

Revit API Events, the Forgotten Power

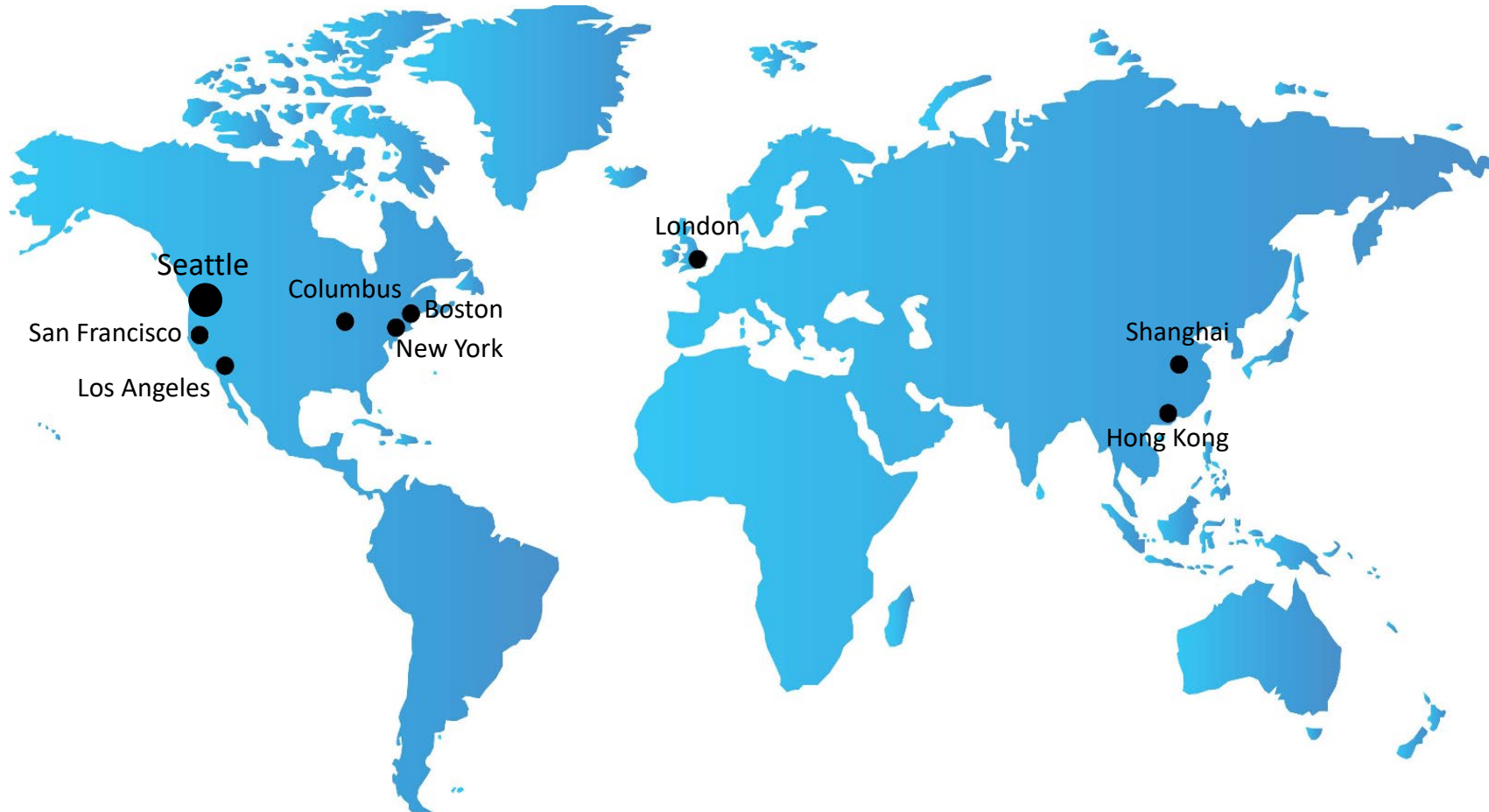
Dan Tartaglia

BIM Platform Leader

nbbj



nbbj



Session Description

This is a very powerful ability in custom Add-Ins you have had access to in the Revit API for years but how many companies take advantage of their power? In this presentation we will look at a number of examples and show the huge value these events have.

Learning Objectives

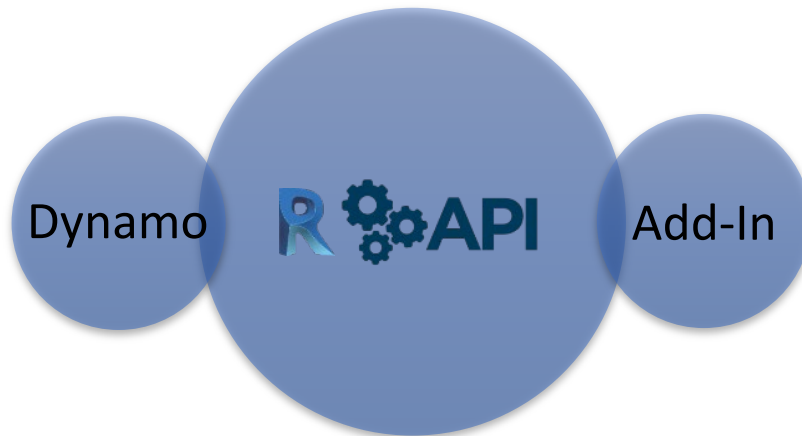
At the end of this session, participants will be able to:

1. Learn what the Revit API is and what Revit API Events are
2. Learn where you can find resources and support to learn how to create Revit Add-Ins
3. Demonstrate a number of example Add-Ins using Revit API Events and discuss their value
4. Step through the code to understand how Revit API Events work in real-time

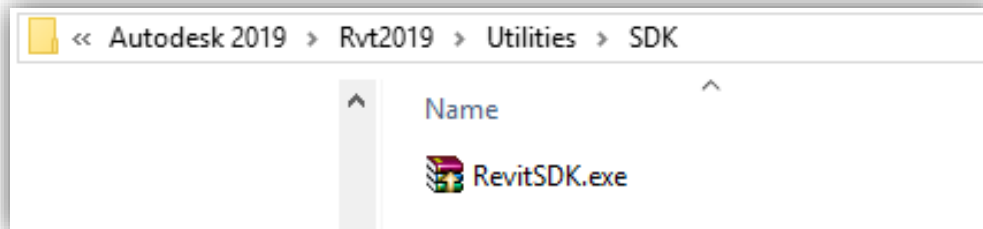
Quick Survey:



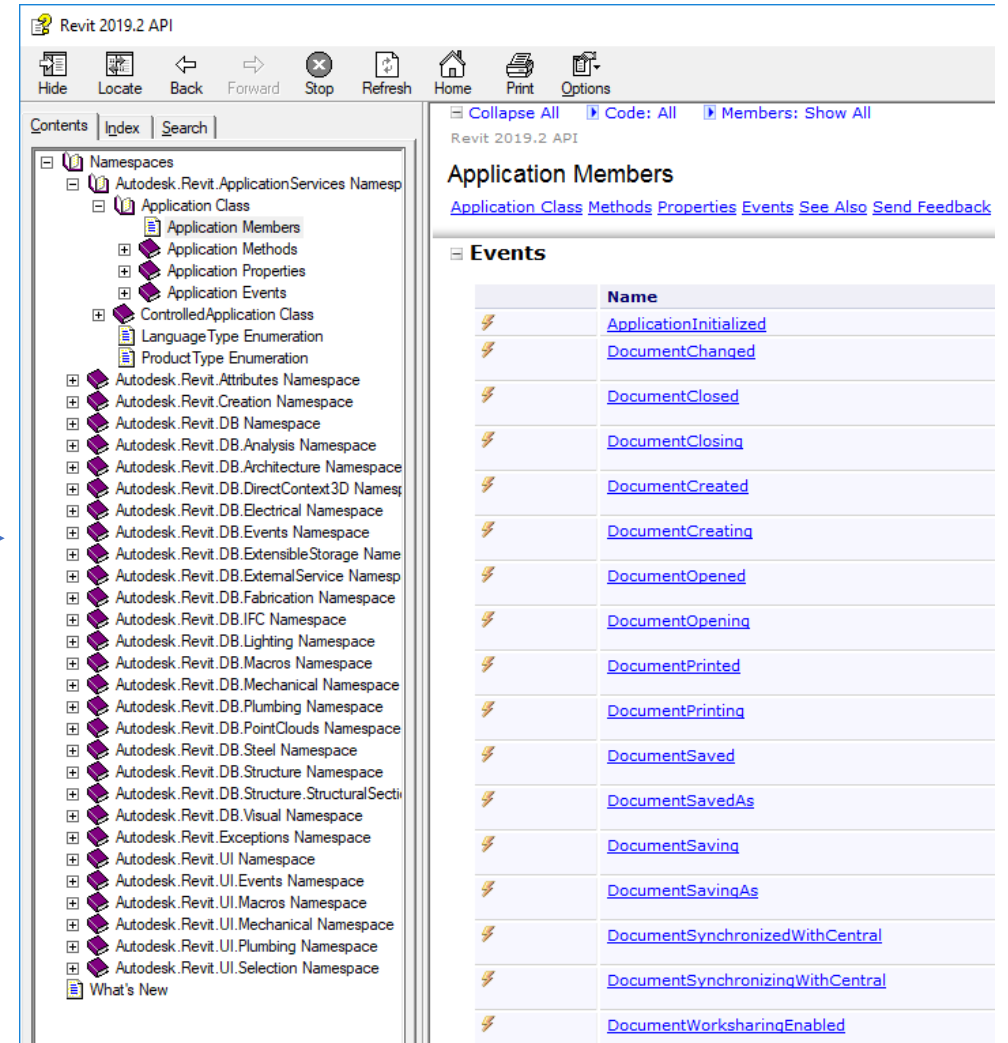
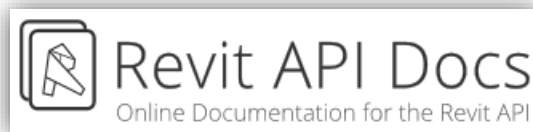
What is the Revit API?



Install the Software Developer Kit (SDK) to get the Samples, RevitAPI.chm and more



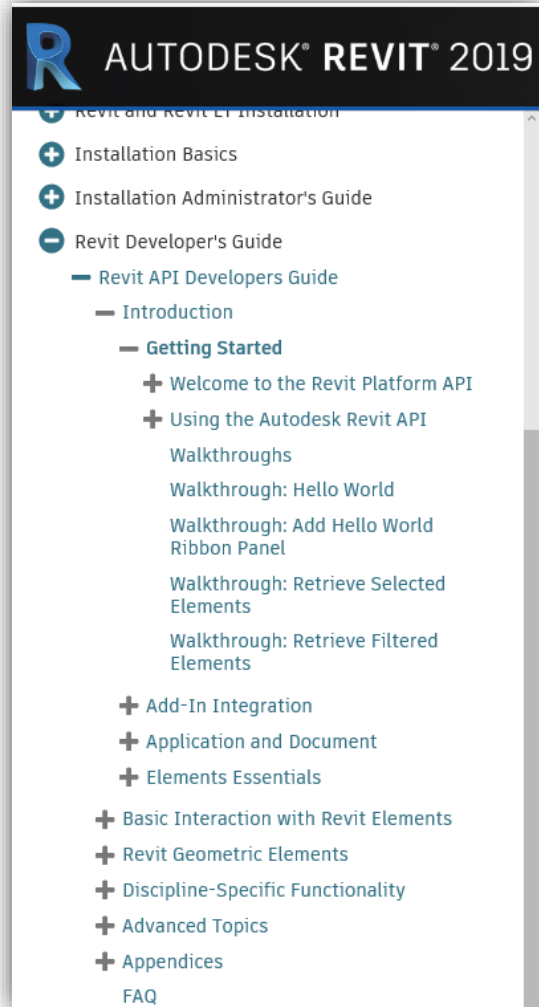
<http://www.revitapidocs.com/>



Learning and support for Revit Add-Ins:

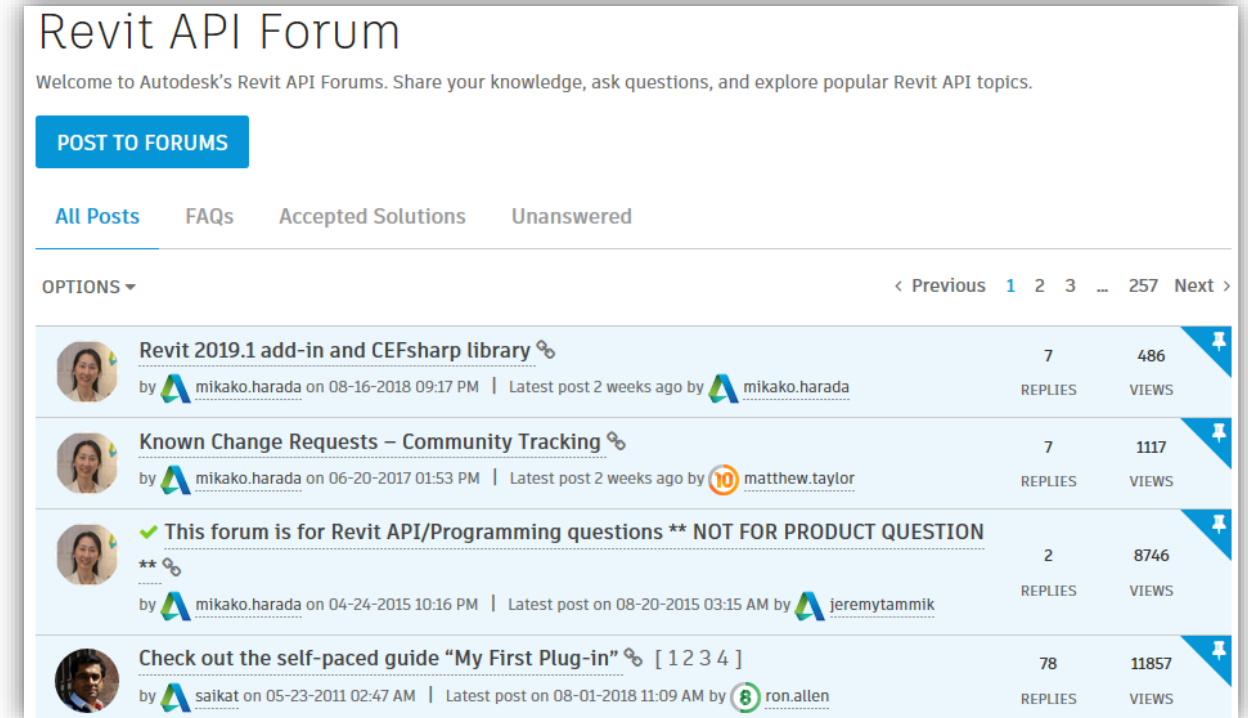
Revit on-line help file

<http://help.autodesk.com/view/RVT/2019/ENU/>



Revit API Autodesk Community

<https://forums.autodesk.com/t5/revit-api-forum/bd-p/160>



The Building Coder

<http://thebuildingcoder.typepad.com/>



What are Revit API Events?

Hook Functions



DocumentOpening()

ViewPrinting()

DocumentClosing()

DocumentChanged()

What are Revit API Events?

Quick look into how Events work

Register the below events:

```
application.ControlledApplication.DocumentOpening += new EventHandler<DocumentOpeningEventArgs>(DocumentOpeningEvent);  
application.ControlledApplication.DocumentOpening -= new EventHandler<DocumentOpeningEventArgs>(DocumentOpeningEvent);
```

Un-register the below events:

DialogBoxShowing()
DocumentOpening()
DocumentOpened()
ViewActivating()
ViewActivated()
DocumentChanged()
DocumentSaving()
DocumentSaved()
DocumentSynchronizingWithCentral()
DocumentSynchronizedWithCentral()
DocumentClosing()
DocumentClosed()

DialogBoxShowing()
DocumentOpening()
DocumentOpened()
ViewActivating()
ViewActivated()
DocumentChanged()
DocumentSaving()
DocumentSaved()
DocumentSynchronizingWithCentral()
DocumentSynchronizedWithCentral()
DocumentClosing()
DocumentClosed()

Application Add-In
Revit Starts Up



Workshared RVT
File Open



File Changed



File Saved



File Synchronize with Central



Revit Close



OnStartup()

DialogBoxShowing()
DocumentOpening()
ViewActivating()
ViewActivated()
DocumentOpened()

DocumentChanged()

DocumentSaving()
DocumentSaved()

DialogBoxShowing()
DocumentSynchronizingWithCentral()
DocumentSynchronizedWithCentral()

DocumentClosing()
DocumentClosed()
OnShutdown()

- Application Add-In = Typical loads when Revit starts
- Command Add-in = Starts when activated then stops

What are the Revit API Events?

Application Class Autodesk.Revit.DB.Events Namespace Assembly: RevitAPI.dll

- ApplicationInitialized()
- DocumentChanged()
- DocumentClosed()
- DocumentClosing()
- DocumentCreated()
- DocumentCreating()
- DocumentOpened()
- DocumentOpening()
- DocumentPrinted()
- DocumentPrinting()
- DocumentSaved()
- DocumentSavedAs()
- DocumentSaving()
- DocumentSavingAs()
- DocumentSynchronizedWithCentral()
- DocumentSynchronizingWithCentral()
- DocumentWorksharingEnabled()
- ElementTypeDuplicated()
- ElementTypeDuplicating()
- FailuresProcessing()
- FamilyLoadedIntoDocument()
- FamilyLoadingIntoDocument()
- FileExported()
- FileExporting()
- FileImported()
- FileImporting()
- LinkedResourceOpened()
- LinkedResourceOpening()
- ProgressChanged()
- ViewExported()
- ViewExporting()
- ViewPrinted()
- ViewPrinting()
- WorksharedOperationProgressChanged()

IExternalDBApplication Interface Autodesk.Revit.DB Namespace Assembly: RevitAPI.dll

- OnStartup()
- OnShutdown()

UIApplication Class Autodesk.Revit.UI Namespace Assembly: RevitAPIUI.dll

- **DialogBoxShowing()**
- DisplayingOptionsDialog()
- DockableFrameFocusChanged()
- DockableFrameVisibilityChanged()
- FabricationPartBrowserChanged()
- FormulaEditing()
- **Idling()**
- TransferredProjectStandards()
- TransferringProjectStandards()
- ViewActivated()
- ViewActivating()

IUpdater Interface Autodesk.Revit.DB Namespace Assembly: RevitAPI.dll

- Description: capable of reacting to any change in the Revit model

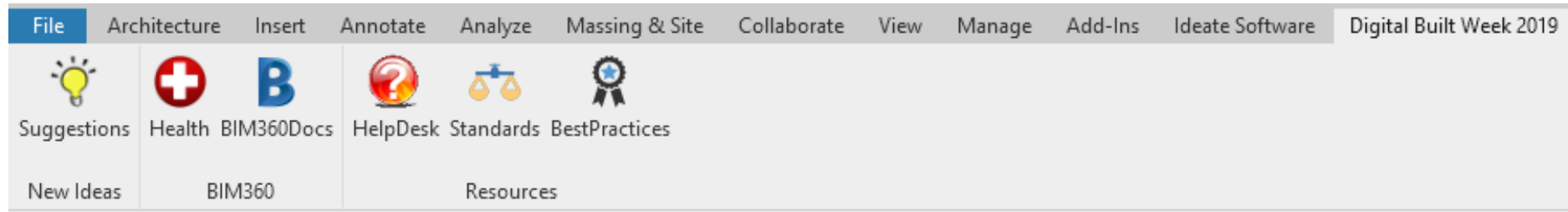


When
you have exhausted
all possibilities,
remember this:
You Haven't..

Quote by Thomas Edison

Simplest use of Revit Events but very valuable:

Ribbon Tab Example



- Uses the Revit API Event:
 - *OnStartup()*

My general categories using Revit API Events:



Model Health &
Performance



Promote Best Practices



Data Mining



Batch Processing

Model Health & Performance Example:

Revit Notification Tool



- **Allows to immediately address an issue that may prevent project work or effect Revit performance**
- Uses the Revit API Events:
 - *OnStartup()*
 - *DocumentOpening()*
 - *DocumentOpened()*
 - *DocumentClosing()*

Model Health & Performance Example:

Revit Notification Tool

Opened Central File?



Opened Over WAN?



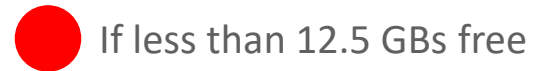
Wi-Fi Enabled?



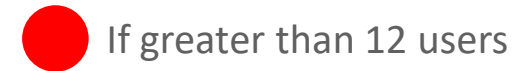
Available RAM:



Free HD Space:



Num Users in Model:



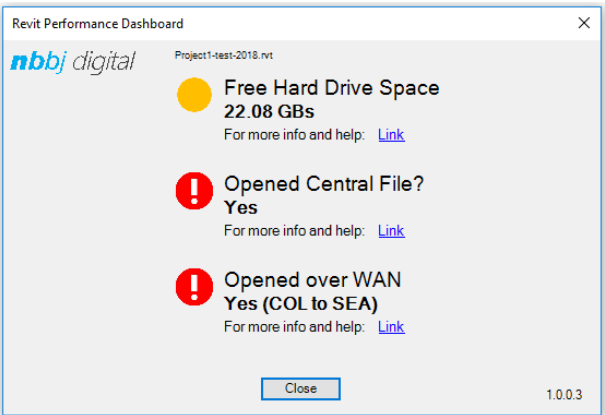
Model Health & Performance Example:

Revit Notification Tool

Notification is shown to user in System Tray with icon



Opens for user if notification or icon is clicked




Email is sent to the Studio BIM Lead and BIM Support if issue is: Red

All Unread	
FROM	SUBJECT
Liou Date/Time:	Revit Performance Issue Detected - Liou - COL55 - Status: Red

Model Health & Performance Example:


Revit Notification Tool



Arash Read Message

Kevin Read; Scott Read; Markus Read; Dan Tartaglia Read

Revit Performance Issue Detected - Arash Read Message - ADM00 - Status: Red

 This message was sent with High importance.

Date/Time:
2/13/2018 1:53:29 PM

User Name:
Arash Read Message

Computer Name:
DESKTOP-12345678

Revit Version/Build:
Autodesk Revit 2018 / 20170927_1515(x64)

Central File Full Path:
\\server\project\BIM\Project\Design\1 - Autodesk\1 - Model\BIM\18.v18.rvt

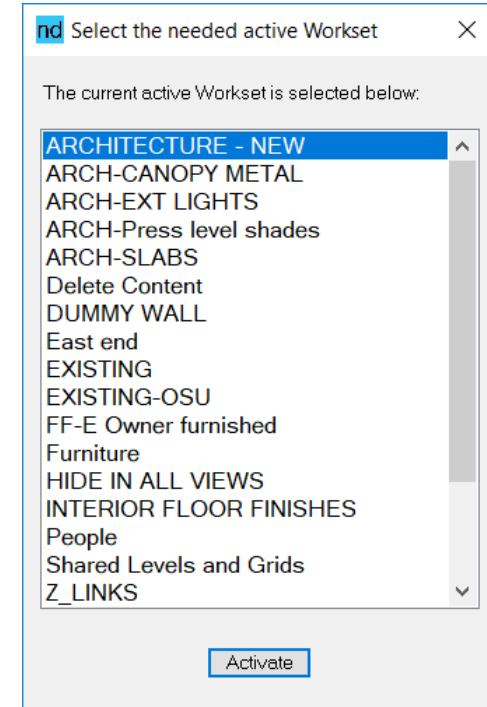
Issue(s) Found:
Red:
Opened Central File?
Yes
Orange:
Users in the Model
10 Users

Promotes Best Practices Example:

‘Best Practices Example 01’ Tool



- Reminds the user to specify a Workset when a model is opened
- Uses the Revit API Event:
 - *OnStartup()*
 - *DocumentOpened()*

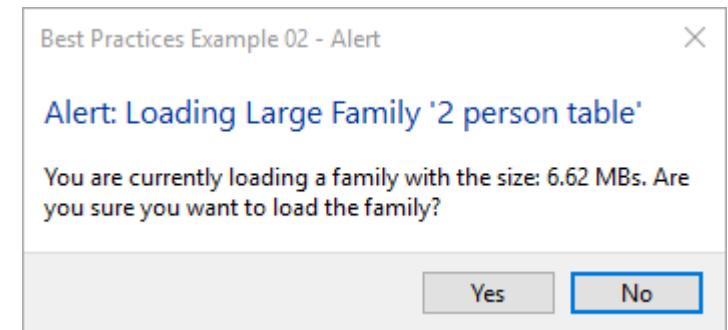


Promotes Best Practices Example:

‘Best Practices Example 02’ Tool



- **When a family is loaded in the model:**
 - Warns the user if the family is larger than 3 MBs, gives the chance to cancel
- Uses the Revit API Event:
 - *OnStartup()*
 - *FamilyLoadingIntoDocument()*



IUpdater Interface:

Capable of reacting to changes in the Revit model

DocumentChanged() Event versus iUpdater (Dynamic Model Updater)

Source: *The Building Coder*:

<https://thebuildingcoder.typepad.com/blog/2012/06/documentchanged-versus-dynamic-model-updater.html>

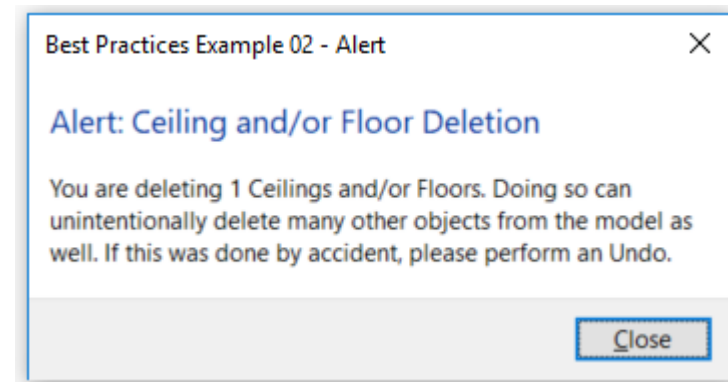
- The *DocumentChanged* event can perform a somewhat similar ability but can the disadvantages:
 - It reacts erroneously when a family is loaded
 - Its performance is suboptimal
- The *IUpdater Interface* reacts only to certain well-defined modifications on a certain well-defined set of elements

Promotes Best Practices Example:

'Best Practices Example 03' Tool



- Warns the user if a ceiling or floor is deleted
- Uses the Revit API Interface:
 - *OnStartup()*
 - *IUpdater Interface*

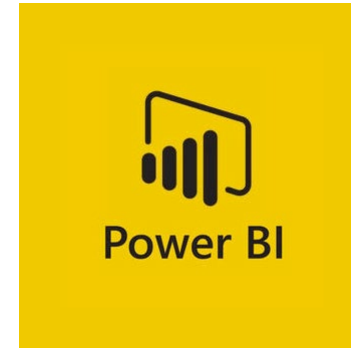


Data Mining Example:

'Extracting Data from Revit' Tool



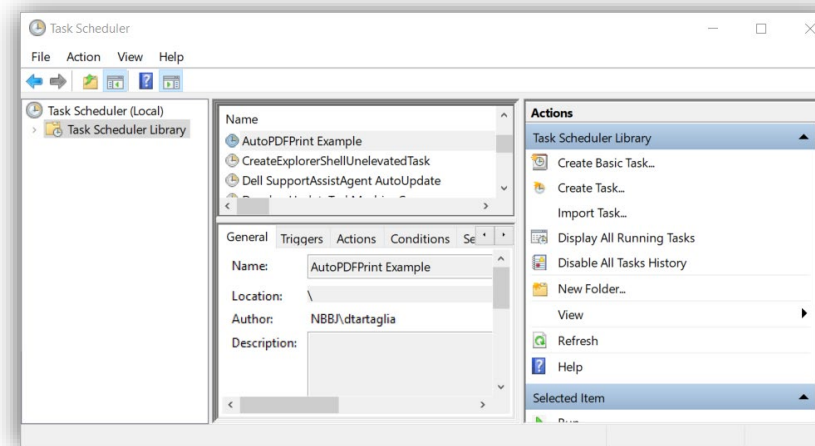
- Automatically extracts data from every Revit user
- Uses the Revit API Events:
 - *OnStartup()*
 - *DocumentOpening()*
 - *DocumentOpened()*
 - *DocumentSaving()*
 - *DocumentSaved()*
 - *DocumentSavingAs()*
 - *DocumentSavedAs()*
 - *DocumentSynchronizingWithCentral()*
 - *DocumentSynchronizedWithCentral()*
 - *DocumentClosing()*
 - *DocumentChanged()*
 - *ItemExecuted()*
 - **Windows *Timer.Elapsed Event()***



Batch Processing Example: 'Automatic Printing to PDF' Example

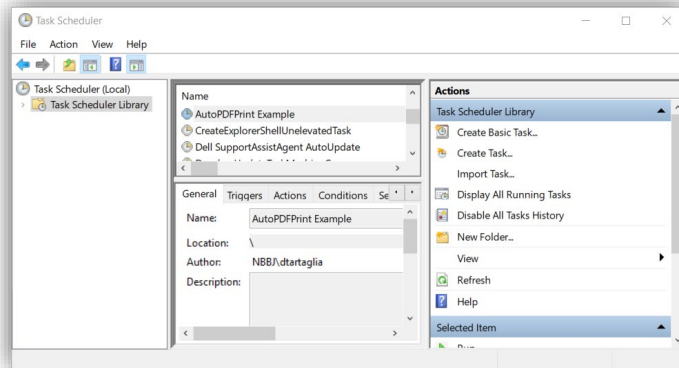


- Using the Windows Task Scheduler and Revit to schedule printing to PDF
- Uses the Revit API Events:
 - *OnStartup()*
 - *Idling()*
 - *DialogBoxShowing()*



Batch Processing Example: 'Automatic Printing to PDF' Example

Windows Task Scheduler



Specify the config file containing:

- Sheet Set Name
- Print Set Name
- File Name
- Output folder for PDFs

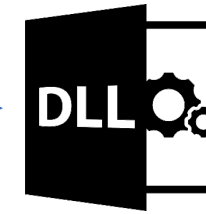
AutoPDFPrint_Bridge.exe



Copies config file to
temp folder, launches Revit



AutoPDFPrint.dll



Uses Idling() event to open
model and print to PDF
as per config file



Close Revit

Summary:



REMINDER

Speaker and Session Feedback is Appreciated

1. Go to *Sessions*
2. Select this Session
3. Select *Session Rating*



REMINDER

**Session materials are available on the
Conference App**

(all the code examples will be up there later this week)



Visit me at the Speaker Lounge

I will be at the **Speaker Lounge** outside the Exhibition Hall for further conversations. Please join me there at this time:

Friday July 19th Afternoon Tea (4:15pm – 4:45pm)

Saturday July 20th Morning Tea (10:15am – 10:45am)



Questions?

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