AUTODESK. UNIVERSITY

Express 4d Simulation Scheduling and Construction Management with Dynamo

Enrique Galicia

Mati Arch | @practicalbim

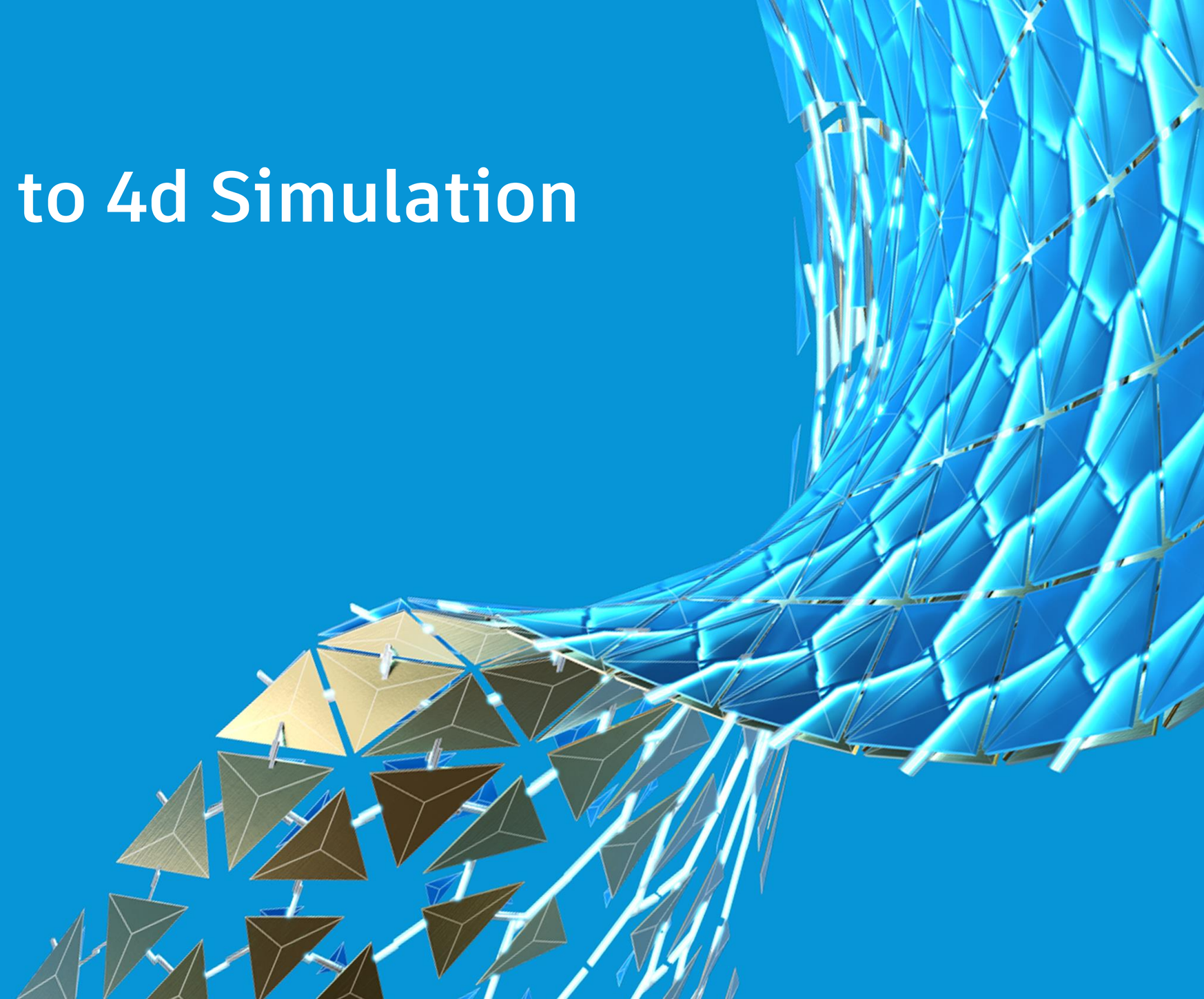
About the speaker

Enrique Galicia Tovar

Enrique Galicia is a BIM Specialist which works as a Consultant to several International Firms, He provides real construction solutions to common problems while implementing and using BIM, using Autodesk Revit, Autodesk Navisworks, Autocad Civil 3d and Dynamo. He has 13 years of experience with workflows of BIM, interoperability and developments.

Worked over more than 110 projects with BIM, and worked deeply on research to enhace future workflows for BIM uses. Awarded Excellence Professor of Architecture on 2019 by the Tecnologico de Monterrey giving BIM Courses and Seminars, Has developed 81 online courses on Udemy's Platform to spread the word using BIM true potential with more than 15000 students over 154 Countries, and its always happy to help.

Introduction to 4d Simulation

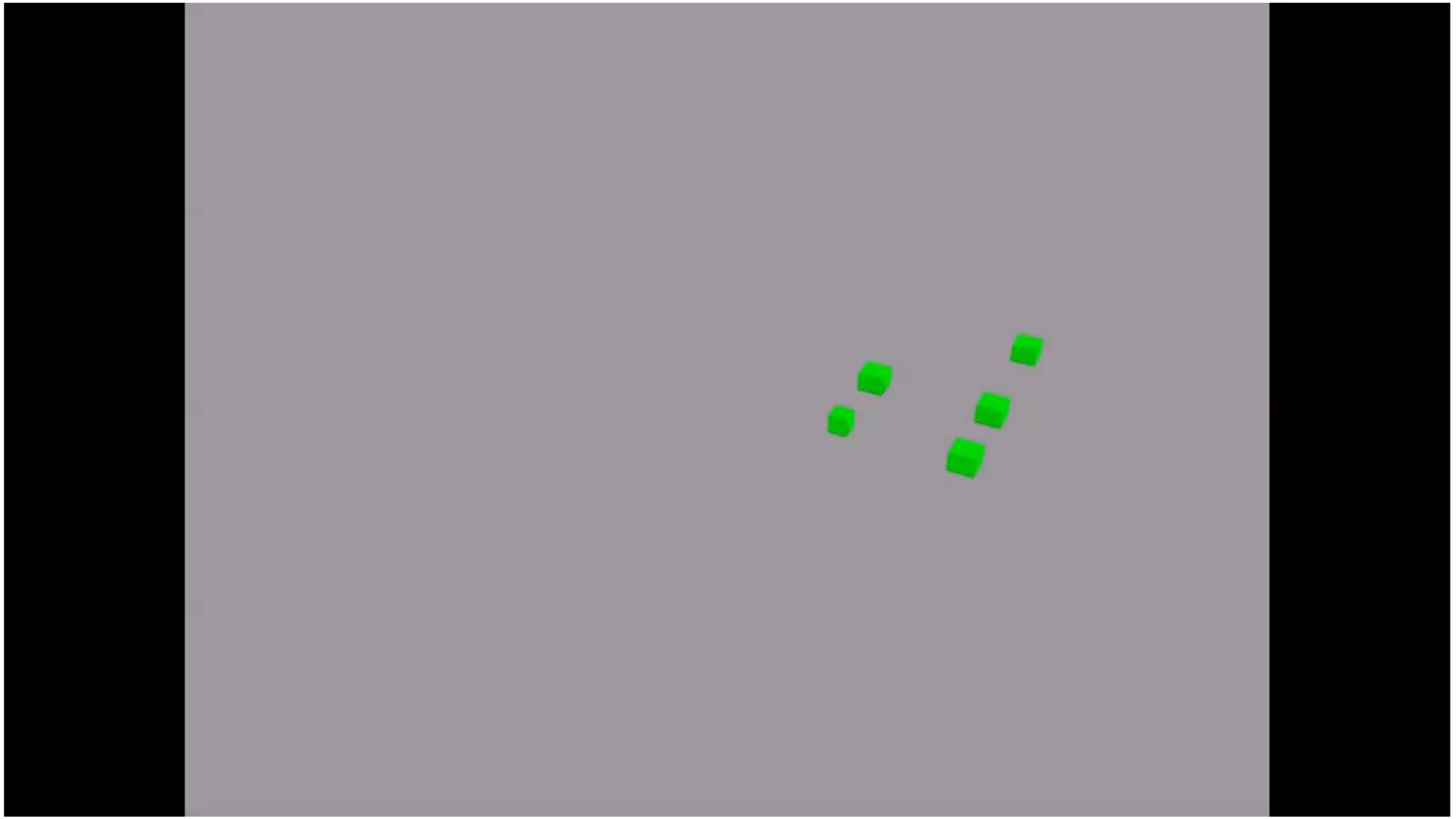


Introduction to 4d Simulation

4d Simulation it’s the process of linking time schedule with construction elements, so that it can easily give us an idea of how construction would be performed, tracked and reported.

Dia=1 Semana=1 Mes=06

4d Simulation Samples



Revit Introduction

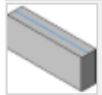
MODELING SOFTWARE

Allow us to create construction elements with parameters.

Model elements follow construction processes

Shared Parameters allow us to set custom values.

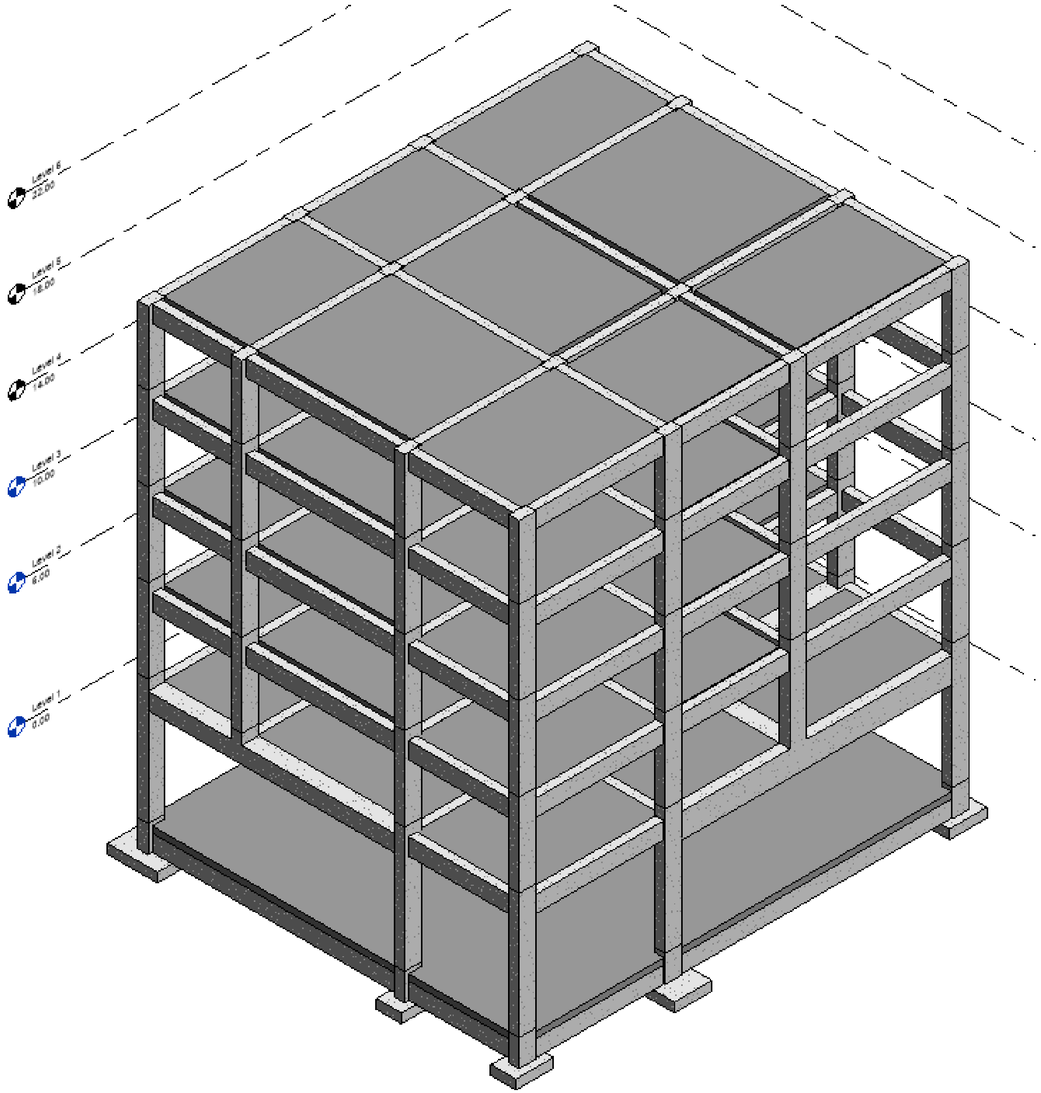
Properties



M_Concrete-Rectangular Beam
400 x 800mm

Structural Framing (Girder) (1) | Edit Typ

Constraints	
Reference Level	Level 6
Work Plane	Level : Level 6
Start Level Offset	0.0000
End Level Offset	0.0000
Orientation	Normal
Cross-Section Rotation	0.00°
Geometric Position	
yz Justification	Uniform
y Justification	Origin
y Offset Value	0.0000
z Justification	Top
z Offset Value	0.0000
Construction	
LO_Building	BA
LO_Level	L6
LO_Zones	G9
LO_Grid	1/2/C/D
SIMULATION	2_BA_L6
SIM_PART	2_BA_L6_9
TI_START	200618
TI_PRO	7
Materials and Finishes	
Structural Material	Concrete, Cast-in-Place gray
Structural	



Navisworks Introduction

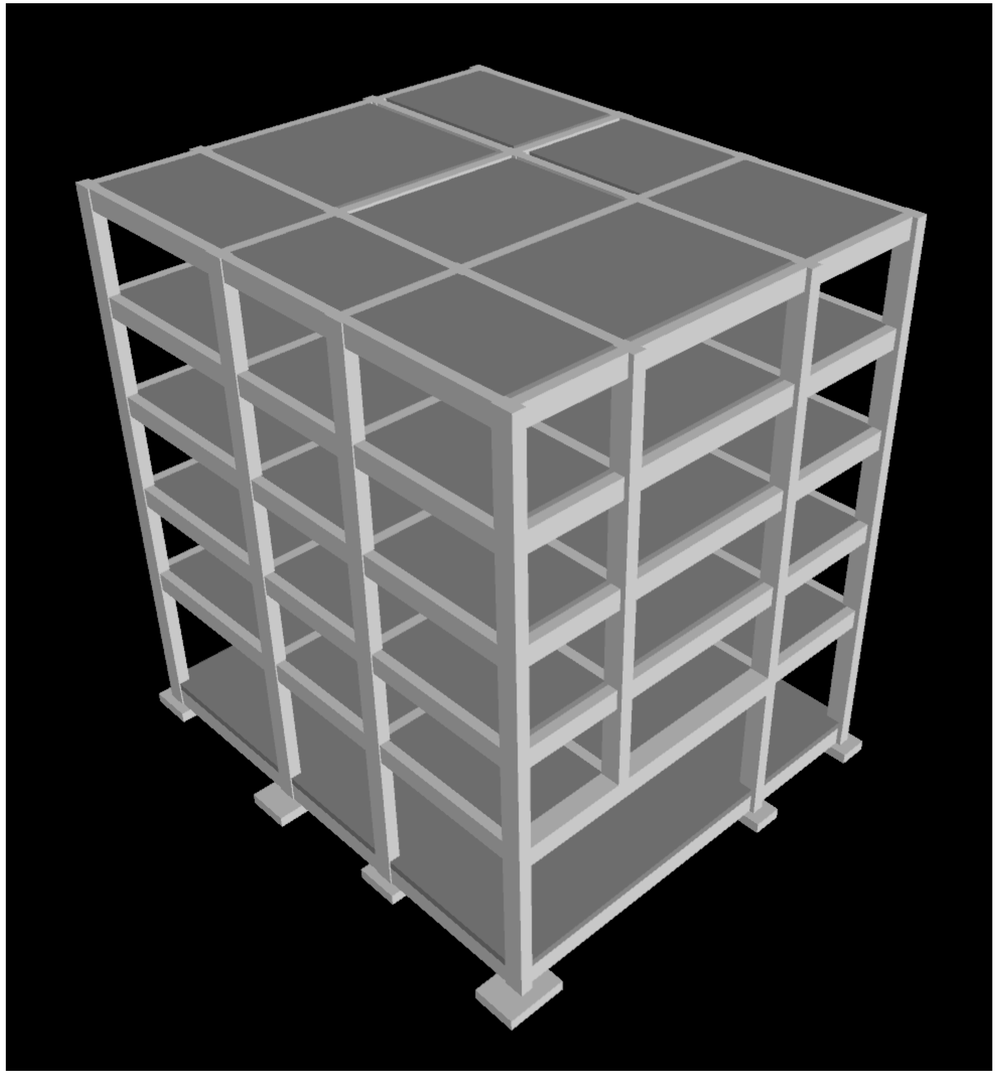
BIM PLATFORM SOFTWARE

Allow us to create interactions between several models and data types.

Reads all exported model properties so that values can be filtered out.

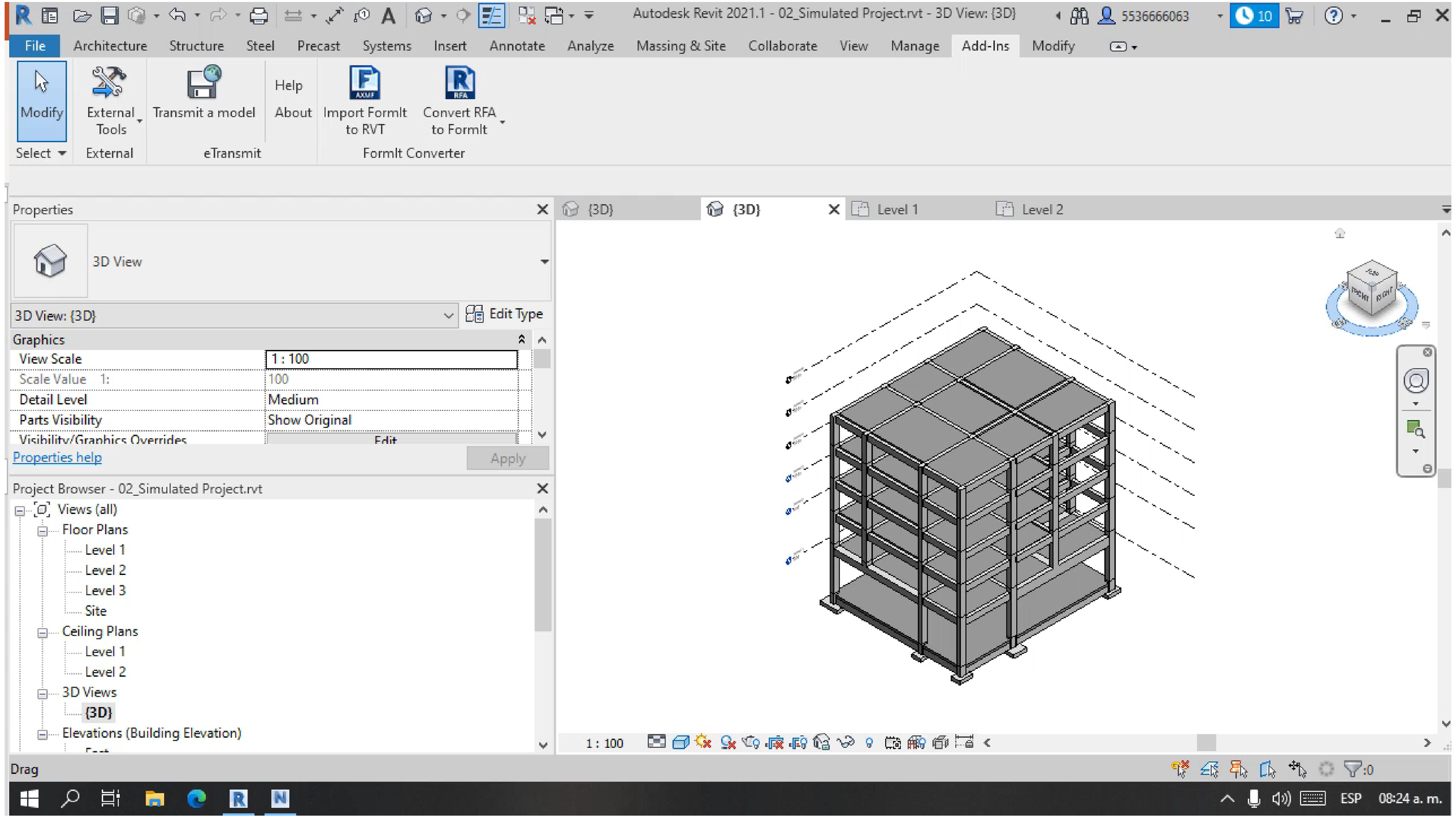
Creates 4d Simulation by the use of Parameters and Tasks

- Base Offset
- Building Story
- Category
- Column Location Mark
- Column Style
- Computation Height
- Cross-Section Rotation
- Cut Length
- Elevation
- Elevation at Bottom
- Elevation at Top
- Enable Analytical Model
- End Attachment Type
- End Level Offset
- Family
- Height Offset From Level
- Host
- Id
- Length



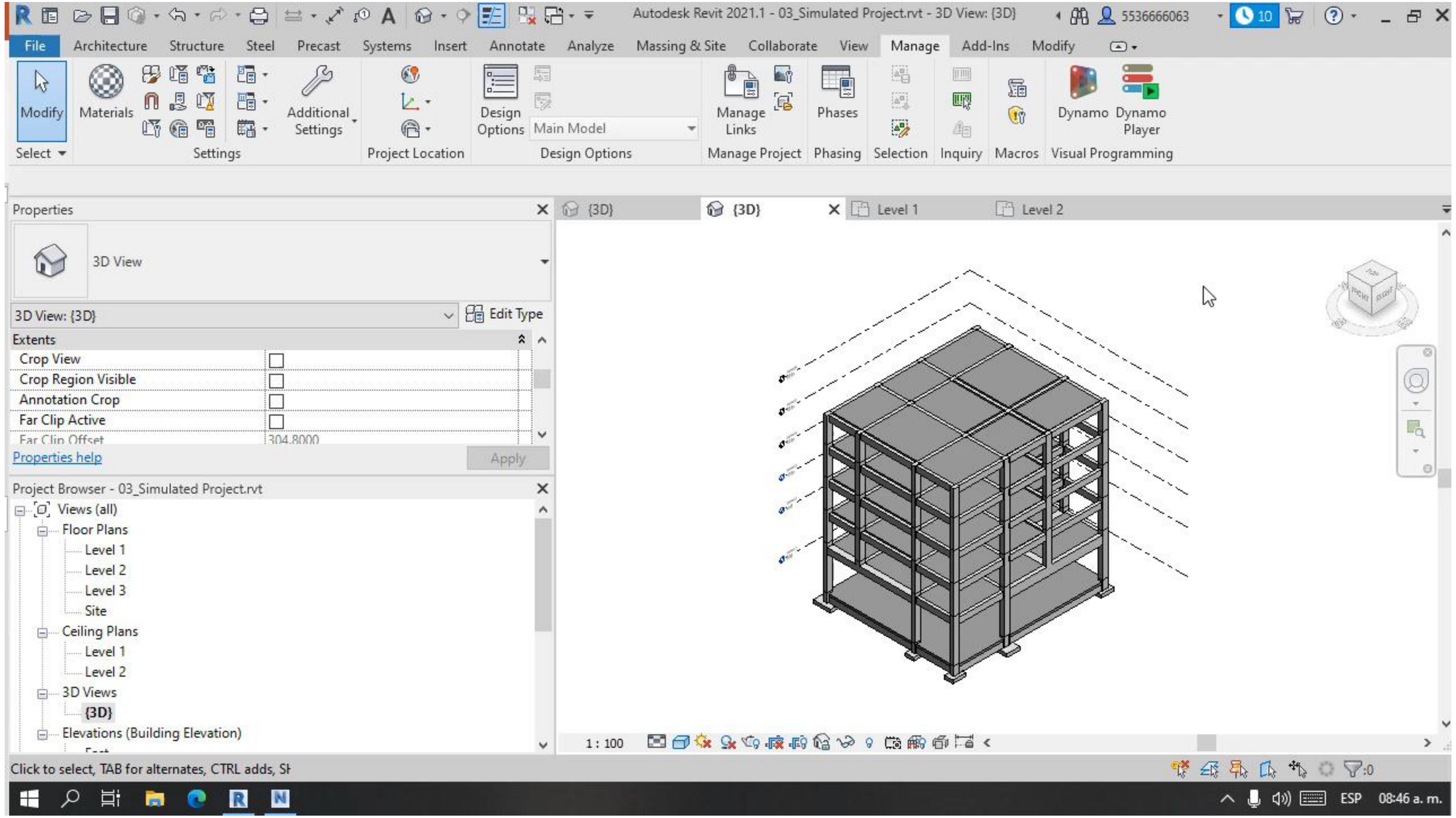
Basic Simulation Workflow

https://youtu.be/CAfxvtyf4gQ



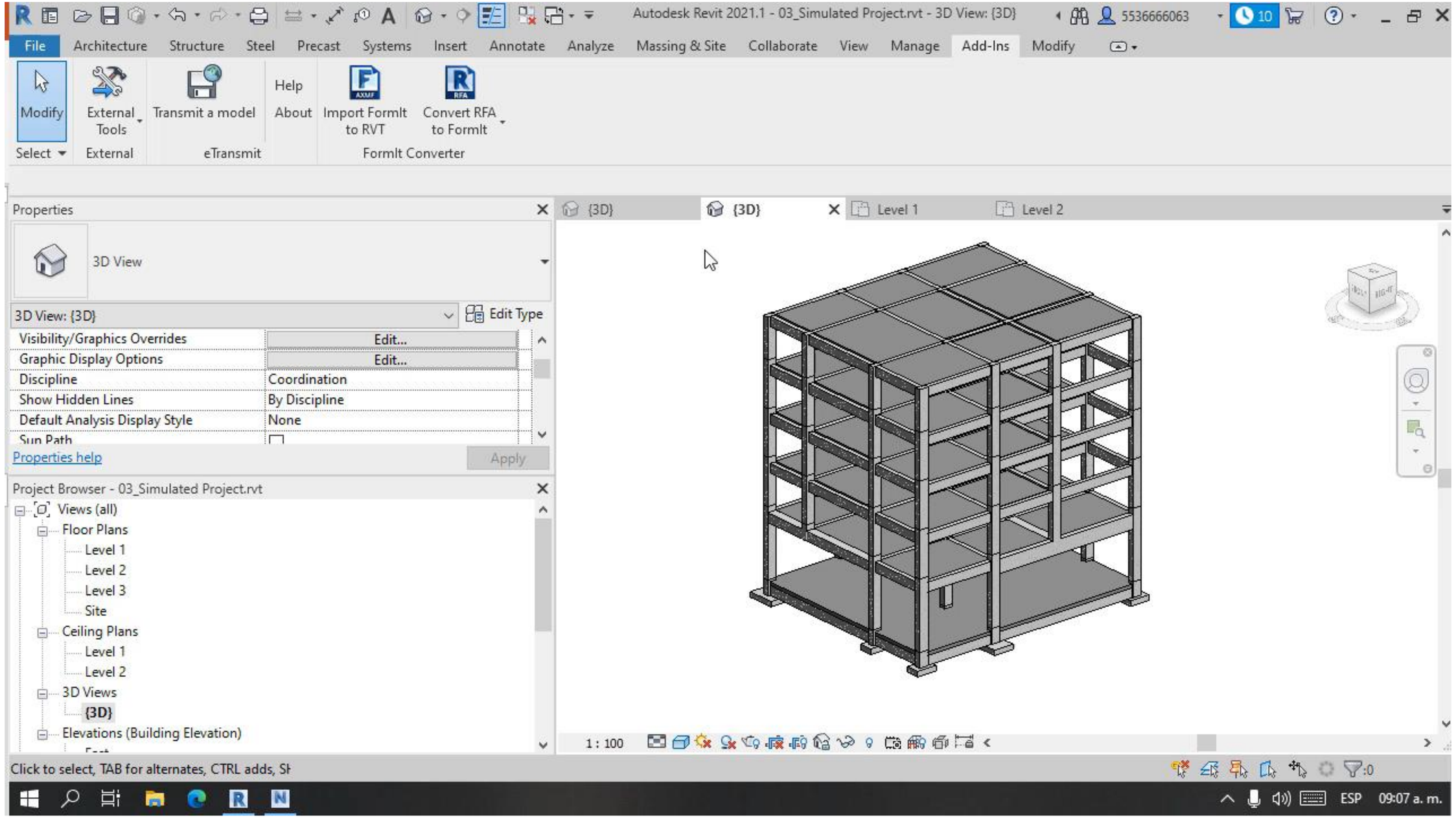
Parameters Simulation

https://youtu.be/jrJUiVzytjI

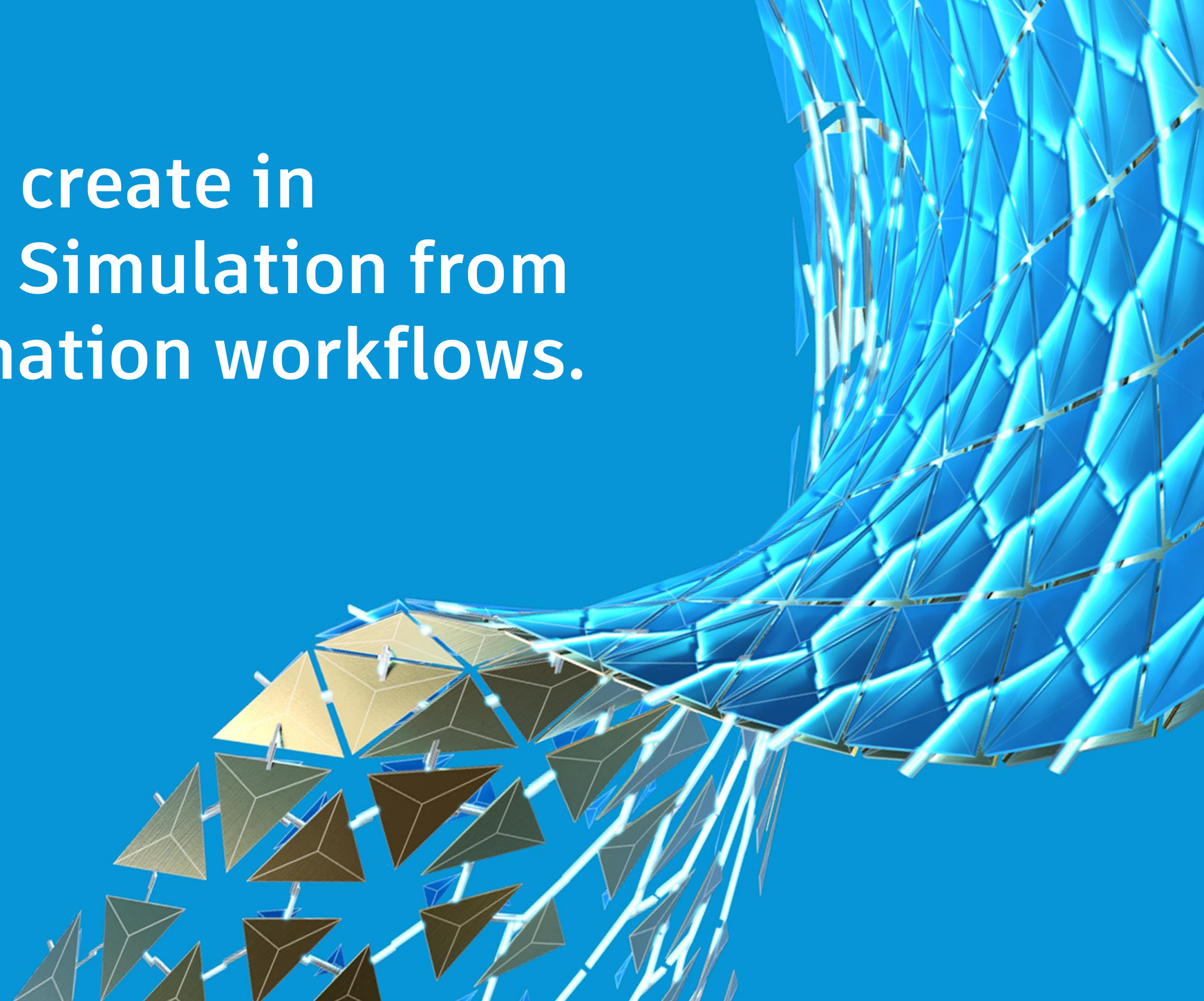


Simulation on Navisworks

https://youtu.be/9cVG7TJokXE



Learn how to create in minutes a 4d Simulation from model information workflows.



Create 4d Simulation in Minutes

So far, all elements covered would create a functional 4d Simulation, but thinking on all the information that its already on the model and the possibilities to cross it, it should be a better way that improves time of creation and linking with model elements

Dynamo as a Game Changer.

Playground Application used for:

- Improve Complex Modeling
- Automate Repetitive Tasks
- Set Model Management
- Transform Model Information
- Create interoperability between different files.

Three Types of Audiences

- Raw Users – That would pull all nodes form scratch and link with normal coding
- Medium Users - That would use workflow scripts and custom nodes to complete their requirements
- Low Users – That would just use the Dynamo Player, as their working tool.

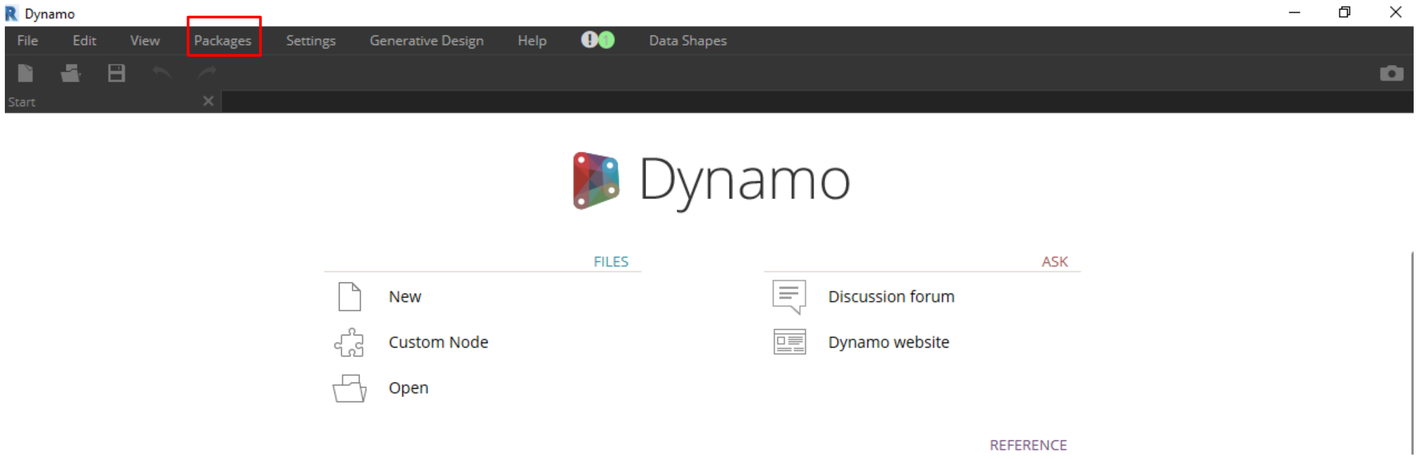
Dynamo Configuration

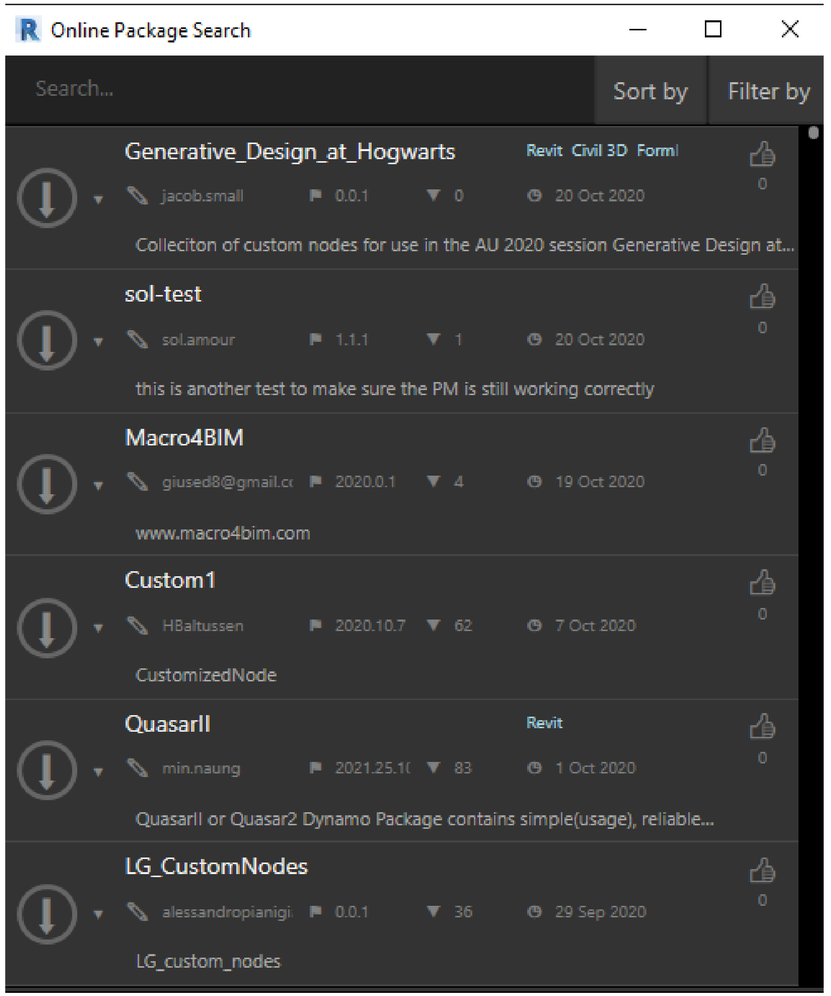
For this project it would be used dynamo with the following packages

Rhythm

DataShapes

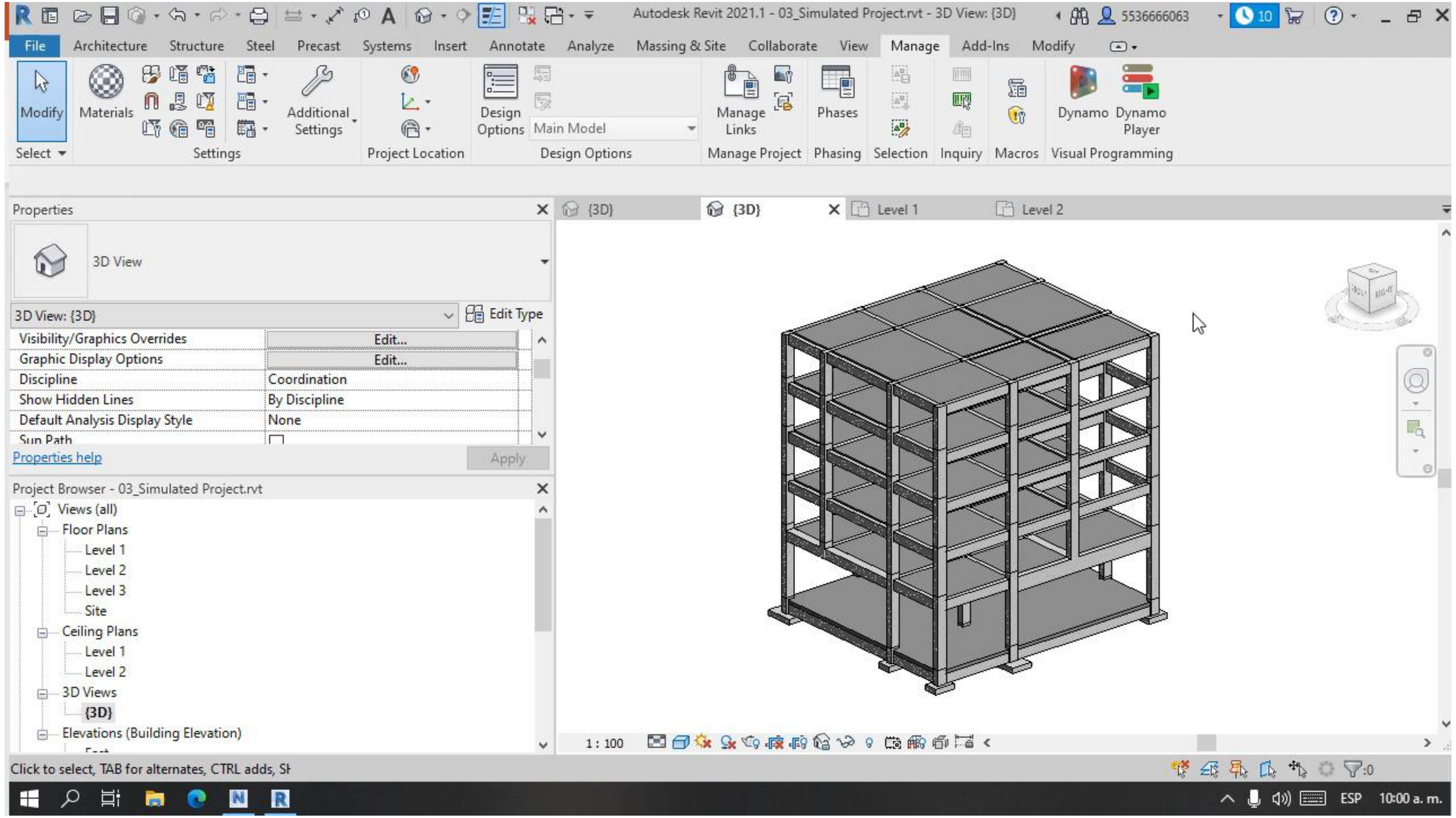
Practical BIM





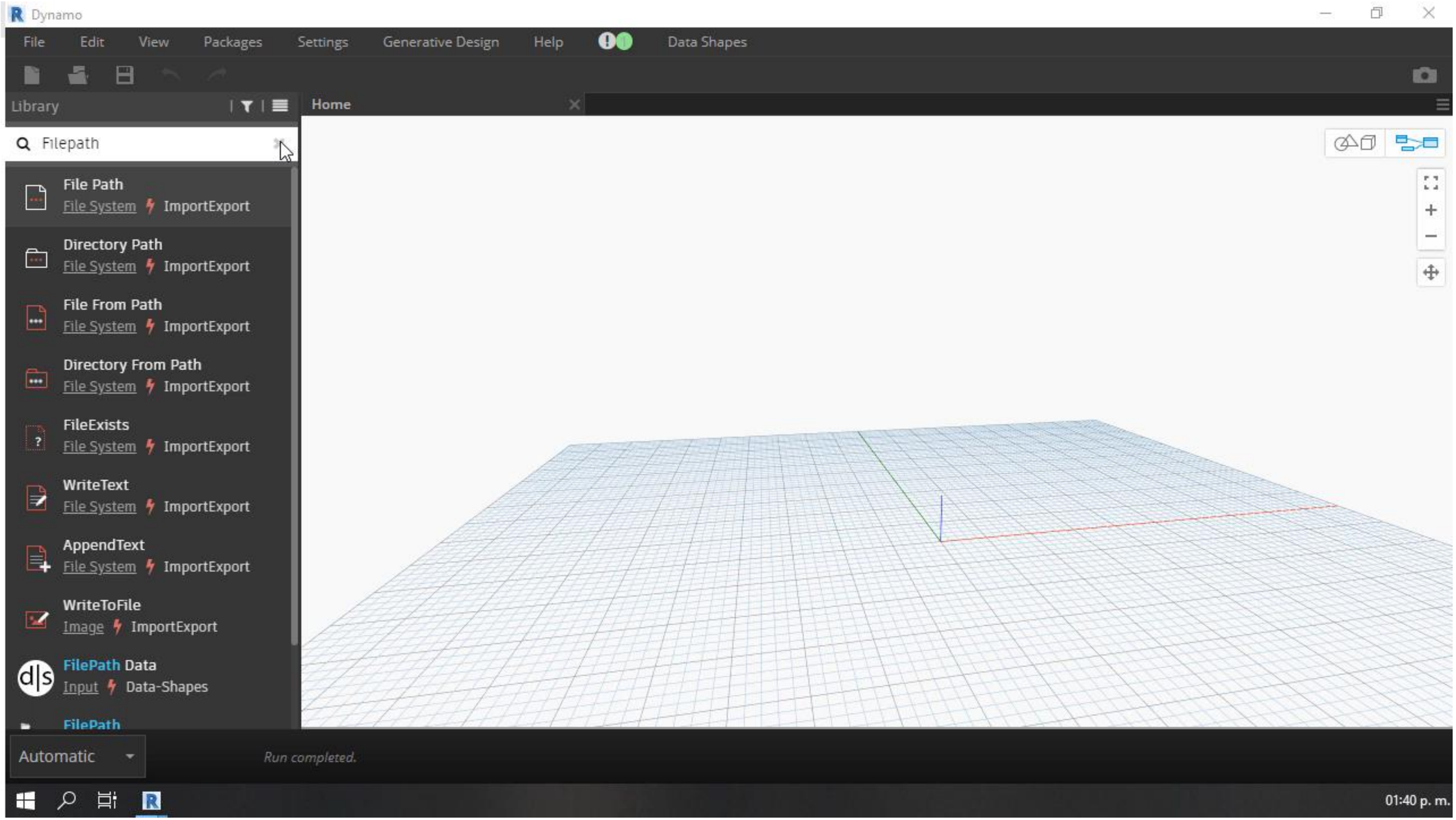
Using Dynamo for Writing the SIMULATION Parameter.

https://youtu.be/9gjykckxZMs



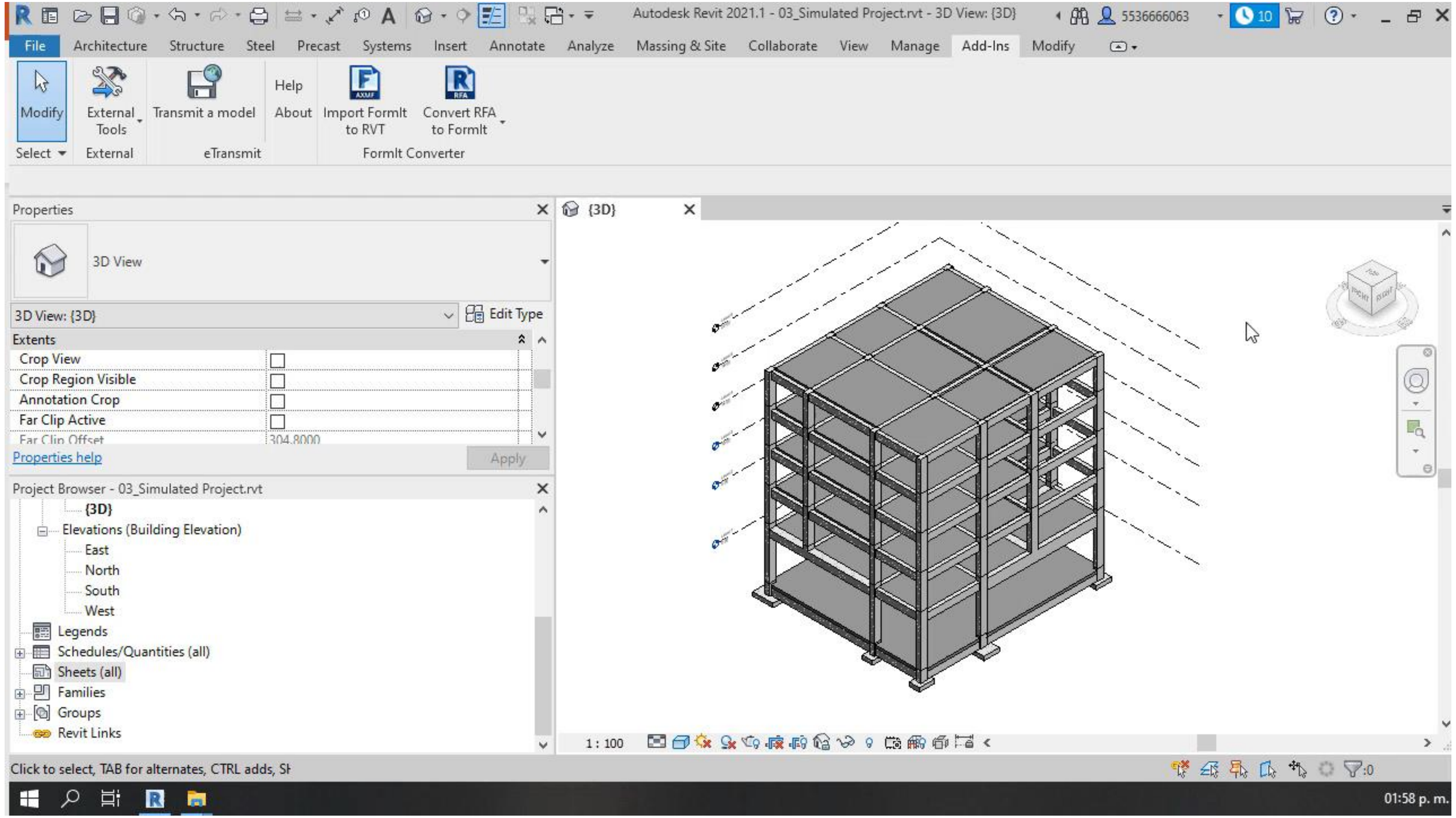
Creating a Time Schedule by Model Properties.

https://youtu.be/wPPgU66jBNU

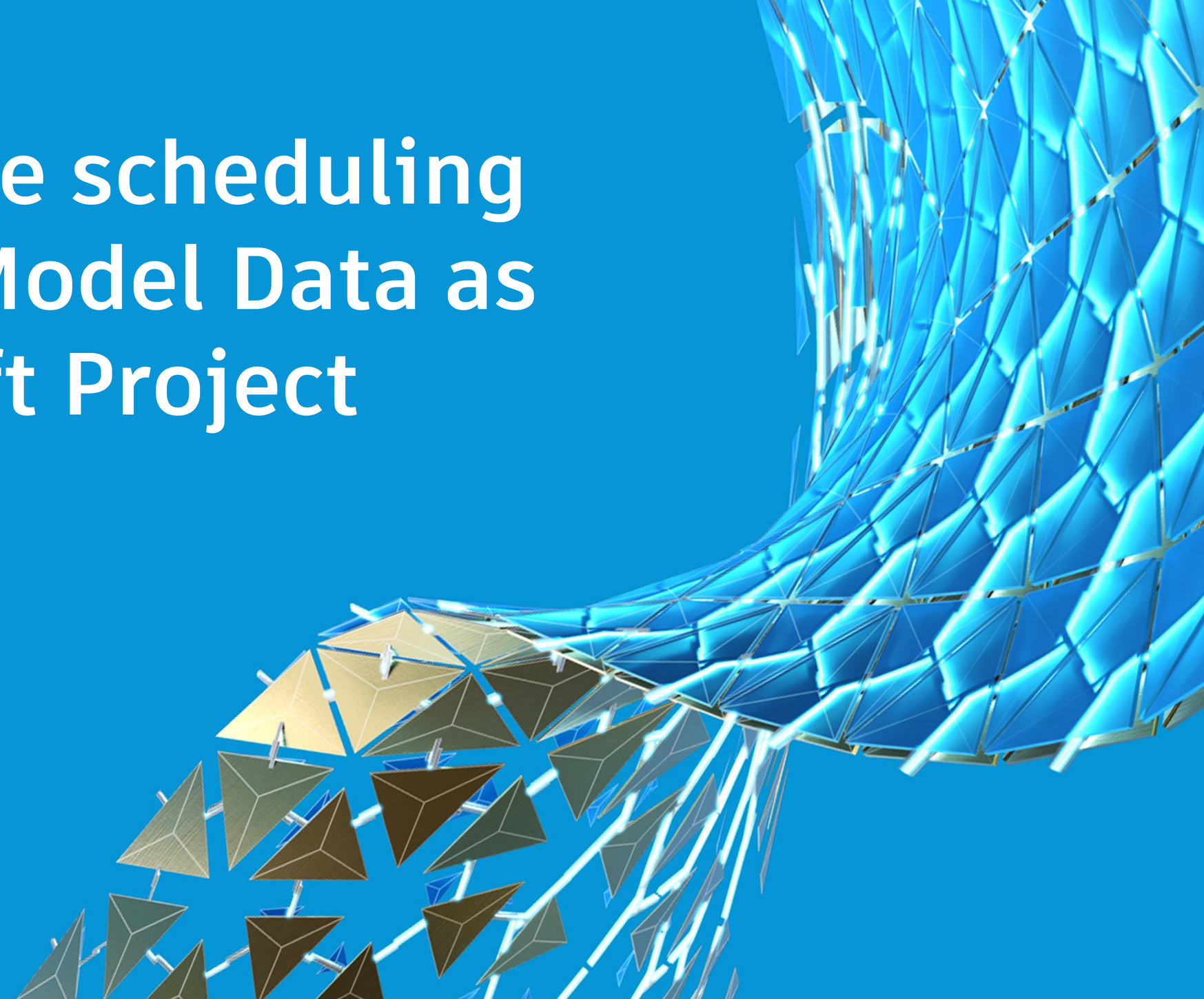


Linking the Result on Navisworks.

https://youtu.be/uPdK0qP-vJs

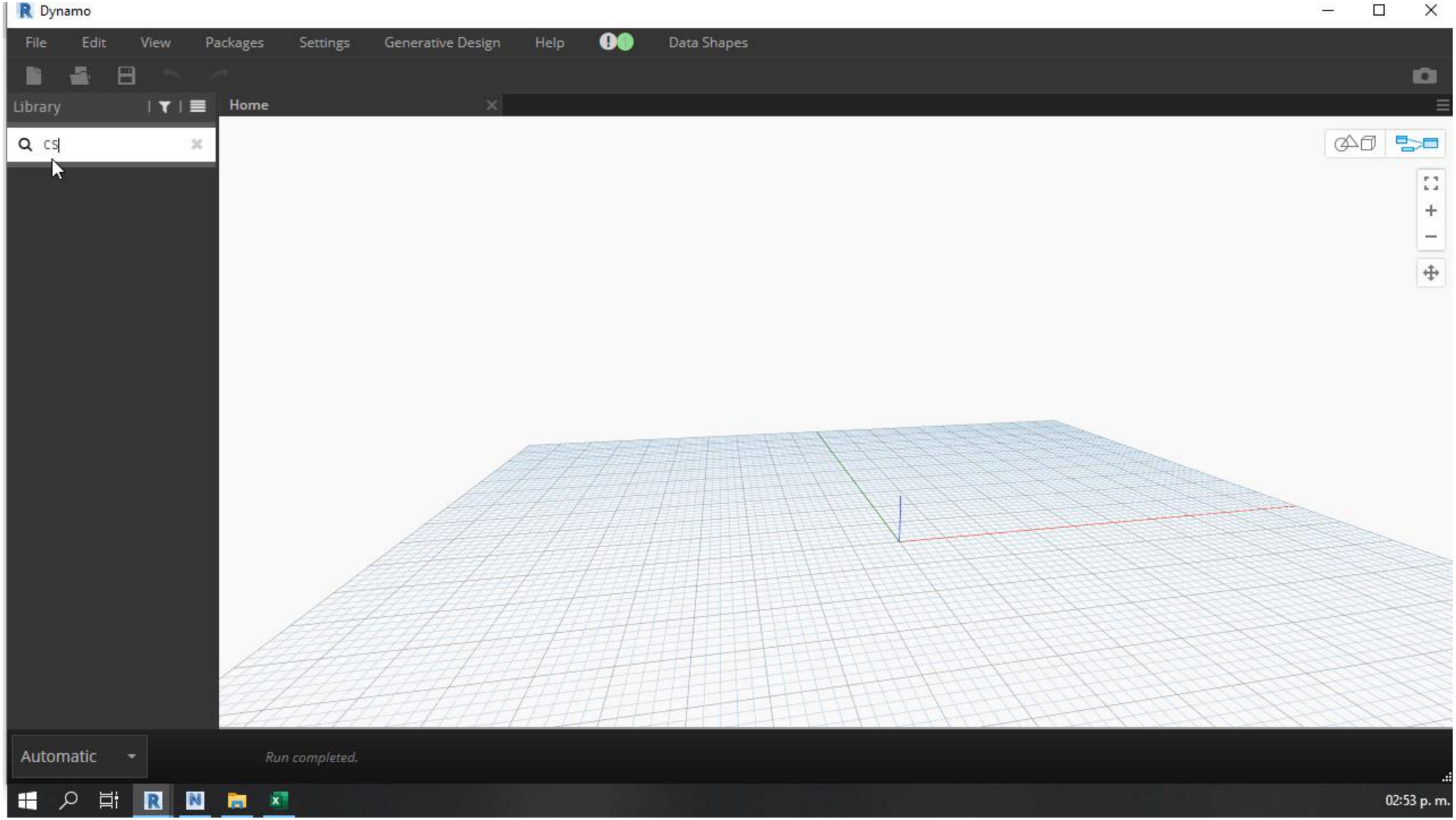


Create time scheduling from the Model Data as a Microsoft Project output.



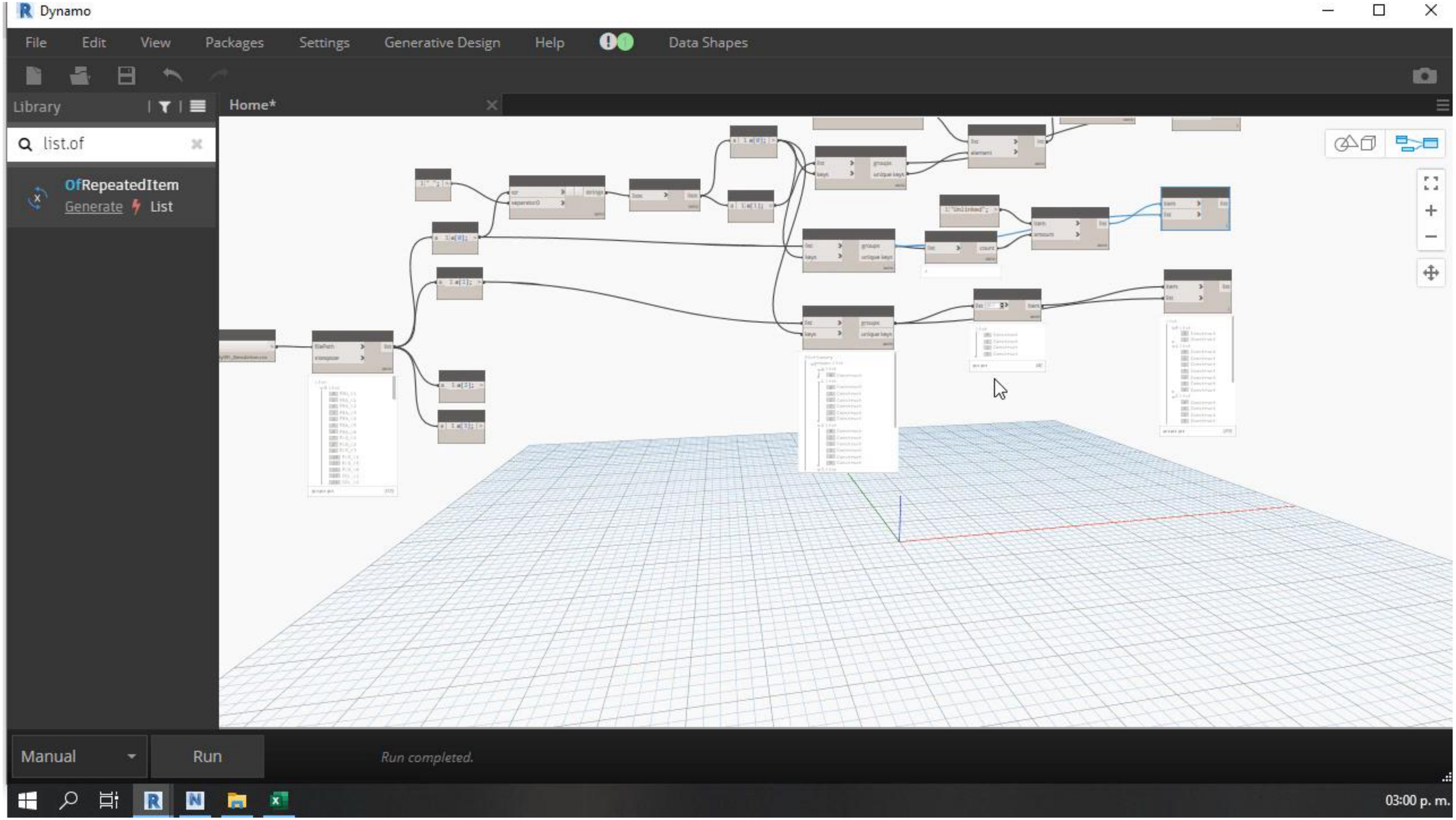
Creating a CSV Structure for MS Project

https://youtu.be/dt7AF1msvN8



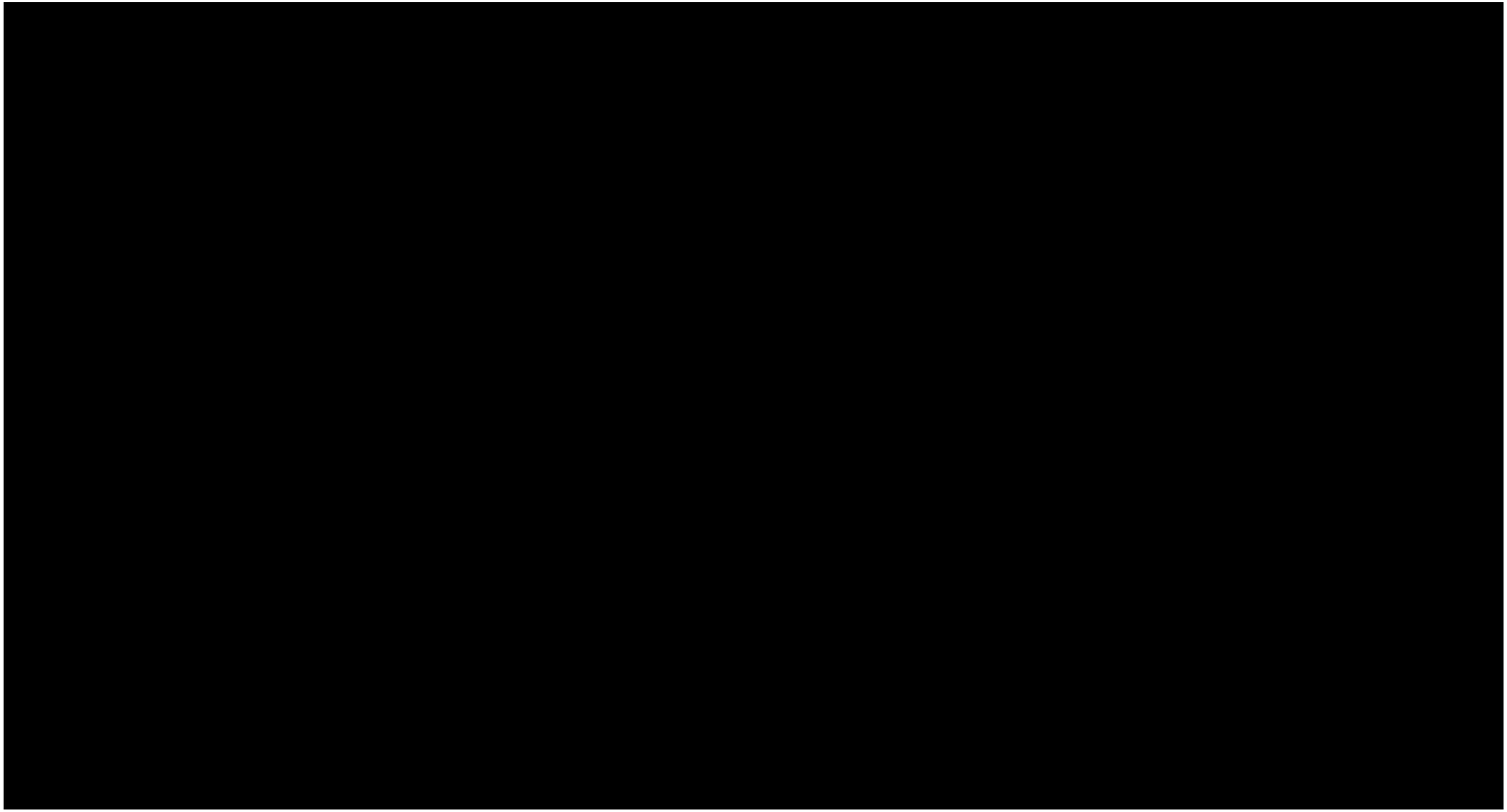
Setting Time Constraints

https://youtu.be/0Aet2IbVJwM

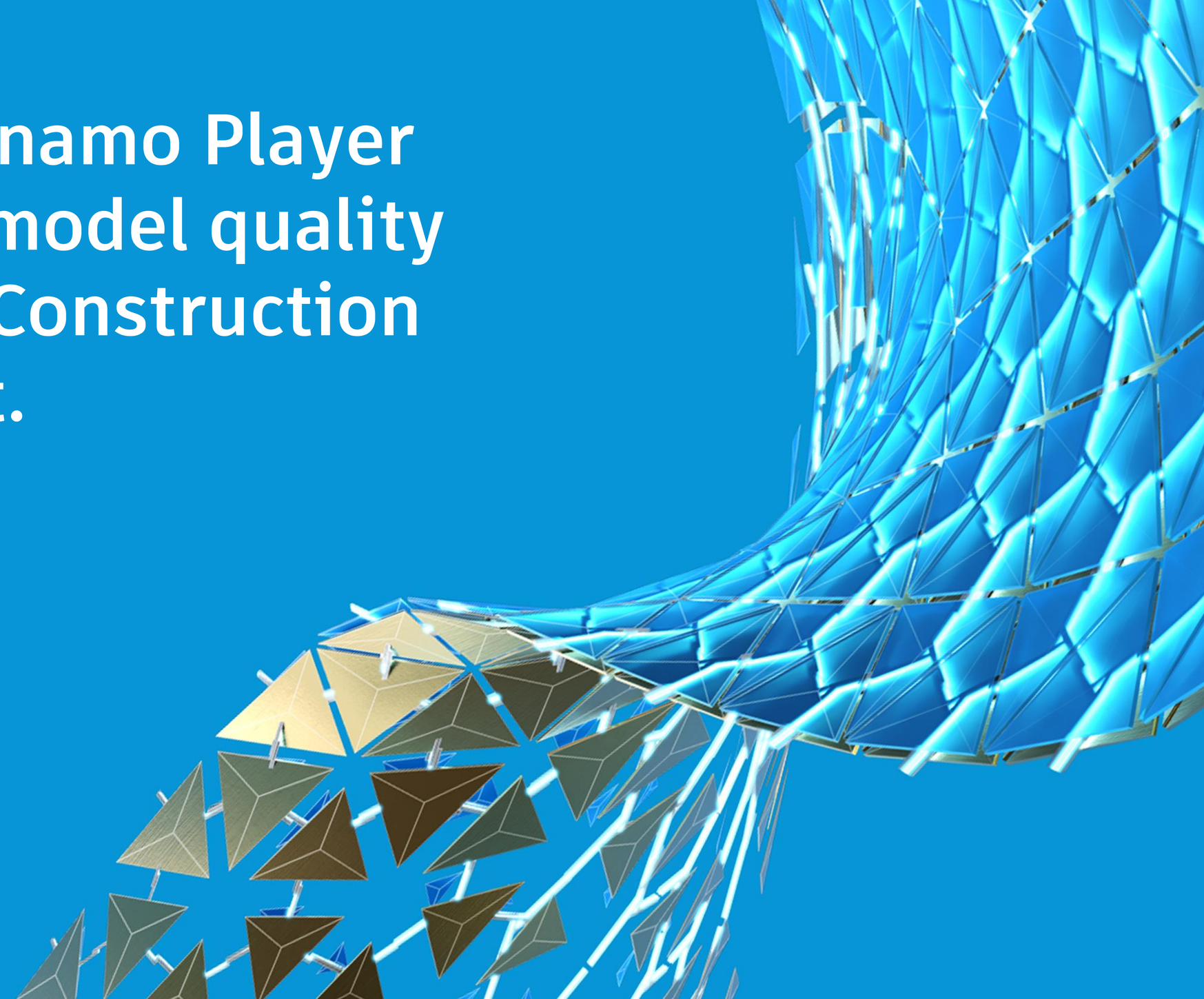


Configuring MS Project Output

https://youtu.be/1w59O4i5mWM



Integrate Dynamo Player Routines as model quality Checkup for Construction Management.



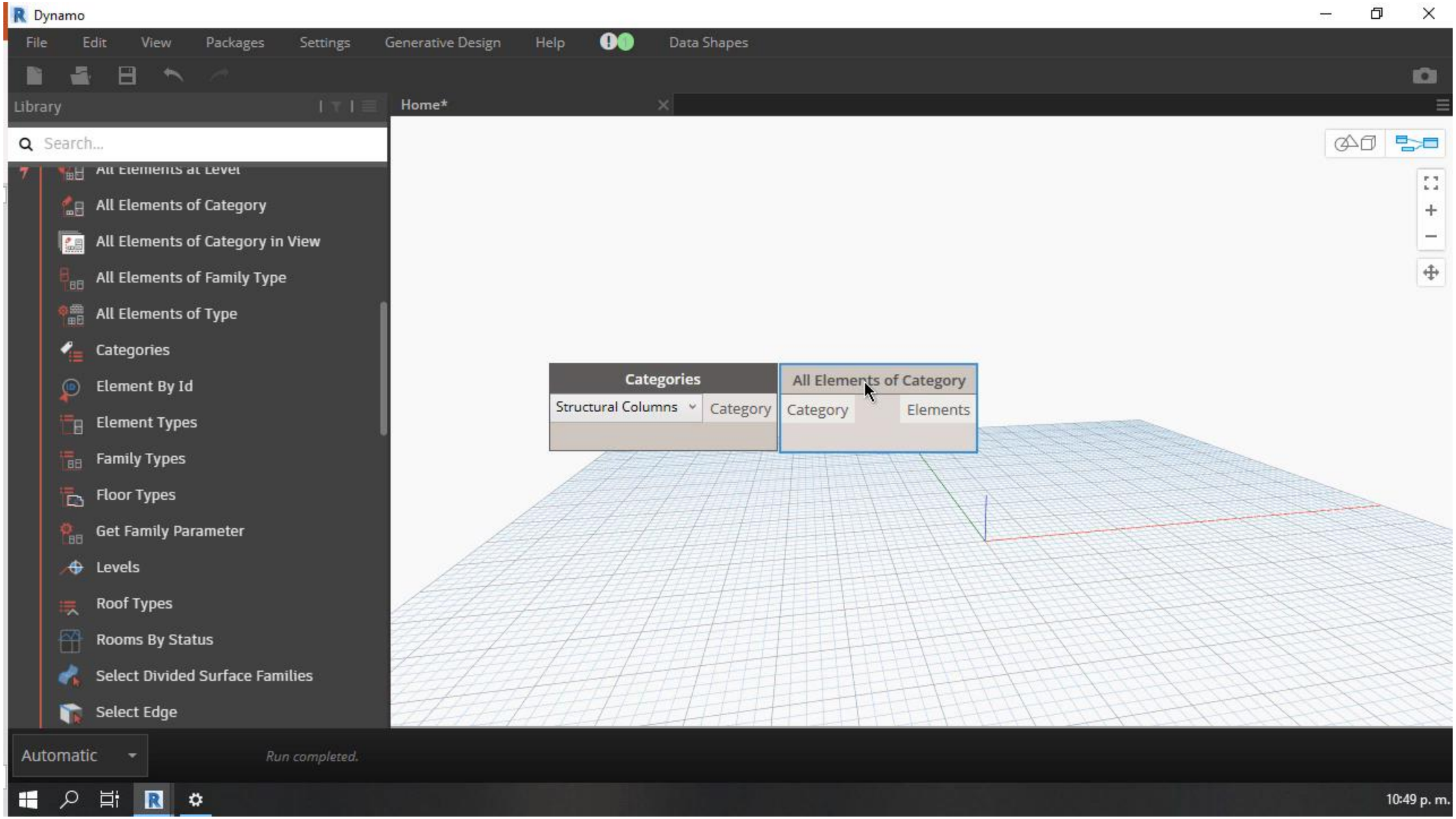
Single Dynamo Player Routines

As we have seen so far Dynamo Uses Extend widely because you can program once and use it for multiple purpouses.

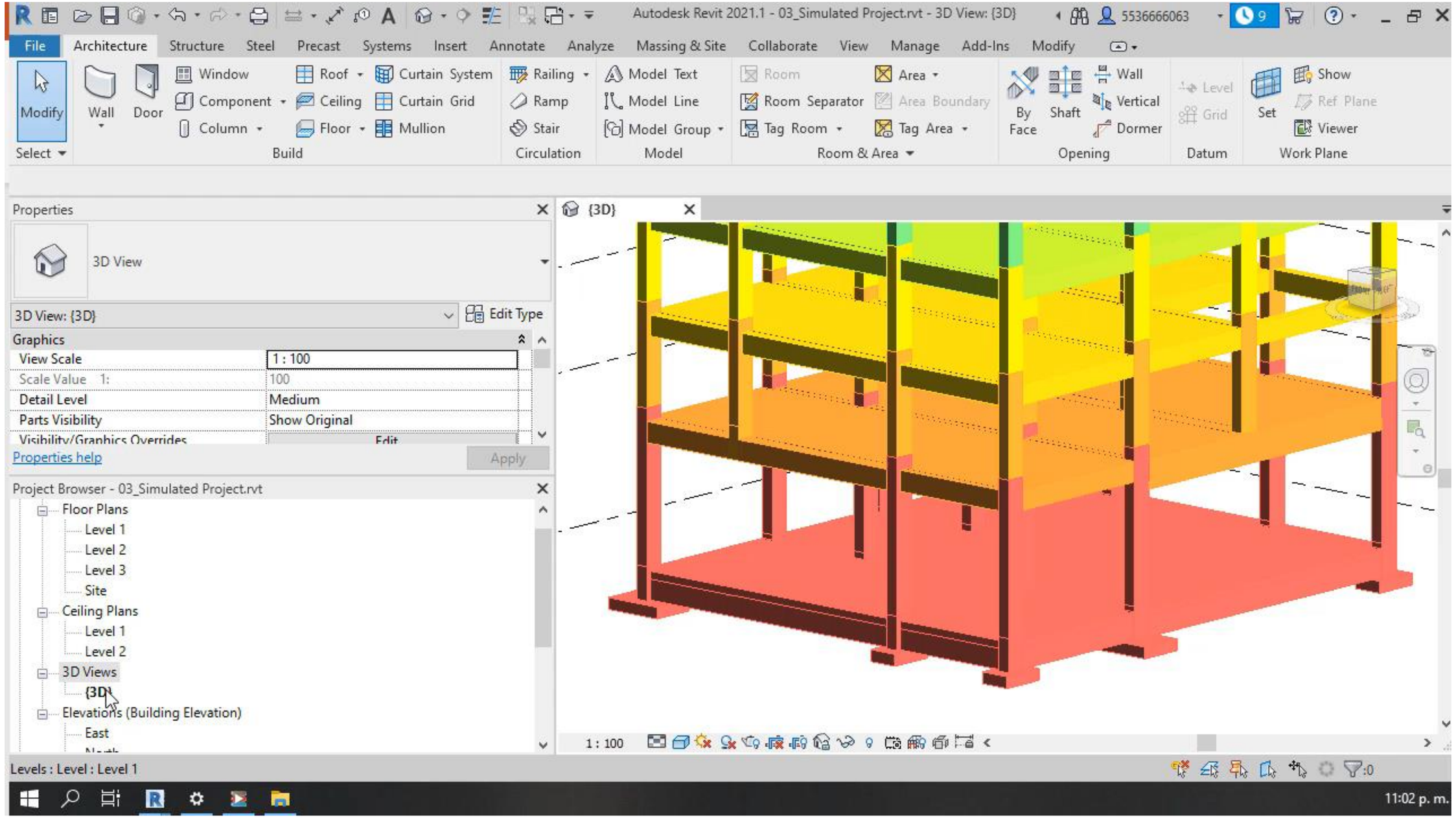
So Next seccion will use Dynamo Player for creating quality check up routines.

Coloring by Parameter or Value

https://youtu.be/fN4WGogSWRE

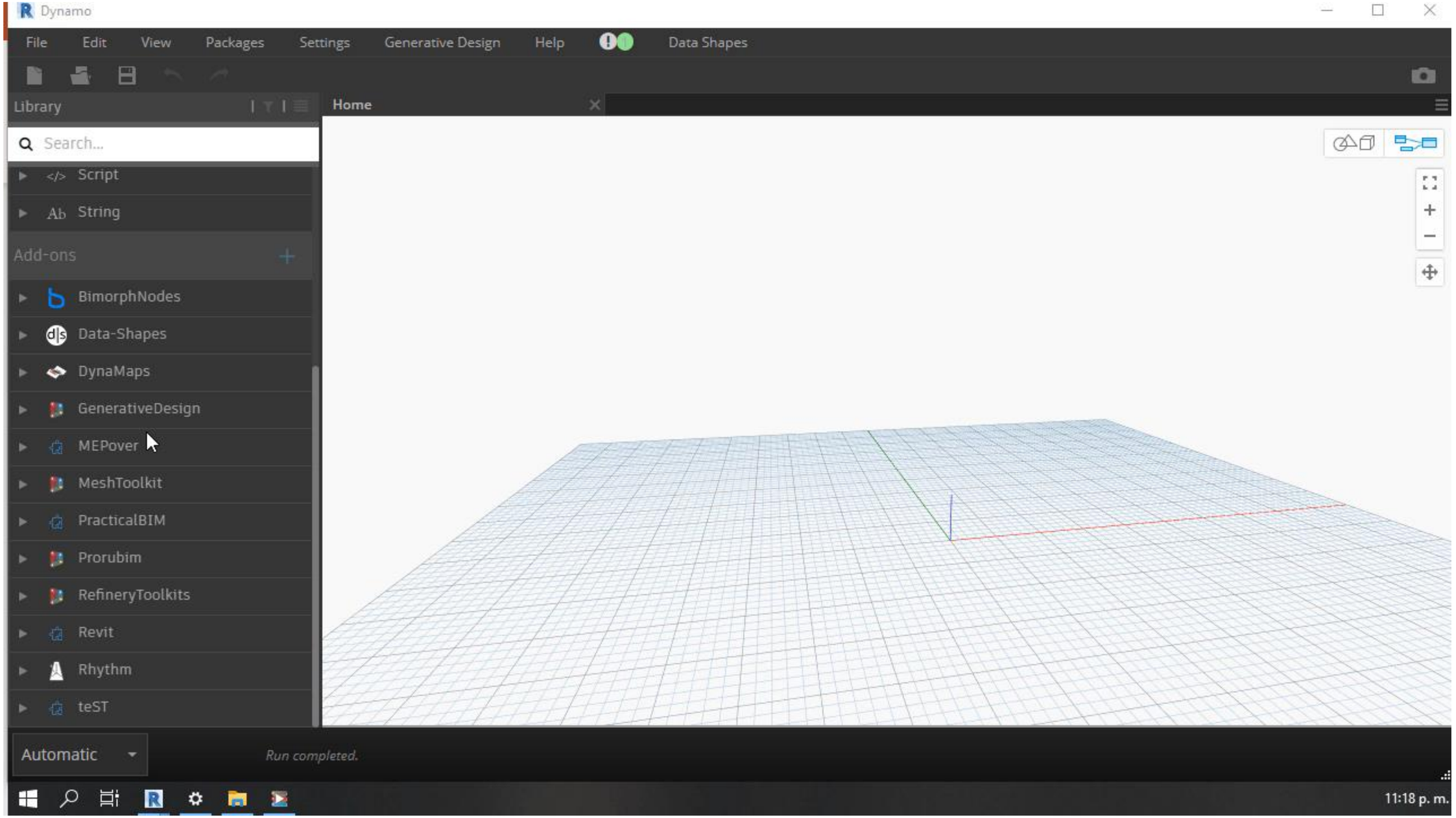


Splitting Floor Elements on the Model https://youtu.be/MXILYXu2qIU

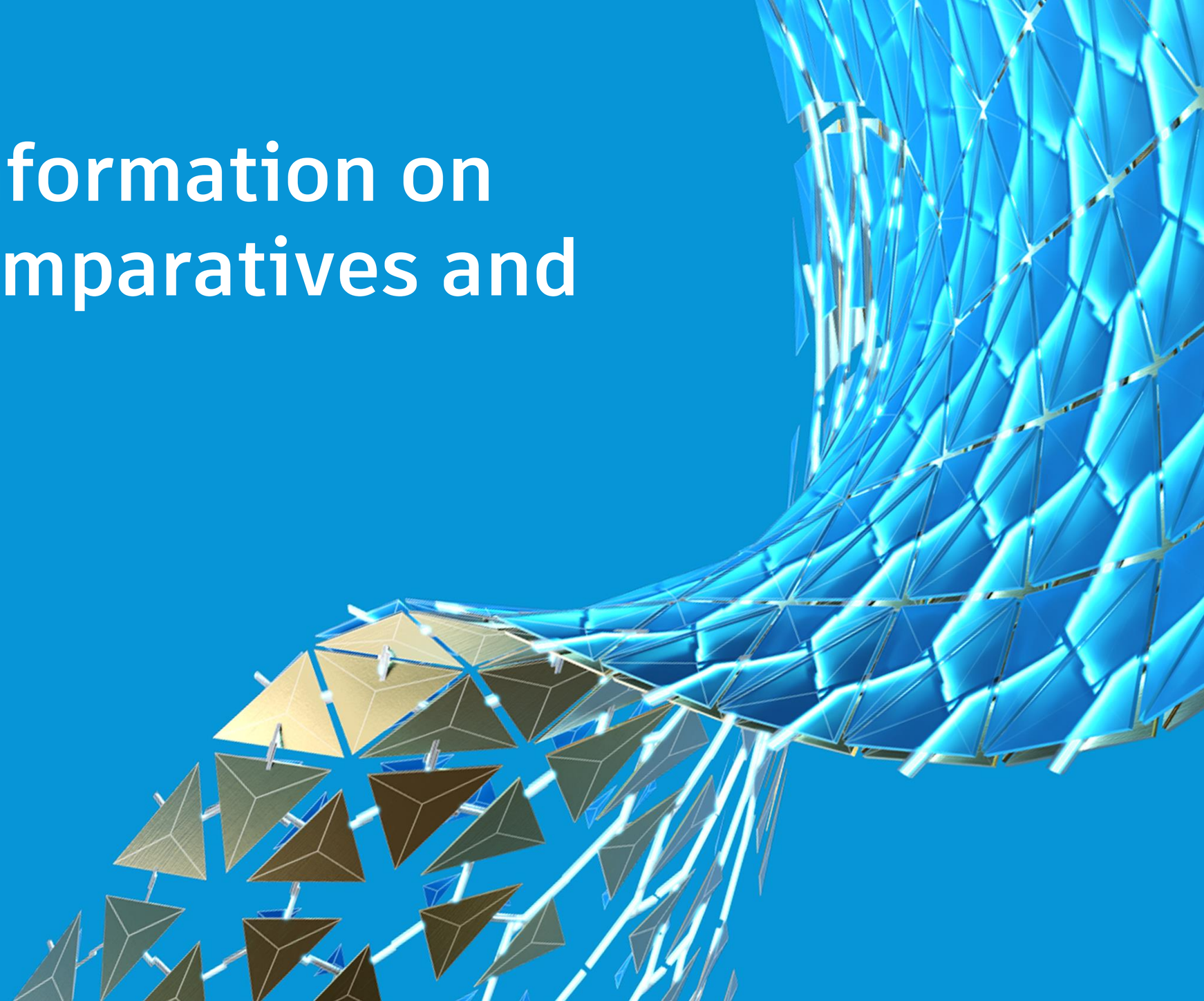


Renaming Levels by Elevation

https://youtu.be/aKsLWRveWik

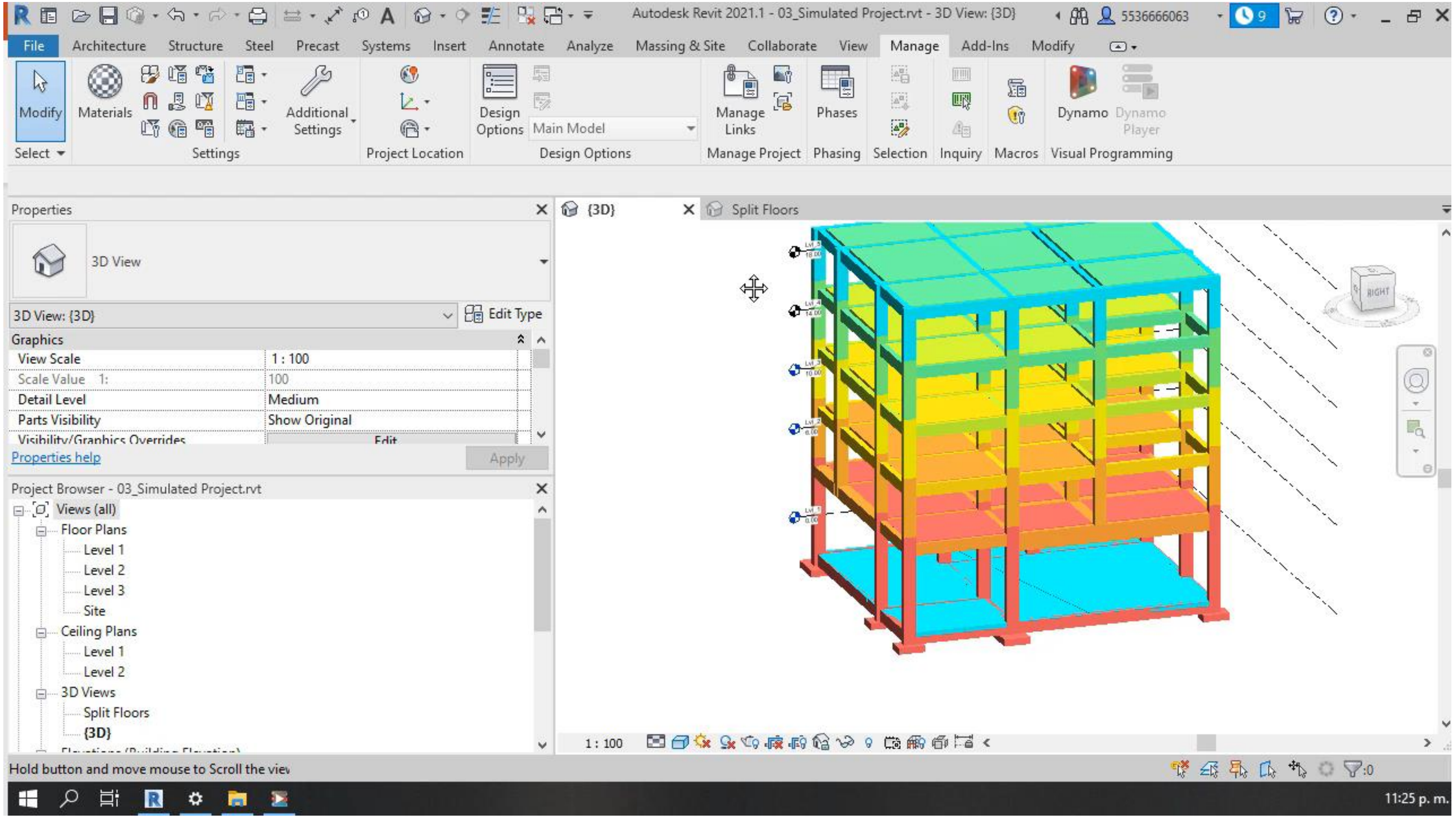


Use Time Information on Revit for Comparatives and Analysis.



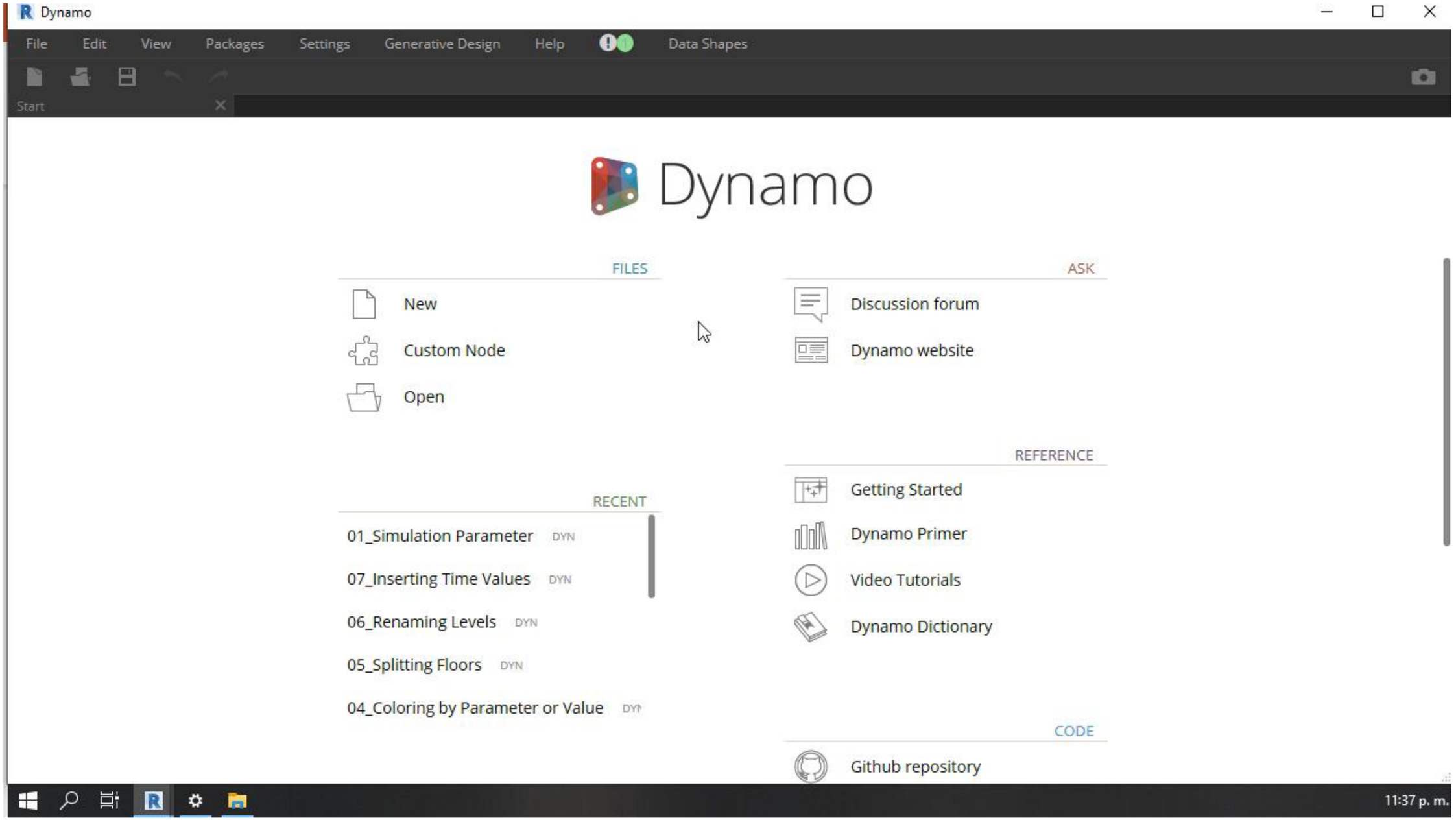
Inserting Time Information into the Model

https://youtu.be/Ttkqy4TdHfo



Comparing time from elements.

https://youtu.be/wo0O2zAm0ow



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