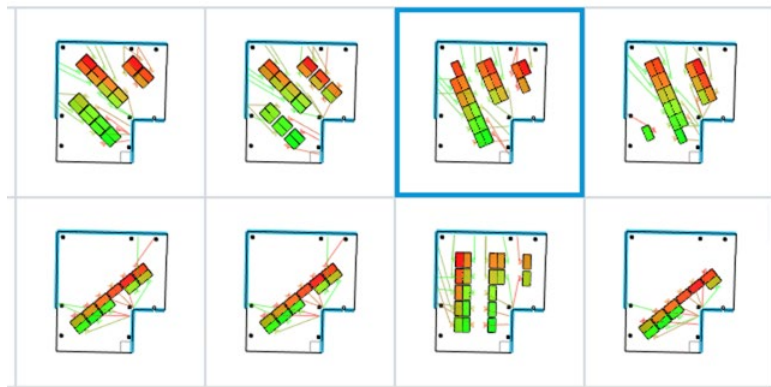


# Generative Design

New in Revit 2021

Revit help: [About Generative Design](#)

“As an architect who uses Revit but is not a skilled computational designer, I want to perform generative studies so that I can evaluate better performing design alternatives.”



“It will be a huge time saver  
to generate and evaluate  
options so quickly”

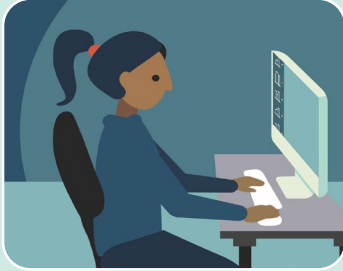
AU Idea Exchange Participant

“This will automate  
repetitive work and create  
better designs”

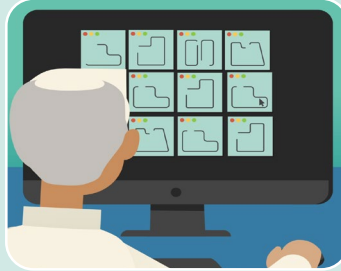
AU Idea Exchange Participant

# Benefits of Generative Design

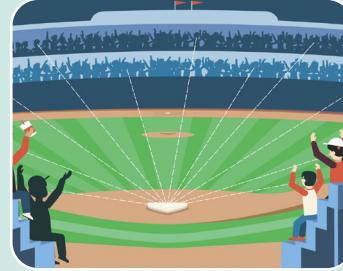
[Video: Introduction to Generative Design](#)



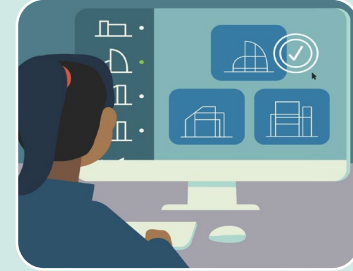
Designers can generate options using the power of computation



Explore the full range of options while focusing on the higher performing solutions



Gain more insight into your designs by studying the relationships between inputs and results at scale



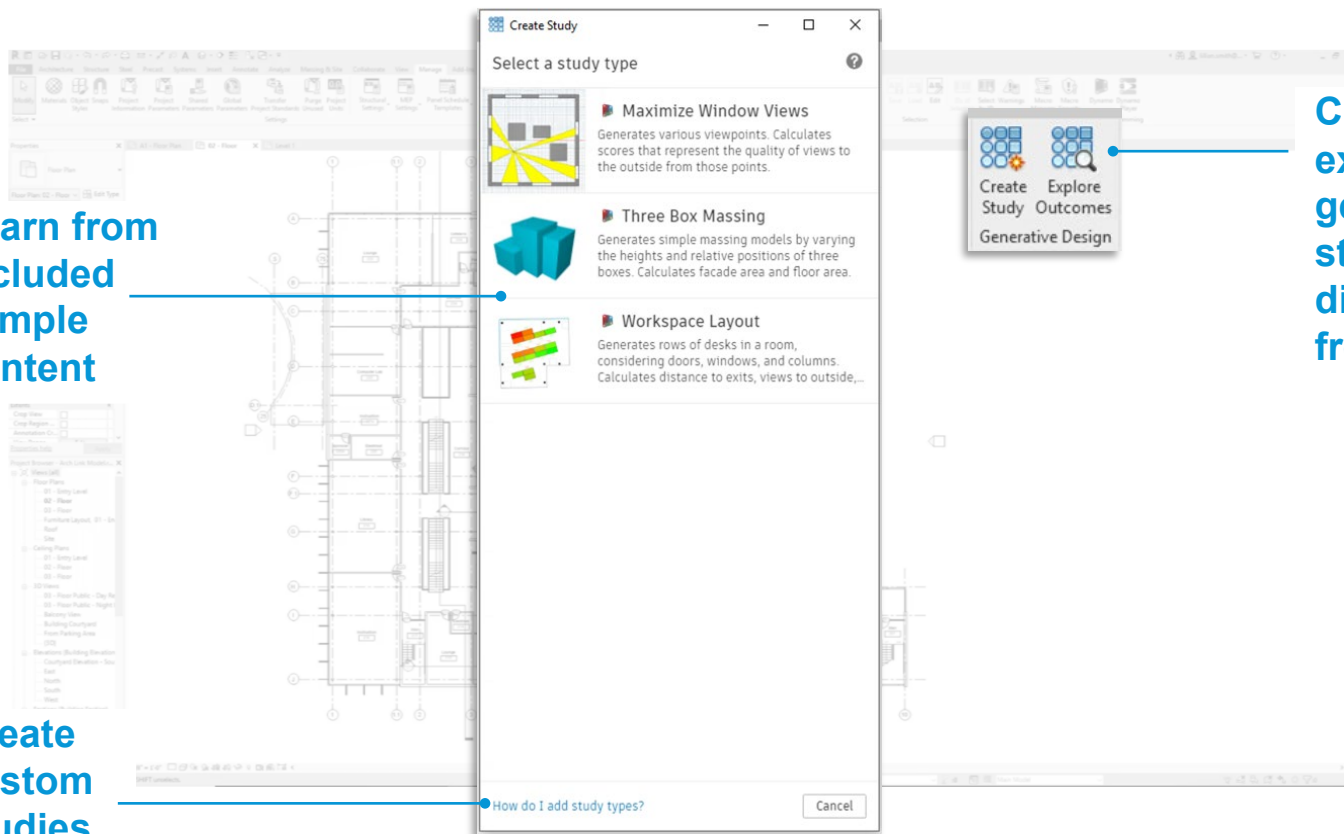
Make more informed decisions in less time by leveraging what is learned in each study

# Create a Study

[Video: Create a Study](#)

Learn from  
included  
sample  
content

Create  
custom  
studies



Create and  
explore  
generative  
studies  
directly  
from Revit\*

\* For AEC Collection and enterprise subscribers

# Define the Study

Revit help: [About Generation Methods](#)

The image shows the 'Define Study' dialog box in Revit, overlaid on a floor plan. The dialog box is titled 'Workspace Layout' and contains the following sections:

- Study Name:** Workspace Layout 001
- Method:** Optimize
- Select in model:**
  - Select a room (Element : 281513) [Select]
  - Select desk family instance (Element : 281519) [Select]
- Choose variables:**
  - ☒ Desk row rotation: -90 to 90
  - ☒ Spacing between rows (ft): 10 to 16
- Set goals:**
  - ☒ Average distance to exits: ☒ Minimize ☐ Maximize
  - ☒ Views to outside: ☒ Minimize ☐ Maximize
  - ☒ Number of desks: ☒ Minimize ☐ Maximize
- Set constraints:**
  - ☐ Average distance to exits: Min [ ] Max [ ]
  - ☐ Views to outside: Min [ ] Max [ ]
  - ☐ Number of desks: Min [ ] Max [ ]
- Generation Settings:**

At the bottom of the dialog box, there is a link 'How do I define a study?' and two buttons: 'Cancel' and 'Generate'.

Annotations with blue lines point to the following elements:

- Set design goals:** Points to the 'Set goals' section.
- Select Revit elements to use in the study\*:** Points to the 'Select in model' section.
- Generate design alternatives:** Points to the 'Generate' button.

\* For AEC Collection and enterprise subscribers

# Explore Outcomes

[Video: Explore Outcomes](#)

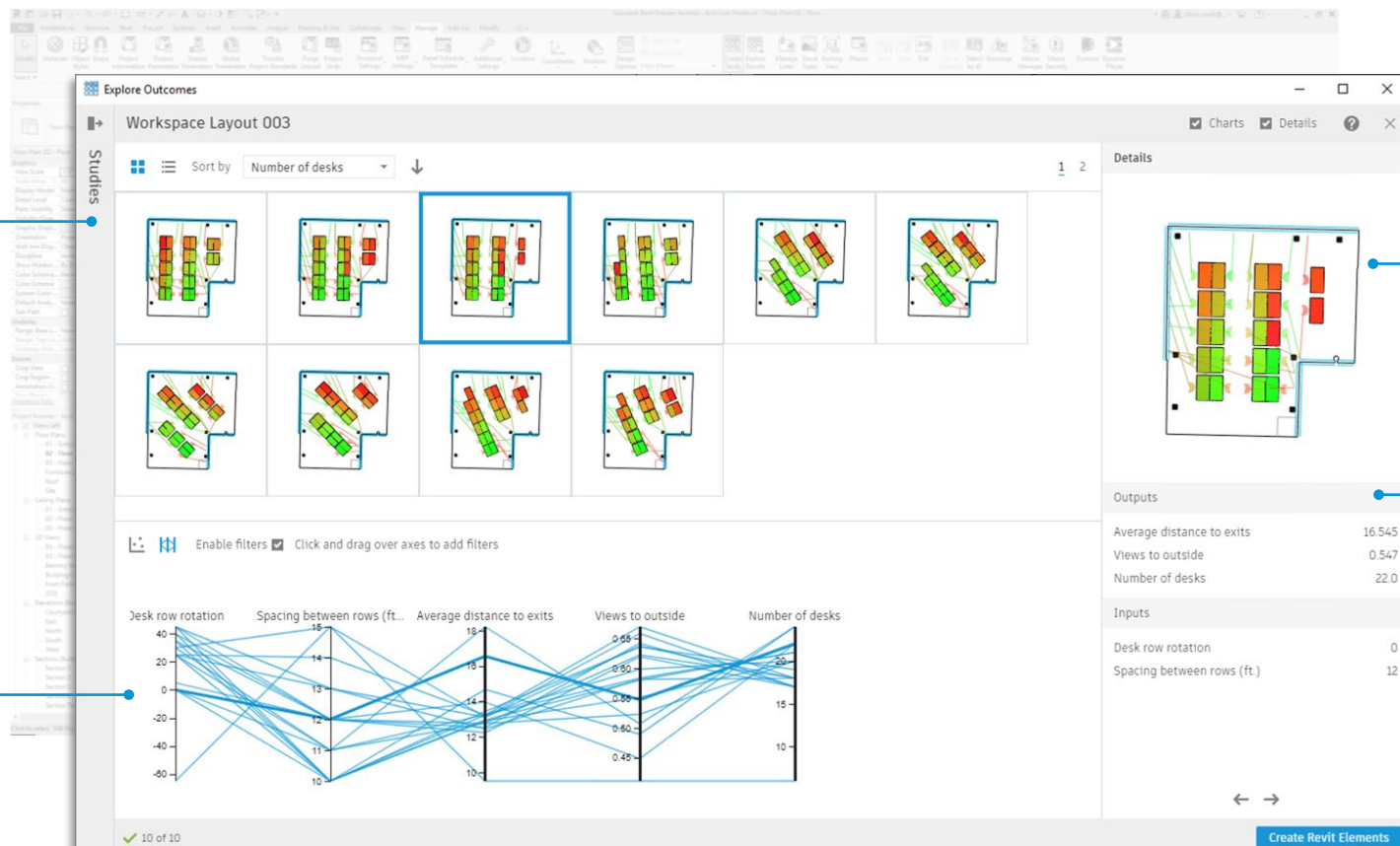
Track  
studies

Filter  
and rank  
results

Explore  
outcomes

Evaluate  
goals

Create  
Revit  
elements\*

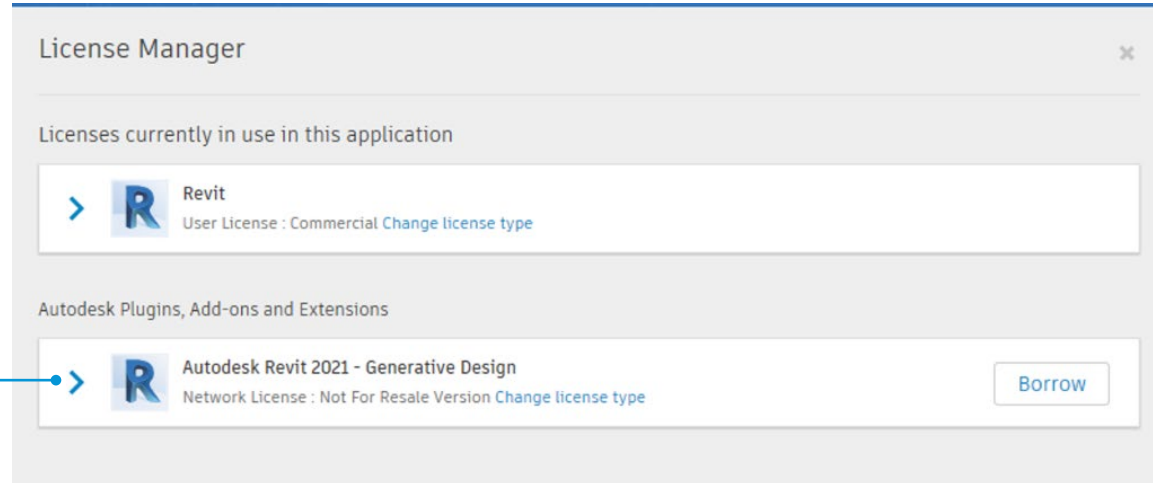


# Installation and Licensing

Generative Design is

- automatically installed with Revit
- updated via Autodesk desktop app and Revit updates
- available in the 14 languages supported by Revit

**For AEC Collection and enterprise subscribers, the Generative Design license enables direct access from Revit\***



\* If you are not an AEC Collection or enterprise subscriber, you can access similar functionality using Dynamo for Revit.

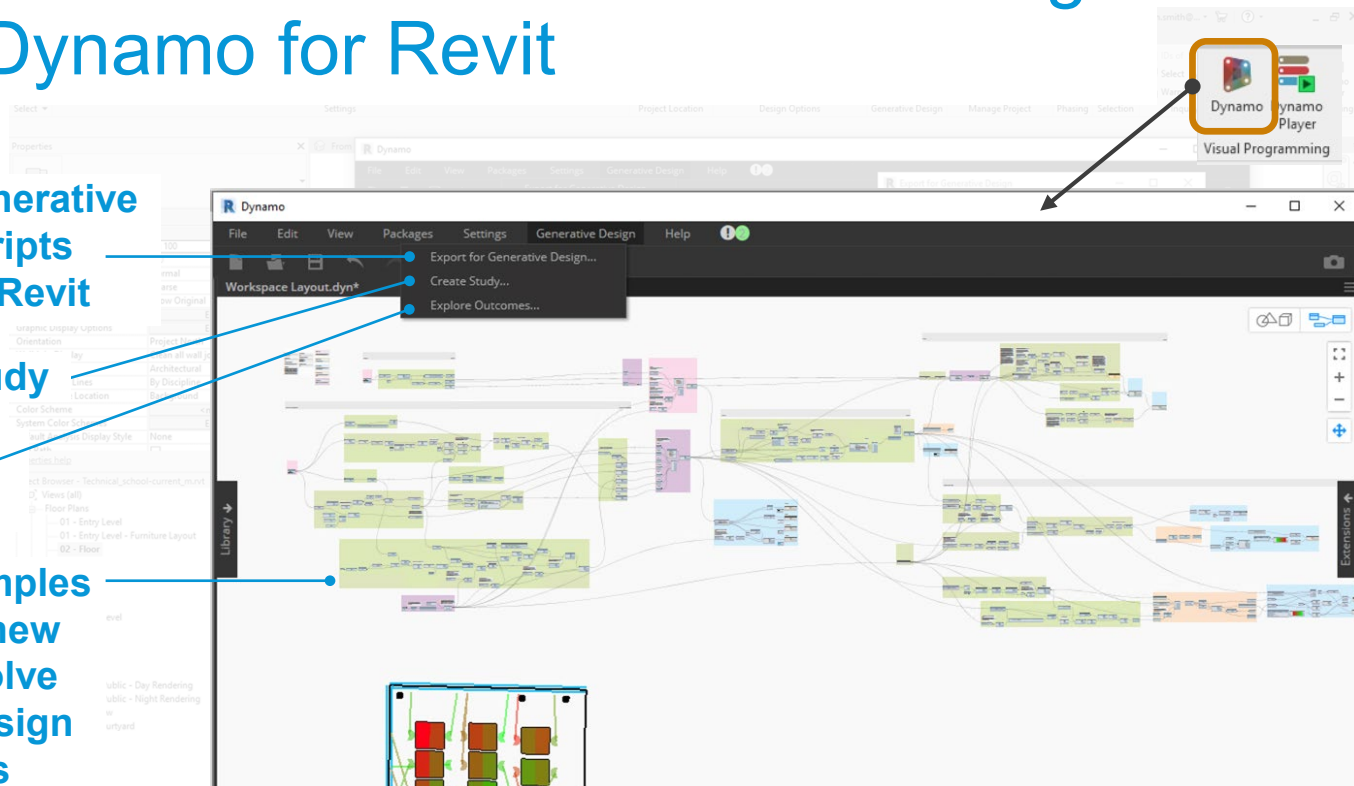
# All users can access Generative Design from Dynamo for Revit

Export generative design scripts for use in Revit

Create Study

Explore Outcomes

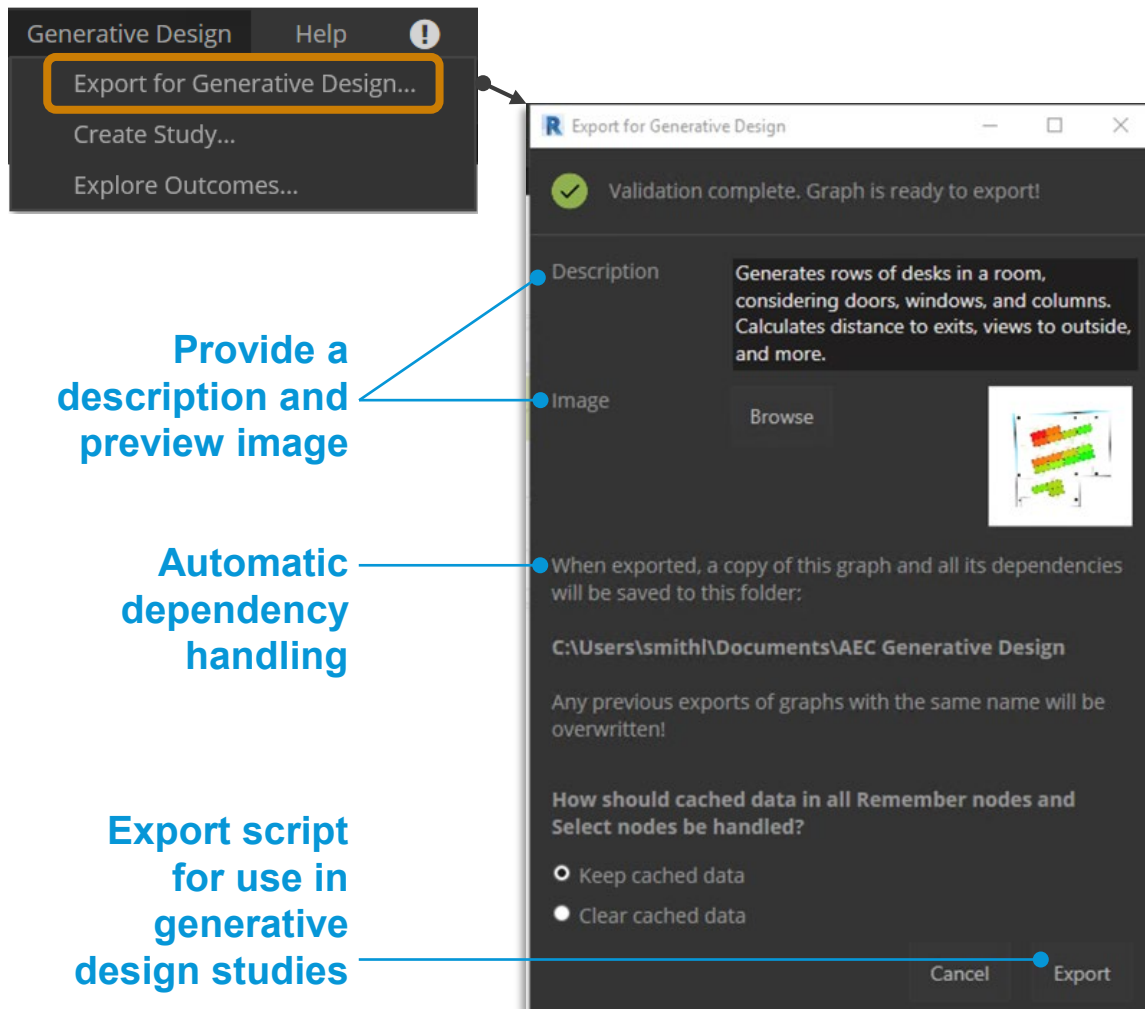
Tweak samples or create new logic to solve unique design challenges



# Export for Generative Design from Dynamo for Revit

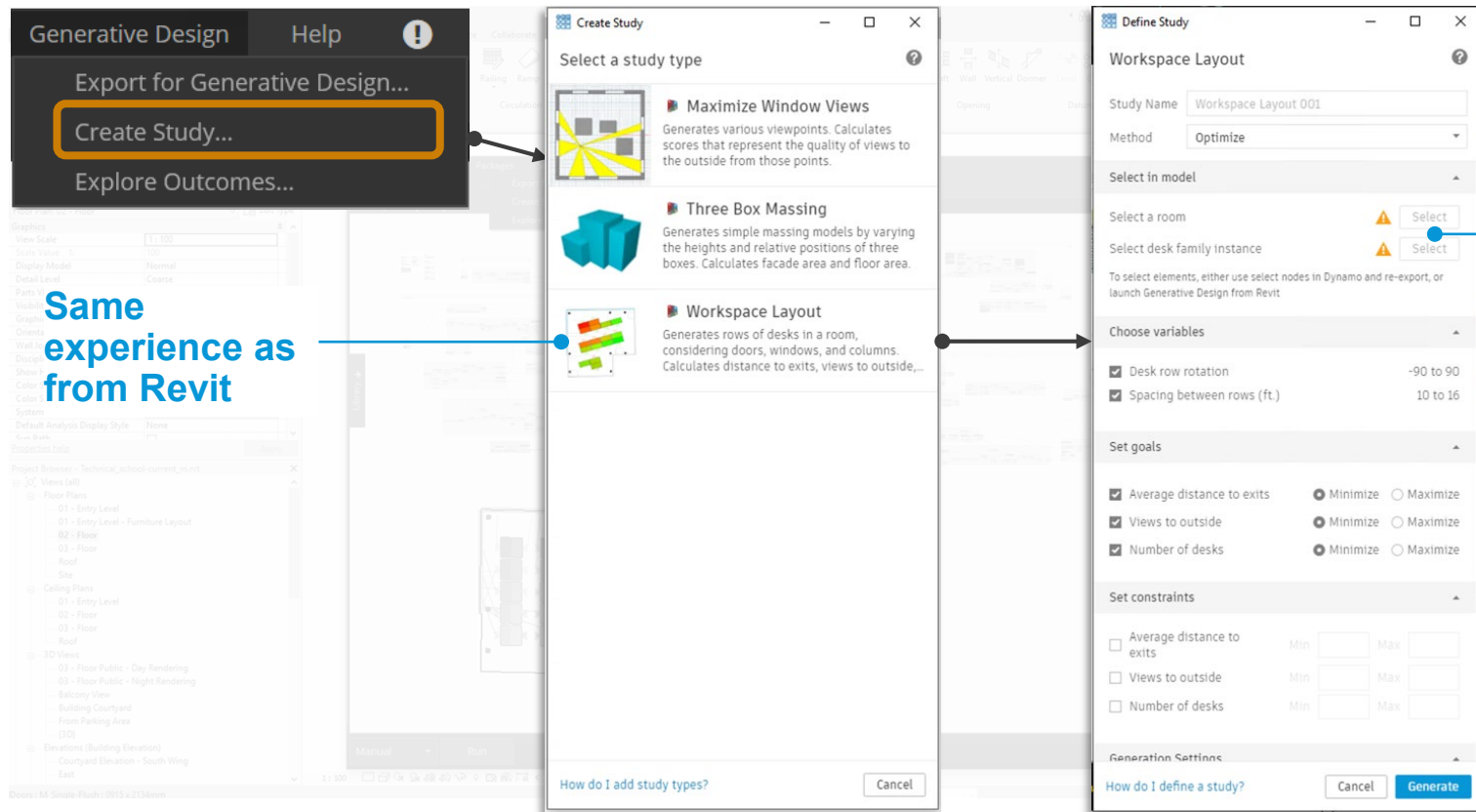
From Dynamo,  
export new or  
updated scripts  
for use with  
Generative Design  
in Revit

Revit help: [Add a Study Type](#)





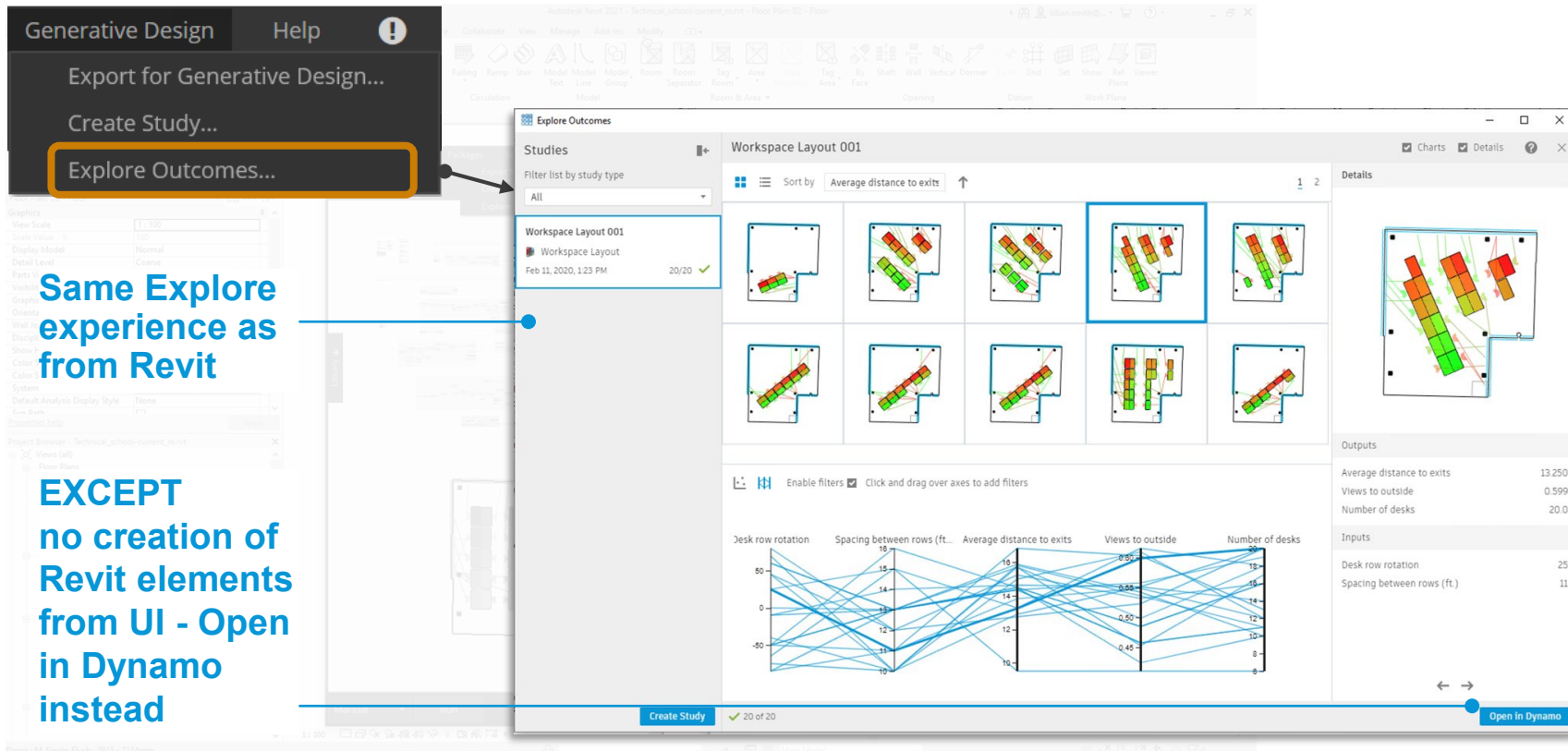
# Dynamo access to Create and Define Study



Revit help:  
[Workflow:](#)  
[Generative](#)  
[Design](#)

# Dynamo access to Explore Outcomes

Revit help:  
[Generative Design](#)  
[for the Dynamo Author](#)



Generative Design Help

Export for Generative Design...

Create Study...

Explore Outcomes...

Same Explore experience as from Revit

EXCEPT  
no creation of  
Revit elements  
from UI - Open  
in Dynamo  
instead

Explore Outcomes

Studies

Filter list by study type

All

Workspace Layout 001

Workspace Layout

Feb 11, 2020, 1:23 PM

20/20

Workspace Layout 001

Sort by Average distance to exits

1 2

Details

Charts Details

Outputs

Average distance to exits	13.250
Views to outside	0.599
Number of desks	20.0

Inputs

Desk row rotation	25
Spacing between rows (ft.)	11

Create Study

20 of 20

Open in Dynamo

# Summary of Generative Design features by license

Feature	Revit Standalone	AEC Collection or Enterprise
Create Study, Explore Outcomes from Revit ribbon	✗	✓
Select Revit elements via Generative Design interface	✗	✓
Create Revit elements via Generative Design interface	✗	✓
Sample study types	✓	✓
Export to Generative Design from Dynamo	✓	✓
Create Study, Explore Outcomes from Dynamo	✓	✓
Online help	✓	✓

# Generative Design Learning Content

## Revit Help

The screenshot shows the Autodesk Revit 2021 Help page for the topic 'Add a Study Type'. The left sidebar contains a navigation menu with categories like 'Get Started', 'Cloud Models', 'Model the Design', 'Design Options', 'Generative Design', and 'Sample Study Types'. The main content area is titled 'Add a Study Type' and includes a 'SHARE' button. The text explains that from Dynamo, users can make more study types for use with Revit Generative Design. It provides information about sample study types and the process of adding a new study type to the 'Create Study' dialog in Revit. The steps are as follows:

1. Use Dynamo for Revit to create and test the graph.
  - The graph must follow specific rules for use with Revit Generative Design.
    - Inputs and outputs have unique names.
    - Inputs are set to "IsInput".
    - Outputs are set to "IsOutput".
    - Additional requirements are satisfied. For complete details, see [Generative Design Primer: Setting up a Graph](#).
2. In Dynamo for Revit, click **Generative Design > Export for Generative Design**.
3. In the dialog, complete the fields to provide a description and an image. This information appears in the **Create Study** dialog in Revit to describe the study type.
4. Click **Export**.
  - The graph is exported to the folder indicated in the dialog, along with any dependencies needed to run it. As long as the graph resides in that folder, it appears as a study type in the **Create Study** dialog.
  - The **Dependencies** folder contains the following files, which you can update directly if needed.
    - info.json: the study type description that appears on the **Create Study** dialog
    - study\_type.png: the thumbnail image that appears on the **Create Study** dialog
5. Share the study type with team members.
  - If other team members want to use the new study type, send them the exported DVN file and its **Dependencies** folder.

## Generative Design Primer

The screenshot shows the 'Generative Design Primer' webpage. The left sidebar contains a navigation menu with sections like 'Welcome', 'Introduction to Generative Design', 'Computational Design', 'Generative Design', 'Visual Programming', 'Dynamo', 'Refinery', 'Deeper Dive to Generative Design', 'Hello Project Refinery!', 'Sample Workflows', and 'Appendix'. The main content area is titled 'Generative Design' and includes a 'Edit on GitHub' button. The text explains that in this section, they will look at what the term 'generative design' means in relation to AEC. It lists the topics they will look at:

- What is Generative Design?
- Why Should I Use Generative Design?
- What Goes Into a Generative Design Process?
- Examples of Generative Design

Below the text is a 3D architectural rendering of a building complex, labeled 'design ID: 66-122'. To the right of the rendering is a table of metrics:

Views:	0.4
Variety:	6
Solar Gain:	0.3
Yard Size:	1.0
Program:	1.1
Total Cost:	\$5,798,095.00
VW Revenue:	\$997,833.30
Input1:	0.900225136
Input2:	0.448278891
Input4:	0.428612159
Input5:	0.442411829

Below the table is a radar chart with five axes: Views, Variety, Solar Gain, Program, and Cost. The chart shows the relative values of these metrics for the design. At the bottom right, there is a note: 'Massing analysis - Alkmaar Housing Commission - The Living'.



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