

56. UMD Symposium 2018

Knowledge into Practice Part 3: Construction

0:00:01 Sara Collins: Nothing we do on a construction site is done in a vacuum. Everything involves other people, and everything involves teamwork.

0:00:08 Christopher Payne: So, really, it's about collaboration, it's about using this information to make decisions better, right? Because there are so many different hands in the pot it's amazing that buildings actually get built.

0:00:18 Mike Schlegel: You know, construction sites, our teammates change every single day, the environmental factors, of course, change, and then what we build is not repetitive, every single building we've ever built is different from the last.

0:00:31 Ryan Anderson: It used to be that if you had a big hall of IT and construction professionals, I think all the IT people would be on one end of the room and the construction on the other, and now you can't even tell the difference.

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0:00:44 Kendall Lott: This is the third and final episode of the series from our University of Maryland's fifth annual project management symposium, Turning Knowledge Into Practice. This one is on construction, and we've selected highlights from the breakout sessions and keynote speeches. We'll learn about some of the amazing technological advances that are changing the playing field very rapidly, and how project managers can use these tools for all the aspects of their work, from scheduling and scope, to communication and stakeholder management. And no, you don't have to be in construction to learn something from this episode.

0:01:16 Announcer: From the studios of Final Milestone Productions, overlooking the White House in downtown Washington DC, this is PM Point of View, the podcast that looks at project management from all the angles. Here's your host, Kendall Lott.

0:01:30 KL: BIM, B-I-M, you're going to hear a lot about that in the next hour. It stands for Building Information Modeling. And it turns out that information and sharing information is one of the key components of project management in the construction space. For one thing, you're working with multiple teams, the designers, contractors, tradesmen. Often very big teams, and they all have to work together to assemble a precisely conceived structure. The new technology allows for enhanced collaboration as well as greater precision at all points in the process, from design to build. It's pretty amazing. So come with me now, as we listen in on some of the presentations.

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0:02:11 KL: As a principal in charge in The Christman Company's Mid-Atlantic office, Ryan Anderson leads project teams in the public and private sectors. He's an expert in planning, scheduling, and risk. His presentation partner, Sara Collins, is senior vice president of HITT

Contracting, with over 23 years' experience in the construction industry. Their session is about evolving expectations for construction project managers and employers.

0:02:36 Ryan Anderson: Most of you have probably seen this picture of all the iron workers on the beam. And it's really amazing, just in our careers, we were talking about how much this industry has changed. As a project engineer, I had drawing tubes, and was shipping everything, and there was a computer... Maybe one computer on site. And look at it now, people walk around with iPads, and drones. And the things that we're asking people to do on construction sites has drastically changed, just in our careers. And it's a different skillset, now. To be successful in the construction industry, you have to be able to much more embrace technology.

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0:03:17 Sara Collins: So we generally expect people to do more with less, more so than when I came in to the market, because we don't have enough talent. So instead of doing one project, a project manager now is expected to do that project, another project, a corporate task force, another initiative, and some other stuff as well, right?

0:03:35 RA: I think multi-tasking was important when we came in, but I think it's much quicker that you're now involved in multiple projects, that is definitely a trend within the industry. And so you've got to be a good multi-tasker or you're not going to make it. Soft skills, I feel like at least when I went through college, we didn't really get any training, or practice in soft skills. I don't know about you, but...

0:03:56 SC: I got none.

0:03:57 RA: And it's critical. I mean, when I'm looking at a candidate, I mean, yeah, okay, you have a degree, that's great, you got your engineering courses, or whatever. But how are you at public speaking? How are you in dealing with people? How's your written communication? Those are critical skills that, you're just not really necessarily getting everything you need in college, but in order to be successful in the construction industry, especially today, it's a must.

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0:04:26 RA: And this is another graphic that I really like. I just love the title, "The Rise of The Machines". Just the visual that that creates.

0:04:32 SC: It's a little bit scary.

0:04:34 RA: It's kind of scary right, so I don't... Maybe this will be robots up here talking. But autonomous vehicles. Companies like Christman and HITT, we're seriously talking about this stuff and trying to understand it and making sure that maybe we're not bleeding edge, but we're at least on the leading edge of what's going on because we feel it.

0:04:52 SC: This is Marriott's corporate headquarters out in Tysons and what we did there was we used virtual reality to simulate the design of their new lobby so their employees could get a feel for where they would be working. This is actual footage from a mixed reality demonstration that we did. So the folks can walk into their space and see it and some of the folks you see in the video, our

superintendent is there, our job site superintendent actually learned to use the mixed reality technology and he was able to find some issues with the construction, the coordination, where the mill work went. In addition to being able to show the occupants how they were going to use their space. So when they say that floor box can't go there and my telephone is going to be over here, that is, we're able to adjust that based on people seeing it and not having to read plans. How many of your clients can read plans?

0:05:47 SC: This is actually, we're showing some floor cores. We can GPS locate after we scan the floor to figure out where the rebar is, where to put these cores so that we don't hit any critical rebar in the floor slab. All of these are things that project managers, they didn't even exist, so whether you knew how to do it or not was irrelevant, and nobody in the construction business knew how to do it.

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0:06:21 KL: Saurabh Gangwar is an executive leader with more than a decade of experience in the AEC industry, that's architecture, engineering, and construction. He currently leads the construction industry division at CADD Microsystems. He spoke at the symposium about the impact of technology on project management in the design and construction industry.

0:06:41 Saurabh Gangwar: There used to be a concept of master builder or master mason, long, long, long time back, at the time of Leonardo da Vinci and the Vitruvian architects where there was one person who can design, who can engineer, who can build, who has all the information and the knowledge to do what it is required to build the buildings. Time was usually not a big concern at that time. Money was not a big concern at that time. But slowly and slowly time changed and now we have different roles, there is an architect who is just mainly responsible to design. There's an engineer who is looking at the structural aspects or the engineering of different mechanical systems, and civil and all those trades that require engineers is responsible for that. We have a role of a general contractor now who will be actually responsible for the building on the site.

0:07:35 SG: And he will have many subcontractors with him. We will have a construction superintendent on the site. We will have a project manager in the design phase from the architect or from owners side also a project manager. We'll have fabricators who are actually doing the work on the site and also fabricators where a lot of fabrication manufacturer is happening offsite. So what you see has actually happened that the knowledge that used to be with one person or a few persons, now have kind of exploded and many, many roles have been created throughout the history. And one of the big reasons why this happened was risk mitigation.

0:08:14 SG: Everyone from top to bottom they just started giving their risk to the next person, to the next person, to the next person. The other thing, the reason why this happened was because we now want buildings better, cheaper, faster. One person cannot handle all that, or one entity cannot do all that. And that's why now we have all these specialized roles that happen. Which will require, as you'll assume since there are many people or many entities involved, a lot of collaboration.

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0:08:47 SG: In terms of project delivery system, how projects are delivered with different roles and collaboration, or lack of collaboration. What started happening was we realized that when we have created so many silos in delivering the building, it has created a lot of problems. So what started

happening was from a traditional design build approach, in which somebody has designed the building, and he hands over the document to the next person, he quotes the lowest price, he gets the project, he builds it and gives it to the owner, three completely siloed phases. The project deliveries started moving towards a more integrated approach.

0:09:23 SG: Where rather than information moving from one entity, to the next entity, to the next entity in different phases, now, we all can start working at the same time in an integrated approach.

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0:09:39 SG: There were two things that actually have helped a lot towards this movement. First one was the advent of building information modeling, or we call it BIM. It is a process in which we literally try to create the building virtually and try to do everything; all the planning, scheduling, estimation, coordination analysis in the virtual world, before we get into the real world and facing problems. And so now it is used as a BIM model, some people call it a 3D model, but it is actually a lot more than just a 3D model or pretty pictures, because it stores a lot of information. And that's the I in the BIM is the most important aspect. So now you can use 3D models to capture and explore information. You will have a more coordinated design.

0:10:26 SG: Because imagine, we used to have these 2D drawings, and plans and plans, and lots of drawings. And when we are doing coordination we have to overlay on top of each other, or do a manner of calculations, use light tables. In the 3D world, that coordination happens, there is softwares that can do it automatically for you. We have a lot of insight in our cost schedule and constructibility because all that information, all that analysis, now happens through BIM. The data is shared so we're not moving drawings from one to another, but there's one central model, everyone is accessing that and it prompts response to change, with processes smarter and faster. So BIM is the smart way of doing construction.

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0:11:13 SG: The second piece that has changed project management and project deliveries is the cloud and mobile technologies. It's data centric. The information just stays at one location in the cloud and everyone is accessing it from one source, so there is no confusion on things like version. Like somebody has downloaded the wrong version of a drawing or a document. It is one information, all versions stored in one place, the latest and greatest information is available in real time to all stakeholders with different sets of permissions, so that they can interact with the information in the correct way. But that's a new way of thinking.

0:11:53 SG: And the two things that I believe that if everyone has to take away from here, is that I think that buildings will not be constructed anymore. They will be assembled. They will be created somewhere else and we will be just assembling buildings. And when that happens, project management will shift from just people management, which is kind of it's there right now at the cusp of people management and technology management, it will just become pure information management. There will be one place to get the information and project managers will be all about who gets what at what time, and setting those permissions.

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0:12:39 KL: Jeff Gravatte is the CEO and owner of CADD Microsystems, a consulting and software firm dedicated to finding new technology solutions in the design and build industry. For his keynote address, he talked about technological advances, and managing design and construction projects.

0:12:55 Jeff Gravatte: What I see happening, and what I predict, is that buildings will be built with larger and larger pieces. And you're already seeing this, right? So you go out on a construction site and you will see big pieces being picked up by cranes and put inside buildings. That's building components, right, or building modularization, right, or pre-fabricated parts of building. This is happening, right? And one of the ways that this can happen is you got to have the precision to know that it'll all fit together, like you're manufacturing something, right?

0:13:29 JG: And the reason that this can happen is because of building information modeling, which is really the trend in my industry. Before computers, you gave them a drawing like this and said, "Build it." But now you've got the actual information to say, "Hey I can build the walls from this," right? You've got this information to say you can fabricate pieces of the building and ask questions of it, so you could optimize design, optimize the cost and the quality. Time, quality, cost, right? So that's really what the promise is with Building Information Modeling is you'll be able to do those type of things.

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0:14:05 JG: But I'm going to talk about something about four emerging trends that are happening in the industry. Certainly cloud computing. Everybody knows what cloud computing is. I don't need to be doing reviews on that. Augmented virtual reality. We've all seen the goofy glasses people are wearing, it's going to get even goofier, let me tell you. Robots, drones. Everybody loves this, right? And then pre-fabrication and 3D printing, which is really the end game here. This is what's going to change, it's going to change the cost of things, it's going to change the quality of things, it's going to change the speed of things. It already is. It's not pervasive, but it's starting.

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0:14:43 JG: So, with cloud computing, really everything's located in one place, so people can get the information out there in the field. Well really, what this is about in our industry is about putting all this information in a vault. All the data about the building, the design, the planning, the building, and the operation of building, all in one place. Put everything in one place, right? Have that data for all the project be in one place and have everybody look at the data, that's really what this is about, it's about collaborating with all this information. So basically you take a building and you say, "Hey I'm the guy who's designing the walls and I want to see what the guy who's designing the structure in the HVAC are doing and make sure it's not hitting each other." Okay, guess what, there's a clash here, what are we going to do about this? Let's figure out where the clash is, let's send an email to David Sanchez, and say, "David can you fix this? You've got to move your vent unit." And he moves the vent unit and the conflict is done.

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0:15:47 KL: Kristen Ambrose is a registered architect with experience in designing higher education environments for teaching and learning. She is Associate Principal at Ayers Saint Gross

Architects and Planners, the designers of the Edward St. John Learning and Teaching Center, at the University of Maryland. Kristen walks us through some of the phases of that project in her presentation on cross-implementing computational design.

0:16:13 Kristen Ambrose: So I'm going to focus today on designing an experience. There's a qualitative way to think about space. There are so many opportunities for spatial coordination or collaboration in the Cloud or elsewhere to help us think through this. So we use Autodesk Revit that is a software application that has a series of model elements that are located in space via a database. We use it for design. We also use it significantly more for collaboration and communication with a larger, broader team, and our teams are hundreds and hundreds of people. To execute a concept which is building information modeling, which is not a tool, it is a process, it's a methodology for thinking. Thinking about design in a way that it's a digital or physical thing, they're actually the same. Much of the digital world is simulating reality in a way that helps us understand its impact, and visually seeing that, allows us to create more communication with our team.

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0:17:21 KA: What we really think primarily about BIM is its ability to allow different disciplines to kind of intersect, so systems integration with our structural and electrical plumbing, mechanical, we're also now looking more at sustainability analysis, day lighting, energy models. Part of implementing BIM is that there are so many institutional habits, especially in architecture and a 100-year-old company about how things should happen and why you should draw something a certain way. Why we should think about design in a certain way. When we think about what integrated project delivery really is, it's the formal construct that surrounds BIM and allows it to be further understood.

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0:18:16 KA: At the Edward Saint John Center, we did kind of a point cloud of the historic renovation, we generated all the specifications for all the materials in that building from the database. And of course, allowed the whole building to be straight modeled, built from the model rather than from the drawing, of the physical drawing, like a PDF from the model. They're building live from the model data, so that's really changed the efficiencies in terms of the construction as well. So there's a gamut of opportunities when you start putting things in the model.

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0:18:57 KA: So what I think makes that building most successful is the understanding of the occupant. So I mentioned designing experience. How you design the actual experience and thinking about it from the occupant standpoint. And what we're seeing now is that occupant demands are becoming more and more diverse. We're seeing emphasis on inclusive design and accessibility, all of the different things that have, in some ways been important before, but are now becoming even more important as there's emphasis on allowing occupants to really have principles of sustainability and wellness and just overall comfort. And appreciating that, and incorporating that into what we're doing is part of where we felt there was a need to really change the way we collect data.

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0:19:53 KA: When we were first starting this in terms of a building project, like designing the Edward Saint John Center, and there's a series of stakeholder meeting, students, faculty, administration. We invite them all, and say, "What do you need? What does this building really need to be?" How does it need to function?" What are the synergies, ultimately needed to allow these curricular programs to be effective for them to deliver their content? And we were doing this in a very kind of haptic way, like a physical, stakeholder meeting, let's print out plans, let's use post-its, let's get docs, which is all very helpful. And we started realizing we could do this digitally, and we ended up translating a lot of this kind of questioning sessions for our folks that couldn't make it to the meeting. Or wanted to reach a broader audience to get a larger sample set, into a formal app survey to allow the same process to exist in multiple modes, not a replacement for this process, but an additional mode to allow more voices.

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0:21:06 KA: We also looked at current teaching load and all the other kind of institutional data about how they're actually delivering curriculum in space now and mapping that into future potential space, more about making space more flexible, making it adaptable. And part of where we're focused is really on the learning spaces and developing them in a way that was centered around the student mode of learning, collaborative modes of learning. So thinking about these learning environments as connections. So we ultimately came back and looked at them as different teaming modules. So here's one, it's called the tier collaborative ellipse, where students can occupy the space and then turn around and immediately within just a swivel of their chair break into groups.

0:22:02 KA: So this is a live Revit model, with Oculus Rift in Enscape, the live viewer, which is actually a fantastic live viewer – you edit something, and it immediately updates as you're walking around. And I think a really good thing about this is that you tend to think of immersive environments in that experience as helpful and understanding. And what we found is that we just need to really drive the Oculus and let someone else kind of be the passenger in the car as we walk them through and they can have that better realistic understanding of all of these other repercussions.

0:22:41 KA: So in our variety of parameters, we can adjust kind of on a scale classroom space, and live see it update in real time. And that has been monumental, in understanding the ramifications of, "Okay, you have to cut the budget. We have to cut this much square footage, this is what's going to happen to your classroom." " Wait, we don't want to do that. Let's talk about another priority, where we can find space and not sacrifice the classroom."

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0:23:22 KL: What's one thing you've learned here at the symposium that you can put into practice?

0:23:25 Chris Ackerman: It's a concept called earned schedule. It's related to earned value, so I'm going to use it starting on Monday.

0:23:31 KL: What's the thing that you can use out of it?

0:23:33 CA: The concept of earned schedule, which is to understand where on the calendar, in the project you should be, based on the work that you've accomplished.

0:23:41 KL: Oh, the other side of the earned...

0:23:43 CA: Yeah, it's like I focused so much on the cost side, I omitted the schedule, and now I think I have myself on track.

0:23:52 KL: That was Chris Ackerman, and it sounds like he just got some handy takeaways from a presentation by Omoniyi Ladipo and Christopher Payne entitled "So, Your Schedule Says Your Project Will Finish on Time. Is that All it's Really Telling You?" Omoniyi Ladipo and Christopher Payne work for MBP, a construction management, project management consulting firm based in Fairfax, Virginia. Omoniyi is program manager and team leader with more than 30 years of experience in the management of building and civil engineering projects from inception to close out. Christopher is MBP's Executive Vice President and Chief Operating Officer. One of his specialties is resolving construction disputes and the analysis of delays.

0:24:36 Omoniyi Ladipo: We know that projects often are behind and unfortunately, some, if not many, finish late. Owners, their consultants, construction managers, the project team more often than not misinterpret schedules when they make them. We know from experience that combining your schedule review with earned value analysis and value management is definitely a benefit to help you correctly interpret your schedules. But typically owners and their consultants look at the schedules focusing on the critical and the near critical paths of the schedule. However, the key point here is that the smarter owners are realizing that it's not important only to have a CPM schedule that is really stacked, and has all the activities, but that all those activities are planned with resources and cost-loading, at the minimum with the costs that actually represents the work that's going to be done and when it's going to be done. It's important that the schedules that we can use to do this have detailed enough activities that reflect what is actually happening out in the field.

0:25:53 OL: So now let's look at some of the elements of combined review. One of the most important things to have is a performance measurement base line. This is based on having a work breakdown structure that is comprehensive. And all of this is fed into your baseline schedule, reviewed between the owner, and the contractor, and all the stakeholders to make sure that you have a realistic schedule. There are some key parameters that are important, the budget at cost, which is also known as the planned value, is a key parameter, the earned value, which is also called the budgeted cost of work completed, and then actual cost of work completed.

0:26:34 OL: So those three parameters are used to derive the earned value metrics. And we have both schedule metrics and cost metrics. So very quickly, the earned value metrics, there are a lot of them, but the two and most common are the schedule variance and the schedule performance index for the schedule metrics. For cost metrics, you have cost variance and you have cost performance index. Basically, the scheduled variance is the difference between what you planned to do and what you actually accomplished. The index is a ratio of what you planned and what you actually accomplished, and that's similar with the cost metrics as well.

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0:27:19 OL: Earned schedule is basically the time when what you've accomplished now should really have been accomplished. So I want to quickly walk you through a few of the observations that we've made on a lot of the projects that we have implemented both CPM schedule and earned

value on. They say a picture is better than 1,000 words, right? We found that it's very, very effective to draw graphs and draw plot curves to show the project team and stakeholders where you are, how things are going on the project.

0:27:54 OL: We don't only do this for the overall schedule, but we do something called "management by exception". And that is, when you look at the schedule and you see that some particular trade, some particular work element is falling behind, what you want to do is then dig down a little deeper into the costs, the plan, and the actual, and the earned value costs for those activities. And then what happens is right here is the overall curve on the project, and here's a subset for a particular trade. And that can help you find out more about where the problems are, and thereby, help the owner and the contractor make informed decisions that can help them improve the situation or correct the problems. And with that, I'm going to hand over to Chris.

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0:28:49 Christopher Payne: We find many project schedules contain too much float. What do we mean by that? What it means is, if you plot those two curves, the early curve and the late curve, there's too much of a gap in space, which can give you a false sense of security that if you're looking at your late dates, the project's still showing that it finishes on time, yet there's so much work left to be accomplished partway through, that it's just physically impossible to do. So when we see that in an S-curve that can be one of our early warning signs that we have a problem. And what we also have seen, and I'm sure many of you have seen this, what we'll see is a focus on the critical path, because everyone's really interested in that, but you'll see unperformed activities not on the critical path just slip month after month after month. And you see a situation where everything on its surface looks fine, from a CPM perspective, because maybe the critical path of work effort is keeping pace.

0:29:49 CP: But we're starting to get this situation... I've heard the phrase a "bow wave", where there's so much left to be accomplished. And if the schedule is poorly prepared, in the first place, it may create a very unrealistic expectation of what can be accomplished. If we have a good work breakdown structure, it makes it easier to drill down into a second order of analysis and focus on certain levels. So if we have a weak structure, or a poor schedule, or poor cost loading, then obviously that's going to impact the value of the review.

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0:30:28 CP: With this combined review, we start to look at those things together, we can become more alert to things, and not simply accept the schedule at face value, but we can alert the project team to risks and as Omoniyi was describing, work with the contractor, work with the project participants and make sure that, not only do we have a realistic forecast, but we can actually work to complete the project on time and in a more productive manner. We have found, in doing this over several years now, the historical data that we have gathered helps us for future projects and provides lessons learned. And we've also found that on a simplistic level, these S curves are understandable. You can readily understand what's going on, and even for less sophisticated projects, you can still do this kind of analysis.

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0:31:26 CP: So one of the things that we tend to do as an industry is we're too willing to accept a poorly created CPM schedule. And just to have a CPM schedule, it's great, this is what we want. But we don't really do the homework to make sure that it's properly prepared. So if we have our late earnings curve too far apart from our early earnings curve, it may be misleading and show basically that steep curve that suddenly at the end of the project everything's going to work out great. So we see that in the 125 or so projects we looked at, we see the large float values and we see this characteristic.

0:32:07 CP: The second thing we found is, again most people, they get a schedule update, what does the end date show? Let's lock in on that. What does the critical path show? That's about as far as we think. And if we're ignoring the EVM updates, we're giving the wrong message here. So we think it's very important, using this combined review technique, to look at the trend of the earnings. And what we often see is what we call a "delusion", that there's a disparity that earned value curve shows a delay, the critical path method schedule shows on time, and we accept that to go, well, we know they're not keeping up, but the schedule's been revised and some changes have been made. We're still showing on time. And that may be a very dangerous belief to carry forward in the middle of the project. We should be skeptical of that steep slope at the end of the project.

0:33:02 CP: All these earnings curves we all learned, they're called S curves, they've got that classic shape. We suggest, we don't normally think about it this way, but the maximum slope of that curve should be four. In other words, if you're trying to do more than 40% of the value of the project in 10% of the time, that alone is probably very, bordering on ridiculous. Three-to-one might be a better choice. So if you're seeing that at any point, either at the end or somewhere in the middle, that's probably an unrealistic assumption in the schedule.

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0:33:51 KL: The next presentation: Information Matters: The State of Project Management Today is the result of lessons learned over the course of the long and challenging careers of Mark Bodner and Lance Coburn. Mark, the founder and CEO of Foresee Consulting has played a key role in construction projects such as: Epcot Center in Florida, the Atlanta Olympic Games, and the MGM Mirage CityCenter in Las Vegas. It was there, working on the CityCenter project, that Mark met Lance Coburn, an expert construction attorney with more than 20 years of experience.

0:34:24 Mark Bodner: 2005, I was asked if I wanted to move to Las Vegas and work on CityCenter, which at the time was budgeted to be five billion dollars. It was the first opportunity I had to actually buy, or specify a software product that would operate in the cloud, that was flexible enough to set up the project any way we wanted to. And I was working with another executive who said, "I want to take the best of the four entities that are on this project and create a culture for the project."

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0:35:02 MB: What we did was we sat down and went through a whole procedures of how do we want to operate this project and what do we want to write into the contract, and then we're going to deploy it. And we ended up deploying the specific requirements of the contract in a workflow application that would enable you to define every process you had. Now it started out thinking we were only going to manage cost. So when I put out the RFP on the street, I expected 50 users and 13

business processes. Those 50 users ended up being 1,300 users. And the 13 business processes ended up being 150 business processes. What we thought we were going to do with just managing cost turned out to be this is how we're going to manage field inspections. This is how we're going to manage retention release requests. Anything that could get lost, if it went into this technology platform, it didn't get lost. You knew exactly when it was submitted, and where it went, and what was submitted.

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0:36:11 MB: We selected this product that was almost like working with a whiteboard. You could just draw up the flowchart the way you wanted. So here's how an RFI process is here's how a submittal process is, here's how a change order... Whatever you have, we had a business process for. And also, in every step, you could define exactly what the individual who received that task had to do. We ended up with a platform that was the single source of truth, because everybody, including all the subcontractors, were working in this platform, in these workflows. And there was no argument as to whether or not an RFI ended or landed where it was supposed to be on a specific date. There was an auditable trail of everything that had to happen on the project.

0:36:57 MB: And you had a record that would enable you to see where it was, and whether people acted on it, and what actions they took, and what information they submitted. If something had to be submitted and returned, you knew exactly why, because the record had all that information in it. And it was real time. So it was accessible at any point in time, which enabled you to actually make some early decisions on problems, because you were aware of them.

0:37:20 MB: Recognizing whether something was due in a payment, because there was a project record as to whether or not something had the backup in the payment request to support the billing. Changes in the work was a process, so we knew exactly why something was... How it was submitted, why it was rejected, why it took so long for something to get approved. You want to talk a little bit about acceleration costs?

0:37:44 Lance Coburn: Oh, acceleration costs, what we saw on that project, and you can see on many projects at the backend is that it's the slow down to speed up. So when you're looking at a construction project that's going on for five years, and all of a sudden, particularly the subs that are working on cost-plus contracts, all of a sudden slow down. And it looks like you're not going to meet your opening date. So how do they get around it? Then they've got to speed up. And then you see these acceleration costs. And then you have to go back, as a litigator, you have to go back and you have to find out, was that slow down justified? Because the acceleration costs can get tremendous.

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0:38:31 MB: Even though we had one main contractor, we had eight different projects, and those projects were grouped by geographic areas. It wasn't per building. It may have been one building in a block that was worth \$1.3 billion, like the Aria Hotel, but then there were other projects that were comprised of multiple buildings. So we had eight GMPs, and the contractor was obligated to submit a GMP with all of the backup to how we're going to agree to this GMP. So when it came time to close out the project, my friend, Mr. Coburn here and I were working arm-in-arm. And he was basically the legal entity that MGM brought in to help manage the contracts.

0:39:17 LC: So what happened was, functionally the project at the time, I think the costs were estimated about \$5.5 billion. And that went up to six billion and then \$6.2 billion, and that was in mid-2008. I can tell you that at the end of the project, which was in 2010, I remember the day it happened, the general contractor filed a lien for \$491 million.

[music]

0:39:44 MB: Most lawyers, they want to make money on litigation. Lance wants to mitigate litigation.

0:39:50 LC: Let me give you some frightening figures, just to emphasize why I feel like that, and that's that, during the CityCenter litigation, there were four separate legal teams that worked on that for the owner. So if you combine those billing totals for the four legal teams, you were at over... You were north of \$150 million. So I came in and took over as lead counsel for... I was a part in the background of those legal teams leading up to it. I took over the case in 2012, litigated it for the last two and a half years, and frankly, most of the information that we needed, and the way we got most of these claims resolved, was by pulling those project records out, because it was already organized in a way that was very litigation-friendly.

[music]

0:40:39 MB: People perceive the industry to be competitive. Why? Because we put drawings out on the street and they bid it, and they come back and we take the lowest price, sometimes the lowest qualified bidder, but it isn't really competitive, because as soon as they sign that contract, it becomes a monopoly. What is it a monopoly over? It's a monopoly over information. The contractor has all the information and the owner is basically beholden to the contractor's opinion.

0:41:04 LC: Well, that flips at the bid award, right? It goes from the owner having the information to the contractor.

0:41:10 MB: Yeah, it flips, right. It goes from the owner in control to the contractor being in control. So how can technology avoid that problem? By reducing the phenomenon of that going on? Well, we have things like artificial intelligence, robotics, drones, the Internet of Things. This gives us information that we didn't have years ago. Potentially, it's going to explode even more so. I can't wait to have drones flying around the building, after all the labor goes to... Is off the site, taking pictures of everything so you know exactly what the state of the work was in different parts of the project.

[noise]

0:41:50 MB: And it's not just technology. You've got to have a few things to support the technology platform, if you will. You have to have leadership that directs strategy, decides strategy and directs. You have to have a management team that actually processes the work and processes the tasks associated with the work, and you've got to have the contractual responsibilities very clearly laid out.

0:42:16 MB: You also have to have people, with all the disciplines on a big project that are

required, that are effective. So you've got to have people involved in funding, all the way through engineering and delivery of the project, all the way to close-out and operations, that effectively understand how to make all these things stick, in terms of contractual responsibility. Because if you have the responsibilities and you've got the technology, and you've got the people, the last thing you've got to have is everybody buying into and using the technology and doing things differently from what they're accustomed to. If you flow down requirements and you process the information and you capture it, you have the ability to report back and have visibility within the project, real time.

0:43:00 MB: So these are the four parts, which is robust contracts, so all the roles and responsibilities are defined; you have a workflow that establishes how that's going to work, which is codified in the system; you have adoption by all the effective intermediaries, and you have organizational change management, you continuously improve.

[music]

0:43:26 KL: Mike Schlegel is the president of Bozzuto Construction Company. Since joining the company in 1999, he has overseen the construction of more than 25,000 dwelling units and over 1 million square feet of retail space, as well as public and private infrastructure projects. At the symposium, his keynote speech was about the disruption in the construction industry.

0:43:49 Mike Schlegel: Disruption, innovative disruption, generally comes from outside the industry. It's the result of innovation that creates a new market or value proposition. It displaces traditional industry leaders. So is our industry ripe for disruption? There's a number of factors which could lead to disruption, so I'm going to go through each one of these briefly; the size of our industry and the extreme fragmentation; the lack of R&D that's being spent inside our industry, especially compared to technology companies; the lack of productivity gains that we're getting in the built environment is pitiful; labor shortages, which I think anybody in the construction world understands what's happening today.

0:44:39 MS: I think since the day I started construction, we always complained about the quantity and the quality of labor, but today, I see it sort of being a little bit different than it has been in the past. BIM and BIM-like softwares, Navisworks, etcetera, things that allow us to design projects differently. And then finally, Wall Street and venture capital.

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0:45:08 MS: So construction is a huge, huge industry, it's approximately \$1.3 trillion a year. Think about that. The US GDP I think is \$18 or \$19 trillion a year. But yet, there's 730,000 companies that label themselves as construction companies in the United States. So you got a \$1.3 trillion a year market, yet, the top three contractors are only doing 1.5% of that. The top three, not the top one. And look at the research and development dollars being spent by technology companies. I recognize that technology company's lifeblood is innovation. So I'm not sitting here trying to compare and say that we need to be just like technology companies, I understand. I'm simply demonstrating these as order of magnitude thinking about what we're not doing and maybe should be doing, if we're concerned about being disrupted by outsiders.

[music]

0:46:08 MS: And then look at productivity gains, or the lack thereof. And in fact, construction productivity gains have actually been negative. And there's some ways to explain that. Some might be the aging of the workforce, I'm going to talk about in a little bit, but the increased regulation that we have on project sites does make things slower. OSHA regulations actually probably have reduced productivity. And I don't mean that as a knock on OSHA at all, I think it's absolutely necessary. But the primary factors are that, and from the manufacturing, I was talking about the positive, they're working in a controlled environment, they show up to work, and their teammates are the same every single day.

0:46:48 MS: Construction sites, our teammates change every single day. It might be the same guys next to you, but your plumber, or electrician, or other guys around you will not be the same. The environmental factors, of course, change. And then what we build is not repetitive. Every single building we've ever built is different from the last, and I think it'll continue to be that way. Not necessarily the pieces and parts, but certainly the building itself.

[music]

0:47:16 MS: Look at the aging of the labor force in the United States. The 25-45-year-olds or something like, 25-44's, I think, used to represent 52-53% of our workforce. When you think about it, especially in manufacturing and construction, that is the bulk of our workforce. I mean, those are the people that are capable of getting out on the job sites every day, working in tough environments, and getting our projects built. And then look at how much they've shrunk, they've shrunk by 10 points in a relatively short period of time. And then from a population standpoint, that level of movement in 20 years is pretty dramatic. When high school kids are surveyed, we know that going into the construction labor force, the trades, ranks as very close to the bottom of desirable places for high school kids to go. So what happens when the availability of a resource declines? No one?

0:48:19 Audience: Costs go up.

0:48:21 MS: Thank you, prices go up. We've seen prices go up in our market in the past five years by about 30%. And material prices haven't gone up by 30%, it's labor.

[music]

0:48:39 MS: Then technology, our projects typically, our large complicated projects, could easily have 1,000 pages of drawings, easily. Each one of those produced differently and separately by different people and different companies. What are the odds of those being coordinated and working together? But BIM, and virtual design, and Revit-like softwares are going to allow us to build in one model. And if you can imagine not having 1,000 sheets of paper, but rather your whole building, your whole project exists on your iPad. And if you make a change to it, you decide you want to change something, a window needs to get bigger, or move an elevator here or there, it gets updated instantly, not just on yours, but on mine, and every subcontractor, and foreman in the field, and the manufacturers all see that change happen, real time right there, and it's perfectly coordinated.

0:49:41 MS: So what does this mean though? It would allow us to build offsite. The reason that more of our buildings are not built offsite is the lack of predictability of what's going to be there

when they get onsite. So often, when something's pre-manufactured offsite, it shows up and it doesn't fit. But if we have one model where everything we need to know about that building, everything exists, then that will allow us to move more of the construction to different facilities in different locations, possibly solving some of the labor issues we have. We might have enough people in a certain place, but yet, they don't have the right skills and they're not in the right geographic locations. But if you could start moving parts of our industry offsite, then that would allow for, first of all, to utilize that labor force, maybe in more economically challenged areas, but also to train them to build what we need to build. And it'd be more in that manufacturing type setting where we saw the productivity gains.

[music]

0:50:51 MS: Investors are starting to poke around our industry, like Venture Capital and Wall Street. Who's heard of Kattera? So they're a construction company, but SoftBank invested \$800 and some million into them recently because they recognized that there's a real opportunity to change how product is delivered in the built environment and that's a massive amount of money for a construction company. And the people running Kattera, the leaders at the top are not construction folks. I'm sure there's a construction guy in there somewhere, but realize it's finance people, it's technology folks, it's people trying to figure out how to change this business.

0:51:34 MS: They're trying to integrate the entire process through BIM and off-site manufacturing, so it would be very interesting to watch them.

[music]

0:51:48 MS: So as an industry, what should we be doing about this? I think creating alliances and partnerships, and possibly mergers. I love this saying, "If you don't like change, you're going to like irrelevance even less." And I think that's what we really need to pay attention to, is not becoming irrelevant, I think you need to embrace technology. I think everybody's concerned about, picking the wrong technology, but the key is just to have a culture of technological change and innovation because the longer you pause and don't innovate or don't embrace new technology, whatever it is, it could be how you manage your expense reports for instance, and you still do it on paper or something.

0:52:32 MS: The longer you delay embracing whether it be root technology or peripheral technology, the bigger the gap becomes between you and having to catch up. The more people are just used to using technology on a daily basis and they're just flipping out this and doing that and they're not using paper etcetera, etcetera, the faster you will be to make changes because everybody's going to be just ready to do it. So don't worry about picking the wrong or the right technology. I mean, certainly do all the research, but just embrace technology, embrace innovation. And then you've got to manage it from the top down. If the leaders of the company are saying, "Yeah, we'll do it because everybody wants to do it, but I don't really believe in that. Please, can you print out my emails for me so I can read them?" That's probably a recipe for disaster. It needs to be top down, so that we maintain our relevance inside our industry.

[music]

0:53:31 KL: Well, PMs, it's a brave new world out there, embrace it or become irrelevant. All these

new technological advances will make your job exponentially easier in terms of communication – bringing all the teams together on one platform. Accuracy – everyone can work off the same plan as it in real time. Risk mitigation – not only can you identify and address problems before they are literally set in stone, but by keeping accurate real-time records of all the requirements, change requests, and transactions over the course of the project, you can minimize any litigation costs that might arise.

0:54:04 KL: Remember though, in order for these new tools to be effective, you've got to have buy-in from all the stakeholders: the owners, the designers, the tradesmen, the contractors, and ultimately the occupants.

Special thanks to this group of presenters: Ryan Anderson and Susan Collins, Saurabh Gangwar, Jeff Gravatte, Kristen Ambrose, Omoniyi Ladipo and Christopher Payne, Mark Bodner and Lance Coburn, Mike Schlegel. And of course, very special thanks to John Cable, the Director of the Project Management Center for Excellence at the University of Maryland, for making it all happen.

0:54:38 KL: As we wrap this up, I spoke with John to see if we could get some updates regarding the Project Management Center as well as get a sneak peek at the 2019 symposium. I got an earful, so listen in.

0:54:50 KL: So John, welcome to the show and tell us a little bit about the symposium for 2019.

0:54:56 John Cable: Thank you, Kendall. The symposium for 2019 is coming together very rapidly. We're getting a good number of abstracts submitted, well ahead of schedule. It's a little bit too early to announce it, but we've got five very, very interesting speakers bringing project management content from all different disciplines.

0:55:20 KL: This is the fifth year, the one you're about to do? Sixth year?

0:55:22 JC: This will be our sixth year.

0:55:24 KL: So it's the sixth annual coming up here in May 2019 in College Park, Maryland. What's exciting for you about doing it for the sixth time?

0:55:33 JC: Well, of all people, Kendall, you know that project management is a constantly evolving field. We're excited about the opportunity to bring together people that are at the cutting edge of doing different things that are really interesting and really all come together to move the state of the art of improving our ability to manage projects.

[music]

0:56:01 JC: Our program this year has been deeply involved in Agile project management. As you know, when the sixth edition of PMBOK came out, they had an Agile supplement to it.

0:56:14 KL: And they've threaded it all the way through the PMBOK in part, as well.

0:56:18 JC: Yes, absolutely. And about a year ago, we started doing some workshops on Agile project management, working with one of the local chapters and those workshops were extremely

well received and that led to us offering a three-credit-hour normal academic course on our Master's degree in Agile and we've just launched a professional certificate, working with edX, which is a joint venture between Harvard and MIT. University of Maryland does a partner with them. And that professional certificate has five courses and if somebody completes each of the five courses, they earn a certificate. The topics are Scrum, Speed, Innovation, Leadership, and Control.

0:57:11 KL: Do they just need to go to edX.org, or should they come to the University of Maryland to find out how to sign up?

0:57:18 JC: They can do it either way. They can go to edX.org or they can come to our website pm.umd.edu, and you may be interested to know that we're actually planning a second professional certificate, that's around the general subject of people and projects.

0:57:36 KL: Oh wow.

0:57:38 JC: That one, we're still formulating it, but it'll deal with all the topics that our project team members are always interested in. Leadership, motivation, conflict resolution, how to create a great place to work, all the things that are the soft skills, so to speak. Our research indicates that that's probably the key issue in effective project teams, is their ability to work together as a team.

0:58:10 KL: Yeah, and I'm glad to know that we're swimming in the same stream here. I'll remind our listeners that we've already done two podcasts at the University of Maryland and they were on Agile and Leadership.

[music]

0:58:24 KL: So if you're going to be in the DC area next spring, mark your calendars for May 9th and 10th, 2019. That's when the University of Maryland's Project Management Center of Excellence will host its sixth annual symposium, bringing project managers and experts from a wide range of industries together to discuss the cutting edge practices and technologies that affect our world and our management possibilities. Registration is already open, so go to pmsymposium.umd.edu/pm2019.

0:58:52 Announcer: Our theme music was composed by Molly Flannery, used with permission. Additional original music by Gary Fieldman, Rich Greenblatt, Lionel Lyles, and Hiroaki Honshuku. Post-production performed at M Powered Strategies.

0:59:05 KL: PMPs who have listened through this complete podcast may submit a PDU claim, one PDU, in the talent triangle "Strategic" with the Project Management Institute's CCR system. Use provider code 4634 and the title PM POV0056 Knowledge Into Practice, Part Three, Construction. Or use the PDU claim code 4634OP0R5W. Visit our Facebook page, PM Point of View to comment and to listen to more episodes. There you will also find links to the transcripts of all of our one-hour productions. You can also leave a comment on the projectmanagement.com portal, evaluate us on iTunes, and of course, you may contact me directly on LinkedIn. I'm your host Kendall Lott, and until next time, keep it in scope and get it done.

0:59:57 S2: This has been a Final Milestone Production sponsored by M Powered Strategies.