DAVID BUTTS: Glad you could be here. Let me go ahead and get a little PowerPoint thing going for us?

AUDIENCE: PowerPoint?

DAVID BUTTS: PowerPoint. Yeah. so how's it going? Everybody here? Having a good time? So earlier in the-- oh, good Lord. What in the world.

AUDIENCE: I'm managing projects in BIM and I'm going crazy.

DAVID BUTTS: I'm sorry. That's as good as I can get this year. So we're going to go with this nice doctor here. He's going to take good care of you. His name is Dr. Shots. It's OK. He's got some good shots for you there.

DR. SHOTS: It's OK. I don't know what BIM is and--

DAVID BUTTS: He's like, I don't know what the heck that was. So welcome to the class today. You are live right now, streaming across the world to everybody that-- all six people that are watching right now. Really cool? Glad you're here today. Is everybody having a good time? Having a large time?

So today's class is about managing BIM projects without going crazy. My name is David Butts. I am a BIM specialist with Gannett Fleming. I'm actually based out of Raleigh, North Carolina but our company is based out of Harrisburg, Pennsylvania. We have about 60 offices worldwide and I manage all of our engineering software, including all the Autodesk products that we use for design and simulation and all that other good stuff. And so today what we're going to be talking about is how to manage projects like this without going crazy in here.

So I'm going to kind of pass over a couple things here real quick. Did I hit the right button? Let's see. It would be that I would get my clicker not to work right with this thing. There we go. So the course today is about covering effective practices for project managers, engineers, anybody who's working on a job in here. And we want to make sure that they can use BIM the right way on a job.

And you guys have probably seen and heard about a lot of this stuff over the years, but sometimes it always doesn't come across. How many of you guys have just started implementing BIM? Raise your hand real quick. How many people have been doing it for, like,

one to three years? How many people have been doing it for more than three years? How many people are ready to kill people who aren't ready to go to BIM yet? Everybody in the class. That's great.

So it's important that, as we go through this stuff, that you know that I'm going to talk about a lot of stuff that you might have heard but you still need to know how to be successful because if you can't put these tasks and tools into play, you really aren't going to be successful. And we've got hundreds of projects right now that we're doing in BIM. And some of them have gone well, some of them haven't. And this is always an exercise. It's a learning exercise for everyone.

So you need to know how to make sure you set up things like your project execution plan and your staffing, how to do that correctly. An example of how this is a culture change for firms is how you work with things like equipment list and your vendors to get your equipment into your models. And you also want to understand how to use Revit software versus CAD Tasks. And I'm going to change some of the way that you might be thinking about where you might have implemented CAD before in the past as opposed to how you do it now.

We also want to make sure that you know how to use key features like schedules and views and so we'll try to get through some of this stuff because those are disruptive type tools that can actually alter how you do your work in a firm. So here's our course ID. It's MP1573. Remember to fill out your evaluation after you get done. The course is being streamed live right now so I ask everybody to hold your questions. If I can get to a logical break and we can ask people then-- like at the end of a chapter-- then we'll go ahead and do that. Most important part, have a good time, don't go too crazy. Is everybody ready to get started? What?

AUDIENCE: Yes!

DAVID BUTTS: OK. What I wanted to hear. So what type of projects do you guys do? Who does water and wastewater? How many people do natural gas and utilities and that type of work? Got a handful of people. That's good.

What about up water tanks? Anybody in here design those? You ever seen anybody do those in Revit before? Had a guy, one of my techs, call me up one day and say, hey, I want to design a water tank in Revit. And I'm like, OK. And so he goes ahead and he gives me this model with all his cut views and everything. I'm like, man, that's awesome. Really taking the initiative.

How about dams? How many people are actually using Revit to design a dam with? Working on those dam projects are a lot of fun, right? So we actually have started using these to do a lot of the dam facilities. One of the reasons why we like using Revit for this is because of how we can interact components like piping and equipment inside of the dam. And so we're actually building all of these elements into our structures in here and it makes it really easy. And it also makes it easier for us to coordinate these things. So they're put together as a composite document.

Usually what winds up happening, though, is that when we start to roll BIM out, how well is it accepted? How many people have had problems implementing BIM? Everybody in your classroom. I want to show you what happened at my firm and how things kind of went south when we first started saying we were going to implement BIM here. So let's see if this thing works and I get sound.

[VIDEO PLAYBACK]

-Good news, everybody. We're switching all of our projects to Revit starting tomorrow. No more [INAUDIBLE] again.

DAVID BUTTS: Did you get this?

-Yay!

-Yay!

DAVID BUTTS: Or do you get this?

-Say what?

-Are you kidding me?

-No.

DAVID BUTTS: Or more of this?

-No!

-Ahhhh!

DAVID BUTTS: This is called the bail out. It's not ready yet.

[END VIDEO PLAYBACK]

DAVID BUTTS: OK. Clap for these guys. That's my-- those are my engineers, office managers, project managers, team firm leaders that participated from our Woodbury, New York and Pittsburgh, Pennsylvania offices. And they're two of my hottest offices right now. They're doing some great work so give those guys a big hand, man. They're doing a fantastic job.

All right. So I want to start off talking about some key things that we might have to deal with in here. And when you start working within a project, you've got to have a plan. And I know, for sometimes, it's hard for people to do that because we get ingrained in our culture that we're so familiar with doing things a specific way that making that change is painful. And sometimes it can be uncomfortable, sometimes it works and sometimes it doesn't, it really kind of depends on the firm and the people that are working in the firm and how they do this work.

So there's two things that, after doing this for four years now with Gannett, we really had to stop and take a look at how we were doing because our first couple projects didn't really go the way we thought. We had some overruns, we had some budget issues, and we wound up going a little bit out of control. And so we step back after the first year-- myself and Norb Howell, who is the BIM manager for the firm-- and we said, how do we get these people in line? And we kind of missed what we had been preaching in the reseller channel for 13 years. We didn't do what we were supposed to do.

And so what I want to start off talking about is a couple things that people ignore and why you don't want to ignore these things in here. So there's a couple things that are really important. First of all, does it really matter what type of project we're using? Does it matter. You all saw what kind of jobs I'm working on. Are those traditional BIM projects? No, yes?

AUDIENCE: No.

DAVID BUTTS: No. They're not. How many people think the building information modelling stands for a physical building? Is building a verb or a noun? In this world right now, we treat building as a verb because we're not talking specifically about building. We're talking about the act of building, the act of constructing. And what we want people to understand is that it doesn't matter what type of project you're working on. It doesn't limit how you're going to use the software. It's up to you to decide how you want to implement it and how you're going to put it

in.

And so this is the part that most people think they get into trouble on is they don't know how to integrate BIM into the work process. What they do is they spend a lot of time going out and teaching the CAD guys how to model in 3D and they don't make a single change for the engineer of the project manager. Has that ever happened to you? Right? Have you ever had a project manager that says, well, fine, we're going to the project in BIM but then he gives you a CAD outline for what he wants to have happen. That's part of the problem is that you're not integrating it fully into the process.

We're going to get into this in a little bit more detail here. You have to know how to manage these disruptive changes because it is going to change your culture, it is going to change how you do things in your firm. And it's important that you select and train staff the right way. You don't want just go out and say, here's a book, here's a video that you're going to do.

Now, I wanted to talk about this briefly here just to make sure that everybody knows that not every project is suitable for BIM. We actually got into a situation on a job where we got a contract-- a very large contract-- to do a project and there was one line in the contract-- one line-- that said, you will use x software for this project. It wasn't an Autodesk product. Oh, God.

And after we had won the job, the project principal came to me and said, what doe this one line mean? What it meant to us was a lot of money in training and software purchases that wasn't accounted for. Now, we're able to make adjustments in how we budgeted the project so that we didn't really get burned on it. But because we didn't do our homework first and understand what it is that we needed to be doing with this, you can really get into trouble in a hurry.

And so there's a couple things that you absolutely need to know. You need to make sure you know what software package and version you guys are using. How many of you guys are actually keeping up with multiple versions of Revit right now or multiple versions of Inventor? How far back do you go?

[AUDIENCE RESPONDS]

DAVID BUTTS: 12. Did somebody say 2009? I actually talked to guy the other day who was putting AutoCAD 14 on Windows 8.1. Not 2014, AutoCAD 14. 11. No, no, don't do that.

You got to know what software and package and version you're going to use and then what

level of development you're going to do. Again, this is a phrase that's been tossed around a lot, but you've got to make sure that you know what your deliverable is. In the case of some programs, you might have everything from a process and instrumentation diagram to an electrical protection and controls to a 3D model. You've got to know if the client is expecting all that to be integrated together and how it's going to be integrated.

And then you need to know whatever ancillary packages you're going to use. Is energy analysis required? Am I going to have to provide something out of Green Building Studio? Am I going to be modeling bridges as a part of this transportation project and how am I going to design those components? When do I want to know this? I really want to know before I actually put a bid in, before I decide I'm going to do a job like this. And too often that doesn't happen. And that's where people fail.

So a couple things you need to know what the influencing factors are. Is the client requiring BIM? How many of you guys have clients that are requiring BIM right now? Good number of them. How many people have a client that you've gone up to and said, I'm doing the project in BIM and they go, what? I have a lot of them like that because I work with a lot of government agencies. Sorry. Didn't say that.

Does the client require that specific software and version? You've got to ask that question. But not only that, do they understand what they're getting? We don't want to be in a situation where a sales rep has come in and said, hey, you want to use the software and the client is totally under prepared. You have an equal obligation to train your clients to understand what they're getting. If you're not taking the time to train them then you're hurting both of yourselves and you're not going to get done what you need to get done.

Do they include standard files such as templates and content? Now, we do have one client that I love. They're an AutoCAD MEP client but by God those guys have got some templates, they've got parts, they've got everything that they need. And so there's one of my few exceptions. I'm still doing a lot of AutoCAD MEP for but that's something that we can use on a regular basis there. So you just got to know, are they going to provide that information.

And are they requiring interaction with data? How many people are actually tying the Revit projects to SQL right now? Whoa. I can't be the only one in the room. Really? OK. We're going to talk about this a little bit more today.

So now that you've won the job, you've got to understand what the impact is of using BIM. And this is, again, what I talked about earlier. Most projects fail because the design team doesn't understand the change in workflow. How many people can say that's happened? Has that ever happened to you? I mean, this is the common failure in here.

I'm from the south, right. Everybody knows that. Right? North Carolina. Anybody else from North Carolina? You're supposed to cheer, raise your hand. They can't see you on-- yeah, got a couple. Some from the south, baby. Yeah. North Carolina State, we lost to Purdue. Damn engineering school.

So they fail because of these workflow issues. And in North Carolina we have a real bad problem with fire ants. And what BIM does is it uncovers a lot of those problems. When you start working, you don't know you have a problem until you turn the rock over and see, hey, I'm loaded up here, I've got to do something to treat this. And so BIM is actually going uncover these weaknesses. You're going to find out in a hurry whether or not the practice that engineer or that architect has been following is a sustainable practice. Is it something that makes sense, is it something that works pretty well. So it uncovers those weaknesses.

But it can also to be restrictive. BIM requires you to do things a specific way. I used to tell people what was the strength of AutoCAD. And the strength of AutoCAD is you can do anything you want to program. What's the weakness of AutoCAD? You can do anything you want with the program. Right? It's the same time.

How many layers can you define in BIM? You don't. You don't use them except for linked files. So it's restrictive in the sense that it's telling you what you can and can't do to categorize elements and you have to work within that environment. And that-- don't get me wrong, that's not a bad thing from a standards management standpoint. If I look at my CAD standard right now it's like, oh, my god. And then I look at my BIM standards, it's like, yeah, baby, we're right on the money. So those are things that you want to be looking at and understand about how BIM changes those workflows.

How many of you guys are following with the national BIM standard right now? I get a boo in the back of the room. So we actually went back last yeapr-- Norm and I stepped back and said, OK, what is the national BIM standard and how does it affect what we do? And it really was affecting how data and information and how standards get established within a BIM model. It was more about sharing data than anything else. And some visibility graphics, a few

things like that, but it was really about how the interoperability files work.

And so we've adopted this and we incorporated it. And one of the things we did is we actually changed our library to follow OmniClass. Whoa. What the heck is OmniClass? How many people use OmniClass right now? If you go look at my library on my computer it's sort by OmniClass. And I use a little app-- I'm going to give them a shameless plug here-- from Smart BIM. They have a great little library browser for free. They also have a paid one that's a fantastic tool. We use that on all our Revit seats, and that's what we used to help people find content within our systems because right now I have 4,836 standard families just in MEP alone. And that includes parametric versions. There's a lot of content.

So in order to stay on track, you need to make sure you know how to use your project execution plans. How many of you guys are using these on a project right now? More of you need to be doing this. I want to talk about this really quickly. What the plan helps was, is it helps you identify your goals and high-value BIM tasks. Where you're not going to lose money, that's a high value BIM task. Right? How do I get a gain out of using the software.

And then, how do I design the execution process to process maps. Now, what I did was is I actually started doing a map showing where somebody used to do a CAD task, this is where you did it with the BIM task. And I handed that to my project manager so they know when they get a BIM project, where I used to do something here, now they do it here. We had to make that change.

We also had to change how the-- we had to define how the BIM deliverables are going to be in the form of information exchanges. Has anybody signed up for A360? Everybody knows you get A360 for free, right? You need to be taking a look at this. I was at a futures session with Armando and some other people earlier here, and I'm looking at the A360 tools. And I have a tool right now that doesn't work very well. It's from another vendor. And so I'm really desperate to get a better collaboration and information exchange tool. And A360, man, I'm going to go back and take a hard look at that now.

So you make sure you have the infrastructure to support implementation, such as your contracts, your communication procedures, your technology, your quality control. You need to go through all this before you ever start a job. And the project execution plan actually helps you define that.

Now, we're in Pennsylvania, right? And I have nine offices in Pennsylvania. Penn State is one

of our clients and we used their project execution plan as a model for the rest of ours. Now, I can tell you that ours is a little bit different because we have it tweaked not just for campuses and colleges but also for our water and wastewater projects, for our transportation's. Everybody thought the video about the maintenance facility was pretty cool? That was a partnership job we did with a couple other firms. A great, great job on that project.

So this is when we start talking about training. I don't know where this picture came from and I would love to know who to attribute it to. But I saw this on Twitter one day and I was like, man, that's brilliant. So when we started taking our staff and started going through how we wanted to execute our plan, the phrase the most dangerous phrase in the language is that we've always done it this way. Have you heard of that recently? That is-- that couldn't be more true. Because an unwillingness to change and an unwillingness to look at how things might be done differently is, again, one of those points failures. It's something that you have to get over.

I've got a great pastor now and we were talking about conquering fear and discovering relevance and improving methods of how you communicate with other people. And so it's important that you can get these tasks squared away and you can conquer these results. Because the evolution of what we've done has changed dramatically. I mean, think. We started on drawing symbols on a rock. My wife and I went Sunday to the Valley of Fire. Has anybody been up there yet? We're walking around looking at the hieroglyphics on the walls and looking at that-- man, that's really cool, somebody actually climbed up that rock and sketched that stuff in that centuries old algae on a rock.

First CAD. And right behind them was a CAD manager saying, you got it on the wrong layer. So we went to the board, the blueprints, to the computer. But people still treat the computer as a drafting tool when it can do so much more for us. And so you have to get past those fears and make it so that people can work on a job.

So when you start planning your project, you need to identify your BIM goals and uses. This is part of the project execution plan in here. You've got to be asking your staff these questions. You have to be asking this. If you don't, you're already in trouble.

What parts of a project are going to be modeled and what part will continue to be produced in CAD? Yes, you still do CAD even with BIM projects. We're a big time AutoCAD P&ID user. We use it for all our instrumentation and controls. We've written an application that allows us to sync our database between a P&ID and between a database extracted from Revit. That's

pretty cool, isn't it? You hear about people coordinating data or coordinating objects. I like to coordinate data because where do most of my change orders come from? They come from somebody making a six and nine in a schedule. Right? That happens on a regular basis.

Next question you're going to ask is how accurately should the model represent the actual conditions or the finished projects? How many people are aware of level of development? You've probably seen this slide a million times, right? We actually do a lot of BIM modeling. We do a lot of as builts. And, yeah, we've done some laser scanning as well, too, but we also get a lot of contracts where we actually do need to go ahead and model the building.

We had one we were really lucky. We actually did it in AutoCAD and we had done all the profiles for the structural shapes and my tech up in Pittsburgh, one of the guys that was in the video, actually took those models and used them to define the BIM models and set all his profiles. He did an existing model in two weeks. It was great. Of a huge water treatment plant. But that's because we had the CAD files to work off of. It made it easy.

And the reason why we didn't choose to go to laser scan was because we were integrating with an asset management system and we were trying to build something for the client. So we did the existing to level of development 100 to 200. And our projects vary. We'll go 300 to 400. I'm finding myself creeping towards 400 more and more frequently. We're going to talk about this in a few minutes here when we talk about equipment.

Then you have the 500 as-built condition that our contractors are really get into. How many of your guys are actually giving you back LOD 500 files? Are you getting any of that stuff back?

AUDIENCE: Depends on how you look at it.

DAVID BUTTS: Yeah. It depends on how you look at it.

AUDIENCE: Because it's not a straight shot.

DAVID BUTTS: It's definitely not a straight shot. You're absolutely right. So those are things that you have to know in your plan. So you're going to ask more questions. How do I select the appropriate staff? Does everybody have that guy in the back of the office, smells kind of funny, been drinking coffee for six weeks and a day? The staff is the key. You got to make sure that you're picking the right guys in here. And those people have to understand how these tools work and how they integrate into the system.

Now, I used to work for a company called Cadre Systems years ago. David Garrigues, who was on before me, we both are old Cadre guys. Really how ironic that the two of us get to speak back to back, right? And we used to have a boss that said, it's better to train people and have them leave than to not train them and have them stay. Does that sound like common sense? Because you can have somebody that they could still not know what model space and paper space is. I got that question last week.

And so you're training is forever. People think that training is go out and get be a book and here, take the tech and have him learn how to do it. That is not training. That's reading. That's different.

So when you're training people in here, you've got implementation that also goes on forever. It's the blob. How many people are old like me and remember the movie *The Blob?* I remember that one, right? Bleh, out everywhere, right? It's coming, we can't get away. It's Jell-O.

All of these things mean that you have to overcome the fear of change. So when you're picking your staff, you have to look at somebody and say, what are you scared of? What are you afraid of? Are you afraid that if you fail on a project you're going to be ostracized? If you fail you're going to lose your job?

Anybody ever heard that before? People have that fear. It's natural and it's hard for them to overcome that. And so you have to work with that team and say, look, it doesn't matter how you do this, I'm going to be behind you. That's why I love working for who I work for. It's because they're behind us 100% of the way.

So once your staff is assigned to the job, how do I make sure they can do the work the way it needs to be done? And that's where you've got to have the right implementation staff and the right plan in place.

So today's reality, training is required and ongoing. I actually spend probably a third of my time training all year long. I'm training people who just got into BIM, I'm training people who have been on BIM, I'm training people who are really good at it and they are training me. Because I learn from what they do. And it's important to understand that.

Now, there's a couple ways to go about doing this. One is to start with a trusted adviser. How many of you guys are working with an outside consultant or a reseller right now? A few of you

are. It's good to have those people around. You know the reason why I left the channel? I was in there for 13 years, why get out of it? Working with a lot of great people at Autodesk, why get out of it? Because I never got to see the end of a job. And so now I've been able to see hundreds of different projects and how they get finished and what it took to get to that point.

So you want to have subject matter experts in house. And David Garrigues actually told me this when I was coming to Gannett. He said, the first thing you want to do is you want to go to each office and have that guy, that person, that woman, whoever it is that's going to be my in house expert in that office. We call them subject matter experts. We assign them to a specific software package, a specific task within a software package like developing families, and then we go and say, you're responsible for this task.

You got to have a well formed training plan based on the people that you're going to be in there. In other words, if have somebody who's not comfortable with a computer are you going to throw them into an Inventor class tomorrow? Absolutely not. You don't want to do that. You want to make sure that they're comfortable navigating and understand things like picks and clicks. If they have a problem with that, they may not be the person to train for the Inventor.

But you also have to make sure that you plan for all the different divisions within the company. The management staff, the design team, and the technical design. And by the way, we don't have drafters anymore. Is that where we're supposed to be right now? When they talk in the forum yesterday, in the kickoff meeting, and you look at how cool some of the designs are that they're working, you're not working with somebody who's drafting paper. You're working with somebody who's designing shapes. And you have to make sure that your staff becomes that designer. That's your responsibility. Lift them up.

We also have to learn how to train BIM managers. We get a little excited sometimes. Yeah, we're going to do the whole job in Revit! You're going to do structure! You're going to do architecture! Ready, set, hike, go! Right? We get a little excited sometimes so that's why we brought the straitjacket this year. Norb uses that on me on an occasional basis.

Your training topics should include-- and this kind of hits the managers here when you start at the top. We start our projects-- all of our trying is project based, by the way. Is everybody doing that? How many people just have somebody show up and do training and then leave. Don't ever do that again. It's OK for a start.

But you know, I haven't taught a big class probably in about two years. I have some but I don't

do that many of them. But you want to provide information like the overview of what BIM is, how you get a return on investment, what the workflow adjustments is. How many people know what the four step process is, been here before? What's my four step process? What is it? He put his hand down as soon I pointed at him. No, don't ask me.

It's select-- pick your equipment first. Select and pick your equipment, define the standards and pick your equipment. The second step inside the Revit process is define your logical systems-- those are circuits, air systems, water systems. The third step is create you're connecting geometry. And the four step is annotate the model. That's our workflow.

And it really is a culture change for us because a lot of times we're waiting until the last minute to select equipment. Anybody do that? You don't pick your air handler until 98.7%, right? You don't have somebody grabbing stuff because I'm trying to save $10, I might get it cheaper on that one part. That's not design alternatives. That's like last minute panic. Right?

And so you have to follow this process and make sure that you know-- your staff knows how this works from a management side as well. They also have to know the legal requirements and the risk. What am I obligated for from a contractual standpoint and what standards I'm going to follow. When we start getting down into the trenches in here and we go tools to task we start talking about traditional versus BIM, when we use data versus an Excel model, anything like that, internal and external tools for sizing and analysis.

We also look at things for compatibility and coordination. How many people use Navisworks for coordination? Using 360 for coordination. I was given Armando a hard time last year. I said, how many projects are you going to have that does interference protection? Every one of them. Right. Got them in everyone of them.

But then, how am I going to integrate CAD such as my diagrams in the process and how am I going to handle documentation? Content developments a big piece in here. If you're not doing this, then you wind up like me, sitting in a dark room, the gut that smells bad with the mushrooms making content for you, right? You become that guy. So those are things that you have to train.

So I wanted to kind of branch off a little bit and talk about culture change in here. And one of the things that is disruptive-- because BIM is a disruptive process. It changes how your firm works, it changes the culture. And as we started getting into water treatment plant projects and we started looking at how we did our work, we started finding flaws, we started uncovering the

rocks.

And I had my first meeting with one of our practice leads and we had our kickoff meeting and the electrical guys were sitting in the back of the room like this. Uh, yeah, all right, whatever. They're all not involved, right? And I finally cornered them-- because I'll take to anybody, right. I walk up to these guys, so why aren't you engaged, what are you doing right now? And they said, well, we don't get involved until the end of the project because these guys can't make up their mind until the equipment gets picked. Right? So we're dead in the water until they can do something.

I'm like, that's not acceptable. You shouldn't be working on the job at the end of the job. Does that happen to you? It's painful, isn't it? BIM is not about construction documents, it's not about the sheet of paper. It's about the information that's associated with an object. Information modelling.

So we changed our culture. We said, we want you to start selecting your equipment at the start of the job, a basis of design. Doesn't have to be the exact equipment, but as you're doing your energy analysis, as you're doing your initial heating and cooling load analysis, I want you to pick something. I don't care if it's right. Why? Because in BIM it's easy to change that, it's easy to add alternatives.

And so we wanted to make sure that when people select and add equipment that they can do this the right way. So this is our first area of culture change. And you want to get the models and data early in a project. You don't want to wait until the tail end of a job.

And, again, we're talking about basis of design versus final selection. I'm not trying to pick the final part right now. As a designer I'm not really worried about that. I am but I'm not. I'm going to have at least three selections but I'm going to be working with someone who has a model that I can use in here. You want to get it as early as possible, as much as possible.

And you can see that some of our vendors have been fantastic to work with. We get some really good parts. And this is where that little creep, that LOD creep, started coming in on us. Because I didn't really want to have models that were that detailed, right? What happens if you get a model that's 150 MG and you try to put it in a Revit file? How many people are working on the cloud? You're all, if you're non the cloud, you're sitting there going, yeah, baby, bring it on. The rest of us have PCs. I still got Windows XP. Two gig RAM, right? Can't use this stuff.

So we want to make sure we get that stuff as early as possible in here. It's important when you're setting things up, if you're using Revit, you need to know what the categories are. And this is one of the things that was also a culture change. We had to teach people the difference between different types of equipment that you'll use in a project. Right? Who has somebody who customizes families? Anybody? I have a guy in Phoenix I love. Ted, I'm going to call you out because I love you to death. One of my first Revit guys.

And idiot me, I set up an equipment template and I assigned it to be the mechanical equipment category. And he was using it to define families that are used in maintenance facilities. Vehicle lifts, tire racks, parts cleaners. What is mechanical equipment? Fans, air heating units, pumps, panels, building service and process control equipment, right? What I might use in a process plant.

And they have internal connections. I'm trying to create a physical connection to create a system for that part. What I really should have been using was specialty equipment, right? Because the owner was providing the equipment. It wasn't provided by the prime. You have to understand how that works. And so it's owner provided and I'm doing external connections.

This is an example-- and this is just one example-- of how you got to understand how BIM works and how you're going to be using the tools. Because I didn't want to lump all of that owner equipment in with what I needed for my mechanical and electrical equipment. Revit gets a little bit confused and when it comes time to do schedules and visibility, it can be a little bit of a problem, right?

So my buddy Ted had created about 500 parts. Guess who's fixing them all? Bad planning on my part. I didn't know how the client was working and how we we're going to use that. So it's important, if you're doing transportation projects, you better know how you're going to set this stuff up.

A lot of times people will get data and they'll store their data in Excel that goes along with these parts. So it's common to use that. But again, we're seeing more of push in the industry to go to bigger databases like SQL. Anybody seen the Maximo Integration tool for Revit? Anybody had a chance to work with that yet?

Why do I not use DB Link? Anybody have that on their machine? I don't use DB Link because it does a static point in time of everything you have in a model. My application allows me to pick and choose what parameters and what information I want to exchange. So you have to

think about that when you're planning your implementation. How do I want to do this? And we like using SQL because I'm not limited by rows and columns. And I can define those fields and I can share them with other applications.

The big thing to do this, is before you start doing your equipment, is define what you want to share. We got what we call the basic seven, voltage, load, number of poles, manufacturer, model. When do I need to know that information? In our culture change, I wanted to know those seven things at the start of the job. I didn't want to know everything else that went into it because it wasn't relevant at that point in the job. So I'm trying to get the stuff set up better.

So as we started working on this, you had to know what type of families you're going to use, whether you're going to use a shared parameter file that goes in the family, a project parameters that applies to all examples, and family parameters. And this is another area you can get in trouble in a hurry. I know a lot of people that put all their shared parameters for mechanical equipment in as project parameters. Why do I not want to do that?

AUDIENCE: [INAUDIBLE].

DAVID BUTTS: Because the plumber's going to have a value assigned to his plumbing fixture that says air flow. OK. I don't want to know about airflow around a toilet. Sometimes that can be hazardous. I have three boys, OK? And dogs. So we want to know about this stuff.

There's another thing, too. How many people have a good relationship with your vendors, equipment vendors? Good one? Water, it's really important because Revit has such an outstanding library of water and wastewater content. Sorry, Armando. It's reality, baby. He may have made this stuff for hospitals, for institutional buildings. It wasn't made for that. I remember when it came out, they were like, you mean me we have to do MEP? Yeah. Revit Architecture 5, or Revit 5, anybody remember that? Am I the only one that's that old?

So the relationship with a vendor changes. And what you're doing is you're looking for representations for the basis of design. We're going to take a look at this real quick in just a second. I've gotten into Inventor quite a bit here lately and I'm using it on a daily basis. And so when I start talking to my vendors, and I start talking to these guys, I ask them key questions like, all right, do you have a website that has your model loaded up? Do you have someplace where I can just download your data? There's a lot of vendors out there that do that right now.

There's a couple small problems with that. Sometimes when you get a part of a site like Seek,

you're going to wind up getting some shared parameters you didn't expect. One of them will say Voltage just like what you have but it's not the same voltage. I've had a project that had 22 parameters that said Voltage. Seen that happen? Because they all have different GUIDs. We have a whole process for dealing with that.

The other question that I ask them is, can you give me the file in a format that I can edit? What does that mean? Well, that means a variety of different things. And this is where I'm loving how Autodesk is changing their business model. Anybody heard about what Carl Bass was talking about yesterday? What's the new model? You pay a fee annually and you get to use all their software. I'm like a kid in a candy store. I'm going to be doing stuff I shouldn't be tied into at all, right? My dad's going to be in the back room, I'm going to be like the kid with the beanie hat going, look, simulation. Right?

So I really started getting into Inventor. So what I wanted to do is do a little sidetrack for you guys and kind of show a little presentation here on a part that I was working with our Woodbury, New York office here. Give me just a second to get this thing driving. OK.

All right. So I'm running Inventor 2015 here, right? And what I wanted to do is I wanted to get a part for an odor control scrubber from a company called [INAUDIBLE]. Has anybody ever heard of them. By the way, the guys I was working with, they were fantastic. They did a great of working with me to give me design alternatives on this job. We were talking about that yesterday. Design isn't about being reactive, it's about being proactive.

And so, as we were working with this facility that had been flooded in-- what was the storm that went through New York? Sandy, right? The building was under seven feet of water and all the electrical equipment, everything's on the first floor. And so we had to go in and redesign this building. And that included a lot of the odor control equipment, the pumps and everything else like that.

So our vendor came up and said, I have a model that I can give me. And I asked him, I said, what format are you working in? And he said, well, we're using another program. All right. So I said, that's fine, let me see what kind of format I can work with. So when you're working with Inventor, you can look at all these different types of files in here. I can get DWFs, CATIA files, AutoCAD drawings, I can get Alias files. Most o the ones we get are SAT Step or STL. Anybody ever gotten a file like that before?

And the first response that comes from the technician is, what am I supposed to do with this?

How many file formats does Revit support natively importing? Two. Besides Revit Families, DWG and ADSK. And they also can do an import on SAT. It has to be imported, right? So you've got to bring that shape in.

So I didn't necessarily get the files the way that I was expecting to get them. It's OK. It's not a problem. I just went down here and said, just send it to me and let me take a look at what this file is. So what I'm going to is I'm going to kind of scroll down here a little bit and I'm going to find this model that I got from my vendor. He send it to me as a STEP-file.

Now, there's one thing you want to do in here. Once you pick these files, you don't want to just go grabbing stuff and just tossing it up there. You want to actually make sure you know how it's going to work. So Inventor includes a little Option setting in here for you. And I'm going to preface this right away by saying, I am not an Inventor user. There are so many people here at AU that are better than I am at this. And it doesn't take a lot. Somebody could fall off a stage and do a better job in Inventor than I do.

But you do want to check a few things. It's always important to check things like the options in here. You want to look at things like, do I want to include things like the wires and the points? I don't really need that because all that really does is litter up my Revit model. It brings in too much information. So I really just need the solids, I need the surfaces that I'm going to use in here. And I also want to just check them so I'll tell it to go ahead and bring it in as a repair environment.

And then I'm also going to tell it how I'm going to bring it in. Now, Revit-- Inventor does things two ways. You have an assembly file which is made up of a series of parts and you have a part which is one composite part. Right? The BIM exchange for me, personally, has worked a little bit better using part files instead of assemblies. That doesn't mean it's not going to work for you. It just means it works a little bit better for me. And so depending on where I'm getting the part from, usually if I'm importing it from somewhere else, I'm going to bring it in as a solid part but I tell it to be multiple solids. And this is where 2015's gotten better and being able to recognize solid shapes, extrusions and that type of stuff and allow you to create a Revit family directly.

Has anybody seen this? Anybody actually gone in and used Inventor to do this? How many people have the Ultimate Suite? Go back to your office, tell your IT person to put this on your computer tomorrow. I may only use it once a week, I might use it 100 times a week, but by

God, I use the daylights out of this thing. In fact, I've got a big conveyance system I have to fix sometime this afternoon for somebody.

So in this case, I want to bring it in as a solid part. And there's a couple of other things you can do. You can convert units-- and I know this is another thing that fouls people up. You ever got that model that you bring it in and you've got to scale it 1.254 times or whatever metric to inch equivalent is? This kind of helps you convert those files. So what I-- I don't need my glasses anymore. Good.

Go ahead and pick OK in this case so you set the standards. And then we're just going to open the file. This is going to take a couple of seconds to open. Hopefully not too long. Again, what I'm looking to accomplish here is I want a representative part. I want something that's close to what I'm actually going to use in the field.

What are some things that I'm looking for with this equipment? What am I looking to achieve? I need to know where the connection points are. Right? The building ren, you look at it and think, oh, this is a huge building, I have a ton of room.

I flew up to Nassau County a few weeks ago and looked at the building and I'm walking through here going, I don't know how we're going to make all this new stuff fit and put it in in such a way that flooding is no longer an issue for us. And so it's really important. And again, my engineers and our tech team up there are fantastic. These guys have been great to work with and they've been great at communicating with our vendors.

And so the vendor provided us four different models of this scrubber to work with in here. Now, looking at it right off the box you'd think, OK, this might be a little bit too complex for something that I might want to use in here. But really, what am I looking for? I'm looking so that I don't have things like nuts and bolts in here. I've already gone through and done a little bit of editing on this. But you're going to take a little bit of content out.

And Inventor does a few things that aren't really that hard to use but you need a little bit of practice with them. When you start working with different BIM files in here. So what I'm going to do is I'm going to come back here and I'm going to the BIM tool that they have which becomes active when I have a part file that I'm using. And I have these tools like Check Revit Features and Recognize Revit Features. These help me understand whether or not the components that make up this model can be used in Revit.

Now, I'm not going to get into editing these but I just wanted to show you where they were. And it helps you see, all right, if I want to save this as a family, is it going to be possible for me to do that? Sometimes it works, sometimes it doesn't.

So most of the times I'm like, OK, I don't really care if it comes in as an RFA as long as I can export it as an ADSK file. Everybody knows what that is, right? Everybody heard of ADSK? You know what it is? Remember an initiative called AIRMAX? The AutoCAD, Inventor, Revit, 3D Studio Max initiative that started-- how many years ago was that? That's got to be 10 years ago at least when Inventor first started coming around. It was a long time ago.

But we need these things to be compatible with each other. And this is just one of those steps in that evolution of the software. Once you recognize those features, there's other things you can do like remove details, fill voids and define envelopes. So if I want to fill a hole in something I can simply go here and say, Pick A Void and I can tell to find a face and I can go through and tell it that I want it to fill in those gaps, fill in those holes.

Now, why would I actually take the time to go through and do this? What-- again, what are you trying to build? You're trying to build something that is a basis of design not the actual part. How much time do you think I had to spend on this file to get it where it needed to be used in Revit? Want to take a guess? An hour? Two hours? Who said 15 minutes?

Did it in five. Five minutes of my time-- which, by the way, I'm not to build to projects. That's another decision that we made, is that our BIM team, we do work on projects, but we're a supporting team. And we support and organize support probably over 100 projects by ourselves. And so we're constantly helping to develop this equipment and get it suitable for use in our projects.

And so those are a couple things that you can do in here. And once you get finished, then you can go into BIM exchange and you can start saying, OK, I can check the design again, check for Revit features, and then I can export the building components. I'm going to say OK and just go ahead save this guy and let it overwrite it. All right. Better give it a different name then.

After I get that saved, what I'm going to do is I'm going to go back and I'm going to tell it what type of file format that I want to go to. So I'm actually creating a storage bin of all these parts that I've worked at an Inventor that I can use later on. And then I can say what type of format do I want to use in here. Do I want to use a Revit family or an ADSK file? Now, I will tell you, most of my exports are done to ADSK.

Who's an AutoCAD MEP user in here? Anybody go to my class yesterday? Nobody. That's because different staff, right? A multiview part is the equivalent of a family in Revit. And the multiview part is basically a block that has pictures all around the block there are 2D images of what's going on with the model. An ADSK file sets up the same way. It creates a solid model and it takes pictures of the model from all standpoints. So you can have an actual detail symbol that you can go in and edit and remove detail from if you want to use those views.

Now I typically don't. What I'll typically do is, once I get a file like this exported, I'll come back in here-- I'm just going to cancel out of this and I'm going to jump into Revit for you real quick. Glasses again. I'm getting old, man, I'm telling you. So let's jump back over into Revit real fast and switch my views.

And I'm going to show you the finished product of this model in here. This is what comes out when you get the ADSK file. You look at this and it's like, whoa, it's just a box, right? Not actually. That's the images that I had. So I can actually just drop that out-- let's unpin this guy first and delete him-- and now I have my 3D model. How big do you think this file is? About a meg, meg and a half. Not too big. It usable. It's manageable.

But it's because I went through the steps to clean it up in Inventor first and bring it in, that was a change in our workflow. So let's kind of back up and talk about the difference in how my workflow got changed by BIM in here. In this case, our workflow has now changed to where the technician has to learn how use Inventor to be able to work with parts that they get from a vendor. How many of you guys are already planning to do that? That ain't enough. You're not being with mom and dad's AutoCAD blocks anymore, OK? You had to have that technician with an understanding of how to work in 3D and that's where that training is forever part. You've got to be able to get them to understand how to do this.

Our IT director asked me the other day and made me panic. He said, have you lined up your replacement yet? What did I do? Oh, no, no, no, no, no, I didn't mean it that way. Thank God.

He said, what happens if something happens to you? Who do we have that's going to fill in your steps? I said, well, I've got about five people lined up right now. So which one would you pick? I said, no, you don't understand. I've got about five lined up to do what we're doing right now. Because we're just scratching the surface of what the potential of the software is. And you have to have that in your plan.

All right. So let's jump back over to PowerPoint here real quick because I know you guys love PowerPoint so much. Get my mouse back where it's supposed to be. I tell you, I'm getting old. I cant do this split screen stuff anymore.

All right. So as we get back into this again, we start talking about the equipment and the models and working with our vendors. There's a few things that you don't want to forget in here. Did they give you a detailed model and include a lot of information parameters with their family?

Again, be careful when you get RFA files from a vendor. You can have a lot of parts and information in there you don't need. We actually have a standing rule. If you download something off of Seek then you have to go get a shot and get immunized first. Right?

You also want to make sure that when you're checking you use non-RFA and non-ADSK content. You want to use things like Fusion 360 to help edit those models. You want to take out the ID Delta items. You want to use Recognize Revit Features and the Simplify tools like removing voids. You want to get those tools out there and use them. And then you're going to use BIM exchange to save the files.

I always add my connectors in Revit. I don't usually do them in Inventor, again, because I'm not an Inventor guy but I'm really comfortable with Revit. So I can set them up the way I want in there. Also make sure that we set our classifications and categories as well, too.

When you get some from online, remember, you're going to have to do all of this. You're going to have to add the MEP connectors, you're going to have to remove nonstandard parameters, you're going to have to associate shared parameters that go with your schedules. Does everybody have their schedules predefined? Right? Got them in a template?

If you don't have that right now, because everybody's still working in Excel, your legally allowed to go in and take Excel away from-- no? Can't do that. Set your classifications, keep your text files down to specific models. Anybody notice that? They get a text based file from a fan company and so you open it up, it's got 600 different types of fans, just go pick the model numbers you want.

I tell you what I do with them. I load up the model numbers I want into my project and then I edit the family out of the project so I don't have to worry about missing all those linked fields that come from a text file. So when I'm setting the one up for the project, I'm limited to just the

information for those files and it makes it a lot easier to strip out. That's a tip for you. Don't go try to edit the original file. Load it up in the project first and cheat. Take advantage of the fact that the project's stripping it down to just what you need, to your design alternatives.

All right. So we're getting into the last few things in here. I want to talk about Revit versus CAD-- cage match-- and where this actually changed some of our tasks in here. First of all, you need to know how Revit alters your traditional task. And I tell people, forget everything you know about CAD. Right? This is not drafting, this is modeling.

You guys still try to worry about things like pen weights? Is that a foremost problem with your documents, the way the documents look and feel? You're in the wrong place. Because if your BIM team is doing things correctly, that shouldn't be an issue.

We follow the national CAD standard which, by the way, Revit follows. In case you haven't noticed, with newer templates, the line weights follow-- they're already pre-defined to follow the national CAD standard. So don't spend a lot of time screwing with this stuff. You can refine it but don't try to replace it. That's just a waste of time, it's a waste of effort.

So you want to plan on spending more time in the schematic phase and less time in the document phase, right? Who does a 15, 25, 50 for a project, right? 15% budget for schematic, 25% for design development, and then they spend the rest of their life in construction documents. We're a 30, 60, 90 company. We work in 30%, 60%, 90% and we change what task occurs where in the project.

So you break your work down in the four step process and figure out how to make it fit within that new timeline. And then you start looking at the task. Now, I'm going to go through these pretty quickly.

But for the architect, there's a lot of things that you want to do that you might not normally do. How many people are actually doing site based projects in here? Only a handful? Oh, God. Where do you start your buildings at? When you start drawing a building in architecture, where do you start from? If somebody in here says zero, zero, by God, I'm going to get down off the stage.

AUDIENCE: Zero, zero.

[LAUGHTER]

DAVID BUTTS: One guy, right? I do that all the time. No, no, no, no, no, no, no, no, no. This is part of the evolution of natural design. Why do I want to design around a specific point in the site? Why is it important for me to do that at the start of a job?

AUDIENCE: It doesn't screw up your consultants later when you change it.

DAVID BUTTS: It doesn't screw up your consultants later when you change it. We always worry about the known point in a building. Is it the lower left corner? Is it the lower right corner? No, it's not. It's a stake in the site aligned with two points. That's all it is.

In a couple minutes I'm going to show you how to do a rotated view in Revit. It's how we got around that problem. But you want to make sure that you do this. I want to tell you a little story real quick. We had a project that we were working on in our New Jersey offices and-- a lot of maintenance facilities-- and of course we got all these prototypes that we built. So we had this prototype that we were using over and over again which, incidentally, has to change on every single job so it's not really a prototype. That never happens. The client doesn't change his mind 15 minutes after you change the prototype, right?

And so we got the building in and the building was laid out and it was laying out it was not site oriented. It was zero zero. And we got to 60% and we got a call from the architect and said, we got to flip the building. I'm like, stop.

[LAUGHTER]

DAVID BUTTS: You said rotate, right?

[LAUGHTER]

DAVID BUTTS: No, no. No, no. We just looked at the site. I'm like, oh, God. What happened? Well, we got it wrong. It's not going to drain correctly and so we've got to change the access road coming into the site and so we're going to mirror the building. So I have, like, 50,000 families in this project that are hosted.

What happens when you mirror a project to all your hosted elements? They lose their reference because when you mirror, what does it do? It deletes the original and puts an original back in its place. What happens when you delete a host? It loses its host.

I swear to God, if y'all make another hosted family and send it to me again. Whose idea was it

to make hosted elements, use dimensional constraints, for crying out loud? Alignment constraints, hosted elements, good God.

I actually have an uprising in office against hosted families right now. They threatened me with bodily harm. It's kind of like the villagers with the torches. Don't do it! We fixed it. Took us a week. That will screw up your budget in a hurry. So we got that worked out.

You also want to, in pre-design, put some masses in, get your levels squared away, and get some basic objects in here. Again, people try to over detail this stuff in schematics. They try to use the specific wall construction. No, no, no. You're still planning. Use generic walls. We actually made all our generic walls purple so when somebody's looking in a planned view you can always tell the walls are generic type because it always comes in a purple shade. And it's a lovely shade of Pepto-Bismol purple, pink, whatever. I want that.

We also make sure that we have our room objects in. We've been doing a lot of energy analysis studies lately and we make sure that we have our room objects in the architectural model and our space and zone objects associated with them. How many people are not doing their rooms as 3D elements that go all the way from level to level and to structures? How many people put a room in that only goes to eight feet or nine feet? That's architect thinking, right? Why is that different to me as the engineer?

AUDIENCE: You have to light the space.

DAVID BUTTS: I've got a heat, cool, light it, and everything else. And what's going to happen is the ceiling is going to act as a bounding element so the room volume is going to stop at that ceiling anyway. But if you don't have that room going all the way up to the ceiling-- and I'm going to show you a picture here in a 3D view of what happened when somebody raised a ceiling and didn't change the room. And my analytical model was wrong at that point because it didn't have contact with a physical object. So you got to know you got to have this stuff done.

Now, I haven't forgotten about everybody else. More stuff in the pre-design phase. We want to make sure that the engineer different develops and refines the schematics. We want to make sure that they know when to perform their analytical studies. You should be doing this in pre-design. Again, electrically, I don't want to be determining loads at the CD phase. I want to know what my expected loads are going to be early in the job.

So that was our culture change. We had to start changing our electrical engineers thought.

Don't over detail every model. I'm not going to go, yeah, we look at these parts right here and I trim them down, but again, I'm editing them to remove detail when I get to that 500 level, I'm going back to that vendor and saying, give me this final part. And the vendor is going to love me because there's going to be a big check in his future. Saying, yeah, baby, I get to go the Bahamas.

You want to select your basis of design equipment and locate this equipment as early in the project as possible. Just the equipment. Don't try to put duct work in a model at schematic design unless you have to. Why? Because you're not ready yet. Equipment moves, right? So in pre-design that's what we expect.

And when we get to design development for the architect, that's when you start putting more detail in. That's when you start putting the case work in. And when you get to the structural engineer, this is when they really should start working in their model in this case. By the time I get to the end of 60%, I want a pretty well developed structural model. Why? Because I've got to start doing interferences at that point. So you want to make that you're coordinating openings, penetrations for all your major components. I'm working on that in the design development stage.

How many of you guys actually have your structural engineer putting the holes in where pipe goes to the floor? Why would you want to do that? Why?

[AUDIENCE MURMURS]

DAVID BUTTS: It's coordination. You have to locate sleeves. Remember we were talking about creep from 300 to 400? I'm really creeping more to that 400. I want my guys putting those penetrations in because that's a big deal. If the pipes in the wrong place and I core a hole in the slab, that's a problem. Right? Because you can't just and put a little Bondo in there and fix it. Right?

Let's talk about a couple of other things in design development when we get to MEP. This is when you start making sure you have your riser diagrams defined, your P&IDs should be finished early in [INAUDIBLE]. You want to make sure your equipment's placed where it needs to be, and I've got the equipment associated with rooms. I'm adding the connecting geometry, all my duct, my pipe, my conduit, my cable tray. By the time I get to the end of the DD's I've got all that designed.

And I'm also making sure that I've got the right, air, fluid, and power source connections for

the industrial components. Like any of the owner provided equipment, I want to make sure I've got those places. So my industrial team's already into it at this point and they're looking at the major equipment and laying things out.

You want to make sure you're coordinating the data between these disciplines so the MEP guys know what's going on. This is where you're not just getting the data, you're coordinating the data. There's a big difference. You want to make sure you're coordinating it. You want to make sure that you got all your loads defined.

Once we get into CDs it kind of wipes everything out. It becomes, instead of a 50% nightmare of drafting, you're going to complete your model layouts with accessories, you're going to track and quantify your power loads, you're going to do hyperlinks. Anybody do hyperlinks to their specs and reports from an object? You put a family in for an air handling equipment and I have a spec on my system that actually I have a hyperlink to that spec with my family.

Why would I want to do that in a Revit model? It's that going to add a lot of memory? It is a little bit. Who's going to get this model? Who gets the model? The builder? How about the owner. Who is not sharing their Revit files with the owner and the builder and the people after the fact, raise your hand. You're too scared to raise your hand.

[LAUGHTER]

I walked into this meeting with the water utility site and I was showing them the model at 30% and how far we'd gotten. And the operator was sitting in the back of the room and he looked at me, he said, you know how long we've been trying to get your engineers to give us a 3D model? I don't have a problem doing it. You just got to sign this little paper that protects our intellectual property. I give them a legal agreement but I said, I'm not afraid of you. I need you to use my file.

Anybody been looking at the fabrication stuff? Great little session this morning on fabrication. Autodesk is really pushing the boundaries of the envelopes in here to help us take the model really beyond design and into more uses in here. So that's why it's important to have this type of information in here. You want to completely schedules with additional data, you want to fill out your 2D details where things don't cover it-- that's you're drafting views-- you want to get your annotation in here and you want to do your constructability reviews. These are what you cover in the CD phase in here.

But when you get beyond BIM, investments going to go here. When we did our first big water treatment plant, we told the client-- they didn't inquire-- we told the client we were doing that and they came in to see what we were doing. And the project manager actually went to field with a computer and a Revit model and during their meetings they were making changes. Since then we've won three more contracts from the client.

And it's not because we're any better than somebody else. It's because we were willing to communicate and share information with the client. It's open. The culture is changing. We've been so bound up in legal obligations that we missed the point of the value of open communication with our clients and with our vendors. And so these are important things that you need to use because the BIM model can be used for asset management and we talked about our SQL application.

Great for operations and management and for asset management. And also for tying our structures into municipal integration. How many people are using InfoWorks right now? Wouldn't you love it to be able to go into InfoWorks and grab your building and see how it sits on the site and pick it up and spin it around and have the grade and contours pick up and change themselves automatically. That's what we're looking for in this case. And for asset management uses. It can be a single source of data. It can be your database. It exports out of SQL. You can use if for life cycle management space planning operations ownership.

So disruptive changes. We're going to wrap up on a couple things, couple demos because I know it's getting close to lunchtime and my stomach just started growling a couple minutes ago and there's some really good over cooked short ribs that I want to go eat for lunch. I'm sorry. Did I really just say that? What is that salad? I'm not really sure, I don't recognize those vegetables. Look, it's moving. Oh.

So I'm going to do this real quick. I'm going to show on part because I know we're running short on time here. How many people just do traditional plan section and elevation views? That all you produce on your jobs? How many of you guys are actually using 3D views in your printed documents? Excellent. Excellent. You should be doing this on a regular basis.

Now, this is what I was talking about earlier with our sites. We actually use rotated views. When I start setting my water treatment plants up, we actually model specific to coordinate points on the site, we'll bring it in center to center and then we'll acquire coordinates from a site, and then we set a couple of points on the project and those become our control points.

And so we're not rotating the model.

And this is where people get kind of fouled up because have you ever try drawing a pipe at a 42.75 degree angle? And then draw an elbow? What does it do? It goes, I can't do this. That's another one. That's on my wish list. So sometimes it's better just to rotate the view because as long as the view is orthographic then it's easy to do layouts and improves the performance.

And we also use a lot of cropped 3D views. How many people have seen some of the Autodesk demos or finished the building analysis-- building performance analysis class? Has anybody been in that yet, from Autodesk? You haven't seen that yet. You need-- is it still available? The BPA class?

AUDIENCE: It was just this morning. Ian had a class this morning.

DAVID BUTTS: OK. Yeah. Ian Molloy with Autodesk was teaching about-- being me and having nothing better to do, really, I took this course and it took me a year to take the dad gum thing because I had so many other things going. I kept getting the emails saying, your account is about to expire, would you please log in so we know you're alive. Right.

So I go in and take this course, and as I get in there my buddy Armando over here actually hired me awhile back to help design a building for him. And so if you've ever seen an urgent care facility in the demonstration, Norb and I did that. Intentionally not finished, so we can show you what not to do with design. But the whole point was to give something that was based on a closer to real world example other than just widgets.

So we use cropped 3D views. And I'm going to just show you this real quick. So let me jump back to Revit real fast. I'll go through these last couple ones and then we'll get you out of here.

So back to Revit again. And now what I'm going to do is I'm going to cruise over here and I'm going to open up one of these other projects. I'm driving like a drunk monkey up here. This guy right here. All right.

So in this case, how would I do a cropped section view if I wanted to see in the building? It's actually pretty easy to do. You come in here and you just drop a section somewhere in the building. Because we were having some coordination issues here, man. I started looking at the model, and Norb, when he was designing it, he was being the architect. Right?

And I'm like, Norb, you can do anything you want, nobody's ever going to build this thing,

right? So you can give me like 16 feet of interstitial space. He's like, I'm not going to do it. It's not real project. I'm not going to do it. His architect was kicking in like you wouldn't believe. I'm not going to do it. You've got three feet. That's from the bottom of the slab. We've got steel beams that are two feet four inches deep.

How am I going to get through all this stuff, and I'm doing a VRF-- anybody know what a VRF system is? Right? That's like the tubing job from oh, my God. Tubing running everywhere to all these little individual units for the refrigerant here. So I'm modeling this because I got an intern from Penn State who's doing the design. And he's like, let me see how bad I can screw with David.

All right. So I started having some problems getting things to work out and I said, let me cut a section through the building in here. So I got the section and then I go to one of my 3D views and actually take a look at this puppy to see what's going on. And by the way, if you haven't used the Transparency features in Revit, oh, my God. This is just like the kid in the candy store with the beanie. This is so cool.

I can actually take this view here and right click on the View cube-- just a simple change-- right click on the View cube and say, Orient the View Sections. And just grab a section. And as soon as I popped into this section I started noticing a little problem. It's kind of hard to see from this standpoint, but what's going on here? Can anybody tell? My lights and my duct work are below the ceiling.

And so as I started getting in here and looking at the building, I'm looking at this going, Norb, by God, I told you to drop the ceilings down and I need more interstitial space. Let me ask you a question. We talk about putting this on a sheet of paper, where else would I use a view like this?

AUDIENCE: Marketing.

DAVID BUTTS: Marketing. Look at me, pretty pictures. You give this to a marketing guy he say, OK, animate it. Have somebody walking through and do it, and I've got a meeting in five minutes, right? I swear to God, that happened to me. I had a tollbooth. I want a movie of somebody flying through the tollbooth, can you get it to me by 5 o'clock. I'm like, you've lost your mind. Because I don't do that. I've got Kevin. I've got a guy. Right?

But we actually sit down with clients and show them this. Communication with a client, can you

think about the advantage of being able to sit there and say, this is what we're facing. What is the fear that you have from going to that person and saying, I can't do this, I can't show it to you. What stops you from doing that? And with 360 tools the way they are now, you can take your iPad out in a field, for crying out loud, and show them this model and do this view. Where's your fear?

Design is evolving, it's changing. And how you manage these projects is changing dramatically. And it's changing how we communicate with other people in the field and with our other clients and with the contractors. It's really changing how we do all of this. And there's a lot of different tools. I've got a lot of stuff in the handout. We're not going to get to all of it because I know we're running out of time here.

So I'll just show you a couple of other things real quick in here. Couple of other things I look at when I'm setting my project up is I use the 3D views. Whoops, am I going backwards? Turn your pointer right side up. OK.

I also look at doing things like schedules-- I do all my schedules in Revit now and I use it to coordinate my data with my tags and with my master parameters and to get all that stuff defined. How many people are still familiar with the Revit standards that were put out a couple years ago? God, it's been three or four years ago now. If you don't have a place that you're starting from, if you don't know where to start, I strongly recommend getting the Revit Modeling Guidelines.

I did include them-- if you go up and look for Class Parts and Accessories-- I've got a zip file that has those standards and their shared parameter files up there for you. So you don't have to go digging around and look for them. Just go to this class and download that zip file. We actually use that as a starting point for a lot of our shared parameters. Why? Because it was an industry standard at the point. Now we've evolved from it, but it still give us a great place and a way to think about the information.

And another thing we did is there's things within Revit that you can use to help your construction document quality. Things like view templates. Even something you can do now with getting your schedules with a view template.

Ever had a schedule that has thick lines on one view and another font on another view and they never look the same? You want to have my pet peeve? We are one company that does all disciplines and I want all my schedules to look the same. Right? I don't want them looking

like they came from five different vendors. And so you can apply CAD standards in this environment. There's no excuse not to do it but you do it in your template, you do it for the whole company at one standard. You have to change that culture that says we're going to work together and do it the same way here.

We're going to skip over there and we're going to wrap this all up. BIM changes everything. It really does. I got three boys and I look at how different their life is now than my life was growing up. Because when I started the Beatles were here, I could disco dance, I actually had a white suit and clogs. Oh, God, I can't. Don't tell anybody that. That was back in the '70s.

I actually had a drafting table. I use it-- it's great for storing drawings and coffee cups now. And then, when working on the computer became a thing for me, my generation really evolved with it. And the younger generation, that's all they know. We get interns in right now and you tell them they have to draw in AutoCAD and they look at you like, what are you talking about? Shouldn't have to do things that way.

So it changes every time. The key is don't be intimidated by it. Embrace it. Get over your fear, take a positive attitude towards it. You, every one of you, can be successful. You just have to make the decision that that's what you want to do in your firm. And then support the people that are there for you. I promise you, if you change your method, you get behind them, you'll get the results that you want.

Pretty cool? All right. When you get the survey stations this is our class ID. It's 1573. Remember, the correct answer is 10. I do that or else-- if I don't get a 10, Armando says you're not coming back next year. We're giving out passes to 2015 next year back here in Vegas again, right? Best thing to do is to do it right after session so it's fresh on your memory. But if you can't do it, you can do these online. There's stations all over the place.

I'll see your results as they come and if you put your name on it and you said, well, you got a one because you were ugly, I'll see that as well too and then I can track you down and find out where you live. If you're a student-- I love this. Man, I taught for so many years and I just remember when I started working with high schools-- I actually set up an AutoCAD program back in 1999 for Wilson Tech on AutoCAD 11. Right? Am I really dating myself?

It cost us-- software cost us money back then. Now it's free. And I think about where we can take our students in the next generation and what we have to offer. And one last thing, I am certified. I hope everybody else is too.

We have betas for Revit MEP and Revit Structural. They just came out. They're betas so don't get all mad if something doesn't work right. Beginning, let's see where we're going to this. Because we're really trying to expand it out and help people gain recognition for their accomplishments. And really say, hey, I passed this exam, I've met the certification requirements in here. That's what I got for you today. Hope you enjoyed it.

[APPLAUSE]