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Dr. Revit's Ultimate Diet and Exercise Guide to Keeping Your Revit Models Ripped

Matt Wunch
ARCAT.com / SkyViz.io

Nauman Mysorewala,
Dr. Revit - BIMologist

Learning Objectives

- Discover what not to do to reduce Revit model's health
- Learn tips to improve a Revit model's performance
- Develop a plan to empower teams to maintain Revit model health
- Learn how to integrate Dynamo for keeping Revit models lean

Description

Hearing constant complaints from project teams about decreased Revit model performance? The spinning wheel, inaccessible model, or constant model crashes? Model fatigue is a curable disease. Empower your teams to perform healthy modeling habits. Dr. Revit's Ultimate Diet and Exercise Guide will provide steps to plan, implement, and maintain Revit models' performances, whether working on small, large, or BIM 360 Design-based projects.

Since the whole topic is ever evolving and we intend to keep updating it based on feedback, product updates and knowledge gained. Hence we decided to put a link to the most current handout, and files

[Dr. Revit's Ultimate Diet and Exercise Guide to Keeping Your Revit Models Ripped](#)

Link to latest Handout, dataset and presentation
<http://bit.ly/DrRevitAU2019>

Speakers

- **Matt Wunch** received his Associates in Science in Civil Engineering from Springfield Technical Community College and is currently the Digital Content Creator for Arcat.com. He provides BIM development, training, and technical support for the company's sales team. Matt has more than 25 years of experience with Autodesk software usage, installation and customization for applications such as AutoCAD, Civil 3D, MEP, Revit, InfraWorks, Navisworks, Recap and more. In addition, he is a member of the Autodesk Expert Elite program, a co-chair of the Construction Institute's BIM Council, a Revit Subject Matter Expert (SME), an FAA certified drone pilot with his own drone company, SkyViz.io, that provides aerial imagery and data collection services, and is also a member of the Board of Directors at AUGI.

Authors

- Dr. Revit Nauman Mysorewala
- Matt Wunch

obesity *noun*

obe·si·ty | \ ɔ̄-'bē-sə-tē

- a condition characterized by the excessive accumulation of 'stuff' in the project model

fatigue *noun*

fa·tigue | \ fə-'tēg

- extreme sluggishness resulting from poor modeling practices; poor performance issues

Irritable BIM Syndrome (IBS) *noun*

ir·ri·ta·ble /'irədəb(ə)/ mod·el /'mäd/ syn·drome | /'sin,drōm/

- Increased levels of obesity and fatigue results in a common disorder that affects users working on these models. Signs and symptoms include cringing, twiddling thumbs, frustration, profanities, stress and constipation, an inability to provide accurate and timely output resulting in blame shifting.

Sometimes it comes on quick, like the stomach bug, other times it slowly builds, often without you ever really noticing, until one day you synchronize your changes, close Revit and go home for the day. When you come in the next morning, you find that you're unable to open your model. So, what happened? Why is this happening suddenly? And was there anything you could've done to prevent it?

Through the course of this handout we'll discuss some common signs, and some not so common signs, users should be on the lookout for the causes of model's obesity and fatigue and why it's so rampant throughout the AEC community. A major cause is what the model consumes. With too much junk, model becomes obese resulting in fatigue. There are some things that are cancerous resulting in model's eventual death. Obesity needs to be kept in check through diet and exercise. Not only it affects the model, users working with these models develop a severely chronic condition, Irritable BIM Syndrome (IBS) that needs to be managed long term using group therapies. Users and teams with severe signs and symptoms of IBS, can control their symptoms by managing their lifestyle, model's diet and stress levels.

Dr. Revit will wrap up with a discussion on these types of diet, therapies and exercises for controlling model's fatigue & obesity and reducing IBS.

Signs & Symptoms of Model Obesity and Fatigue

As with any illness, model obesity and fatigue have some distinct warning signs. Many of you are probably already aware of the "unrecoverable error" message, "a fatal error has occurred" message, and of course the dreaded "missing elements" message. These should all be obvious signs of an unhealthy dying model. But there are other, more subtle, signs of an unhealthy model such as dialog boxes that take an excessively long time load, slow commands or opening views, linework that "jumps" around on the screen while panning or zooming, and transparent views when they're set to be hidden to name a few.

The biggest complaint the Doctor's team deals with is "slow model performance." This can be attributed to a number of things such as overly detailed families, analytical analysis, system calculations, excessive number of line patterns, materials, system settings, inadequate amount of RAM, low disk space, slow network, inadequate CPU/Video card specs, file size and on and on..... Sometimes it's a combination of these symptoms which makes finding a cure about as easy as finding a needle in a haystack. The key is to systematically rule out each possibility one-by-one. This is not always an easy task but there are some tips we will recommend for decreasing

the amount of time required for diagnosing causes of model's obesity and fatigue. However, let's discuss the major causes of obesity and fatigue and how putting your model on a diet and performing regular exercise can significantly improve performance.

Diet:

Watch what you eat for your health, we all have heard the advice. Same is true for the health of models, watch what you import into the model.

The gist of the CADio regimen involves abstaining from CAD imports in the both project and in

CADio

DIET & EXERCISE PROGRAM

THE BEST PROGRAM TO REDUCE MODEL'S OBESITY AND FATIGUE

families. It is hard to completely abstain from the CAD imports so it may take some time to completely get rid of them from a project's life. The CADio exercise involves weeding through the project and company library and getting rid of these carcinogens.

Here is a list of things to pay attention to when on the CADio diet:

- Carcinogens
 - CAD Imports
 - CAD Links
 - Groups
 - Overly complex geometry
- Weight
 - Model file size
 - Links file size
- Calories:
 - Loadable Families
 - In-place families
 - Raster Images
 - Unneeded Views
 - Duplicate elements

Carcinogens

• CAD Imports

- It is critical to avoid these like the plague as in our experience, majority of corrupted models diagnosed had CAD imports and exploded CAD imports.
- One of the biggest, if not THE BIGGEST, cause of model obesity is exploded AutoCAD DWG imports. The contents of an exploded DWG quickly spread through the model like a cancer, infecting the project model; line patterns, materials, text styles, fill patterns, detail items. Even something as innocent as just importing a DWG can bring along unwanted line patterns. When left unchecked, the total number of line patterns can grow to a staggering amount,



• CAD Links

- Limit the number of CAD Links
- Prior to Linking, cleanup the CAD in the native program. Delete unnecessary content, Audit and purge the file. For DWG files, set the PROXYGRAPHICS to 1.
- When linking evaluate whether the Link needs to be Annotative (Current view only) or Model (Current view only unchecked).
- If it is a Model object, place it on its own workset and make that workset NOT Visible in all views. This is a critical step as these can create a lot of fatigue when refreshing views and may lead to inconsistent plotting results.
- Limit the number of layers to only the ones that are needed. Use the Specify option for layers in the CAD Link dialog box.
- Avoid linking in CAD that has content very far from the origin. This leads to many anomalies and instability.

• Groups

- The number of Groups (Model / Detail) can cause severe fatigue.
- If you want to poison a model, go ahead and include Datum Objects in Groups and start Mirroring Groups in the project.
- It is highly recommended to include the hosting elements as part of the same group. This will reduce the issues of Excluded objects thus improving accuracy.
- Reduce the use of model and detail groups.
- Instead of detail groups, try to compose the elements inside a Detail Component family.
- Limit the number of elements in a group. Section off portions of the building for repeating geometries.
- Avoid nested groups.

```
Model contains 179 text styles
Model contains 475 materials
Model contains 92 fill patterns
Model contains 14351 groups
Model contains 106 linked DWGs
Model contains 488 imported DWGs
Model contains 6 SecretInternal arrowhead
Model contains 241 in-place Casework fami
Model contains 33 in-place Specialty Equip
Model contains 16 in-place Generic Models
Model contains 3 in-place Furniture famili
Model contains 1 in-place Furniture System
Model contains 24 filters
```

- By default, Array command copies and associates objects together as an Array Group. After an array deploys, ungroup the arrayed objects to remove their parametric associations. Alternatively, you can deselect Group and Associate in the Options bar when using the Array tool.

- **Miscellaneous**

- SecretInternal..Arrowhead. These can cause fatigue, crashing and very obese model. These arrowheads type may appear in the Purge Unused dialog box, however, cannot be purged. Refer to the Utilities section to use Dynamo to remove the arrows. Refer to <https://autode.sk/2TX5wUQ>

```
Model contains 34 text styles
Model contains 312 materials
Model contains 144 fill patterns
Model contains 136 groups
Model contains 15 linked DWGs
Model contains 1 imported DWGs
Model contains 123 SecretInternal arrowheads
Model contains 102 in-place Casework families
Model contains 0 in-place Specialty Equipment famil
Model contains 23 in-place Generic Models families
Model contains 600 in-place Furniture families
Model contains 0 in-place Furniture System families
Model contains 39 filters
```

Model file size / Links file size:

The heavier the weight, the higher the fatigue. Some may argue that model file size may not be an issue, however the larger the file, the more data Revit has to push and manage. Yes, it can be broken down by worksets, it is better to do better model organization and separating the models if it is possible. When a link is being loaded, the link authors do feel the slowdown as it takes longer time to load the file. It is worth the investment of time for coming up with a better Model Breakdown Structure for the overall project to reduce individual file sizes.

Control the Calorie intake to prevent obesity:

- **Loadable Families**

Loadable families are what makes the project and they can also be what breaks it. Unnecessary content in the model leads to obese model. Bloated families with complex imported geometrical content or unpurged content. These suggestions not only assist in reducing the weight impact of families on project, they also cover reasons of fatigue.

- Simplify, don't over parametrize family's controlling parameters
- Avoid nesting families more than two deep.
- Use symbolic lines and masking regions and turn off 3D geometry in Plan & Elevation views, for plan views
- NEVER EVER import a 3D DWG into a family and try to pass it off as "a Revit family". This has severe impact on view performance.
- When downloading manufacturer families, highly vet them to make sure it does not contain unpurged elements, CAD entities, multi-level nesting, and overly complex geometry. Manufacturers are getting better at rebuilding families with native Revit geometry, however if your library contains older downloads, it would be wise to recheck and replace offending content with newer versions.
- DO NOT use imported 2D CAD elements. Never explode the 2D import in the final family to be used on the project. For 2D elements follow the procedure explained in the document to convert 2D CAD elements into Revit Line & Filled region elements. Review existing library and project families for these obese and cancerous elements.

- When encountering the “Cannot edit family,” take IMMEDIATE ACTION to identify corrupt families and replace them with good copies from backup or remove them completely. It is a cancerous element in the project and Ignoring this warning will lead to a model’s death.
 - Purge and Audit families in the company library and project.
 - Poorly modeled mechanical and piping equipment are one of the leading contributors to model fatigue when it comes to MEP models. Pipe connectors that are haphazardly placed in a family without any consideration for direction of flow or system classification can cause major discomfort when trying to model a piping system. Connectors with no sense of direction can essentially “clog” the analytical arteries of a project. To make sure this doesn’t happen you have to be aware of the correct direction of flow – out to in, in to out. For an excellent resource on how to properly create MEP families with connectors, be sure to check out David Butts’ Autodesk University 2018 lab titled “Perfecting Piping and Duct Systems in Revit”.
 - There is new hope for the corrupt families now. With the release of Revit 2020.2 a new feature was added to alert users of corrupt elements when saving to avoid the dreaded Too many missing elements error..
- **In-place families**
 - These are limited for unique instance of a special condition.
 - Limit in-place families only for system families that cannot represent the special condition for the project. A justifiable use would be creating a barrel-vaulted ceiling, etc.
 - These should never be copied, as each instance is a unique family and adds weight to the model.
- **Raster Images**
 - Images, such as renderings, when saved to the project model add a lot of unnecessary baggage and can increase the file size tremendously. Whenever possible save the rendered images to a shared project folder rather than the active project model.
 - When inserting images for use, convert the image to a lower pixel count based on the use, final printed size and resolution requirement. We have seen high resolution logo images in Title block ballooning the project size.
 - Purge to remove unplaced Raster Images/Decals. Use Manage Images command to remove unneeded images.
- **Views**
 - It is recommended to have a Project Browser organization that supports identifying and categorizing views to be used on sheets.
 - The working view concept is great; however, users tend to mix them in with regular organization and make it harder to identify the views.
 - Other working views are copies of the views placed on sheet. These are sometimes copied using Duplicate with Detailing. This carries over unneeded annotative content, adding to the weight of the model.

- Avoid custom crop regions, especially with curves. They have a tendency to cause issue when plotting
- **Duplicate elements**
 - It is obvious that Duplicate elements will add unnecessary weight to the model. It is important to remove these elements. A quick way to identify these is by reviewing the Warnings. Look for the warning “There are identical instances in the same place. This will result in double counting in schedules...” Review each pair of elements and select the one to delete.
 - Duplicated/overlapping Room bounding elements can not only cause obesity and fatigue, but can lead to model corruption or frequent crashes.

Exercise

Prior to talking about the exercise regimen, it is important to have the correct equipment and making sure it is kept tuned.

Get the Right Exercise Equipment

As with any diet and exercise program, using the right equipment is necessary for a successful recovery. And prior to engaging in heavy lifting, one needs to build up the muscles. The next few pages we'll dig into some of ours / Autodesk's recommended equipment specifications for buying the appropriate 'muscle computer'. At the end of this section you'll walk away with the knowledge of how to properly use each piece of equipment as well as some tools you can implement right away to update your existing equipment.

Hardware

Having the right hardware is critical for achieving optimum performance. Depending on the weight of the model, <300MB or >300MB, follow the recommendations put forth by Autodesk <https://autode.sk/2Wi9iKB> . These recommendations are time sensitive, so make sure to review the latest and greatest hardware recommendation mentioned at the provided link.

Dr. Revit's team recommendation:

The basics:

- CPU with higher single core speeds. Currently, most Revit processes utilize single core processing. It is important to invest in a CPU that will provide the highest single core speeds, as oppose to the number of cores. CPU's Turbo boost feature can assist in improving performance
- RAM/Memory. If the machine, while using Revit, is running out of memory, adding additional RAM can help alleviate slow performance. It may be as simple as closing other programs as well.
- SSD storage. For new computers, specify SSD which are now becoming standard. For rejuvenating existing computers upgrade current mechanical hard drive to SSD hard drive. Even if purchasing a Minimum budget laptop or desktop with a mechanical hard drive,

swap out for an SSD to realize significant improvement. If the machine has a 2.5" hard drive and has a PCIe slot, opt for a M.2 PCIe for increased performance.

- Discreet video card. Discreet video cards are designed to handle complex graphics and typically perform better than built-in graphics card. Minimum: Entry-Level Configuration <200MB models with no links or complex geometry
 - Latest Intel i3 series, AMD equivalent or above multi-core processor
 - Intel or AMD built-in graphics card or above
 - 8GB ram
- Value: Balanced price and performance <300MB-400MB models (cumulative with links)
 - Latest Intel i5 series / AMD equivalent or above processor
 - Intel or AMD built in graphics card, Nvidia GeForce/Quadro entry level
 - 16GB ram
- Performance: Large, complex models. >600 with multiple links
 - Latest Intel i7 series /Xeon / AMD equivalent or above processor.
 - Nvidia GeForce/Quadro or AMD mid-level graphics card. The doctor prefers GeForce over Quadro cards, since it provides the best performance/cost ratio.
 - 32GB ram

Tuning the Equipment

Whether the equipment is brand new or existing, it needs to be fine-tuned and maintained to get optimum performance.

Windows tune-up

- Restart your PC at least daily. Open only the apps you need.
- Close Internet browser(s) or close all unneeded tabs. This will reduce the memory footprint and minimize CPU usage.
- Customize Startup programs and services running in background. Disable unneeded background applications. This should be reevaluated every few months or upon installation of new software.
- Review and updated [Power Options](#). On new machines, especially laptops, it is set to Energy/Power saver, resulting in poor performance for both CPU and GPU. Verify it is set to at least Balanced performance or set it to High performance.
- Turn of Visual Effects, Windows includes many visual effects, such as animations and shadow effects. Nice and slick but come at the cost of additional system resources and can slow down your PC. This is especially true if you have a PC with a smaller amount of memory (RAM) and built-in video card.
- For laptops disable Wi-Fi when connected to a hardwire connection. Having dual connection can cause slow downs for the entire team and may lead to file corruption. Some latest machines have auto disconnect feature available. Verify it is turned on. <https://www.itechtics.com/5-ways-automatically-turn-off-wifi-ethernet-lan-cable-connected/>.

- Video card settings. Users investing in machines with discrete video card (Nvidia or AMD) do not get the performance they paid for. This is due to the hybrid mode being turned on, i.e. by default the operating system will use built-in video card and for graphic intensive applications, utilize the discrete video card. Due to misconfiguration, Revit may not be utilizing the higher end graphics. Our advice is to disable the hybrid mode and set the system to use Discrete graphics. This setting is located in the BIOS configuration, accessed at startup of machine.

Exercises

WITH WEEKLY TREATMENT, HEALTHY MODELING PRACTICES, DETERMINATION AND THE MINDSET TO IMPROVE YOUR OVERALL MODEL'S HEALTH, WHAT ONCE SEEMED LIKE "THE EASY WAY OUT" WILL BE REPLACED WITH A NEW LIFESTYLE AND HEALTHY HABITS

"IT'S TIME TO CARE; IT'S TIME TO TAKE RESPONSIBILITY;
IT'S TIME TO LEAD; IT'S TIME FOR A CHANGE;
IT'S TIME TO BEAT YOUR OLD HABITS OF CONSUMING "JUNK FOOD" IN YOUR MODELS

IT'S TIME TO GET YOUR REVIT MODELS RIPPED!!!!

Audit / Selectively Purge / Compact the model .

Weekly:

- This is an essential step. Also make sure your team is Auditing weekly at a minimum, Purge Selectively, and Compacting the model when no one is in the model.
- It should go without saying that purging a model should be your FIRST steps towards a healthier model. Unfortunately, after providing technical support both on the forums and for Autodesk, we've found that isn't always the case. It seems people are afraid to "let go" of their stuff. It's similar to the psychological disorder hoarding. When you save everything because "you just never know when you might need that [fill in the blank]", your model becomes overloaded with "stuff". Sometimes it is necessary to let go of the things that are weighing your model down. Purging should always be the first step towards going "clean" and on the road to model recovery.

Recreate the Central file

Once a month: Sometimes compacting the central may not reduce the file size significantly. Recreating the central model helps.

- Make sure no one is in the model
- Open the central model detached with Audit.
- Purge selectively
- Review duplicated content and remove
- Rename the central model by appending the date. Go the same for the centralmodel_backup folder.
- Save the detached model with the original name in the original location.
- Sync and relinquish all User created worksets
- Request users to create new locals.

New Local a day keeps Doctor Revit away...

Have people create new locals EVERY DAY. (credit: Harlan Brumm)

Perform the system flush

Weekly:

- Empty Temporary folder <http://autode.sk/2xZB9Gh> You can also use the Disk Cleanup tool in Windows.
- In Windows 10 (1803+) enable Storage Sense feature to automatically perform the cleanup.
- Clean up local model folder
- Cleanup the Revit Journals folder. Revit saves backups of families edit in the Family Editor and non-workshared models. <http://autode.sk/2vHGzBK>
- For BIM 360 hosted models, in case of issues with models, clear BIM 360 local cache and reopen model from BIM 360. <https://autode.sk/2VYYEqX>

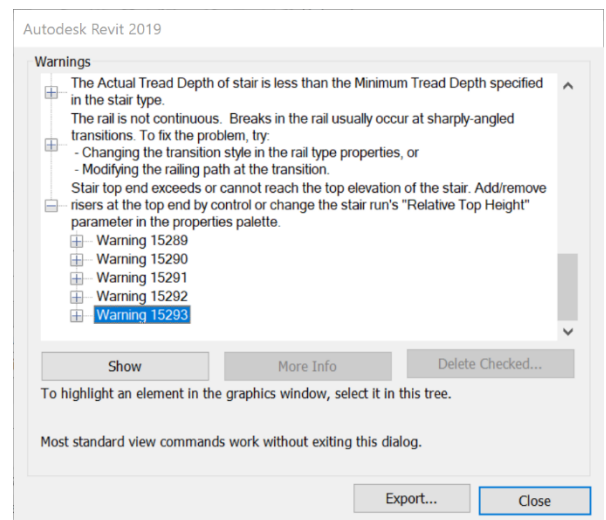
Review and mitigate Warnings

Weekly:

When warnings are left unchecked, they can quickly grow out of control, making the review process daunting and overwhelming. Prevention starts with good modeling practices and procedures. Do not just “wing it” and if you see a warning or error message pop up while you’re modeling, take the time to look at it and not simply just dismiss it.

Try to mitigate the number of warnings.
 Especially:

- Joined but not hitting targets
- Join errors
- Off axis related warnings
- Overlapping walls and room separation lines.
- Highlighted walls are attached to, but miss, the highlighted targets
- Highlighted elements are joined but do not intersect
- Area or Room separation line is slightly off axis and may cause inaccuracies
- Highlighted lines overlap. Lines may not form closed loops and it's variations
- Stair errors.



Group exercises

The above-mentioned routines need to be performed by the overall project team. The authors of linked models should be encouraged as it helps reduce the overall model ecosystem obesity and fatigue.

Revit build version

Verify all team members are on the same Revit build version. Using multiple builds of Revit on a project will most definitely lead to corruption or unexpected crashes. Please make sure that ALL machines are on the same Revit build, preferably the latest.

Syncing

Synchronized swimming may be a sport, exercise, art and more, when it comes to Revit, Synchronized Syncing should be avoided at all costs. This is especially true when there is crunch time and production staff is added to the team.

- Determine a schedule for syncing. Have users consistently save locally
- Use the communicator tool or a common IM platform to communicate to the team when syncing. Take turns, stepping on each other toes is never a good idea.
- On BIM 360 syncs, it is imperative to take turns otherwise it will lead to extreme cases of Irritable BIM Syndrome (IBS) for all team members. Not coordinating syncs is a huge team efficiency degrader on BIM 360.
- On distributed storage systems, this is a leading cause of slowdowns and model corruption.

Plotting

- For larger batch plot jobs, eTransmit the model When plotting multiple sheets, switch to a simple Starting View or drafting view and close all other views and sheets.
- For PDF printing verify that the PDF driver works well with Revit.
- Check printer/plotter drivers and settings. Resolution 300-600dpi, Image compression type, PDF version 1.5+, Line merge, etc.

Check Project Models Vitals

Our team uses various tools to measure the health of the project. Autodesk University available classes include various classes that go much deeper on the topic and to implement these companywide.

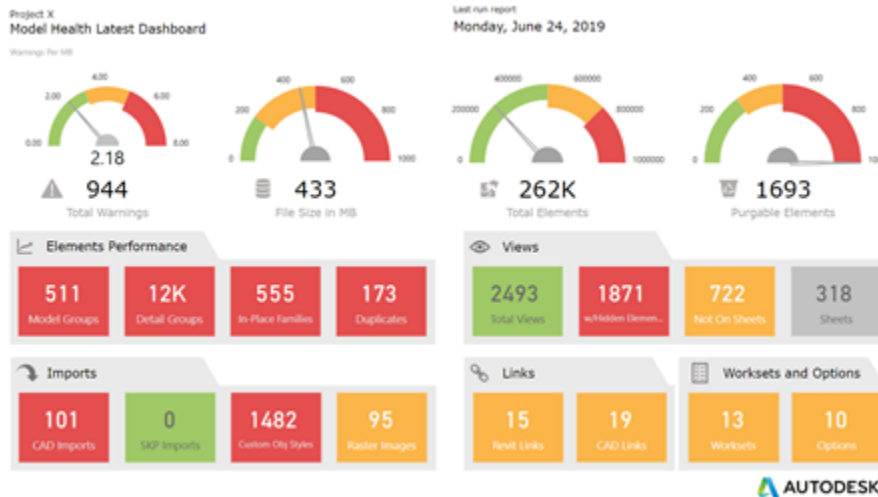
Dynamo

Dynamo is a great tool when it comes to trimming the fat from your model. And with plenty of YouTube videos, forums, user groups, and on-line and in-person presentations, you're sure to find what you need. My two personal favorite sources of Dynamo information are 1) the Dynamo forums (<https://forum.dynamobim.com/>) and 2) LinkedIn Learning. For FREE access to Lynda.com material is via your local library. Just sign up for a Library card and visit the library's E-Books section and look for Lynda.com access. If you have access to a Premium LinkedIn account, then you have access to LinkedIn Learning and all of the Lynda.com videos as well (Lynda.com was bought by LinkedIn in 2015). What's great about LinkedIn Learning is that all the sessions can be done at your own pace and most include sample datasets that you can download and follow along with. If you're not sure if you have a Premium LinkedIn account just look at your profile page. If you have a gold banner and it says "PREMIUM" then you have access to all the videos and training sessions on LinkedIn Learning.

Included in the dataset is a simple Dynamo script to provide quick health check the team uses to perform quick vitals check and diagnose the problem. As mentioned before, most of the cases that the team handles for corrupt models or inability to sync are due to exploded CAD imports, groups, and corrupt families.

Autodesk BIM Interoperability Model Checker tool

The Model Checker is a great tool for performing “blood tests” to check the health of the model. It has built-in checksets to check Revit modeling best practices and other national institutions have their bespoke checksets. Doctor’s team has included a customized version of the Revit Health Dashboard check set that has some extra checks for things mentioned in this document. Visit <https://www.biminteroperabilitytools.com/modelchecker.php> to learn more about the tool and download the latest version. The team has included an awesome Power BI template that works with the Revit Health Dashboard to visualize the model



[Download a sample Health Dashboard Model Checker checkset XML, a Microsoft PowerBI template, and instructions](#)

[Watch a video with detailed instructions on implementing the sample dashboard](#)

[Download the Revit Model Health Dashboard whitepaper](#)

Dr. Revit's Rehab & Recovery Guide

Model Vitals

- Can you open the model?
- Can you open the model with 'audit' toggled on?
- Can you open the model closing all worksets using the specify option?
- Can you open the Local model from a user and recreate a central?
- Can you open the model isolating it from network?
- Can you rename the model and open it?

System Vitals

- Do I have the most recent updates for Revit installed?
- Do I have the latest video card driver installed?
- Were there any recent Windows updates?
- Do I have enough free space on my computer?
- Is the issue isolated to a user/computer/model?
- Have I checked the Autodesk Knowledge Network and online forums?

Check the Revit Build version installed?

- Build Version can be found under Help>About, in Journal file, or SLOG file.
- Visit <http://autode.sk/2fZS8Nt> to check latest released Revit updates and identify Build numbers & Build Version. You can search this <http://autode.sk/2gcrI0E> page for a complete list of updates for various versions of Revit and if needed, you can download the available updates from your Autodesk Account Management page, or Autodesk Desktop App.
<https://manage.autodesk.com/cep/#products-services/updates>
- Verify the local computer has the latest build.
- Verify all team members are on the same build.
- If updating to the latest Build, make sure to apply the same update to all team members editing the file.

Do I have the latest (certified) video card driver installed?

- If Revit is crashing intermittently, it is good practice to check for video card driver updates. Autodesk has a page dedicated to certified hardware but it's important to note that it's not completely up to date and just because a video card isn't listed, that doesn't mean it won't work. Should you decide to update an old driver and for some reason it makes things worse in Revit, you can always roll back to a previous driver. Visit <http://autode.sk/2ixu88T> to check the latest Certified driver available for your video card.

Were there any recent Windows updates?

- A lot of random issues lately have been attributed to Windows updates and the 4.7 version of the .NET Framework. This is especially more prevalent in the older versions of Revit because they simply don't support the newer advances in Windows technology.
- In case of major windows updates, i.e. Fall Creators, check hardware driver updates from manufacturers, including video card drivers. Windows 10 tends to update hardware drivers and they can cause issues as well. In that case a roll back may be necessary.

Do I have enough hard drive space available?

- This one isn't as obvious as the other but it's just as important. Without adequate disk space, Revit won't be able to save backup and temporary files. These days with computers being upgraded with smaller SSDs (128GB or 256GB) it is critical to monitor the space usage and cleaning periodically is highly recommended.
- Whether the computer has enough hard drive space or not, it's important to clear the %TEMP% folder. If you can't delete everything, that's okay. Crashed Revit sessions will leave large temporary files.
- [The Revit journals folder](#) (for each version of Revit you have installed) is not an obvious location to check for temporary bloat. When saving a non-workshared model to a network drive, Revit will save a copy of the model to the journal folder and if for some reason Revit crashes, the copy of that model will be left behind. This folder also contains backups of the families edited in a particular session.
- Refer to these tenforums.com articles (most topics are applicable to older versions)
- How to Free Up Drive Space <http://bit.ly/2ydTSKo>
- Run Disk Cleanup <http://bit.ly/2ycAttI> It will also find extraneous window update files including %TEMP% files.

Your support system

As with any sort of rehab and recovery process, your success can be greatly improved if you have a strong support team to help you along the way. In this case, your support team are your co-workers, outside consultants, architects and engineers who also access and use your models. All team members should have the same build of Revit installed, preferably the most current. If not, you run the risk of possible model corruption.

```
' 3:< Document save history --> :
' 3:< Revit 2015 - Preview Pre-Release 2015 (2015.000) : 20140120_1515(x64)
' 3:< Revit 2015 2015 (2015.000) : 20140606_1530(x64)
' 3:< Revit 2015 2015 (2015.000) : 20140223_1515(x64)
' 3:< Revit Architecture 2015 2015 (2015.000) : 20140322_1515(x64)
' 3:< Revit 2017 2017 (2017.000) : 20160225_1515(x64) < Initial release of Revit 2017
' 3:< Revit 2017 2017 (2017.000) : 20160720_1515(x64) < 2017.0.2 Service Pack 2
' 3:< Revit 2017 2017 (2017.000) : 20171027_0315(x64) < 2017.2.3
' 3:< Revit 2017 2017 (2017.000) : 20181011_1645(x64) < 2017.2.4
' 3:< Revit 2017 2017 (2017.000) : 20160225_1515(x64) < Initial release of Revit 2017
' 3:< Revit 2017 2017 (2017.000) : 20161117_1200(x64) < 2017.1.1
' 3:< Revit 2017 2017 (2017.000) : 20190507_1515(x64) < 2017.0.5 (TLS Security Update)
' 3:< Revit 2017 2017 (2017.000) : 20190508_0315(x64) < 2017.2.5
' 3:< Document save history <--
```

Journal file 'Document Save History' when auditing the file

Looking at the above Journal entries, notice the various versions in the journal file. The major issue is the fact that, not all users are on the same build of Revit. Opening a Revit file in a newer build, then older build, then newer build, will cause serious harm.

Recovery won't be easy. Try to surround yourself with like-minded people who are committed to seeing this recovery be successful. And always remain positive. There may be times when you want to take the easy way out and "insert a *small* DWG. Just this one time". Try to resist those temptations as it will only be self-harming in the long run.

Utilizing Dynamo & 3rd Party addons

- Free:
 - [pyRevit](#) latest version (4.7+) added the function to check corrupt families.
 - [Family Size Reporter](#). This will also identify the family sizes, nesting, and any import symbols being used by the families.
 - [Revit Lookup](#) – Now provides search for both Element ID and GUID
- Paid:
 - [Project Sweeper](#) – Great tool for cleaning up IMPORT Line patterns.
 - [Ideate Explorer and BIM Link](#) – This is a great tool to drill down inside the model and perform 'biopsies' and surgically remove offending elements.
- Dynamo Scripts
 - Unused secretinternalradararrowhead arrowheads cannot be purged from Revit project <https://autode.sk/2TX5wUQ>

The good news is that you can easily remove the SecretInternal

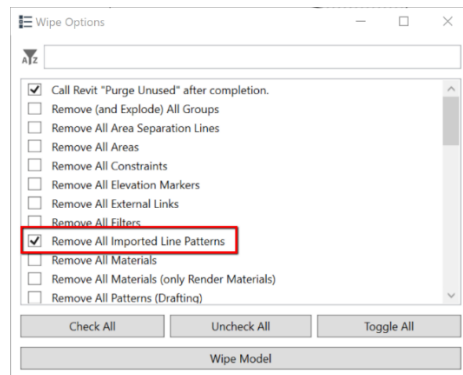
arrowheads using a Dynamo graph included in the dataset and the forum post: <https://autode.sk/2U2qlc8>

- Large number of IMPORT line patterns which occurs when users explode imported DWGs. This can cause slowdowns and could lead to corruption. You can easily remove them using Dynamo graph. Keep in mind this will remove ALL IMPORT line patterns, including the ones used by Links or details. Project Sweeper give you lot better control and our team prefers that. DELETE IMPORTED LINE PATTERNS USING DYNAMO <http://bit.ly/2zzNILM>
- You can use a simple Dynamo graph to remove all of the imported DWGs. HOW DO I USE DYNAMO TO LOCATE AND DELETE IMPORTED DWG'S? <http://bit.ly/2TZb3dz>. If these DWGs are necessary, I would highly recommend creating families for the 2d linework instead of using DWGs

pyRevit

pyRevit is by far one of my all-time favorite add-ins for Revit. And it's FREE!! So what can pyRevit do for your model? Well, for starters:

- It can quickly identify all linked and imported DWG file
- It can quickly rid your model of IMPORT line patterns, imported 'Render Material RRR-GGG-BBB' using the Wipe Model command. Use this tool

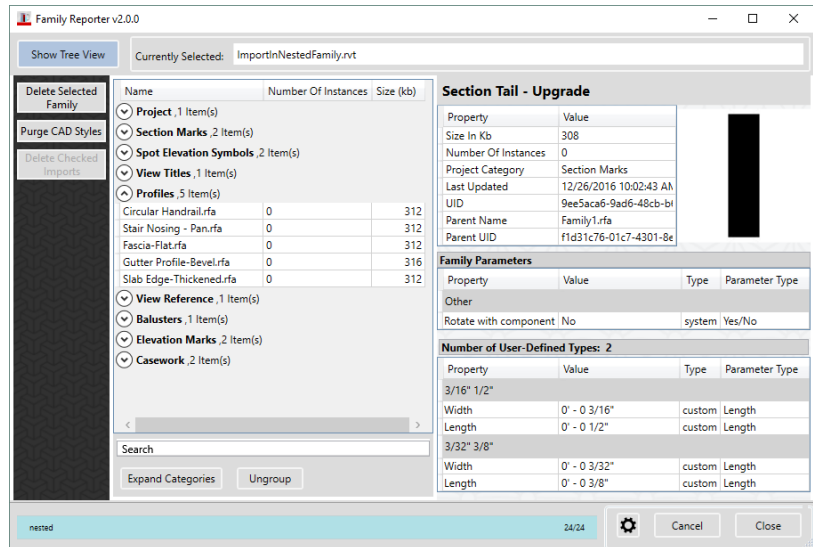


with extreme caution.

- Need to find the offending users causing model health issues? Utilize the Teams > Who did what? Tool.

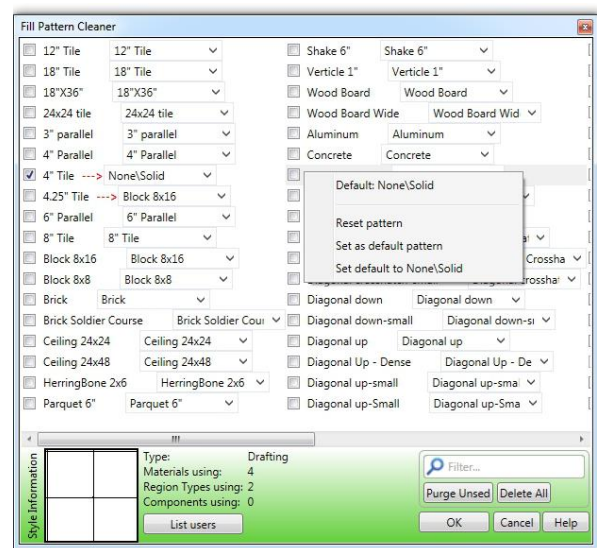
Family Size Reporter

This is one amazing tool for diagnosing family issues and track down CAD imports in families. Best of all, it's free. It starts off as pyRevit or the manual process do by saving out families. However, it goes way beyond; reports size, checks for all nested families, and identifies CAD imports within the families.



Project Sweeper

When it comes to swapping and purging IMPORT Line Patterns, Filled Regions, Fill Patterns, no one comes close to what Project Sweeper can do. Instead of using the sledgehammer approach of dynamo or pyRevit, it allows user to purge unused patterns. If the pattern is being used, it shows, with its built-in viewer, where the pattern is being used and what the definition of the pattern is.

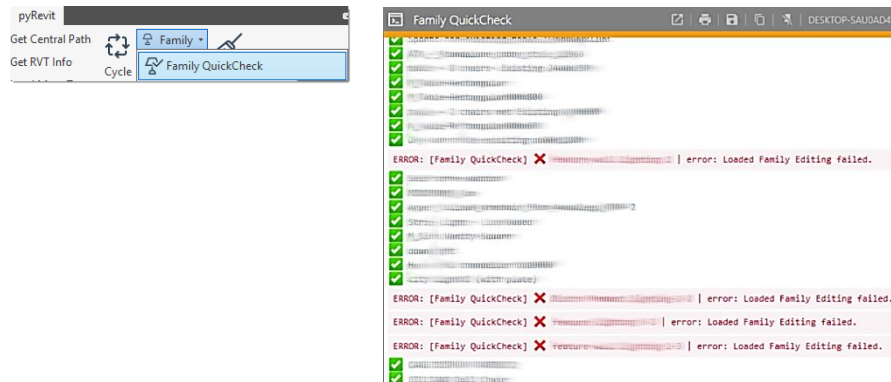


Corrupt Families

If you've assessed the basics and your model is still crashing, then it's time to begin the manual resuscitation process of first searching for corrupt families. Corrupt families are a big contributor of model crashes, inability to sync, model getting corrupted.

pyRevit

Family Quick Check



Manual process

The process itself of searching for corrupt families is quite simple, but it can become very time-consuming the more corrupt families reside within the model. Make sure you monitor the process actively as there will be popups (Constraints errors), corruption errors which will need to be clicked for the process to continue.

Journal files may list some errors like

- *DBG_WARN: (asynchronous i.e. previously detected)Why no ElemRec?: line 119 of OwnerGraph\KingOf.cpp.*
- *DBG_WARN: (asynchronous i.e. previously detected)Missing owner, or cycle of owners!: line 113 of OwnerGraph\KingOf.cpp.*
- DBG_WARN: Failed to translate big ElemId.: line 217 of Family\FamilyDocument.cpp.*
- Assertion failed: line 797 of ElemTable\Marshaller.cpp*

Thankfully, there's a (somewhat) easy process of determining which one(s) are causing palpitations in the model.

Currently, I have been noticing a lot of corruption which may be attributed to CAD imports and Exploded CAD Imports.

Procedure:

1. Open the model using the detach from central option then save as a new central model.
2. Purge out all Loadable Families, Furniture, Annotations, Generic Models, GROUPS, etc. Also purge Materials, Material Assets (you will have to purge multiple times to get rid of

all unused materials/assets. This will speed up the next steps and may clean out some corrupt families.

3. Save out the families, File> Save as > Library. When Revit finds one that's corrupt, it will crash or popup error saying cannot save file. You may ignore the Constraints not Satisfied or other errors, except Cannot Save Family.
<http://autode.sk/2y4xouN>
4. Make note of the family that crashed Revit or error pop-up saying the family could not be saved. (the last family will be visible on the status bar in the lower-left corner). The names are also saved in the journal file as well.
5. Close Revit if it crashes otherwise jump to step 9.
Reopen Revit
Open the central model from step 1.
Delete the corrupt family(ies) from step 3.
6. Save the model
7. Repeat steps 2-6
8. Repeat until Revit doesn't crash or does not give errors. while saving the families.
9. Get clean, AUDITED copies of the original families from your library or an older version of the project file and reload them into the model. Overwrite the Family(ies).
10. Audit, Purge and Compact the Central file and Recreate it on the server. All users must create new locals.

It's essentially the same process as outlined in the Solution section of this AKN article, with some additions of mine <http://autode.sk/2i6ovOu>

Finding other cancerous Elements

For a more detailed troubleshooting process borrowed from <http://autode.sk/2zDslhw>

When encountering unexpected behavior (e.g. crashes when accessing a particular view or selecting particular commands), you can fairly quickly check if the issue is related to elements within the project (by deleting "all" elements), and then narrow down and isolate the problematic elements.

Solution:

Warning! To avoid accidentally making unwanted and irreversible changes to your (production) project file, before going through any of the steps below, make a copy of the project (and if necessary linked project files) and only work with the copied file.

Overview:

- Delete everything from the model.
- Check if the unexpected behavior occurs (recreate elements to reproduce if necessary).
- If the issue is cleared, delete items by category in groups until the specific problematic element or elements are found.

Detailed Steps:

- If you have particular elements that you suspect are causing the issue, delete them, and test if the issue continues.
- Check the journal file recorded by Revit, to see if any specific elements are referenced prior to the issue (this might help isolate problematic elements faster).
- Delete all elements from the project by going through the following steps (and retesting after each deletion to find when, or if, the issue is cleared):
 - Go to a default 3D view.
Draw a crossing selection box (from bottom right to top left) over all the visible elements and delete them.
 - Delete all but one level
 - Delete all of the project views, except for the default 3D view.
Delete all of the schedules.
 - Delete all of the sheets.
Delete all of the loaded families.
 - Delete any Design Options.
 - Disable Worksharing.
 - Delete loaded families from the project (select multiple family types in the Project Browser, right click and select Delete).
 - Purge Unused objects from the project (you may need to run this several times to clear all possible items).
- If the issue stops after removing "everything" from the project, then we know it is related to one of the items removed. Start removing less elements to find the group responsible.
- If you find that the issue is related to one of the elements deleted (instead of a sheet, schedule, or view), go through the following steps to isolate the particular family or family instance:
 - After selecting all the elements, and before deleting them, filter your selection by category, removing groups of categories. This will allow you to find the category of the problematic elements.
 - Once you know the category, use the project browser to find all of the families associated with that category, expand the family, right click on it -> Select All Instances, and select In Entire Project. Remove groups of families within the category to find the specific family related to the issue.
 - Once you have isolated the family related to the issue Select All Instances again, and then use the IDs of Selection command to get the Element ID for all of the family instances. Copy these IDs, paste them into a text editor, Select by ID in groups to find the specific element(s) associated with the issue.

Note: When dealing with issues that lead to a crash in the program, I have found it faster to delete several groups of objects, test for the behavior, undo the last deletion, test again, and repeat.

- Once you have identified the specific items causing the issue, try cutting to the clipboard (if possible) and then pasting back to the same place. If this does not work (or is not possible), remove the items and recreate them, but test to see if the issue returns at each stage (e.g. after drawing the object, after editing the profile, after changing parameters.)

If you've gone through this process and have cleaned up any corrupt families, or didn't find any corrupt families, and your model is still having trouble breathing on its own, then it's time to start analyzing the journal files.

If all else fails, visit the ER!!

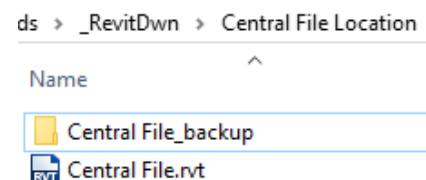
There will be times after all tries, one cannot fix the issue. So.....

If all fails and the backups that are available are too old or corrupt as well, you will need to create a Support case with Autodesk. However, before sending in the case do some prep work to minimize downtime. Autodesk Support will always ask for most of the items listed below.

Gather the items

As with any emergency room visit the nurse/doctor needs to gather the facts and test results to perform any recovery for the patient. In Revit's case end user/client model recovery or Autodesk Revit troubleshooting, there are some basic files needed to begin the diagnosis process.

- Last 3-5 Journal files for the user. <http://autode.sk/2vHGzBK>
- Corrupt Revit project file
- Latest 3 backups for a non-workshared file
- Revit central file_backup folder. This contains the SLOG file as well.
- Revit Local files from the user(s).
- You may also need the local file_backup folder
- All Revit/IFC Linked files, especially when troubleshooting performance issues, or weird anomalies in the software.
- Any critical linked CAD DWG files
- MSINFO file. How to obtain System information file for diagnostics and troubleshooting. <http://autode.sk/2w0A1j3>



Minimizing File Corruption with Diet and Exercise

As proper diet and exercise are healthy for the human body, Revit, being a complex "animal", also needs a similar regimen.

The process of maintaining a healthy model relies on these major concepts. We have covered this a few times at the beginning of the document, however, it still needs to be repeated.

- Computer Maintenance
- Model Maintenance
- Prevention
- Being proactive

Computer Maintenance:

- Apply latest updates to all team members simultaneously
- Keep the video card driver relatively updated
- Monitor Hard disk space ensuring there is at least 10GB available
- Empty the %TEMP% folder regularly

Model file maintenance

- Increase the number of backups
- Audit the project and linked files periodically. At least once a week
- Selective Purge
- Compact
- New locals. "A local file a day, keeps support away." – *Harlan Brumm*, 2009
- New Central's occasionally
- Review Warnings and keep them to a minimum.

Prevention

- Vet the families from other sources, manufactures, consultants.
- Periodically check your model for corrupt families. <http://autode.sk/2i6ovOu>
- CAD files (Best Practices <https://autode.sk/2GcWrol>)
 - Avoid Importing CAD
 - Avoid importing CAD and Explode CAD in project or families. Always use an interim file to convert CAD linework into Revit lines. In a new project or family Import the CAD, Explode and then remap the lines, patterns to match your company standards or OTB types and styles. Copy the cleaned-up version into your actual project or family.
 - Link CAD files. It is advisable that CAD file should be cleaned up (especially civil files), purged, audited, PROXYGRAPHICS set to 1.

- Unload/remove unneeded CAD files. CAD files add a considerable bloat to Revit. IF CAD files are visible in the view, the view navigation performance is affected.
 - Avoid CAD objects in families.
- Avoid using Undo command after sync with central or cancelling a sync process. This leaves the model in an inconsistent state.

Supporting AKN articles, forum posts and resources

AKN Articles

[AKN: How to tie the Build number with the Revit update](#)
[AKN: Annotations are missing when opening a Revit file on one computer](#)
[AKN: System exception when Activating the default 3D view in Revit](#)
[AKN: One or more views in a Revit model are extremely slow when zooming or panning](#)
[AKN: Project phases disappear after a wire run tool is started and canceled](#)
[AKN: Revit button does not open](#)
[AKN: Cannot open or save file with audit in Revit](#)
[AKN: Dynamic Model Update](#)
[AKN: Error: "An unrecoverable error has occurred. The program will now be terminated" when opening Revit](#)
[AKN: How to clear a corrupt/damaged C4R model or outdated link from the system in Revit](#)
[AKN: Revit family cannot be edited](#)
[AKN: Improve Revit Performance](#)
[AKN: Memory Usage and Instability](#)
[AKN: Optimize your Operating System for Performance](#)
[AKN: Model Efficiently](#)
[AKN: Best practices for families modeling](#)
[AKN: Crash during DWG or DXF export from Revit](#)
[AKN: Graphics Issues after Linking or Importing CAD](#)
[AKN: File will not synchronize in Revit](#)
[AKN: Warning: "Your local file is not compatible with the central model" in Revit](#)

Blog & Forum posts

[Dynamo Forum](#)
[SecretInternalArrowHead forum post](#)
[Delete imported line patterns using dynamo](#)
[How do i use dynamo to locate and delete imported dwg's?](#)

Tools

[pyRevit](#)
[Autodesk BIM Interoperability Tools Model Checker](#)

Symptom, Causes/Diagnosis, & Therapy Reference

The next section contains list of signs and symptoms of model obesity and fatigue and simple therapies that can be taken to reduce the levels. Some of the causes may repeat due to the interrelated nature of the diagnosis/causes. A detailed description of some of these therapies will be discussed later in the document. Also refer to the attached Doctor Revit's class, *Code Blue Dr. Revit. Help Resuscitate corrupt Revit models*, presented at Autodesk University 2017 and updated for a presentation at BILT NA 2018.

SYMPTOM	CAUSES/DIAGNOSIS	THERAPY
File Open/Save/Sync/Interaction		
Slow Open	<ul style="list-style-type: none"> • The obvious, File size. Heavier the model the harder it is to get up and going • Loading Links. The number of links and size of the links affects the open times tremendously. • Under performing system hardware can lead to slow opens. Size of available ram and hard drive speed can have a large impact. • Inconsistent or slow network connection, i.e. WIFI, VPN or malfunctioning network equipment. • Opening to a complex, 2D/3D view. Doctor has seen that certain companies have completely bought into the Starting View feature; however, they used a Sheet with multiple 3D views as their starting view. This defeats the whole purpose of setting a simple view/sheet as your Starting View. Adding a lot of informational and standards content views on the Starting View sheet can be detrimental to the performance. • Unnecessary content in the model leads to obese model. Bloated families with complex imported geometrical content or unpurged content. 	<ul style="list-style-type: none"> • Come up with a better Model Breakdown Structure for the overall project to reduce individual file sizes. • Place each link its own workset and when creating the central file, select the option to Specify worksets on open. Control the number of open worksets that are relevant to the task at hand. • If possible, invest in appropriately specified hardware for the type of models being worked on. For older computers, increasing the ram, necessitated by max ram usage, and upgrading to an SSD hard drive can stretch the life of computer. • Avoid opening larger files over WIFI or slow VPN connections. Not only it locks up users of your model but also causes issues for the users working on the linked file being loaded. • Use the Starting View feature with limited dynamic information on the view. • Obesity is a major issue in the model, it also applies to families too. Two words: PURGE & COMPACT.
Crash when opening	<ul style="list-style-type: none"> • Corrupted Revit program files, Microsoft .NET version/installation corrupted, Add-ins, and more. • Recent Windows update • Corrupted model elements, corrupted families, Corrupted Add-in Schema data. 	<ul style="list-style-type: none"> • Repair Revit installation using Programs and Features • Repair / Reinstall .NET installation • Follow guidance provided in this document to help diagnose and eliminate corrupted model file data.

	<ul style="list-style-type: none"> • Corrupted local file • Corrupted local cache for BIM 360 projects. 	<ul style="list-style-type: none"> • Delete/Rename Local file and create new local. • Delete BIM 360 local cache and reopen model from BIM 360.
Inability to open	<ul style="list-style-type: none"> • Corrupt families. The common errors that users encounter are “Model is corrupt,” “Too many elements missing,” or Revit crashing upon opening. • Corrupt group instances. • Caused by an incomplete save in the previous session. • Truncated Revit file due to lack of disk space or network disconnection during previous sync. 	<ul style="list-style-type: none"> • Do not use CAD imports, especially avoid exploding the imports in the project and the family. • Reduce the use of model and detail groups. Avoid mirroring or adding Datum elements in groups.
Slow Syncs	<p>This is a tough one to crack sometimes as there are myriad of possibilities, and multiple at the same time. The list here can never be complete due to too many internal and external factors. This list captures the biggest culprits.</p> <ul style="list-style-type: none"> • File size. This is a given, the larger the file size the more data Revit will push through the network. • Number of active users in the model • Inconsistent network connection, defined as high latency >100ms, syncing on WIFI, or network infrastructure fault, will not only wreak havoc on the health of the model but will cause fatigue for the overall team. This results in the dreaded message “Central model is currently unavailable” for other members of the team. • File Server load, incorrect server settings, inadequate server hardware and many other nuances can trigger issues with syncing. Distributed file storage systems, cloud storage servers, and remote sync-based servers, in their sales brochures, may claim smooth and reliable performance. Based on Doctor’s extensive experience with these technologies, this is not the case especially working with Revit file server based worksharing technology. • Worksharing Update Frequency set to default 5 secs or any interval between 5-60 secs, will cause slowdowns especially when there are more team members accessing the central file. Revit writes multiple lines of data in the SLOG file causing slowdowns. This issue is extremely evident in distributed file systems. 	<ul style="list-style-type: none"> • Never sync on WIFI or VPN for larger size models with multiple users working in the model.

	<ul style="list-style-type: none"> • Not synchronizing syncs. Stepping on each other toes is never a good idea, and it applies to Revit too. As in real world, when exercising, team members must pay close attention to this issue, same is true in the world of Revit sync activities. On BIM 360 syncs, this leads to extreme cases of Irritable BIM Syndrome (IBS) for all team members. This is a huge team efficiency degrader on BIM 360. • Corrupt families and model elements will also affect the speed of syncs. • Obesity of the model as a result of higher than normal line styles, imported line patterns, fill patterns, text styles, materials, groups, CAD imports can also lead to slow sync. Unpurged items in the model. • Putting off syncing for long time >1 hr. with many users working on the model will lead to slow sync times as Revit has to consolidate all the changes from your file and the numerous updates to the central file. • For larger models >150MB and multiple users working simultaneously, having multiple views open, especially sheets with large number of views will cause huge delays as Revit updates each view every time it receives updated model elements from other users. 	
Inability to Sync, corruption when syncing or Crash when syncing	<p>The inability to sync, model getting corrupt or a model crash is often related to corrupted data in the model. Based on Doctor's experience a lot of them can be attributed to the items below.</p> <ul style="list-style-type: none"> • Using multiple builds of Revit model. • Software bugs, i.e. the infamous Sun and Shadow settings bug affecting certain Revit 2016 and 2017 builds. • Not running the latest build of Revit as some software bugs are typically squashed in the newer builds. • Family corruption. • Corrupted local model cache, especially in case of BIM 360. 	<p>Some of these items are explained in detail in the document.</p> <ul style="list-style-type: none"> • All users on the team must be on the same build of Revit, preferably the latest. This is not limited to just a single discipline model; it affects all other discipline models linked into the overall project. • Check for family corruption. Refer to the procedure described in the document. Better yet do not let it become a problem in the first place by not importing CAD files and exploding imported CAD files. Doctor has found that there is a connection between family corruption and CAD import exploding. • Perform the basic hygiene recommendations at a defined schedule mentioned in the document.

	<ul style="list-style-type: none"> · Neglecting basic hygiene of cleaning: Not emptying %TEMP% folder at least weekly; not cleaning Local cache for both BIM 360 & file based worksharing periodically; not creating new local daily. · Lack of available disk space as a result of the neglect · Inconsistent network connection (high latency >100ms, WIFI) 	<ul style="list-style-type: none"> · Watch the disk space carefully. Perform hygiene and / or invest in a bigger hard drive. · Never sync on a WIFI connection. For other network issues, get the IT team involved.
Crash on saving file	<ul style="list-style-type: none"> · A model that crashes altogether when saving is also often a sign of a corrupt family. · Add-ins may cause issues · Invalid geometry · Software bug · Lack of disk space 	<ul style="list-style-type: none"> ·
Crash when purging	<ul style="list-style-type: none"> · Often a sign of a corrupt family · Certain Model and Detail Groups being updated as a result of a purge · Invalid geometry 	<ul style="list-style-type: none"> ·
Add-ins	<ul style="list-style-type: none"> · Add-ins can be a great time-saver, making monotonous, repetitive tasks quick and simple. They can, at times, prevent the model from opening, through no fault of your own. Especially Add-ins monitoring user inputs (reactors). 	<ul style="list-style-type: none"> ·
Crash when editing element	<ul style="list-style-type: none"> · Often a sign of a corrupt family · Corrupt view element · Resultant geometry due to editing action. · Model or Detail group being affected by editing action resulting in an invalid group. 	<ul style="list-style-type: none"> · Perform the process to identifying corrupt families. · Review journal file for hints to identify the corrupt elements. · Delete the affected element · Ungroup or delete the Group · Verify Group has not been mirrored or contains Datum elements or constrained elements
Views		
Slow when opening or while zooming/panning	<ul style="list-style-type: none"> · Underpowered computer hardware, low performance Windows / video card power settings or out dated video card drivers. · CAD import and CAD links. CAD elements visible in views have a significant impact on the view refresh times. 	<ul style="list-style-type: none"> · Prior to chalking up the slowness to computer hardware, review windows power settings are set to at least Balanced and not Power Saver or Energy Star.

	<ul style="list-style-type: none"> • CAD files linked as model objects (Current view only unchecked), if not controlled correctly, become hidden gremlins in elevation, sections and detail views. These are not visible in the view to the naked eye, as they are hidden by the Level or Floor elements. • The higher the number of view elements from the host or from linked files, the slower the view refresh times. • Excessive use of Hide in view elements, override graphics in view. • Too many View Filters applied. • Complex geometry. • Overly detailed imported geometry from CAD, SketchUp, Rhino, etc. • Overuse of Custom visibility overrides for linked models. • Duplicate elements. • Duplicated instances of Revit links. 	<ul style="list-style-type: none"> • Resolve video card issues: update to latest drivers, review video card power settings. • In case of Hybrid video card (CPU chipset + discreet) set Revit to run utilizing discreet video card. Better yet, disable the CPU chipset based video card. • Avoid CAD imports, reduce CAD links. • Unload or remove unused CAD links. • When linking CAD files, link to current view only. Yes link, not import. Do not open all layers, either select visible layers, or selectively pick from the list. • When linking CAD files required to be loaded as a model object, place them on a separate user created workset with workset set to NOT Visible in All views. Same is true for Point Clouds. Control the visibility of the workset under Visibility Graphics setting of the view where it needs to be seen. Ignoring this advice will lead to extreme fatigue for all views in the model where the user forgets to turn off the CAD/Point Cloud under Visibility Graphics, especially for Elevation and Sections views. Plotting speeds and plotting fidelity is also affected. • Clean up CAD Links in native software, deleting, purging and auditing in the native software. In Revit, delete unneeded layers from the CAD link. • When linking Revit / IFC / Point Cloud Links place each of the links on its own workset. Verify the workset settings and set each workset NOT Visible in All views. • Unload Revit / CAD / IFC / Point Cloud Links when not needed for context for the present task. Refer to the Point Cloud topic • Utilize Visibility Graphics / View Templates to set view's overall detail level of Coarse, Medium and Fine. <ul style="list-style-type: none"> • Revit allows control of detail level for each category individually. • Sparingly use Custom visibility settings override for Revit links.
Failure to open or crash when opening a view	<ul style="list-style-type: none"> • Often a sign of a corrupt family. 	<ul style="list-style-type: none"> •

	<ul style="list-style-type: none"> • Room bounding elements causing room geometry to become invalid • Room bounding elements from Links set to room bounding • Color Fills applied to resulting invalid room geometry • Wall joins, Walls and Floor attachments may create invalid geometry. • Complex geometry. • Overly detailed or invalid imported geometry from CAD, SketchUp, Rhino, etc. • Corrupted view elements. Excessive use of Hide in view elements, override graphics in view can also cause view element corruption. • Corrupt annotative elements. Corrupt annotative family, detail lines, Color Fills, detail groups with 	
Visibility Graphics dialog slow or won't open	<ul style="list-style-type: none"> • When a dialog box such as Visibility Graphics won't open or Revit locks up or freezes, this is often an indication of too many line styles, line patterns, materials, or all above-mentioned. Revit appears to freeze due it trying to populate the dialog box with all the styles that are clogging the performance arteries of the model. It also affects visual performance when refreshing views. 	<ul style="list-style-type: none"> •
Issues with custom Crop Regions	<ul style="list-style-type: none"> • Custom shaped crop region boundaries, especially with curved elements will not only increase view refresh times but may result in unexpected print results and generation of excessively large PDF files 	<ul style="list-style-type: none"> •
Output		
Slow Plotting	<ul style="list-style-type: none"> • Review all the items mentioned under "Slow when opening views" as they apply here verbatim. • Extremely slow plotting. • • 	<ul style="list-style-type: none"> • A quick way to improve 2D view/plotting performance is to make the 3D geometry hidden in 2D views and represented the plan & elevation views using symbolic lines. • When plotting multiple sheets, switch to a simple Starting View or drafting view and close all other views and sheets. • For PDF printing verify that the PDF driver works well with Revit. • Check printer/plotter drivers and settings.

		<ul style="list-style-type: none"> • It is typically caused by overly stuffed, highly detailed or improperly modeled geometry in families. When Printing, Plotting or Exporting, the system gets pipeline gets constipated with the sheer amount of faces, edges and vertices to process. This improper family creation technique can be seen where 3D geometry is not turned off for plan views and the object's display is not shown through the use of Symbolic Lines. The Doctor's pet peeve, imported 3D geometry, is also a leading cause of this problem. •
Crash when Plotting	<ul style="list-style-type: none"> • Review Crash when opening views section 	<ul style="list-style-type: none"> • If crash is related to printing to a PDF, try printing to an actual printer or another PDF driver. • If crash occurs when printing multiple sheets, identify if the crash is related to a specific sheet. Print sheets individually or remove the offending sheet from the batch. •
Output infidelity	<ul style="list-style-type: none"> • If objects are missing or parts of the drawing are missing. • Line weights are incorrect • Filled regions are missing or partially missing. Have incorrect scale or does not match the visual representation. • Text sizes are incorrect. 	<ul style="list-style-type: none"> • Try printing using raster mode, even though not ideal. Complex fill patterns, overlapping
Links		
Raster Images	<ul style="list-style-type: none"> • Images, such as renderings, when saved to the project model add a lot of unnecessary baggage and can increase the file size tremendously. 	<ul style="list-style-type: none"> • Whenever possible save the rendered images to a shared project folder rather than the active project model. • Purge to remove unplaced Raster Images/Decals • Use Manage Images command to remove unneeded images.
Revit Links	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Unload Revit Links not needed for current task. Set your central file open option to Specify (worksets) • Manage worksets in Links to reduce objects visible in views, and to improve Link load times.

		<ul style="list-style-type: none"> · Detail levels (in Revit Links) Consider lowering the level of detail in linked models. For example, if you're working in a MEP or Structural model, lower the detail level of linked architectural models to 'coarse'. Rarely is it necessary to see all the fine details of an architectural model, such as the individual layers that make up a wall style, the complete door jamb, or the ornate detailing of a light fixture. Likewise, if you're working in a structural or architectural model, it may not be necessary to see all mechanical systems as double-line objects. Single-line piping and ductwork may be enough.
Rooms	·	<ul style="list-style-type: none"> · To Reduce file size: <ul style="list-style-type: none"> · Delete unused Rooms · Turn of Area and Volume Computation
Areas	·	<ul style="list-style-type: none"> · Delete unused Areas to reduce file size · Delete unneeded Area Schemes
Spaces	·	<ul style="list-style-type: none"> · Delete unused Spaces to reduce file size
Arrays	· Use arrays to copy and associate objects together.	<ul style="list-style-type: none"> · After an array deploys, ungroup the arrayed objects to remove their parametric associations. Alternatively, you can deselect Group and Associate in the Options bar when you create the array.
Walls	· Walls should not extend through many levels. This design can cause relationships between levels that can significantly increase the time needed to update the model.	<ul style="list-style-type: none"> · Review Warning related to walls and mitigate overlapping, off axis and wall join issues.
Design Options	<ul style="list-style-type: none"> · Unused Design Options create bloat. · Walls joins through the Design options cause slowdowns. 	<ul style="list-style-type: none"> · Remove unneeded design options. This will reduce the size of the file increasing performance.
Analytical model	· Architectural, Interiors, and other trades using Structural elements and not turning off the analytical model causes slowdowns and bloat.	<ul style="list-style-type: none"> · Turn off Structural analysis under the Revit options > User Interface section.
Constraints in project	· Great feature in Revit to be able to maintain relationship between elements. If used un wisely will cause constant errors and performance hits. Revit has to always check and make sure all the constraints are met.	<ul style="list-style-type: none"> · Use constraints sparingly when designing your model. · Minimal constraints help to prevent the following: Errors in which elements cannot stay joined when moved. · Workset sharing issues in which you unknowingly take ownership of a project elements causing slowdowns.

		<ul style="list-style-type: none"> · Never constrain elements to elements in Links.
In-place families	<ul style="list-style-type: none"> · Creates project bloat. 	<ul style="list-style-type: none"> · Limit in-place families only for system families that cannot represent the special condition for the project. A justifiable use would be creating a barrel-vaulted ceiling, etc.
Railings	<ul style="list-style-type: none"> · In some conditions, they can crash the model. 	<ul style="list-style-type: none"> · Review Warnings and try to mitigate the errors related to railings.
MEP elements	<ul style="list-style-type: none"> · Pipe connectors that are haphazardly placed in a family without any consideration for direction of flow or system classification can cause major discomfort when trying to model a piping system. 	<ul style="list-style-type: none"> · Poorly modeled mechanical and piping equipment are one of the leading contributors to model. · Connectors with no sense of direction can essentially “clog” the analytical arteries of a project. To make sure this doesn’t happen you have to be aware of the correct direction of flow – out to in, in to out. For an excellent resource on how to properly create MEP families with connectors, be sure to check out David Butts’ Autodesk University 2018 lab titled “Perfecting Piping and Duct Systems in Revit”.
Warnings	<ul style="list-style-type: none"> · This is the models ‘blood test’. · The actual number of warnings may not be the correct health measure, however higher the number, the less hygienic the model. · Certain warnings have higher impact on the model health and fatigue. Overlapping room separation lines, overlapping walls, duplicate items in the same place, to name a few. 	<ul style="list-style-type: none"> · Refer to the detailed Warnings topic for information
CAD Imports	<ul style="list-style-type: none"> · Model corruption · Plots missing elements, slow plots. · View zoom, pan, refresh performance lagging 	<ul style="list-style-type: none"> · Don’t. Use. CAD Imports! Ever!! PERIOD! I forgot to say NEVER EVER!! · If you did import CAD, DO NOT EXPLODE it in the active project. Refer to Importing CAD guidelines · Unload unused CAD Links. ·
Groups	<ul style="list-style-type: none"> · The number of Groups (Model / Detail) can cause severe fatigue. · If you want to poison a model, go ahead and include Datum Objects in Groups and start Mirroring Groups in the project. 	<ul style="list-style-type: none"> · It is highly recommended to include the hosting elements as part of the same group. This will reduce the issues of Excluded objects thus improving accuracy. · Reduce the use of model and detail groups. · Avoid mirroring or adding Datum elements in groups. · Ungroup Array groups which may not be needed.

Dysfunctional Families	<ul style="list-style-type: none"> • Poorly modeled and overly detailed families are a major contributor to model fatigue, especially when it comes to view refresh and printing. • Families with multilevel nesting • Complex geometry • Multiple parametric relationships • Excessive constraints • Inability to edit a family. Any time you receive a message stating “Cannot edit family”, that’s a definite red flag that something is wrong with your model. 	<ul style="list-style-type: none"> • Simplify, don’t over parametrize family’s controlling parameters • Avoid nesting families more than two deep. • Use symbolic lines and masking regions and turn off 3D geometry in Plan & Elevation views, for plan views and NEVER EVER import a 3D DWG into a family and try to pass it off as “a Revit family”. • DO NOT use imported CAD 2D or 3D elements. For 2D elements follow the procedure explained in the document to convert 2D CAD elements into Revit annotative elements. Review existing library and project families for these obese and cancerous elements. • When encountering the “Cannot edit family,” take IMMEDIATE ACTION to identify corrupt families and replace them with good copies from backup or remove them completely. It is a cancerous element in the project and Ignoring this warning will lead to a model’s death. • Purge and Audit families in the company library and project. • When downloading manufacturer families, highly vet them to make sure it does not contain unpurged elements, CAD entities, multi-level nesting, and overly complex geometry.
Point Cloud	<ul style="list-style-type: none"> • Extremely slow loading • Extremely slow view open and refresh. • Running out of memory 	<ul style="list-style-type: none"> • Using ReCap to break up the point cloud into small sections. • Decimate the point cloud in ReCap. Based on your use in Revit, a decimated file performs well. Using a 10-15mm decimation would be fine for simple coordination and using it as a context for verification. • Do not link the point clouds from a server location. Utilize the functionality in Revit for pointing to a local hard drive location to access point cloud files. This combined with decimation can really improve the efficiency. For higher density files this works well too. • Place point clouds on separate worksets and make these workset <i>Not visible in all views</i>. • Close point cloud worksets when not required for context or modeling.
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BIM 360

Slow processing of sheets	<ul style="list-style-type: none"> Extremely slow performance when publishing views and sheets. 	<ul style="list-style-type: none"> Control Sheets/Views that you publish under Collaborate > Publish Settings tab in Revit.
	<ul style="list-style-type: none"> Unexplained crashes and anomalies with Links. 	<ul style="list-style-type: none"> When collaborating on Revit models hosted on BIM 360 in Project Files, not under Plans section.

Reducing Obesity		
Purge	<ul style="list-style-type: none"> Hit the heavy hitters 	
Duplicate Elements	<ul style="list-style-type: none"> It's the unnecessary fat in the model. 	<ul style="list-style-type: none"> Utilize the Warnings dialog and look for the warning "There are identical instances..." and "Highlighted Floors overlap.." to quickly go through the elements and select the unneeded ones.
Single instance Groups	<ul style="list-style-type: none"> Having too many groups in the project will have negative impact on the project. Especially having a single instance of the group. 	<ul style="list-style-type: none"> Ungroup and purge out to reduce bloat in the project
Secret internal Arrows	<ul style="list-style-type: none"> Un-purgeable Arrows Based on the Doctor's team experience, they manifest themselves when CAD instances are imported and exploded. They may appear in the Purge unused dialog, under Arrows, but cannot be purged. Another sign of the arrows are extra linear dimension styles in the project. All these add bloat to the project. These arrows are a sign of an unhealthy model. <p>https://autode.sk/2TX5wUQ</p>	<ul style="list-style-type: none"> Since they are a sign of an un-healthy model, check for these in the model that are performing slow, having sync issues, or corrupt. Can be removed from the model using Dynamo script provided in the link

