where do you like to go to get information on the latest built environment technology or green buildings? Do you read publications? Do you go to conferences? Where do you like to consume new information?

27:31

Jon

There's a couple of venues that I've gotten Arup to join that I think that I've been involved in the past that I think are great, especially around construction technology. You've probably heard of Built Worlds, but I do think built worlds is a good place. It has a good mix of the investors, the new startups, and some of the consumers of that stuff, like big companies like ours and so forth. And so that mix creates a great diversity. And particularly some of the investing firms that are doing that have also formed their own spin offs around piloting technologies or funding new startups. I think getting into that space about what's going on is really important because I think larger companies tend to be insular in that respect and think that, hey, if we've got a development in our own company, or we've got to hire somebody to do that. And a lot of the new startups are coming up with tools that make some of those things, especially with the AI situation, easier, faster, cheaper, better to work with. Why reinvent the wheel when something's out there? There's another group that's called the Society for Construction, not the simulation. It's the SCS Society for Construction Solutions, which was started by a buddy of mine, Curtis

Rogers, who you might know several years ago. It's basically a networking social group that meets now in several cities, I believe, around the world.

28:58

Jon

Originally it was in San Francisco. It's a great place for people that are interested in technology to catch up with other people in that space and just in a real relaxed environment, find out about what's going on and stay connected. And I think it's these kinds of groups that are really fueling a lot of the cool stuff that kind of gets young people motivated.

29:17

Charlie

All right, everybody check out those two resources. I'll put a link to each in our podcast show notes. Starting with two final questions here. Jon, I really love getting to know you and your story more as you look back on your career. Is there any career advice you wish you'd have known earlier?

29:33

Jon

Absolutely. Understanding the relationship between the business side of projects and the innovation side is really important to be able to efficiently put innovation into practice and get business leaders to recognize the value. I've learned a lot along the way, but I think if there was a way earlier on for that kind of connection to be made you'd see a lot more innovation be put into practice. It's really understanding. They call it ROI, return on investment. And I think that's kind of an overused term. But to some degree, innovators and technology people are responsible for being able to at least communicate what that end value is to what they're doing and not just assume that it's going to be better that you have to substantiate it.

30:26

Charlie

Love that. Great nuggets there. Our last question, let's say someone's listening to the podcast and they're just now jumping in through either the green building movement, built environment, maybe technology here in the built environment, and maybe they're making a career change, or maybe they're a young professional, but say they're getting super excited hearing your story. Any words of encouragement, Jon, for them, if they're just now jumping into this movement?

30:49

Jon

Absolutely. I think the industry does need more people that have that mindset. And so what I would encourage them is to come in and communicate new ideas to their senior leaders in the company or to their supervisors. And using some of the things we talked about is to be able to create those opportunities. And those opportunities are great because the industry needs more people. They're basically under-resourced and need more fresh ideas. And I think it's one of the few industries actually that has that kind of gap between what's needed and what's happening, as opposed to other industries where you just have you're almost at that saturation point, say between there's so much going on, how much more can you do, how much more improvement can you get?

31:38

Jon

But what I've found in the AEC industry is you can do a relatively minor innovation and have a big impact, and that includes sustainability. You can have a big impact because the scale of what you're creating, it's so large that even a small percentage makes a big deal. It's a great industry to look at that perspective and say, 'Hey, I can really impact things without necessarily having to have three degrees or be the best in the world at this point.'"

32:07

Charlie

Impact. Thanks and well said. I hope everybody listening has enjoyed this conversation with Jon, West coast office and all the digital discussion, the green building discussion. And Jon, just keep up the fantastic work. I really enjoyed our time together today. This was great.

32:23

Jon

Awesome, Charlie, it was great talking to you and I really appreciate the opportunity. This was a lot of fun, really. The cool guy and I love what you're doing.

32:32

Speaker 4

Thank you for listening to this episode of the Green Building Matters podcast@gbes.com. Our mission is to advance the green building movement through best in class education and encouragement. Remember, you can go to Gbes.com podcast for any notes and links that we mentioned in today's episode, and you can actually see the other episodes that have already been recorded with our amazing guests. Please tell your friends about this podcast, tell your colleagues, and if you really enjoyed it, leave a positive review on iTunes. Thank you so much and we'll see you on next week's episode.