AUGIWORLD

The Official Publication of the AUGI Design Community

February 2021

Advice For New Users

Also in this issue:

DELL Technologies

DELL PRECISION 3560 MOBILE WORKSTATION

THE POWER IS IN THE DETAILS

With next-gen NVIDIA® professional graphics and up to Intel® Core™ i7 processors, the redesigned 15" Precision 3560 mobile workstation with AI-optimization powers design and visualization workflows for the most immersive user experience in an entry-level workstation.

CONTENTS
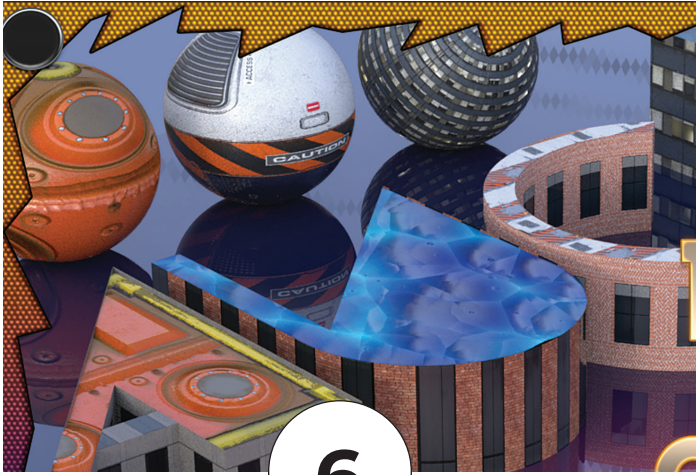
6

14

30

From the President

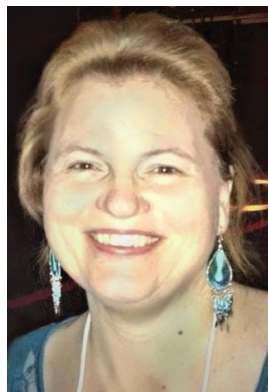**H**ello to everyone in the AUGI world! I'm looking forward to serving as President of AUGI!

I am very grateful for all the support the CAD/BIM community has shown me over the past 34 years, since the first time I touched the keyboard of a computer with CAD software loaded on it. One of my goals has always been to give back to this community. I've done this by presenting and mentoring presenters at AU, presenting at conferences in California, Nevada, Hawaii, & Utah, and providing training for going on 28 years. Another goal of mine is to help CAD/BIM users to find resources and answer questions that will take them to the next level in their skills. I believe that mentoring others is an essential part of the future of our industries.

This issue is dedicated to the beginner, but I believe that everyone will learn something new in this month's AUGI World, as there is always something new to be learned. So delve into these pages and find the one new thing that will improve your world and maybe your co-workers as well!

Go out and be a mentor to the beginners around you (yes, even those who are only beginners themselves, there is always someone that is just starting to learn)! Mentoring and teaching others helps you find your own passion for your industry and you will find joy in helping others (even on a virtual platform)!

I am genuinely excited to be able to contribute to the AUGI community and my hope is that AUGI will grow and be a continually renewing fountain of knowledge for all AUGI members!

My best regards to all of you,
KaDe

DIGITAL BUILT ENVIRONMENT INSTITUTE

DBEI

A Global
Community for
AEC Professionals to Learn,
Grow and Exchange Knowledge.

Become a member: www.dbei.org/membership

Professional Results Quickly

I t is simple to get professional results quickly using 3ds Max, even if you are a beginner. To accomplish what I present in this article, you need the latest versions of 3ds Max, the Substance plugin from Adobe, and use the Arnold renderer included in 3ds Max. We'll utilize materials like those displayed in Figure 1 and discuss importing Substance materials using the menu & material editor and converting them to Arnold.

Figure 1 – Substance Menu

SUBSTANCE

Creators use Adobe's suite of software to generate materials for 3D software known as Substance materials. The two primary applications used to generate materials are Substance Designer and Substance Alchemist, both with unique capabilities. Adobe created the Substance Source online to share these materials and to use with 3D software. There are two versions for download: SBSAR and SBS. The SBS is the source file we can manipulate in software like Substance Designer, while SBSAR is the compiled version we'll use in 3ds Max. Figure 2

Figure 2 – Substance Source Library

displays a portion of the library's snapshot to show the quality of the materials provided.

ARNOLD SETUP

Setting up the Arnold Render and a stage in 3ds Max is simple. In the Rendering menu, select Render Setup. For Renderer, select Arnold. After that, select the System Tab and check the box labeled "Legacy 3ds Max Support." See Figure 3.

LIGHTING AND ENVIRONMENT SETUP

Using Arnold, lighting the environment is simple. Bring up the Material Slate Editor (M is the default shortcut). Type "HDR" in the search and drag and drop an HDRI Environment node onto your slate. When you drop it, it will ask you to select an HDR image. You can use the defaults provided with 3ds Max or select from the many available ones freely downloaded online. The only value you'll want to worry about is the exposure. The exposure controls how bright the lighting of the image is, which will influence your scene. Since HDR images are prepared differently by every creator, this value is up to you. See Figure 4, for example.
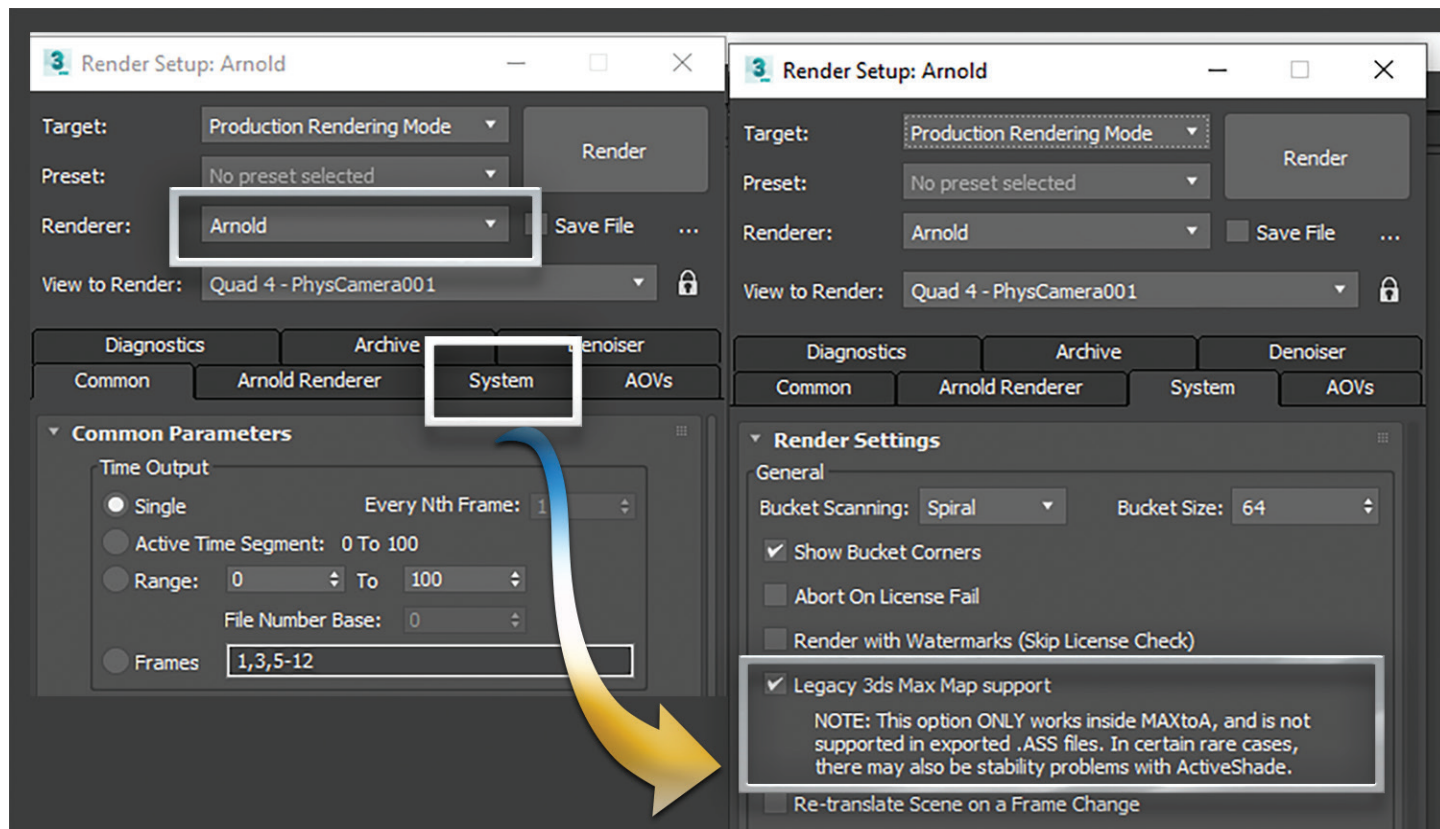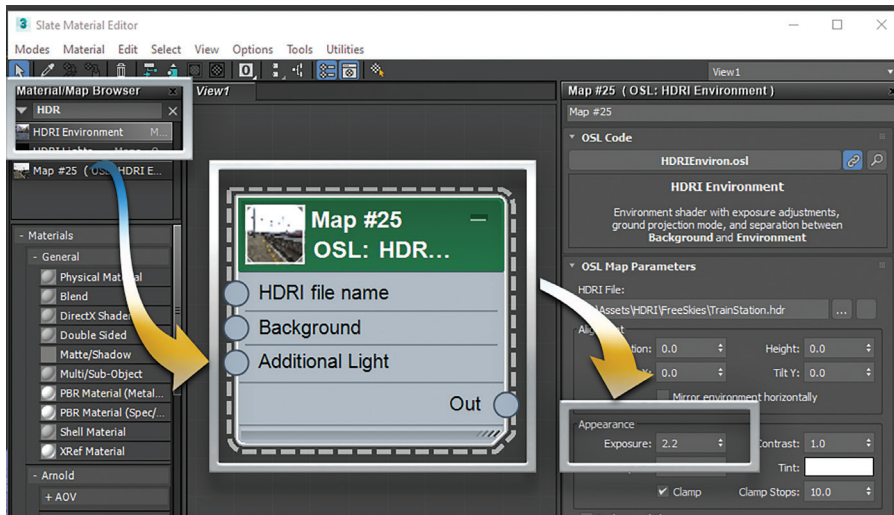

Figure 3 – Arnold Setup

Figure 4 – Lighting Setup

Figure 5

MATERIALS

The next step, is to import the Substance SBSAR materials and convert them to Arnold materials that we can apply to our objects in our scene. With the Material Slate open, select the Substance Menu and choose Substance Batch Import, which inserts the Substance materials as a node into the Slate Editor. Next, select all the Substance Material nodes in the editor, then choose Substance to Arnold under the Substance plugin menu. Doing this will convert all the Substance nodes to Arnold Materials. Now you can apply them to any object in your scene.

FINAL TIPS

Using displacement, we can force our object to show differences in depths and heights, which is key to producing more realistic results. To apply displacement, use the Arnold Properties modifier and plug the Height of the Substance node into the displacement map.

Substance Materials are robust. Creators often include preset conditions that allow us to use one Substance Material to achieve many results. See Figure 5 of a shuttle engine material. The creators provided presets for black and white nozzles, red flap nozzles, weathered nozzles, and additional settings like manipulating individual object's colors in the material and adjusting scratch and dirt levels. These kinds of customizations are common, making Substance Materials one of the most popular used today.
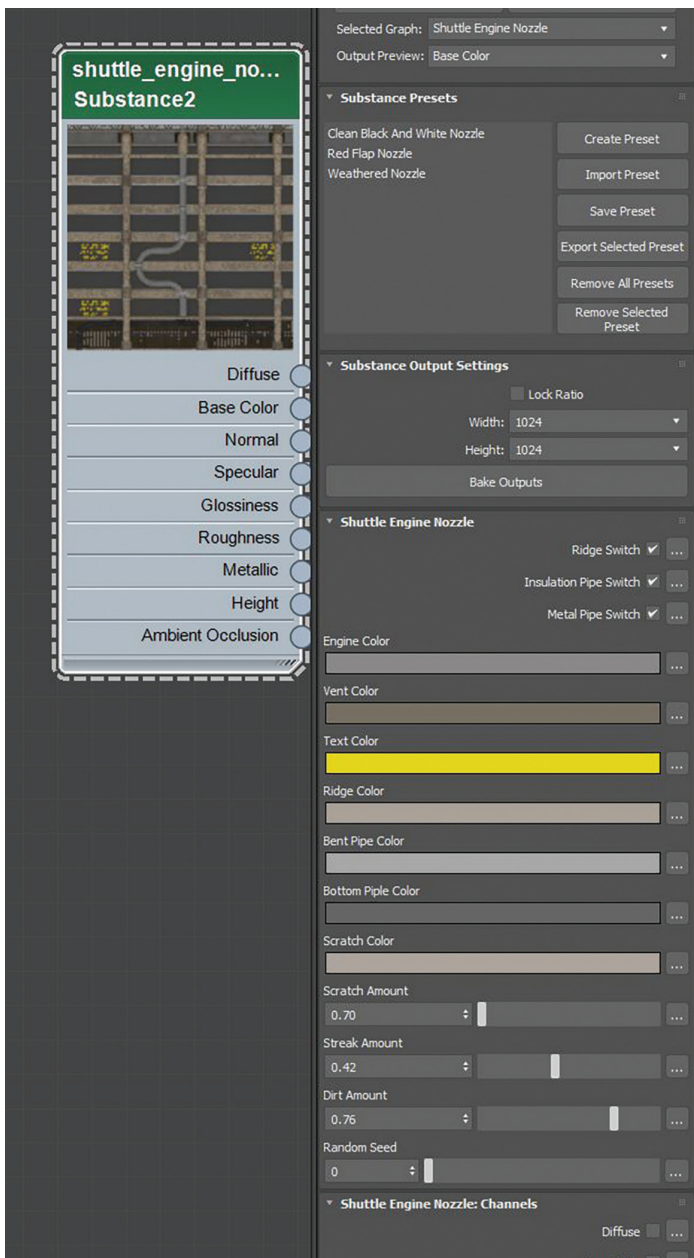
Brian Chapman is an Autodesk Authorized Developer, Digital Artist, Designer, and a CAD Application Specialist for an engineering firm located in Las Vegas, Nevada. Brian shares tips and tricks at procad.blog with a portfolio of digital artwork and renderings at emptypawn.com. Brian's email is procadman@ pro-cad.net

Spaces for Revit MEP

So, this month we got the directive to write an article on a simple subject. I have not been asked to specifically do that... Wow, I think, ever. I think it took me longer to decide what is easy and what is not, than to actually write this article.

So, with much pondering and hemming & hawing, I decided MEP spaces would be a good topic. It's easy! But I do still get a lot of questions about it. So, let's first break down what an MEP space is. Simply put, an MEP space is a 3D element that is bounded within closed walls. The space will read the architects room name and number from a linked model and can display that information within a

tag. When the architect updates their name or number the information in the space will update accordingly upon opening the model or reloading the architectural model. Spaces obviously do more than that, but let's focus on this aspect first.

READING THE ROOM NAME AND NUMBER IN A SPACE TAG

This concept is simple, but it does require making some choices. The problem is, the default tag in Revit doesn't display the room name and number as the architect has it. It displays the space name and number. Let's check it out and follow these steps:
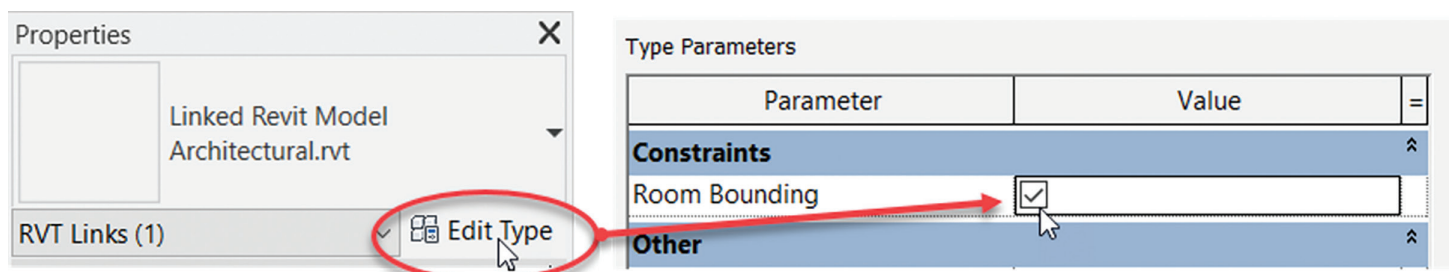
Figure 1

1. Link an architectural model that you know has rooms in it.

2. Select the linked model and click Edit Type on the Properties palette.

3. Check the box for Room Bounding as shown in Figure 1.

4. Click OK.

5. On the Analyze tab, click the Space button on the Spaces and Zones panel. Make sure the Tag on Placement button is active.
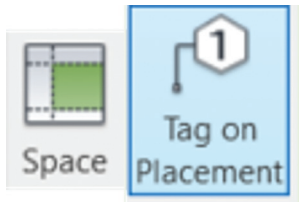
Figure 2

6. Place the space into a room.

7. Notice it just says Space and the number is 1. Not gonna work! Let's cover one way to change it right in the model, then we will edit the actual tag.

1. Hover your cursor over the room in which you placed your space. Move your cursor around until an X shows up. Once you see that, select it.

2. In the Space Properties, scroll down until you
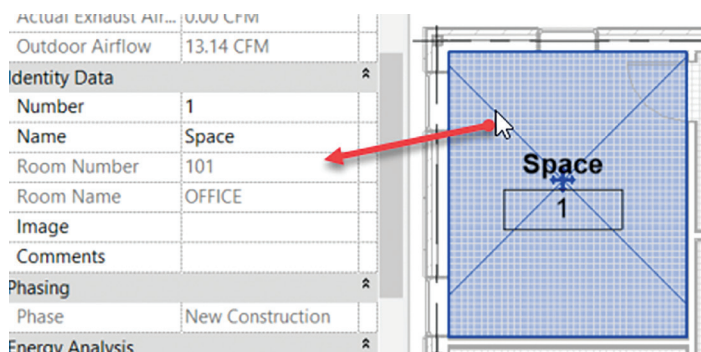
see the Identity Data category. It has the room name and number, but it is only allowing you access to the space name and number. You could change that here, but let's do it another way (Figure 3).

3. Hit Escape.

4. On the Spaces and Zones panel, click the Space Naming button.

5. Select Names and Numbers (Figure 4).

It updates all of the space names. Nice, but I don't like it! You see, if and when the architect changes the room name and number, you would be none the wiser. Your tags don't automatically update. Let's look at something different. This time I want to change how that tag displays at the family level.

1. Click the Space button.

2. Now click Place Spaces Automatically. I know it puts spaces in we don't want, but we can either delete the space or delete the tag.

3. Now, select any one of the actual space tags and click Edit Family
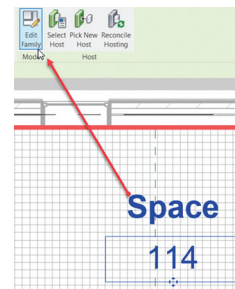
Figure 5
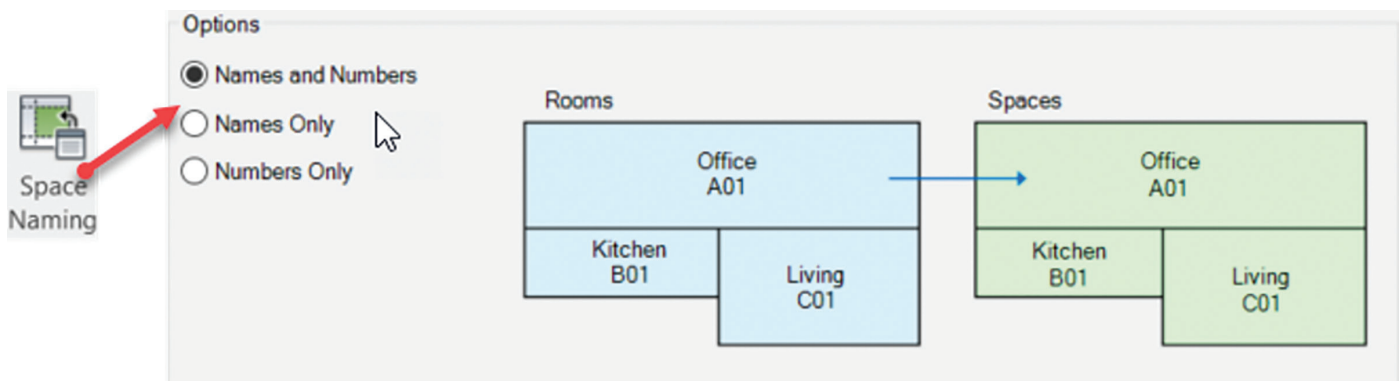
Figure 3

Figure 4

4. In the Family Editor, select the word Space Name, and click Edit Label.

Figure 5

5. In the Edit Label dialog, click on the number 1 next to Name, under Parameter Name.
6. Click the red Remove Parameter from Label button.
7. In the Category Parameters section on the left, scroll down until you find Room Name.
8. Select it, and click the green Add Parameter to Label button.
9. Click OK.
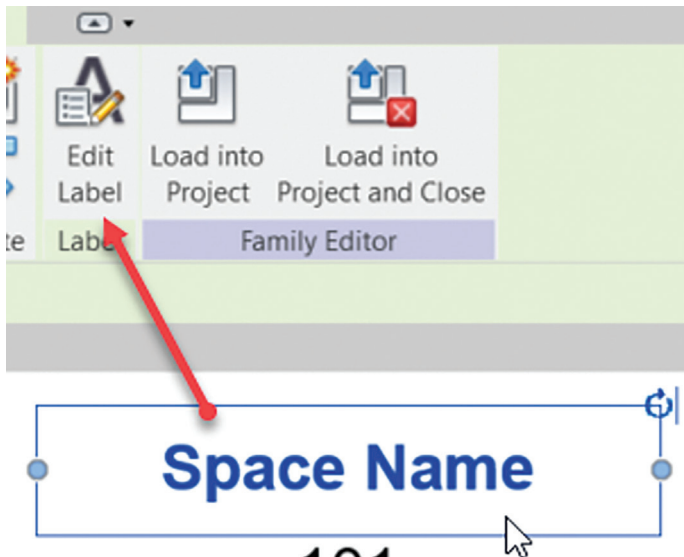
Figure 6

10. Select the tag that says 101 and click Edit Label.
11. Repeat the above procedure, only this time, it is Space Number being replaced by Room Number.
12. You can save this family if you want to. I of course, have one saved for my company.
13. Click Load into Project and Close.
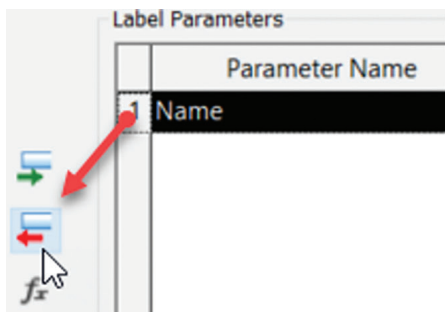
Figure 7
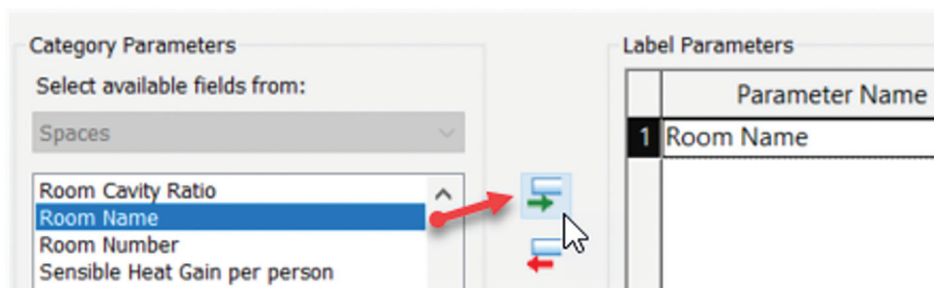
14. Click Overwrite the Existing Version, and BINGO, the spaces all updated. The good thing here is when the architect changes the name, our tags will update! One thing to remember though, is you do want that space named the same as the room. This method doesn't change the space name. I recommend before you do any heating and cooling loads, you run the space naming function again.

WHY ARE WE ADDING SPACES INSTEAD OF ROOMS?

I knew you'd ask! OK, first of all, you would need to manually name the rooms anyway. With spaces you can do what we just did. Second, spaces work with our energy and analysis settings. A space has all the information we need to perform calculations for both HVAC as well as lighting. When we place diffusers, that space will start calculating the CFM. Now we can add Heating and Cooling Zones and calculate heating and cooling loads.

Eric Wing lives in Syracuse NY where he is the Director of BIM Services for C&S Companies. Eric is a popular speaker at events around the country speaking on many BIM-related topics. Eric has authored several books including Autodesk's official training guide for their BIM solution "Revit" called Revit for Architecture No Experience Required. Eric is also an author for LinkedIn Learning where he has authored around 60 full courses on BIM management, Revit, AutoCAD MEP, Navisworks and Virtual Design and Construction (VDC). Eric has truly been a leader in the architecture, engineering and construction industry since the conception of BIM and 3D design, and has specialty skills in BIM coordination, training and development of technical staff along with daily application of these tools on multi scale, multi-disciplinary projects. Eric is also currently a Professor at Syracuse University teaching BIM and Advanced BIM at the School of Architecture, and at the School of Engineering. Eric has also taught courses at the Rochester Institute of Technology and Clarkson University on the subjects of Analytical tools for Facility Management, BIM, and Integrated Project Delivery.

Figure 8

by: Brad Brown
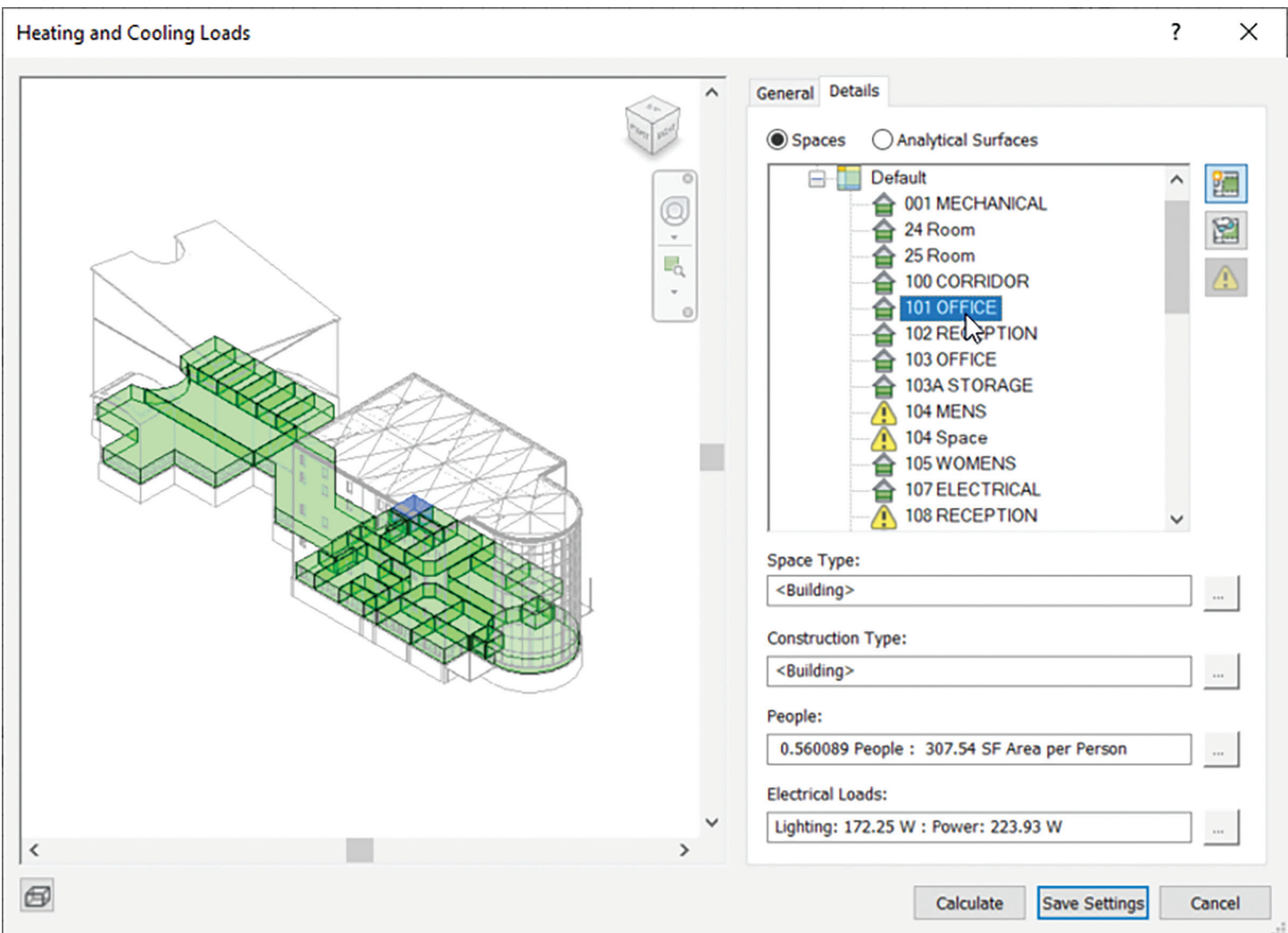
Where Did The 'I' In BIM Go?

Far too often, in the Architectural Engineering & Construction industry, the BIM (Building Information Modeling) tends to focus on the 'B' and sometimes 'M' portions of this acronym. I see the Building as a representation of the design portion of each project. Design is subjective and not always applicable depending on the phase (e.g., post-occupancy). Modeling is the representative details or produced drawings, which rely on their implementation during construction to remain relevant. Information can be utilized, shared, enhanced, accessed, etc. by every participant in some fashion throughout the entire lifecycle.
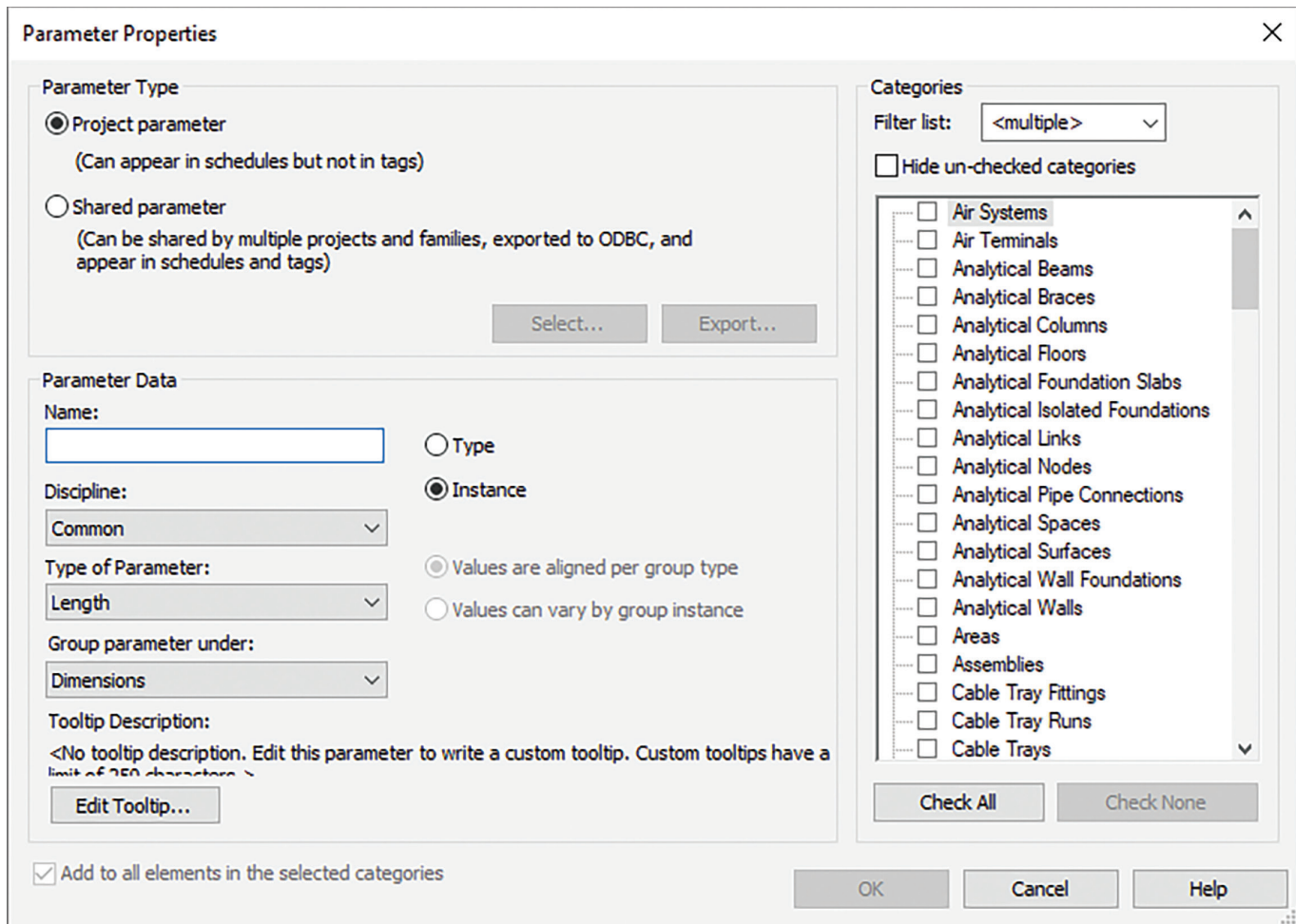
Building Information Modeling [BIM], like any other data storage structure, relies on fields, nodes, cells, or software-specific datasets. This is the structure which stores, organizes, and analyzes data. With filters and sorting, these can then be used to produce datasets to better understand and communicate trends, estimates, quantities, etc. Autodesk Revit uses parameters to house most modeling data. Unfortunately, parameters are some of the most misunderstood and under-utilized pieces of this application. Resulting in Ignored, Inaccurate, Irrelevant, Imprecise, and/or Incorrect data sets. Data is what separates a BIM from BiM from 3D CAD (Computer-Aided Design).

To improve the Information portion, we will use my current focus of Revit doors to help illustrate and understand how most of our peers utilize Revit Parameters.

At the most basic level, there are two types of parameters: System parameters and user-defined parameters. System parameters are provided and predefined by Autodesk, which individual users cannot change, e.g., height and width. Users cannot even modify their names to "door width", for example. However, user-defined parameters can be added/modified as required to house data, drive variables, and calculate.

Concerning user-defined parameters, there are two basic concepts: Project Parameters and Shared Parameters. Shared parameters become Project Parameters but not all Project Parameters are Shared Parameters. {see Figure 1} I use both often. Project Parameters are quick, simple, and easily applied to single or multiple Revit categories within a model. I also use project parameters to

Figure 1

Figure 2

house calculations, e.g., the number of occupants per egress door. Shared Parameters can be more difficult/intimidating for inexperienced users to understand, as they are generally saved in an external text file. However, Shared Parameters are enormously powerful. They can be used to link data from multiple sources (such as Revit families), drive variables, firm standards, etc. Both parameters can technically connect data via linked models, however, I strongly recommend utilizing Shared Parameters for this process. Something as

germane as different case structure for the Project Parameters name could cause linked data to not appear in a schedule, whereas shared parameters use the same source file to ensure data can be seen from a link model within a Revit schedule (see Figure 2).

Next, there are two types of Project/Shared Parameters: Type and Instance based parameters. Again, I use both often, depending on their purpose. Type-based parameters are just that: they are

Figure 3

associated with a specific Revit Family Type. That simply means when you change the family type, all "Type" based parameters will change to align to a specified value. However, this also requires that if an additional value is needed, another family type will be needed as well. Instance parameters allow for quick and independent changes. But, since Revit schedules do not work like other spreadsheets, this process can be arduous. In relation to doors, I have found values which drive modification such as widths or heights, work best as a Type Based parameter. However, esthetics, hardware-sets, details, or other values that often vary from door to door are most often utilized as Instance-based parameters. A good rule of thumb is: if you are looking for consistency, use a type-based parameter; if you're looking for flexibility, use an instance-based parameter (see Figure 3).

Next, we will briefly discuss the newest (relatively speaking circa 2017) parameter option: Global Parameters. Global parameters are one of the most overlooked parameter options in Revit, so more thoughts will be provided in future papers. When determining whether to use a global parameter or a project parameter, I find it best to ask: Could this parameter have a different value based on project type or local jurisdiction? In the earlier calculation example, the load factor or percentage of opening obstructed could be affected either by jurisdiction or building occupancy type; therefore, Global parameters could provide flexibility needed for these variables. Or is it a value that will

drive a required dimension, e.g., door to wall adjacency to meet accessibility? Note: unlike other parameter options, these values truly exist within your Revit model and have no association with any specific category (see Figure 4).

Finally, we have a bonus. I have noticed and coined them "ghost parameters." These are easy to get and painless to address. When a schedule that has a "shared parameter" (that is not loaded into your active model) is copied, there is a ghost of "said" parameter. Only the copied schedule sees this parameter, neither your model nor families can utilize this "ghost parameter". The way I determine if a parameter is ghosted or not: within manage parameters, they will not have neither [instance] or [type] designations. In order to get the full benefit of this shared parameter, simply load it into your model from the shared parameter source file and make the instance/type designation (see Figure 5).

Figure 4

Figure 5

The AEC industry is facing yet another era of unprecedented expectation. Fortunately, thanks to our ability to adapt and innovate, we have always found a way. I believe, in this field, our most valuable commodity is data. We can harvest, share, enhance, or more; within every phase of the building lifecycle allowing for each expert's "digital twins" to represent the proposed or constructed product. Data is the constant from the first spreadsheet of program space through the facilities management (via an owner's maintenance schedules or software), and each step between.

For most projects today, this entire process relies on Revit parameters and the data sets they can generate and drive. This makes our information Important, Indispensable, Invaluable, Influential, and Imperative, for EVERY phase of our building true lifecycle.

If you have made it this far, I thank you, as parameters can be a dry topic. With that said, I hope this helps at least ONE person see the huge value of understanding their parameters and how to turn our collective process from BiM to BIM -- or (better yet) B!M.

A 17+ year veteran in the AEC industry, Brad Brown is the Customer Success Lead for the Overtur product line from Allegion where he assists users in their implementation of Overtur as well as other BIM needs. A registered architect in Indiana, Brad previously was an associate and the Director of BIM for a large Indiana-based architecture firm. He is an Autodesk Certified Professional for Revit. He holds a Bachelor's of Architecture from the University of Tennessee.

Welcome to *AUGIWorld* Inside Track! Check out the latest opportunities to advance your skills, processes, and workflows in your firm with the most current AEC-related software and hardware updates available.

BIMRIGHT
https://apps.autodesk.com/RVT/en/Detail/Index?id=5487852973665402546&appLang=en&os=Win64
Autodesk Revit: 2021, 2020, 2019

BIMright is a suite of powerful features that automates your work within Autodesk® Revit® which saves Revit users hours of time and ensures data efficiency.

Here is the list of features:

Data Reference - A live reference to data in the project, for example, the total of the length parameter of all walls of a specific level, and then you can bind it to a text note to update text in your project as you change the model, or you can bind it to global parameters so you can use it with formulas.

Text Note Binding - This allows you to bind a Text Note to a Data Reference, Project Information or Global Parameter so it will be updated with live project data as you change the model, and you can also bind to a cell in a linked Excel file.

Global Parameter Binding - This allows you to bind a Global Parameter to a Data Reference so it will be updated with live project data as you change the model, and you can also bind to a cell in a linked Excel file.

Project Information Binding - This allows you to bind a Project Information Parameter to a Data Reference so it will be updated with live project data as you change the model, and you can also bind to a cell in a linked Excel file.

Category Join - Join multiple categories so you can pass parameter values from one element to an element of another category, for example, the type mark parameter of a wall to a parameter of a door inside this wall, or the total of all window areas to a parameter of the room (similar to table joins in relational databases).

Excel Link - Synchronize in real-time between Revit and Excel, updates as you change the model (no import and export),
- You can bind an Excel cell to a Data Reference or to a Global Parameter.
- Bind a Revit Text Note or Global Parameter to Excel cell.
- Two-way binding from Revit schedules to Excel tables.

Note: all of these are getting updated automatically as you change the model.

Note: This app uses a custom installer (and not the standard App Store installer).

INSTASYS
https://apps.autodesk.com/RVT/en/Detail/Index?id=3363743719644416312&appLang=en&os=Win64
Autodesk Revit: 2021, 2020, 2019, 2018

InstaSys helps the user to review their building construction project with respect to the 4D analysis in a native Autodesk® Revit® environment. It animates the building construction procedure according to its schedule. The building schedule data is attached to the model in the form of phases. The use of InstaSys is possible in building projects where the phasing data is already attached to the 3D model.

Features:
- The animation is possible in two modes (a) Automatic & (b) Manual.
- Phase grouping is possible, which is beneficial for large projects.
- The user can set the timing for each phase.
- The manual mode of animation allows the display of text labels consisting of important information like quantities, cost, or contractors firm name.
- The user can select the font, font size & color for the text.
- The animation also displays the time schedule.

NVIDIA® RTX 3090 24GB here now!

MTower™2P64X & MTower™CX

The CX blew away the competition by nearly 100% on Digital Engineering's AutoCAD®Render Test. With **new aggressively priced** Intel® Xeon W-2200 to 18-Cores 4.6GHz 1C-TB, with multiple NVIDIA® Quadro® RTX 6/8000 & 3080/309010/24GB GPU.

PowerGo™

Our newest PowerGo LE starts at **$ 859**. The PowerGo with 6-core Intel i7-10875H and RTX® 2060 starts at **$1299.** The XL model supporting both the Quadro RTX 3000, 4000 and RTX 2070 SUPER, is aggressively priced with the Quadro P620 at just **$1559.00**

WebRAIDer™& NetRAIDer™64X

The most cost effective building blocks for data center, rendering, AI, simulation & machine learning computing solutions. 1U/2U/4U & 6U Rackmount with unsurpassed **scalability to 56 cores Xeon**, 2TB ECC to **8x NVIDIA Ampere® A100, Quadro® RTX 8000 & GeForce® 3090.**

MTower PCIe

6-19 Digital Engineering "Fastest Ever" tested **workstation**, designed for the most demanding workflow. Quiet, powerful, compact, cost effective, available with the **Intel Core i9-10900K 10-cores, 20-threads, up to 5.3GHz** TVB clock frequency. @Xi certified for 100+ CAD applications including **AutoCAD, 3ds Max, Adobe CC, CATIA, Cinema 4D, Inventor, Creo, Revit, and SOLIDWORKS.** Impeccably built, guaranteed & supported in the USA. Our expert IT Architects will customize **the fastest workflow solution** for your application and budget.

www.xicomputer.com
800-432-0486

by: Mark Kiker

Pitfalls of Tech Management – Part Two

Last month we started looking at pitfalls that you might get caught in. Some can be avoided, and others may snare you before you see them coming. I have stepped into many of these over the years and probably will continue to be caught by them in the future.

Pitfall One was "Not doing Research and Testing", Two was "Over Monitoring" and the third one I covered was "Creating Artificial Deadlines". I suggest you go back and read those before you start on this continuation to my list.

PITFALL FOUR: BEING INCONSISTENT

I am a very consistent kind of guy – most of the time. Sometimes I veer off the road that I construct. I leave the beaten path that I have created and forget a step or two. I am human. If you read my writings, I am a list maker, rule follower, structure builder and guideline creator. But I sometimes take shortcuts, deviate from the plan, get lazy, or react out of frustration. When I do, it sometimes comes back to bite me.

People need to know you are dependable and consistent. They should be able to know how you would react in any given situation. One way to prove that they do know your approach and responses, is to deviate from them and see how quickly you are called out. People will complain that you have broken the rule or have not measured up.

Consistency is needed so that people can focus on other things and not worry about your mood or how much sleep you got last night. They need to know what personality you are going to have when you show up for work each day, the happy helper, or the grumbling Grinch. They need to know that you will protect them and their time by planning your efforts around their deadlines. They need to know that you will provide the needed info or training at the right time on a project. They need to know that you will see flaws in a workflow and suggest corrective measures. They do not want you to wait around for a project to go off track before you step in. Or complain about oversights when you could have prevented them.

Consistency allows people to frame their expectations because they know how you will react and work. If you are the one that fine tunes documents, then they expect you to fine tune them. If you are the one that remains calm and thinks quickly in a crisis, they will expect you to do that. If you are the one who always spots a deviation from standard, they expect that (even if they are annoyed by it). If you always speak up when you have a concern, then when you do not speak up, they will take your silence as approval. Being consistent lets other just do their work.

PITFALL FIVE: NOT LISTENING

When you are the answer provider, it gets hard not to provide an answer when you think you have it. You will jump in with a solution, but it may not match the problem. You need to listen to the entire explanation and not come to a conclusion prior to knowing all

the issues. Listening is not that easy. Some people tell you way too much and take forever to get to the point. Others do not tell you enough and leave out key details. Troubleshooting and listening go hand-in-hand. You need to hear what the problem is before you start thinking of remedies.

You also need to listen to find out what has already been done. You do not want to just dash off some solution thinking it is the fix, only to hear that they already tried it. Telling someone what to do is different than asking them what they have done. Ask what has been tried already. If you have done a good job of training and including others in solution finding, then they may have already done a lot to seek results. Ask them what they have done and then listen to the answer.

PITFALL SIX: UNCLEAR ROLES AND RESPONSIBILITIES

People need to know where your roles and responsibilities start and end. And they need to know about theirs also. Usually, Tech Managers operate beyond their formal job description, but most all jobs do that to some extent. Knowing the boundaries of your role is key to making sure things run smooth. You need to know, and so do others.

Roles may get confused when they overlap with other departments and project work. Others may assume that you are doing something when you are not. You may think that some task was your job, and others may step in before you. It all needs to be talked out. Not a formal talk, but just constantly mentioned as you work with people.

Let's take Standards as an example. Some folks will think that standards compliance is your job. You wrote the guidelines, and you have to make sure that they are followed. That is true, but it really falls to all staffers to make sure the guidelines are followed. Each team member has a responsibility in knowing the standards and verifying that they are followed. Reinforce a culture that does not just accept or pass on shoddy workmanship. Encourage everyone to create rock solid files and models.

PITFALL SEVEN: FAILING TO GROW

I talk about this a lot and it bears repeating. No one may be more important to tech progress at your firm than you. Sure, others have great ideas and know more than you in some areas. I am not talking about you being the only person that can research, plan,

and promote new tech. Others have great insight and skills that you must tap into. But you may be the pivot point for tech and if you are not growing in skills, talents, knowledge and wisdom, your firm will feel the negative impact.

You need to expand your tech savvy and people skills all the time. You need to learn more about new tech and gain insight into the next thing that is coming down the pipe. You need to refine the existing process and find new ways of improving your firm's production. Stop doing things the old way if it is not the best way. Start new projects with refreshed procedures. Train yourself and others as you go. Extending your reach can be done at any time.

Start now with some online research or talking to others outside your firm to see what they are doing. Tap into others as you see them gain knowledge in an area that you have not checked out yet. Understand that others will supplant your knowledge of some long-standing tools as you move forward. That is okay. Stay close to the front-line design staff as they learn more. You have an advantage as you work with multiple people, offices, projects, and clients. You will learn more as others keep you informed. Do not let your skills stand still.

By being aware of the pitfalls that you may stumble over, you may be able to avoid some. You stand a better chance of staying sharp and moving forward when you are sensitive to your own foibles. Your firm will gain as you become better at your job and you will extend your career too.

Mark Kiker has more than 25 years of hands-on experience with technology. He is fully versed in every area of management from deployment planning, installation, and configuration to training and strategic planning. As an internationally known speaker and writer, he is a returning speaker at Autodesk University since 1996. Mark is currently serving as Director of IT for SIATech, a non-profit public charter high school focused on dropout recovery. He maintains two blog sites, www. caddmanager.com and www.bimmanager.com.

Revit Structural 2021 for Beginners

Several years ago, my firm made the choice to switch from Microstation to Revit. The biggest challenge of this switch was understanding that Revit was NOT a new 3D drafting tool. Understanding that there was so much more to Revit than just a 3D model of a building. Some of the things that we looked at were Intelligent Schedules, COBIE data, Live Renderings, IPD Workflows, integration with engineering analytical software, early coordination to resolve clash conflicts, and the list goes on.

This article will focus mainly on tips for those beginning to use Revit Structural. The planning and startup process, looking into different analytical applications that integrate with Revit Structure, and the workflows with design staff.

BEGINNER TIPS - PROJECTS

So, you have Revit installed, now what? What is the next step from here? What is the plan to get Revit deployed to your firm and start utilizing the tools for more than just developing construction documents? We started by:

- Developing a small list of individuals to be trained
- Deployed Revit to those individual's systems
- Developed a training plan
- Developed firm wide templates
- Developed firm wide BIM standards
- Picked a pilot project
- Evaluated the pilot project upon completion
- Made changes and rolled out to the rest of the firm

Where/How did we begin? The first thing we had to understand was that Revit is more than a 3D drafting tool. Some people saw Revit as the next CAD tool. Revit is so much more than a CAD application. Understanding what Revit is,

and can do, was an important first step in our development. Some of the goals we wanted to achieve with the switch to Revit were, to develop intelligent models and drawings. Develop better coordinated documents with fewer RFI's and less conflicts between disciplines. These are just a few of our goals in switching to Revit from true CAD applications to start out.

We wanted to get a pilot group up and running quickly. So, we had someone come in and hold an initial weeklong training session for our core group of employees and BIM Management staff that would be involved in the pilot project. The plan was to pick a small project that was not too complex, and the team could get their feet wet with to develop some good workflows and learn what worked and what did not work. This could be shared with the rest of the group before bringing others in and teaching them.

We spent the time to develop our structural template that contained a majority of the families that would be used on 90% of our projects (or what we anticipated we would need for a typical project). The first template we developed was heavily loaded full of data that as time went along, we discovered was not the best approach to the project template. Talking with Autodesk and others we met at AU, we learned that the leaner the template is, the faster the model would be on the project. On smaller projects we did not notice the issue as much, but as we started doing larger and larger projects, this became more obvious.

BIM standards, not the same as the old CAD standards, but similar. BIM Standards do not just involve components of the model (symbols, linetypes and styles), BIM standards involve Hold Harmless agreements on how the model will be shared with contractors, subs, and clients. The development of a BIM Execution Plan and LOD documents for projects with the integration of Revit with other applications such as BIM360 and Structural Analytical applications like RAM, RISA, ADAPT and ROBOT. This is the plan for BIM projects and how they will be setup, managed, and delivered for the project team after the completion of the project.

The pilot project we chose was a small, simple project. During the kickoff meeting with the team, we discussed goals for the project that we wanted

to accomplish during the project. The reason behind this is that there are so many moving parts to a full BIM project, that we did not want to take on too much in the first project.

- Model all concrete and main steel members
- Use live schedules
  - Column schedule
  - Footing schedule
- Convert standard CAD details to Revit details
- Develop construction documents for project delivery

After the project was completed, we called the team together to review the project, listen to the team, and discuss:

- What worked, what did not work?
- What would you change for the next project?
- What training needs do you think would have helped?
- Develop a plan to address issues before the next project or bringing others on board?

After we addressed the issues that were brought up at the evaluation meeting, we discussed plans to bring others on, and training for the next group of designers and engineers to use Revit. We also developed a small committee of users from the pilot group to task them with developing and converting CAD details to Revit details.

By converting, what is meant is NOT bringing a CAD detail into Revit, but we took the time to re-draw the details from scratch using Revit Detail Items. Doing this ensured that our new standard details for all projects moving forward were clean and ready for use. We previously tested converting the CAD details and found that our models were plastered with linetypes and CAD layers from the original CAD details.

Working toward the second project, with the same team, we developed some additional goals for the project team:

- Develop custom tags for beam labels
- Develop additional schedules
- Utilize a structural analytical model for the development of the Revit Structural model
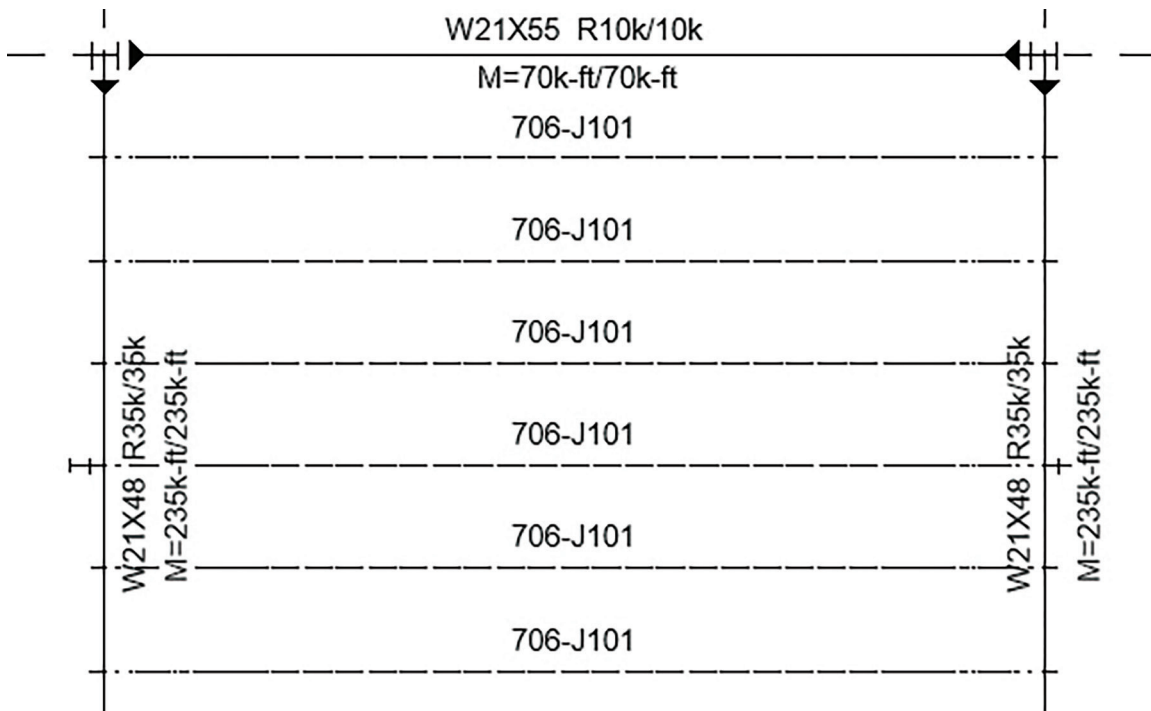- Develop braced frame elevations from the model

Figure 1 – Customized Beam Tags

The development of the custom tags was to make the tags look more like the text labels we had in CAD.

For this project we added a reinforced concrete wall schedule, concrete beam schedule and post tension beam schedule.

The BIG thing we added to our workflow on this project, was the ability to reuse and utilize the engineering model without having to model the steel structure in Revit. This saved a TON of time on the project schedule. We were able model the structure using RAM Structural Systems, a Bentley engineering application for analyzing the building structure. Utilizing the structural model is the big difference between CAD and BIM. Reusing data when possible will eliminate errors and omissions of the manual process of developing a model like old school methods of taking a paper drawing and stick build the model.

We also developed our braced frames from framing elevations in the model and then setup the views, tagged them, and placed them on the designated sheets.

With each of the first few projects we did, we made it a point to sit down as a steam after the project was finished to do a debriefing to see what could be made better. This process happened until we moved everyone over to Revit and had people up to speed on the best workflows. With all the jobs we have done over the last several years, we still do training. Each new version they improve workflows and tools, new features, and add-ins all the time to help automate and improve workflows of doing repetitive tasks. We live in a world now where we no longer rely on the CAD drawings. Now the model is just as important as the drawings. We are asked to push projects out faster than ever before and minimize RFI's. The only way to continue to do that is to fully understand how the tools work and find ways to do our jobs as efficiently as possible.

One of the biggest pieces of advice in closing, would be to keep your models as clean as possible. Make sure to do model maintenance regularly, keep up to date with patches and versions and follow best practices to keep things moving smoothly.
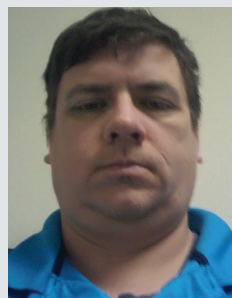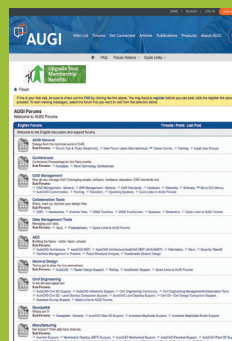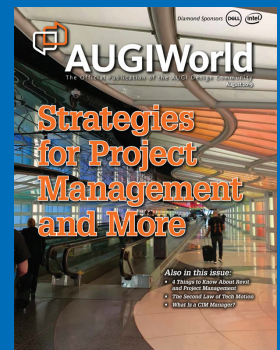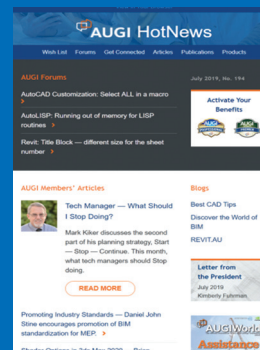
Kenn Farr is currently Senior BIM Technology Analyst - Practice Technology Group w/ 13+ yrs of experience at Gresham Smith. Involved in troubleshooting, training, development, implementation, and support with the building engineering groups. Kenn has over 26 years of experience in the AEC industry.

by: Kenton Grant

Using BIM to Leverage People, Processes, and Tools

A new year often brings a fresh perspective, reflecting on projects from last year and a desire to do better. As a Design Technology manager, I constantly think about how I can better leverage Building Information Modeling (BIM) on projects. However, I look for opportunities beyond Revit and modeling practices and instead reflect on the entirety of the project – how teams communicate, how colleagues respond to challenges, and how we can push our organization to do more. In this article we will take a 50,000 ft. view of BIM, outline the primary components that support it, and take a brief look at how they relate and depend on each other.

BIM PHILOSOPHY

The term BIM is nothing new, and I am sure many are familiar with it and have seen it often, if not everywhere you look. What is interesting about the term is how it's interpreted by different people and how little or how much it impacts an organization's practice. I will forgo the history lesson, but I highly recommend "BIG BIM little bim" by Finith Jernigan for those wanting a deeper dive and understanding of the origins and perspectives of how building information modeling has evolved and operated within the AEC industry. There are two primary viewpoints: BIG BIM, which is very open, data centric, and emphasizes the larger ecosystem; and Little bim, which operates in silos, modeling, and cad centric, but the benefits do not extend beyond the project.

I practice the BIG BIM philosophy. Breaking the concept down into three pillars, BIM is about:
- People: Who we are
  - Talent including soft and hard skills
  - Roles and responsibilities
  - Organization and culture
- Process: How we achieve our goal
  - Best Practices
  - Workflows
  - Roadmaps
- Tools: What we use to get there
  - Technology
  - Training

BIM is the culmination of these three pillars, each distinct and unique in its own way, but still relies on each other to support the BIG BIM picture. I will explain the pillars, why they are important, and how they relate to one another, hopefully shedding light and challenging how you think about BIM.

TOOLS

Tools are easily the most recognizable pillar of BIM, specifically 3D modeling platforms like Revit, Rhino, and ArchiCAD. They are the instrument that gives shape, color, and context to the project, but do not start and stop with modeling alone. In fact, model authoring tools might only represent a few tools in your toolbox when you consider everything else you use like Outlook, Enscape, Navisworks, BIM360, Twinmotion, Miro, Teams, Power BI, Procore, and

Figure 1 – BIM Tools "sample software list"

anything else your project might touch from concept to turn over.

We can categorize our platforms into a few general buckets: Modeling, Visualization, Communication/Collaboration, Coordination, Information, and Analysis. This provides a visual representation of our toolbox and what project teams have available to them. We can now respond to RFPs and BIM Execution Plans (BEPs) with confidence and accuracy regarding software capabilities. We can identify strengths and weaknesses within these buckets; perhaps the organization is light on collaboration tools and should consider testing Miro.

The outline could also be a catalyst for internal training. After all, a tool is only as good as the user wielding it. Beginner Revit training can be a long and arduous process, but our training does not stop there. We learn by doing, and with each project we touch, we become more competent. On the flip side, we do not know everything, and as our projects continue to envelope more technology, the need for continued training is important. An organization that understands this is quick to identify training opportunities to develop processes to create content, schedule sessions, and solicit feedback.

Without BIM champions to inspire talent growth or processes to evaluate lessons learned, the tool will wear down. In this case, the tool could be stagnant standards, frustrated staff, or projects, even proposals that miss the mark. While many people see platforms like Revit as a BIM tool, every platform is part of your BIM environment. Taking this a step further, we could say that there is no "BIM" platform, rather BIM is how you leverage the platform to achieve a set of goals.

PROCESS

Generally speaking, Process is how an organization leverages People and Tools effectively. The Process pillar of BIM is a broad and diverse one, including best practices, workflows, roadmaps, and much more. Gone are the days of thick binders full of AutoCAD standards, line-weights, and dimension styles. Instead, Process can be as tangible as a Revit Template or as loose as a BIM vision statement for your project or organization.

For BIM to be successful, it is important to define what BIM means to you and your organization. Thinking back to the comparison of BIG BIM and little bim, you can assume that no two people share the same philosophy on BIM, and that is okay. Different perspectives bring value to the whole. Acutely clear expectations will help your project team and organization stay focused on common goals and establish a unified vision of BIM that is easily shared internally to your organization and externally to consultants and clients.

Project workflows are impacted by how we implement BIM, as well. We still start with programming and concept design and end with turnover or facilities management, but the efforts and transitions between these phases can have noticeable effects. The chart below illustrates the effort of a project team compared to the project phase and ability to affect the effort. As we progress deeper into a project, it a) costs more to make changes, and b) those changes have increasingly smaller cost benefits. A traditional project curve shows a steady increase of effort over time, with most production occurring during CDs. In a BIM
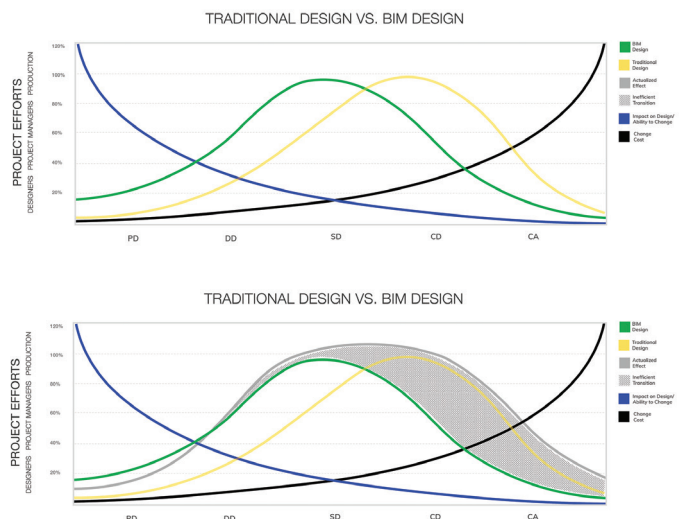
Figures 2 & 3 – Traditional vs BIM vs Realized

environment, we focus on planning and strategy, so the effort has shifted. In a failed BIM environment, we see the worst of both worlds.

We see some attempt to plan, but a lack of follow-through, leadership, and shared responsibility foster a traditional workflow mimicking silo modeling behavior and rushed project development. This results in some front-end effort and an increase in the effort where we should have seen a decrease.

To mitigate this risk, we ensure that BIM is not just about technology, but how and when we use that technology on projects. This involves open communication with project managers and leadership to understand potential staffing adjustments, skill gaps, a need for BIM strategy, and possibly on-going support for the project.

Large projects often use BIM Execution Plans (BEP) to establish a positive BIM environment. The BEP documents anything and everything related to BIM and is meant to serve as a living document and guideline for the project's life. Not every project needs a large document such as this, but the concept is beneficial. Boil a BEP down to its simplest form, and you have a set of basic questions that help you understand project needs, document the team, and identify potential problems. Implementing a practice to capture this information for every project will help your team start on the right track.

Project planning helps identify software requirements and training needs, unique design challenges that require more staffing or new team members. Kicking off a project with BIM in mind allows the project team to work efficiently with fewer upfront problems.

While the practices listed here tend to be organization heavy, they do not exclude project and task-oriented workflows. No best practice is too small if it is used to assist with your BIM Implementation, including transitioning between Rhino and Revit via conveyor or Revit modeling tips for successful Sefaira analysis. We rely on a feedback loop with our production team, management team, and leadership to stay apprised of everything good and bad. Our continued use of BIM is not a static idea but a dynamic process that ebbs and flows with our projects, clients, and organization.

Figure 4 – BIM Project Planning "sample checklist"

PEOPLE

An organization or project team is nothing without the people, and the same could be said for fostering Building Information Modeling. The concepts and practices mentioned above require champions to train and use the tools daily and foster and lead BIM within the organization. What is unique about BIM today compared to several years ago is the diversity and growth of technology and the adoption of these tools. When our toolboxes grow, our talent must grow with it. While it is obvious that if we acquire new software, we need to have talent who knows how to use it. Today's projects are leveraging more technology and communicating or collaborating more frequently. This requires the hard skills to use the software and soft skills to communicate effectively, develop more relationships, and genuinely collaborate as project teams.

As BIM sweeps through our industry, we have seen several new roles develop to support it. The roles can seem confusing on the surface; one firm's BIM Coordinator is another firm's BIM Manager and is yet another firm's VDC Specialists. Understanding roles and responsibilities do not have to be a daunting task. Much of what we have learned here can be used to identify desired skills, job responsibilities, and management or leadership opportunities.

The images illustrate BIM centric roles across three firm sizes and are meant as a rough guideline for understanding how roles function and their typical responsibilities. As firm size grows or as the number

The manager oversees the team to ensure standards and goals are met, the expected results obtained, and that the project or product is achieved, and above all else, meeting the client's expectations. A leader allows the team to flex, learn, and succeed independently. It shifts the team's accountability and risk, but even scarier for some requires trust in (and from) your team.

Managers are still vital to oversee project deadlines, schedule staffing, and ensure best practices, standards, and workflows are utilized. However, leaders help inspire and cultivate an environment that breaks down traditional drafting practices, shifts responsibility and accountability across the team, creates bottom-up employee buy-in, and develops a culture that collaborates and focuses on projects and products with the client's mind.

SUMMARY

As the industry continues to evolve, so should our outlook of workplace practices. What once worked 30 years ago during an age of hand-drafting may not work now in this age of technology and BIM adoption. Although many see Building Information Modeling as a way of drafting, modeling, or data-driven design, we view BIM as how to leverage people (managers and leaders alike), processes, and the tools they use.

Figures 5, 6 & 7 – Roles & Responsibilities "sample organizational chart" developed by Kenton Grant and UniSpace.

of people and projects utilizing BIM grows, the need for dedicated management AND leadership increases, too.

"Management is doing things right; leadership is doing the right things" - Peter Drucker

Management and leadership both have a necessary place in the BIM world, and not only warrant differentiation between the two, but an analysis of their distinct roles will only enhance any office dynamic and BIM endeavor.

The traditional view of a manager is to oversee a team working on a project or product and usually has clear inputs and outputs with expected results.

Currently a Design Technology Manager with Gensler, Kenton Grant collaborates with projects teams across several practice areas focusing on supporting and fostering Design Technology Prior to joining Gensler, he completed The Mine fellowship, a 9-month program dedicated to social entrepreneurship based on McKinsey methodology and is also a graduate of Leadership Tulsa, a 9-month personal, professional, and community development program. Throughout his 18-year career he has worked for Architecture and Engineering firms including a Fortune 500 defense contractor. He has presented at Autodesk University and Midwest University and chaired the Architectural Drafting competition for Career Tech Oklahoma for 3 years.

by: Anand Stephen

A Case for Computational Design: A Systems Perspective

The current pandemic has upended our social and physical systems, testing the limits of their resiliency. The Merriam-Webster dictionary defines resilience as "an ability to recover from or adjust easily to misfortune or change." However, when misfortune strikes, time is critical for an effective, resilient response. The faster a system responds to an external force, the lesser it will impact the system.

SYSTEMS PERSPECTIVE

One could take a sledgehammer approach and throw all available resources to respond to the external force. However, the response itself will alter the system's shape. For a system to not entirely change its form, the fewer inputs (or resources) that the response requires, the more a system will remain closer to its original condition.

We must explore any opportunity to improve resilience within the civil engineering community. The implications of improved resilience within civil engineering are far-reaching, extending beyond profitability. Systems designed by the civil engineering community is the connective tissue of contemporary society. Computational design is a tool in our toolbox that we will explore here.
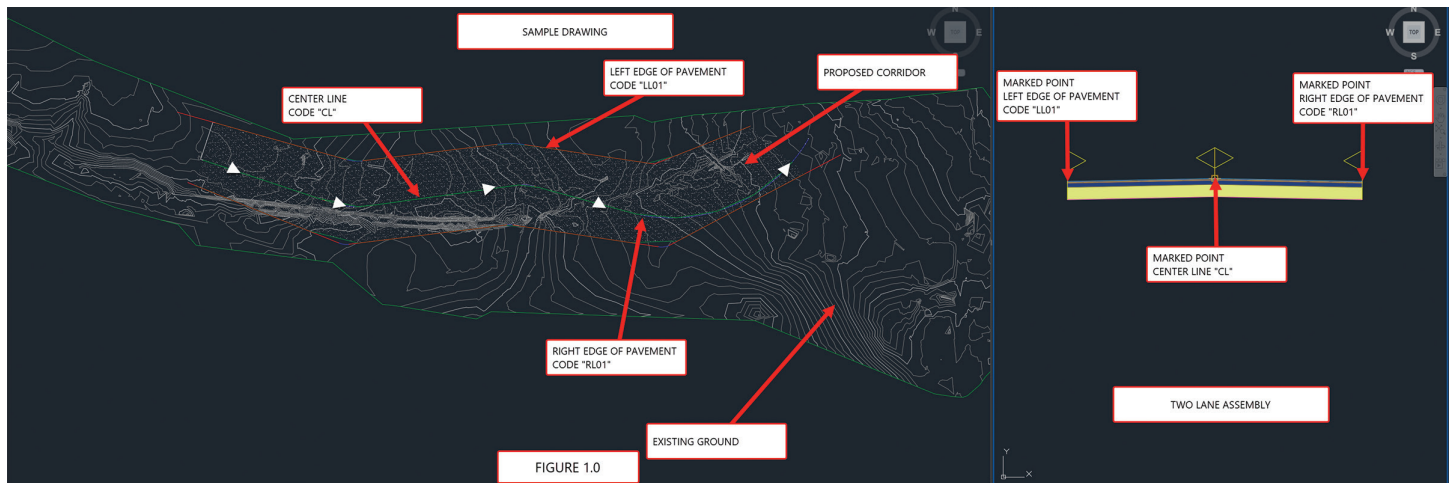
Figure 1 - Data Inputs

This article outlines steps for using a computational design tool: Dynamo, a visual programming application that interfaces with Autodesk Civil 3D (C3D). I intend to help readers imagine the possibilities of computational design within civil engineering. In the example outlined here, I will show how to perform a simple cross-slope analysis using C3D, Dynamo, and Microsoft Excel.

Imagine the steps and time it takes for you to analyze cross-slopes for several miles of a roadway. The task at hand is to produce a report to identify deficient cross-slopes along a highway. While in this example, we are connecting data from C3D to Excel. Imagine the possibilities with the Internet of Things (IoT). For instance, elevation data from GPS enabled stakes placed along the slopes of a cliff sends updates to the cloud to update the survey; subsequently, we execute the script. Anytime the slopes exceed a critical value, it could trigger an appropriate response. What is the common denominator in these examples? It is the promise, and potential, of reducing the response time to an external change. Thus, increasing system resilience.

The Problem – As an example, let us consider performing a cross-slope analysis on a two-lane roadway.

Data Inputs – The 3D topography of the existing ground, roadway centerline, and lanes edges (see Figure 1).

Data Output – The output contains coordinates (X, Y, and Z) and station values along the Centerline, Left, and Right Edge of Pavements (EOP).

DYNAMO PROCESS

First, let us delve into the Dynamo script that solves the above problem. Subsequently, we compare the Manual and Dynamo methods. For the comparison to be useful, we will use similar workflows in both cases. Hopefully, it showcases the potential benefits of computational design.
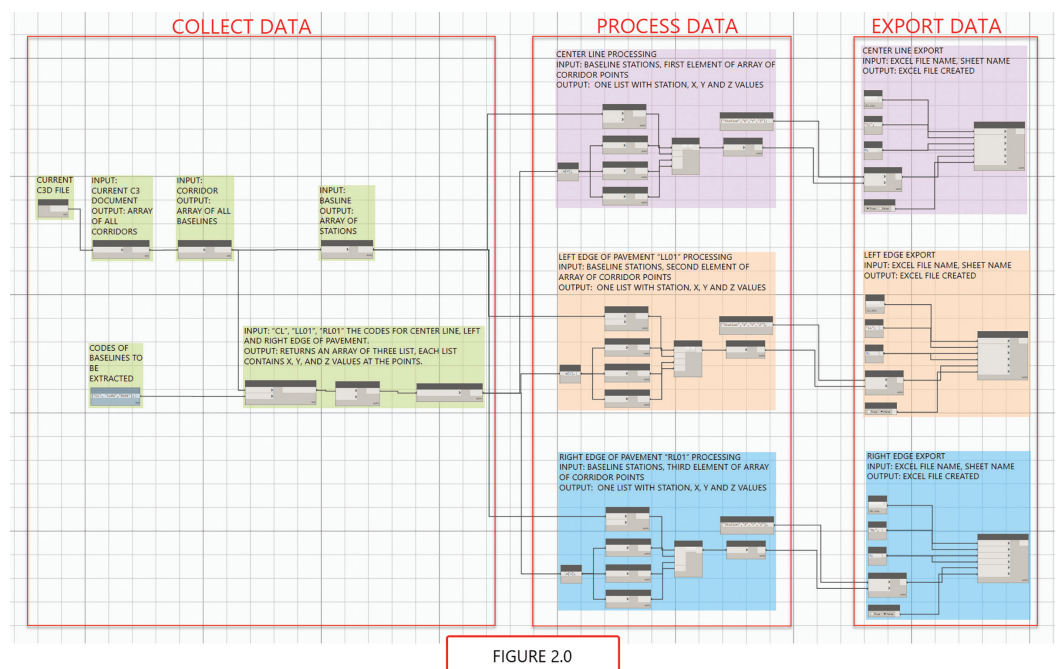

Figure 2

Dynamo is a visual programming application. Users can connect logical blocks of pre-programmed computer code, called nodes. Every node takes in an input and produces an output. The output from each node becomes the input for subsequent nodes.

From a data perspective, there are three necessary actions to perform a cross-slope analysis. We need to collect, process, and export the data. We analyze the data in Excel using formulas and data links. The three logical steps are necessary regardless of the Manual or Dynamo script methods. Figure 2 provides an overview of the nodes and logical steps within Dynamo.

Collecting Data - We collect data by connecting a series of nodes shown in Figure 3.0. Data collection steps begin with a node that loads the C3D document with the corridor requiring cross-slope analysis. It is essential to note you must have the C3D file open; subsequently, you open the Dynamo script. Currently, Dynamo can process only one file at a time. After loading the C3D file, the next node loads all the baselines.

Note the values in the code block of baselines to be extracted (see Figure 3.0). It consists of an array of three elements — "CL," "LL01" and, "RL01" — this array limits the baselines to the Centerline, Left, and Right EOP. Moreover, the order of the array elements is essential, as Dynamo maintains that order through the Data Processing and Data Export steps shown here.

While a node extracts the geometry of the points of the baselines with marked points "CL," "LL01," and "RL01", it does not contain station values. Hence, we need another node that collects the station values. Its output has an array with three lists of station values for Centerline, Left, and Right EOP. Important to note, both arrays within the data collection step contain lists in the order of "CL," "LL01," and "RL01"; hence, the first, second, and third elements in the array contain geometry and station values for the Centerline, Left and Right EOP.

Processing Data - Thus far, Dynamo has collected two arrays, each with three lists containing the geometry of points and corresponding station values. We need to split each element within these arrays into individual lists for Centerline, Left, and Right EOP.
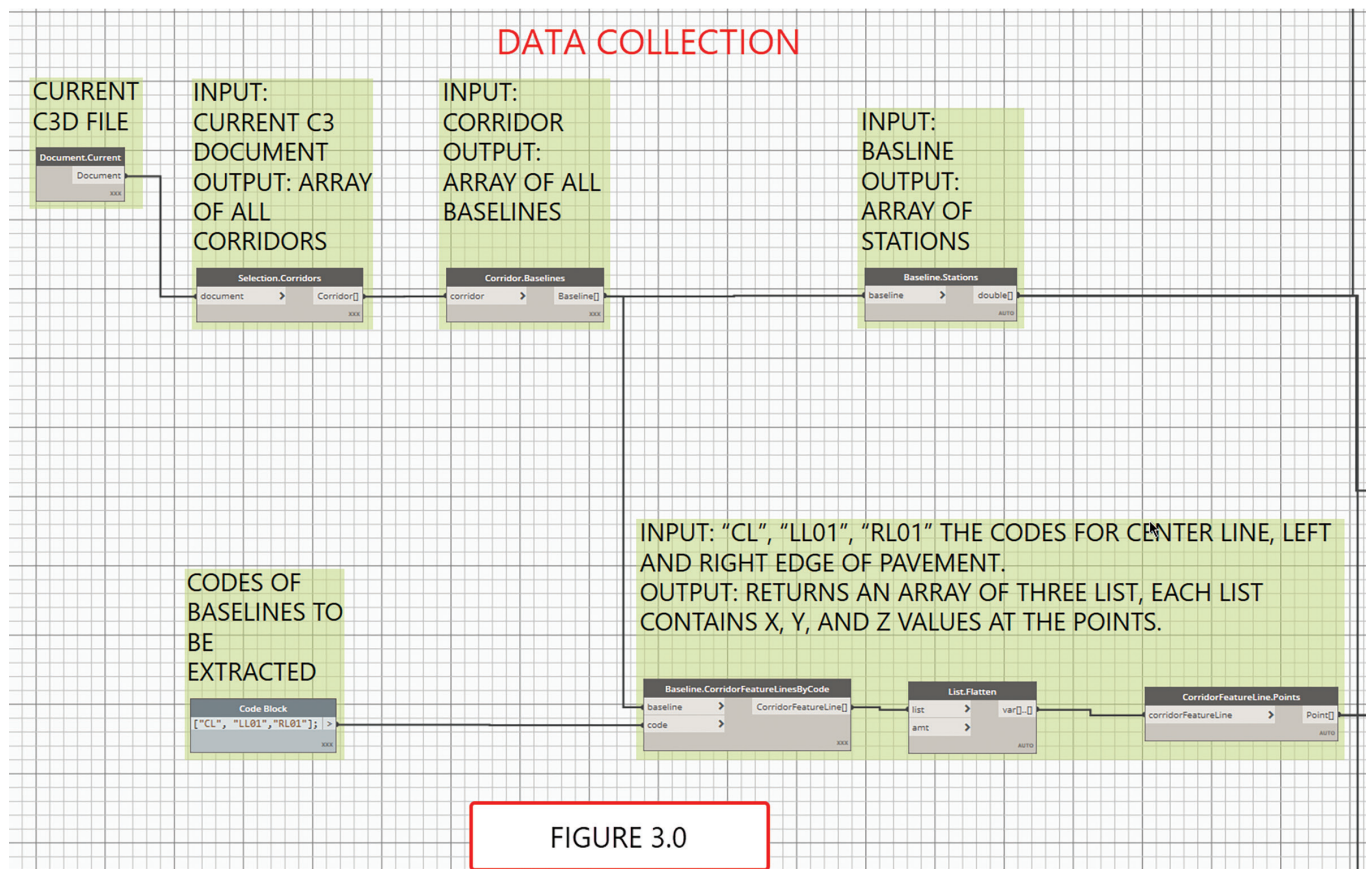

DATA COLLECTION

Figure 3

FIGURE 3.0

Data processing (Figure 4.0) involves splitting the above arrays into separate lists, each for the baselines. Subsequently, we need to merge the list for geometry and station values into one list. Notice the code block a[0]; it instructs Dynamo to pick the array's first element. Remember the order of codes listed above: "CL," "LL01," and "RL01." Hence, the 0 in a[0] corresponds to the Centerline (Figure 4.0). The difference for Left and Right EOP is the code block a[1] and a[2], respectively.

Exporting Data - The final logical step is exporting data (Figure 5.0). The main inputs are lists containing the geometry and station values derived from the data processing steps above, Excel file name, and sheet name. The steps shown in Figure 5.0 are for the Centerline. They are replicated from the additional two baselines. The differences for the other baselines are providing appropriate file and sheet names.

SYSTEMS COMPARISON

There are many ways readers may accomplish the above task manually. Let us review two conceptually similar workflows for the Dynamo and Manual methods to facilitate a useful comparison.

I. Initial C3D setup
1. Create or Data Reference existing ground surface
2. Create and a two-lane assembly (see Figure 1)
3. Add Marked points with codes "CL," "LL01," and "RL01" to the Centerline, Left and Right EOP, respectively (See Figure 1).
4. Create a Centerline, Left and Right EOP alignments, and sample corresponding existing ground profiles (see Figure 1)
5. Create a corridor using the above Centerline and target Left and Right EOP (see Figure 1)
6. Create point groups, one each for the Centerline, Left, and Right EOP
7. Using the "Create COGO Points from Corridor" command, choose the "CL," "LL01," and "RL01" codes to insert the points into their respective Point Groups
8. Export each of the point groups into separate Excel files to a known location
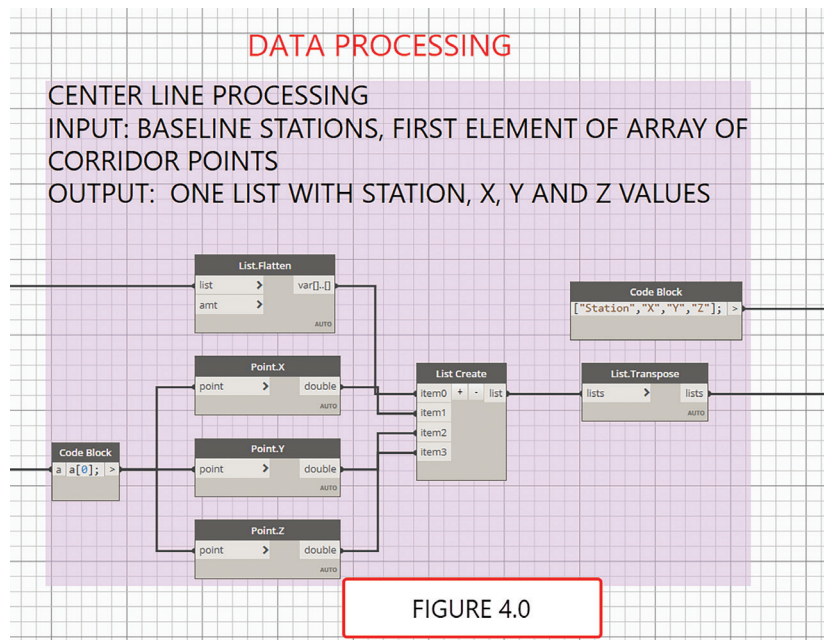

FIGURE 4.0
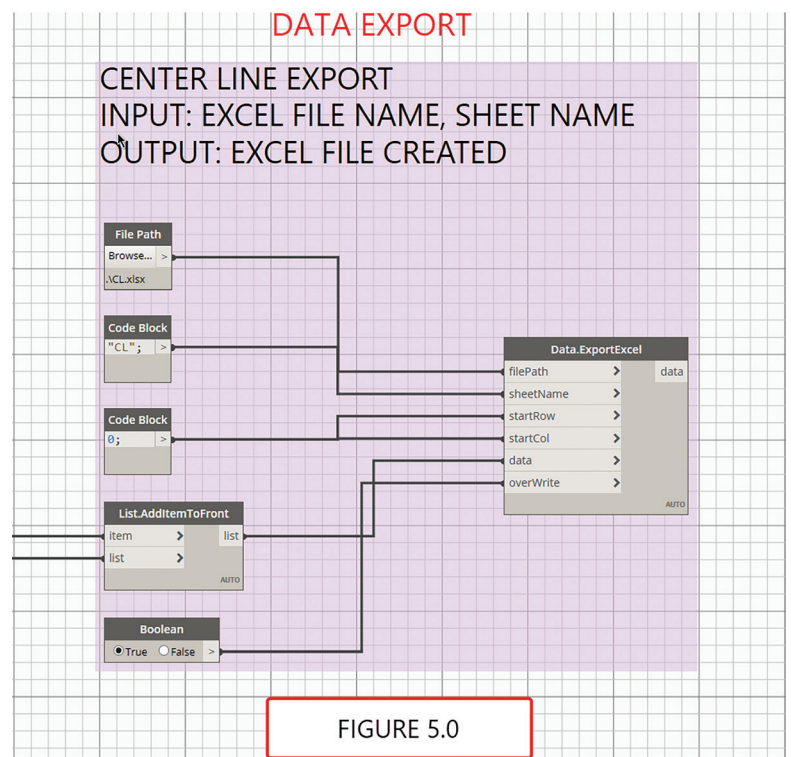
Figure 4

FIGURE 5.0

Figure 5

II. Initial Excel setup
1. Create an Excel file with four sheets. One for the summary and one each for the Centerline Left and Right EOP.
2. Link the data to each of the COGO points exported file in their corresponding sheets using the "Get Data from file" command within Excel

3. Setup the formulas in the summary sheet for distances and slopes for the Left and Right lanes
4. You can use conditional formatting to highlight cells where cross-slopes are not between 0.5%

and 2.0% (See Figure 6.0). You can use values that are critical to your case.

BEFORE LINKING DATA

AFTER LINKING DATA

FIGURE 6.0

Figure 6

BEFORE DATA REFRESH

AFTER DATA REFRESH

FIGURE 7.0

Figure 7

III. Report re-run to accommodate changes

1. Delete all points within each of the point groups for Centerline, Left, and Right EOP
2. Using the "Create COGO Points from Corridor" command, choose the "CL," "LL01," and "RL01" codes to insert the points into their respective Point Groups
3. Similar to step I (8), export the point groups into three separate files, ensure to overwrite the files
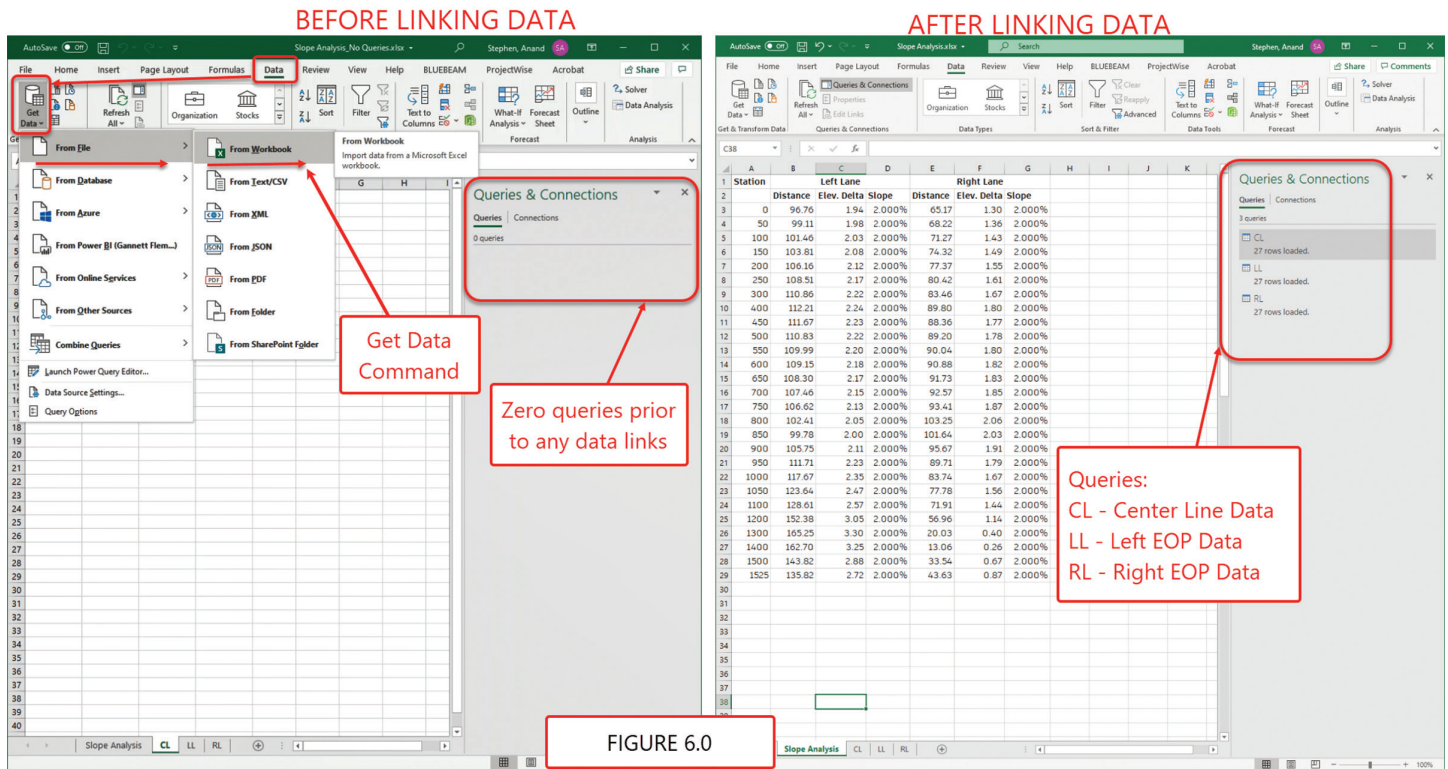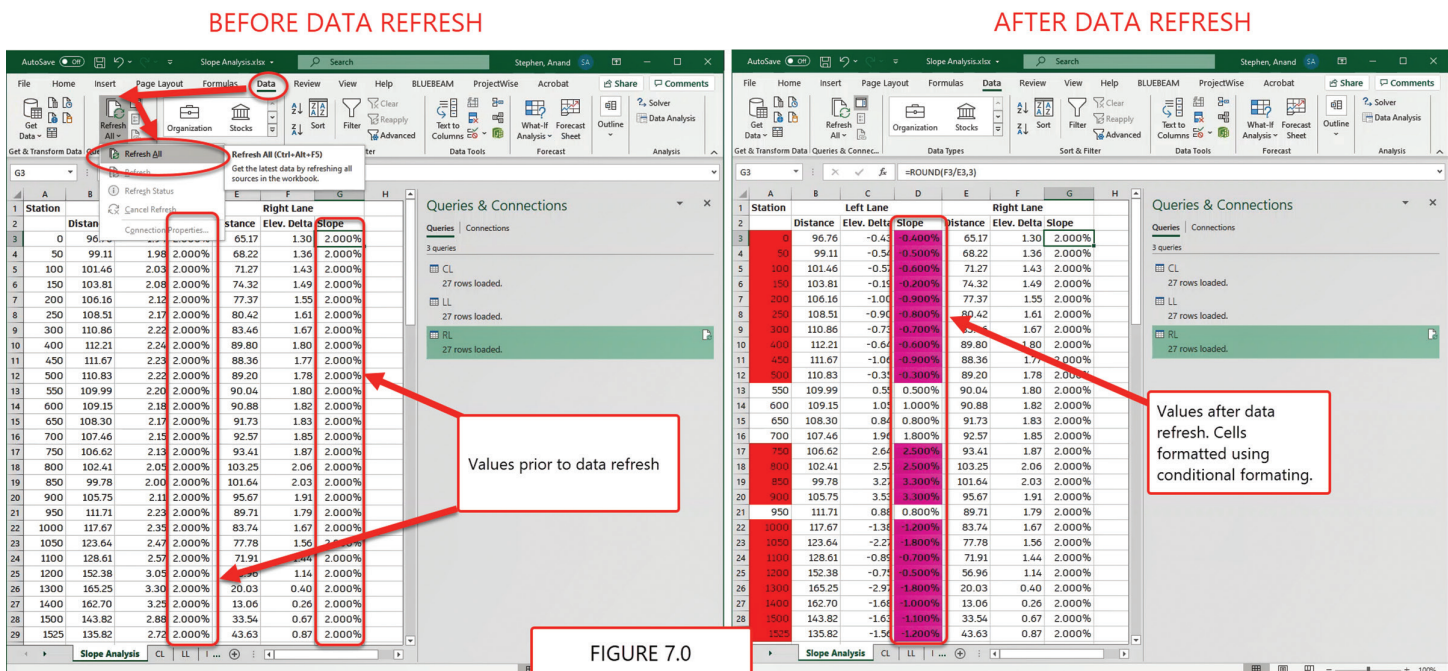4. To update the summary, open Excel and refresh the data sources (See Figure 7.0)

Using Dynamo

1. Initial C3D setup: Only steps I (1) through I (5) are necessary
2. Initial Excel Setup: Same steps as the manual process
3. Initial Dynamo step: logic and process outlined in the section above
4. Run the Dynamo Script anytime to accommodate any change
5. To update the summary, open Excel and refresh the data sources

Comparing the Manual and Dynamo processes, superficially, it appears that we save only three steps during the initial setup and three actions while re-running the report. However, when we examine actions I (6) through I (8), we notice three steps within each step. Similarly, steps III (1) through III (3) each require three steps, one each for the Centerline, Left, and Right EOP.

The comparison shows nine extra steps for initial setup and further nine steps to re-run the report. For every additional lane added to the system, the number of steps increases by three for both the initial setup and report re-runs. Finally, we must keep in mind that each extra manual step introduces the potential of human error.

CONCLUSION

Using a systems approach, we can classify the report as the output, the steps to accomplish the task as resources, and change in topography as an external impact on the system. A resilient system responds to the changes by consuming fewer resources without altering the form of the system. In the two methods outlined above, we examined the resources required to respond to an external change.

Dynamo is just one tool within the computational design toolset. It is a visual programming application. Like most visual programming applications, it has limitations in implementing loops and recursive logic structures. Hence, we should consider textual programming languages, in addition to a visual programming application like Dynamo.

Computational Design is vital to develop resilient systems and should become part of our toolbox. Comparing a simple system above shows us the importance of adding a computational design to our toolbox. It dramatically minimizes the steps required to respond to an external force. The difference gets even more exaggerated when the complexity of the system increases.

It would be a pleasure to discuss your experiences or questions regarding computational design within engineering with anyone. Do not hesitate to contact me anytime.

Anand Stephen, PE, CME is a Civil Engineer who has designed infrastructure projects across the US. He has over two decades of experience spanning engineering, software development, and sociology. He has led digital delivery and digital change in several AEC firms. Anand mentors and teaches engineers to use 3D design technologies. He has experience designing and programming enterprise software systems. Besides, he has taught courses at the university. For any comments or questions, you can contact Anand at astephen@gfnet.com.

BOXX Solutions for Every Autodesk Workflow

Office

APEXX S3, the world's fastest Autodesk workstation professionally overclocked to 5.4GHz, is purpose-built for Revit, AutoCAD, 3ds Max, and more.

Download the free eBook on how to configure your workstation for ultimate Revit performance.

Download eBook

On-the-Go

GoBOXX SLM, the ultra-thin laptop purpose-built for 3ds Max, Maya, Revit, and more, empowers you to create from anywhere.

Watch Video

Enterprise Remote

FLEXX, purpose-built for enterprise organizations, enables your team to remotely access Autodesk data, content, and projects with the power and performance of a desktop.

Watch Video

Cloud

BOXX Cloud frees your AEC team from their desk side computers and enables them to work remotely with identical, seamless, cloud-based Revit performance.

Download the free BOXX Cloud eBook filled with vital information you won't find anywhere else.

Download eBook

Storage

BOXX Storage provides secure, next generation NAS data storage (or SAN) for surveillance, backup, and archive within demanding, high performance Revit workloads. **Download the free storage brief** featuring product profiles for a variety of storage needs.

Download Brief

BOXX

nVIDIA.

(888) 302-0223
512-852-0400
boxx.com/augi