Automation Workflows with the Forge Design Automation API for Revit

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Sr. Product Manager, Revit Platform + Services

AUTODESK. UNIVERSITY

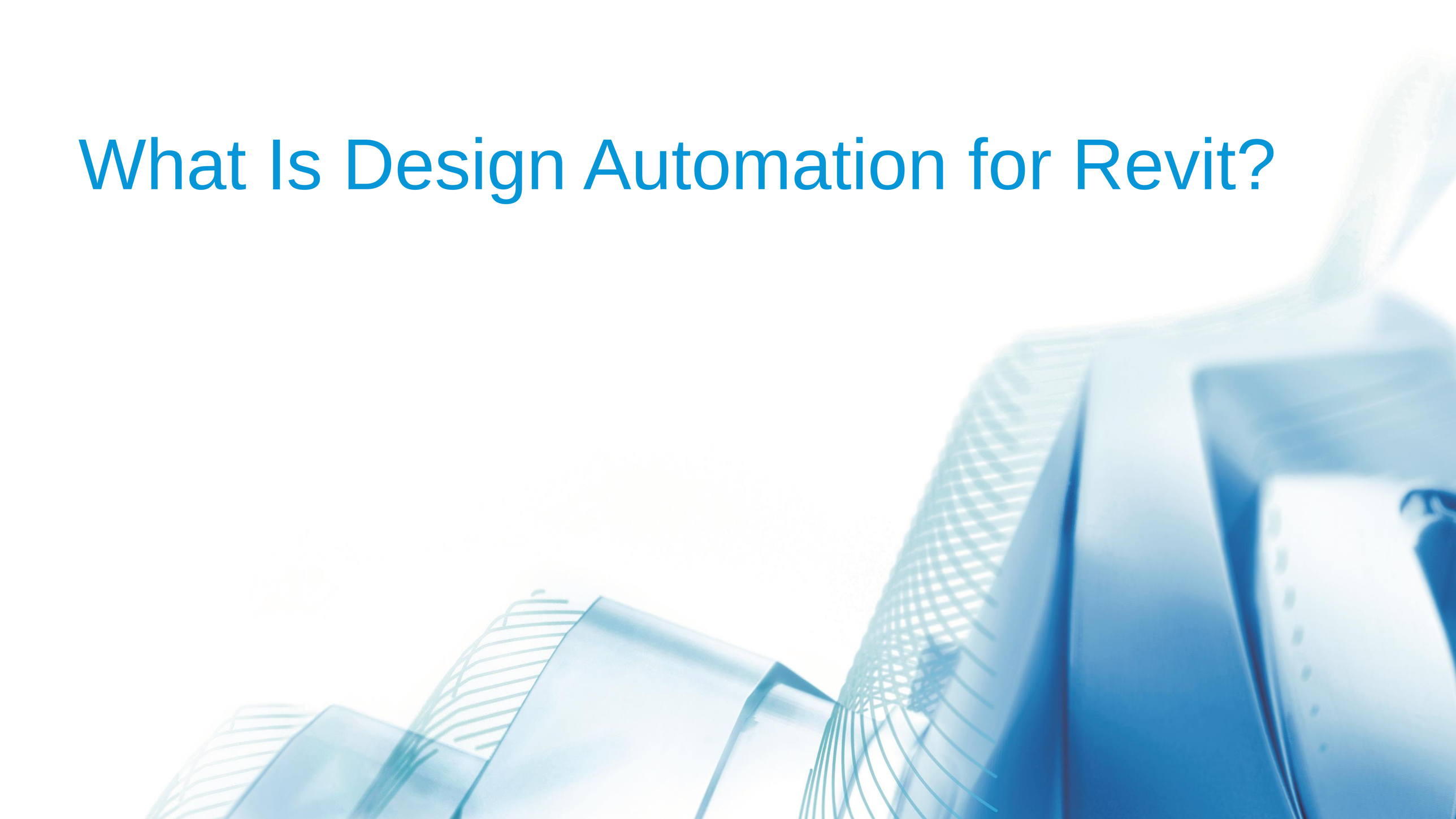
We may make statements regarding planned or future development efforts for our existing or new products and services. **These statements are not intended to be a promise or guarantee of future availability of products, services or features** but merely reflect our current plans based on factors currently known to us. These planned and future development efforts may change without notice. **Purchasing decisions should not be made based upon reliance on these statements**.

We assume no obligation to update these forward-looking statements to reflect events that occur or circumstances that exist or change after the date on which they were made.

Agenda

- What Is Design Automation For Revit?
- Workflows
- Roadmap
- Getting Started
- Panel Discussion

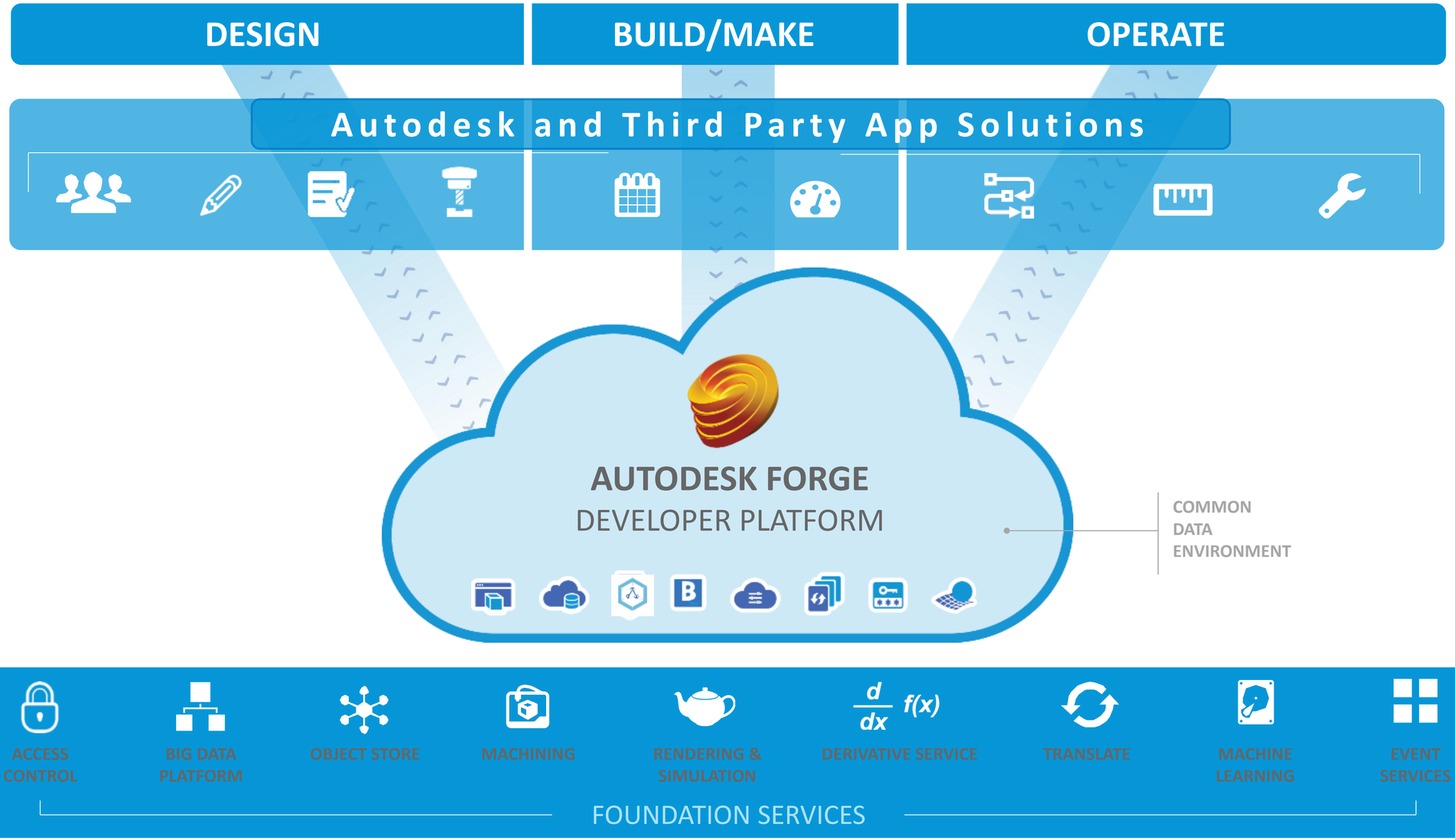
What Is Design Automation for Revit?




MORE | BETTER | LESS
MORE | BETTER | LESS
MORE | BETTER | LESS


FORGE

The Forge Ecosystem

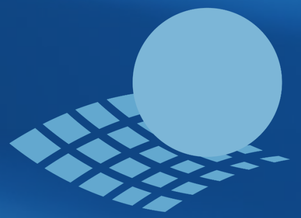


Data Management API

BIM 360 API

Webhooks API

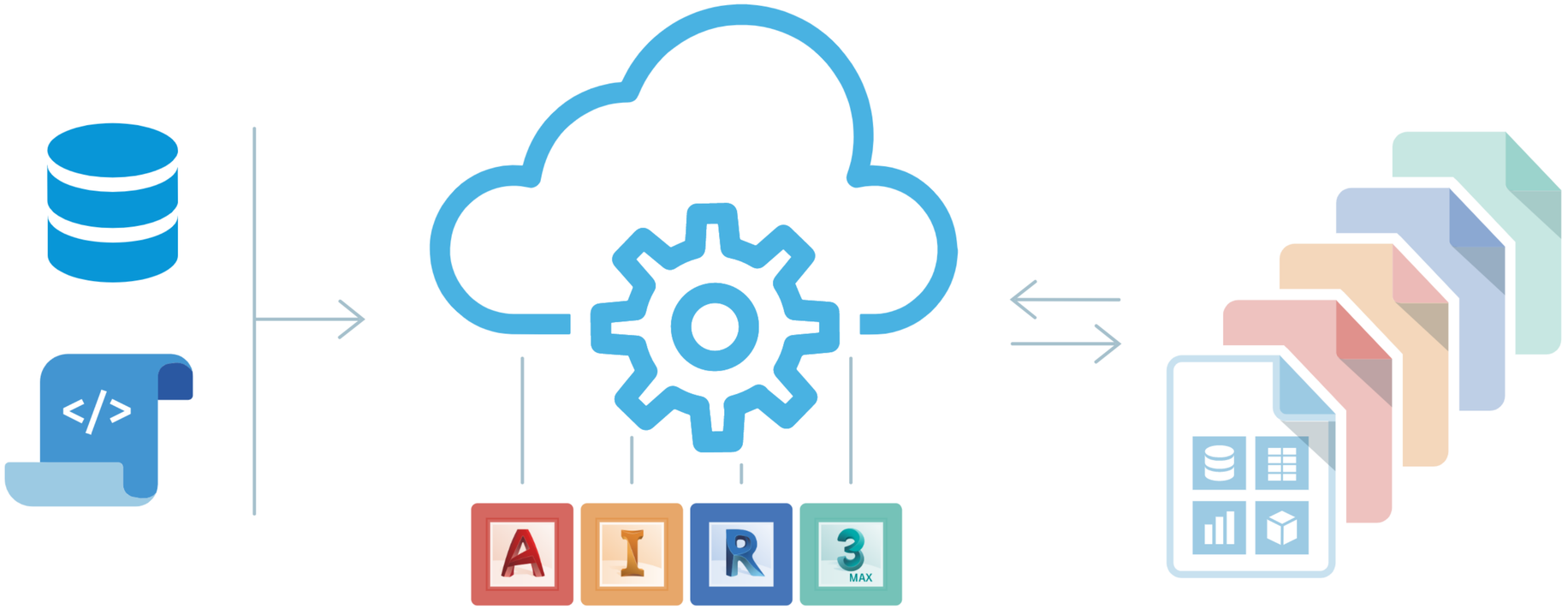
Model Derivative API & Viewer



Reality Capture API

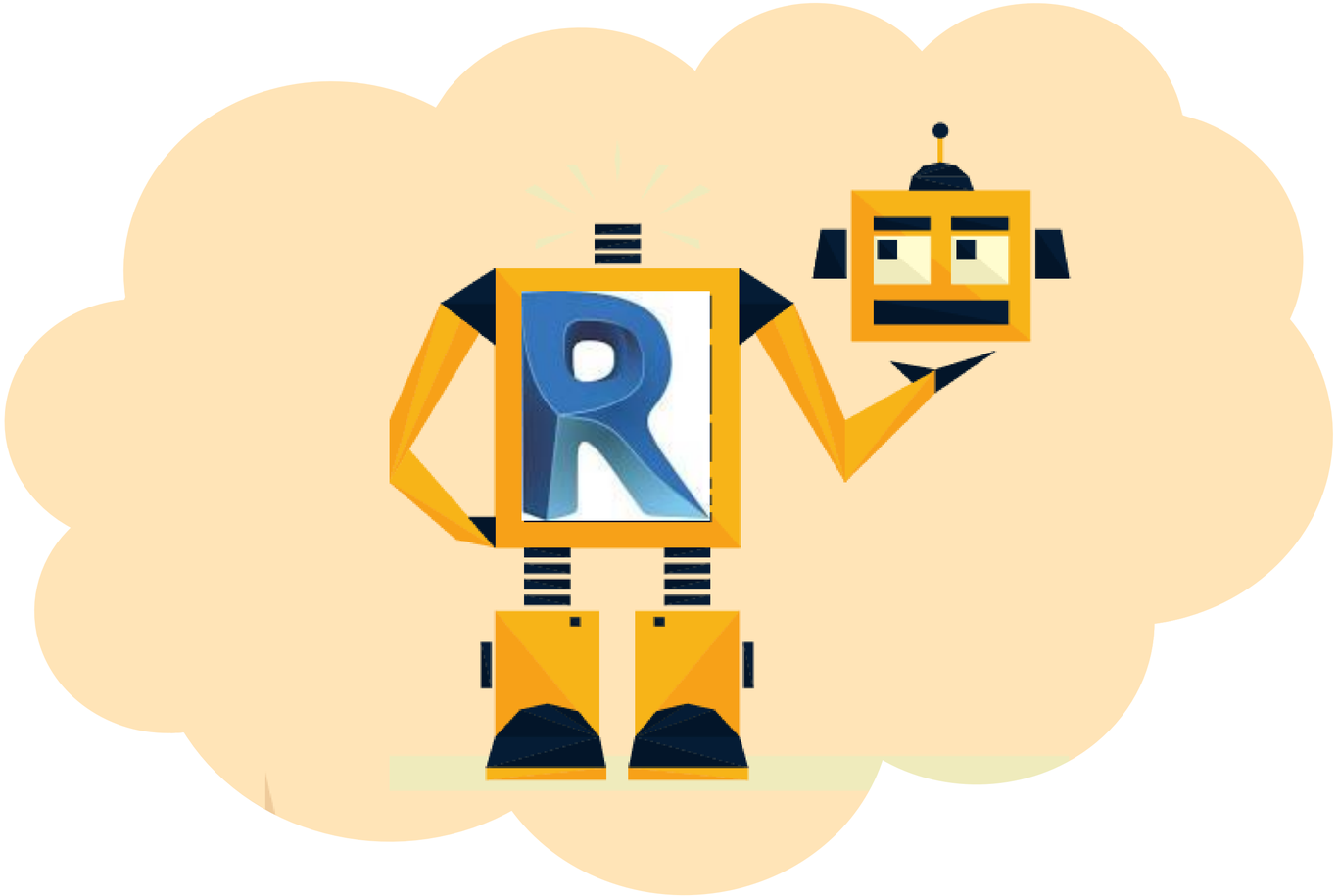
Design Automation API

The Forge Design Automation API



Enables batch processing access to
Autodesk product engines

Revit’s API, Now In The Cloud

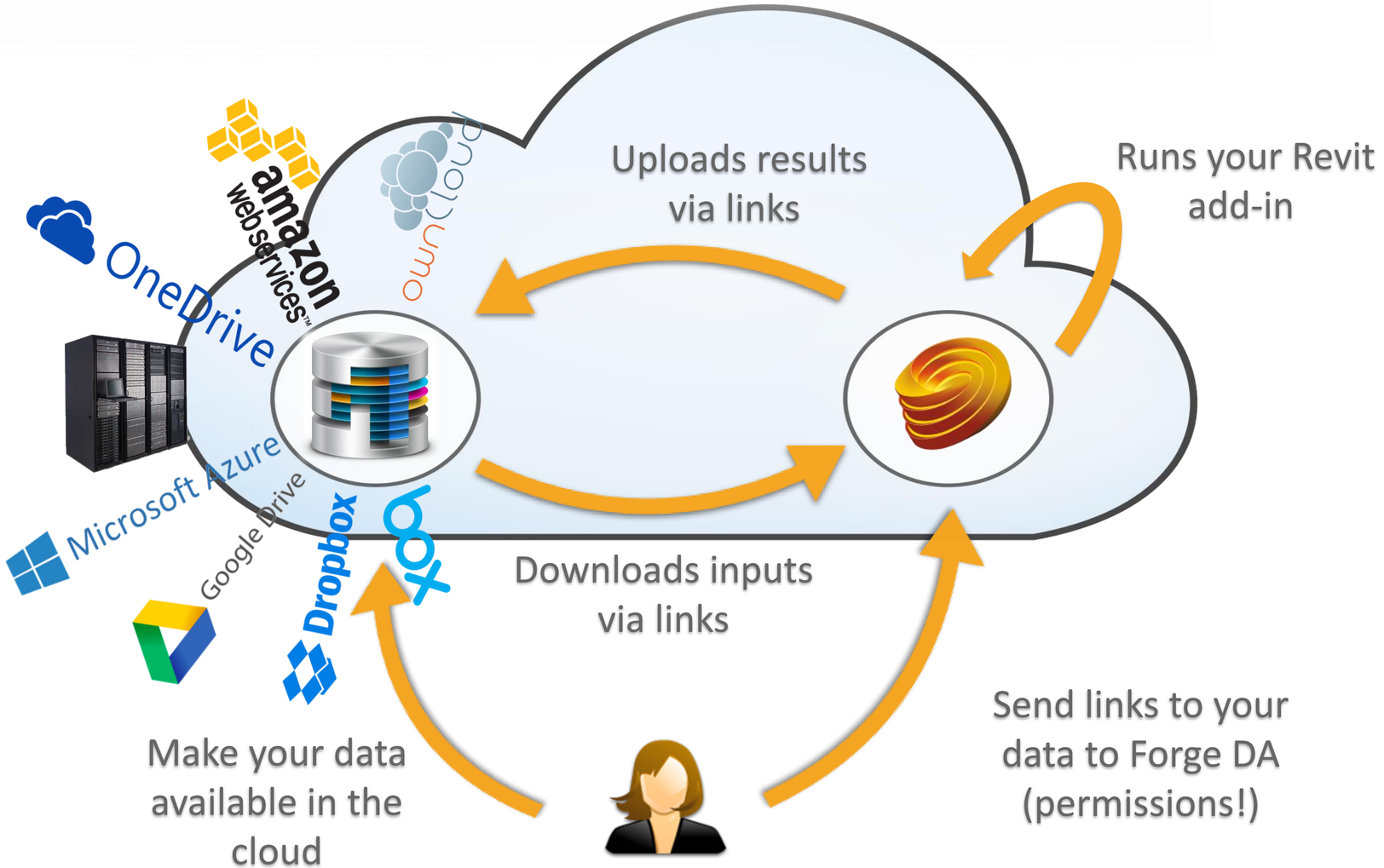


Details

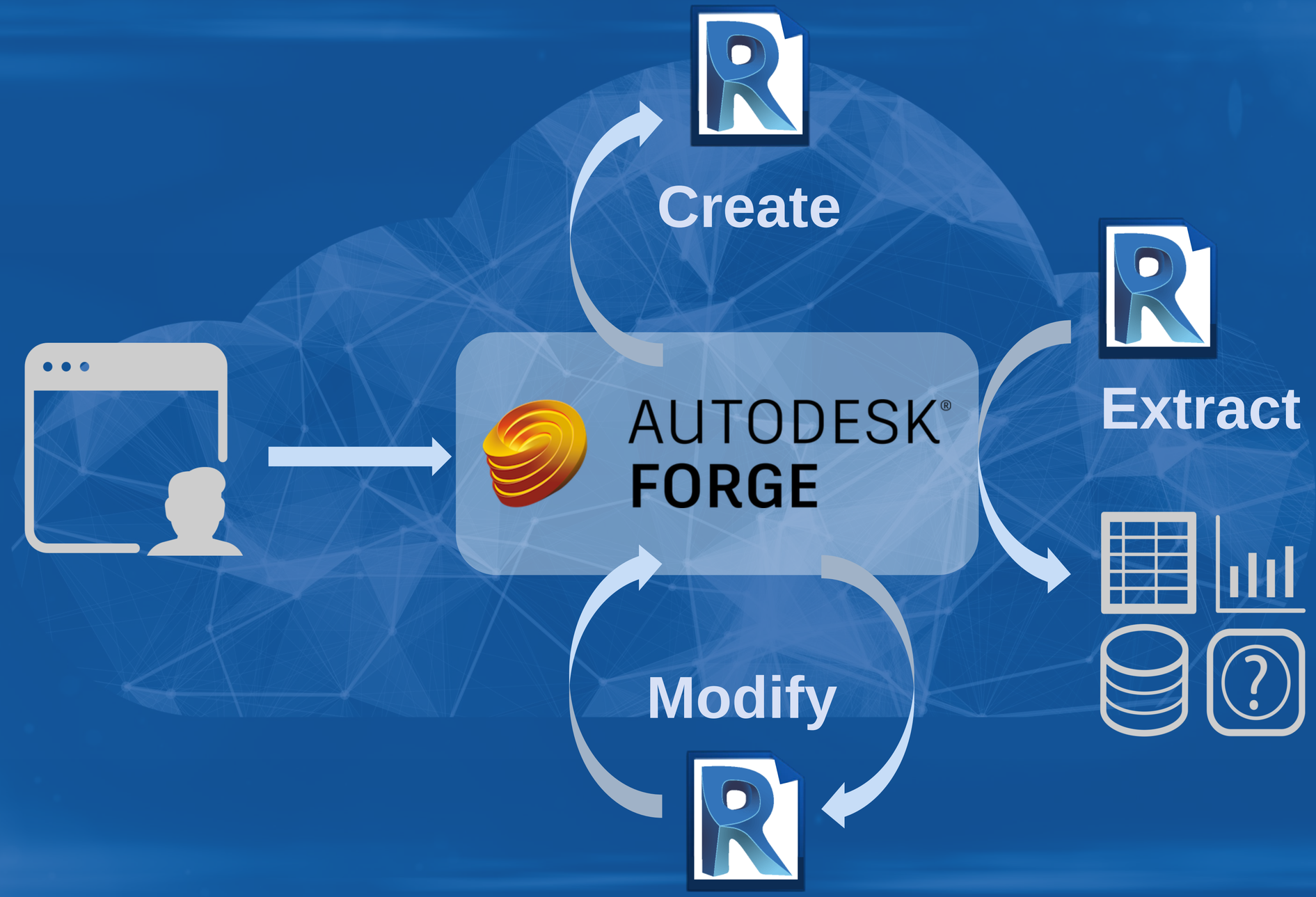
- Batch processing of Revit data
- Run many jobs in parallel
- Automate tedious tasks
- Multiple versions of Revit
- No Revit license needed

- Revit's DB layer only (there's no UI!)
- No access to the network
- No interactive sessions

How Does It Work?

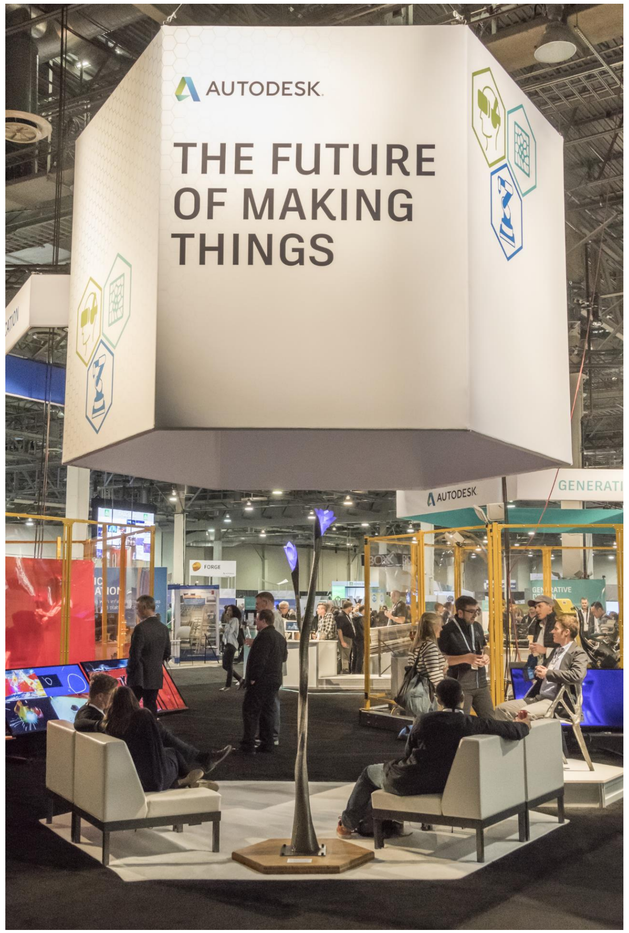


ⓘ Input/outputs are **NOT** stored, they are downloaded/processed and **DISCARDED**


Create
AUTODESK®
FORGE
Extract
Modify

What’s changed since last year?

- Support for Revit 2020-2018
- Enabled virtual printer driver
- Added IFC export, open, and link
- Local debugging
- Override default timeout limit
- Support for on demand inputs
- More samples
- (a lot of behind the scenes stuff)



The documentation has more details

AUTODESK FORGE | Success Stories | Solutions | Getting Started | Documentation | Community | Support | Pricing | SIGN IN

Design Automation API (Beta) v3

- Developer's Guide
  - Overview
  - API Basics
  - Field Guide
  - Rate Limits and Quotas
  - Restrictions
  - Aliases and IDs
  - Callbacks
  - FAQs
  - Postman Samples
  - Troubleshooting
- Step-by-Step Tutorials
  - Design Automation API for 3ds Max
  - Design Automation API for AutoCAD
  - Design Automation API for Inventor
  - Design Automation API for Revit
- API Reference
- Change History

Step-by-Step Tutorials (Beta)

This section presents typical workflows for the Design Automation API in a step-by-step format.

Create and Run a WorkItem

Create an AppBundle, Activity, and WorkItem. Run the WorkItem to call the Activity, which changes parameters and produces results. The results are stored in an OSS bucket.

Run Workitem

Design Automation for Revit

Getting Started Guide for Design Automation for Revit outlines an example workflow starting with the conversion of a Revit addin and concludes with posting a workitem.

Step 1 – Convert your Revit AddIn

Step 2 – Create a Forge App and get authenticated

Step 3 – Create a nickname for your Forge App

Step 4 – Publish your Design Automation appbundle

Step 5 – Publish your Design Automation activity

Step 6 – Post your Design Automation workitem

Handling Revit Failures

Using onDemand inputs

Launched October 28th!

We’re in production.

4.0	Cloud Credits / processing hour (AutoCAD)
6.0	Cloud Credits / processing hour (non-AutoCAD)*

Visit forge.autodesk.com/pricing

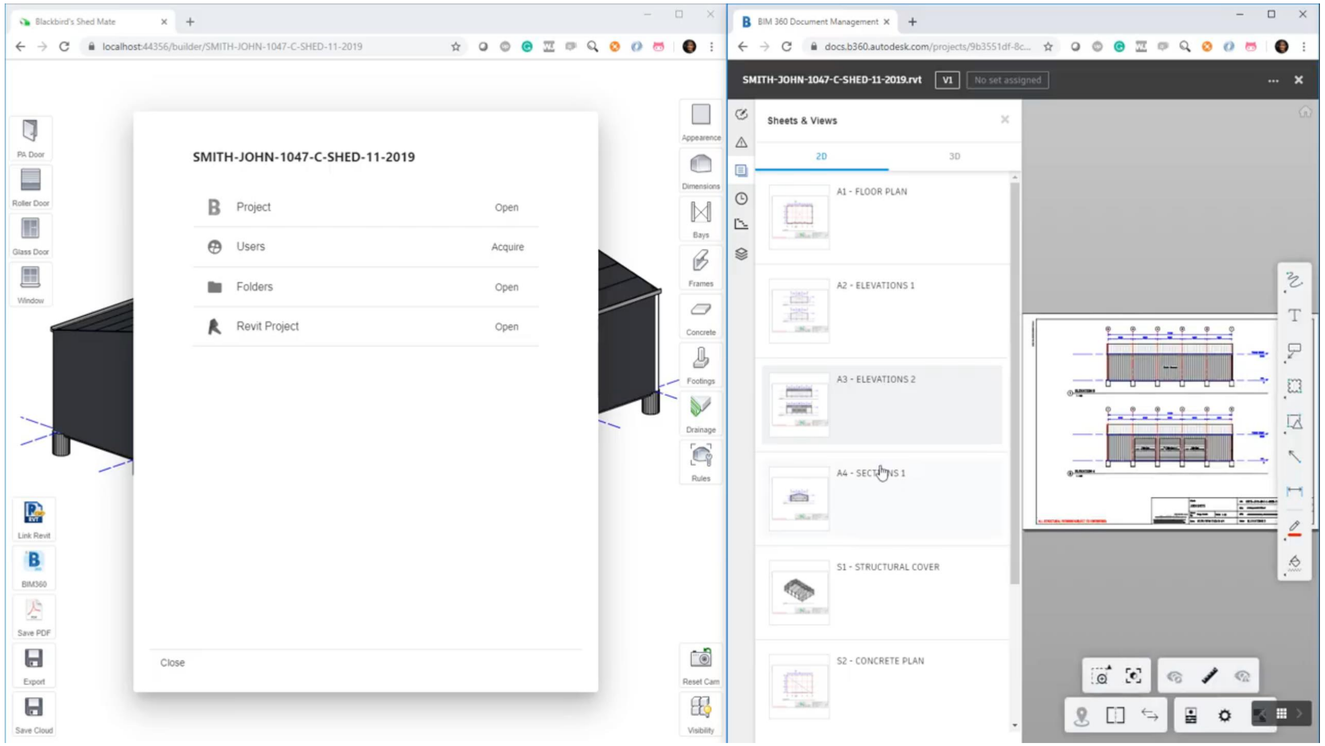
Workflows

Create Ideas

- Create families (RFAs) from a catalog
- Create RVTs from layout app
- Stair layout generator
- Convert from third party format to RVT/RFA
- Auto-generate documentation

Shed Mate
Blackbird Industries

- Web-based model generator creates all structural frames, concrete slabs, wall/roof claddings, etc
- These are then used to generate workshop drawings.
- Enables any technical salesman or manager to produce high-quality, fully documented Revit models
- Also enables creation of material cutlists, shop drawings, quotes, etc



APIs Used:

Design Automation

Viewer

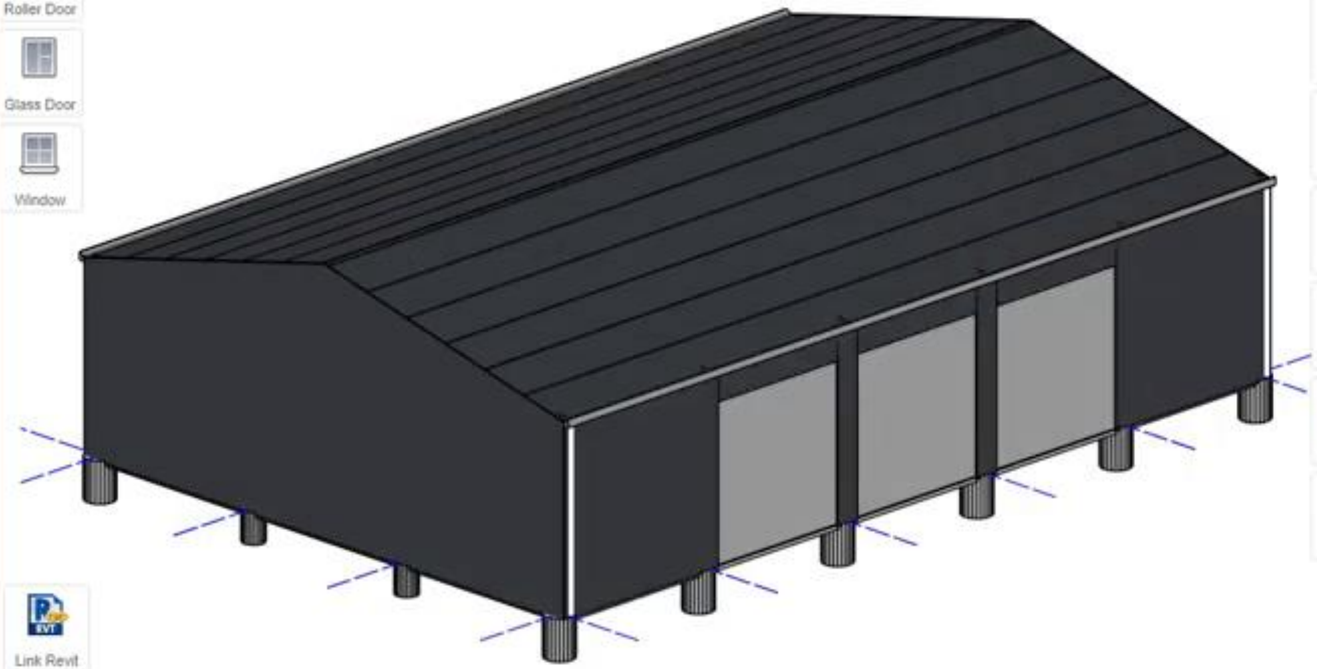
Data Management

Model Derivative

Blackbird's Shed Mate

localhost:44356/builder/SMITH-JOHN-1047-C-SHED-11-2019

PA Door
Roller Door
Glass Door
Window



Appearance
Dimensions
Bays
Frames
Concrete
Footings
Drainage
Rules

Link Revit
BIM360
Save PDF
Export
Save Cloud

Reset Cam
Visibility

BIM 360 Document Management

docs.b360.autodesk.com/projects/9b3551df-8c...

AUTODESK BIM 360 | Blackbird Dev › SMITH-JOHN-1047-C-SHED-11-2019

Document Management

FOLDERS | REVIEWS | TRANSMITTALS | ISSUES

View by

Folders | Sets

Upload Files

Showin...

Search for documents

- Plans
- Project Files
  - 000-TRASH
  - 001-Client-information-require...
  - 002-Models-Plans-Fabrication
    - 000-Revit IO
    - 001-BIM Models (WIP)
    - 002-Plans (Review)
    - 002.1-BP (Submit to quoting)
    - 002.2-BP (Submit to Planning)
    - 003.1-CD (Submit to quoting)
    - 003.2-CD (Submit to Building)
    - 004-3D-Coordination
    - 004.1-Signed Off
    - 005-Timber-fabrication
    - 006-Steel-fabrication
    - 007-CD (For construction)
  - 003-Contract-documentation
  - 004-Council-&-energy-efficiency
  - 005-Estimation
  - 006-Contractor-quotes

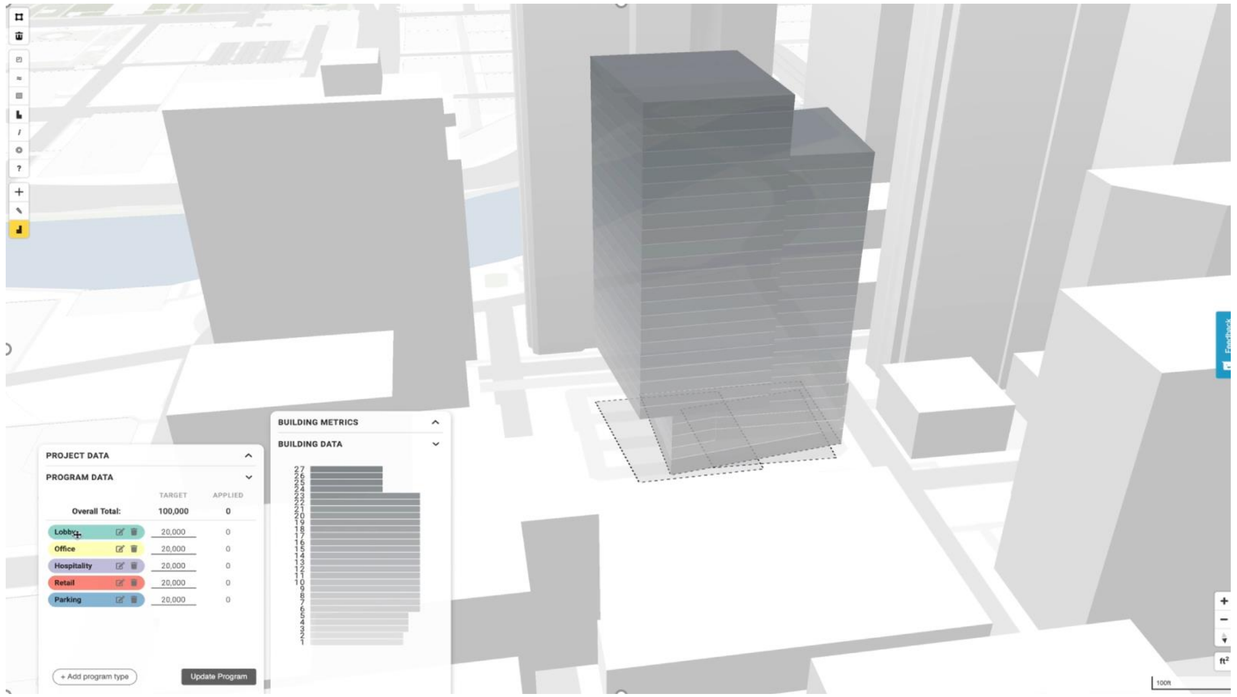
V1

SMITH-JOHN-1047-C-SHED-11-2...

MassFormer
Perkins & Will

Perkins&Will

- Enables a web-based creation of massing studies for non-Revit personas
- The design is then be converted into a Revit model



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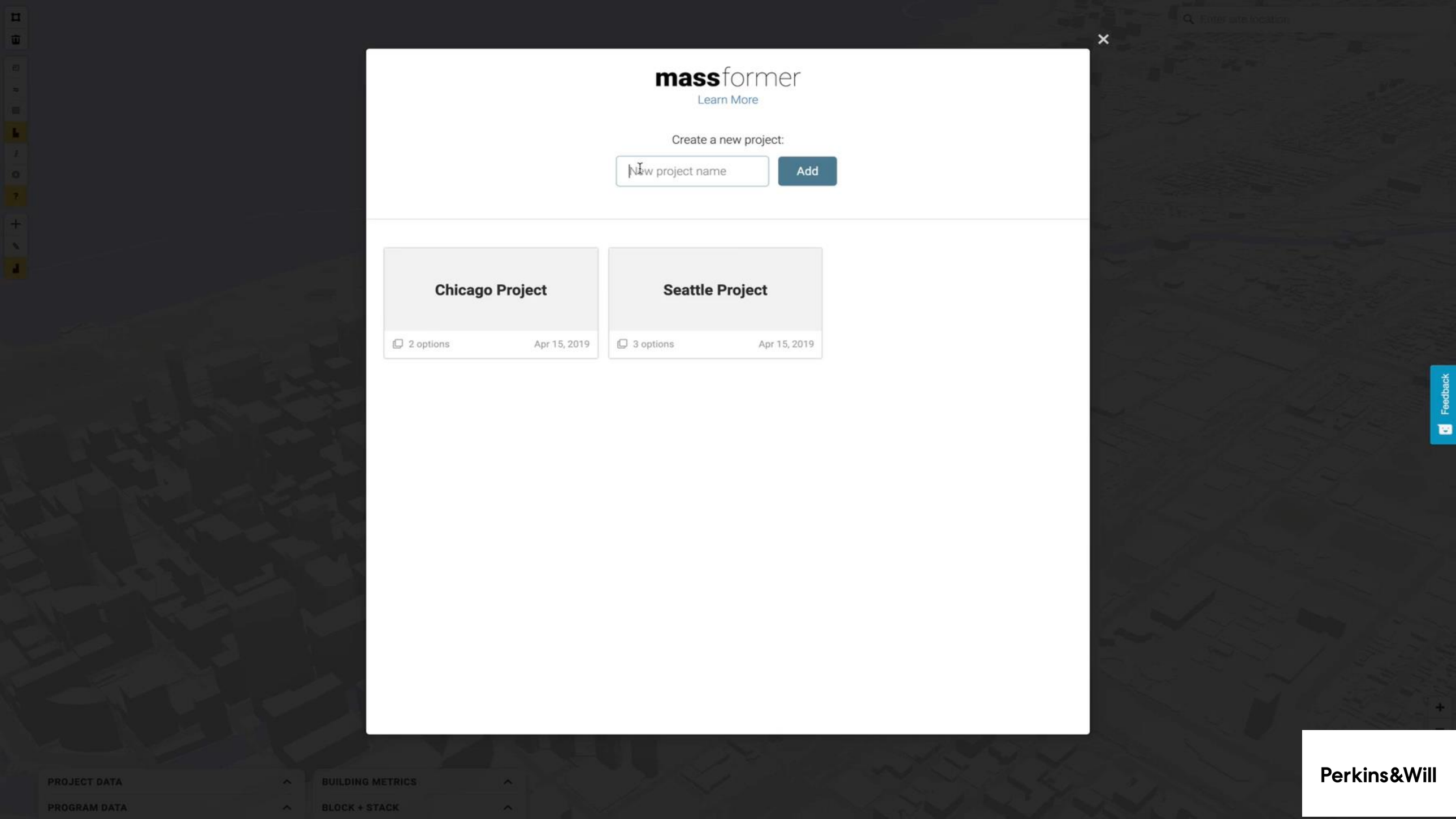
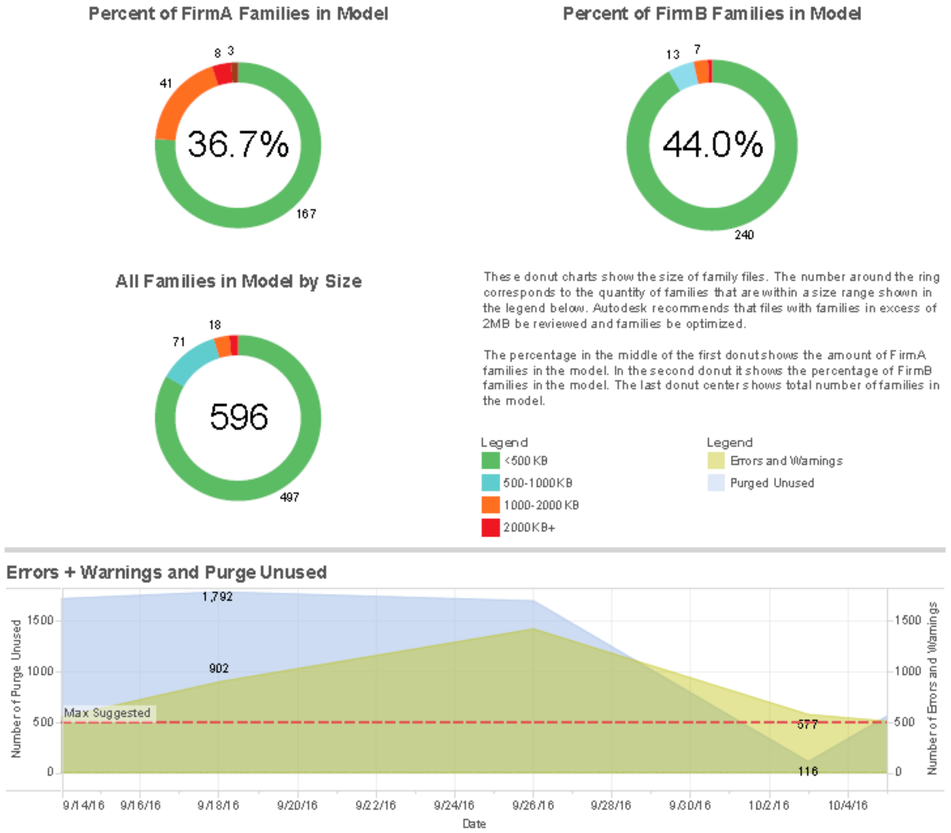

massformer
Learn More
Create a new project:
New project name
Add
Chicago Project
2 options
Apr 15, 2019
Seattle Project
3 options
Apr 15, 2019
Feedback
PROJECT DATA
PROGRAM DATA
BUILDING METRICS
BLOCK + STACK
Perkins&Will

Extract Ideas

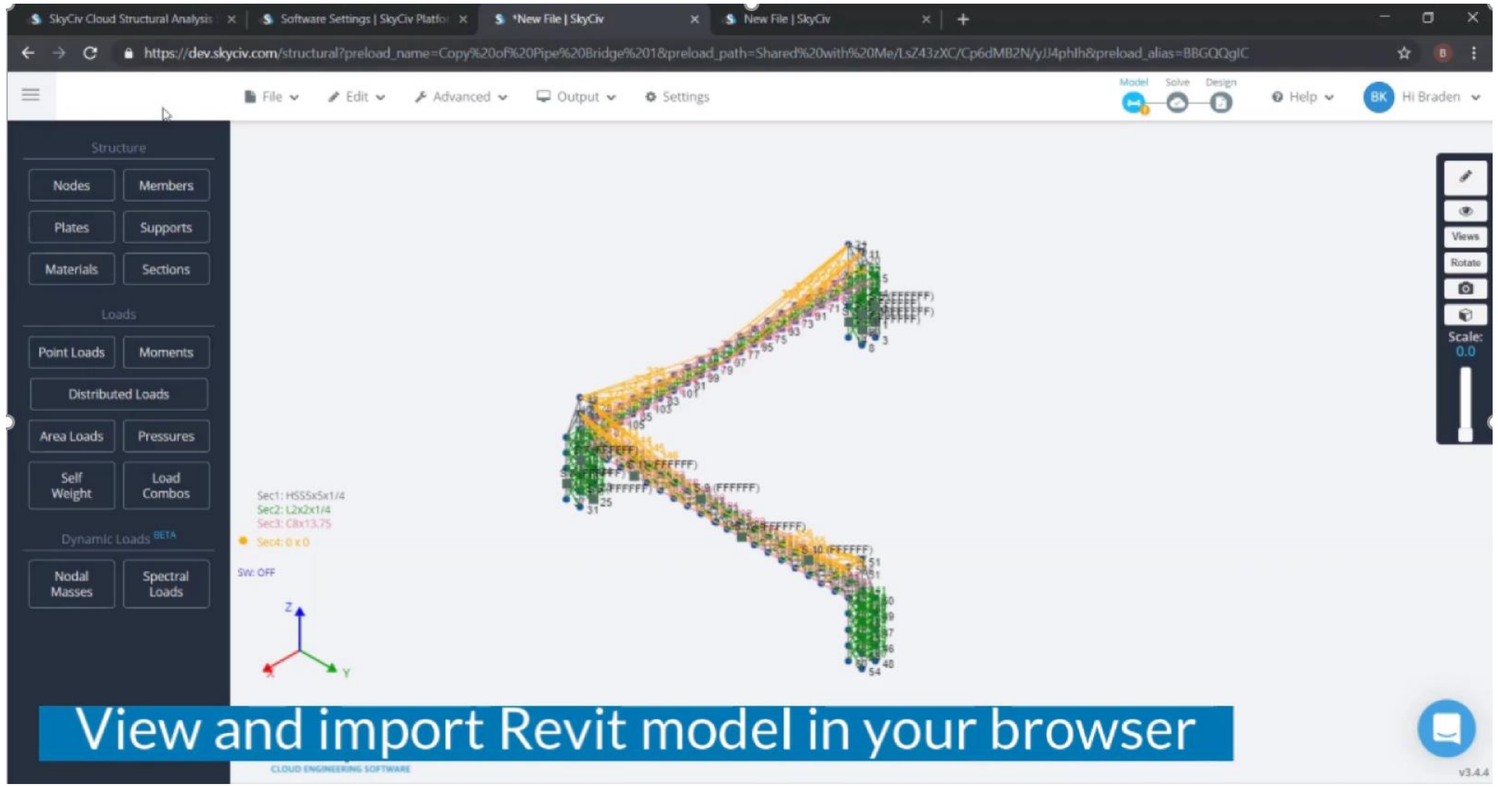
- Custom extraction (Excel, private database, unsupported formats, etc)
- Automated extraction (e.g. nightly IFC or DWG)
- Model QA/QC & code checks
- Clash detection
- Share model information with consultants without need for Revit



Revit Integration
SkyCiv

- Import Revit models into SkyCiv
- Create Revit models
- View Revit models in a web viewer

SkyCiv
CLOUD ENGINEERING SOFTWARE



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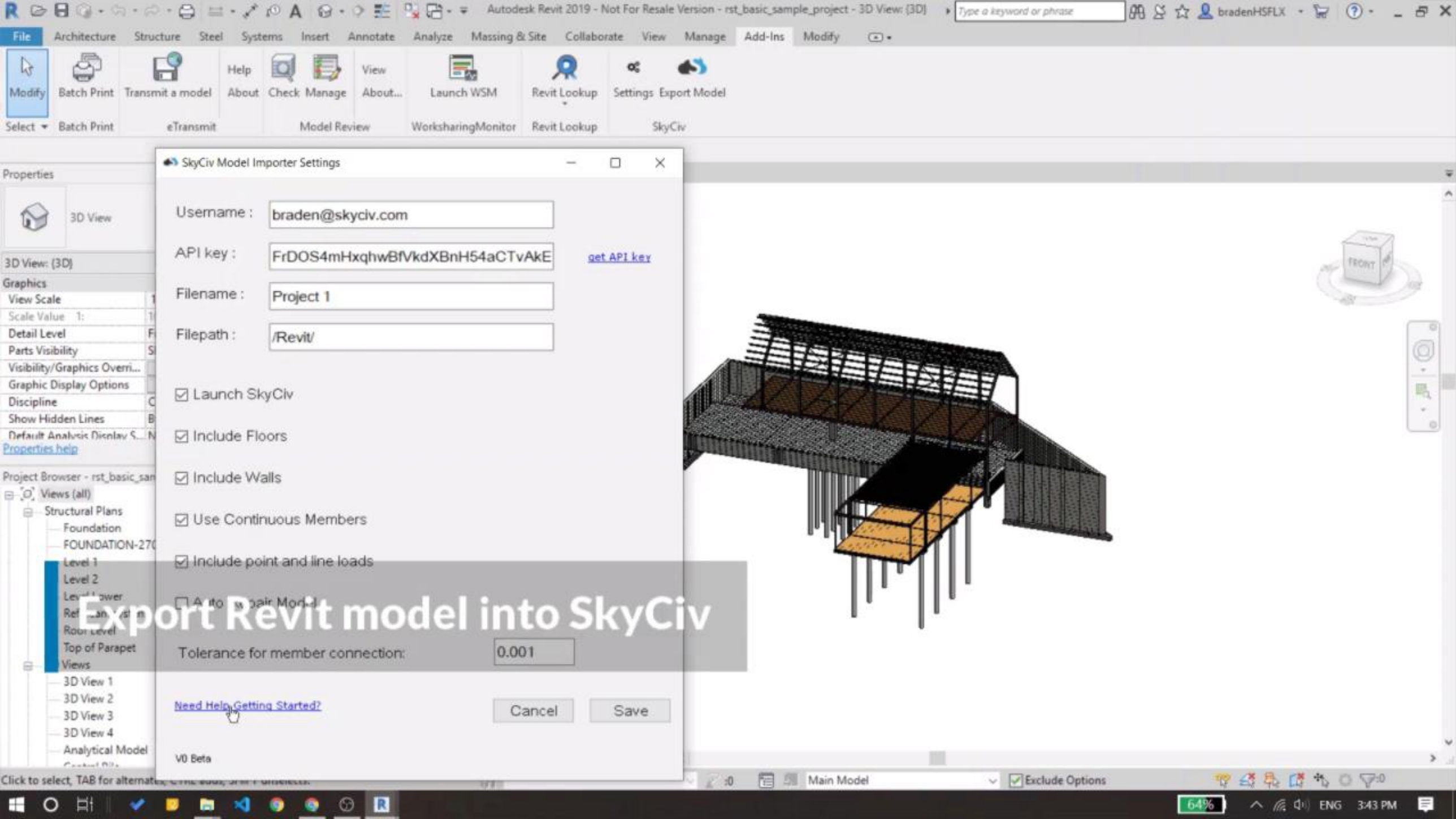
Design Automation

Viewer

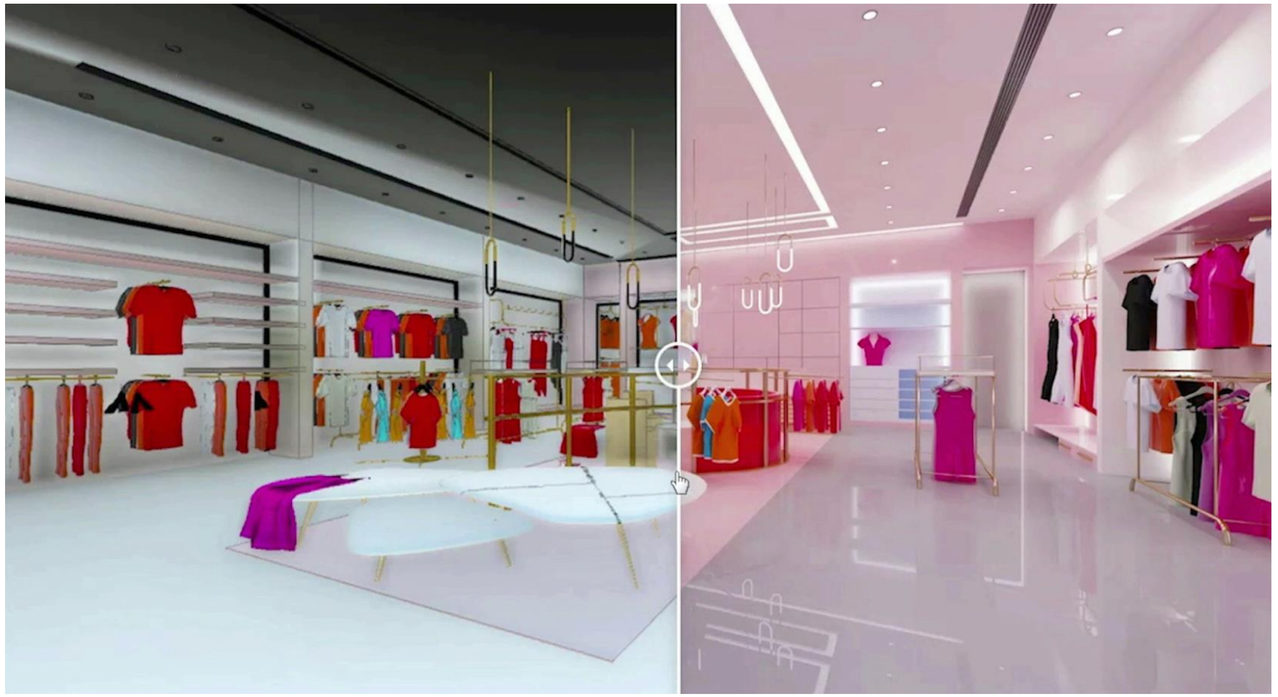
Model Derivative


Autodesk Revit 2019 - Not For Resale Version - rst_basic_sample_project - 3D View: {3D}
File
Architecture
Structure
Steel
Systems
Insert
Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
Modify
Modify
Batch Print
Transmit a model
Help
About
Check
Manage
View
About...
Launch WSM
Revit Lookup
Settings
Export Model
Select
Batch Print
eTransmit
Model Review
WorksharingMonitor
Revit Lookup
SkyCiv
Properties
3D View
3D View: {3D}
Graphics
View Scale
Scale Value 1:
Detail Level
Parts Visibility
Visibility/Graphics Overri...
Graphic Display Options
Discipline
Show Hidden Lines
Properties help
Project Browser - rst_basic_sam
Views (all)
Structural Plans
Foundation
Level 1
Level 2
Top of Parapet
Views
3D View 1
3D View 2
3D View 3
3D View 4
Analytical Model
SkyCiv Model Importer Settings
Username :
braden@skyciv.com
API key :
FrDOS4mHxqhwBfVkdXBnH54aCTvAkE
get API key
Filename :
Project 1
Filepath :
/Revit/
Launch SkyCiv
Include Floors
Include Walls
Use Continuous Members
Include point and line loads
Tolerance for member connection:
0.001
Need Help Getting Started?
Cancel
Save
V0 Beta
FRONT
Main Model
Exclude Options
Export Revit model into SkyCiv
64%
ENG
3:43 PM

Collaborative Lighting

Mustafa Salaheldin & Imad Hanna

- Connects design, to visualization, to manufacturing
- Extracts Revit model data
- Sends information to DA for 3dsMax for visualization
- Has sufficient information for downstream manufacturing workflows



APIs Used:

Design Automation

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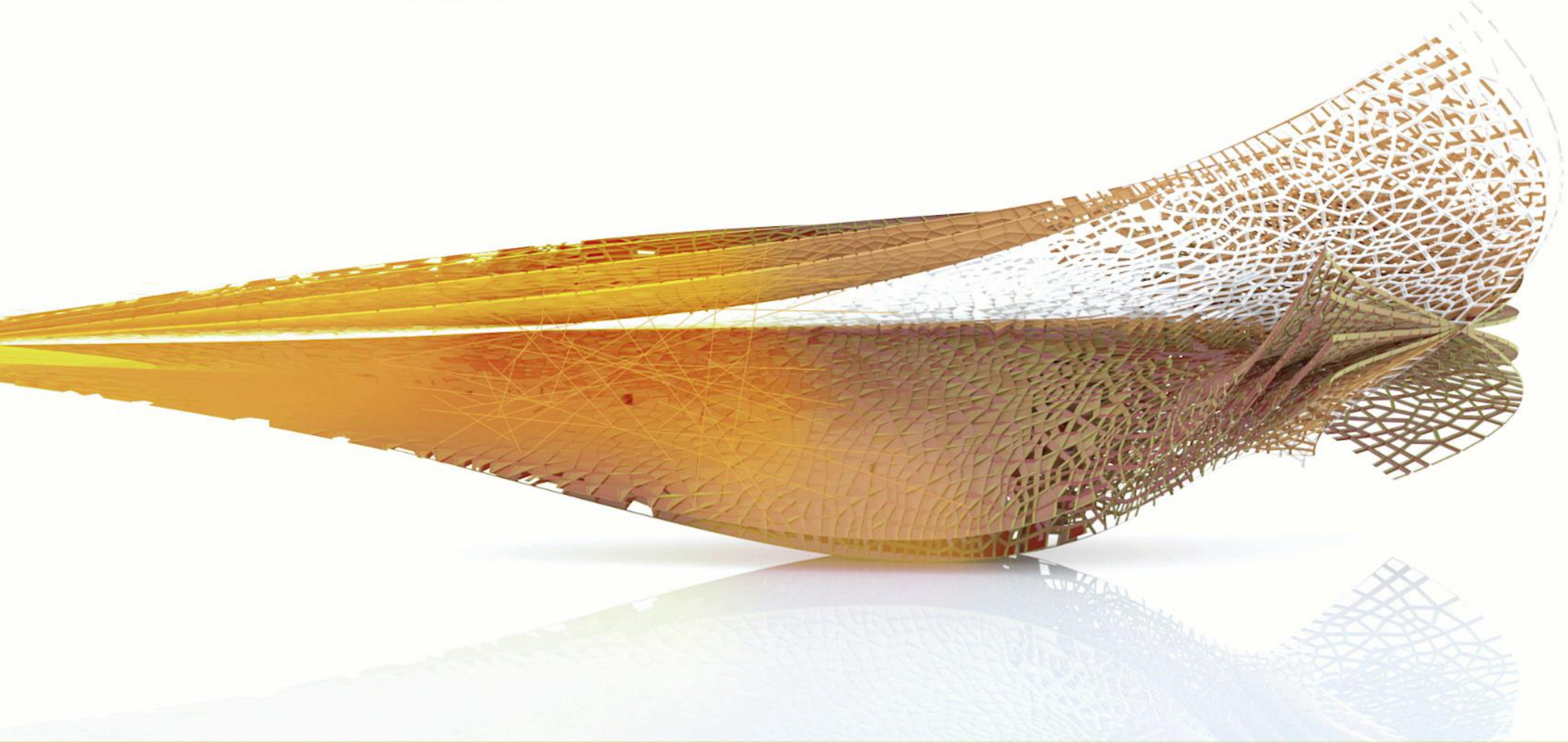
Data Management

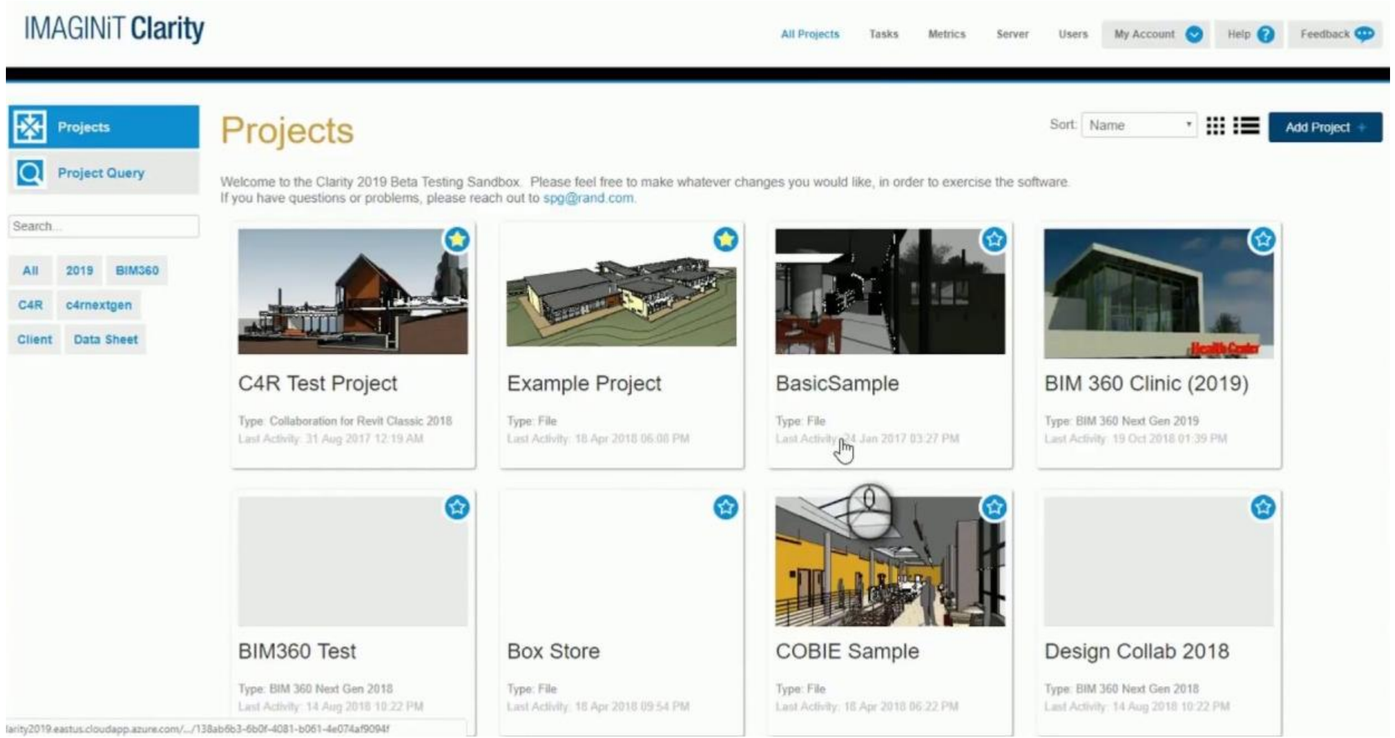
MORphogenesis



Reconfiguring lighting for Architectural Space using automation,BIM, Generative Design and Digital Fabrication

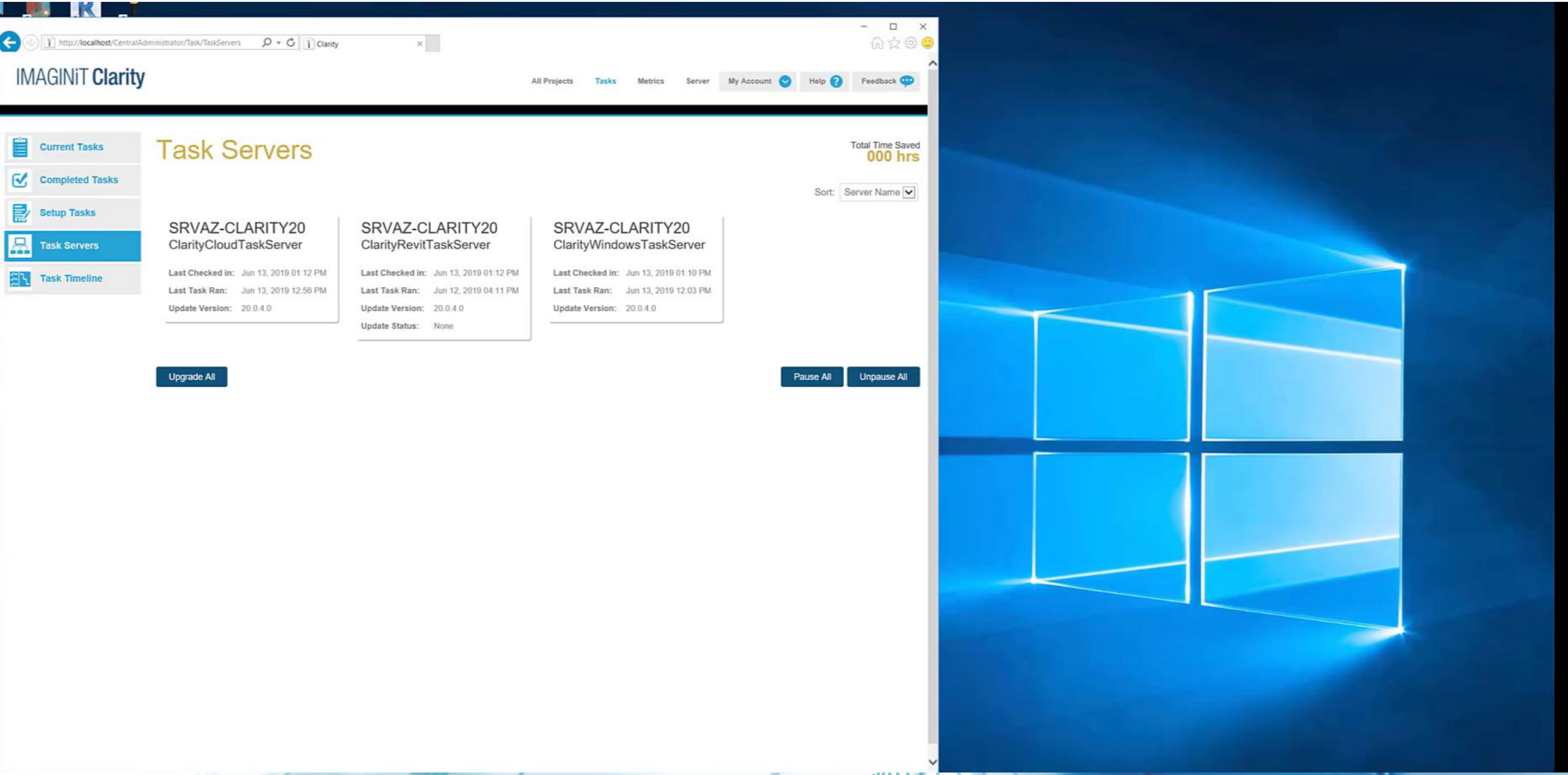
Clarity on Cloud Servers
IMAGINiT

- Automated processing & model checks
- The same tools can now be scaled to the cloud.



APIs Used:

Design Automation


http://localhost/CentralAdministrator/Task/TaskServers
Clarity
IMAGINiT Clarity
All Projects
Tasks
Metrics
Server
My Account
Help
Feedback
Current Tasks
Completed Tasks
Setup Tasks
Task Servers
Task Timeline
Task Servers
Total Time Saved
000 hrs
Sort:
Server Name
SRVAZ-CLARITY20
ClarityCloudTaskServer
Last Checked in: Jun 13, 2019 01:12 PM
Last Task Ran: Jun 13, 2019 12:56 PM
Update Version: 20.0.4.0
SRVAZ-CLARITY20
ClarityRevitTaskServer
Last Checked in: Jun 13, 2019 01:12 PM
Last Task Ran: Jun 12, 2019 04:11 PM
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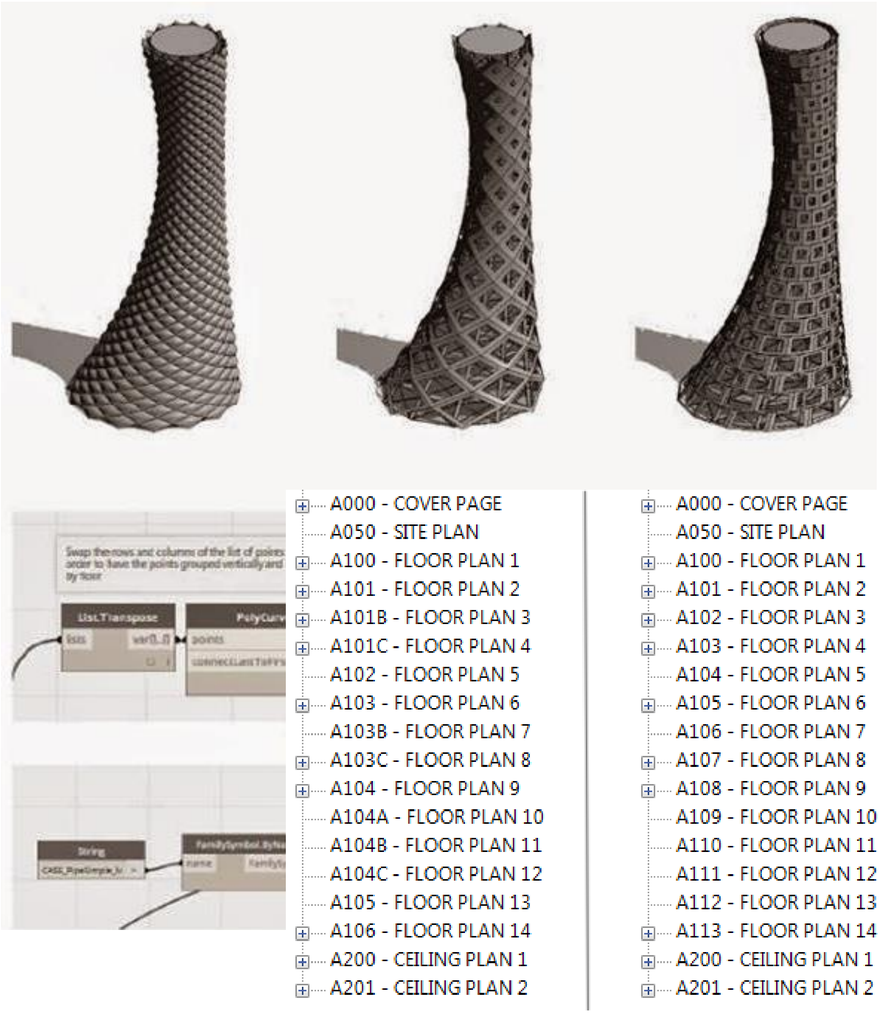
Update Status: None
SRVAZ-CLARITY20
ClarityWindowsTaskServer
Last Checked in: Jun 13, 2019 01:10 PM
Last Task Ran: Jun 13, 2019 12:03 PM
Update Version: 20.0.4.0
Upgrade All
Pause All
Unpause All

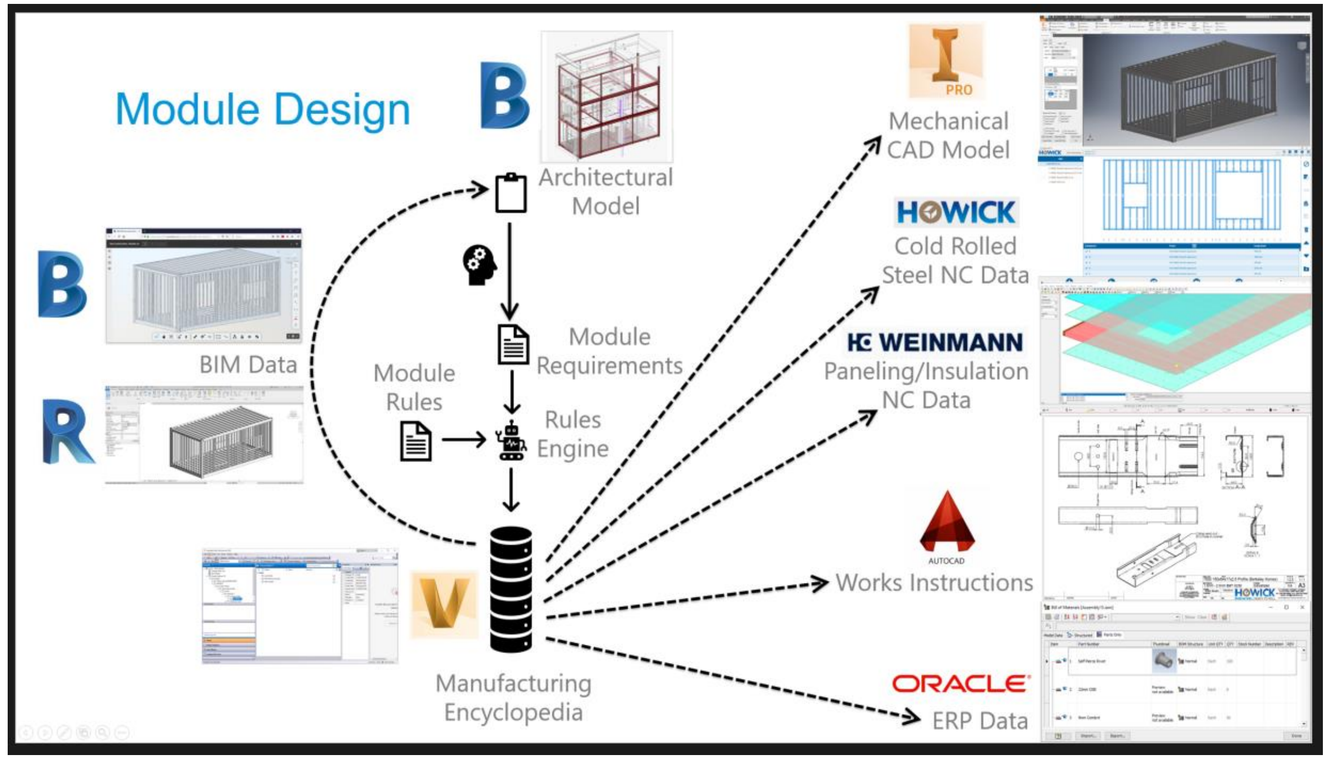
Modify Ideas

- Execute nightly model tasks on models
- Fix common modeling and documentation mistakes
- Batch upgrades & updates
- Automatically replace out-of-date content
- Limitation: No way to directly modify a central model.



Automated Framing
Design Automation Systems

- Connects AEC and manufacturing by providing an rules engine that can automatically generate wall framing models
- Processes architectural model for wall and opening geometry.
- The rules engine creates wall framing information.
- Forge enables the framing information to be sent to Revit, Inventor, the Forge viewer, or directly to CNC.



APIs Used:

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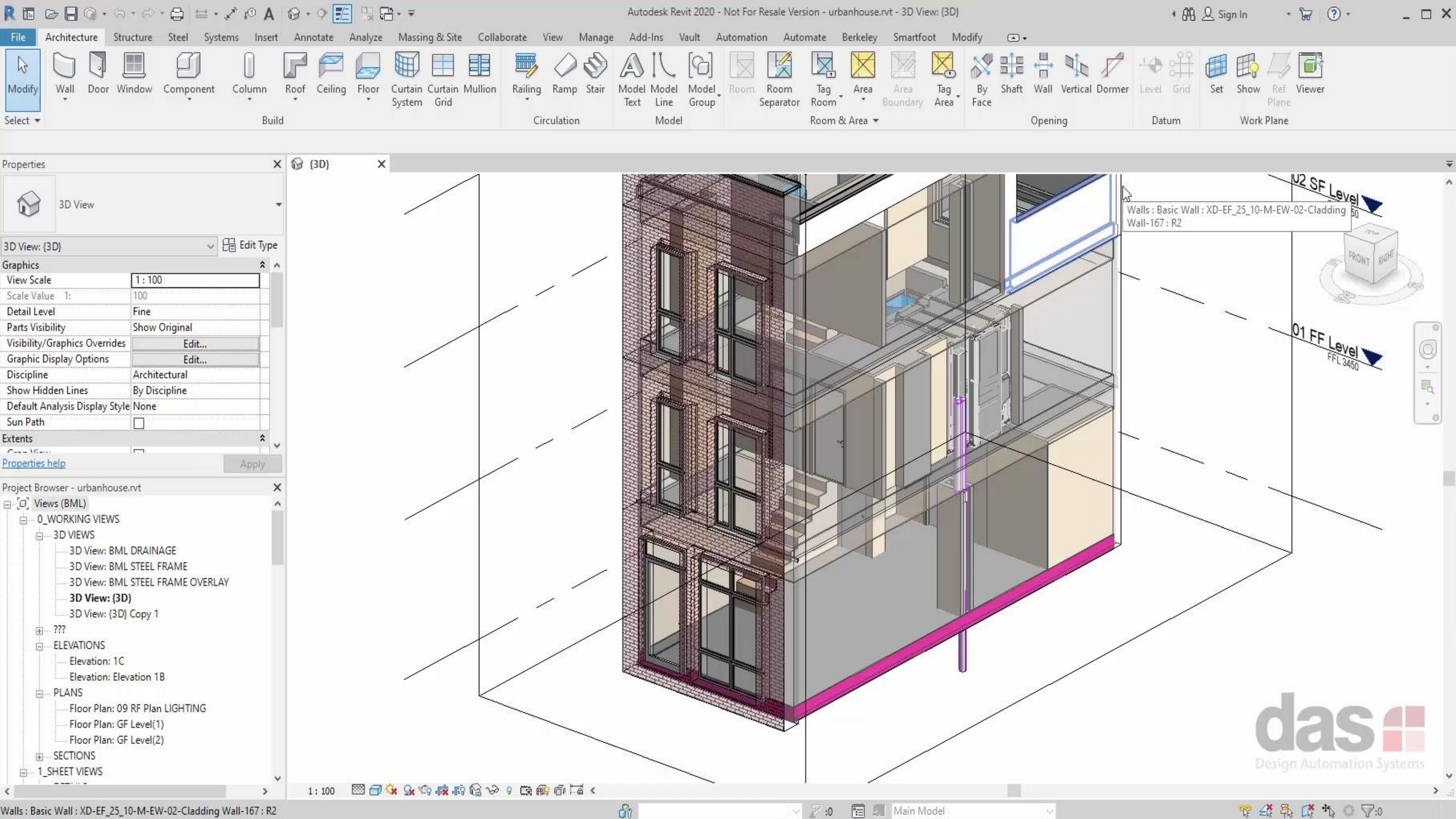
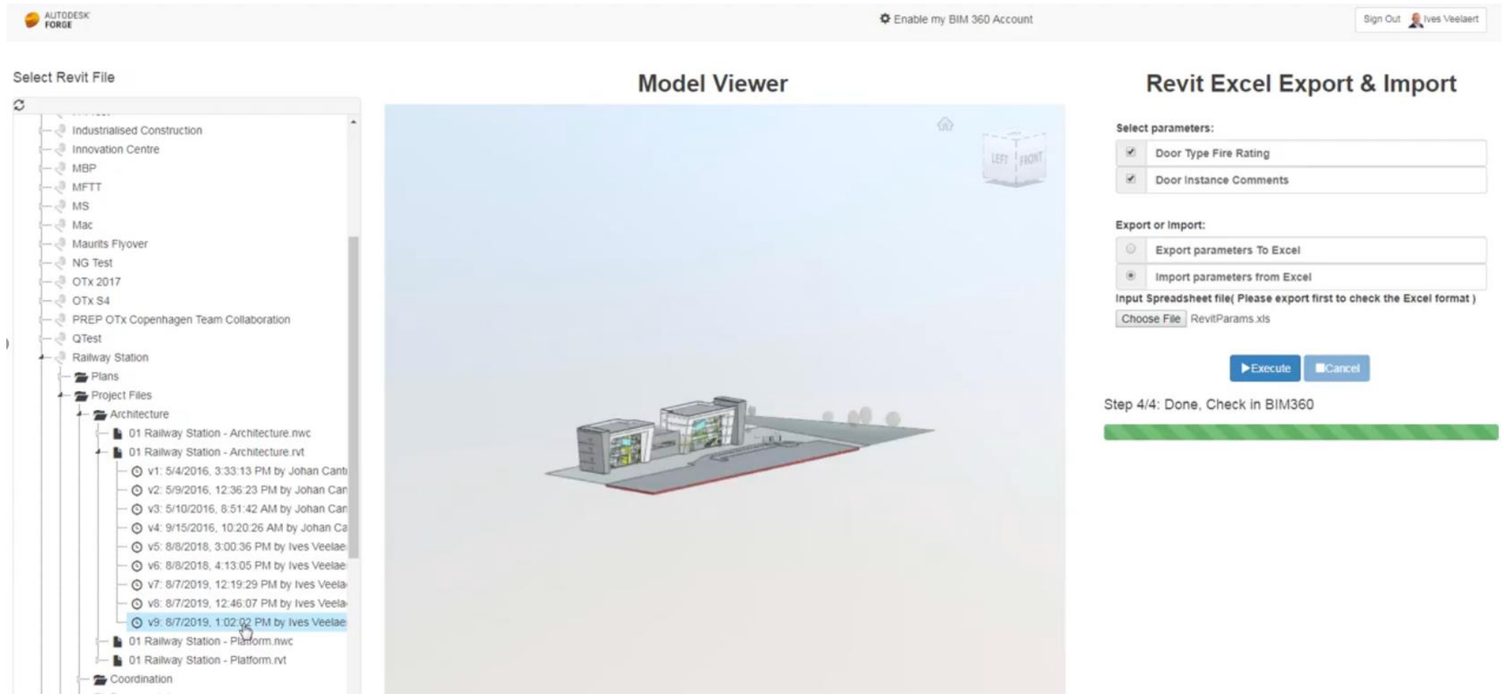
Data Management

Model Derivative


Autodesk Revit 2020 - Not For Resale Version - urbanhouse.rvt - 3D View: {3D}
Sign In
File
Architecture
Structure
Steel
Systems
Insert
Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
Vault
Automation
Automate
Berkeley
Smartfoot
Modify
Modify
Wall
Door
Window
Component
Column
Roof
Ceiling
Floor
Curtain System
Curtain Grid
Mullion
Railing
Ramp
Stair
Model Text
Model Line
Model Group
Room
Room Separator
Tag Room
Area
Area Boundary
Tag Area
By Face
Shaft
Wall
Vertical
Dormer
Level
Grid
Set
Show
Ref Plane
Viewer
Select
Build
Circulation
Model
Room & Area
Opening
Datum
Work Plane
Properties
3D View
3D View: {3D}
Edit Type
Graphics
View Scale
1 : 100
Scale Value 1:
100
Detail Level
Fine
Parts Visibility
Show Original
Visibility/Graphics Overrides
Edit...
Graphic Display Options
Edit...
Discipline
Architectural
Show Hidden Lines
By Discipline
Default Analysis Display Style
None
Sun Path
Extents
Properties help
Apply
Project Browser - urbanhouse.rvt
Views (BML)
0_WORKING VIEWS
3D VIEWS
3D View: BML DRAINAGE
3D View: BML STEEL FRAME
3D View: BML STEEL FRAME OVERLAY
3D View: {3D}
3D View: {3D} Copy 1
???
ELEVATIONS
Elevation: 1C
Elevation: Elevation 1B
PLANS
Floor Plan: 09 RF Plan LIGHTING
Floor Plan: GF Level(1)
Floor Plan: GF Level(2)
SECTIONS
1_SHEET VIEWS
{3D}
Walls : Basic Wall : XD-EF_25_10-M-EW-02-Cladding
Wall-167 : R2
U2 SF Level
01 FF Level
FFL 3450
FRONT
RIGHT
1 : 100
das
Design Automation Systems
Walls : Basic Wall : XD-EF_25_10-M-EW-02-Cladding Wall-167 : R2
Main Model

Excel Export & Import **Autodesk**

- Bi-directional connection between Revit data and Excel.
- Exports Revit model to Excel.
- After changes are made in Excel, the updated spreadsheet is processed to update the original model.



APIs Used:

Design Automation

Viewer

Data Management

Excel Export & Import

https://revitexcel.herokuapp.com

Apps | Autodesk Learning | Autodesk Buzzsaw | Brainshark | Task Tracking | BIM Toolbox | Type... | BIM360 TEAM | A360 Internal | A360 Viewer | connected-desktop | Task Tracker | Autodesk Forge Pla... | One Team Source... | EMEA Training Navi...

AUTODESK FORGE

Enable my BIM 360 Account

Sign Out Ives Veelaert

Select Revit File

- Industrialised Construction
- Innovation Centre
- MBP
- MFTT
- MS
- Mac
- Maurits Flyover
- NG Test
- OTx 2017
- OTx S4
- PREP OTx Copenhagen Team Collaboration
- QTest
- Railway Station
  - Plans
  - Project Files
    - Architecture
      - 01 Railway Station - Architecture.nwc
      - 01 Railway Station - Architecture.rvt
        - v1: 5/4/2016, 3:33:13 PM by Johan Canti
        - v2: 5/9/2016, 12:36:23 PM by Johan Can
        - v3: 5/10/2016, 8:51:42 AM by Johan Can
        - v4: 9/15/2016, 10:20:26 AM by Johan Ca
        - v5: 8/8/2018, 3:00:36 PM by Ives Veelae
        - v6: 8/8/2018, 4:13:05 PM by Ives Veelae
        - v7: 8/7/2019, 12:19:29 PM by Ives Veela
        - v8: 8/7/2019, 12:46:07 PM by Ives Veela
      - 01 Railway Station - Platform.nwc
      - 01 Railway Station - Platform.rvt
    - Coordination
    - Documentation
    - Inspection

Model Viewer

Revit Excel Export & Import

Select parameters:

- [x] Door Type Fire Rating
- [x] Door Instance Comments

Export or Import:

- (•) Export parameters To Excel
- ( ) Import parameters from Excel

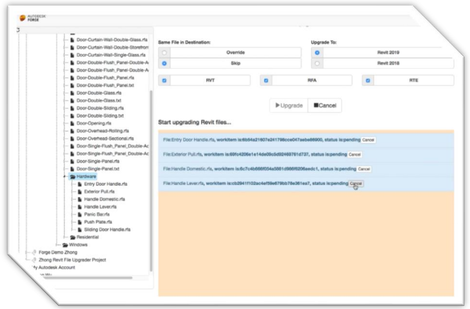
▶Execute ■Cancel

Progress

https://revitexcel.herokuapp.com/#

More Samples…

1



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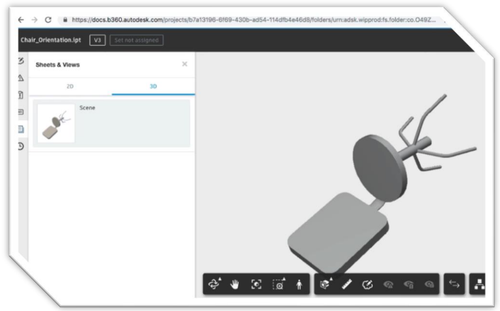

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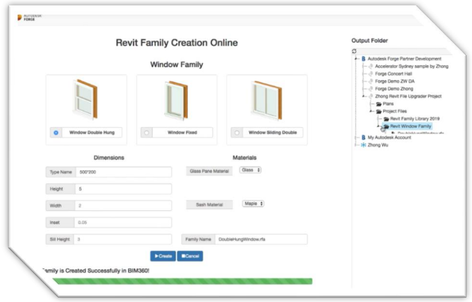
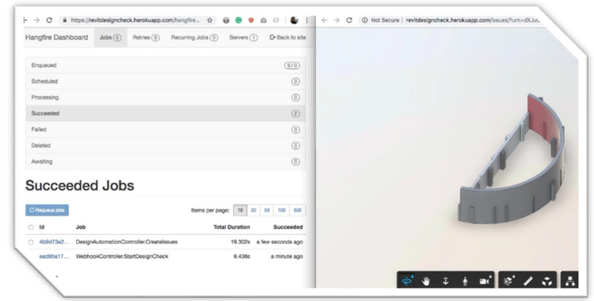
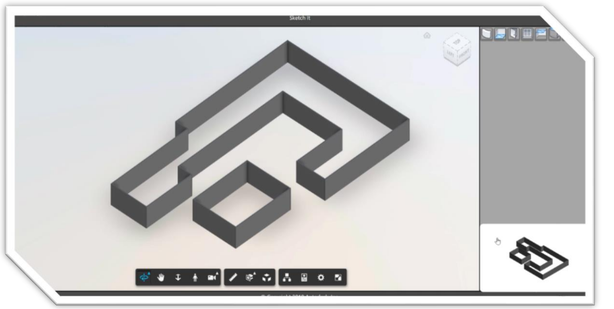


4



5

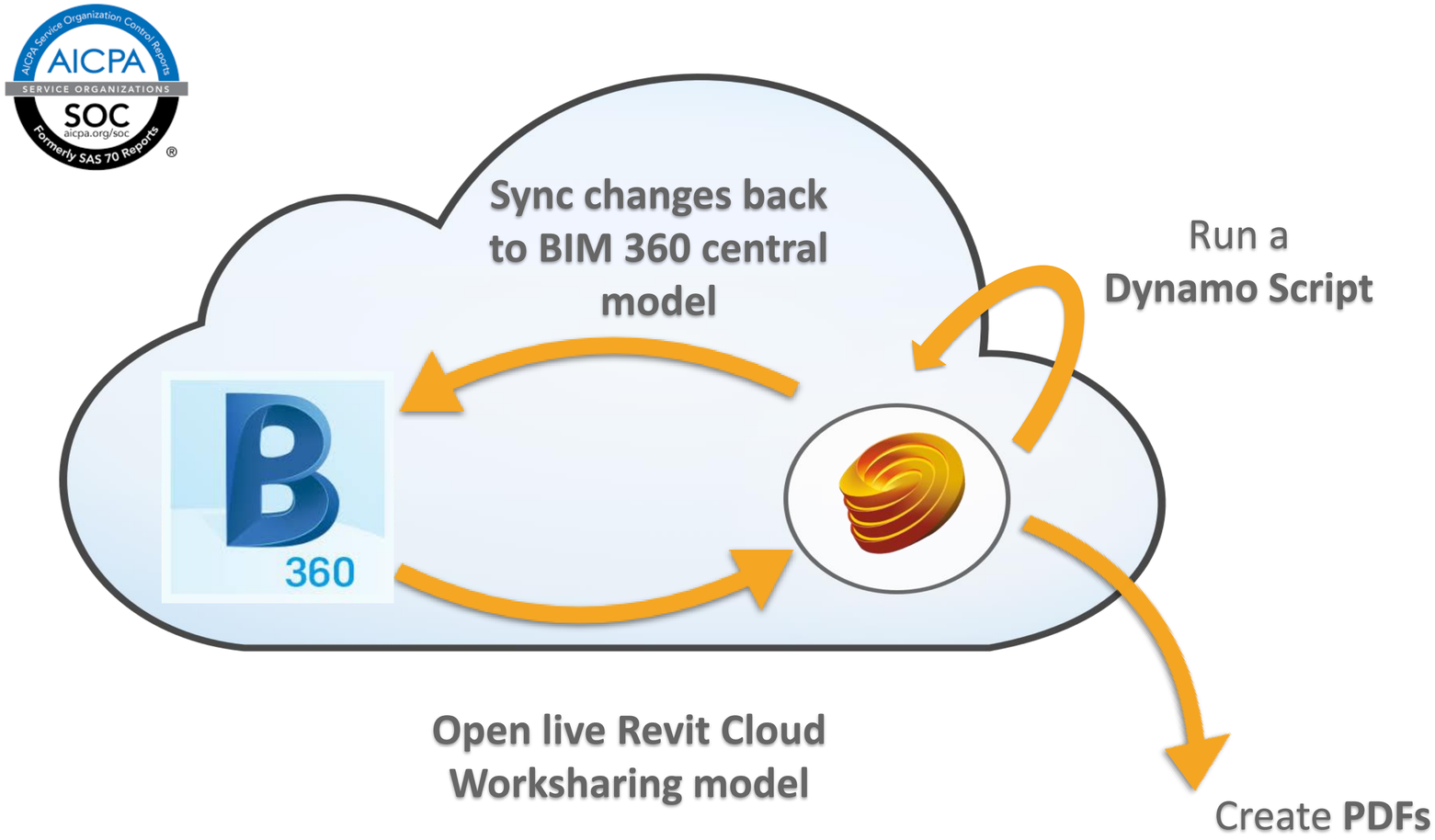


APIs Used:

- Design Automation
- Viewer
- Data Management
- Model Derivative

Roadmap

The Roadmap


AICPA
SERVICE ORGANIZATIONS
SOC
aicpa.org/soc
Formerly SAS 70 Reports
Sync changes back to BIM 360 central model
Run a Dynamo Script
360
Open live Revit Cloud Worksharing model
Create PDFs

Your Input

Which of the following Design Automation API for Revit improvements would be most valuable to your business?

- **Read** Revit Cloud Worksharing (BIM 360 Design) central models
- **Modify** Revit Cloud Worksharing (BIM 360 Design) models
- Run **Dynamo Scripts**
- **PDF** Printing Support
- **Other** (email to revitonforge@autodesk.com)

Vote: http://etc.ch/Hf7Z

Getting Started

What you'll need

Get Started at AU

Practical Tips & Tricks

Wednesday 1:30pm

SD323658

Rahul Bhobe & Jason Kunkel

Getting Started on Design Automation for Revit on Forge

Hands on Lab

Monday 5pm

FDC322552-L

Fernando Malard

Learning Lab: Modify files using Design Automation API

Visit us at the Forge Center, in the middle of the Autodesk space in the AU Expo all week…

Forge Center

Meet The Forge Leaders Networking Happy Hour (Wednesday 5.30-7.30PM)

Participate in the Forge Scavenger Hunt and be entered into a daily raffle for some cool prizes!

Forge Dev Zone

Hands-on technical support on specific APIs/Services (Tuesday-Thursday)

Tuesday	12:00-2:00PM	Design Automation
Tuesday	5:30-7:30PM	Forge Viewer
Wednesday	10:00-12:00PM	Data Management & Model Derivative
Wednesday	12:00-2:00PM	Forge and BIM 360
Thursday	12:00-2:00PM	Design Automation

Forge Answer Bar

Get answers from our experts (Tuesday-Thursday)

More at AU

Watch the Recording

- FDC323705 - Scott Heide - Graphically Interactive, Rules-Based Sales Engineering Automation with Forge

Monday

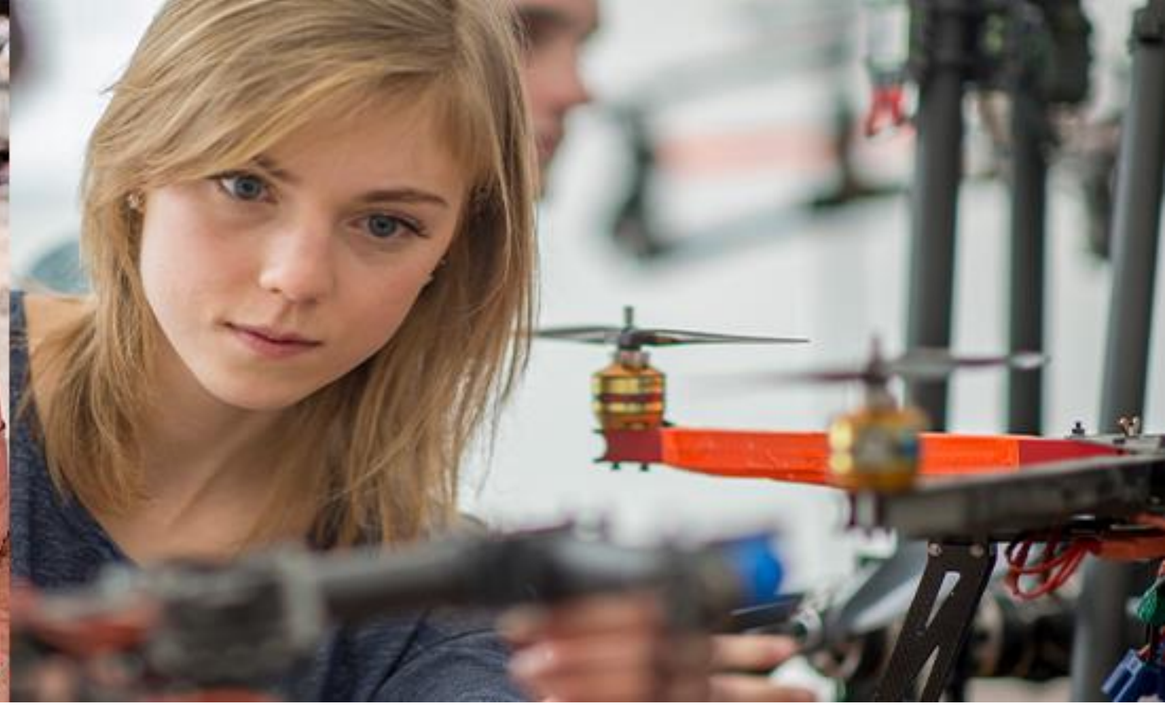
- 3:30pm - FDC350436 – Kris Riemslagh & Gill Gonnissen - A Revit Developer’s Journey from Desktop to the Cloud

Tuesday

- **9:15am - MFG317857 - Graham Cleland & Neil Lee - Delivering an Automated Precision Manufacturing Facility for Off-Site Housing Products**

Thursday

- 8:00am - AS316991 - Tim Burnham & Dimitrii Pokrovskii - OK Forge! Using Google Voice to Construct Design-Automation Revit Models in BIM 360
- **1:30pm - BES322239 - Mustafa Salaheldin & Imad Hanna - Collaborative lighting design, from visualization to manufacturing using Forge API**
- **1:30pm - BES322807 - Thiago Almeida - Forge and Generative Design for Planning, Modeling, and Fabrication**



Forge Accelerators

San Francisco, CA – January 13-17, 2020
Bogota, Colombia – February 3-7
London, United Kingdom – February 17-21
Sydney, Australia – March 9-13
São Paulo, Brazil – April 13-16
Boston, MA, USA – April 27-May 1
Denver, CO, USA – June 1-5
Barcelona, Spain – June 8-12

A special program to help developers leverage Autodesk Forge APIs to build next generation solutions

Work up close and personal with the Autodesk team to turn your idea into a working prototype.

Apply at www.autodeskcloudaccelerator.com

Panel Discussion

Panel

Sasha Crotty

Revit Product Manager

Autodesk

Rahul Bhobe

Principal Engineer

Autodesk

Ryan Duell

Product Owner

Autodesk

Matt Mason

Director

IMAGINiT Technologies

Neil Lee

Director

Design Automation Systems

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