

AUTODESK **UNIVERSITY** 2015

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A Global Large Data epidemic - How industry is working with federal influencers to resolve the issue

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Learning Objectives

- Appreciate the importance of 'family' data
- Manage data throughout the lifecycle of their project models
- View data from a 50,000 ft. approach and address this from the ground up.
- Maximize production time – buys you more BIM budget

Description

Production time = Money. So how can we speed up production time? Whether you are a large design house or a one person show, we all suffer when dealing with large models, but why do we put up with it? We have multiple sources of families and families gather data, they pick up 'data dust' and grow and grow and then they live in our models increasing the size of our project files, what we need is a medic! Or Autodesk SEEK's new solution – family quality control. But it goes beyond that, this session tackles large data, sourcing families and family standards for in house use. We look at how we are addressing this from a global perspective, implementing standards and working towards achieving a national standard.

Your AU Experts

Justin James - Justin has lectured on 3 continents, has been in the industry for over 24 years and watched technology drive the industry forward, giving him the ability to speak about the benefits of BIM adoption to improve efficiency and reduce costs – from design to build. Following a 6 year apprenticeship in Building Services Engineering in the UK, Justin worked through the ranks from apprentice, to lead coordinator and Project Manager Roles. He has worked with a wide variety of clients in the design/build industry; around the London area, as well as in Australia, his passion remains in the construction field. Since Justin moved to Canada in 2009 he had employed his knowledge and keen interest in building construction to co-write and instruct the first one day classes on BIM in Canada to members of the construction industry through the Edmonton Construction Association. Justin now runs his own business 'REACH-Consulting Ltd' providing BIM adoption and implementation services to all divisions of the AEC industry, from a BIM overview / transition, to a full BIM implementation plan for your company. Justin's passion for educating the next generation and existing fellow Engineers is coupled with a desire to enhance the industry's future.

Jim Conger *-Jim has worked in the construction industry for over 20 years and is an expert on building product manufacturer sales and marketing. He has worked as a manufacturer, contractor, CSI technical director, and marketing consultant giving him first-hand experience from many different sides of the construction marketplace. Jim currently works in special division of Autodesk, helping manufacturers understand their place in BIM and how they can leverage it.*

Now you know us, we hope to get to know you more too:

Hi everyone and thank you so much for attending our class, as promised, we wanted to get this paper published as soon as we finished the class, so you can download and share it with as many people as possible, to continue to spread best practices in data size management. We also want to keep in touch with you all and hopefully hear of success stories and 'wins' within your teams, as promised we shall keep this document live until Autodesk University pulls it from the AU15 website, where we shall then host it on REACH's blog and on the Autodesk SEEK website.

A HUGE thank you for all of your lovely reviews, they came in so quickly and with such a high average score, we really do appreciate you taking the time and for all your wonderful positive feedback.

Introduction:

Where does BIG data come from?

Data is the 'I' in BIM – Building Information Modelling – **information** that we extract from **families**. Dependent on how our families are built is dependent on what data / information we can extract.

These are often seen as 'available fields' when putting together a quantity take off schedule within Revit. The exercise of putting together a schedule in Revit is merely the process of collating the data from the families or from the elements modelled in the project file – 'rvt file'. Only data that is available is schedulable! For those of you that are not familiar with the term 'family' let's take a look at one in detail.

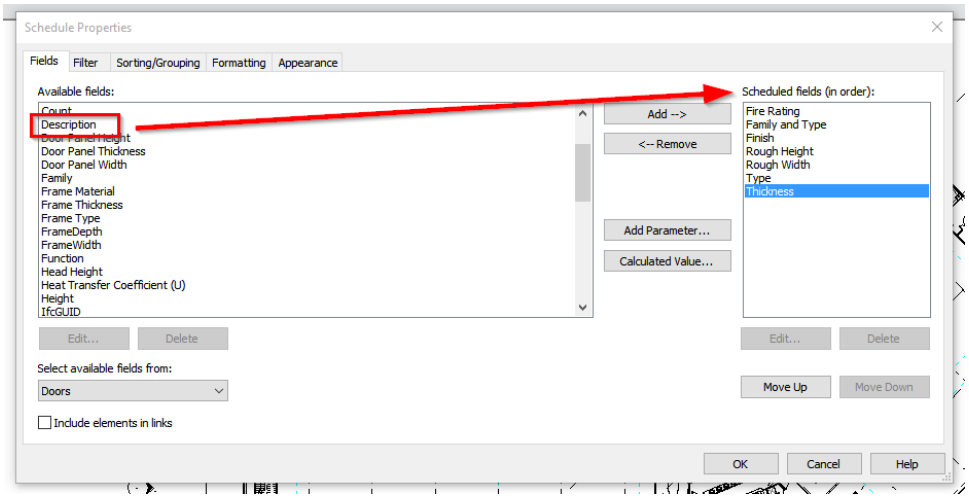


FIGURE 1: WHERE DOES BIG DATA COME FROM – FAMILY FIELDS

Appreciate the importance of 'family' data:

Families are known as the 'building blocks' of Revit – they make up a model in its entirety, but they go way beyond the simple visual representation in our virtual environment. They actually build the data (information) of our model as we use them to build our model, we add another window on the south side of the building and all the window / material **schedules** update to reflect this.

Families are built with the end in mind, what information we desire to extract from the model at its final usable stages such as O & M, will be determined by the make-up of the family at the very beginning of the project. This is often not thought through at the beginning of the project and needs to be discussed PRIOR to modelling starting on a project.

We may not always know what is required at the end of the project when we initially begin to model, which is why it is important to know that we can manipulate your 'place holder' families later.

Luckily for modelers, Revit comes with a comprehensive library of families ready to use, and a huge network of users and manufacturers content through 'Autodesk SEEK' a link for which is provided in the top right of your user interface, these families can then be downloaded and edited to your needs. We'll come back to this later.

Family Types:

System families cannot be exported like component families; they can only be transferred to other projects. They are the host for the component families. Always copy and modify the copy of the family. Never edit it in the current folder.

3 types of family in Revit:

One is saved as an rfa file separately from the project, with defined solids and voids in it. You can create parameters that control the family with formulas etc. to link and calculate values. This is a **component family.** It's good as it is easily transferred from one project to another via the rfa file. Example is a window where you have a window family with multiple sizes available; the window type is defined by the family while the available sizes are defined by the types.

Next is the **system family**, mostly for "layer type objects" like walls roof and floors but also for text, dims etc. They are basically the families that are defined within dialog boxes, not with solids/voids, when you create a wall you simply state the thickness of multiple layers, simples… copying them from project to project is harder as there is no rfa file, but transfer project standards or a simple copy/paste of the wall/roof/floor/text/dimensions etc. can get it across.

Finally there are the **in place families**… these are a last resort for one off items. For example in an HVAC system you may have a custom piece for connecting some duct, it would be a huge pain to define it as a proper family where you could put multiple values into it for angles and size, so you just make a mass form of it in the model and tell the project that the mass is a Duct Fitting. They are not able to be transferred from one project to another, so it's for real custom objects only. Examples are kitchen counters, duct fittings, but as mentioned only to be used as a last resort…

A closer look at families:

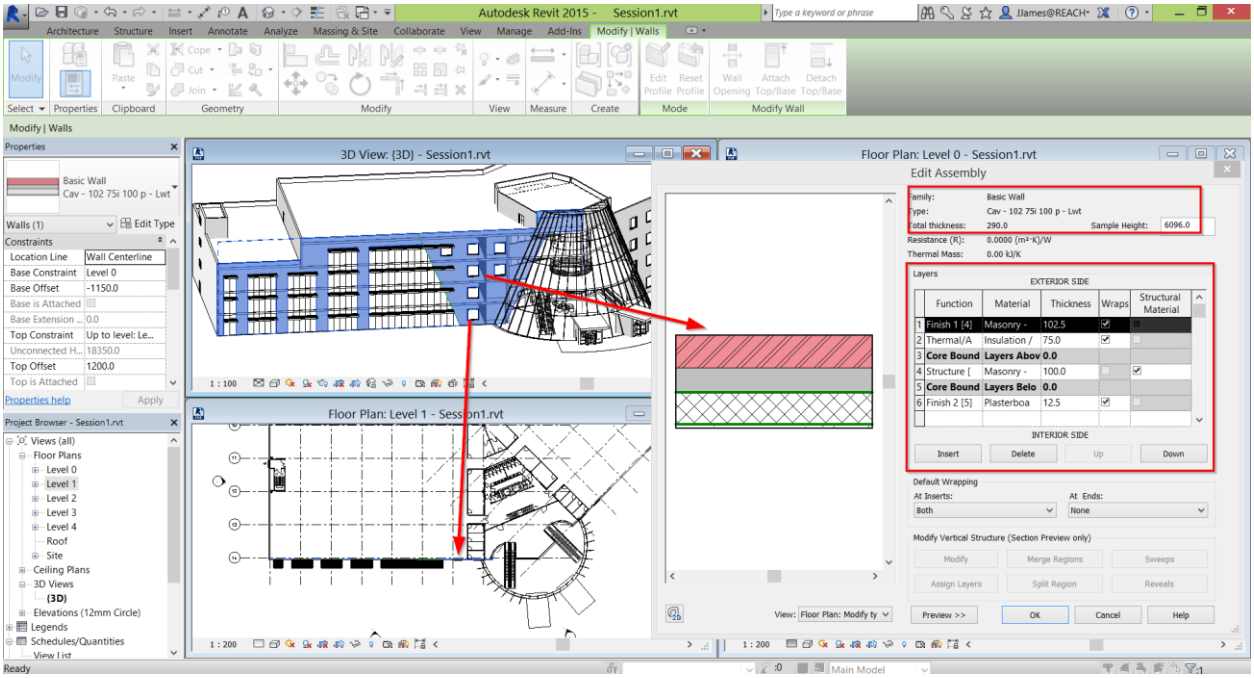


FIGURE 2: APPRECIATE THE IMPORTANCE OF 'FAMILY' DATA – A DETAILED VIEW

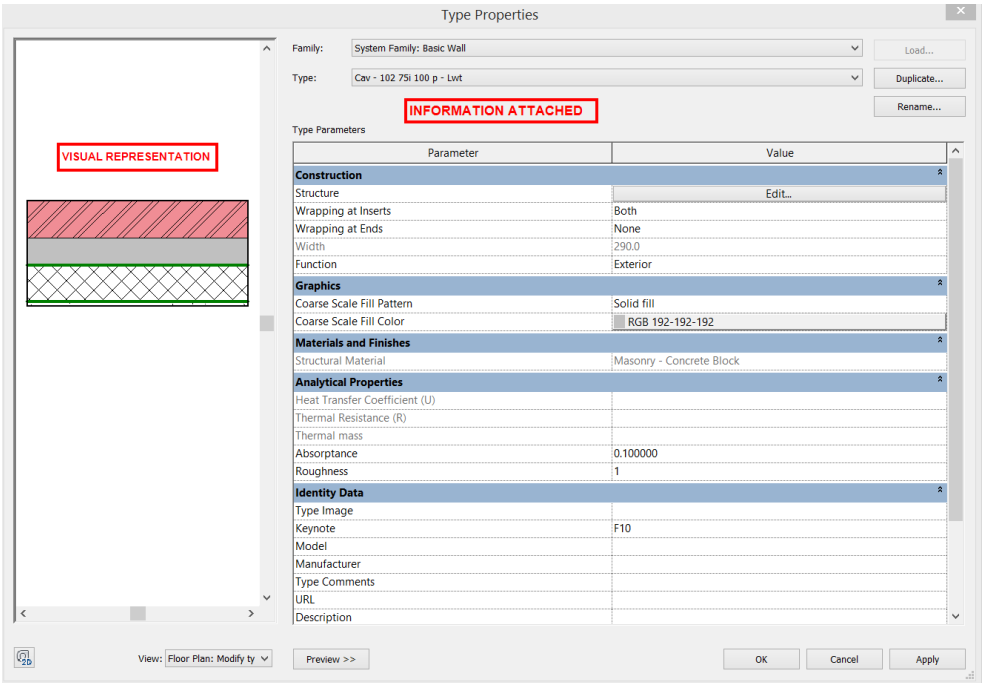


FIGURE 3: APPRECIATE THE IMPORTANCE OF 'FAMILY' DATA – A FAMILY'S PROPERTIES

In *Figure 2* we see an external wall selected, on the right of the figure you see the 'properties' of this building block (family) and a preview is shown of how the family is made up of 'parts'. We have provided *Figure 3* to take a closer look still of the structure, this can be duplicated and a new version of this family can quickly be created, or if you were to create a similar family, it could become a 'type' of the same family, such as an external wall without a vapour barrier, as you edit this structure, by simply using the 'edit' button under the value section (the column on the right of figure 3) you would now save this new 'type' of family in to your project directly, giving you the ability to select it from the library of parts to model with this new wall in the future.

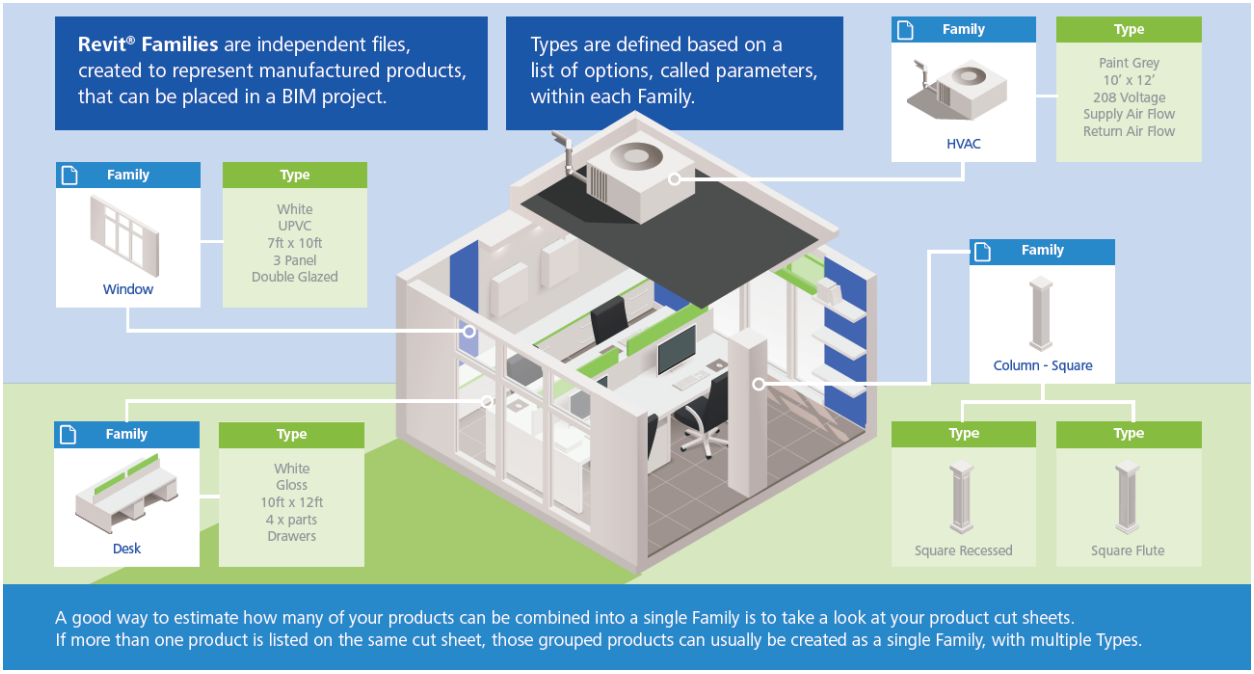


FIGURE 4: APPRECIATE THE IMPORTANCE OF 'FAMILY' DATA – FAMILY TYPES

As you can see each family holds even more data, as well as the construction details, which host material types, you can also edit how the family appears as you create a section through it, you can also edit its analytical properties such as, thermal resistance, thermal mass and heat transfer Coefficient, or U values. You can also apply key notes to the family which follow the family around the project, the list really is vast. Whilst this example that you see in our wall used in *Figure 2 and 3* is small, other families get larger, by attaching more data to them, some of which may not be necessary depending on the phase of the project.

Manage data throughout the lifecycle of their project models

In this section we would like to go over the 'top tips' that we covered in the session, you will also see some additions that we either didn't have time to add, or have received in addition since the session. This really acts as your 'BIM Manager' **check list** on managing data size, ensure that there are standards of how to manage family size, cleaning families up, creating a master library etc. and general quality control.

Our best Tips and Tricks:

Check its size! "We have an app for that"

'Model Health Checker' – MHC is brand new, affordable and altogether a great time saver, quickly flagging large data and categorizing them in to size bundles… but watch out for updates! RedTopTraining informs us that new updates and additional apps are on their way to add value to this already smart app for Revit.

You can download it here:
https://apps.autodesk.com/RVT/en/Detail/Index?id=appstore.exchange.autodesk.com%3amodelhealthchecker_windows64%3aen

The file that we used during the session is the Autodesk Sample file that comes free with Revit, it is approx. 19,500 KB on opening, and the run for MHC to check the entire model is under 2 minutes.

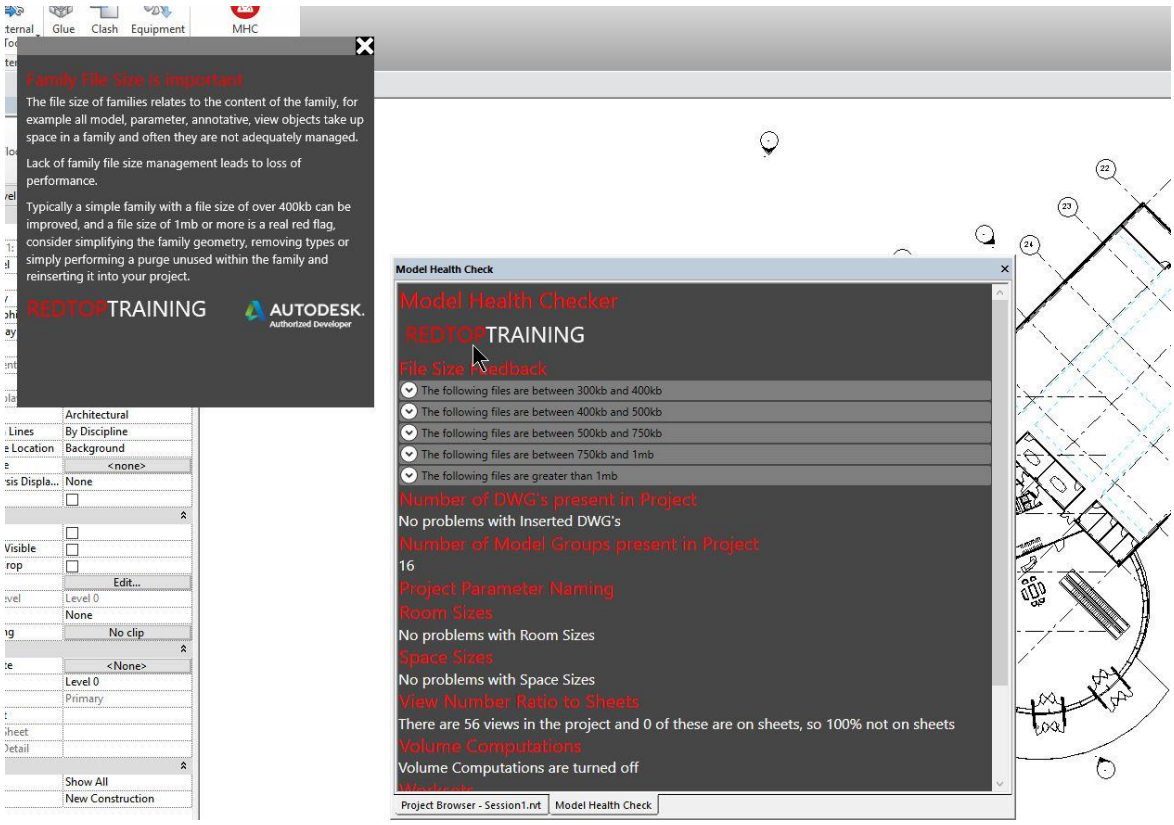


FIGURE 5: MANAGE DATA THROUGHOUT THE LIFECYCLE… MHC APP

Quickly putting families in to separate size folders, MHC allows you to easily find out where your large data is being held. Along with other useful tools, such as DWG check, Room Sizes, Volume computations and much more. Single click on the MHC icon in the 'Add in' Ribbon runs the check and collated the report, it couldn't be more straight forward.

Purge Unused:

A forgotten button in Revit, put simply – use it! Not early in the project though, in those early stages of a project there may well be families that you haven't used yet, or have imported in to an existing template as a place holder for use later. Consideration should be given regarding when you will consider your first purge and how often thereafter their frequency would be.

Compressing your Revit file:

Revit files are highly compressed and once opened Revit expands the size to approximately twice the size. Occasionally Revit fails to compress the file as it exits! You may find that your file size grows for no particular reason. So run your own compression.

Delete any unused Model and Detail Groups:

Delete by going to the Project Browser and right clicking over the group and if "Select All Instances" is greyed out then you are safe to delete as there will be no references in the file.

Family Groups:

Don't use them unless you need to! Creating detailed components and families is better.

Check Parameters:

Are they necessary, if not delete them! Or save that more detailed family elsewhere for later use if need be.

Eliminate or Reduce Warnings:

Warnings (reviewing the warnings can eliminate duplicate instances, overlapping items like walls and room separation lines). The overlapping room separations seems to be a big issue. Area boundary lines too.

The Phantom Loading!

After you create a family, before loading it into the project, it should be loaded into a blank project and saved out from there. This eliminates the entire history of the family. (I didn't believe it at the beginning, but we tried it. We had some large families in one of the models, about 20 MB. After loading them into a blank project and saving them from there, the size got reduced to half!) You should also purge unused before loading the family in the blank project.

Audit and Compact:

Every model (on a weekly basis, let's say) this also reduces its size by a lot!

Close all Hidden Windows:

Prior to saving ANY file! This should be common practice, but it is surprising how many people forget the basics, another tip about windows – keep them running at the lowest number as possible, 3-4 is ample tiled windows and keep checking your 'close hidden' command often.

DWG Links:

Try to keep your DWG information linked, rather that importing in Revit, because importing will increase your file's size. After you have finished utilizing the DWG, REMOVE IT! After unloading DWG files we found that Revit also ran faster…

Categories / Sub-categories:

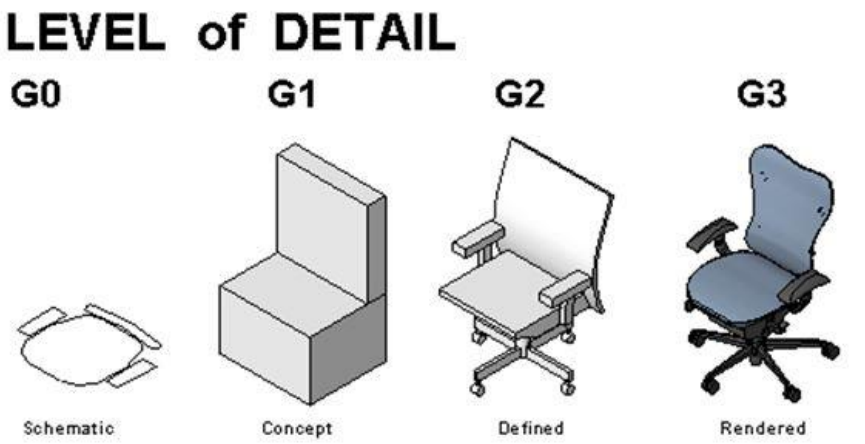
Turn these off if they are not required. This is important in 3D views also.

Worksets:

If you are not using some, close them! This will speed Revit up more than them off in visibility.

A note on LOD – Level of Development:

A hot topic in the industry at the moment, however it really isn't as complex as some make out, LOD merely addresses the question – "How much detail should I model and when" so the industry answered this question with a simple guide:



Description: Office Chair	**Description:** Office Chair	**Description:** Office Chair Arms, Wheels	**Description:** Office Chair Arms, Wheels
Width: -	**Width:** 700	**Width:** 700	**Width:** 700
Depth: -	**Depth:** 450	**Depth:** 450	**Depth:** 450
Height: -	**Height:** 1100	**Height:** 1100	**Height:** 1100
Manufacturer: -	**Manufacturer:** -	**Manufacturer:** Herman Millar Inc.	**Manufacturer:** Herman Millar Inc.
Model: -	**Model:** -	**Model:** Milla	**Model:** Milla

FIGURE 6: APPRECIATE THE IMPORTANCE OF 'FAMILY' DATA – LOD EXPLAINED

The purpose of this guide is to provide a little clarification of how much detail to add, for example if you are in the conceptual stages of design and you are merely modelling to claim space for an AHU, you can simply model a box! 'G1' LOD. As long as the box's size represents the AHU and its access, you have 'claimed the space' that is needed. However, details design may call for you to add specification to the AHU and therefore you will need to define more detail, in other words – build your family up and add more data – but only when it is needed, so we are back to families and their importance once again!

BIM Manage your projects:

In other words, do all the above regularly, dedicate someone to the task.

Where should all these tips, decisions etc. live?

In a **Project Execution Plan**, or whichever acronym you would like to use, but this should become a part of your everyday project workflow. Yes, we admit that the transition from no standards to a clean and lean library will take time, but this is the point, why would you not have a standard of how to create content, in exactly the same manor that you would you a graphic standard.

Here is a link to one of our favourite execution plans from Penn State:

http://bim.psu.edu/project/resources/ we appreciate there are many others you can find online, we also appreciate that whilst Penn State may not have all the latest inclusions of advanced BIM use today, it is a great 'starter for ten', we won't talk in depth about execution plans here, we have another presentation on only these from last year's AU if you would like a copy.

View data from a 50,000 ft. approach and address this from the ground up:

The Autodesk® Seek web service enables architects, engineers, and other design professionals to quickly discover, preview, and download branded and generic building information modeling (BIM) files, models, drawings, and product specifications for their active design sessions in Autodesk Revit® or AutoCAD® software.

For building product manufacturers, Autodesk Seek offers a unique way to connect with the professional designers ultimately responsible for specifying and recommending their products for purchase.

Here is a link to the new SEEK app from the Exchange apps website:

https://apps.autodesk.com/RVT/en/Detail/Index?id=appstore.exchange.autodesk.com%3aappautodesk00aeseek_windows64%3aen

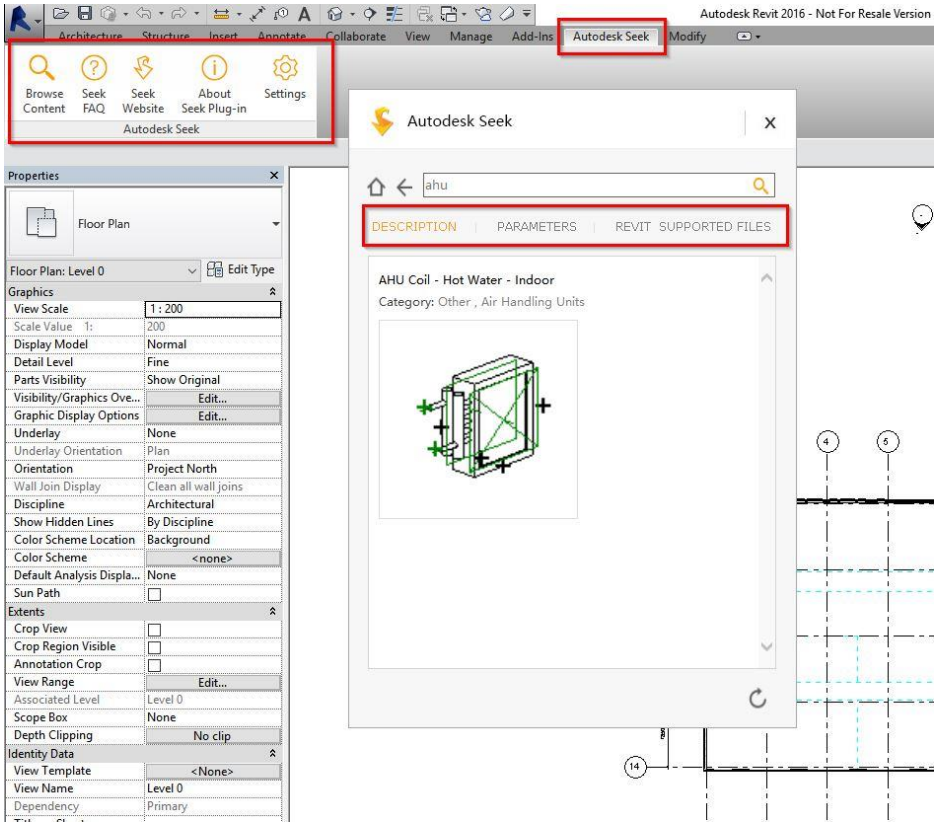


FIGURE 7 - VIEW DATA FROM 50,000 FT. – SEEK EXAMPLE

When BIM was introduced to the construction marketplace, owners, architects, and contractors were invited to the party but others in the construction process, like manufacturers and subcontractors, were not. Now that we are using more and more product specific data to help complete the "information" part of BIM, manufacturer data is in higher demand. This both helps us to ensure accurate information (who knows specific product information better than the ones that make them) and also saves us time from having to build the content ourselves (win back some of that lost billable time). The current problem is that manufacturers are new to this party and most have only a very basic view on what BIM even is. This causes problems when they start to provide their families and systems to the designers… they have no clue what we need/want nor do they even know where to start. The result is a content ecosystem flooded with poor families and systems.

Autodesk's answer to this is the Seek product database which is accessible from within Revit and AutoCAD and recently available in a new Revit app. For content to be allowed into the database, it must pass a rigorous QA program which looks at, among other things, file size, and standardized shared parameters.

What can we do to help the manufacturers accelerate their understanding and participation with quality families and systems? Every time we communicate with the manufacturers (reps, customer service, management, etc.…) we should let them know the importance of them providing accurate, quality families/systems. Once they understand this they will invest in resources to provide these files.

Maximize production time – Buys you more BIM budget:

- You will now have a cleaner & leaner model
- Model Size is everything! Consider size when sharing externally and internal use.
- Where do you currently save your data?
- Upload & Download speeds
- Sync Speeds
- Opening in part (Worksets)
- Saving time = saving money, production time is expensive!
- Increase in efficiency in production time will lead to more budget being available to implement more BIM training, programs and collaboration efforts.

A company standard could become a global standard!

So with small efforts being made across multiple companies, the industry is began to listen, see the benefits and act! We are currently working with federal influencers within Canada to standardize content creation across the entire nation! Offering advice to manufacturers across all sectors in either white paper, blog or face to face formats, such as events to ensure model collaboration is eased by model management resulting in smaller data. With other country's governments beginning to sit up and take note of what we are achieving in one country, we feel that once we have refined these methods, for the health and wealth of the industry, the movement will continue to grow and become a global solution.