

PRESENTER: Good morning. I'm excited we've all made it to day three and we're all awake at 8:00 AM. You are in Ways To More Effectively Use Revit For Electrical Design. So if you've not had your coffee yet and you're in the wrong class, please feel free to go ahead and get up, and go find the class that you intended to be in this morning.

Before we dive in I want to kind of get a feel for who we have in the room. So how many BIM managers, coordinators, do I have? OK. How many electrical design engineers, technicians? OK. Any other mechanical, or plumbing staff in here? OK. So we've got a pretty good variety.

So a little bit about me. I'm a licensed engineer-- electrical engineer for Jacobs Engineering. I've been working in Revit since 2007. So for those of you who have just gotten into Revit, it is light-years ahead of where it used to be in the 2007-8 time frame.

And one of the other things that I typically find in a lot of classes is that presenters give this great presentation but they've done it on like, a 10,000 square foot building. And I'm like, a 10,000 square foot building does me no good because most of my projects are bigger than that. So all of the examples given in this presentation are done on a 250,000 square foot airport terminal.

It's been done on a million square foot airport terminal. I've done it on some high rise office buildings as well. So this is a tried method used on larger projects.

I've worked in Revit on everything from aviation, to office buildings, to entertainment, to specialty-type buildings. And then I've also served as the BIM consultant for some of the same projects.

So this is the class summary that you read whenever you signed up for the class. I'm not going to make you read it again, nor am I going to read it to you, but I am required to have it in the presentation. But today I hope that when we all walk out of the room that we're going to be able to use schedules to perform our energy code calculations, that we're going to be able to better coordinate between disciplines with schedules, that we're going to be able to do some load checks with our schedules, and that we're going to be able to catch some of our un-circuited items as well.

Now one other item to note. In my firm, we typically have every discipline in separate models.

Where the projects just get too large to have all of MEP in the same model. So all of these examples are done assuming that mechanical and plumbing are in external models being linked in. That causes some unique situations because as of right now we can't really transfer a lot of data across the link very well.

So here, we've been trying to think outside of the box on how to improve that until Autodesk finds a way for us to actually get the data back and forth.

So let's dive into the energy code calculations. For those of you who have been in the business a while you'll remember that this is what our energy code calculation typically looks like. You can do a spreadsheet. It's going to have this list of all of the light fixtures, the types. You can be pulling out all the cut sheets, looking up the wattages, but then you've got this tension. When do I actually stop and do the energy code calculation?

Because in this method-- typically for projects you commandeer a conference room, you print out all the drawings, and you highlight it. You find your favorite colors of highlighter and you sit down and it takes two or three days. And the question is, well when do I stop and do that? Because the architect and the lighting consultant want the data real time. They want to know, hey, are we doing good? And for us, we've got to stop and take time out of our design to do the counts.

Now maybe, you work with architects and lighting designers who get it right on the first try. I, myself, have not been so lucky. There's been substantial changes and reworks in the design. And so you do the count, and then they go, oh wait, we didn't really like that layout, so we redid the layout. And then you do the count again.

But if you wait too late, you're in this problem of you don't meet energy code. And so how do you really walk that fine line?

What if I was to tell you, you could throw your highlighters away? And that you could give real time data to the architect, to the engineer, and to the lighting consultant. We can do that we can give a schedule just like this. From the minute we put the lights in our model I can give you this data any time you call up and ask. It's a real time update and I know immediately where we have the problems and what we need to address.

So if you notice on this schedule, on the far side I've highlighted these are the spaces where I've got problems but if you look at the very bottom, you'll notice that I've got-- I'm allowed

about 1,400 kw of load, and I only have 8,600-- or sorry, 14,000. So with the tradeable allowances that I have in energy code I'm OK. So I've got spaces that are problematic, but as a whole ASHRAE lets me trade those wattages around.

So we can say, you know what Mr. Architect Mr. Lighting Consultant, we're doing OK right now. We're getting a little close, but we're doing OK. Or we can say, you're home free. Keep on moving. So how do we achieve this?

The great thing about Revit is it's a database. It's got all this information in it and so we have to have this mindset shift that we're no longer just drawing lines and connecting them to have this representation of something but all of the items in our model are true data caches of a bunch of information that we can use. All of our lights can have all the information in them rather than just being line work. Revit can be able to be smart enough to know that these fixtures are in these rooms. So when we place a light fixture, I've got all kinds of data at my fingertips rather than just this little four lines put on there, or this circle.

So we've got to start thinking of Revit as a database rather than a drafting tool. And when we make that mindset shift we start to realize that there's a lot more data at our hands with work we've already done.

So the way that we can get this schedule into our model, we're going to have a little bit of front end set up. So we're going to start by making a spaces a schedule.

Now, if you're not familiar with it, architectural models have rooms, MEP models have spaces that are used for calculations. We are not able to reach across the link and grab the room and use it for any of our calculations. So there's a little bit of front end set up here.

And so what we're going to do is we're going to make sure that we've got the room bounding on, and if we go to the Analyze tab in Revit we're able to create spaces in our own model. And we can define what that limit offset, or the top of our volume is in Revit. Now we can choose as the engineers whether we want our offset to match the architect, or if we would rather have ours go slab to slab. The architect's room volumes are typically going to be to the ceiling.

Now, granted, for calculations our items have to be in the space. So there's a couple of different ways we can combat that.

So on this schedule we've created the spaces, then we've used a tool to plug in that Autodesk provides called the Space Naming Utility. What the Space Naming Utility does is, it looks at the

architectural model and says, these are the room names and numbers, and then matches those to our spaces. So we're able to grab the room name and number across the link and assign it to our spaces. And when you have a large building and a lot of spaces it saves you a lot of time from having to coordinate that.

Now one item to note, if the architect substantially changes room names, room numbers, you have to re-run the Space Naming Utility. It is not a live update. So you run it, and it grabs the stagnant data, and then you work with that.

So on this schedule we've got the room number that we've pulled across the link, we've got the space name that we pulled across the link, and then I've got the limit offset which I've defined in my model, and right beside that I have the room limit offset, which is what the architect defined the ceiling height, or the room volume height to be. And we can either choose to match it, or we can deviate from it. The space volume in our model is only used for calculations. It is not used for anything else, so you can make it be whatever you want it to be. It's not going to impact anybody else. And then right here, we've got the space type definition.

So Revit has this awesome little built in thing called the Building In Space Type Settings under the engineering settings. In here it's got the default settings for building type and space type.

These settings are based off of ASHRAE 2007. I have not checked Revit 2016 yet to see if they've updated it for ASHRAE 2010 or 2013. But these settings can be changed. So they have a default. This is the lighting power density right here, and so it's a default setting.

So the one great thing about this is we're consistent. So we're able to come into each of these spaces and we can either say, you know what, we're going to the whole building method and on the building tab we would say, this is an office space, this is an assembly space, whatever it may be. And it's going to assign that to all of these spaces. Or we can go in manually and say, this is a conference room, this is an open office, this is an active storage space, and set all of these settings right here.

Now before we leave this, the one thing that I want to remind everybody of, your light fixture has to be in the space in order for it to count-- in order for this schedule to work. You have two options with this. In 2015 they introduced the room calculation point part of the family, so you can either change that to where you have it, like sitting on the floor so that it's always going to be in the space. Your other option is you can create this little pole, rod part of your family and

that length can be set to be whatever the fixture offset is. So then that way part of your fixture is in the space.

All we need to do is break the plane of the space volume. Just some part of the fixture, whether it's the calculation point or a rod coming down, whatever you're most comfortable with for your model. It's done both ways. It's a matter of preference.

Another item to know that is very important is, none of this will work if we do not have the room bounding box checked on the link that we're trying to pull the data from. You will spend hours pulling your hair out trying to figure out why it doesn't work if we don't have this nice little box checked because this is what tells Revit go grab the data across, go find the boundaries that the architect has defined and use them in my model as well.

The way you get to that is you click on the link, and then you hit Edit, and then this little window will pop up, and then just check that box. You only have to check it once and you're good to go. But if you forget to check it, lots of headaches.

So once we've done that set up in our model-- for my 250,000 square foot aviation terminal I think it took me 30 minutes, maybe 45 minutes, and I spent most of the time looking at it going, what type of space is this? Click this, this is active storage, this is an office space. That's where most of your time is going to be spent, is assigning the spaces.

You only have to do it once, unless our friends the architects redo the drawing, and then you've got to go back and modify it for where they reworked the rooms and spaces. But you can do that at the front end, kind of once the architect settles the background down. And I'm not going to say finishes. I'm going to say settles down, because the background is never finished, even after construction documents it's still kind of moving around.

So then we get to this schedule. And so on this schedule we're still working off of that spaces schedule we created. We've got the room number, room name, we can get the square footage in here, the space type. So on this schedule you can see I've assigned a lot of different space types.

The great thing about the space types is it uses that-- the building slash space type setting in Revit and pulls in what the allowed watts per square foot, and what that VA calculates out to be using our square footage, and the LPD allowance. So all we do is, we add the parameters that are already in there, specified lighting allowance-- specified watts per square foot, and

specified wattage. Those are parameters that are already in there and we're able-- so we add those in, and then we add the same thing of actual lighting wattage, and actual lighting wattage per square foot.

So it pulls that in, and then if our lights are in the space it also pulls in what we have in that room. So all we've done is, we've set up spaces, we've put our lights in the model, and we've created a schedule manipulating that data to our advantage. So now, instead of spending three days doing the energy code and then having to redo it, I've got a live snapshot of the data that I can use at any point. And I've still got the summations at the bottom to know that the tradeable allowance, I'm still OK.

OK. So how did we actually get the conditional formatting on there? One of the things about Revit is that the formulas are not always the easiest thing to work with. They're very basic for conditional formatting and schedules, and they're very simplistic. Meaning, I can't do this it/then type of statement. I have to do a greater than, less than, equals-- one variable equals this. There's not really a whole bunch to work with.

So if we think outside the box, how can we manipulate the data that we are to have to let us get that type of formatting?

So all I've done is, I've added this Above LPD Allowance column. I'm using the data that's already there and it's a calculated value. So if you've never worked with calculated values, on your schedule properties you're going to go to Fields, and then you've got the add parameter, and then right below that you're going to see the calculated value button. We're going to click that button and we're going to put in our calculated value.

So what we've-- you can name it anything you want. Above LPD Allowance is intuitive to me, but you can name it over, or offset, whatever works for you. And all we're doing is we're looking at the actual lighting load, and we're dividing it by the specified lighting load. We know that if we're in the energy code allowance it will always be one or less. If we've exceeded the energy code, then it's going to be greater than one. So now, we've got it simplified so where we can use the formulas in Revit.

So I've got the actual lighting-- let somebody go over to the Formatting tab, and under the Formatting tab, I can come over here. So here, as you can see, this is as basic and simple as the formatting that I can do on a schedule. It is very basic, greater than, equals, less than. I

can only work with one field at a time and do one very simple comparison.

So we've manipulated the data in a format that I can use, because before I needed to do that above-- you know, the division, to know where I stood. Here, I've done it and I'm working with, the above LPD allowance is greater than one, and then I put a color on it. So now that's going to show up on the schedule and this is a formula that runs in the background.

So you may meet the energy code in a room and then you decide that we're going to go from T5's to T5HO's, and that's going to send us over. And we change our light fixture out our schedule will update as well.

So we've done all of this. We've got this assessment of where we stand on the energy code but then I've actually got to present it to the AHJ. The Authority Having Jurisdiction. In Houston I have to fill out COMcheck. I don't know what your authorities having jurisdiction require to prove energy code, but if you've ever worked with COMcheck, it's not the most intuitive program. It's not the most user-friendly program.

So we can manipulate the data to the exact format that we need for COMcheck. And so now, I've got this schedule right here that I just have to print it out, and either I can input the data myself, or I can give it to an intern, or someone else to put in. It's already divided exactly how they need it, active storage, conference meeting room, corridor. I've got what my type mark is, the fixture description, how many lamps, what lamp type it is, the wattage.

All of this data is already in our families. If we program it into our families, all of this is here. All we're doing is we're manipulating some schedules to present the data in a format that is usable to us.

So now, I've gone from having three to five full days of doing energy code calculations and then putting it in-- getting it in a format that I can do in COMcheck to two hours, maybe three hours of work, just by manipulating what we already have.

For my aviation terminal I filled out COMcheck in 30 minutes flat. If you've ever filled COMcheck you know that's pretty fast, start to finish grabbing all the information you need and putting it in.

Right so, this is all great and fine until we start working with cove fixtures. In the way that we typically model a cove fixture is we do an extrusion. So you have one family that stretches to

the length that you need but most of the time, that's not how a cove fixture is going to be installed. It's going to be installed in four foot segments, or three foot segments, whatever that length is going to be.

So Revit looks at the instances of the family. So if you've got one cove fixture that's 500 feet long, but it's only one family-- one instance, Revit sees that as one fixture, not 200 fixtures, which would throw our energy code off. But we found a way to work with that.

So Revit has a length field in it. And so our family has a length, and in that co-family we also added a parameter that said, off-the-shelf fixture length. Meaning, we would typically buy this fixture in four foot segments, or we typically buy it in three foot segments, and we created a formula that said, the length divided by the off-the-shelf length gives me this many fixtures.

And so then I've got the cove whole number field. So what I've done is, I've done that formula and then I've told it to round up. Revit has a couple of cool commands where you can tell it to round down or you can tell it to round up. In our case, we know that if the fixture-- if the cove length is 500 feet two inches, I've still got to make sure that two inches is covered somehow. And it could be done where we could stagger the fixtures or we could do something, but we know that I have to round up. I can't just disregard that one foot doesn't fall in my even dimensions. And so for a conservative approach for our energy code, we're going to tell it to round up, meaning we're going to need one more fixture to cover that.

So, one of the tricky, weird things about Revit is the count field cannot be used in calculations. I really wish it could, but it can't. I cannot grab that data and use it, but one of the things-- the way to work around it is, I've created a count manual field. And so all it is, is it equals one.

So on that schedule I told it, do not itemize every instance. So it's going to put all of my JA fixtures in one line. And then I've told it give me-- for the count manual field, give me the totals. And so it will actually sum it up and give me the actual count of that instance as a family.

So now I've got this formula right here, where I'm saying if the cove family-- if it's a cove family then use my count based off of the length and the fixture lengths off the shelf. If it's not a cove family, then use the count. So that way I'm doing this comparison to know exactly how many fixtures automatically. I'm not having to go in and check a box and say, this is a cove fixture, so use this value, or override anything.

Are there any questions in regards to the energy code calculations schedules?

OK. All right, so let's dive into mechanical equipment checks. This is a trickier part of Revit simply because I can't pull a lot of the data over that mechanical has already done. So how do I actually check?

Old school, our highlighters came back out. We'd go print all the mechanical schedules, and we'd sit down, and we try to find them on our drawings, look in our panel schedules, check the loads. We're hoping that we printed the schedule at the right time and the mechanical hadn't just redone everything on us. And so sometimes we do the check and then realize we've got to do it again because they just redid it.

So we're working on ways to improve that. So one of the first things that we've started doing in our office is copy monitoring mechanical equipment. And the reason we've been doing that is, it helps us to know when mechanical moved or deleted a piece of equipment.

We like to think in our perfect world that we communicate really well within our MEP teams, but you know, once you get close to a deadline everybody's scrambling, and sometimes things get dropped, or fall through the cracks on that type of communication. So we're going to copy monitor.

But I don't want all of these air handling unit families in my model. I don't really want to deal with them. They're big. They're bulky. We're electrical. We don't really like the air handling units.

So with the copy monitoring we can either tell Revit, copy monitor the family exactly as it is in the other model, or when you copy monitor it, use a different family that I tell you to use.

So what we're doing here is, we've got mechanical equipment. This is what you're going to see standardly. The copy behavior, copy individually, meaning I have to physically click on every single piece of mechanical equipment in order for the copy monitor to happen. And then the mapping behavior is, I want you to copy the family that I clicked on directly into my model.

But what we can do is, is we can do a type mapping to where we can say, for this family for the BTH family don't use the original, use this family that I'm pointing you to instead. So what the family that we typically use is the electrical connector symbol. So now, I'm copy monitoring it, but with the family I'd already be using.

One of the things that's important to note though, is this family has to be classified as

mechanical equipment. I cannot copy monitor mechanical equipment and tight map it to an electrical equipment. It has to be the same family category.

And the same difference-- we need our mechanical engineering friends to make sure that all of their equipment is on the mechanical equipment category. It shouldn't be a big deal for them. It's not going to change any of their calculations. It's not going to change anything for them if they don't, but a generic model won't work for this. We need them to have it on the mechanical equipment category.

OK. Doing a check on time. We're doing good.

So we've got this family, and we're bringing it in. We've got it classified as mechanical equipment. So the next thing that we're going to do is make a schedule.

So one of the key points of why that has to be mechanical equipment is so that it shows up on this schedule. So in that family I've sat down with my mechanical engineer and I have identified key parameters that we need to agree on.

Our mechanical group happens to use mark for their equipment naming. Some people use type mark, but we need to agree.

We need to say, OK, for this family this is the field-- the parameter we're going to populate. So we've created a schedule and we've told them, do not itemize every instance. And we've also said, include elements in link. This is a very important checkbox. That checkbox will also cause us headaches if we don't have it checked, because you're going to create this mechanical equipment schedule and then wonder why you can't see the mechanical equipment that's coming across the link.

So when we have that box checked-- so then we're doing the schedule that has, do not itemize every instance. So if I have my electrical connector named the same as the mechanical piece of equipment, they're going to roll up under one line item.

And so the way that I check to make sure is, I've got this count field right here. I should see a two in that count field if the mechanical model has that piece of equipment and I've made an effort to circuit that piece of equipment. I've acknowledged that it's there. If it only has a one, then I need to figure out, either the mechanical team deleted it, or I have not recognized in my model, with my connector symbol, that it's there.

And then, one of the things about Revit schedules. Revit schedules do not understand null. If there is nothing there it won't do anything with it. You can't do a formula on it. You can't do a conditional formatting. Nothing. Excel, we can say if it's null, then do this. Revit, you can't, at least not out of the box. We might be able to write a plugin or something but out of the box Revit does not understand null.

So my conditional formatting here has switched a little bit. So instead of saying, I have a problem. It's now highlighting on the mechanical schedule, this is where we're in line.

So on the schedule you can see that for error handling unit 1A, I've got a count of two, meaning the mechanical model has it and the electrical model has it. And we both agree that it's 7.5 horsepower. So in this point we're coordinated.

But on the next line you can see for air handling unit 1B, I have a count of two, meaning we've both put it in our model but we disagree on what the horsepower is. Typically, when we circuit, we put in, this is the assumed horsepower that we were working with. So that we can check it and say, OK we thought it was 10, you still say it's 10, we're good.

So now in that field I obviously assumed it was one thing and our mechanical engineers have changed it from when we first circuited it. So now when we don't itemize every instance and the field differs, Revit says I don't know what the right answer is so I'm just going to leave it blank. So when it's left blank that highlights to us that we are no longer coordinated. We need to go look at that piece of equipment and determine what horse power it should be.

And then if we move down, 1C, my count is one, meaning I haven't tried to circuit this piece of equipment at all. So even though the field is highlighted as green, I haven't made an effort to circuit it yet. So therefore I need to go find it and circuit it.

This same strategy can be used with plumbing equipment, your connector, or your disconnect switch would just need to be defined as plumbing equipment rather than mechanical equipment. You could use it for doors-- like the automatic doors that architects have, or anything that requires a motor. You would just need-- you would need to know what family the architect or the engineer has it classified as, and your family that carries that important data would have to match.

This is one of those things that if we lived in the same model this type of coordination would be a little bit easier, schedule wise, but because we don't, we have to get creative. Embedded

schedules do not bring things across the link well. So just because I embed a mechanical equipment schedule in there, the data doesn't always come across the link. So that's kind of why we've come across this type of schedule.

AUDIENCE: You know if you can use schedule keys to customize your schedule?

PRESENTER: I haven't tried that. The question is, can you use schedule keys, or key schedules--

AUDIENCE: Because I know you could if you were just coming through the length [INAUDIBLE] process [INAUDIBLE].

PRESENTER: Yeah. The question is, can you use key schedules as part of the copy monitoring strategy to pull data in? I haven't tested it. In the past it didn't work well but it may have improved in 2015 or 2016. Likelihood is, probably not. Because key schedules are not one of those things that Revit or Autodesk advertise well. It's kind of one of those hidden, little gems in there. So I don't think they're focusing on it right now.

Are there any other questions regarding this type of strategy?

OK. So I talked a lot about itemizing every instance. This is that magic little box right there, to where you would say, itemize every instance or don't itemize every instance. And that's going to be under your sorting and grouping tab.

One of the things that you can do is-- so, we've got this schedule and it's blanked out. We could then go and check that box. And then, you would see air handling unit 1A, and then our copy of air handling unit 1A listed right below it. Any data that's come across a link we're not going to be able to change.

So when we click on that motor field it's not going to respond. It's just going to be blank, grayed out. But our motor field we would be able to click on and change the horse power right there.

Other things that we could do this with? We could do it with voltage. Our mechanical friends are notorious for changing the voltage on us sometimes. We could do it with poles. Sometimes we think it's 480 three-phase, they think it's 480 single-phase. Minor difference.

So start thinking outside of the box on what are the things that are important to your team to coordinate with these other disciplines. What are the things that we typically get ourselves in

trouble with? And we can do schedules to combat that.

OK. One of the other things about Revit-- in my office we've kind of got this wide range of people. The fresh out of school, super excited, technology is my best friend. All the way up to the good old boys who have been around since the board drafting days and AutoCAD was a major leap for them.

And so now that we've got Revit they're like, I'm not touching that. I'm retiring in two years. I'm not learning another software. And so then we've got this disconnect between the good old boys who are like, I haven't done it that way. I'm not changing. My way works. And then this database full of great information that our young, energetic, new team members are like, this is awesome. Look everything I can do.

So how do we actually get the data to a format that is usable for our good old boys? That they can see there's merit to this program? And that's one of the things that we've really been battling with, is how do we get that data out?

And so what we've come up with is electrical loading checks, and what we do is we call it the Z Series Drawings. In the MEP world we will never have a Z series drawing. We're always going to be an M, E, P. Sometimes is going to deviate a little bit, but we will never have a Z.

So if we have a Z series drawings it does two things. One, we never want to publish these checks. We want them for internal use only. So if we put them on a Z title block and we mistakenly send it to our architects they're going to call us up and be like, why did you send me this Z series drawing? Or your sheet index is wrong, fix it. And then we're going to realize we mistakenly sent it out.

This is also really easy thing for our QA/QC team, because what we do is, we have Z series drawings. So now they go, you know what, I need the Z series drawings as part of my quality check. And we go, great, easy enough.

So, one of the things that we've got in Revit is the overall load analysis. Some of our good old boys are used to the Excel spreadsheet, where you've got to keep it up to date at every minute and normally towards the end of a project you don't always get your load analysis updated as quickly as you would hope.

Here, I've got a real snapshot of exactly what I have in my model and what's circuited at any given point. And this is a load analysis that we publish to the city, and the city accepts it. It's

got all the data on there. If they wanted to, I could add the demand factor column in there. It's part of the model, I just don't have it on this schedule.

So how did we get this schedule? This is one of those schedules that is kind of a challenge because panel schedules don't lend themselves to this well but this is where all the data is. It's in the panel schedules.

So what we've done is we've created a template called load analysis. And when you create that load analysis template at the very bottom you're going to have all the loads. So we've just deleted all the circuitry information above it. And so for our switch gear, we don't typically publish a panel schedule. Our one line holds all the data for the switch gear, or whatever you're using as your service entrance. You're going to have your one line and then once you get downstream of that is where you start publishing panel schedules.

So here, I've got a panel schedule called load analysis that I formatted in this way. And then you just delete all of the upper information, all the circuits, all the panels, all that information at the very top. And I'm just left with the load analysis.

Now granted, there's going to be a couple of extra lines in that schedule because Revit doesn't completely want to let go of the fact that it's a panel schedule. It should have breakers. But those lines are blank. And when you put it on a sheet they won't show up. So just note, you're going to see a couple of blank lines at the top of your schedule when you're looking at it in Revit but they will not show up on your plot sheet when you print.

And along these lines we have some AHJs that want to see the breakdown of the load at the bottom of a panel schedule, and we have some that don't. This is simply a template change. I didn't do any additional work to put the loads at the bottom. I just have two templates in my model. One template that says, panel schedule with loads. One that says, without.

And I mean, the data is there. It's just how we present it. We have to start thinking about how do we want to present the data that we've already done? We've already circuited everything. We've already connected everything.

One thing to note, on this load analysis we must physically connect all of our panels in our model. If we don't connect the panels, the load analysis will not work.

So Revit has two things that we have to think about when we're circuiting. You've got the

behind the scenes, actual circuitry of where Revit's realizing that I'm connected-- panel 1A is connected to panel 1DP, and panel 1DP is connected to MSA. And then we've got the graphical representation of our circuits, where we're drawing the home run arcs or our one lines, whatever it may be. So there's two things we have to account for when we're circuiting.

In CAD, we just drew a little arc and on the drawings we were circuited. And then we used our Excel spreadsheets to connect everything together and we prayed that someone didn't break the link because then, you're like, trying to find where the link was broken all the way back because you know the 500 amps on a 1,600 amp board is probably not right.

So, I typically circuit this at the beginning of a project. Once you get far enough along to where you kind of know what your one line looks like, you spend 20, 30 minutes actually connecting all the equipment together. This is what's going to bring the loads all the way through the model and give us accurate data at the front end. If we don't actually connect the panels, this schedule will not work.

Now another thing to note is our good old boys think technology is evil and therefore they're going to say, I don't trust this schedule. I've had this discussion with multiple senior guys who've been around for a while.

And I would say to that, you know what, let's test it. Sit down and have-- you Mr good old boy, senior engineer, do your hand calcs. I'm going to do the calculations in Revit, and let's sit down at the end and compare them.

And one of the things that you'll find is there's going to be human error, but there's going to be human error on both sides. They don't like to think about the fact that they might make a mistake on their Excel spreadsheet just as easily as we'll make a mistake on our circuitry values. So once you work through that there was human error on both sides, the numbers are actually going to agree. I've done this on multiple projects and I've managed to have success in proving to them that this will work.

Another thing that they're going to say is, well, I don't like Revit telling me what my demand has to be. Hey, you can set that. The demand factors are part of the engineering settings. It has some out of the box settings but you can go in and modify those. So whatever setting you would like them to be.

But you can see on here I've got cooling, heating, kitchen equipment, lighting, miscellaneous

continuous, miscellaneous non-continuous, motor, receptacle, spare, even existing load. So I can do everything that the Excel spreadsheet can, and I can do it faster. And so then when you start having those discussions and you go tell your project manager, I can do it faster and still get the same information.

Suddenly you start getting people's attention that maybe there's something to this program. And if we start having this reeducation in the change of mindset that we're now working with a database that happens to have a drafting component rather than just drawing a bunch of lines, we can get somewhere.

Other things that we can do is our RHJ requires a line at the bottom that says, whatever the service size is adequate. That's not a field that I manually populate. It brings it in automatically. It's just a parameter.

So we've got our panel schedules there. One thing that we do have in here is a non-coincidental load. Revit does not understand non-coincidental loads. So that's a manual formula that we plug-in, but it will automatically run. We'll come back in touch on what that formula actually is.

So how do we actually use this data to prove to our senior guys that there's something worthwhile? A lot of times on our jobs, at the very beginning, we kind of size our one line and we have everything laid out and we don't really know what all the loads are going to be so we're going to throw 75 KVA transformers in across the board.

And then we go, you know what, I'm short on pole spaces. I'm just going to add a second section, and then I'm going to add a third section to that panel, and we forgot to go back and look if our transformer could handle that additional load. So now we can make a schedule that gives us what our transformer name is, what the KVA size is. That KVA size is based off of the family.

So when I put a transformer on the drawing I'm going to put a family-- it's either a 15 KVA a family, or a type of-- or 30 KVA type, or 75 KVA type. So that's not a manually entered field. It's based directly on the family that I put on the drawings.

And the reason I say that it prevents us from just changing the KVA and forgetting to update the footprint. Because that's where we also get ourselves in trouble, is we go, oh, that needs to be bigger but it's still a 15 KVA transformer footprint and it suddenly doesn't fit. So and then

I've got the connected load and I've got the estimated demand.

So this is all the data that our senior engineers would want to see to evaluate what the sizing of that transformer should be. And I'm highlighting instances where I probably need to upsize it. So if you look at transformer 1TADA, it's size is a 30 KVA, but I've got 46 KVA of load on it. Probably need to change that.

One of the other things that we're notorious for is throwing a bunch of 75 KVA transformers on there and then never going back to see if we should downsize them. Sometimes we have them in there for future capacity because we know the tenant's going to come back and build it out, or the client going to do something. But sometimes we were claiming our space early and then we forgot to go back and look to see if we really need it.

And so this schedule can also highlight where our transformers might be underutilized. For an example, 1TAHB. I've got a 75 KVA transformer with nothing on it. Maybe I don't even need that transformer or that low voltage panel. Or, maybe there's supposed to be something on and I've got absolutely nothing on it.

So I need to go figure out what's going on. It may be a case of the panel never got circuited to the transformer. So this schedule is highlighting something is off, let's go figure out what it is.

Two things to note really quickly. I told you these were based off of real projects and they are, but I intentionally manipulated some of this data to show you how the schedules will work. So I intentionally broke it and made things overloaded to show that the formatting will work.

And the other thing is, these schedules are not the end all, be all. They do not take away our engineering judgment that we should be using on every job. This is just presenting the data to us in a usable format to make those engineering decisions.

I can never stand in a court of law and say, well, my schedule said I should change that transformer size. That's not going to be a viable answer. So this is not-- just because the schedule says I could downsize it, I should. It's simply presenting the data to us to make a decision if we should make a modification to our design or leave it as is.

So we've looked at transformers. One of the other things we get ourselves in trouble with is panels that we just circuit away to our heart's content, and then at the very end we hope we remember to go back and check all the mains and make sure that they work. And normally that was done by our senior engineer asking for panel schedule printouts and sitting down and

going through it, and we're going, well, but I'm not quite done. I realize the deadline is tomorrow, but I'm not quite done.

This can give us a real-time snapshot very quickly. So rather than paging through 30 sheets of panel schedules I can present him all the data right here. And so on this schedule it's the same premise.

You can see that on this panel right here, 1DAD I've got 522 amps on it, on a 400 amp panel. Probably an issue. And I'm also highlighting where I might be able to downsize the panel. To where, like right here, a 1,200 amp panel, 267 amps on it. Maybe I don't need a 1,200 amp panel there. Maybe I could knock it down to 800 amps, or 600 amps.

But this goes back to that engineering judgment. Maybe I'm reserving space for future tenants. So just because there's extra space doesn't mean we need to change it, it's just highlighting to us that we have a bunch of extra capacity on the panel.

Now one of the things that I want to show you. 1DBJ looks like it's overloaded. All of these mains-- I'm doing it off of 80%. We don't typically design with 100% rated breakers. That's the exception, not the rule for us. And so all of these assessments are assuming an 80% loading.

Now, so I've got 1DBJ. 1,475 amps on a 600 amp main. It looks like it's a problem but one of the things that we talked about earlier that Revit does not understand non-coincidental loading. Non-coincidental loading is essentially if the heat is running, the AC most likely is not, and vice versa. So I don't need to size the panel as though both are running at the same time when we know that that's not going to happen.

So on the panel 1DBJ it has 1,475 amps, but when I take the non-coincidental value it only has 997 amps. So now that 1,600 main is appropriate. But this gets back to that problem that Revit doesn't like null.

This formula-- this field right here, the NC demand current, if it's blank it means that that panel either does not have a heating load on it, or it does not have a cooling load on it, or it does not have either. So it's going to come through as blank. It's not going to come as a zero. It's going to come through as blank because in Revit's mind it doesn't exist.

So on this schedule I can't actually do a formula that includes the non-coincidental because some of those fields are blank, which become null and whenever there's a null in a formula

Revit just does nothing. It doesn't know what to do so it just ignores it. It will not calculate it.

AUDIENCE: So couldn't you just create two separate schedules so it doesn't look like it's there? [? Is that ?] [? one way ?] of doing it?

PRESENTER: I mean I could manipulate it but I don't want to have multiple schedules. So the question is, can I create another schedule so that I don't have null? And so I could create another schedule that only has the heating-- like it has, if this panel has both heating and cooling then those panels are on an isolated schedule.

Yes, I could do that. But my end game here is to give all the panels to my engineer in one snapshot. So yes, you-- but that's a great example of manipulating the data to what we need it to show. So in this case I'm giving the engineer the data that he would need to make a decision. Does that non-coincidental load now mean I don't want to change the breaker size?

And I'm still highlighting over here where I might need to revisit my main size. So how did we do that? We've done some hidden fields again where we're looking at the overload or the underload. So the overload value-- so we're just looking at how many amps are present versus the main size.

And we know that if it's overloaded it's going to be greater than 0.8 when you make that math. If it's underloaded, in this case I was looking at 40%. That loading value can be anything your senior engineer wants to see. It can be 10%. It could be 60%. That value is whatever you want to set it to.

OK, now circuit loading. So we've gone from the overall load analysis, we've stepped down to looking at our transformers, and we've looked at our panel schedules, and now we're going to zero in to the circuit loading. And this is where a lot of our senior engineers get hung up. This is where the real discussion comes in about whether the loads actually work in Revit.

Because I've had the conversations where the senior engineer says I'm the one putting the values into my panel schedule so I know they're right, but they refuse to touch Revit so therefore they're no longer inputting that data. They're trusting it into their team. And some of our good old boys really like to hold tight to their panel schedules and their load calculations. So now I can present that same data to them, for them to go line by line and check it.

So you can see what panel it is, what circuit number it is, what the load name is. And I can

break this down, I could do filters, and do it by panel, I could do it based off of the low voltage versus high voltage. We can present this data any way we want.

Another field that we could add to this to give our engineers comfort is the load classification field, where they could clearly see that this panel is this load classification, or this circuit is this load classification, because all of our data here hinges on inputting the right amperage and the right load classification. Because if we have it wrong then everything's going to roll up incorrectly.

So on this schedule I've highlighted two things. First, I've highlighted the rating, looking at whether it's overloaded or not. Because sometimes loads change on us and we don't always go back and check them. So we're looking at whether the mains are overloaded.

The other thing that I've highlighted on here is any circuit that has a 20 amp breaker. The reason I've done that, Revit refuses to size a breaker. Absolutely refuses. They are not going to make any attempt to size a breaker. It gets into legal ramifications and such, and they're like, I want no part of that. So Revit defaults to 20 amps just across the board, no matter what it is, Revit will always put in 20 amps for the circuit-- for the breaker size always. And so this schedule is helping to highlight to us where we have 20 amp breakers so that we can revisit it and say, did I really mean for a 20 amp breaker to be there, or did I just forget to change the rating when I circuited it?

Because this-- one of the things about Revit is if we get the breaker size wrong it rolls downstream and we start getting wire sizes wrong, and we start getting a lot of other things wrong if we miss that breaker size. So this is a quick way for us to see the data in one common spot.

So how did we do some of this formatting? Breaker loading, breaker loading greater than 80%. Once again, we have some hidden fields, looking at the actual amperage versus the mains rating, and then determining what that ratio is. The other thing is if the rating is equal to 20. So we're highlighting that that breaker is 20 amps. Did we mean to do that?

Are there any questions regarding the schedules and these formatting?

AUDIENCE: How are you doing your one line? Because if you go back one slide it looks to me like the MSG, that's your main. Is that your main?

PRESENTER: It's one of my main boards, yes.

AUDIENCE: So you're getting your circuit number, so you're scheduling that somewhat, correct? So you're using the panel-- the switchboard schedule for that?

PRESENTER: So the question is, how do I deal with the fact that I have to circuit it in Revit, but my one lines are on a drafting view that I may be numbering the breakers there and it may differ.

Our firm, we do not publish-- if we've generated a one line, we do not publish a panel schedule. So in order to connect everything I do actually have to circuit it and it is going to be given a breaker size, and it's going to be given-- that it's connected to MDG. But that's only to pass the loads through and it's a way for me to check that I actually circuited it. But I don't publish them. So yes, I could generate a panel schedule for it, but I don't publish it.

AUDIENCE: We do the same thing but our biggest problem is like, when you start out how have a breaker this size on your one line and then you start doing this and you up-size it or lower it, [INAUDIBLE].

PRESENTER: Now, I actually-- I'm going to touch on something later that will highlight that. The question then becomes, now that I've got this schedule and my senior engineer marks up that maybe this 800 amp breaker for 1DAD should be increased to 1,200 amps. Am I creating an instance where I'm going to be uncoordinated, and that they changed the size here but they did not change it on the one line? So we still have an issue that we thought we corrected the data but we didn't.

So hold that thought. I've got something down the road that will start to help improve that.

AUDIENCE: So while you're in here with your wire size for your length are you using the out of the box [INAUDIBLE]?

PRESENTER: So the question becomes, thoughts on wire sizes. Items to note about wire sizing, it's greatly improved since 2007, 2008. In 2007 and 2008 Revit did as the crow flies. It was a direct line. There was no up/downs. It was just point A to point B, no Z axis at all.

The wire sizes now do incorporate x, y, and z-axis. So Revit understands that the panel is mounted at three feet, and it's going to go up to the ceiling, and it's going to go over, and it's going to go back down. So it does incorporate some of those up and down and 90 degree bends.

However, Revit assumes everything is connected in series. Meaning, end to end, every light fixture-- light fixture one is connected to light fixture two, which is connected to light fixture three. Most of the time a contractor is going to come out of your main electrical room, he's going to hit a junction box, and he's going to splice in that junction box to connect to the different rows of light fixtures. So now our circuit is actually not as long as Revit thinks it should be.

So for items where we have one motor and it's from the distribution panel to the motor, the length is decently correct. It's normally within 5-10 feet. And that gets into the coordination of when we design, we determine what route we think they're going to use, and then the contractor does his coordination drawings and he may or may not use the route that we designed. So we're designing the voltage drop in the wire size to the best of our ability based off of the routes that we put in our design.

But when it comes to wire sizes you typically can get yourself in trouble very quickly. Because Revit assumes that they're connected in series, Revit is going to start up-sizing the wire for the voltage drop. And so you could have a receptacle circuit that would at worst case be number tens, and you're going to see it jump all the way to number fours because of the length that Revit thinks it is.

So ideally, I would have a plugin that lets me override the wire sizes. A lot of times we just manually enter them. Just because right now I can't get to the wire size data very easily. On the home runs I can change the number of tick marks are there, I can tell it to use a neutral, or not use a neutral, but I can't actually get to the wire size data because it's calculated.

Does that answer your question? Ish? I mean, the wire sizes have issues is the short answer. Use them with caution.

All right one final thing. The most annoying RFI, to me, that I will ever get, is you didn't circuit this receptacle. What circuit should I put it to? You know, it's annoying because it's so simple. It's like, I don't want paperwork generated because I forgot to circuit a receptacle. So there's ways that we can use Revit to our advantage to prevent that, or to help us find those items.

So here is where we've applied view templates, or view filters, to our drawings. So you can see this one up here is green, and in our model that means I've made no attempt to circuit it. I didn't even realize it was there. I put a couple of disconnects or such, but I'd never attempted to circuit it to a panel.

And then the red means I attempted to circuit it but I didn't quite get it assigned to a breaker, which means the load is not going to be carried through. The other thing that can happen with this red is if I have it circuited to panel 1LA and then someone mistakenly deletes panel 1LA, it's going to highlight to me that even though I thought I had it circuited, something changed and I'm no longer circuited to the breaker.

So how did we do that? So we created some filters. I named mine circuit to panel and circuit to breaker. You can name it whatever works for you. Under the categories I'm using this filter as a broad catch all. So you're going to select electrical equipment, electrical fixtures, light fixtures, lighting devices. If you circuit your fire alarm devices you can put in the fire alarm devices as well. But it's going to select as many categories as should be circuited.

And then on the far side I've got the filter-- or I've got, filter by panel equals blank, and circuit number equals blank. Basically saying, I've made no attempt to circuit it. And then how do I filter out-- so in the next one, it's the same thing. I've got the same categories checked, equipment devices, light fixtures, lighting devices, fire alarm.

Yes?

AUDIENCE: I was wondering, that filter, is it for your panel schedule or for your drawing?

PRESENTER: It's for the floor plans.

AUDIENCE: How did you get [INAUDIBLE]?

PRESENTER: If you go to visibility graphics on that front page where you've got all of your categories, at the bottom there's an option for filters. There's actually a filters tab as well. So you go to visibility graphics, and then you'll click on the Filters tab, and then add the bottom there's one where it says Edit New-- Edit/New. You'll click on that. That's what brings you to this window, and this is where we set it. And then in that same filters tab you have to apply the filters you've created.

So here we're just checking to see-- so this is the circuit to breaker, meaning we thought we circuited it but it didn't quite land on a breaker. So then, here is where I'm on my Filter tab, under visibility graphics. And I've applied my two filters.

You've got to make sure the filters are on otherwise you're not going to see any of the colors, and I've applied red and green. Those are colors that are easy to see on a white background

because I typically work on a white background in Revit, but those colors are arbitrary. You just need two distinctive colors that your team knows what they mean. It's up to you how you want to set them. Red, green, pink, blue, doesn't really matter. But so you want to make sure that the visibility box is checked, and that you've assigned a color. You are going to have to assign these filters to every view that you want them to be used on.

One of the things that I like about these filters is that whenever I print that green with the way our pen tables are set for our plotter, that's going to print half-toned. And so my QA/QC guy is going to be going, why is this disconnect switch half-toned? This should be bold. And then he's going to realize, oh, it's not even circuited.

Now, granted, you have to print on gray-scale. If you print black and white everything's going to be printed bold, but we typically print on gray-scale. And so these things are going to print a little bit differently. And so you can use the printing to your advantage as well. So where it's going to catch that something is off.

Some items to note. We've kind of touched on these but I just want to reiterate them because they are very important for electrical modeling in Revit.

One, the length calculations. They do follow structure loosely. Not meaning Revit does not understand where the beams are and where all the columns are, but Revit does understand I have to go up and then over and make 90 degree bends, et cetera. So it's not going to be following the structural model. I just want to reiterate. It is not intuitive enough to understand where structure actually is, but it makes an attempt to understand that I can't route as the crow flies. That I'm going to have to go up, and over, and make some bends to get to my device.

Revit assumes serious connections, which we've talked about, which will get us in trouble regarding our wire sizes. So a lot of times I like to use the length for a lot of my motors and such, do some lose voltage drop calculations, or do some take offs for SKM between my panels. Rather than having to actually get the ruler out, or draw the polylines, and take the length off. I can create a schedule with all of my panels and the length that connects them because I know that panel only has one thing downstream. So it improves our SKM short circuit calculations.

Voltage drop. Revit does make an attempt to do voltage drop but voltage drop is based off of the length, which we've already talked about. There are some serious issues with the way the length is calculated. So you can always assume that the voltage drop is going to be worst case

but it may be worst case extremely where you've gone from number tens to number fours and you don't really need number fours.

Voltage drop is based off of circuit ampacity, which is good news for some engineers. Some prefer it off the breakers but it's basically saying, only the load that's present is going to be included as part of my voltage drop. It's not assuming a worst case load on the circuit.

Wire size goes back to our lovely friend, length, which we know there's problems with. So our wire size might be increased unnecessarily, but wire size defaults to the breaker size so we can have confidence that the wire size at a minimum will match what the breaker size says it should be. As long as someone has not changed your settings. There are settings at the beginning of the MEP settings where you define for certain ampacities, this wire size should be used. Default out of the box they're pretty good.

I think there's one that might be slightly off, and it's a difference between 75 degree and 60 degree wire sizes. And some engineering firms choose that 75 degree across the board is acceptable because you've met the criteria that NEC says. So as a whole it's fairly accurate for that.

And our big thing, breakers default to 20 amps. I cannot reiterate that enough. Breakers default to 20 amps. So we're always going to have to size it, or we're going to get ourselves in trouble.

Additional software that I love. Space naming utility plug-in. It should be part of your Autodesk subscription. And that's what we use in order for our energy code calculations to work well.

The other tool that I love is RushForth Tools. If you do not have it, I would recommend your company looking into it. It was written by David Rushforth, who's a licensed electrical engineer and he has worked in Revit, which is what actually makes it great as he's done the design work and understands the shortcomings. I want to say it's like \$100 a license, or you can pay \$4000 and have unlimited licenses. So the pricing is actually really good for what it does.

The things that it does well. Schedules in Revit can be tedious if we're using them to manipulate the data, constantly inputting things. So think of your sheet index and you've got all your data put in there and then the architect comes back and says, I don't want the date of the first, I want the date of the third. And so then if you're having to go through and change that date on every single sheet, it's tedious.

The schedule-- schedules in Revit are not user friendly. Because you have to drop down, select your new date, or type it in, and then it's going to think for a minute, and then you move down to the next line. When you have 150 drawings it's not worth your time.

But with RushForth I can take that schedule, export it to Excel, then I can use the functionality of Excel, of drag it down-- type in the first one, and drag it all the way down and import it back into Revit. So now what would take me 20 minutes took me two. I updated 150 sheets in one pass.

The other thing that RushForth does really well is it allows us to quickly add parameters to families. So on my light fixture schedule I have some parameters in there that we typically use. You can use the out-of-the-box parameters. We have some that we like to format a little bit differently.

So if I have one light fixture that I formatted exactly like I want it, then I can do the light fixture schedule, have all my light fixtures show up, run this tool, and RushForth will add the parameters to all the remaining families on the schedule. And it takes like five minutes.

You can do that for any families. It's not just lighting families but any family. So if you get one family formatted with the parameters that you mean, create a schedule that has all the families on it that should have that parameter, and then run this tool.

Yes?

AUDIENCE: Is that for MEP, or just light?

PRESENTER: It's for everything. You can-- architects use it. It's not specific to MEP. It can be used for any family in Revit that has a parameter. I mean, it's written by an electrical guy but he's opened it up pretty well.

And then the parameter linker, which kind of gets back to that question that we were talking about earlier is, if we change a breaker size in one spot and forget to change it in the other. So David is working on this and when I tested it last it was still a little rough but he's got a great idea going.

And what this parameter linker does is it allows us to take a parameter that we have in a detail component, which is kind of like a block that we would use on our schematic drawings on a

drafting view, and link a parameter there to a parameter in our family. So now I can tie the text on a detail component for whatever that breaker size is to the mains that are actually on that panel on the drawing. The reason it's rough is it's a little labor intensive to get all of those links set up. Once you do it once you're good but if you've got a bunch of panels it can be labor intensive.

So I think he's trying to work on a way to mass make those connections. But so, I mean they're working on options that allow us to start tying our one lines and drawings together so that when you change the data in one spot it changes in both.

Two slides that I got to get through and then we'll wrap up.

One, please fill out the surveys. If you hated the class, don't. No. No, we really want feedback. It's how we improve AU, and it's how speakers improve. Of knowing whether the presentation was worthwhile and what you would have liked to see different, or was it great as it was. So that AU can improve each and every year.

And also, this class was recorded if you want to share it with colleagues but there's a bunch of other classes that are also out there that were recorded. Because like we've said, and Lynn Allen joked about a lot of the classes that we wanted to attend were all at the same time, and so how did we pick and choose which ones to attend? So after the fact, go back to autodeskuniversity.com and see if the classes that you wanted were recorded. So that you can watch them and share them with your colleagues as well.

Questions? Yes?

AUDIENCE: How many [INAUDIBLE] electrical system?

PRESENTER: In like, connecting the panels together? So that--

AUDIENCE: The panels, the outlets, the transformers, everything. [INAUDIBLE]?

PRESENTER: So the question is, how proficient is my staff in regards to how to do this circuitry and working in the Revit model as a whole? Some of my younger staff, amazingly proficient. I find that if you never learned AutoCAD you pick up Revit a lot faster. For those of us who know AutoCAD there are some things that become challenging in Revit. I'm constantly mixing and matching commands between the software. And so it's been a process on how to actually get my staff

up to speed.

One of the things that we've done is we've started doing-- we have a computer lab and we'll do a lunch and learn, a brown bag, or sometimes we'll provide lunch, and we just get everybody in there from the project managers to the senior engineers and I have models that are detached from central that they can break. And I dare them, break it, try to break it.

But it gets them playing around with things because I find that the hands on is where most people are actually going to remember what they were doing. If I'm just going to stand in front of someone and tell them how to do it they're going to come back and ask me tomorrow, now what did you say to do? Because then they're actually looking on the interface themselves trying to repeat it. So it's an uphill battle at times, just depending on your staff, but it can be done.

And I would say pick and choose your battles. So rather than trying to get the entire staff totally proficient in Revit, start with maybe, schedules. We just want you to be able to input the data in the schedule. Or we just want you to be able to circuit something.

So pick small, small bites, and then before they know it they're going to go, oh my gosh, I can use this program. And they don't realize that you've slowly been converting them to the merits rather than when you come in and just give them the mandate they're going to throw up their hand and be like, no not doing it. Yes?

AUDIENCE: So, your [INAUDIBLE] broken into three models. How can you moderate equipment across-- how do you handle routing conduit when the duct work doesn't copy monitor, or the piping doesn't copy monitor? How are you doing class detection?

PRESENTER: For class detection I actually let the-- I don't copy monitor the duct work I just have the mechanical link on, and I'll turn on the duct work category or the piping category.

View templates are the most amazing thing in the world and in Revit 2015 they gave you the option to have a temporary view template. So you can have a template applied to your view to keep everything efficient but at the very bottom, you can click a button that says temporary and then the user for as long as they're on that drawing they can change all the settings and turn on duct work they can turn on piping but the minute they leave that drawing it resets back to the view template.

We typically will export out to Navisworks to do all of our class detection. I don't typically do it in

Revit. I know Revit can but rabbit was not really designed for class detection. It was an afterthought, per se, and a lot of our contractors use Navisworks as well. So I want to be doing the class detection in the same platform that they are so that if they are saying there is an issue I can easily reproduce it in-house to determine what's going on.

Yes?

AUDIENCE: I work for an architect [INAUDIBLE] in house. Regarding small projects and big projects. Small projects, I can do the whole thing without [INAUDIBLE] the link and have everything there in one [INAUDIBLE], or I should always have them in--

PRESENTER: So the question is, on smaller projects should you still have separate models for every discipline or should we be putting everyone in the same model? It's a little bit of a loaded question in the fact that BIM coordinators will never agree.

Some offices-- I am of the opinion that unless it's a ridiculously small project everybody needs their own model. Reason being, it keeps you honest. Because if I'm in the same model as the architect and I need my electrical room to be six inches bigger, what's to say that the wall just doesn't magically move six inches? You know. But I mean, work sets-- I'm not a fan of work sets. We don't really use them in a hard core checking things in and out, and such.

And part of that goes back to user education and not all of my users understand how work sets behave. And so when everyone's in the same model things can suddenly start disappearing and moving, or if I click on someone's air handling unit, then I own that air handling unit, and then my mechanical guys got to call me and be like, hey can you save the central, or relinquish all.

But then there are some BIM coordinators that will hardcore say everybody should be in the same model, it's simpler. So there's not a direct answer. I'm going to say it's up to your workflow and your users what the best answer is for your firm. There's not a right or wrong answer. It's a matter of preference and users that are in it. I know that's not the answer you're looking for, but that's the true answer.

Any other questions?

AUDIENCE: I've got one quick one. Have you ever run into the fact of architect [? sites ?] that have interior and exterior models and where [? you cut ?] those spaces in you can't create spaces

[INAUDIBLE]?

PRESENTER: I have not. I have run into a shell model and a interiors model but--

AUDIENCE: In this case here we had an architect decide that they wanted to have all the exterior skins on a model and all the interior walls on a model. But when you tried [INAUDIBLE].

PRESENTER: Well you can actually add additional-- so the question is, what happens when the architect has an exterior and an interior model, meaning all of your skin is in one model, and everything that's inside of the building-- the interior walls-- in a separate model. Spaces don't behave as well as we would like them to. You can actually add bounding lines to trace around the perimeter, which should help with creating spaces but it becomes much more labor intensive.

AUDIENCE: And it does. That's the problem [INAUDIBLE]. I guess my suggestion is that we have architects that don't do that.

PRESENTER: Well, I mean, yeah, there's two answers to it. Either don't do that, or draw some very, very, very basic walls in your interiors model so that the MEP can still do the calculations that they need.

AUDIENCE: Right. The other problem that I run into that the architects don't connect the walls to the ceilings, or the floor, some spaces aren't going in there either unless you separate them.

PRESENTER: Yeah, I mean and so that brings up a really good point. In order for all of us to play nice in Revit there's education that has to happen, and there's education that has to happen between the MEP teams as well as with our architects.

I worked on a project where our architect thought it was a great idea to have all of this stuff as generic models. And when I have all these generic models suddenly I can't do the views and stuff that I need. And so we had to have a conversation and an education with them of look, I just need you to change this category. You have to redo anything. I just need you to change a category.

And when you start explaining to people why you need things done a specific way most of the time-- I'm not going say all the time-- but most of the time they're receptive. Especially if you can point out to them that it's not-- that they're not going to lose work, and it's only going to take 20 minutes for them to make a couple of tweaks and our lives are going to be so much better.

Got time for like one or two more questions, and then we've probably got to get out of here.

Yes ma'am?

AUDIENCE: What we've started doing is having our architect set up [INAUDIBLE] in their model and then turning off a bunch of their stuff that we don't need and then we link to those views in our model.

PRESENTER: So, I have done that before. So the point is there's a couple ways to work around that. You can either create-- have the architect create views that you link to, or you can have a live views in your model where you're completely controlling the view settings.

There's pros and cons to both. Sometimes when you have the linked views what the mechanical team wants to see, the architectural-- the plumbing team doesn't want to see, or the fire alarm team doesn't want to see, and the architect has to start maintaining that view. So if the architect doesn't understand how the linked view works for us and they don't start maintaining it then you still run into problems again. So, but that is a solution and that highlights again, we've got to think outside the box. We've got to find ways to make this program work for us.

OK. I'm happy to stay around and have more questions but I actually have to end the sessions so that you can move on to your next class. Thank you for your time.