



# A Generative Method to ReFrame Visitor Experience in IKEA Showroom

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[48-724] Scripting and Parametric Design  
Final Project  
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Final Project

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# Maze of IKEA

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# **Maze of IKEA.motivation**

# Why does IKEA need Maze of IKEA?

Some people may find the interior space of IKEA stores to be confusing because of the sheer size and complexity of the stores. IKEA stores are typically very large, with many different product categories and a seemingly endless maze of aisles and displays. This can make it difficult for customers to find the specific products they are looking for, and can lead to a sense of confusion or disorientation. Additionally, IKEA uses a unique numbering system for its products, which can be difficult to understand and can add to the confusion. However, IKEA stores are also designed to be fun and engaging, and many people enjoy the challenge of navigating the store and discovering new products.

The products in IKEA are constantly being updated, driven by customer preferences and market activity. However, the interior layout of the showroom remains consistently the same - leaving a bit more to be desired by frequent visitors of IKEA. From the designer's point of view, it can be time consuming and laborious to constantly be generating iterations of path and plan layouts throughout the store. Metrics such as density, length of time in store, path distance traveled, and corridor size or only a few of the initial design decisions they must make, without even getting to the task of laying out exhibits.



Image source: ikea.com

# How does **Maze of IKEA** help IKEA?

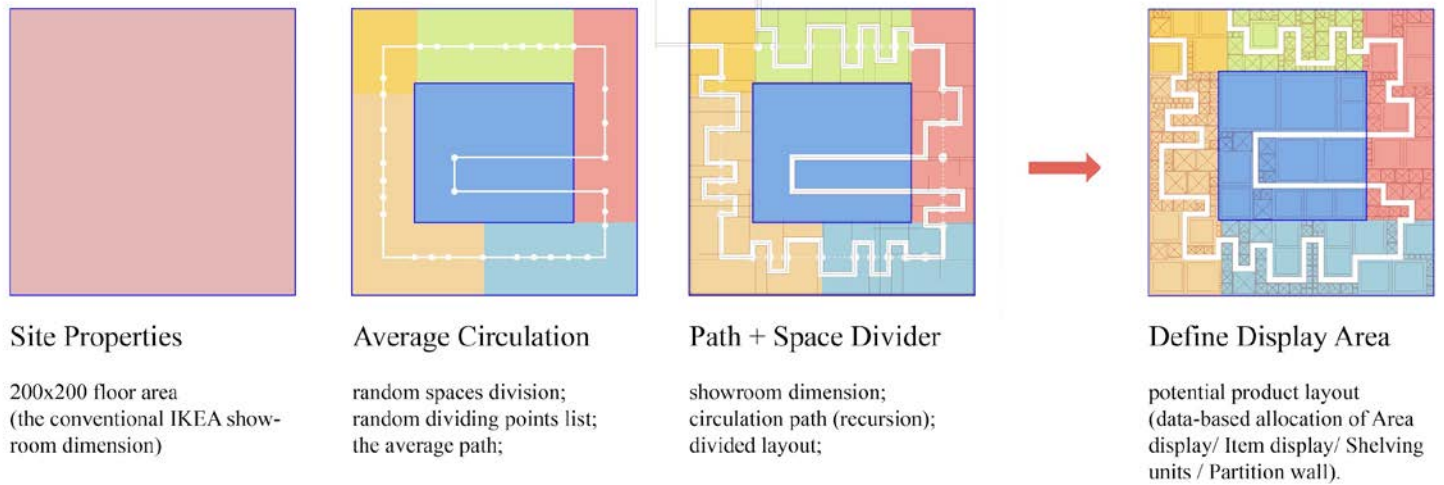
The basic principle behind IKEA's store layout is to create a circulation path that guides customers through the store in a logical and intuitive way. This typically involves starting at the entrance and following a predetermined route through the store, which is marked by signage and other visual cues. As customers make their way through the store, they are encouraged to explore different areas - composed of showrooms and marketplaces of different categories.

The design seeks to provide a generative tool to facilitate refreshing of the interior experience in IKEA - proactively updating the floorplan layout and keeping customers engaged by the circulation experience, while also providing readily available data for marketing analysis based on variants of interior layout. The design seeks to provide a generative tool to facilitate refreshing of the interior experience in IKEA - proactively update the floorplan layout and keeping customers engaged by the circulation experience, whereas also provide readily available data for marketing analysis based on variants of interior layout.

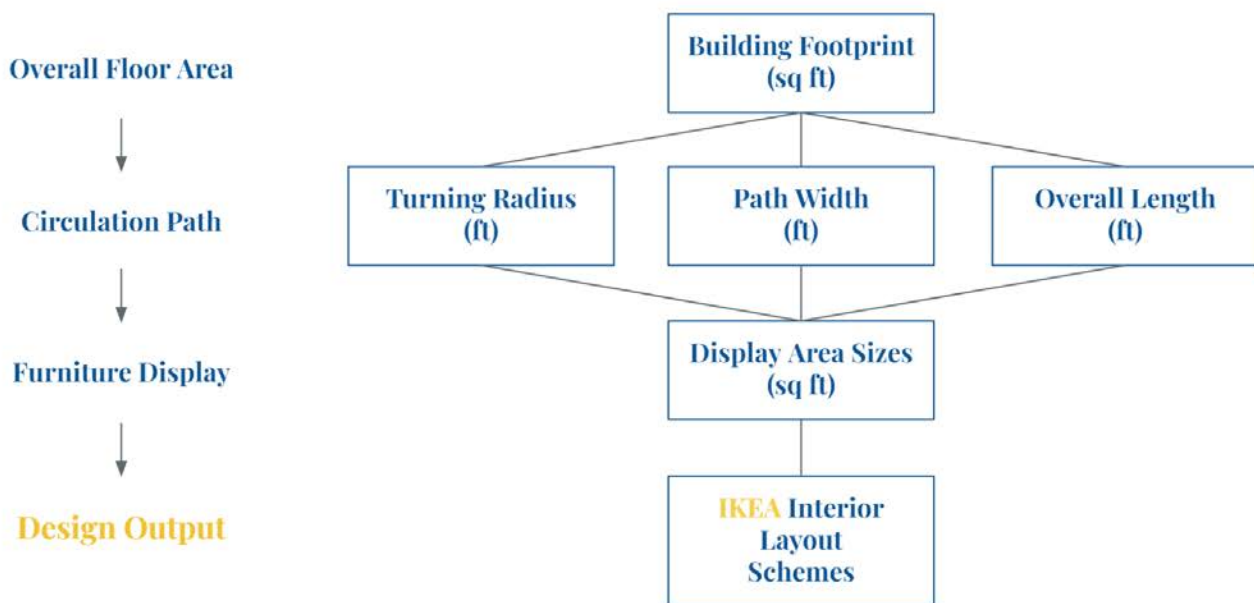


# **Maze of IKEA.works**

# How does **Maze of IKEA** work?



## Algorithmic Flow Chart

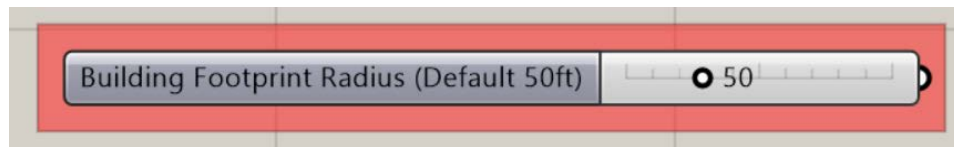


## Parameters Input/Output Flow Chart

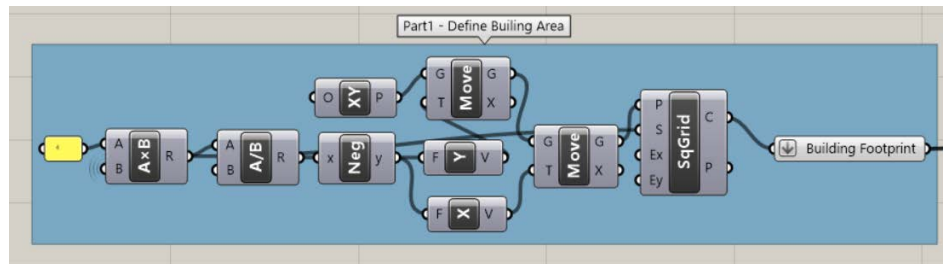
In a nutshell, this plugin is primarily composed of four parts. With the first part being the input of site boundaries generated. Next, the plugin will draw a centralized “courtyard” and automatically finds the average path as the baseline. In this step, actual generation will be operated based on input parameters. Furthermore, the average path will be offset to further articulate the circulation zone - eventually divided into modularized display areas.



# Part 1 . Define Site Boundary

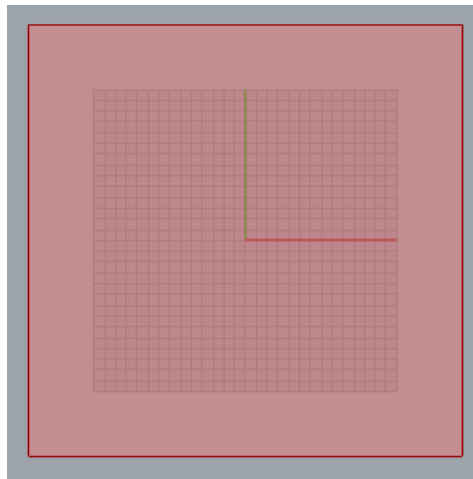


**User Input** - “ Building Footprint dimension” Factor



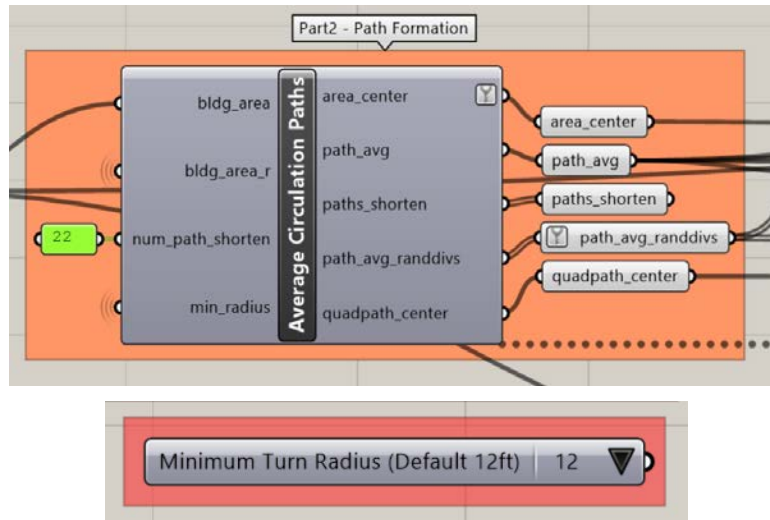
**Building footprint definition**

As the first step, users need to define the site boundary. By default, the conventional building dimension of an IKEA showroom is 200 ft x200 ft. The unit factor in the script is based on multiplication of 4. Therefore, while the variant in the sliding bar ranges from 48ft to 64ft -the plugin provides a varying scale of building from 196ft to 256ft in dimension.

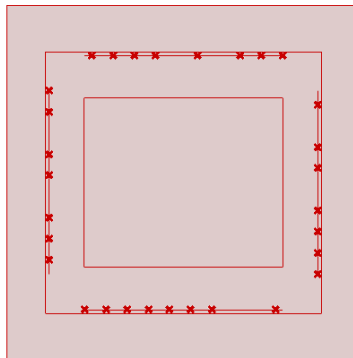


**Part 1 Output** - “Building Footprint Generated by Plugin”

## Part 2 . Generate Circulation Baseline



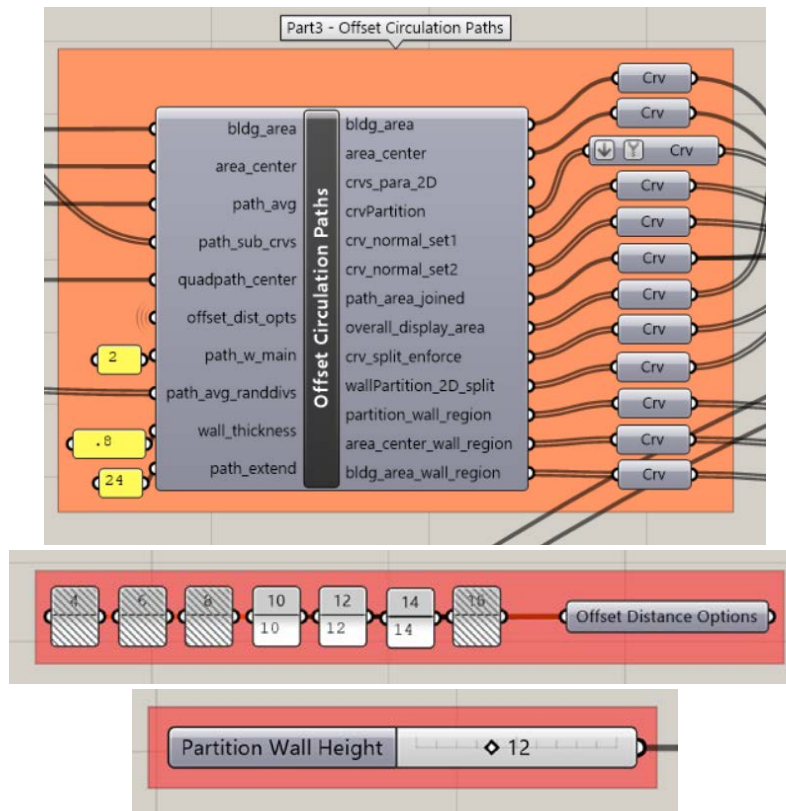
**User Input** - “Minimum Turn Radius”



**Part 2 Output** - “Average Circulation Path”

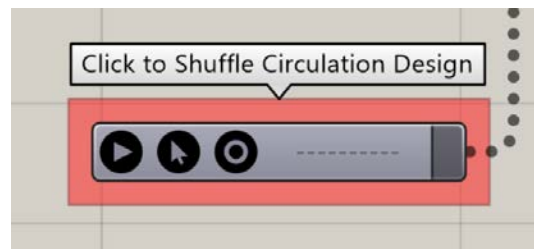
As introduced in the algorithm workflow, based on the building footprint generated in Part 1 of the plugin, Part 2 automatically generates a **baseline average circulation path** as “path\_avg”. By user defined input of ‘minimum turning radius’, this part of the script actively divides paths into increments of steps with minimal randomization. Points in the screenshot demonstrate **turning points of the final paths** in the next step.

## Part 3 . Offset Circulation Paths

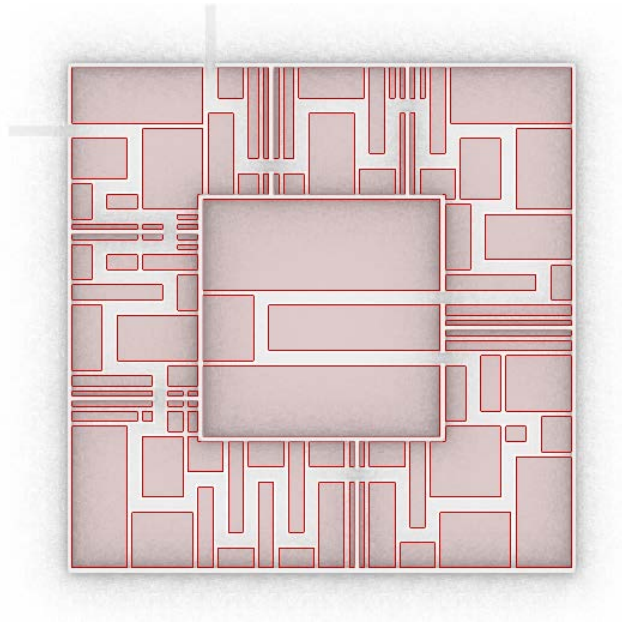


### Part 3. User Input - “Offset Path + Space Dividers”

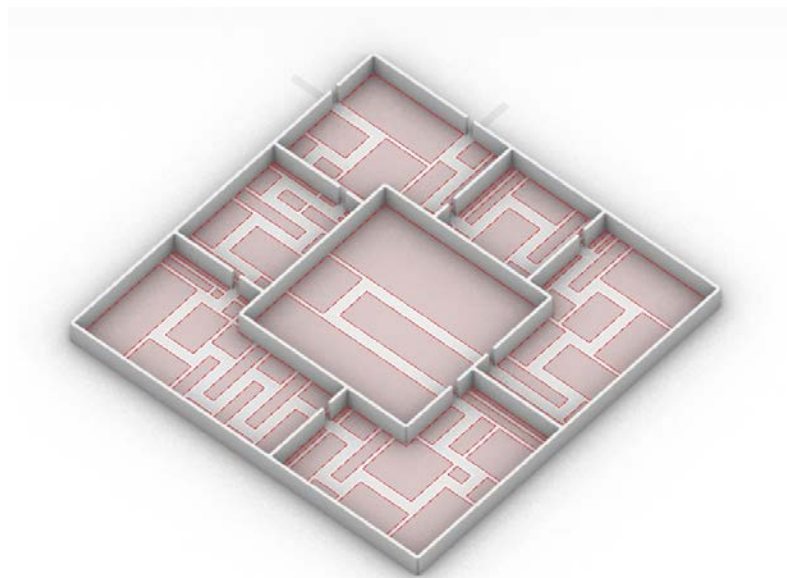
Selectively, users can opt to decide which parameters to be used for “offset distances”, which will ultimately determine the final circulation path offset from the baseline (see the updated path screenshot). Based on the combined selections of parameters above, users can elect to use the “Shuffle Circulation Design” feature to regenerate design scenarios until optimal results are achieved. At this point, a preview of the design scenario will be provided for reference. (see screenshots below).



### Part 3. User Input - “Shuffle Circulation Design”

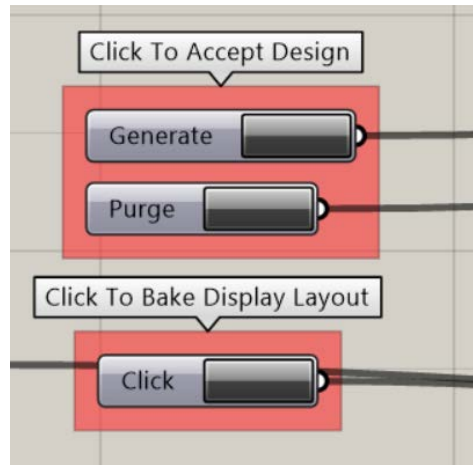


**Part 3.** Plugin Output - “Design Scenario Preview” - Plan View



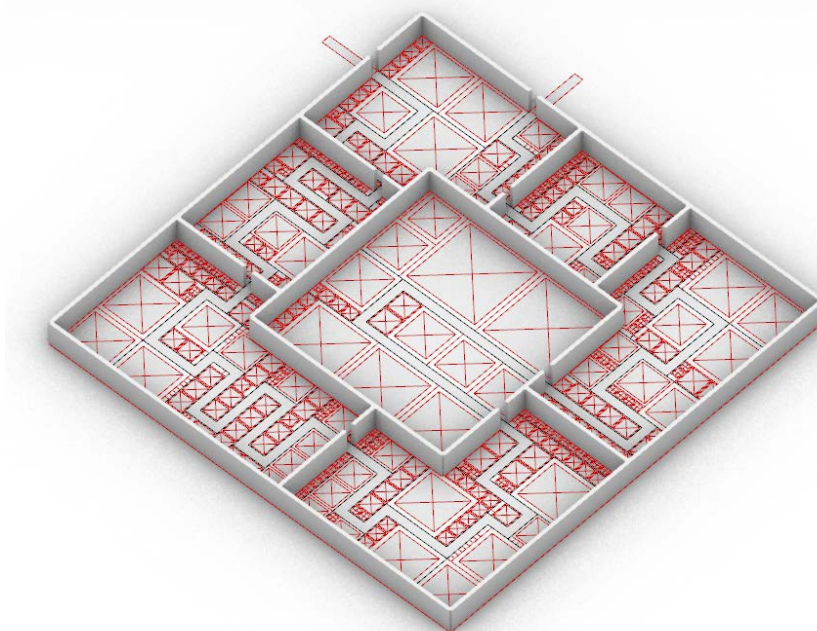
**Part 3.** Plugin Output - “Design Scenario Preview” - Axon View

## Part 4 . Generate Display Areas



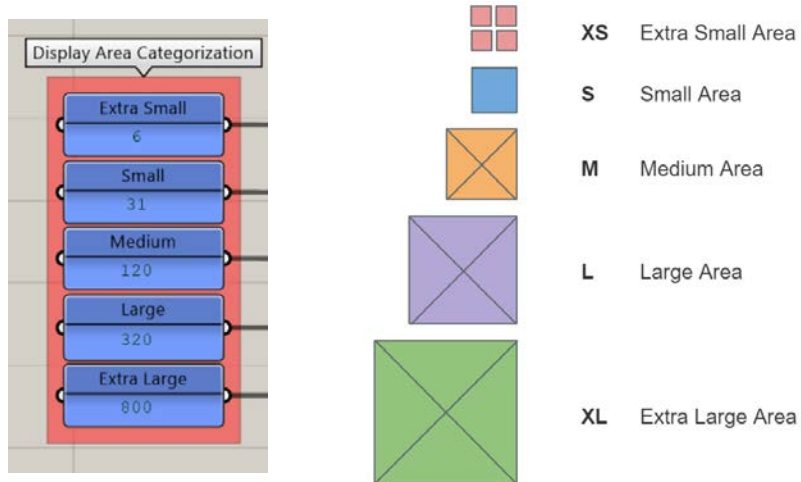
**Part 4.** User Input - “Accept Design - Generate”  
+  
“Base Display Layout” into Rhino Space

Within the last part, once the design scenario generated in Part 3 is accepted, the plugin operates recursion events to articulate potential display layout in individual spaces. An intended consistency of dividing spaces in squares for modularity purposes. If the user is not satisfied with the outcome, “Purge” action can help the user to start over.



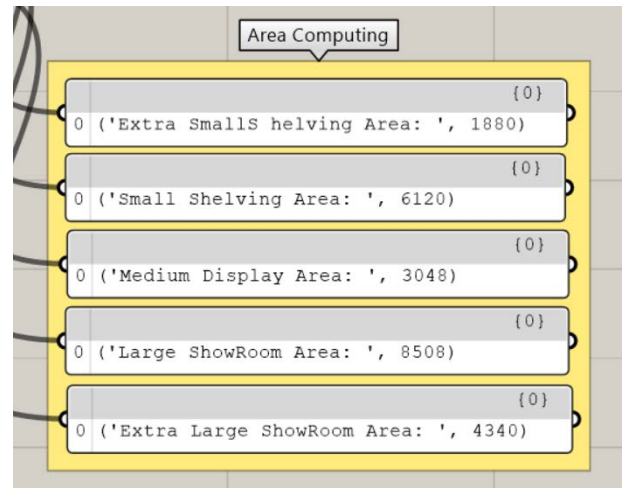
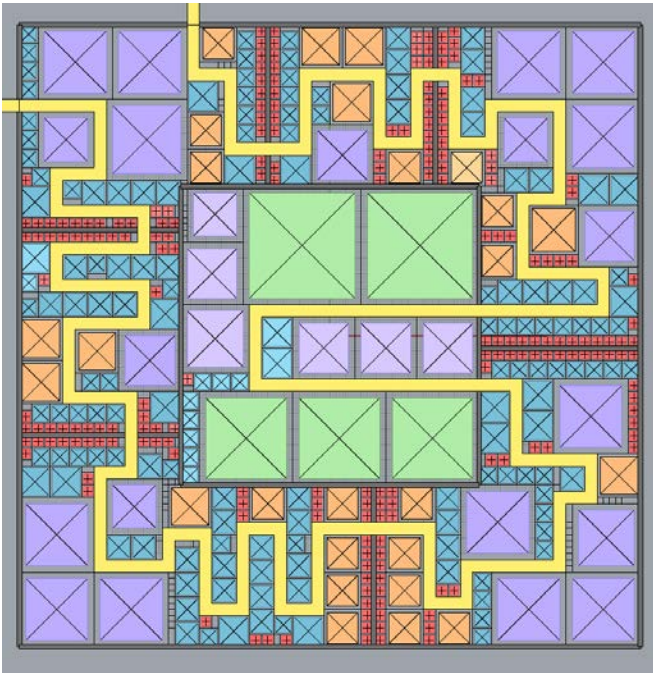
**Part 4.** Plugin Output - “Generated Display Area” - Axon View



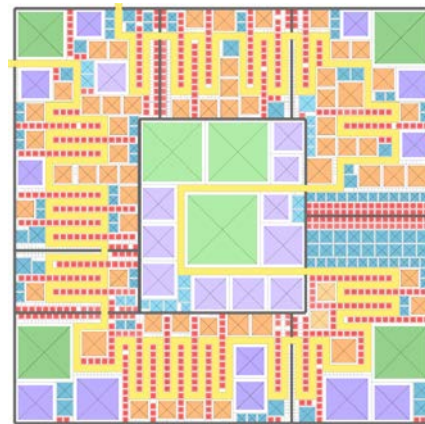
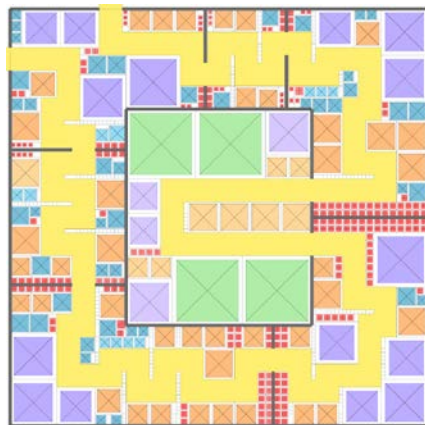
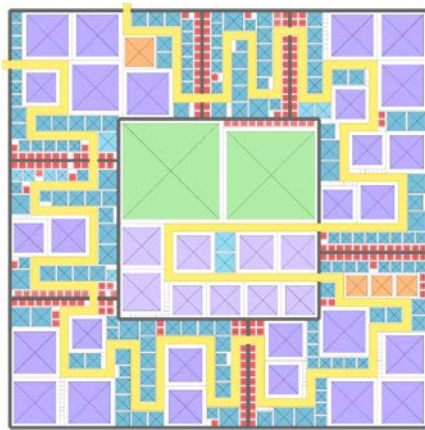


#### Part 4. User Input - “Display Area Categorization”

In order to visualize various hierarchies of display areas generated, users can opt to change parameters in the “Display Area Categorization” to gauge output parameters in the final visualization below - with the intent to categorize scales of display area by computed area data (as shown in the table below). At this stage, the Plugin execution process is complete.



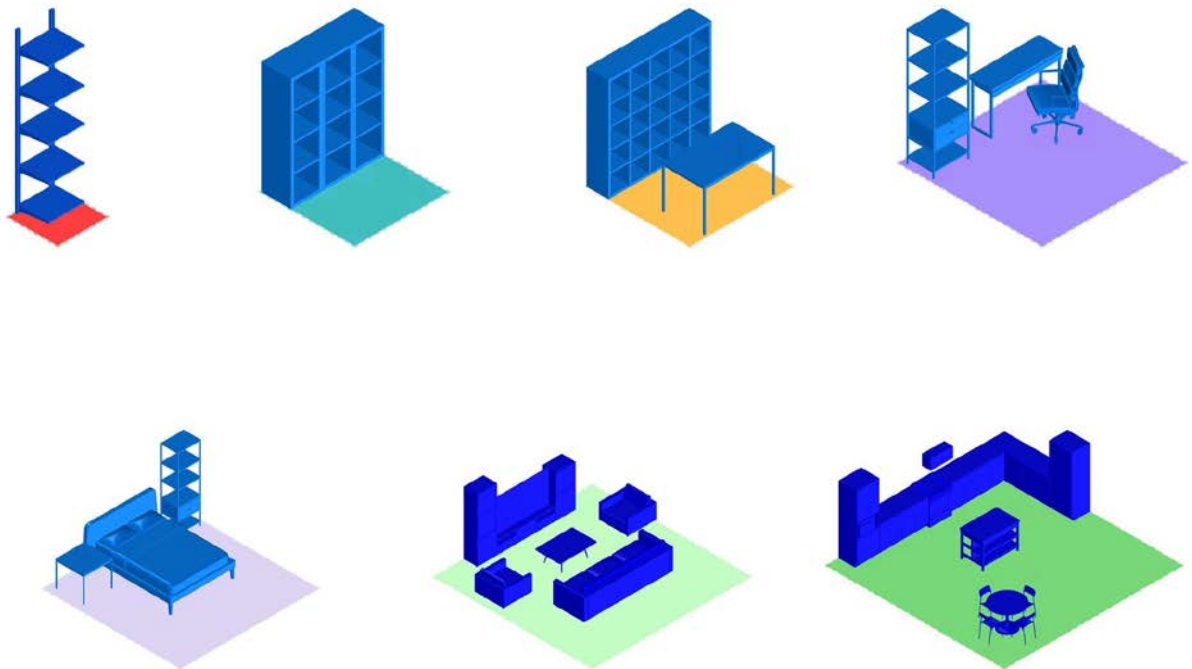
#### Part 4. Plugin Output - “Colored Generated Display Area” - Plan View + “Display Area Summary Table by Category”



#### Part 4. Plugin Output Samples

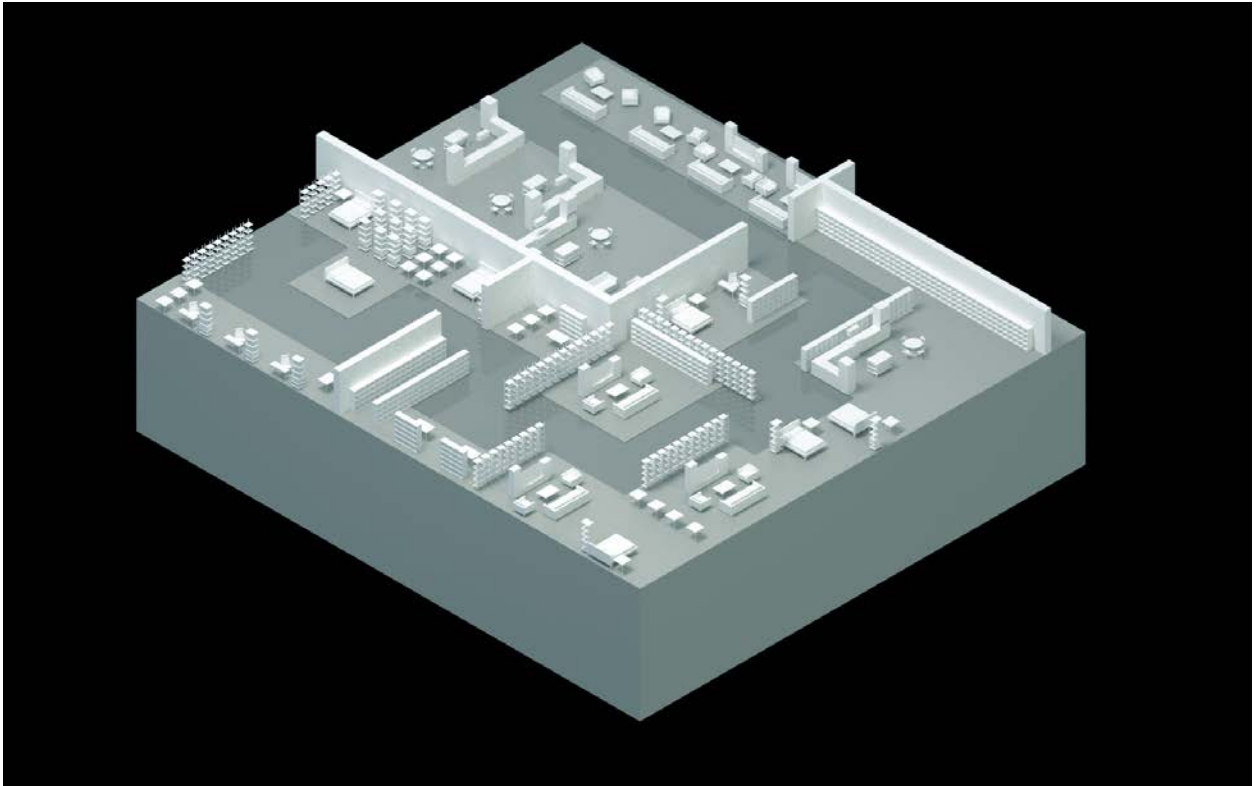
## Part 5 . Layout and Display Activation

As defined in the previous section, the IKEA space plan is broken up into color-coded display typologies determined by area. Below are some examples of typical IKEA displays and furniture layouts. Designers can take the spatial outputs defined in the previous steps and layout their own furniture and displays as needed, depending on what the store has in stock. The below examples are just a fraction of what IKEA has in their warehouses.



**Part 5.** Design Application - “IKEA Display Typologies”





**Part 5.** Design Application - “IKEA layout examples”



## Part 5. Design Application - Renderings

## **Maze of IKEA.potential**

# What are the limitations of Maze of IKEA?

The team found a few difficulties when developing the tool. For instance, we ran into problems when updating the tool to fit odd shaped IKEA stores, such as “L” shaped or trapezoidal. Moving forward, that should be one of the issues the team should look to resolve.

The tool does not take into account the real world building conditions that an IKEA designer might encounter, such as structural grid, MEP and HVAC placement, life safety, or a variety of other important architectural factors. This tool is not meant to be an overarching IKEA design tool, but the addition of those fixed parameters might aid in optimizing the process.

Lastly, the usability of some spaces created is an issue. Some spaces are far too small and common, overlapping each other and blocking circulation or access from the main corridor. Adding a hierarchy to the tool based on typology and distance from the corridor boundary might be a possible solution. In addition, some spaces are far too large for any reasonable IKEA display typology. These areas need to be further divided without creating other areas that are infinitely smaller. The tool could even allow users to select sections of the store individually and decide the density needed for that program type.

# What is the potential of Maze of IKEA?

This tool could easily be modified to fit a variety of planning and design applications. For instance, the tool’s outputs resemble an urban grid, with the squares providing a variety of urban development typologies along a main transportation corridor. Instead of a retail experience, a designer could use this tool to develop an urban-scaled experience.

Outside of IKEA, this could be used for other retail vendors, with the addition of an optimization metric for time in store or elements displayed to patrons. It could be used in the capacity study phase of design to determine if a space is suitable for a prospective client’s needs. This could be a powerful tool for both designers and real estate development partners looking to lure in clients of various programmatic needs.

Lastly, this tool could be abstracted and deployed for facade design, with the corridor space representing an opaque service or circulation corridor, and the walls subdividing the space acting as the opaque area over structural members. This would require some slight retooling, but is a good example of how the development for one application could feed into the solution for a completely different application.