

Diamond Sponsors



# AUGIWorld

The Official Publication of Autodesk User Group International

August 2017

# Collaborative Design

## Also in this issue:

- Remodeling Your Tech Environment
- Project Navigator in ACA
- The Workflow of the Future... Now!

HP recommends Windows 10 Pro.



# THE HP Z2 MINI

HP's first mini workstation designed for CAD users



## Next level power

3.3x the graphics performance of a business-class mini.\*



## Designed for the workspace of the future

The HP Z2 Mini G3 Workstation is 90% smaller than than the HP EliteDesk 800 G2 tower.



## Industry-leading reliability

Tech issues should never hold you back. Feel confident using a workstation certified for the most popular CAD software.

[hp.com/go/Z2mini](http://hp.com/go/Z2mini)

\* Based on business-class towers with >1 million units annually as of October 3, 2016 with performance measured by processor clock speed and ViewPerf12 rating, having 4th or 6th Gen Intel processors or AMD Pro processors, integrated VESA mount, VGA, 6 USB Ports, Windows Pro OS and TPM.

©2017 HP Development Company, L.P. NVIDIA and Quadro are either trademarks or registered trademarks of NVIDIA Corporation in the U.S. and other countries. All other trademarks are the property of their respective owners.



**NVIDIA**

# contents



**6 Revit Structure** Collaboration in 2017 and Beyond

**12 Autodesk AEC Collection** Collaboration (and More) in 5 Simple Steps

**16 AutoCAD** The Right Tools for the Job



**24 AutoCAD Architecture** The Project Navigator: The Center for Drawing Management

**30 3ds Max** Collaboration Tools in 3ds Max

**32 AutoCAD Civil 3D** The Workflow of the Future... Now!



## columns

**4** Letter from the President

**10** RTV Tools

**20** Tech Insights

**22** CAD Manager

**29** Inside Track



**Cover Image:**  
Photo credit by Brian Andresen @kaotikwestcoast  
Copyright © 2017

Downtown Los Angeles  
Taken from: "OUE Skyspace LA"

# Letter from the President



# AUGI

**D**o you ever find yourself having a conversation with someone, trying to solve a technological problem, when you realize the issue isn't technology at all? It seems that at many of the conferences I attend, people complain about things as if they are "CAD problems" or "BIM problems, when really that complaint has been around since the beginning of designer/client relationships. Exhibit A would be, "How am I supposed to keep up when the client keeps changing the requirements?" CAD, BIM, and other technologies may have changed how we respond to these kinds of requests, but that doesn't make it a new problem. In the end, I think it all comes down to communication.

Effective communication is yet another skill that we are rarely taught directly in school but that is absolutely invaluable in the working world. If you were lucky enough to have specific communications training, it might be worth revisiting some of those materials. For the rest of us, it might be time to remember that English class gave us more than an appreciation for literature. We may not have to write five-paragraph essays anymore, or answer long-form exam questions in blue books (thank goodness!), but good grammar, spelling, and clarity of expression will help you cultivate a professional appearance in the eyes of those reading your work.

It's not just written communication that's important, either. Let's say you're in a working meeting. Some people at the table prefer to talk through their ideas, throwing out one suggestion after another until they find one they actually like. Others work best when they think quietly, and may even have trouble verbalizing their thought process until it's complete. If you're one of the former, it can help if you warn people you're only brainstorming. "I'm just listing ideas here; I'm not committed to anything yet." Otherwise, you risk them taking you seriously when you're just tossing spaghetti at the wall to see what sticks. If you're the latter and you need time to think, ask for it. "Let me have a minute to work through that before I respond." Without that heads-up, your colleagues may interpret silence as detachment, when you're really just trying to gather your thoughts.

And because communication is a two-way street, we can't think only about ourselves when choosing a communication method. We need to account for our colleagues' preferences and priorities. Take phone calls and email. If you have something really important to say, are you more likely to pick up the phone or spend the time to write a few paragraphs? Chances are, one of those feels like a more "important" communication medium to you. But what does the recipient think? Depending on their mindset, the response could go one of two ways: "If it was important, she would have put it in writing!" Knowing which method carries more weight can help you make sure that your message is heard.

It's tempting for those of us who are technically-minded to play down the importance of these "soft" skills. When your professional aptitude is oriented towards design or modeling, you might go days at a time without needing to write a thing. (For your project, that is. If your email inbox is anything like mine, there are plenty of other opportunities throughout the workday to hone your sentence-crafting ability.) But having a good set of communication skills can improve your reputation and expand your career opportunities. You don't have to look farther than the pages of *AUGIWorld* to see great examples of this. Our authors are a talented crew who generously share their time and expertise with us, and we're lucky to have them.

And of course, writers don't mean much without readers. Thanks for your AUGI membership, and thanks for reading!

Kate Morrival  
AUGI President

## AUGIWorld

[www.augiworld.com](http://www.augiworld.com)

### Editors

#### Editor-in-Chief

David Harrington - [david.harrington@augi.com](mailto:david.harrington@augi.com)

#### Copy Editor

Marilyn Law - [marilyn.law@augi.com](mailto:marilyn.law@augi.com)

#### Layout Editor

Tim Varnau - [tim.varnau@augi.com](mailto:tim.varnau@augi.com)

### Content Managers

3ds Max - Brian Chapman  
AutoCAD - Walt Sparling  
AutoCAD Architecture - Melinda Heavrin  
AutoCAD Civil 3D - Shawn Herring  
AutoCAD MEP - William Campbell  
BIM Construction - Kenny Eastman  
CAD Manager - Mark Kiker  
Inside Track - Brian Andresen  
Inventor  
Revit Architecture - Jay Zallan  
Revit MEP - Joel Londenberg  
Revit Structure - Jason Lush

### Advertising / Reprint Sales

Kevin Merritt - [salesmanager@augi.com](mailto:salesmanager@augi.com)

### AUGI Executive Team

#### President

Kate Morrival

#### Vice-President

Scott Wilcox

#### Treasurer

Robert Green

#### Secretary

Chris Lindner

### AUGI Management Team

Kevin Merritt - Director of Communications  
July Ratley - Director of Finance  
David Harrington - Director of Operations

### AUGI Board of Directors

Robert Green	Curt Moreno
Kimberly Fuhrman	Kate Morrival
Chris Lindner	Scott Wilcox

### Publication Information

*AUGIWorld* magazine is a benefit of specific AUGI membership plans. Direct magazine subscriptions are not available. Please visit [www.augi.com/account/register](http://www.augi.com/account/register) to join or upgrade your membership to receive *AUGIWorld* magazine in print. To manage your AUGI membership and address, please visit [www.augi.com/account](http://www.augi.com/account). For all other magazine inquiries please contact [augiworld@augi.com](mailto:augiworld@augi.com)

### Published by:

*AUGIWorld* is published by Autodesk User Group International, Inc. AUGI makes no warranty for the use of its products and assumes no responsibility for any errors which may appear in this publication nor does it make a commitment to update the information contained herein.

*AUGIWorld* is Copyright ©2017 AUGI. No information in this magazine may be reproduced without expressed written permission from AUGI.

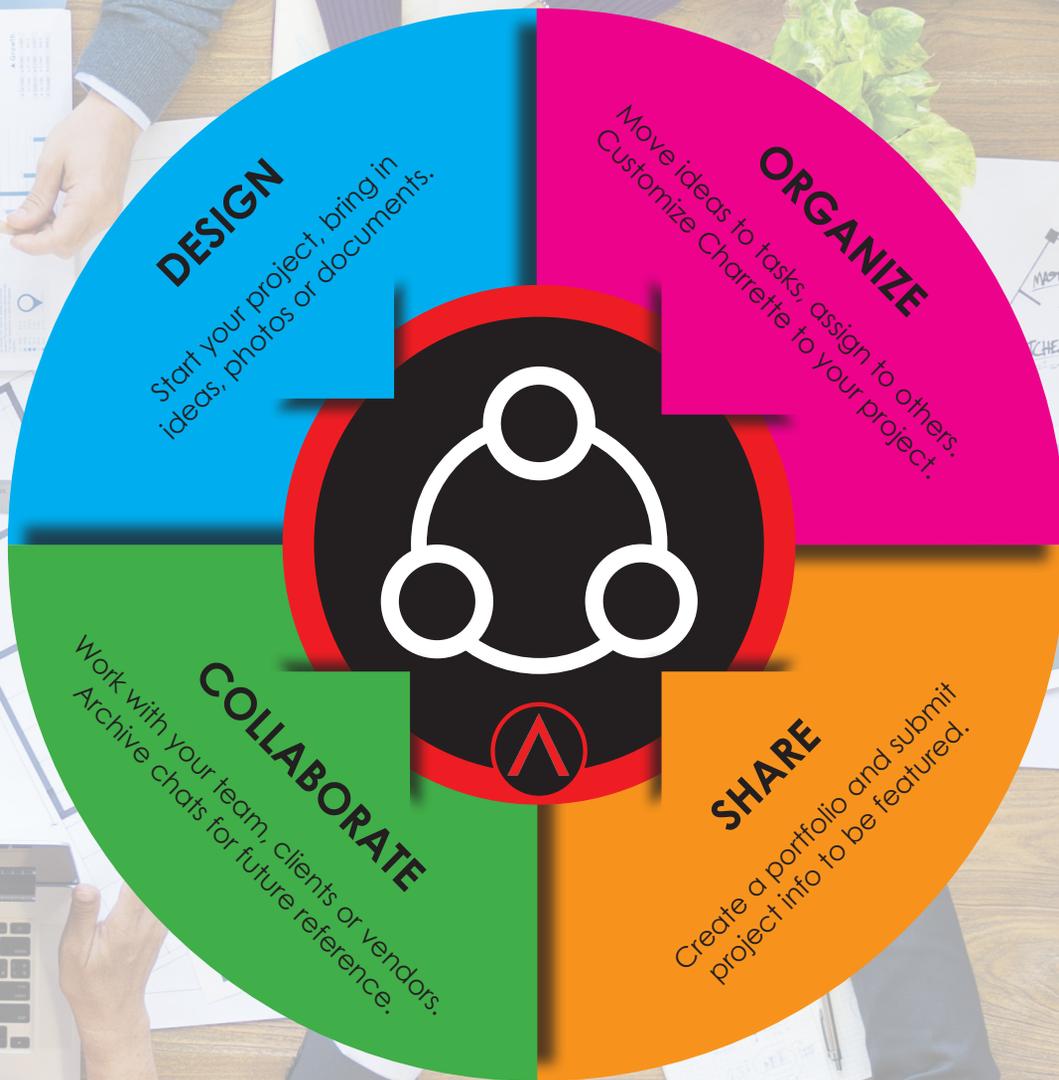
All registered trademarks and trademarks included in this magazine are held by their respective companies. Every attempt was made to include all trademarks and registered trademarks where indicated by their companies.

AUGIWorld (San Francisco, Calif.)  
ISSN 2163-7547



# CHARRETTE

A NEW WAY TO DESIGN, ORGANIZE, COLLABORATE AND SHARE



**ARCAT**<sup>®</sup>

learn more at  
[www.arcat.com/charrette](http://www.arcat.com/charrette)

# Collaboration in 2017 and Beyond




**C**ollaboration, at its core, is the idea of working together. When the word collaboration is brought up, most people think of the human element and almost always the shortcomings of not working well together. That is only part of the overall picture of collaboration. We need to also embrace the technology side of it, as well as what the future holds for collaboration.

## THE HUMAN ELEMENT

In the past, I have written on collaboration and focused quite a bit on the human element. We all know that the key to good collaboration starts with the individuals involved in the project. As great as the technology is, it won't communicate without human involvement. That is why having BIM kickoff meetings is crucial to getting a project off on the right foot as well as keeping the lines of communication always open.

I believe most of us have seen a silo on a farm. What is a silo's main purpose? To keep its contents (grain, corn, etc.) inside the walls. We often operate in what I call a silo mentality, driven by our discipline, and when we work in a silo we don't look outside of our area until we are significantly into a project or until problems arise that make us look outside our silo. Silo-driven projects are destined to fail at the most inopportune time and are usually a significant detriment to the overall project.

Silo mentality isn't driven only by different disciplines or companies not communicating. I have worked on projects where even people on the same team work in a silo. One group may be designing and modifying embedment plates, but don't take into consideration the concrete and rebar in which they are being embedded.

Silo mentality also lends itself to looking like a good design, for each individual discipline, but in the end it just won't work. The structural design may be excellent, with everything well thought

out, but when it hasn't taken into consideration other disciplines, the design becomes pretty useless. It doesn't matter how much time and effort has been put in on the project—you are still destined to clash with the other commodities.

I often find myself dwelling on the negatives of not collaborating and not really looking at the positives of it. I believe that is driven, more often than not, from seeing collaboration not done well. I have been guilty of it and have witnessed others guilty of it.

I believe when you hear about a project that went well and all parties are happy, then collaboration was happening. From the beginning of the design until the day it is turned over, if you are having up-front conversations about what you are doing and how it impacts the overall projects, everyone benefits. Of course, the biggest benefit comes when the client's expectations are met or exceeded.

### THE TECHNOLOGICAL ELEMENT

My background is in information technology and as a BIM manager I absolutely love the technology side of this industry. My group's main task at this moment is to do a constructability review of all civil commodities. To do this we are utilizing a 3D software, incorporating as-built information in both a traditional way of singular points as well as utilizing LIDAR scans and running clash detection to find major issues that will cause significant construction delays. All of these items point to collaboration.

The 3D software that is so prevalent today in the industry is driving a reduction of RFIs as well as giving an overall cleaner design. When modeling, we can find design issues well before they would be discovered in the field. If these discoveries can be made well in advance of the field, significant time and money will be saved.

We all know that change paper costs money, and sometimes large amounts. The only way these types of savings are made is if all the players are doing the same. What good is a structural model if there isn't anything to clash it against? Sure, it helps to make sure there aren't any self-clashes, which we all know can exist, but it doesn't bode well for collaboration.

Utilizing LIDAR, also referred to as a point cloud, has been a game changer in design for renovations, additions, and even multi-story new builds. In the past, if you were lucky you may have the original design drawings or CAD files and you could typically only dream about having an as-built set of drawings. Even if these drawings were available there was still time to go to the field and verify what is shown there is accurate, then translate that to a 2D drawing or 3D model so that it would be beneficial to your project. Without fail you always were missing a crucial dimension, or missing a picture to better explain the field situation (or maybe that's just me!).

By utilizing point cloud scans, you are getting a much more complete picture of the existing conditions, down to millimeters of accuracy. You will almost always get more data than you need,

**We all know that the key to good collaboration starts with the individuals involved in the project. As great as the technology is, it won't communicate without human involvement.**

but when was the last time anyone complained about having too much information? You can easily convert walls to a 3D object or in some cases, depending what your deliverable is, you can build directly from the interface of the point cloud with your new addition or renovation.

Clash detection is another big part of collaboration. When you utilize 3D modeling it gives you the ability to see what is occupying any given space. We all know that two objects can't occupy that same space and our software is able to flag that as a clash. When you are holding clash detection meetings you can get resolution quickly and efficiently. You can walk away with everyone taking ownership of the clash and making a commitment to do what is needed to resolve that clash. Depending what your work process is like, these can even be changed on the fly in the meeting to resolve some issues.

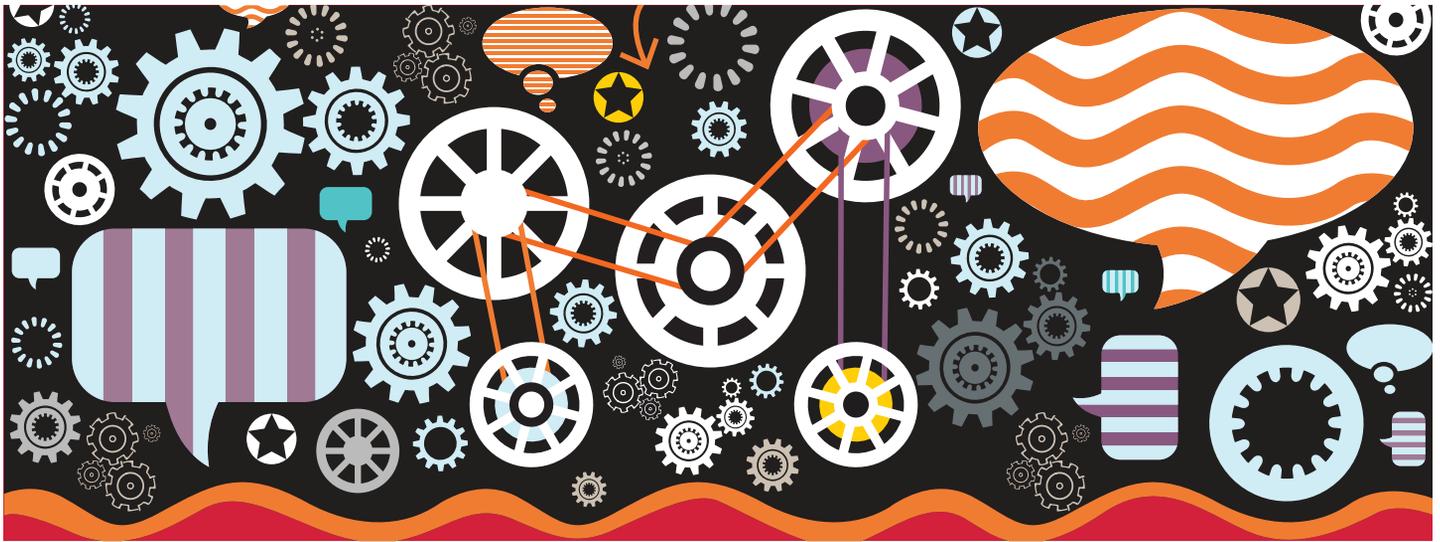
This only touches on a few parts of the technology our industry has available for everyday use. I would love to hear how other individuals are using current technology to collaboration's advantage in their projects.

### THE FUTURE ELEMENT

The future is even more exciting than the current technology. I see articles every day discussing new technology and how it may be used in our industry.

We have Virtual Reality (VR) being used around us daily. VR is the use of computer technology to create a simulated environment. VR has been around a lot longer than we really think about. You can go as far back as panoramic paintings from the 19th century that worked on filling your entire field of vision to make you feel as if you are present. Who didn't have a View-Master as a child?

# Revit 2018 – Structure



Well, there were even earlier versions of that dating back to the 1800s. How about flight simulators and the action of putting you in flight without ever leaving the ground?

These are just a few examples, but why does it seem like newer technology? The biggest reason is the accessibility to the devices that display VR are much more readily available than they were in the past. Think of Oculus Rift, Microsoft HoloLens, Samsung GearVR, Google Cardboard, and the list goes on and on. All these viewers are available to the consumer market and pretty affordable overall. With this type of technology, you can take what you have built in a 3D model and place your client in the middle of their project so they are able to walk through it, look around, and see what their finished product could look like.

Walt Disney was able to utilize this type of technology on the Shanghai Disney Resort’s Castle and found it to be very beneficial. Penn State’s College of Engineering ICON Lab is specifically used for collaborative design. They have the ability to walk through projects both on large screens as well as with different viewers.

We have the development of Augmented Reality (AR). AR is a live direct or indirect view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphic or GPS data. We are starting to see more and more of this with apps that will allow you to put paint on the wall of your room so you can see what it looks like or furniture in a room to see if it will fit. Being able to see your project in its true context can be monumental in design visualization. AR works with many of the VR devices mentioned above, and is being further developed all the time.

All these areas of technology give you a much more complete way of collaborating with your design models in the world that they are going to exist. You can see with both Virtual and Augmented Reality that it gives you a whole other way to interact and collaborate in the design process. With LIDAR scanning equipment becoming more affordable and technology such as drones being used in the construction industry, you can see why I say the future is even more exciting.

## WHAT DOES THIS MEAN FOR COLLABORATION?

We see that the human element will always be a critical part, and that will never change. Let us avoid a silo mentality and work together collaboratively as a team to deliver a great product for the client. Whether that team is within the same company or multiple entities, we all look better when we work together for the better of the project. We have the opportunity to learn from all the players of each project if we just learn to listen to one another.

Let us use the technology that is available now so that we can have a different level of interaction with the models we are creating, to deliver a better product to the other people involved in the design and ultimately to the project owner.

Let us look forward to the new technology that is being developed daily. Let’s not be of the mindset, “this is how we have always done it.” Let’s be open to utilizing new technology that will benefit the process and the project. We have technology available to us currently and being developed that can truly change the front of design and construction, so let’s utilize it.

Let us make 2017 the year of collaboration on all fronts.



*Joshua Geimecke is a Construction Support Specialist with the Fluor Corporation. He is currently working nuclear construction, leading a team, doing constructability review of civil commodities for the Integrated Construction Planning Team for new reactor builds. He has been involved in the CADD industry, working in many different disciplines and sectors for more than 17 years with the last 9 years focused on structural BIM.*



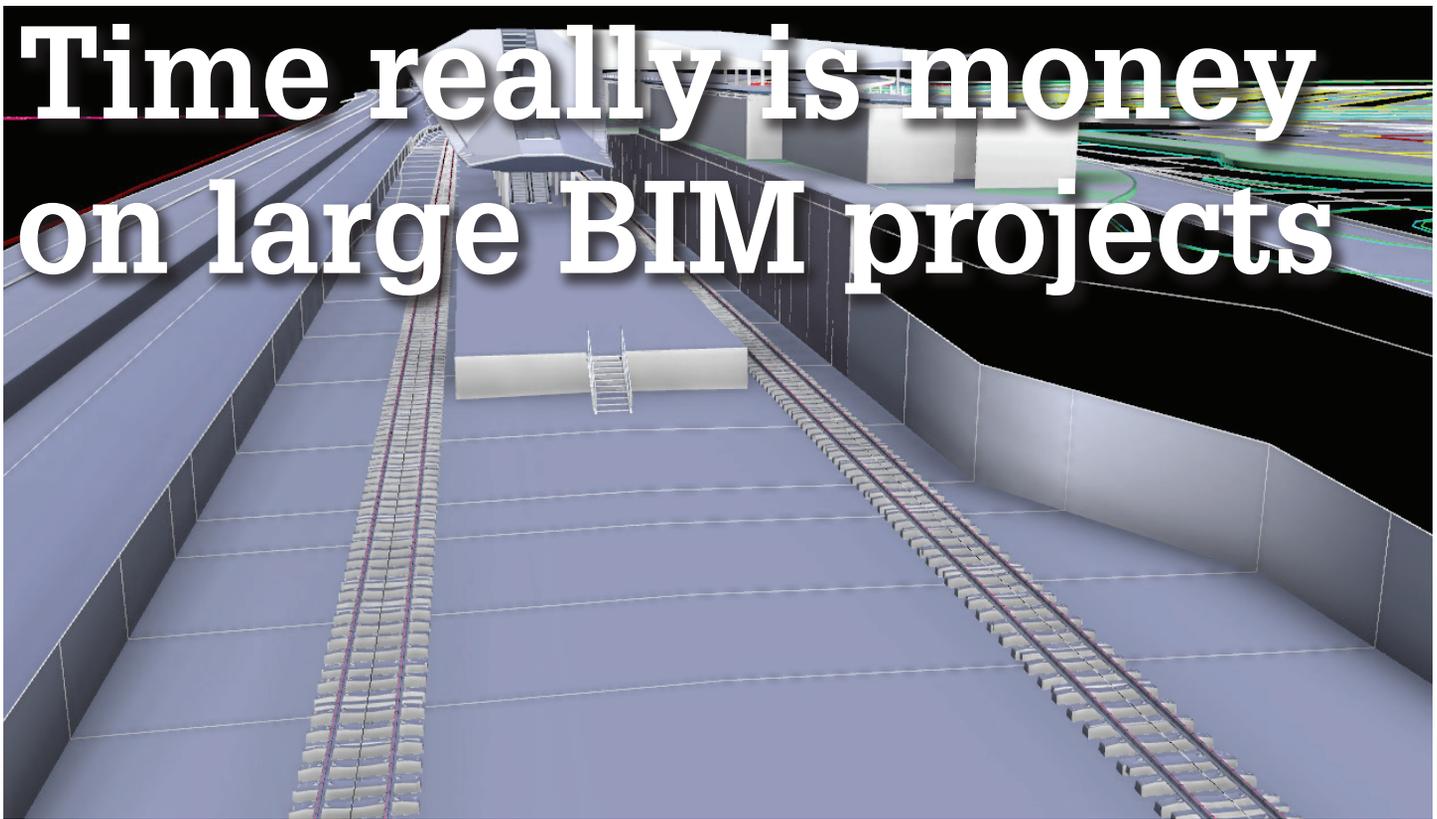
dRofus  
A NEMETSCHKE COMPANY

plan.  
design.  
build.  
manage.

THE LEADING **PLANNING**  
AND **DATA MANAGEMENT**  
SOFTWARE FOR THE GLOBAL  
BUILDING INDUSTRY



[www.drofus.com](http://www.drofus.com)



# Time really is money on large BIM projects

Image supplied by GHD

**E**xpectations are high on GHD's latest project in Western Australia with the client requesting a LOD500 operations and maintenance model as part of the project BIM deliverables. With such a major undertaking ahead of them, the team had to find ways to be more efficient with time, says Western Australian BIM Lead Belinda Thompson.

The \$2 billion project is an 8 kilometre long stretch of underground tunnel and rail including three stations, ancillary buildings, cross passages, and egress shafts all being designed and modelled using both Autodesk and Bentley platforms.

"This is definitely the most complex BIM project GHD's Perth office has undertaken with 90% of it being modelled in Revit. Revit works great for straight up and down buildings but does not lend itself well to linear projects, especially 8km ones."

One of the most time consuming parts of the project was creating weekly exports from the model.

"The lead for each discipline across the project had to export hundreds of Navisworks files and PDFs on a weekly basis. Each file takes 8 minutes to convert to Navisworks. Naturally, sometimes they would fall behind, and so often we didn't have the files when we needed them."

**“ We're saving 26 hours every week, that's \$87,150.00 over a year. ”**

"We would also get various quirks in the final product as each team member would have minor differences in their settings for export options.

"We are now half way into building the model and have re-visited how we set files up for exporting to Navisworks so that we have fewer files to export."

RTV Tools' Xporter PRO is an add-on for Revit that automates documentation processes allowing users to schedule automatic exports of prints and digital files such as DWG, DWF, PDF, IFC and Navisworks, all unattended.

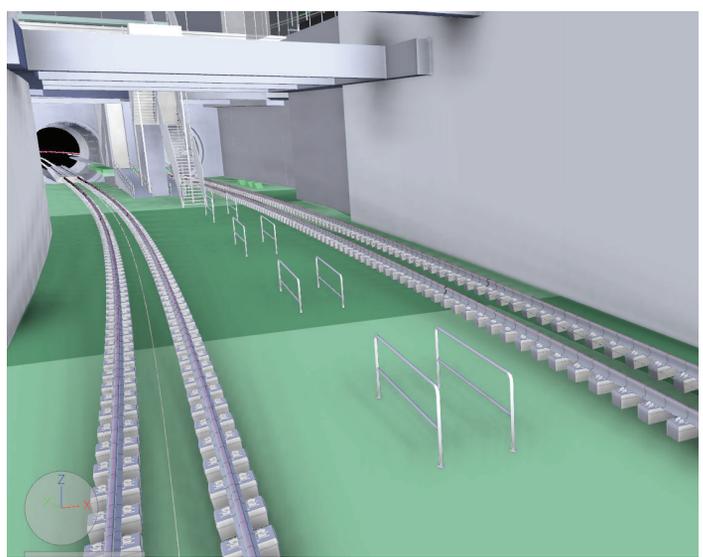


Image supplied by GHD

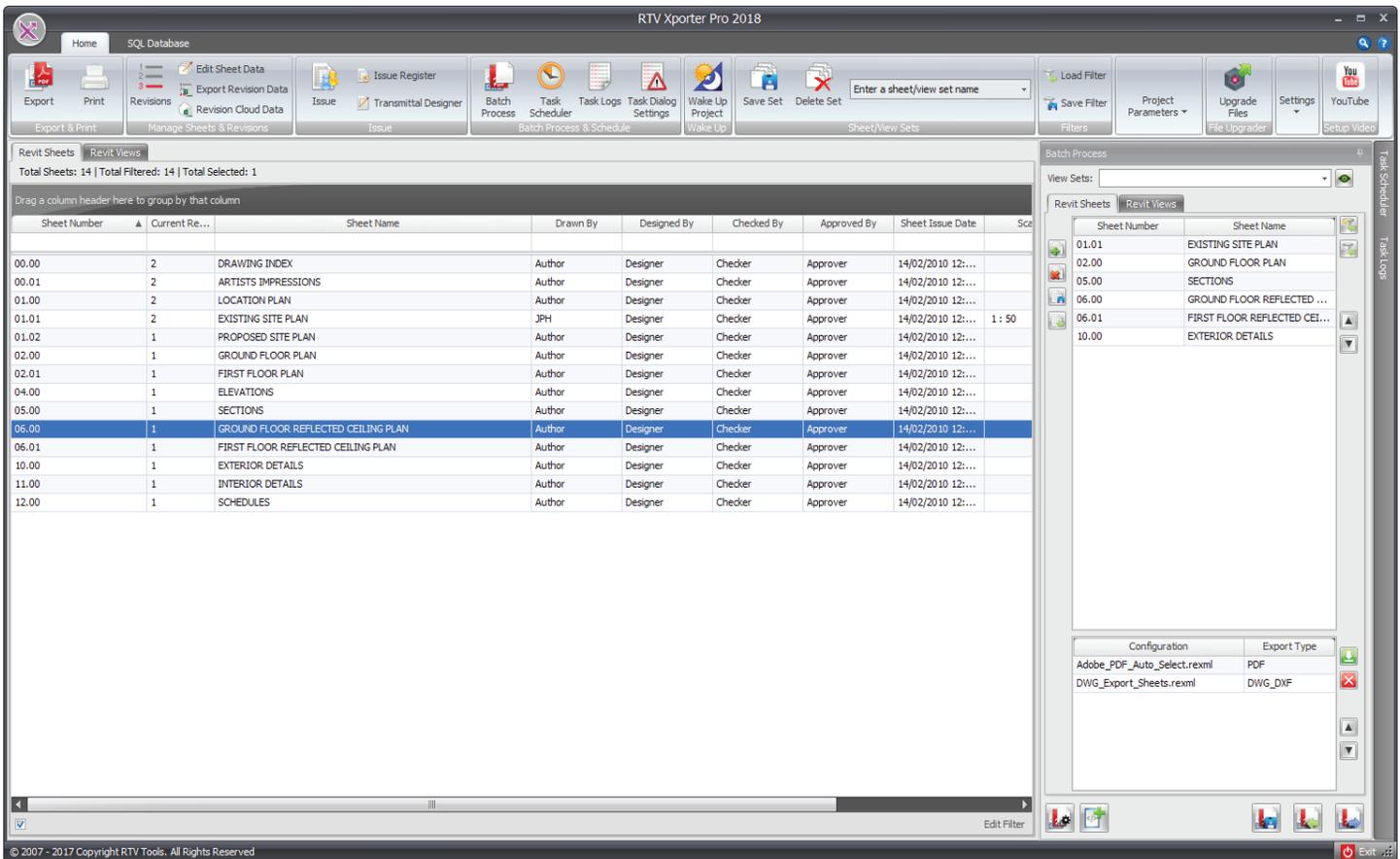


Figure 1: RTV Xporter PRO main application interface

“We had been using RTV Xporter to export PDFs, DWGs and NWCs on our Architectural and Building Services projects in Perth but it wasn’t until we faced the thought of exporting 300 models that we looked into the schedule function of the Pro edition of the software. Instead of each discipline lead doing weekly exports we gave the software to one person who got it up and running – and now the process is completely automated.”

“Yes it is saving us a lot of time, and management is happy because of the impact it has had on the project’s bottom line.”

“ with projects increasingly growing in scale the industry needs tools to automate BIM processes. ”

“For our Navisworks exports we’re currently saving 8 minutes, multiplied by 96 Revit files bi-weekly, equaling 26 hours every week. Over the course of our two-year design phase that is approximately 2,490 hours saved. In just one year we are looking at saving AUD\$87,150. That is a brilliant return on investment for software that costs under USD\$50,” says Belinda.

“The output is also standardised because no one is changing the export settings. Now every file in the federated model is showing the same information.”

With projects increasingly growing in scale, the industry needs tools to automate BIM processes in order to meet realistic time frames and allow the project team to focus on the final BIM deliverables.

“There is much more to BIM than just developing design drawings using a 3D software package.”

### CONTACT US

web: [www.rtvtools.com](http://www.rtvtools.com)  
 email: [sales@rtvtools.com](mailto:sales@rtvtools.com)  
 tel: + 64 4 473 3888



# Collaboration (and More) in 5 Simple Steps



**T**he 2018 release of Autodesk’s AEC Collection makes it easier than ever to coordinate, geo-locate, and collaborate between Autodesk® InfraWorks®, AutoCAD® Civil 3D®, Autodesk® Revit®, taking it all into Autodesk® Navisworks® and beyond to a VR experience. And with just five simple steps, it’s probably easier than you think.

## THE TEAM PLAYERS

First, let’s look at the players of our collaboration team—InfraWorks, Civil 3D, Revit, Navisworks and Live (Figure 1).



Figure 1

It’s probably important to note at this point that Live is not part of the AEC Collection, but is a separate subscription. But at \$250 per license per year and its ability to quickly go from from Revit to an immersive VR experience, it is well worth it.

## 5 STEPS FOR COLLABORATION

The workflow outlined below assumes that you currently have no digital data; all you have is the proposed job site address. The workflow will begin by creating an existing conditions model using InfraWorks’ Model Builder. From there, the existing conditions model will be brought into AutoCAD Civil 3D using the new InfraWorks ribbon tools. Next, it’s on to geo-locating the site plan within Revit. Once the InfraWorks, Civil 3D and Revit models are geo-located and in sync with one another, they can be pulled together into Navisworks for coordination. And finally, we’ll look at two ways to push the combined data to a VR experience (Figure 2).

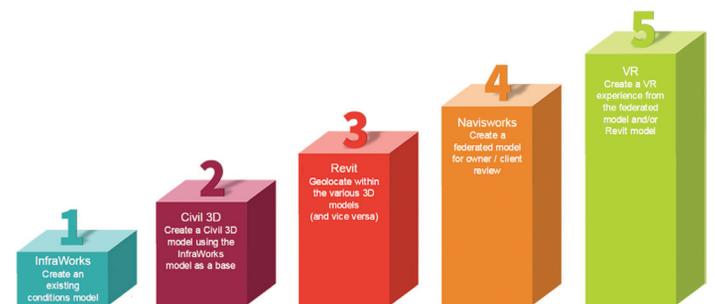


Figure 2

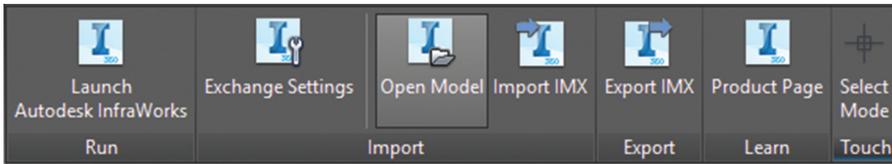


Figure 3

## STEP 2 – CIVIL 3D

Once the InfraWorks model is created it's extremely simple, with the 2018 release of AutoCAD Civil 3D, to import the existing terrain and roadway alignments using the Open Model command on the InfraWorks panel (Figure 3). Simply select the InfraWorks .sqlite file, select an area of interest (AOI), and Civil 3D takes care of the rest.

## STEP 3 – REVIT

The next step is to geo-locate the Revit model on the AutoCAD Civil 3D site plan. To do this, link in the DWG site plan, rotate it, set the elevation, then acquire the coordinates (Figure 4).

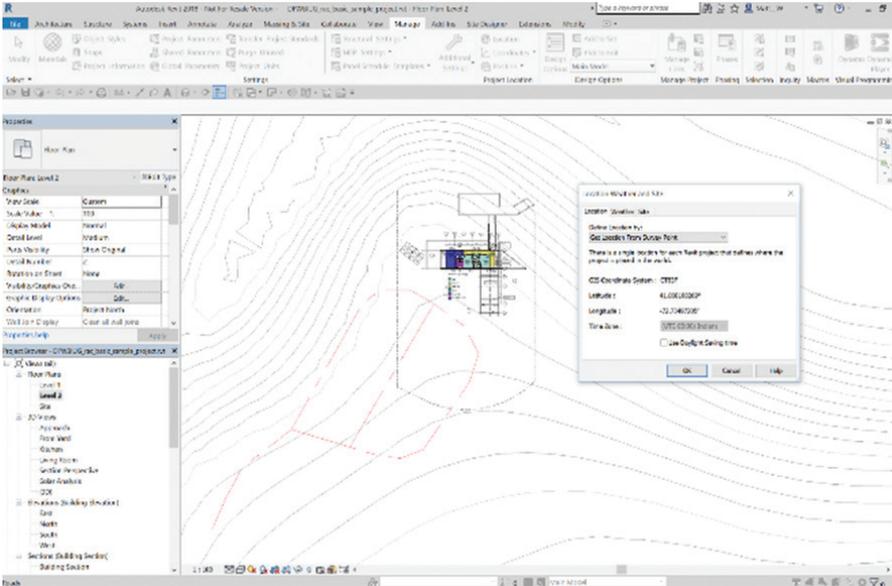


Figure 4

To verify that the coordinates were acquired successfully, you can click on Manage > Location and note the location change (Figure 5).

Once you've acquired the coordinates you can remove the DWG link. At this point the InfraWorks, Revit, and Civil 3D models are in sync and can easily be exported/imported into one another using Shared Coordinates in Revit or 0,0,0 as the insertion point within Civil 3D.

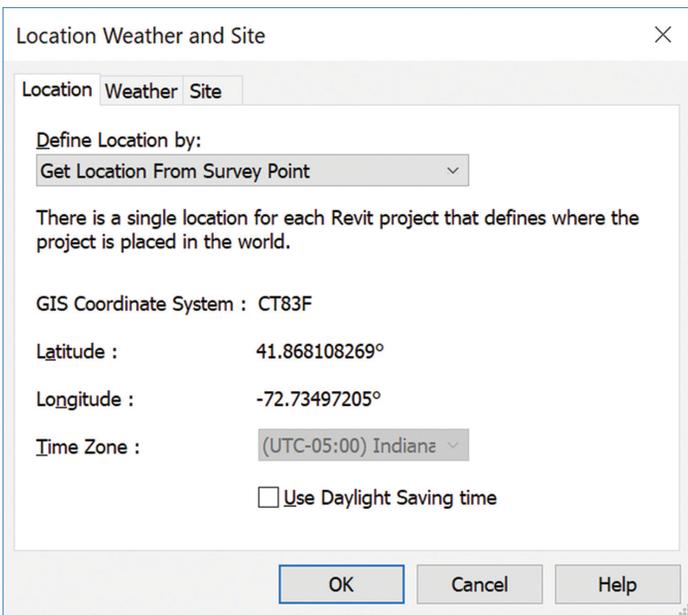


Figure 5

## STEP 4 – NAVISWORKS

Now that InfraWorks, Revit, and Civil 3D are in perfect harmony, you can combine them all into Navisworks for review, coordination, clash detection, and share the combined NWD file with clients, owners, construction managers, and others. Or you can create a VR experience using the Autodesk cloud rendering service to render a view to a Stereo Panorama, which leads us to the final step...

## STEP 5 – VR EXPERIENCE

Navisworks and Autodesk's cloud rendering service make it quick and simple to create a simple 360° panorama rendering (Figure 6).

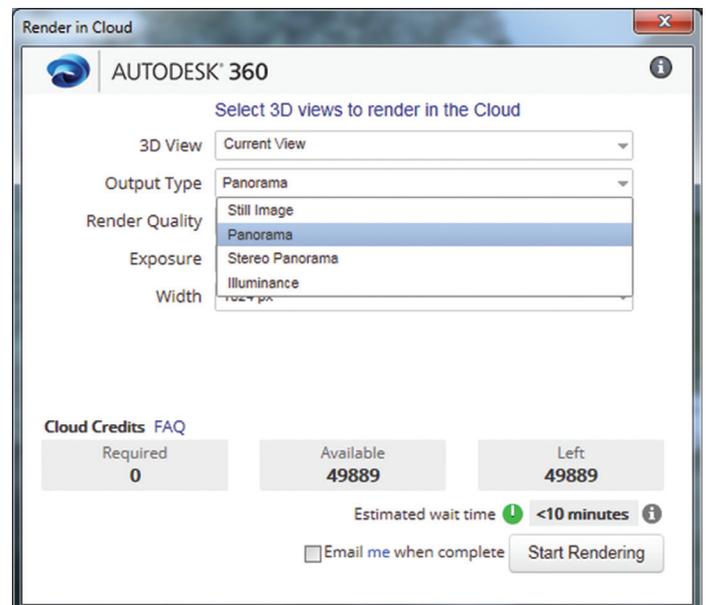


Figure 6

## STEP 1 – INFRAWORKS

Creating the existing conditions model using InfraWorks' Model Builder is probably the fastest and easiest way. With nothing more than an address and a few clicks of the mouse you can go from having no data to a fully interactive 3D digital model in InfraWorks. If you're new to InfraWorks, you can read more about the basics in my February 2017 AUGIWorld article, "InfraWorks – A Brief Overview for Beginners."

# Autodesk AEC Collection

I refer to this as the “poor man’s VR” (Figure 7) because you don’t need any fancy VR headgear (or even the inexpensive cardboard viewer). All you need is a web browser. Once the cloud rendering service generates the panorama, you can share the link and anyone can view it from a desktop browser or on a mobile phone browser.



Figure 7: “Poor man’s VR”

You can take it one step further and create a stereo panorama. This is the kind of VR experience that requires a headset or a cardboard viewer. Just like the 360° panorama, the stereo panorama is easy to create, thanks to Autodesk’s cloud rendering service. A few clicks of the mouse takes you from the desktop to VR (Figure 8).

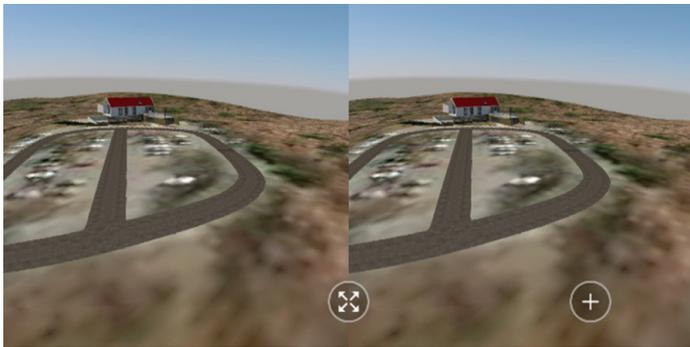
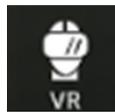


Figure 8: Stereo Panorama

To take the VR experience even further, export from Revit using Live. You can import the terrain data from AutoCAD Civil 3D using the Site Designer add-in and LandXML data of the contours (Figures 9 and 10).

Once the topography is in the Revit model (it should fall right into place because they’re all geo-located and in sync with one another), it’s a few clicks of the mouse to take your Revit model to Live.

And just like the “Poor Man’s VR”, you can share the model with someone (they’ll need to download and install the Live Viewer) or you can view it in a true VR experience by clicking on the VR icon in the lower-right.



Scan this QR code for a video of step-by-step instructions for Collaboration (and More) in 5 Simple Steps.



Figure 9



Matt Wunch is the BIM Manager for BVH Integrated Services, P.C. in Bloomfield, Connecticut, and Newton, Massachusetts. He is a Revit Structure, Architecture, MEP – Mechanical and Electrical Certified Professional, Autodesk Expert Elite, and a member of the planning committee of the Construction Institute’s BIM Council. He can be reached for comments or questions at [mattw@bvhis.com](mailto:mattw@bvhis.com) or on Twitter @MattWunch.

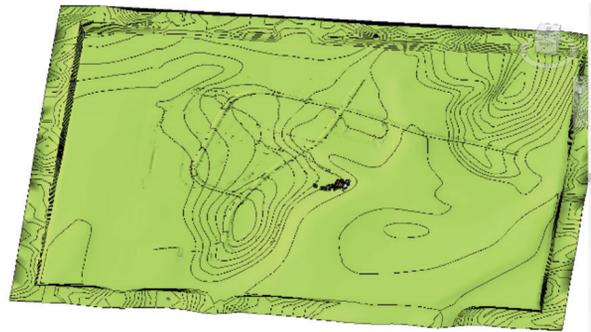


Figure 10

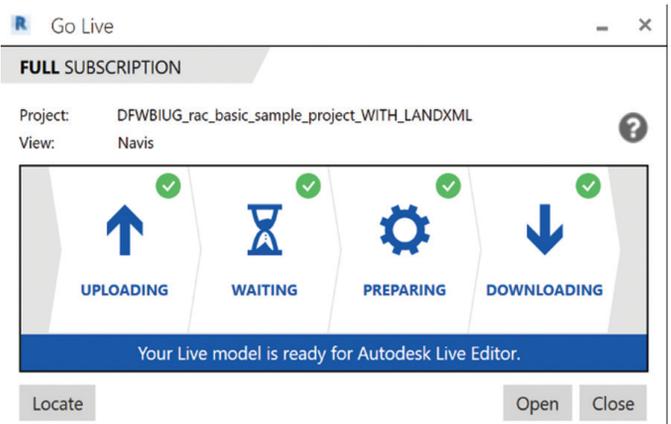


Figure 11



Figure 12

# with RTV Xporter PRO



## Automate Revit!

- Printing
- File Exports
- File Upgrades
- Sheet Revisioning
- Drawing Transmittals
- Overnight Scheduled Tasks

“ With RTV we're saving 26hrs every week, that's over \$80,000.00 a year! ”

“ Without RTV our timescales would be three times longer! ”

## without RTV Xporter PRO

Contact us for a demo!  
email: [sales@rtvtools.com](mailto:sales@rtvtools.com)  
web: [www.rtvtools.com](http://www.rtvtools.com)



# The Right Tools for the Job



**D**o you use AutoCAD to draw everything? Huh? Of course! For many designers, architects, and engineers, AutoCAD® is the go-to software for drawing up their designs, except, of course, for fellow Revit® users. Sometimes the drawings we are tasked with may not be best suited for AutoCAD. What other software tools do you have in your toolbox and what do you recommend to others?

Because of what I do for a living, I often get questioned from people through church, associations, or just within my circle of friends if I would be willing to create a drawing of something they need for a personal interest, a side project, or for work in a field unrelated to my own.

Occasionally I will agree to help, but as years go by and time is more precious and, therefore, more valuable, I pick and choose the project based on my desire to get involved. These projects

vary in size and scope and have included business signs, logos, home renovation plans, deck or landscape plans, furniture plans, control diagrams, and even the occasional entire set of house plans. Some of the projects I've turned down will look for referrals to someone else or a recommendation about what software they should get to do it themselves. When it comes to making software recommendations, my answer will depend on what is being drawn and whether it is a one-off item or is something they plan to draw up regularly.

I have used AutoCAD for 30 years, so it is definitely high on my list of recommended products, but there are multiple factors to consider when recommending drawing software. Learning curve, features, flexibility, and cost all come into play.

There are hundreds of options available to users depending on the type of drawing needed, so it could take a fair amount of time to figure it. To minimize the choices, four mainstream players in the drawing arena come to mind, each with its own advantages. The

four products are Visio, SmartDraw, SketchUp, and AutoCAD. Now, many would jump to point out that these are not in the same arena, and I agree, but not all drawing tasks are the same, either. Two of the above products started out primarily as diagramming tools, one as a 3D drafting and modeling tool and one as an all-around 2D/3D electronic drafting tool. These tools have matured greatly since their creation and continue to evolve with more advanced features in each release.

Starting backward alphabetically, we have Visio. Visio is one of the early diagramming products that came out in 1992 by a company called Shapeware Corporation. In my former technology-focused years, I used Visio to create networking diagrams and process flow diagrams. Visio was purchased by Microsoft in 2000 and since then, the product has continued to evolve into much more than a diagramming tool. In the latest version (2016), you can do flowcharting and diagramming as you would expect, but you can also do various plan layouts for sites, floor plans, electrical layouts, and office layouts. Except for the office layout planning, the other plan drawing tools will require the Professional version of the software.

Visio comes in three flavors: Standard, Professional, and Pro for Office 365. The standard version focuses primarily on business type diagramming functions, while the professional versions have the most features and template options. There are various templates available in the pro versions that cover Business, Education, Engineering, and Flowcharting. Business flowcharting is also included in the Standard version. Visio Professional will even import AutoCAD DWGs (up through the 2010 format).

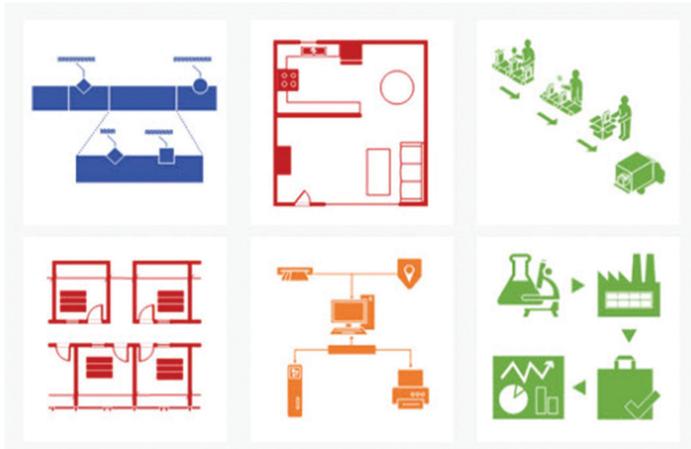


Figure 1

Next on the list is SmartDraw, another early diagramming software that was created in 1994+/- . This is probably one of the most versatile diagramming software products I have seen of late. Like Visio, SmartDraw uses templates to help get you going. The current version can do a wide variety of drawings, including a variety of plans for office layouts, site plans, home floor plans, desk designs, closet and storage design, and more. SmartDraw comes in three versions as well: Standard, Business, and Enterprise.

Breaking away from software whose roots are in the diagramming world is SketchUp. Created in 2000 by @Last Software, SketchUp

## Business and Enterprise Editions Include

- Flowcharts
- Org Charts
- Mind Maps
- Cause & Effect
- Decision Trees
- Maps
- Marketing Charts
- Network Design

## Plus Everything in Standard

- Floor Plans
- Landscape Plans
- Engineering & CAD
- Retail Planning
- Infographics
- Healthcare Diagrams
- Emergency & Disaster Planning
- Legal Diagrams
- Flyers & Certificates
- Family Trees
- Genograms
- Forms
- Science & Education Diagrams
- Software & Web Design

Figure 2

started out as a 3D modeling tool for architects and the like and is to this day still widely used in many architectural firms for doing building renderings and modeling objects for client presentations. SketchUp was purchased by Google in 2006 and then again by Trimble, Inc. in 2012, its current owner and developer.

SketchUp Pro

SketchUp Make

3D Warehouse

Extension Warehouse

my.SketchUp <sup>beta</sup>

SketchUp Viewer (iOS/Android)

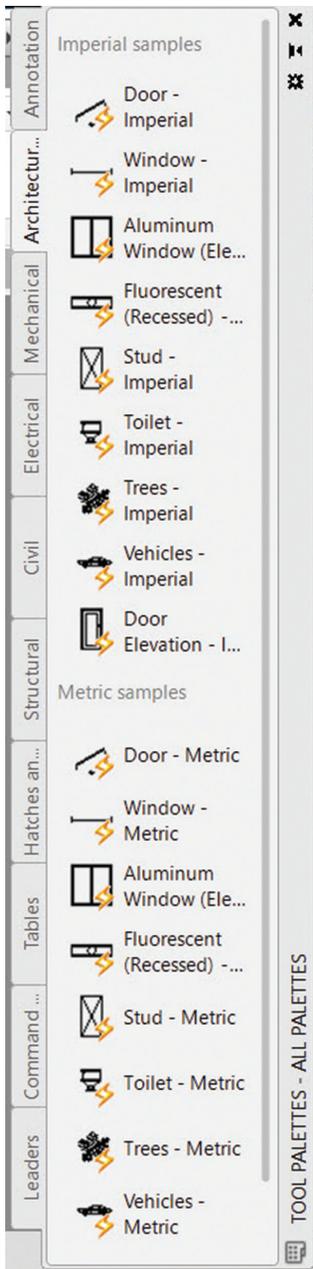
Figure 3

SketchUp has a variety of offerings, including mobile versions for iOS and Android.

With SketchUp, you can Build 3D models, Geo-locate Models in Google Earth, Import CAD files, Export CAD and PDF files, and much more. There is a huge 3D warehouse online with a nearly endless selection of models you can use in your work and you yourself can contribute to.

You can buy SketchUp Pro online and the Commercial and Educational/Student version through local resellers.

Finally, we have AutoCAD, a 2D/3D drafting package created in 1982 by Autodesk, its original and current owner. AutoCAD has a variety of offerings from basic AutoCAD® LT to vertical versions that are industry specific. These products include Architecture, Civil 3D, Electrical, MEP, Map 3D, Mechanical, and Plant 3D.



Right off, I can tell you that AutoCAD will be the most expensive option, but also the most powerful. AutoCAD uses a subscription model so you pay as you go, which is becoming more and more common these days.

If you do not have a big budget, AutoCAD LT is a great option and the entry level version on pricing. Don't be mistaken—AutoCAD LT is very powerful and for most work, short of 3D modeling and rendering, it is an excellent choice in terms of features and pricing. Unlike the other diagramming products mentioned earlier that can do plan layouts, AutoCAD is a full-fledged drafting program that has the ability to draw nearly anything.

AutoCAD comes with some basic templates and symbols (blocks) in both metric and imperial versions that can be used for a variety of plans, diagrams, schematics, etc., but to be honest, what is provided is more of a sample of what is possible.

To really be productive with AutoCAD, you need to get third-party blocks or create your own. Fortunately, this is pretty easy to accomplish

as there are tons of resources on the web from which to acquire blocks—both free and paid. Making your own blocks grants you complete control and flexibility of your designs.

In my opinion, it would be great for beginners if Autodesk had a symbol library offering that included blocks for various industries that could be purchased as an add-on.

Of the four product offerings here, what would I recommend? If the goal is to draw flow diagrams, network topology, mind maps, or a business organizational chart, Visio or SmartDraw would be my first choices, with SmartDraw being #1.

If you are going to be doing office planning layouts for a renovation or new office, a deck or landscape plan, which are typical one-off projects, I would recommend the Business version of SmartDraw.

If you are going to draw dimensionally accurate floor plans on a regular basis in a business setting, AutoCAD or SketchUp would be the way to go, with AutoCAD being my first choice. As I said previously, it is not uncommon to see both of these products used side by side in many professional design firms.

For miscellaneous projects such as furniture, cabinetry, or equipment drawings you could use either AutoCAD or SketchUp, with AutoCAD being my first choice.

With the exception of creating diagrams and charts, which is possible with any of these software products, or one-off projects, the product I would lean to most is AutoCAD, partly due to familiarity and partly to flexibility and power. If you can dream it, you can draw it in AutoCAD.

As this is an opinion based on personal experience and product exposure, there will be others who feel differently. What other software tools do you have in your toolbox and what do you recommend to others? Feel free to email me: [walt@functionsense.com](mailto:walt@functionsense.com).

Figure 4

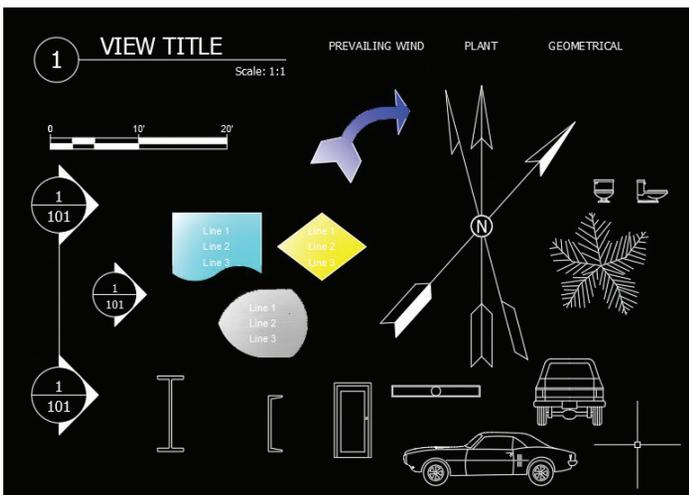


Figure 5



Walt Sparling has worked in the building design industry for 25+ years, starting as a hand drafter. He moved on to CADD in the mid 1980s and then into CADD and networking training and consulting. Walt has served as project manager and designer in the mechanical and architectural realms and currently works with an electrical engineering firm in Tampa, Florida. In his spare time, Walt maintains a couple of blogs and a personal website: [FunctionSense.com](http://FunctionSense.com) and [waltsparling.com](http://waltsparling.com)

# Xi NEW INTEL EXTREME i9-7900X



## MTower™ 2P64X & Render-RT™

*"Blew Away"* the competition by nearly 100% on the AutoCAD® Render Test -Desktop Engineering. 25%+ Higher Clock Speed but 25% less expensive than equally configured competitors. Intel XEON® based with NVIDIA Quadro P2000, P4000 & GP100.

## PowerGo™

*"On the SOLIDWORKS® test, the Xi® PowerGo XT was the clear winner, surpassing every other mobile workstation we have ever tested"*-DE-11/16. Xi PowerGo 15/7 with NVIDIA Quadro P3000 is the DE Editor's pick of the week April 2017.



## WebRAIDER™ & NetRAIDER™ 64X

The most cost effective building blocks for converged storage, simulation, virtualization and HPC computing solutions.

1U to 6U Rackmount unsurpassed scalability to 64cores XEON, 1TB ECC and up to 8 NVIDIA® Tesla® P100 PCIe or SXM2 with NvLink®.



## MTower PCIe

Award winning CAD desktop workstation designed to streamline the most demanding workflow. Quiet, powerful, compact, cost effective and **with the new Intel i9-7900X @4.5GHz clock, truly the fastest 10-cores in the world & proudly built in the USA.**



@Xi certified for 3ds Max, Adobe CC, AutoCAD, CATIA, Cinema 4D, Inventor, Modo, Revit, and SOLIDWORKS.

Our expert IT architects will help customize **the fastest workflow solution** for your application and budget.



www.xicomputer.com

toll free: 800-432-0486

# A Design Tour of the HP Z2 Mini



The world's smallest workstation weaves feats of engineering with industrial design panache, incorporating desktop and mobile computing elements without a single visual compromise.

Some five million users worldwide are running CAD on consumer-class PCs — computers not configured to support 2D and 3D design software and not engineered to be reliable under demanding use over time. With an eye to this untapped segment of the CAD user base, the HP Workstations group set out to develop a product to address CAD users' unique pain points. The result is unlike anything the market had seen before: the HP Z2 Mini, the world's first miniature workstation.

Measuring a mere 8.5" x 8.5" x 2.3", the HP Z2 Mini is ten times smaller than a traditional tower workstation. Yet the system is twice as powerful and 63% quieter than the similarly sized HP business-class mini PC — all in a uniquely attractive "space gray" housing accented with black chrome.

## THE VISION



HP customer research revealed that when it came to hardware, CAD professionals often lack performance, flexibility, and inspiration. Many users of AutoCAD, which requires high processor clock speed but not much else in terms of computing power, are poised to transition to 3D applications such as

Autodesk Revit or Inventor, which are much more compute- and graphics-intensive. Office spaces are shrinking dramatically, but the amount of office clutter is not, making it increasingly challenging to accommodate full-size computers. And the very people who have a

keen eye for design, who draw inspiration from the environment around them, are using computers that by and large are boxy and black.

Andrew Willard, HP Global Product Manager, said, "Those were the three main things that led us to say there is going to be a place for a new category of workstation. It has to be small but it can't compromise performance, and we're going to do it in a way that is beautiful without compromising function. That was our vision for this product category."

The Z2 Mini performs: Equipped with Intel® Xeon® E3-1200v5 or Intel® Core® i3/i5/i7 processors, up to 32 GB RAM and 1.5 TB storage, the HP Z Turbo Drive for large-file handling, and optional NVIDIA® Quadro® M620 GPU, it hits the sweet spot for 2D and entry-level 3D CAD work. It is flexible: You can mount it behind a monitor, on a wall, or under a desk — or display it on even the smallest of work surfaces. And it is inspirational: On top of being an engineering triumph, the Z2 Mini is exceptional in its industrial design elements that convey performance, professionalism, and a premium look and feel.

## THE PROCESS

From product definition to launch, Z2 Mini development spanned 20 months and involved nearly 30 people, including the core design team of Willard; a lead industrial designer; mechanical, electrical, and thermal architects; and several senior technologists.

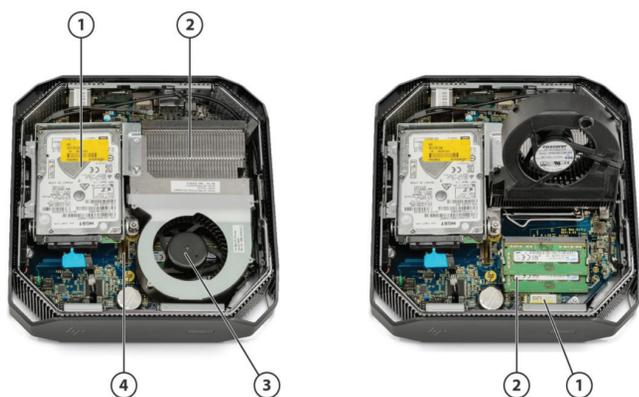
The design incorporates all the obvious preconfigured components, including the processor, RAM, storage drives, and the mobile GPU, and adopted an existing power supply unit (external to conserve space and thermal effects). But everything else about the Z2 Mini was HP proprietary, Willard said. "There's a dramatically higher number of custom components and design elements in the Z2 Mini because it's a brand new category in the industry."

The Z2 Mini evolved to be a hybrid of desktop, server, and mobile workstation technologies. Size-wise, it might have made sense to adopt a mobile CPU but, Willard explained, its power lags behind that of the server-grade processors used in desktop HP Workstations.

So for the Z2 Mini team, the challenge essentially was to shrink a server-grade architecture into a product that has the footprint of (or in some cases is even smaller than) a mobile workstation.

The cooling system represents the hybrid approach to design. All those high-powered components in close proximity generate a lot of heat, demanding ultra-efficient cooling to maximize airflow without significantly adding to heat production.

The Z2 Mini fan, custom designed by the thermal architect, is closer to what you'd find in a traditional desktop product: Its relatively large blades circulate more air while spinning more slowly, therefore generating less heat itself. Cooling also relies on heat pipes throughout, traditionally a mobile cooling solution. The hybrid desktop–mobile approach keeps the compact system cool while operating at maximum performance.



HP Z2 Mini Entry, Internal View

1. SATA HDD/SSD (9.5mm 2.5")
2. CPU heatsink
3. CPU blower
4. M.2 80mm (PCIe SSD)

1. M.2 30mm WLAN/BT
2. (2) SODIMM memory slots

Storage and RAM, the components upgraded most often by CAD users, are easy to access in the HP Z2 Mini: Simply slide a switch to remove the front panel. The drive bay sits up front in the top left corner; in the lower right corner, the hinged CPU fan flips up (shown on right) to expose two memory slots.

## INDUSTRIOUS INDUSTRIAL DESIGN

Packing so much high performance into a small package, the Z2 Mini team could scarcely afford to include a design feature that didn't have a practical purpose. An innovative venting solution is one example of tightly entwined engineering and aesthetics.



Each corner of the HP Z2 Mini shows off a guarded, black chrome-embazoned vent.

The team could have opted for numerous small vents sprinkled over the chassis, but that would have detracted from the desired look and

August 2017

feel. "We didn't want to design a solution that looked like a piece of Swiss cheese, full of holes," Willard recalled — and the team was adamant about not compromising aesthetics.

"There was a ton of give and take, as you can imagine, before we really got down to the right combination of function and beauty," Willard said. "We decided to very strategically locate the vents in the corners of the system, and we got really creative with how air is pushed through the chassis, how we're ducting it, the size of the vents, and so forth." Air enters through vents in the front, moves directly through the fans to the CPU and GPU, and exits through vents in the back.

The vents' inextricable design and functionality didn't stop there. The team realized that the innovative corner positioning could pose a risk if the small workstation were pushed into a corner or blocked by papers, possibly causing the unit to overheat. So the team added a uniquely designed band to the perimeter, Willard said. "The thought was, 'We're going to find a way to force an opening there so air can get in all the time.'" The practical solution developed from an industrial design perspective. "It highlights the vents rather than detracting from the design. It's really cool."

## LOOKING BACK

Willard believes the greatest engineering achievement of the HP Z2 Mini is its performance-to-size ratio. "Looking across the industry," he said, "we saw vendors continually compromising on performance in order to achieve the smallest size possible. We didn't. Our vision as a team throughout development was to deliver the same level of performance that a customer would expect from a traditional desktop workstation, and do it in a solution that was smaller than anything that had come out before."

"The response to the Z2 Mini and the excitement in our industry has been overwhelmingly positive," Willard continued. "Our team has the attitude that that's not enough. We're actively looking at ways to enhance the use cases and experience for this product category, and we have all kinds of fun things that are on the list for the next generation. We're of the mindset that you never have a finished product."

## ABOUT HP

HP helps you stay ahead of the curve with professional desktop and mobile workstations designed for large and complex datasets, dispersed teams, and tight deadlines. HP Z Workstations deliver the innovation, high performance, expandability, and extreme reliability you need to deliver your 3D CAD projects in less time. To learn how to configure a HP Z Workstation, visit the HP and Autodesk page at [www.hp.com/go/autodesk](http://www.hp.com/go/autodesk).



© Copyright 2017 HP Development Company, L. P. The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein. Intel, Core, Thunderbolt and Xeon are trademarks of Intel Corporation in the U.S. and/or other countries. NVIDIA and Quadro are trademarks or registered trademarks of NVIDIA Corporation in the U.S. and other countries.

# Remodeling Your Tech Environment

**M**y wife and I recently remodeled our kitchen. The old appliances were showing considerable wear, the countertops were outdated, and the cabinets were scratched and worn. We thought about it forever before pulling the trigger on the construction. We pondered features, appliances, floor plan changes, and so much more. Then we finally jumped when our oven broke. It had broken before and we said, “Next time we remodel.” So we called a few contractors to get proposals. We reviewed their offerings and even visited some homes they had remodeled, then made a selection and moved forward.

The demolition and rebuild took nine weeks. We set up a temporary kitchen in a bedroom, complete with microwave, toaster oven and a dormitory-size refrigerator. Along the way we made some changes in our plans—additions and modifications. Our chosen contractor was very agreeable and had the time to extend the build out. Cabinets were designed, fabricated, and put in place. Appliances were chosen, delivered, and installed. Final touch-up painting was completed and we moved back in.

Why am I telling you this? Because you may need to do some remodeling of your CAD/BIM/Tech environment. It could have grown tattered, worn, and outdated. It may be missing features that would come with an update. It might be in need of some shiny new software versions or updated policies. Here are a few ideas.

## RESEARCH FIRST

What needs to change? Ask around. It is not just what you think that matters. It is not just what you heard about or tried. Get input from experts and others. Local user groups, tech communities,

and, of course, AUGI. When researching our kitchen, we looked online at the many websites that offer photos of remodels. We also asked friends and consulted with appliance stores.

When remodeling your technology, don't limit your input. Make a list of the items that others have suggested and review what management might be complaining about. Are there items that have been on the wish list for some time? It may be time to move these to the top of the list. Get as much as you can.

## PLAN YOUR WORK

Just like planning for a home remodel, you must plan your work remodel. If multiple efforts are needed, map out which to do first, second, third, and so on. Plan out the timeline and get it on paper. Enlist others to review your plans now.

We spent time mentioning to our friends and family about our remodel. We pointed out features that we considered changing, appliance choices, and more. Some just wanted us to stop talking and get started. Others shared ideas about what they had done or seen others do. We added so many small touches from the ideas of others. So, float your completed ideas and plans with as many as will listen.

## PLAN YOUR BUDGET

It may not be money that is needed to get your BIM processes enhanced. It may not be cash for CAD. It might be time, manpower, or just a break between projects to allow for some rethinking of efforts. Whatever it is, pause and think of what you will need to complete the transition 100 percent. Don't get caught short.

Our remodel budget went beyond what we had planned (don't they all?). We added items and found other things that needed to be done that we did not price in (like a stove hood and fan, which is not cheap). If money is tight, then work on the critical items first and add more as others see progress and are willing to allow an expansion to the expenditures.

## BUY THE BEST YOU CAN AFFORD AND MIX IT UP

When it comes to appliances, we stepped up a notch. We could not afford the very high-end manufacturers (you can go broke really fast), but we still wanted a little higher grade than we had. We looked at features, functions, flaws, and reviews. We started by thinking we wanted to unify everything by going with one manufacturer, but ended up buying each appliance from a different manufacturer.

When defining your CAD environment, you can mix and match. Buy from one reseller, but hire another for training. Get a freelance consultant to manage your first project in the new tools. Don't scrimp on training—it is so easy to pass over and you pay for it in the long run.

## HIRE CONTRACTORS IF NEEDED

I am not that handy. I can fix some things and build some things, but I hire out big projects that I want to get right and last a long time. A kitchen is a big project. I obviously was not going to do that by myself.

Don't be afraid to consider bringing in a hired gun for big rollouts of new software. A consultant or reseller can move you miles ahead when the software is new and you are just getting up to speed. You are hiring the knowledge and they will pass it on to you when they do the work. When BIM was new and we were rolling out Autodesk® Revit®, my firm approved the hiring of a consultant to assist with setup, configuration, training, and more.

## MAKE CHANGES ALONG THE WAY

As you get into your tech remodel, don't hesitate to add or remove items from your list. As we watched our kitchen unfold, new ideas came to mind. We added a beam and posts to help set off the kitchen from the rest of the house. Open floor plans can be too open at times.

When you get into the thick of your tech remodel, you may find the early assumptions are not panning out. So make a change. You may find that new ideas and opportunities present themselves. Grab them, change direction, and run. You may find that the new focus is easier to achieve than the old one. Or it may bring greater productivity. Explore options even after the building has begun.

## STOP MAKING CHANGES

At some point, we had to stop making changes and let the construction get done. We forced ourselves to stop thinking of clever drawer inserts, easy cabinet enhancements, and ways to get the most storage out of our space. We had to let the project get done.

When you see the progress you are making in your tech environment, keep checking the pulse of the people involved. There is such a thing as “change fatigue.” When people start questioning the value of the change, or are reluctant to share ideas or offer to help, be mindful. When management starts pulling back on investing more time or money, be wary. When people stop attending status meetings or responding to emails, take notice. This could mean that people are tired and need to stop changing so much.

## SETTLE IN WITH NEW HABITS

Make sure that the old habits of your workers are gone and new habits take their place. Do not use the new software like the old software. BIM is not CAD. 3D is not 2D. Making new habits is not easy. During our kitchen remodel, we relocated our refrigerator and our sink and I still find myself turning to the former location of the fridge to get iced tea or moving toward the old sink location to drain the spaghetti. Your users might turn back to the old habits also. Be on the lookout for hints that they are using what is new in the same way they used the old.

## ENJOY THE NEW ENVIRONMENT

When you are done, or reach a milestone, celebrate. Take some time to enjoy the fruits of your labor. Our kitchen is now done and we have entertained friends and family many times. We have enjoyed just making dinner together (we are empty nesters).

Keep talking up the advantages of your remodeled tech environment. Keep selling management on the production values either achieved or coming (it takes time to get proficient in new tools). Make sure clients know that the new tools are enhancing their project delivery.

## REMODEL REWARDS

When all is planned, said, and done, your new environment will bring enhancements to productivity and worker confidence. They will move your firm toward better delivery methods and expanded market penetration as it opens new opportunities to sell services and deliver superior projects.



*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](http://www.caddmanager.com) and [www.bimmanager.com](http://www.bimmanager.com).*

# The Project Navigator: The Center for Drawing Management

**T**he Project Navigator in AutoCAD® Architecture is the main point where you work with a project. The Drawing Management environment within the Project Navigator helps you organize, create, and access all your project drawings in one unified interface. Creating sheets for plotting is easier with the streamlined coordination that is built into the Project Navigator.

The Project Navigator has four tabs that you can use to enter project data. These tabs correspond to the main phases of project creation: general project information, creating building data (constructs), and creating building documentation (views and sheets). We will start with an overview of each and then look at them more in depth.

## PROJECT CATEGORIES OVERVIEW

Each of the basic categories is represented by a folder in the

Drawing Explorer within the project structure that helps you to organize your project files. For every building project in AutoCAD Architecture, the following basic category structure is displayed on the Project tab of the Project Navigator palette:

- ♦ **<ProjectName>** – this is the top node in the project and is represented by a folder with the project name.
- ♦ **Constructs** – this is the default category for constructs within the project. When you create a construct, it is saved into the Constructs category.
- ♦ **Views** – this is the default category for view drawings in the project. When you create a view drawing, it is saved into the Views category. It is important to note that if you create model space views within a view drawing, they will be placed under the view drawing in the same category as the view drawing itself.
- ♦ **Sheets** – in the project, sheets can be viewed in two ways: the Sheet Set View and the Explorer View. Each of these views will be discussed in more detail later in the article.

The main category structure listed above is fixed, but you can create subcategories and subcategory trees within this structure. Subcategories typically represent aspects of your workflow. These subcategories can be set up in different ways. For example, you might set up subcategories by discipline, by view type (presentation, section, and rendering), or by sheet type (floor plan, ceiling plan, and elevation). It is important to note that you cannot mix basic category types. For example, you cannot create a Construct subcategory within the Views category.

Categories offer excellent organization for a project. Even small building projects contain a large number of individual drawings that can be difficult to track. By putting them into descriptive categories, you can quickly find the correct files you need for your project.

## THE PROJECT TAB

The Project tab on the Project Navigator tool palette is where you enter information that pertains to the entire project. The Project tab allows you to do the following:

- Change project properties
- Launch the Project Browser
- Launch the Content Browser to access the project library
- Add, modify, and delete levels
- Add, modify, and delete divisions

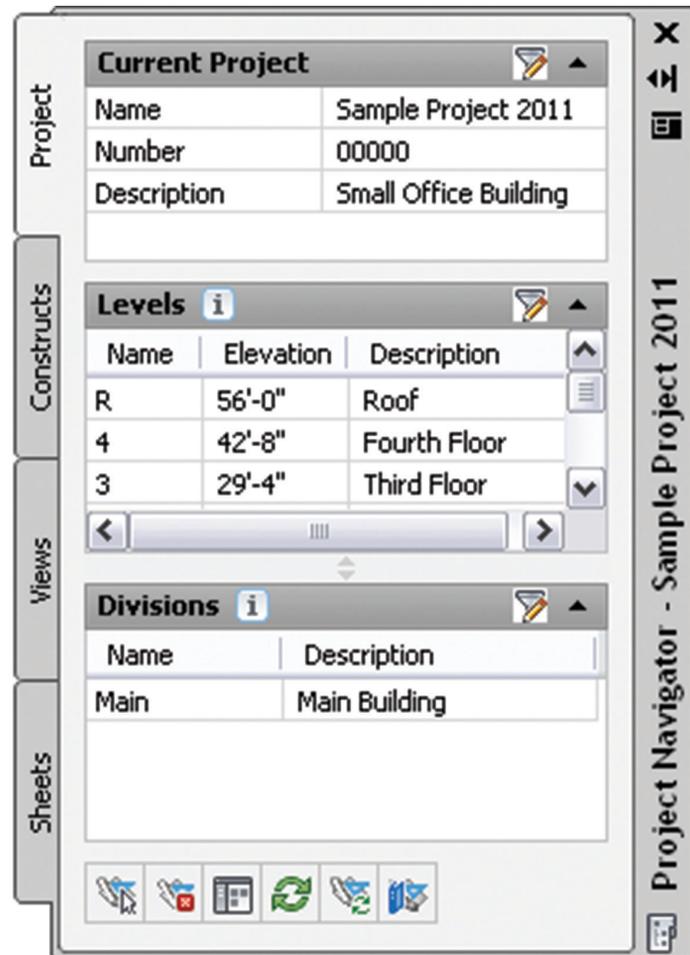


Figure 1: Project tab

- Synchronize the project with project standard styles and display settings
- Enable and configure project standards
- Refresh the project
- Close the current project

## THE CONSTRUCTS TAB

You start creating constructs when you want to assemble the basic objects of your building project into base files. Typically, you begin a project by creating constructs. The Constructs tab of the Project Navigator tool palette is where you add the basic building objects for your project. Constructs are basically the main building blocks of the building model. A construct represents one unique portion of a building, such as a building core or an entire floor. You will need to assign a construct to a level (floor) and a division (area of the floor) within the project. Constructs can span more than one level, which is useful for objects such as curtain walls.

The Constructs tab allows you to do the following:

- Open and close existing construct drawings
- Add, modify, and delete constructs within the project
- Create categories for constructs
- Launch the Content Browser to access the project library

A construct is a drawing (DWG) file. As opposed to non-project related drawing files, an additional XML file with the same name is created. The accompanying XML file contains information to connect the construct to the project. The XML file is created and updated automatically. You do not need to edit it, but be careful not to accidentally delete it in Windows Explorer.

In multistory buildings, levels may have identical floor plans. You can create the constructs for one level and copy them to the other levels in one quick step.

You can convert an existing drawing file into a construct within a project. You specify the subcategory into which to move or copy the source drawing. When you convert a legacy drawing file into a construct:

- the drawing file is either moved, copied, or connected through a link to the project category you specify.
- you assign a level and a division to the construct.
- you give the construct a different name and add a description to it.

There are three different types of content you can place in a construct:

- **Drawing objects.** You can draw an entire floor, apartment layout, a frame drawing, or a ceiling grid as a construct. Also, spanning objects such as curtain walls or elevator shafts are usually created directly as constructs.
- **Element references.** You can display repeating components within the construct, such as desk/chair combinations, bathroom layouts, or stairs.
- **A combination of drawing objects and element references.** If you have a floor with different office types but repeating furniture elements, you could draw the office walls directly in the construct but reference the furniture as elements.

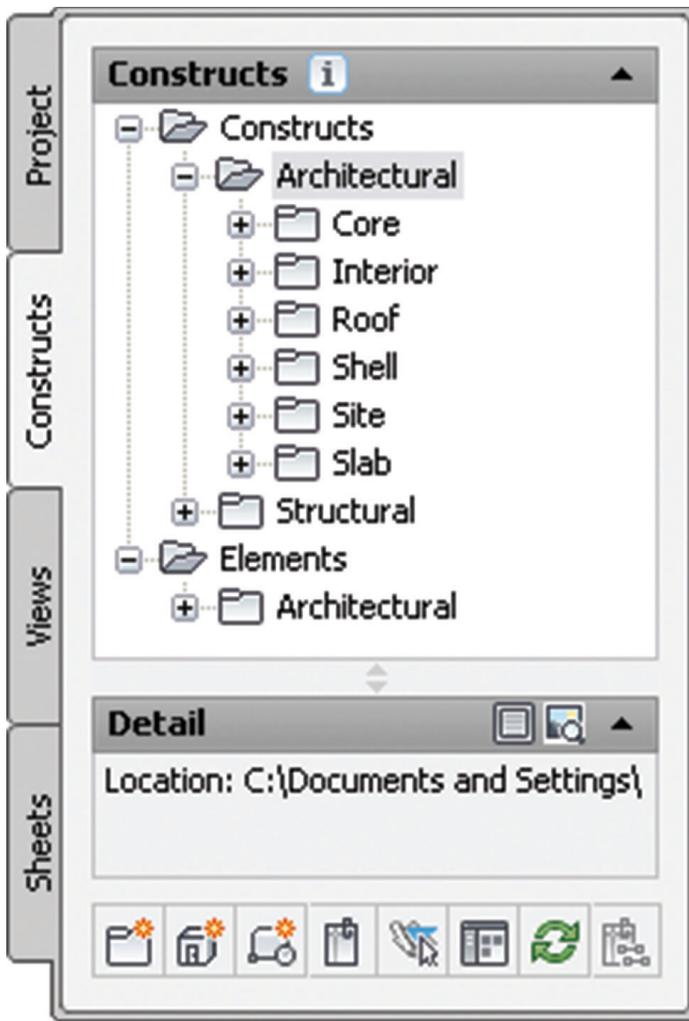


Figure 2: Constructs tab

## THE VIEWS TAB

The Views tab of the Project Navigator tool palette is where you can create individual views of your building data. Views contain constructs and are the primary location for you to add annotation such as notes, tags, and dimensions within the project. After you have created a view drawing, you can then create model space views within it.

After the structure of the building project has been defined and constructs have been assigned to both levels (floors) and divisions (area of the floor), you can then start to create view drawings within the project. A view drawing references any number of constructs to present a specific view of the building project.

To create a view drawing, you must first decide which portion of the building you wish to look at and which type of view you wish to generate. View drawings will automatically reference the appropriate constructs in accordance to their level/division assignments within the building. For example, to create a floor plan of the west wing of the second floor, you would create a view that references all constructs that are assigned to the second floor and the west wing.

The Views tab allows you to do the following:

- Open and close view drawings
- Add, modify, and delete model space views
- Add, modify, and delete general views, detail views, and section/elevation views
- Change the contents of view drawings
- Create categories for view drawings
- Launch the Content Browser to access the project library

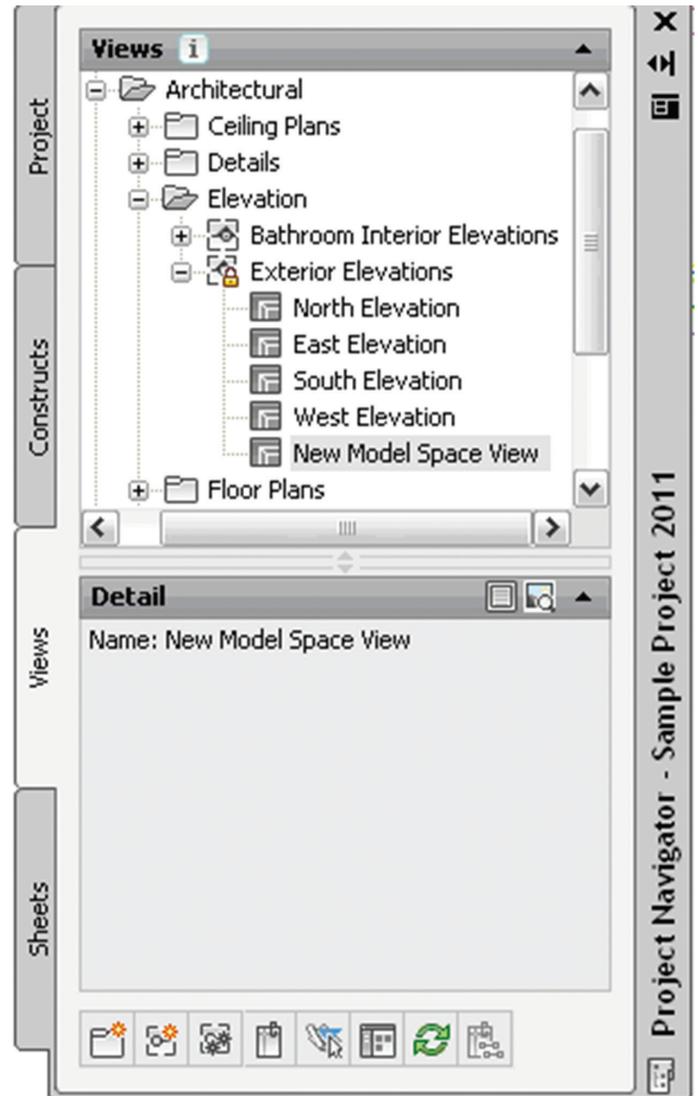


Figure 3: Views tab

## THE SHEETS TAB

The Sheets tab of the Project Navigator tool palette is where you create and organize sheets for your project. Sheets reference views and are used for plotting drawings. The Sheets tab is also where you manage the project sheet set. This is where you will perform tasks such as creating a table of contents, managing page setups, or publishing to a plotter, a PDF, or a DWF file. The buttons at the top of the Sheets tab let you view sheet information in two ways: the Sheet Set View or the Explorer View.

The Sheet Set View is a tree view of the project sheet set in which you have access to all publishing capabilities. The Sheet Set view allows you to do the following:

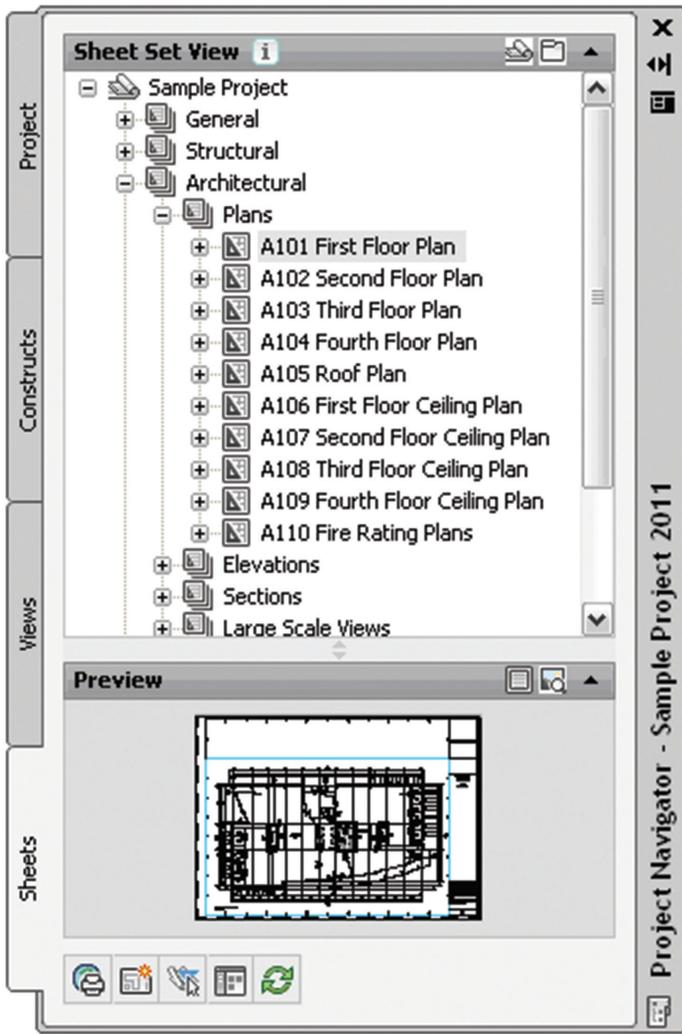


Figure 4: Sheet Set view

- + Add, modify, and delete sheets in the project
- + Open and close sheet views
- + Assign numbers to sheet views
- + Insert a table of contents
- + Electronically transmit the sheet set
- + Archive the sheet set
- + Create sheet selections for specific tasks
- + Manage page and publishing options
- + Launch the Content Browser to access the project library
- + Publish the sheet set to a plotter, a PDF, a DWF file or to an alternate page setup

The Explorer View is a view of the folder structure and sheet drawings in the project. The Explorer View allows you to do the following:

- + Open, close, and delete sheet drawings
- + Create categories for sheet drawings
- + Launch the Content Browser to access the project library

Sheets are organized into sheet subsets in the Sheet Set View. Sheet subsets are a logical structure. The sheet folder category does not need to be identical to the sheet subset in which the sheet is placed. To avoid confusion, however, it is recommended that you

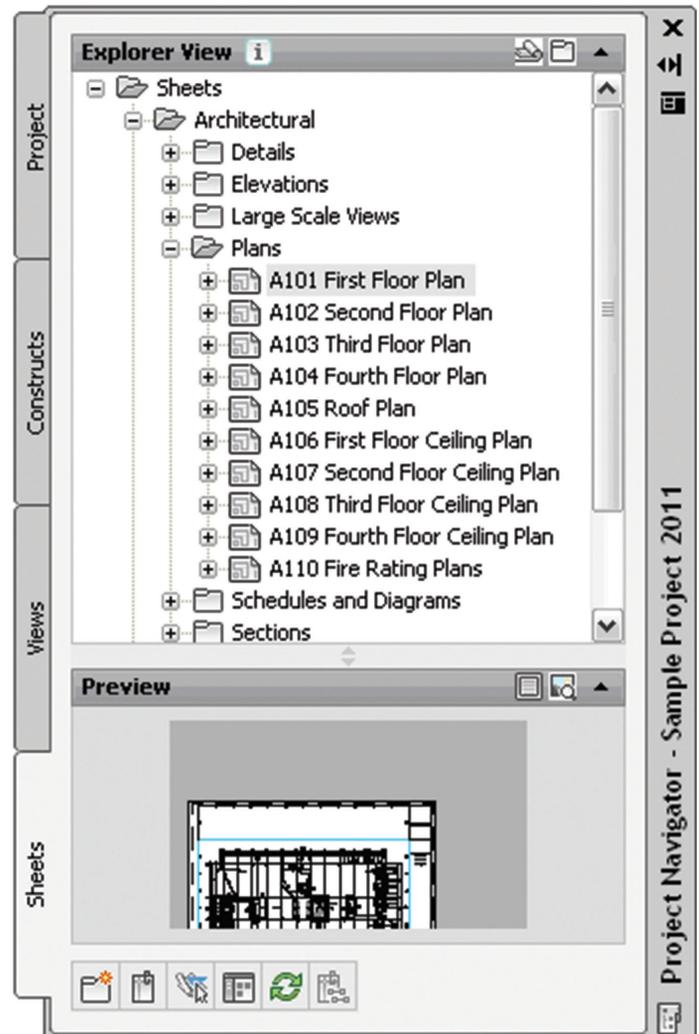


Figure 5: Explorer view

have parallel structures in the sheet set and the sheet categories. You can rearrange sheets into different subsets within the Sheet Set View, but that will not change their physical location in the category or folder. Also, when you remove a sheet from a sheet subset in the Sheet Set View, only the reference of the sheet to the subset is removed. The layout itself and its containing sheet drawing are not deleted from the Sheets folder or subfolder.

In the Explorer View, sheet drawings are placed in folder categories. When you create sheets or sheet views within a sheet drawing, they are placed in the sheet drawing.

## THE DRAWING EXPLORER

The Drawing Explorer is a tree view that is common to the Constructs, View, and Sheets tabs of the Project Navigator. This is where the drawing files are organized. With the exception of the Project tab, each tab of the Project Navigator has a Drawing Explorer tree where the associated project drawing files are displayed.

Drawing files belonging to a project are displayed on their respective tabs in the Drawing Explorer tree view. This tree view lists the drawings within their category. You can drag and drop, or copy and paste drawing files in the Drawing Explorer.

# AutoCAD Architecture 2018

## EXTERNAL REFERENCES

The Drawing Management feature uses external references (xrefs) as a means to create a project and maintain it. Elements are referenced into constructs, constructs are referenced into views, and views are referenced into sheets. The mechanism of referencing is identical to the regular AutoCAD External References Management feature; however, the background methods employed have additional features.

Xrefs that are created in drawing management can automatically make use of project data, while those that are created manually through the xref palette or command line cannot. If you are working in a project environment, the best practice for referencing project drawings into other project drawings is to use the Project Navigator rather than the standard AutoCAD Xref Manager. The AutoCAD Xref Manager cannot differentiate between project drawings and non-project drawings. If you reference a non-project file into a project file by mistake, you cannot use the full Drawing Management functionality on that file.

It is important to keep the following considerations in mind when working with a project:

- Do not delete any XML files generated by the Drawing Management feature as they are vital for the project.
- Use the Project Navigator to create, modify, and reference project files within the project. If you want to use existing non-project files in a project, convert them to project files first.
- Drawing Management supports the use of relative paths for external references. In the project setup, you can decide whether to use full paths or relative paths. Working with relative xref paths makes moving the project and transmitting it easier and reduces the need to repath the project.

## REFRESHING THE PROJECT NAVIGATOR

When multiple people are working on the same project simultaneously, one person's Drawing Explorer view on the Project Navigator palette can become out of sync with the changes of another. To prevent this situation, refresh the Project Navigator by clicking Refresh Project so that all items are updated to reflect the current project status. It is highly recommended that this is done frequently during a project session if there are multiple people working on the same project.

On the Quick Access toolbar, select Project Navigator. Next, select the tab where you want to refresh the file tree. Finally, select Refresh Project.

## REPATH THE PROJECT

A repath is necessary after you make any of the following changes within the project:

- Rename a project file
- Move the project to a different location
- Move a project file to a different category
- Move a subcategory from one category to another

In addition to updating the project files, repathing will also update the paths of support files, images, and schedules that are referenced in the project drawings.

When you zip a project and then send it to another user who unpacks the project to a different location on another computer, the project will be updated in its new location when it is set current for the first time on the new computer. However, this will update only if all project paths were correct and current when you zipped them. If you have moved the project to another location on your computer and did not repath it before zipping, the repathing on the new user's machine will not work correctly. Before you zip and send a project, you must make sure that all external reference paths in the project are valid.

You have the choice of repathing a single project file, all files in a category, or all files in the project. On the Quick Access toolbar, select the Project Navigator. Next, change the name or the location of a project file or project folder in the Drawing Explorer. The Project Navigator - Repath Project dialog box will display (see Figure 6). Specify when you want the repathing to be done (Repath Now or Repath Later).

It is important to note that when you repath a project that was saved in a version of AutoCAD Architecture prior to 2010, the drawings are saved in the new file format. You will no longer be able to open these drawings in a version of AutoCAD Architecture prior to 2010. Synchronizing a project with the project standards will also save the project drawings in the new file format.



Figure 6: Repath Project dialog box



Melinda Heavrin is a CAD Coordinator & Facility Planner for Norton Healthcare in Louisville, Kentucky. She has been using AutoCAD Architecture since release 2000. Melinda can be reached for comments and questions at [melinda.heavrin@norton-healthcare.org](mailto:melinda.heavrin@norton-healthcare.org).

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.

## QUICKSELECT



<http://bit.ly/2t1P6MH>

QuickSelect: A fast and easy way to select elements in Autodesk® Revit®. This easy-to-use app allows the user to select any item in just few clicks.

The app features:

1. powerful selection tools
2. window selection of pre-filtered elements
3. select any item by any parameter in seconds
4. customize your own settings
5. recognizes current selection and lets you work with it
6. save any selection and retrieve it from the Revit built-in selection manager
7. clean up selections so that grouped or blocked elements are cleared
8. select elements that Revit wouldn't allow such as area/room boundaries, lines, links, and model/detail groups.

Inside  
Track

**AUGIWorld  
brings  
you recent  
developments  
in Autodesk  
and related  
software  
items**

If you have some news to share with us for future issues, please let us know. Likewise, if you are a user of a featured product or news item and would like to write a review, we want to know. Contact [brian.andresen@augi.com](mailto:brian.andresen@augi.com)

## MODELO EXPORTER FOR REVIT



<https://modelo.io/>

Modelo is an online 3D-enabled platform, compatible with most CAD software, allowing you to view 3D models like never before.

The two main areas are Presentation and Collaboration:

### Presentation:

- + Walkthrough (and comment, client-ready feature)
- + Presentation mode
- + Model settings: layer, effect, material, background
- + Architect effects: Section, Virtual Reality, Panorama

### Collaboration:

- + Upload model and view in browser
- + Comment, attachment
- + Sketch on model/ Markup on tablet
- + Measurements
- + Shareable link and model file
- + Assign task
- + Project wall
- + Assets folder
- + Sketch on assets
- + Invite to project or company (permission controls)
- + Email notifications

Modelo Exporter includes a plug-in that uploads Autodesk® Revit® documents to the Modelo cloud platform. The current version has the following features.

- + Supports multiple view exporting
- + Supports exporting textures (built-ins/user textures)
- + Supports exporting workset in Revit to layers in modelo.io
- + Direct uploading to modelo.io

## WEBGL EXPORTER FOR 3DS MAX



<http://bit.ly/2sDEi8e>

WebGL Exporter for Autodesk® 3ds Max® exports solid bodies into HTML file. It has the following features.

1. Supports both face level and body level material (color and texture).
2. There is an option to control the file size and quality by specifying precision value. Increasing precision value will increase the fineness and accuracy of the model as well as the file size.
3. You can choose whether you want to tessellate at the body level or face level.
4. All the data is compressed, which reduces the file size as much as possible.
5. Supports Autodesk 3ds Max 2014, 2015, 2016, and 2017, downloading an .exe. Just open the .exe and the install will begin.

# Collaboration Tools in 3ds Max



**I**n this article, I'll be demonstrating some of the tools that can be used in 3ds Max® for collaboration.

First, we'll talk about xrefs. Xrefs are a powerful way to allow multiple people to work on a single project to ensure it proceeds quickly. This naturally creates collaboration as users introduce ideas and concepts as each person reviews the work of others dynamically and shares his or her thoughts. With 3ds Max 2016 and up we can apply modifiers, transform or add materials to referenced objects without having to merge the xref object into our particular scene. These are all completed non-destructively, leaving the master file intact. See Figure 1 for example. I xrefed a creature that had several modifiers applied to it. By selecting "Merge" for

modifiers shown in Figure 1, I am able to change the modifiers in my new scene while keeping the original file intact. This is particularly powerful for reviewing multiple options quickly, allowing more time for the collaborative process and ultimately a better product.

Another particular useful tool for collaboration is the File Link Manager, which allows us to connect to Autodesk® Revit®, AutoCAD®, FBX, and DFX files, review designs while they are



Figure 1

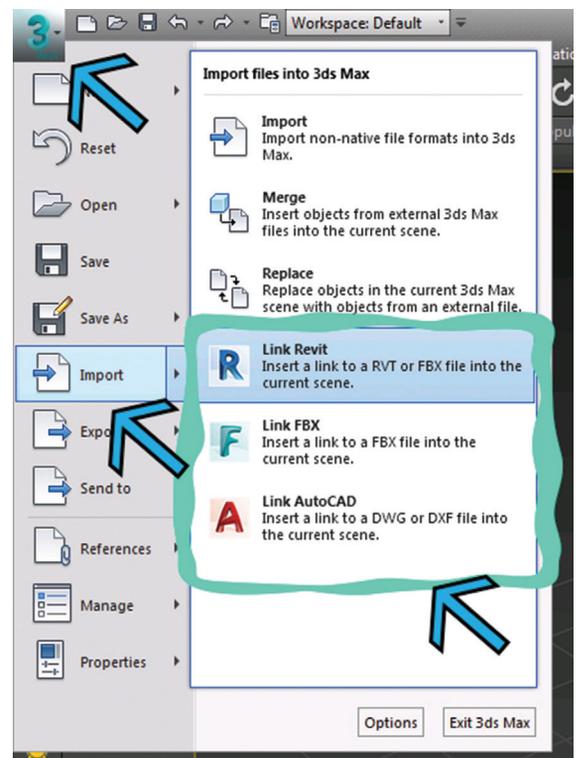


Figure 2

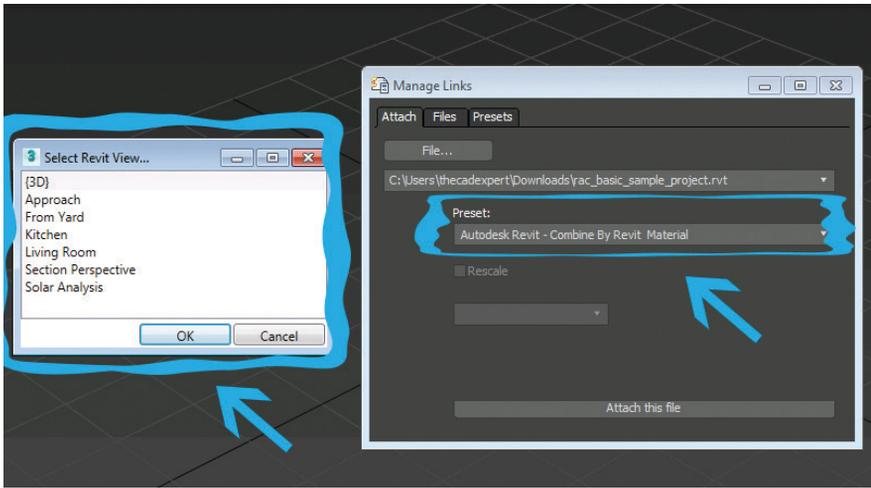


Figure 3

in progress, and populate environments while particular structures are worked on by others. The options to connect are located under the main file menu shown in Figure 2.

While linking, 3ds Max provides us some options to take advantage of the connection. For example, when connecting to a Revit file we are asked to select a particular view and preset option, shown in Figure 3.

The beauty of this particular connection is that it allows us to apply materials, import lights, and create cameras based on the various Revit views available during import. This allows us to review and discuss the Revit work while working to present it using the animation and rendering power built into 3ds Max.

I'd like note is that if you are a design professional using 3ds Max and working with Revit files it might be helpful to know that Autodesk has provided a workspace specific to your needs. This is called the "Design Workspace." To select the Design Workspace, use the drop-down menu provided next to the File Menu icon shown in Figure 4. The ribbon will be updated to reflect tools helpful to work with this particular connection type.

One useful item might be the ability to turn on the Revit materials in our scene. To do this we select Realistic under Materials shown in Figure 5.

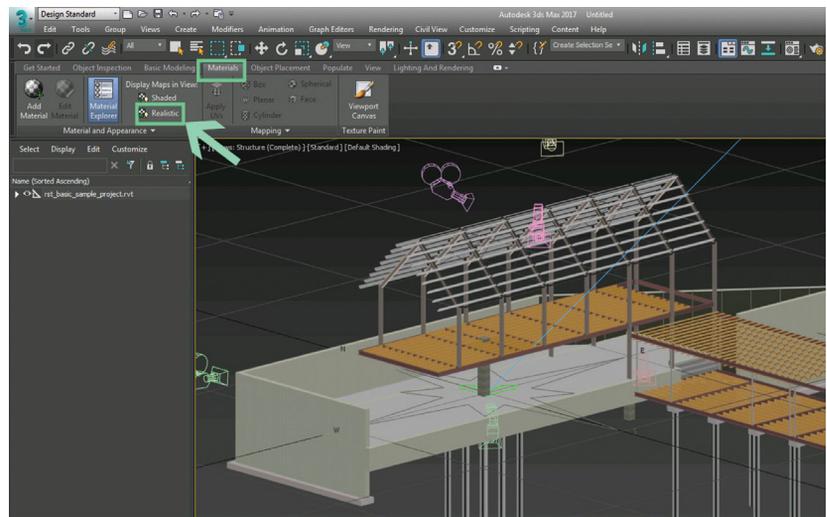


Figure 5



Brian Chapman is an Autodesk Authorized Developer, creator of Pro-Cad.Net and Senior Designer for Slater Hanifan Group, a civil engineering and planning firm dedicated to superior client service. Brian can be reached at [procadman@pro-cad.net](mailto:procadman@pro-cad.net).

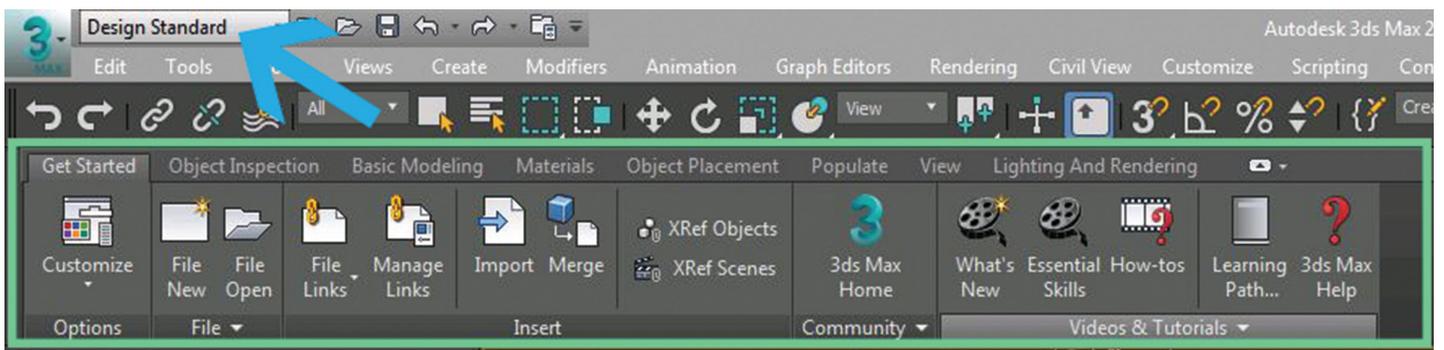


Figure 4

In conclusion, I'd like to discuss collaboration in general. As professionals, we grow when working with various files and sharing with one another. While that's true, it's important to keep in mind there is more to collaboration than that. We must put aside our egos to accept ideas that we might not particularly agree with (learn the shrug of a professional), allow others to explore new ideas even with our own work, and be open to sharing what we've learned with others. In my opinion, the key to insure the best effort is applied during collaboration is to lead it.

*"Lead with your own participation in a way that you believe will create value and will invite others to do the same."* – Suzanne Mayo Frindt

# The Workflow of the Future... Now!



**D**o you have the Infrastructure Design Suite or the AEC Collection? Do you feel that the only thing you can possibly use from them is AutoCAD® Civil 3D®? What about Autodesk® InfraWorks®? Do you feel that it is more of a marketing or fancy planning tool?

In this article, we will look at a futuristic workflow that can be used now. This workflow encompasses more than just Civil 3D and can possibly take your project further faster than just using traditional one-software workflows.

## INFRASTRUCTURE SOFTWARE

If you are reading this article there is a good chance that you are currently using Civil 3D. How many of you are using Autodesk® ReCap™? How many of you are using InfraWorks? A great deal of the conversations I have with drafters and designers have shown me that not a lot of people are taking advantage of what some of the other software can provide in terms of ease of use, speed of process, and ultimately, the quality of the output.

I will guide you through a workflow that will utilize Autodesk ReCap, Autodesk InfraWorks, and Civil 3D to get a final output consisting of a great topo, point cloud data, and other output that could help you move your project further along and at a faster rate than how you may be doing things now.

## SCOPE OF WORK & DELIVERABLES

Obviously, some of the first things that need to be determined on an awarded project are the scope of work and the deliverables of the project. Some of the common questions are; What does the project consist of? Where is it located? How large is the area? What are the final deliverables the client is requesting? Answering these questions early in the project can help guide the technology train down the right tracks. The proper use of technology can get you to

the finish line quicker, easier, and with better quality deliverables, making this a win-win situation for all involved. Could your projects be more profitable when properly utilizing technology? I don't think you have to answer that question, but if you really need to, then the answer is YES!

## PROJECT DESCRIPTION

Let's talk about the project that I will be using to go through this workflow and what the end deliverables will be. This is a conceptual project that will consist of a proposed subdivision and roadways contained in it. We will be responsible for some preliminary design work showing the roadways, grading, underground utilities, and more.



Figure 2

## TECHNOLOGY DECISION

After getting the scope of work and deliverables defined and agreed upon, consultants will have to decide what technology will be used for producing the deliverables. If you have been doing projects for a while there may be some reluctance to making any changes to your workflow. Resistance may come from management or users, but their reasoning will usually be for different reasons. Obviously, management is concerned with profitability and users

Figure 1

are concerned with learning new workflows. While all of this is understandable, sometimes we need to step out of that comfort zone and try new things that may improve our organization in both of these areas.

Let's discuss some of the technology decisions that will play a major part of this workflow. First, the site we will be working with has had a drone flight performed to produce point cloud information as well as geo-rectified aerial photography. For this portion of the project deliverables, there are a couple of routes to go for data processing. If you go outside of the Autodesk world, Pix4D is a great tool for processing the data produced by drones. If you decide to stick with the Autodesk workflow, there is a partnership with 3DR that utilizes Autodesk ReCap with 3DR's own Site Scan software. This produces great results, but currently there is an image limitation. Not a showstopper, but I just wanted to mention that.

## EXISTING CONDITIONS

Regardless of what is used to process the data, ReCap is still an important piece in the workflow. After the drone data processing is complete, the point cloud data should be processed through ReCap to produce an RCP file so it will go into other Autodesk software seamlessly. ReCap can also be used to clean up point cloud information as well, so if some of the "noise" or other unwanted data needs to be trimmed out, ReCap is fully capable of doing this.



Figure 3

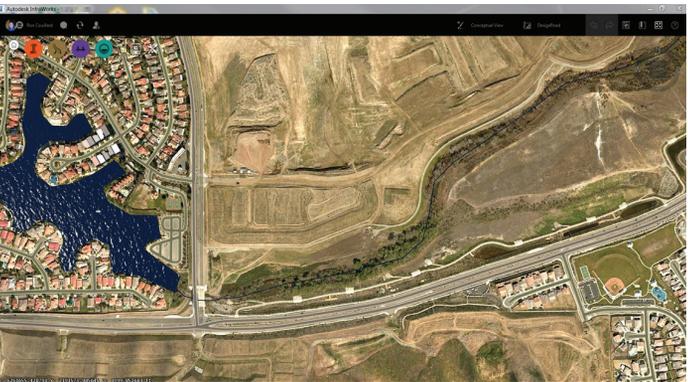


Figure 4

With a fresh RCP file in hand, we might be thinking it is time to head over to Civil 3D to bring in the point cloud. Not so fast! Yes, Civil 3D can bring in an RCP file and it can produce a topo for you. However, you may not be satisfied with the topo it produces and the file size of it as well. We have a better way to do it!

## THE USE OF INFRAWORKS

Now coming to the computer screen: Introducing InfraWorks! I know you are probably thinking, "InfraWorks? Really?" Let's break down exactly how we can use InfraWorks in this workflow. First, hold onto your ReCap file. We will use that a bit later.

Now, in InfraWorks, we will start a new project using the Model Builder. Why would we do this if we have fresh drone data that is probably more accurate than what Model Builder provides? This will give us a canvas from which to start that will most likely include a larger area than what our drone data encompasses. This can be useful to be able to see surrounding areas to the project area.

Also, keep in mind that InfraWorks' ability to bring in various data formats means that we can start with this Model Builder data and then supplement the model with the data that we got from our drone flight. We can drop in our sharp aerial imagery, of course, and the overall quality of it compared to the original imagery is going to be instantly obvious, but the really cool piece of this is bringing in our point cloud. "But I have seen what a point cloud ends up looking like! I don't want a pixelated picture, I want something I can use!" Sure, I understand and that is what is so cool about using InfraWorks in the workflow. InfraWorks can process the point cloud and create terrain from it. Surface data! Additionally, it can model some of the elements from the point cloud data as well. In Figure 5, you can see that the point cloud terrain data has been wrapped into the model terrain and 3D elements such as vehicles have been replaced with yellow boxes. In some cases, I have changed the boxes to be 3D models of what the original objects were.



Figure 5

Let's pause here and clarify what we have going on up to this point. By using the point cloud terrain tools in InfraWorks, I can get tight terrain data, some 3D elements, and, one of the coolest things is that InfraWorks trims out things that don't seem to belong to the terrain. Look at Figure 5 and you will notice some vehicles in the underlying aerial imagery, but those vehicles did not make it into the terrain data. How cool is that? InfraWorks did the cleanup for us. Now that we have our existing conditions modeled and tied down pretty well, let's talk about our conceptual design and what we will do with it after we get it drawn out.

# AutoCAD Civil 3D 2018

## CONCEPTUAL DESIGN

With existing conditions taken care of, I can now go into InfraWorks and do things like layout design roadways, grade areas such as basins, pads, etc. After getting design roads created, such as the ones in the proposed subdivision in Figure 6, I can even get drainage networks quickly designed. Simply selecting the road, I can right click, go to drainage, and choose “add drainage network.” I am then prompted with a dialog box that allows me to put values into the drainage network. Very cool stuff, but wait until you see what this will give us when we round-trip the data into Civil 3D. This next section will cover bringing this data into Civil 3D.



Figure 6

## BRINGING DATA INTO CIVIL 3D

Now that we have both our existing and conceptual design data in InfraWorks, it’s time to bring it into Civil 3D so that we can pick up the “design ball” and run with it. You will find that creating elements in InfraWorks is very easy to do, so that is why InfraWorks is an important part of this workflow: point cloud / terrain processing, as well as ease of creating elements.

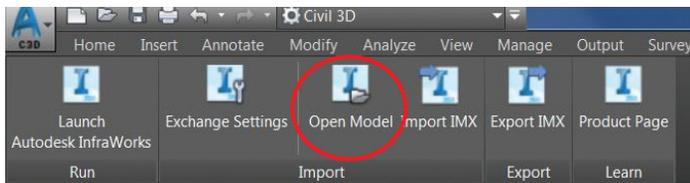


Figure 7

Now, let’s cover this process. I recommend shutting down InfraWorks before trying to connect to the model from within Civil 3D. Notice I said “connect to the model” and didn’t say anything about importing a file? I didn’t even say to export anything from InfraWorks!

In Civil 3D, create a new drawing. Setting a coordinate system to match the coordinates in InfraWorks is good, but you will be prompted for that when you attempt to connect to the model. For Civil 3D 2018, there is a new ribbon tab totally dedicated to collaboration with InfraWorks as shown in Figure 7.

On the Import panel of this ribbon tab, click “Open Model” and you will see the “Open InfraWorks Model” dialog box. This will prompt you to select the model to open (.sqlite file), the coordinate system to use (in which you can specify the model coordinates or the dwg file coordinates), and other choices to refine which elements you want to bring in.

After making these decisions, click the “Open Model” button to begin the import process. After a few minutes, take a look at the results. You will get alignments for all of the roads, if you had chosen them. You will notice that major roads will come in with their actual names thanks to their Open Streets properties. Any design roads you created will come in with both alignment and profile data.

Remember when I pointed out that you could create a drainage network on your design roads? Well, that came in as a Civil 3D pipe network! See Figure 8 to get an idea of the imported objects you get using this process. Now you can take it from here and get the project further “down the road.”

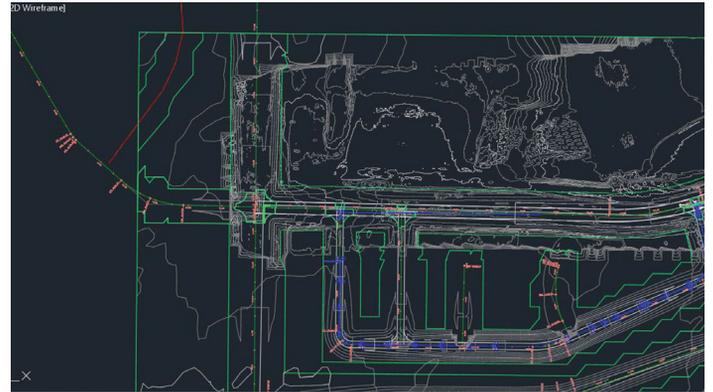


Figure 8

## CONCLUSION

If you have been on the fence wondering if Autodesk InfraWorks can fit into your current workflow or you are just not sure if you can use anything in your suite or collection other than Civil 3D, the workflow we discussed should help make your decision a more informed one.

If you have any questions regarding this workflow or the software used in it, feel free to contact me at the email listed below.



Ron Couillard has over 18 years of experience in Civil CAD production for commercial, military, and airport projects as a Designer and CAD Manager. He provides technical expertise and training, including software installations, and product customization in the support of AutoCAD Civil 3D, InfraWorks 360, AutoCAD Map 3D, AutoCAD, and other Autodesk solutions. Additionally, Ron is an Implementation Certified Expert in both Civil 3D and Map 3D and is also a Certified Professional in AutoCAD Civil 3D 2016. He has instructed classes at Autodesk University as well as AUGI CAD Camp. Ron currently works as a Solutions Consultant with U.S. Cad. He can be reached at ron.couillard@uscad.com

# Most Buildings Sit On The Ground



## That's Why BIM Is More Than Buildings

**BIM** is more than buildings. **BILT** (formerly RTC) is a global **BIM** technology conference dedicated to a sustainable built environment. We believe BIM is a growing ecosystem of **Buildings, Infrastructure** and **Lifecycle** integrated with **Technology**. Our delegates, speakers and sponsors are globally recognised AEC industry experts who can help you select the best solutions for your business needs. Time is money and BILT is ready to invest in your future.

### North America

Toronto, Canada  
3 - 5 Aug 2017

### Europe

Aarhus, Denmark  
5 - 7 Oct 2017



## Register Today

[www.rtcevents.com/bilt](http://www.rtcevents.com/bilt)

RTC Events Management   @BILTevent   rtcevents.com   secretary@rtcevents.com

#### GLOBAL PLATINUM SPONSORS



#### GLOBAL GOLD SPONSORS



#### GLOBAL SILVER SPONSORS



#### GOLD SPONSORS



#### SILVER SPONSORS



#### BRONZE SPONSOR



#### GENERAL SPONSORS





# GPU-Accelerated Rendering. VCA Certified.



**NVIDIA QUADRO**  
CERTIFIED

▪ VCA

Accelerate your design and production workflow like never before with the VCA-certified **BOXX APEXX 8R**. Built for enterprise-class content creators, **APEXX 8R** delivers the finest NVIDIA® Quadro® has to offer—GPU-accelerated performance for selected renders, along with expandability, unparalleled performance, and mobility within your deployment.



**APEXX 8R**  
VCA CERTIFIED

**BOXX**

FIND OUT MORE  
[WWW.BOXX.COM/VCA](http://WWW.BOXX.COM/VCA)  
888-302-0223



**nVIDIA®**