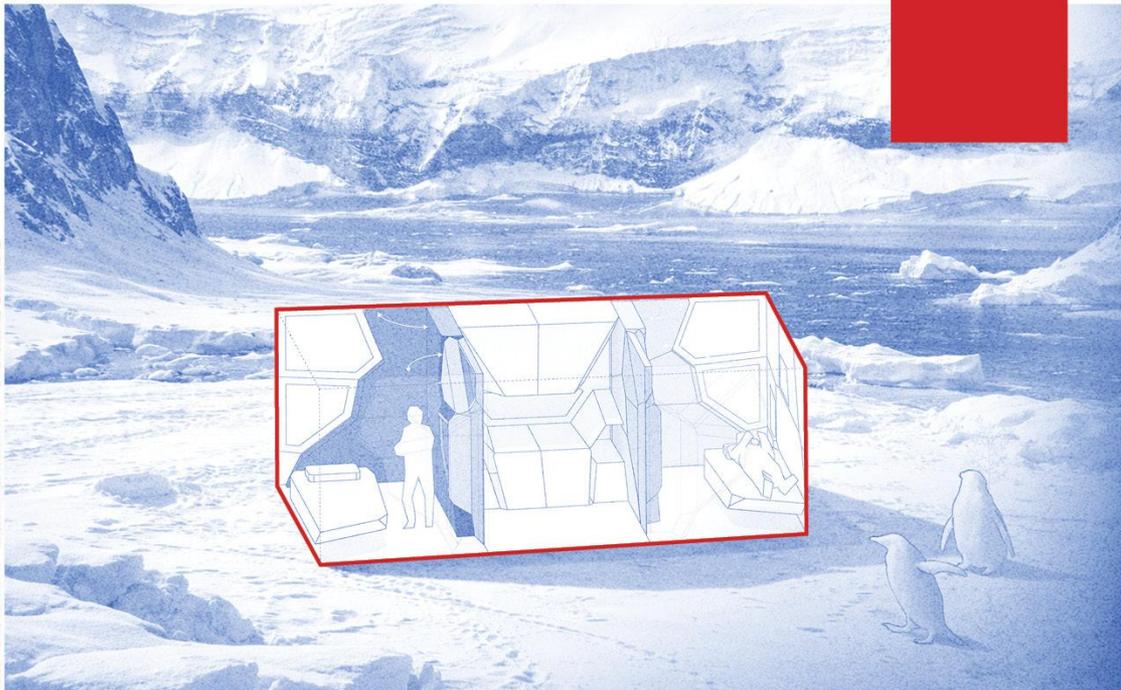


# TROLL STATION

ANTARTICA 72°00'42"S, 2°32'06"E

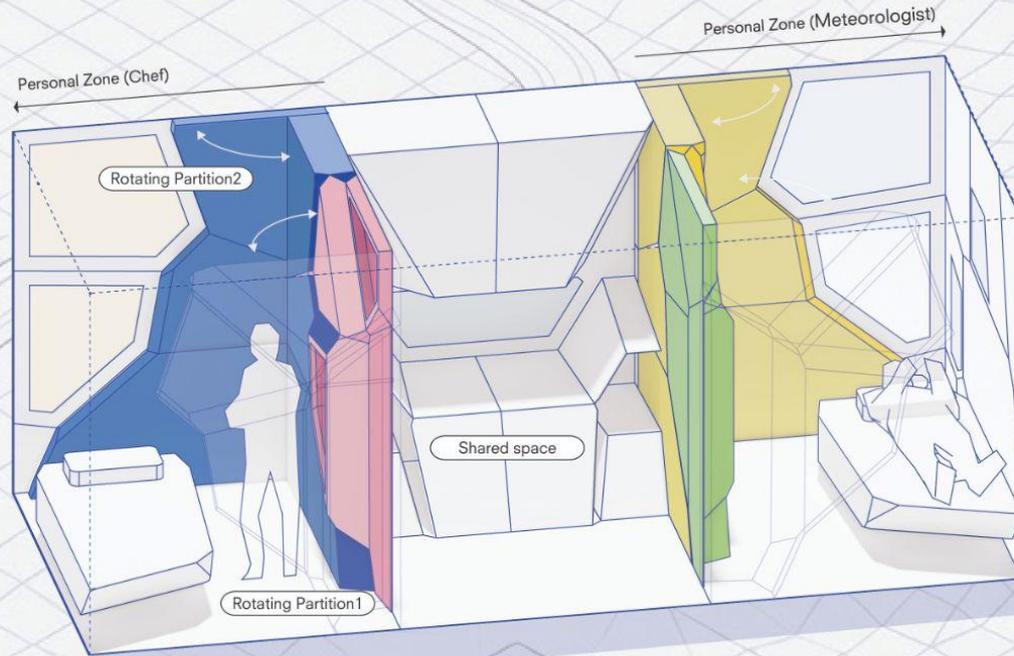


2026 - MS-c2 - Q3

GROUP 4  
ANAELLE MATHIEU  
AASHNA SINGH  
ILAI DEBAZI  
LUCA MARCHETTI  
SOHYUN PARK  
NIELS KOENRAAD

1:1 IAP

# Previous iteration

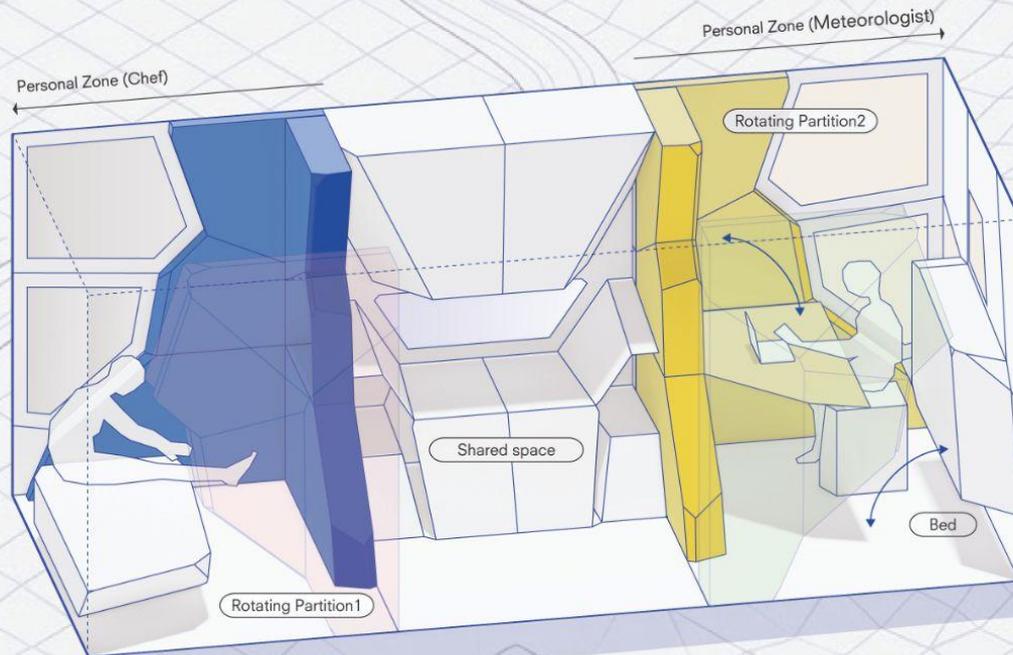


## Daily Scenario 1 Morning 5:00AM

The chef wakes up and gets dressed at the wardrobe. The meteorologist sharing the room is still asleep. All rotating partitions are closed, keeping individual privacy

Privacy ██████████  
Interaction ██████

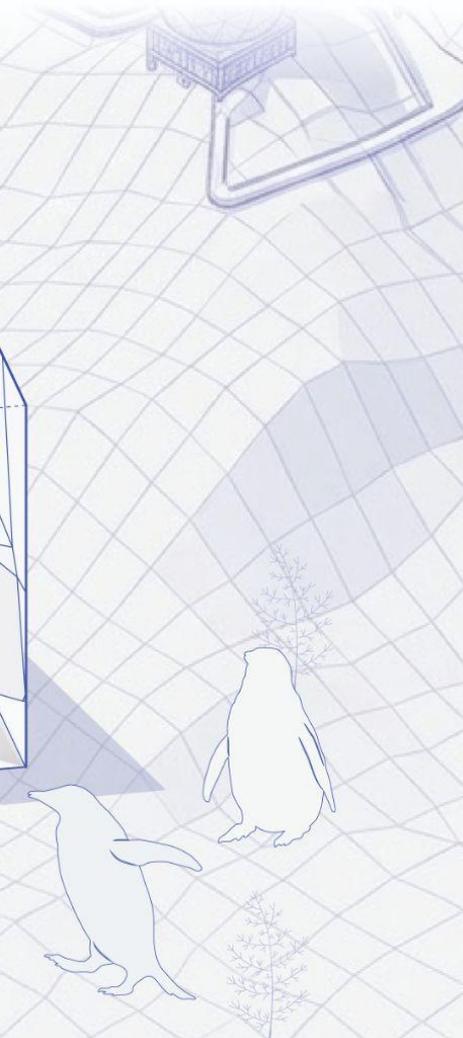
# Previous iteration



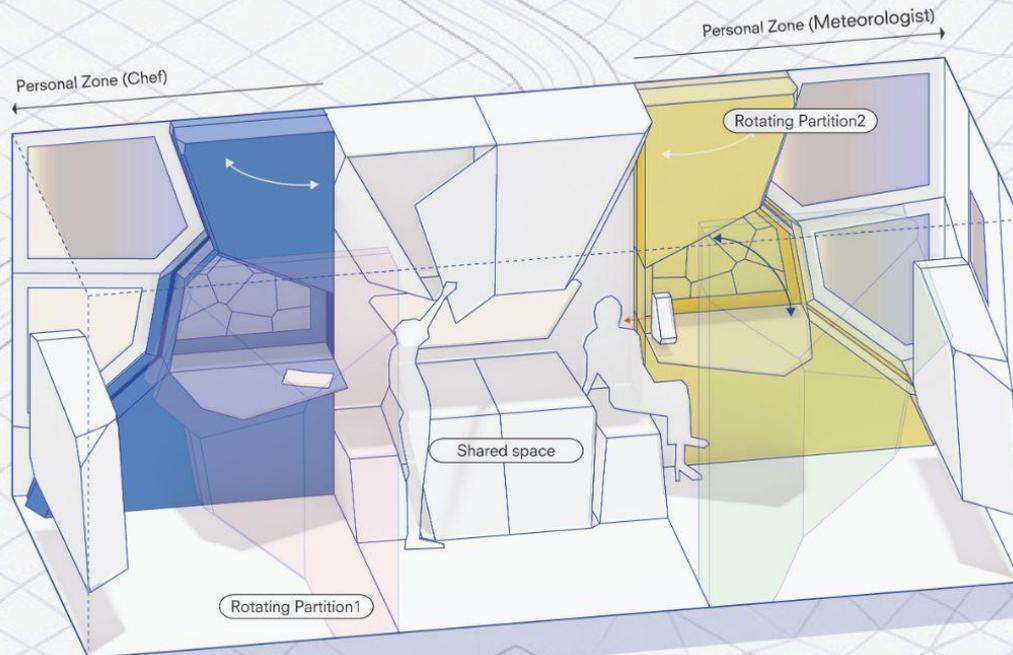
## Daily Scenario 2 Afternoon 1:00PM

The chef is going to take a nap after preparing the meal. The meteorologist finishes collecting climate data and reports to the network. Rotating partitions are opened partially.

Privacy ██████████  
Interaction ██████████



# Previous iteration



## Daily Scenario 3 Evening 8:00PM

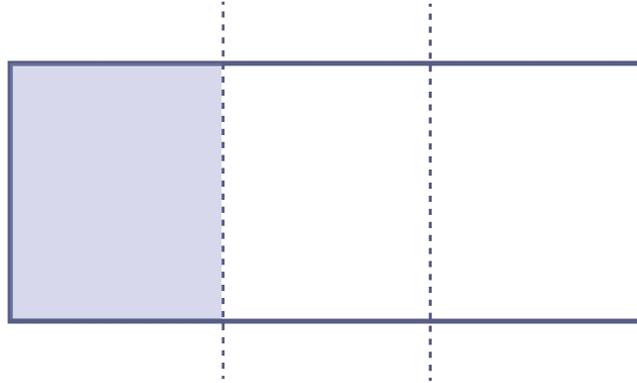
After finishing all daily tasks, two residents take time to rest. The meteorologist enjoys lighting therapy, and the chef opens the shelf to look for a camera.

Privacy

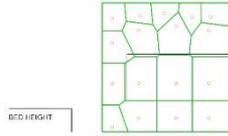
Interaction



# Form creation

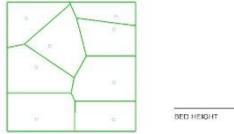


# Form creation



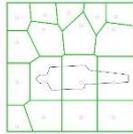
## SECTION 1

(you can move the points/add points, make sure to put them in the right layer)



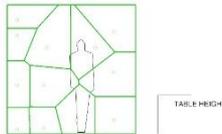
## SECTION 2

(you can move the points/add points, make sure to put them in the right layer)



## SECTION 3

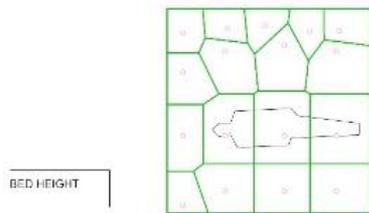
(you can move the points/add points, make sure to put them in the right layer)



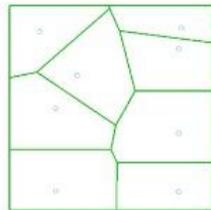
## SECTION 4

(you can move the points/add points, make sure to put them in the right layer)

# Form creation



Sleeping  
xyz



Sitting  
xyz

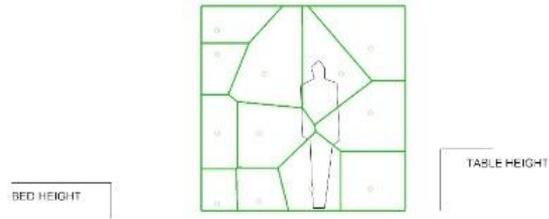
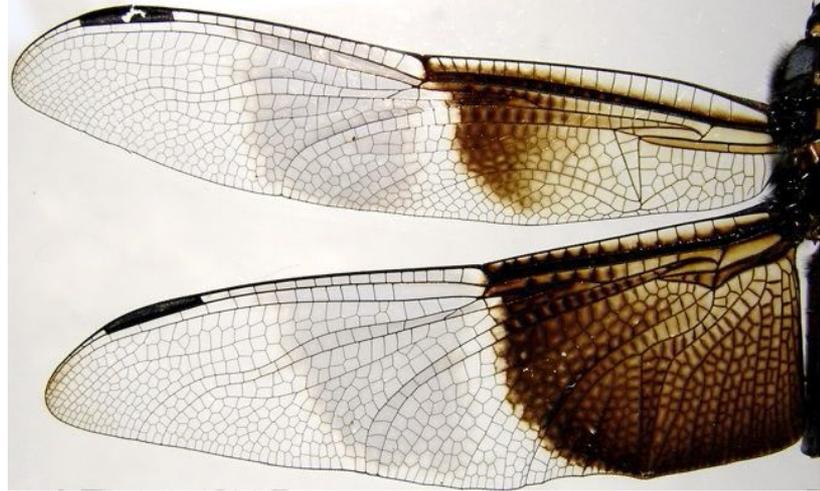
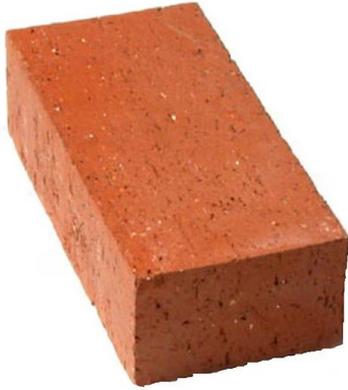
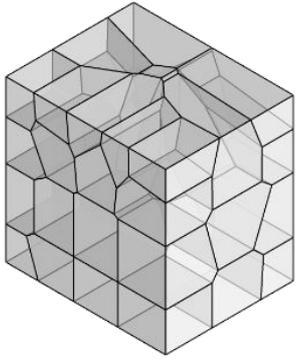


Table  
xyz

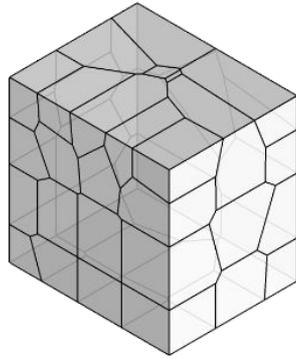
# Voronoi



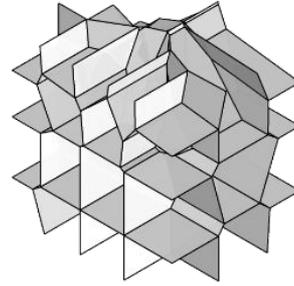
# Form creation



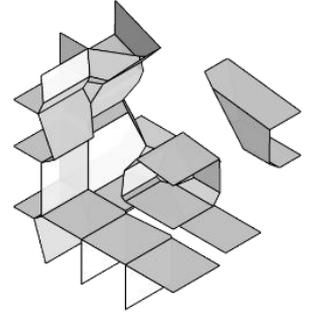
Body



Skin

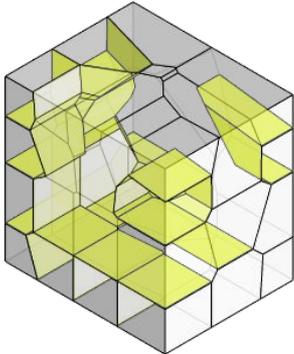


Bones



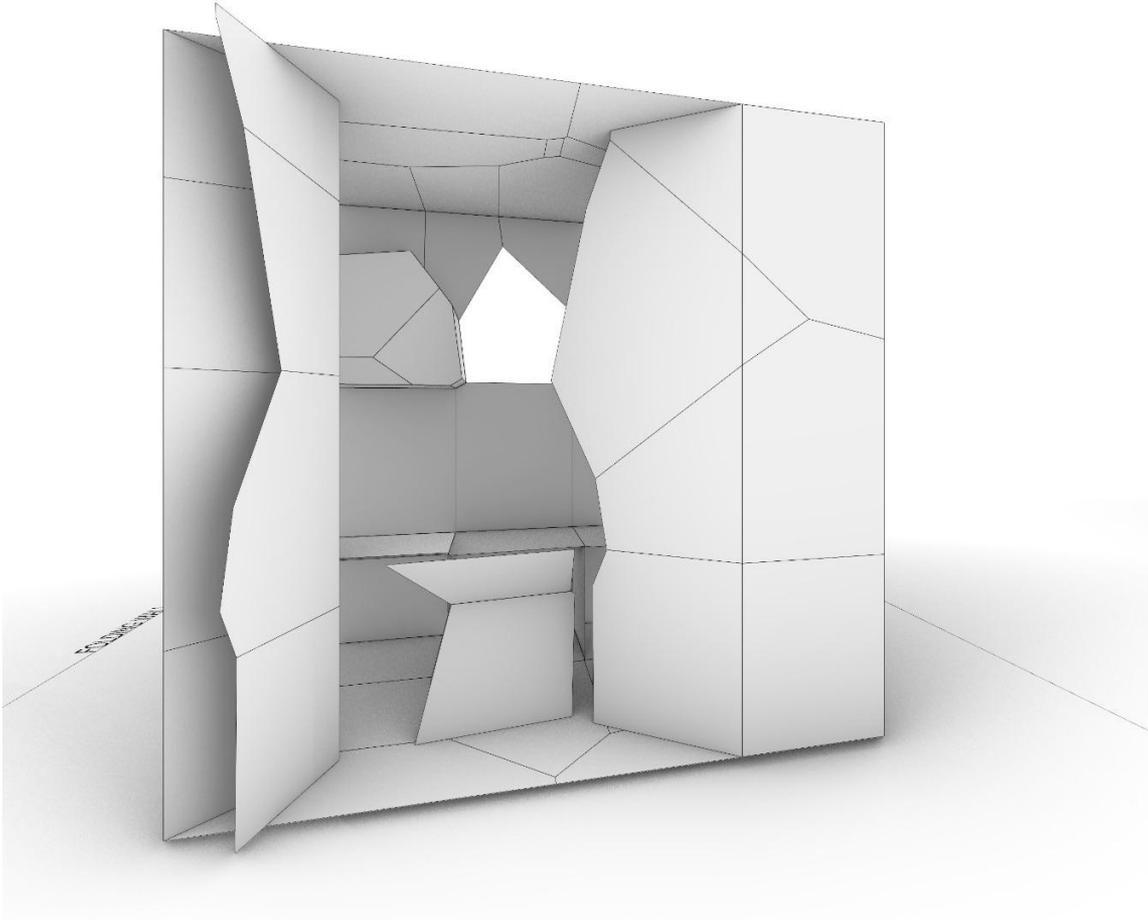
De-boning

# Form creation

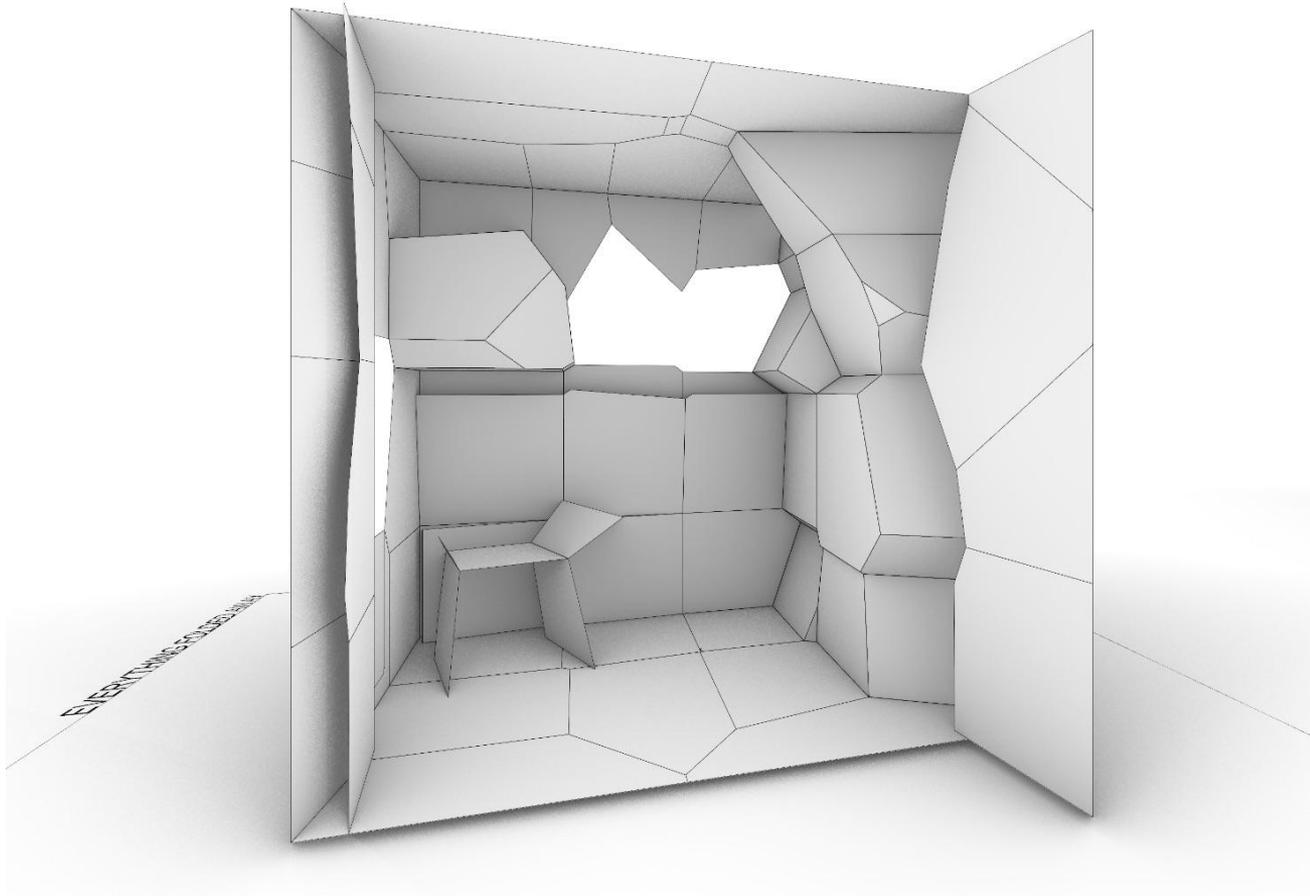


Coupling

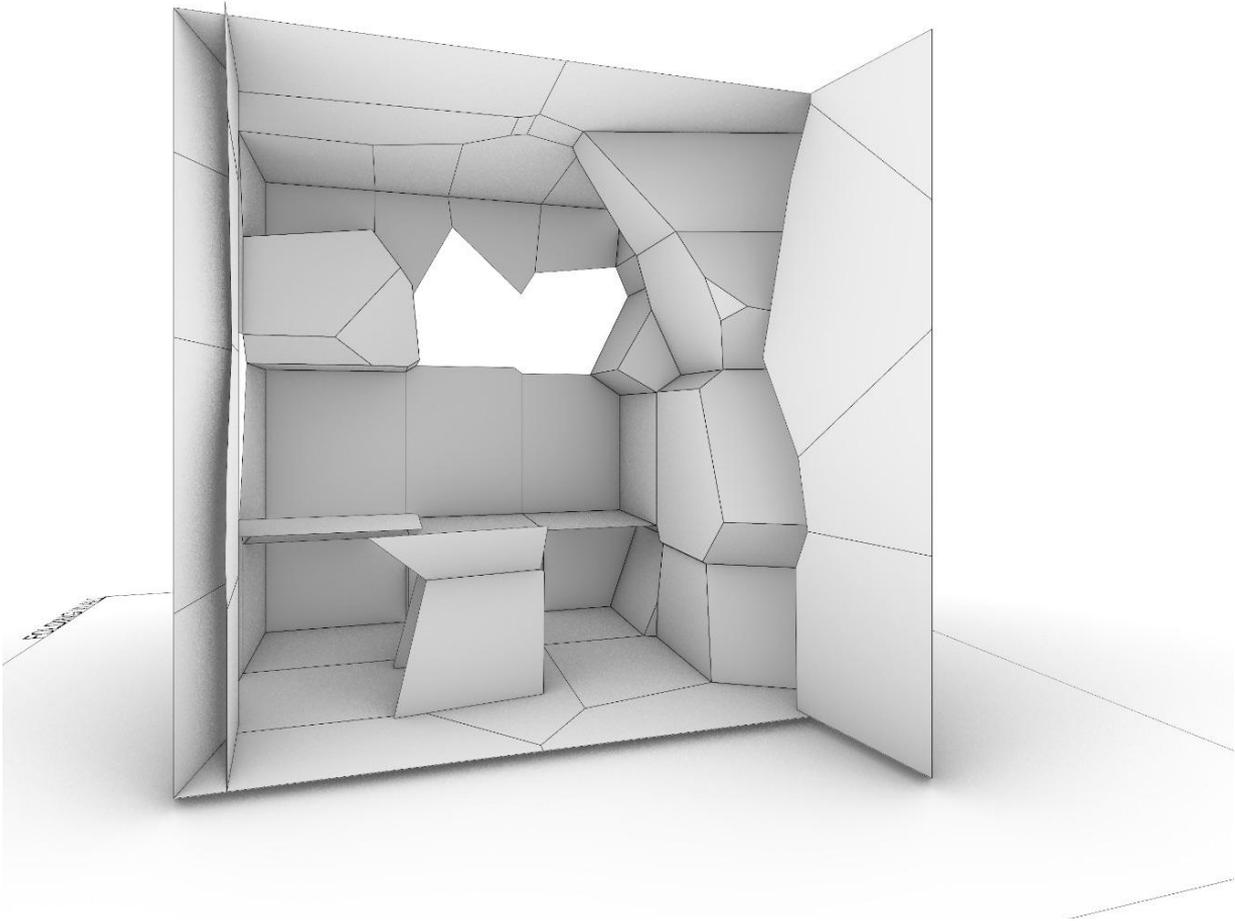
# Separation Closing



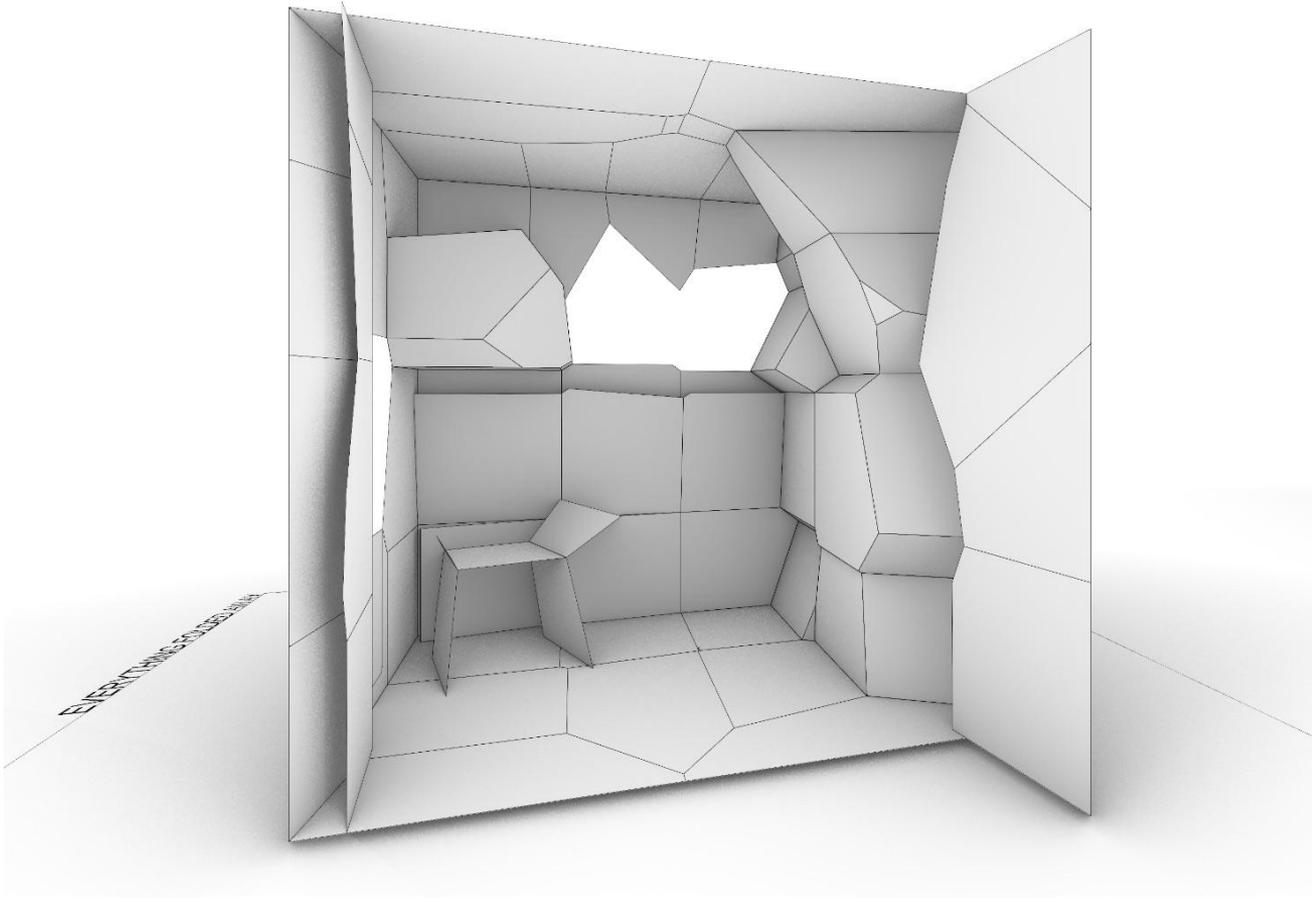
# Separation Opening



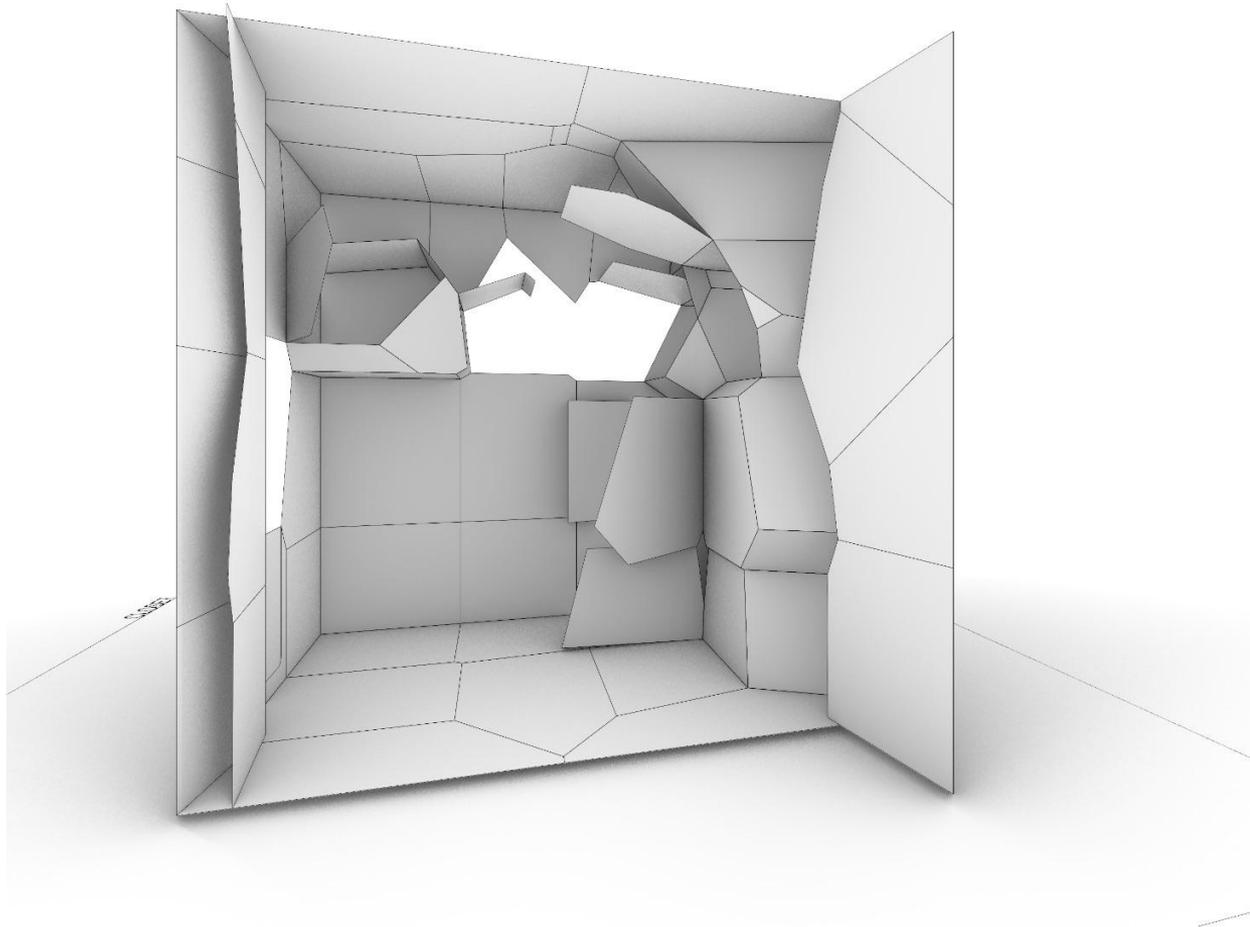
Unfolded



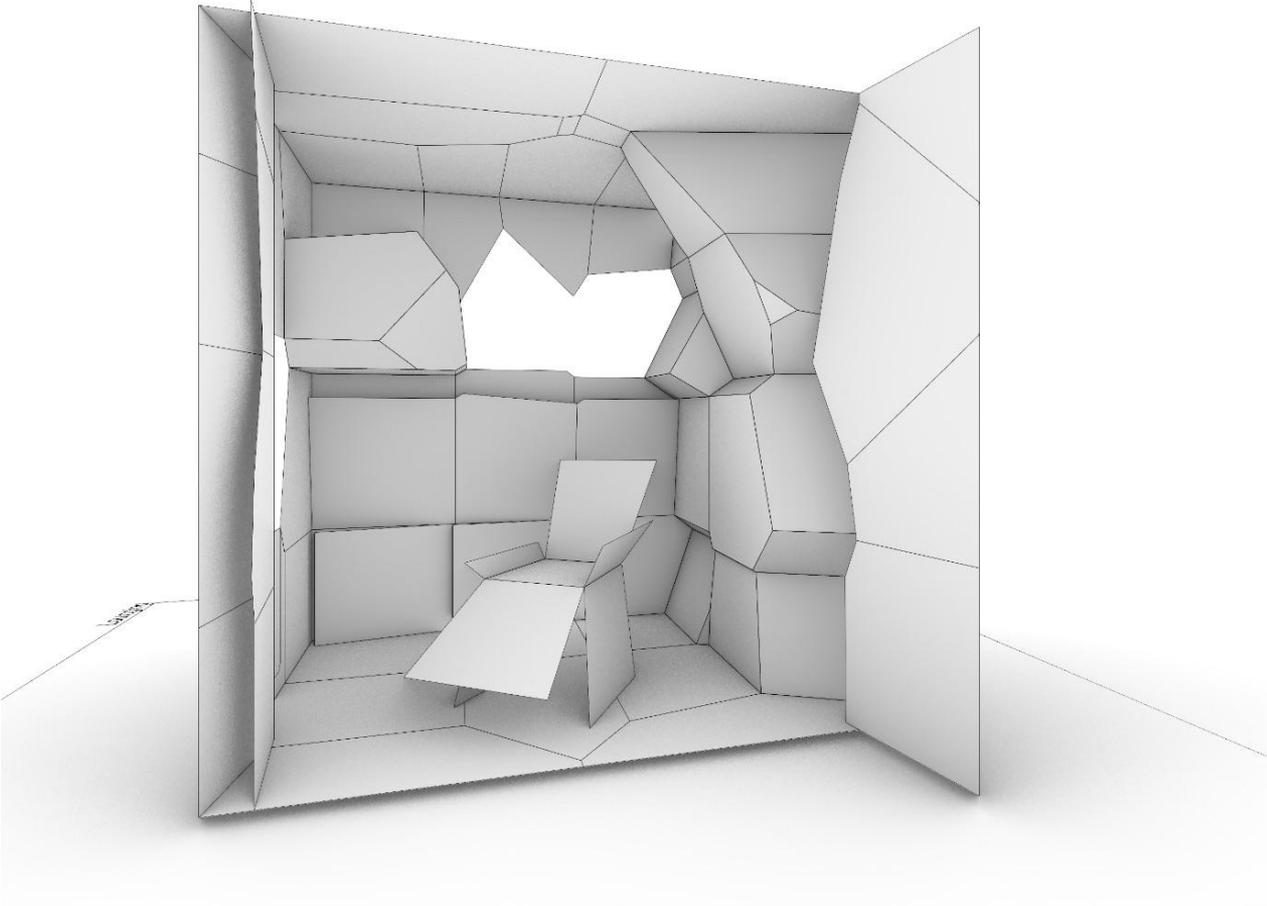
Folded



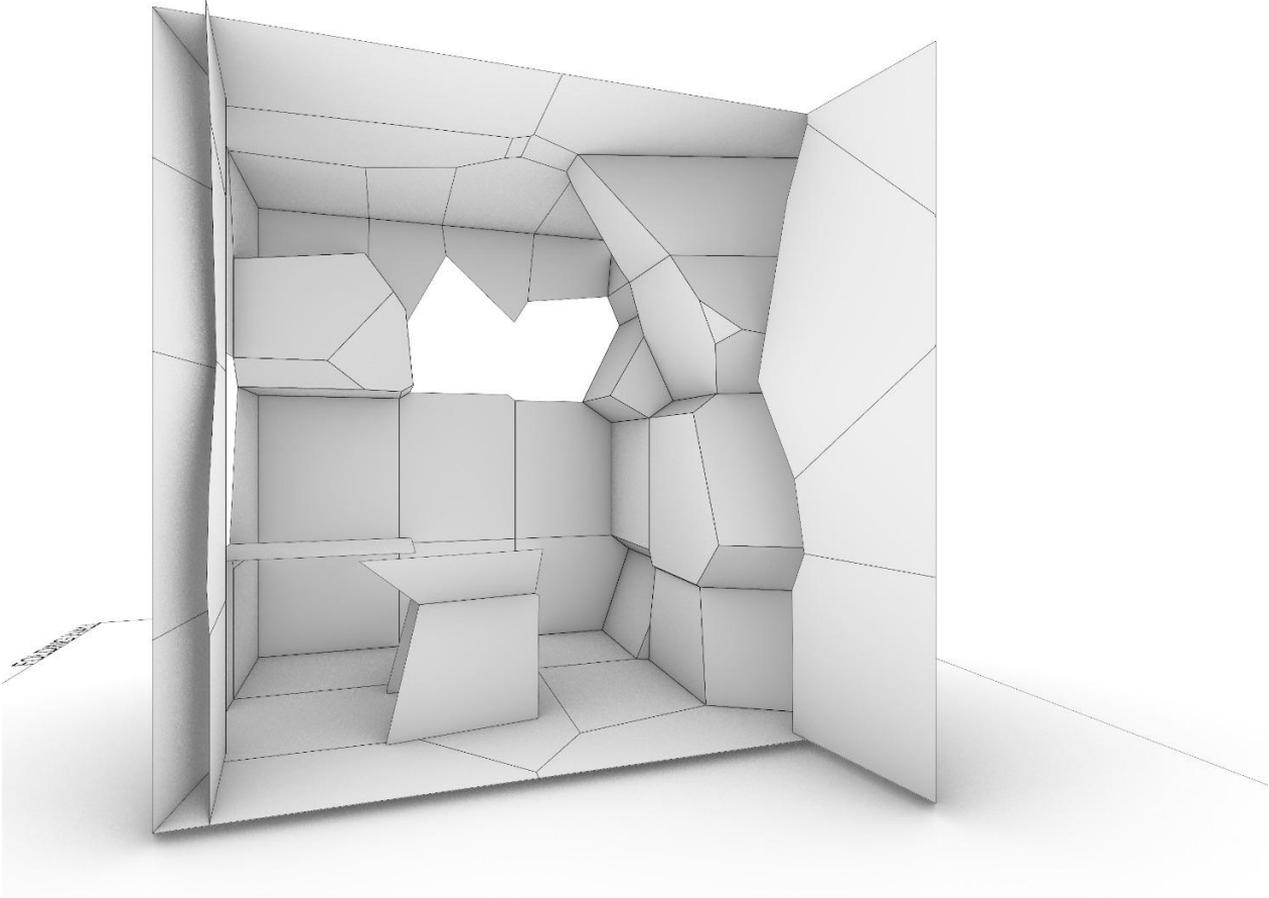
# Storage



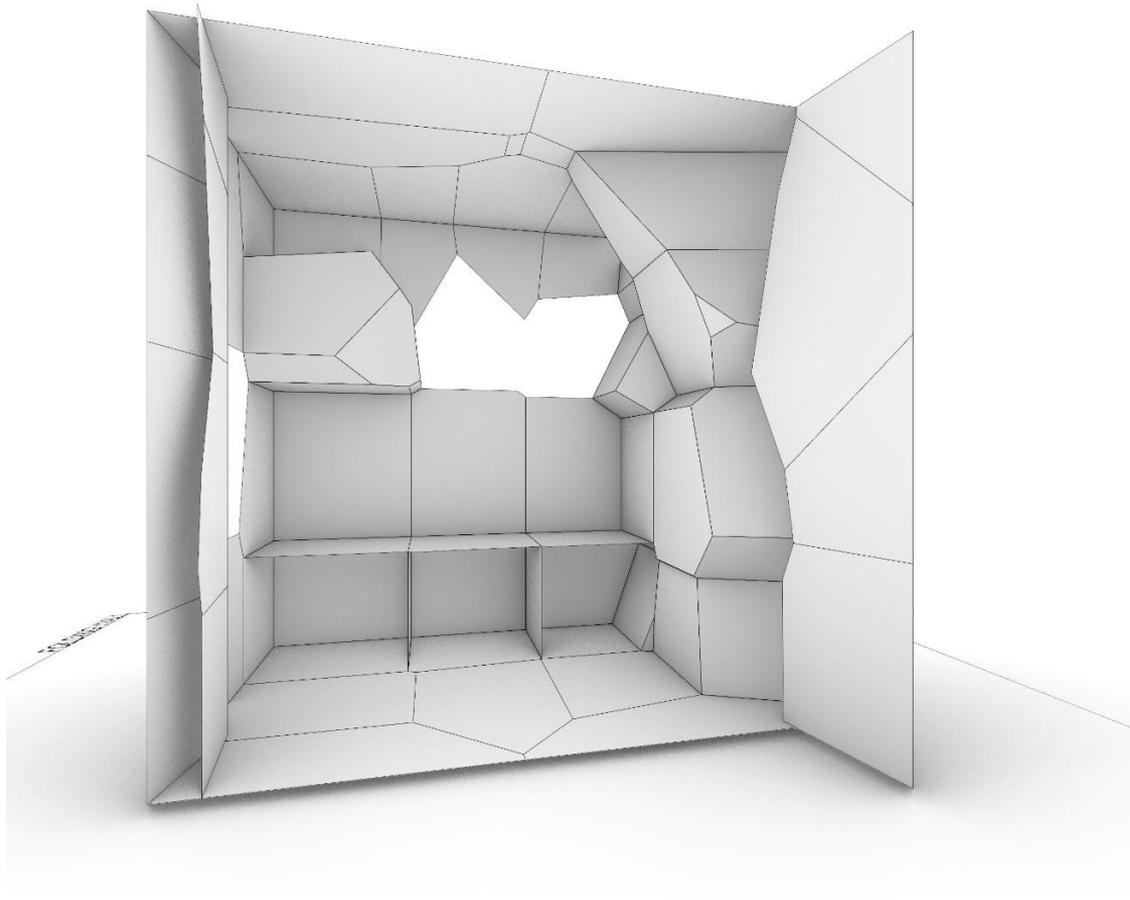
# Lounging



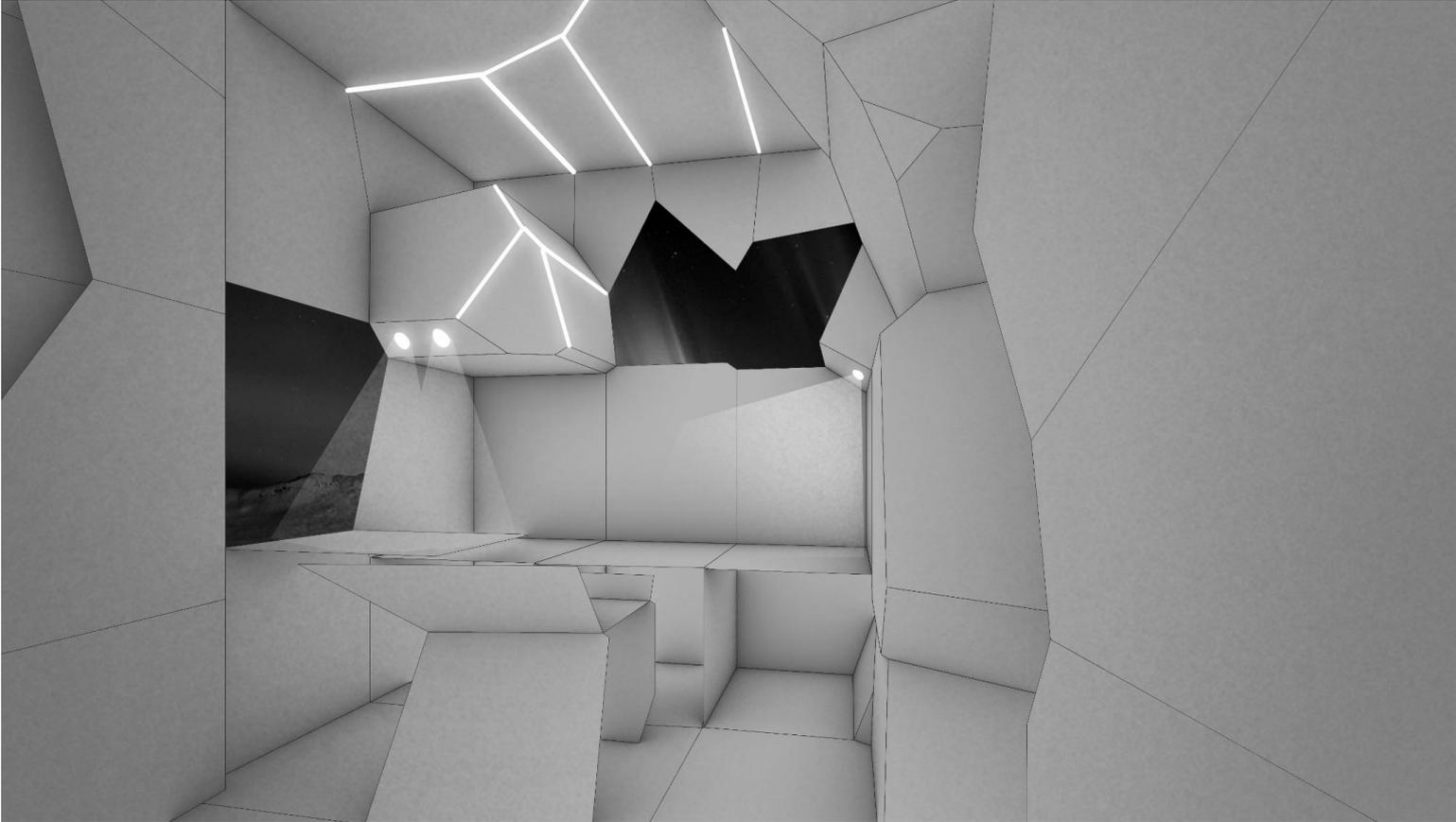
# Working



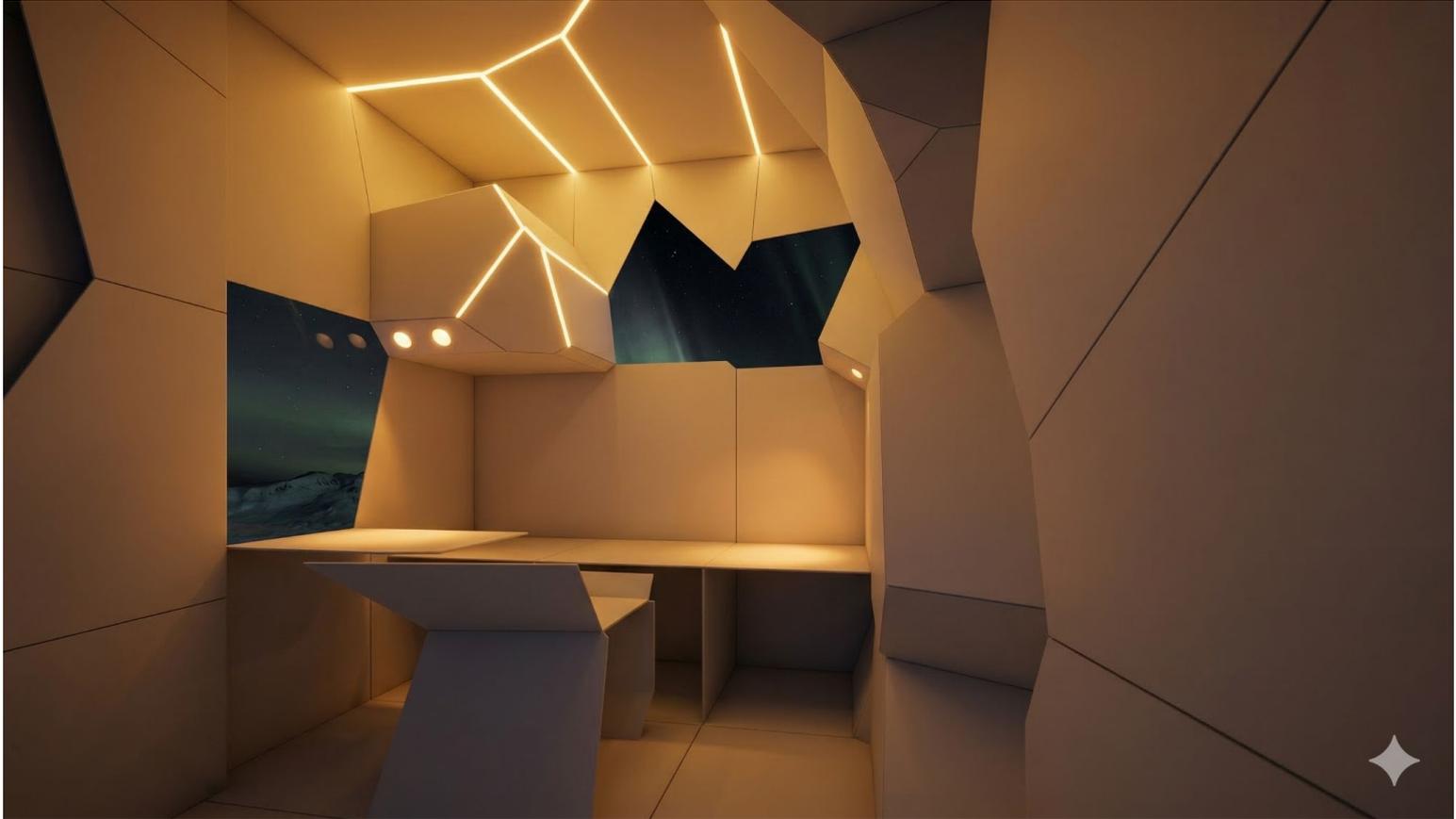
# Sleeping



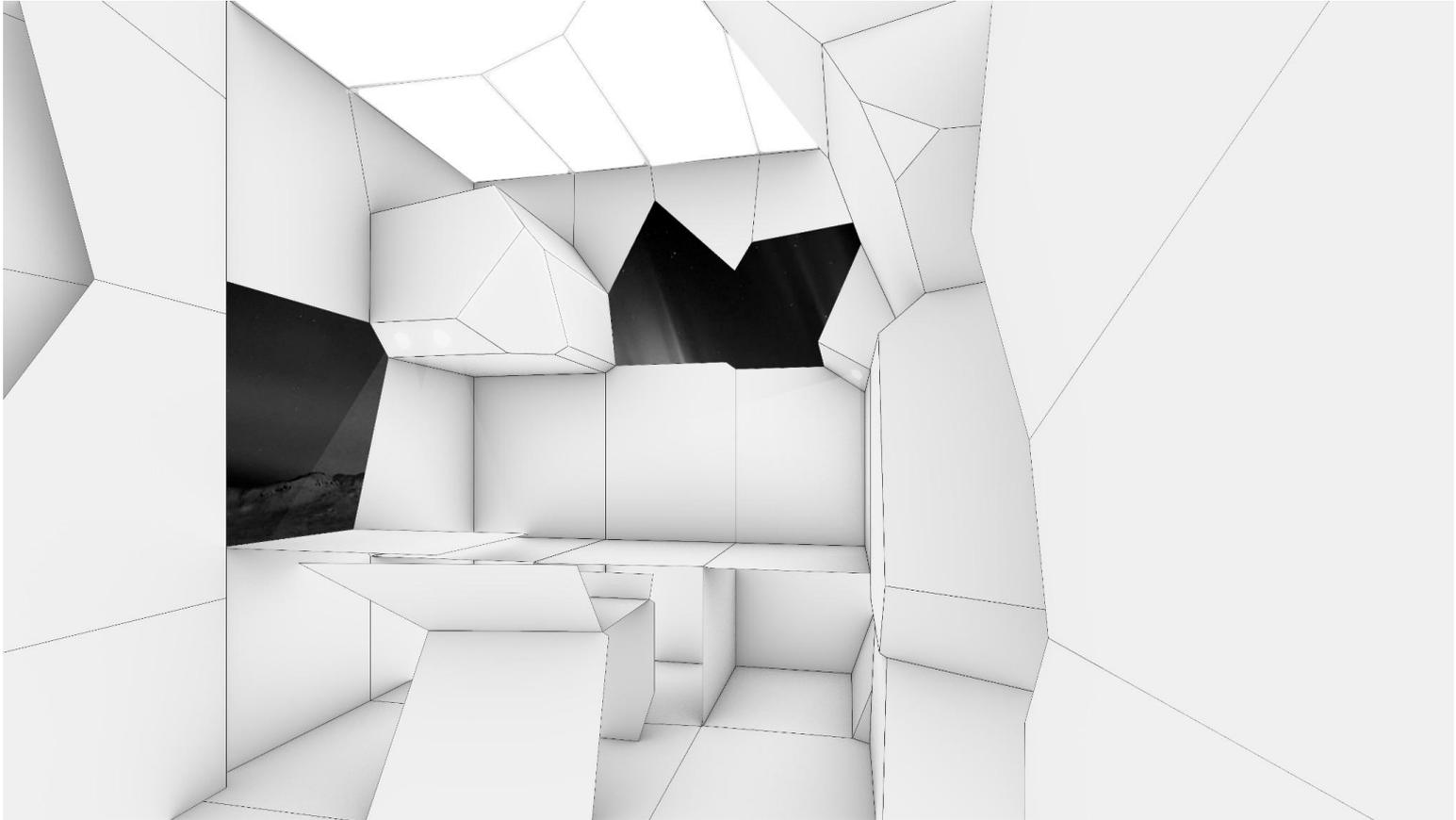
Nighttime



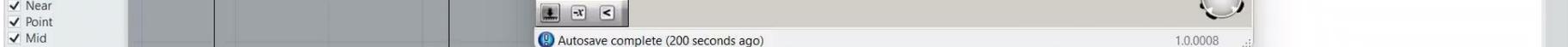
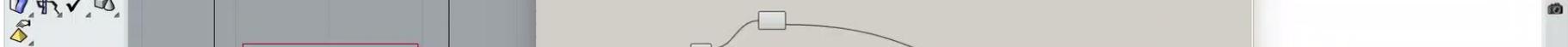
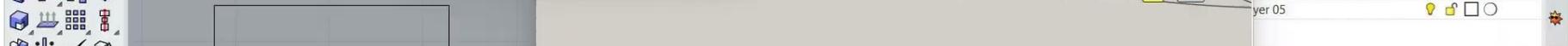
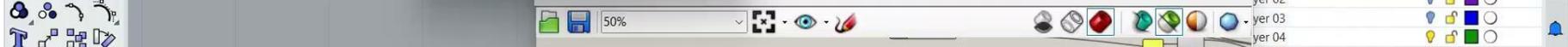
# Nighttime



Daytime

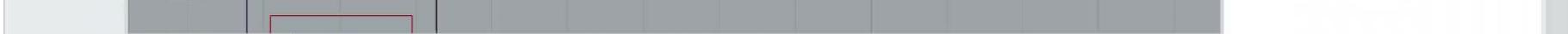
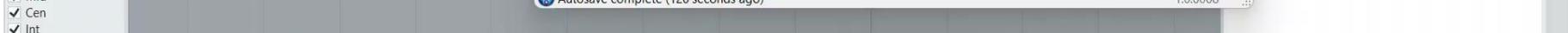
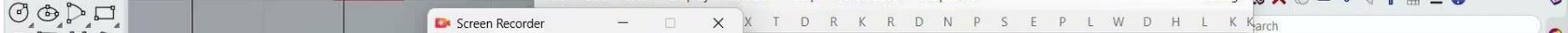


Choose coordinate system ( CPlane World ): \_World  
Choose world view ( Top Bottom Left Right Front Back Perspective TwoPointPerspective ): \_Top  
Command:

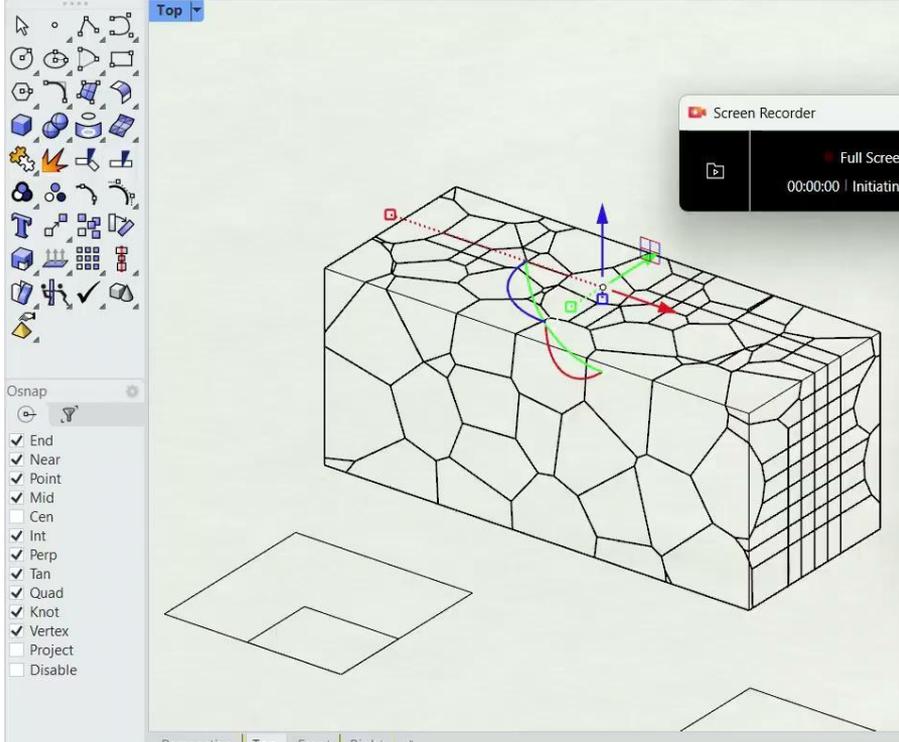


Choose world view (Top Bottom Left Right Front Back Perspective TwoPointPerspective):\_Top  
Command: Grasshopper

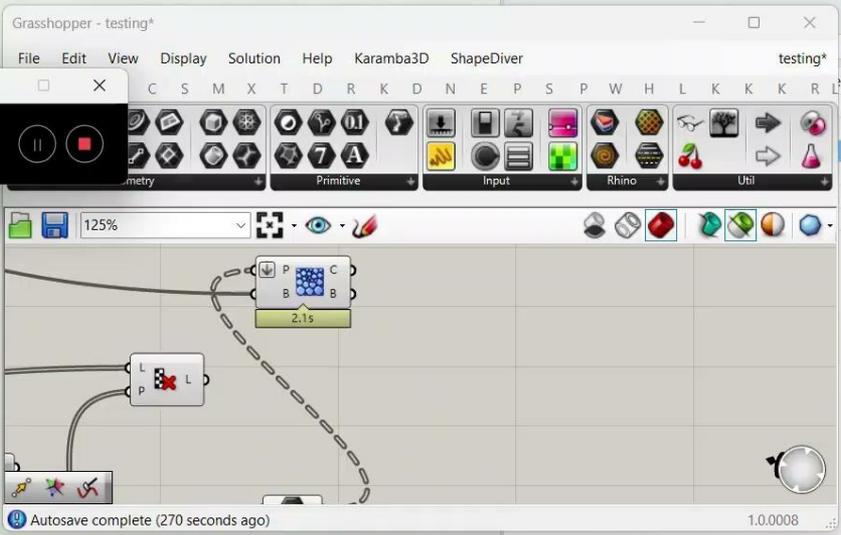
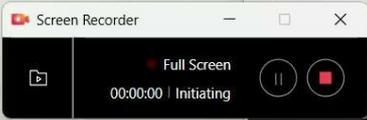
Command:



Display mode set to "Pen".  
Tap Alt to make a duplicate  
**Command:**

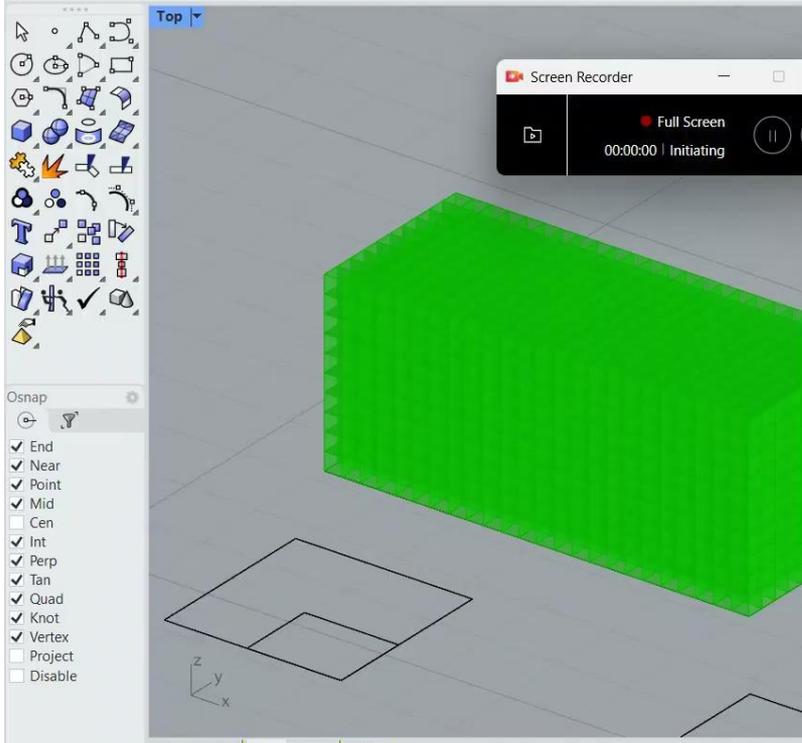


- Osnap
- End
  - Near
  - Point
  - Mid
  - Cen
  - Int
  - Perp
  - Tan
  - Quad
  - Knot
  - Vertex
  - Project
  - Disable



Tap Alt to make a duplicate  
Command: Grasshopper

Command:



- Osnap
- End
  - Near
  - Point
  - Mid
  - Cen
  - Int
  - Perp
  - Tan
  - Quad
  - Knot
  - Vertex
  - Project
  - Disable

Screen Recorder

Full Screen

00:00:00 | Initiating

My Videos - Screen Recorder

	20260316110412.mp4 16/03/2026 11:04:12				
	20260316110311.mp4 16/03/2026 11:03:11				
	20260312182614.mp4 12/03/2026 18:26:14				
	20260312182117.mp4 12/03/2026 18:21:17				
	20260312182008.mp4 12/03/2026 18:20:08				
	20260227080419.mp4 27/02/2026 08:04:19				

testing\*

K K K R trial

Util

1.0.0008

**05**  
**Material**



## 05 Material From waste to use

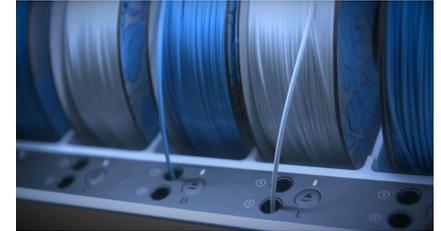
**Reference: KLM** - From recycled plastic bottles to 3D printed aircraft tools for maintenance

<https://www.voxelmatters.com/klm-3d-printing-tools-plastic-bottles/>

Collect leftover PET bottles



Plastic Pellet



PLA Filament

## 05 Material Reference

**Reference: Van Plestik** – From recycled plastic waste to 3D printed furniture.

<https://vanplestik.nl/en/about-vanplestik/>

Semi-transparent



White Matte



## 05 Material on-site vs outside fabrication

### ON-SITE PRODUCTION

- Additive manufacturing (large-scale 3D printing) enables the direct fabrication of the Voronoi structure on site
- Use local recycled materials (bioplastics, reinforced polymers)
- Requires temporary infrastructure: energy supply, protected workspace, robotic equipment
- Allows real-time adaptation to site conditions and design adjustments
- Reduces transportation impact and logistics complexity
- **Limitations:** longer production time, technical expertise required, machine constraints

### OUTSIDE PRODUCTION

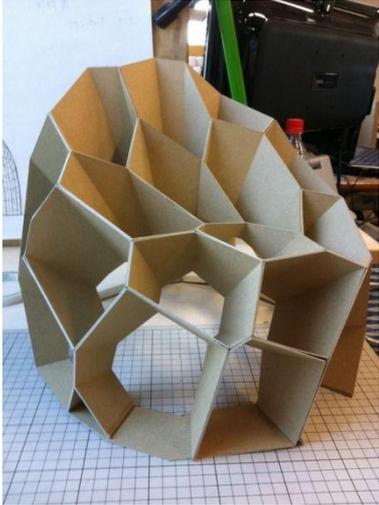
- Prefabrication in controlled environments ensures high precision and quality
- Components are modular, lightweight, and optimized for transport (container-based logistics)
- Pre-integration of systems: LED strips, wiring, connection nodes
- Enables fast on-site assembly through plug-in connections
- **Limitations:** higher transport costs, limited adaptability, dependency on supply chains

### HYBRID PRODUCTION

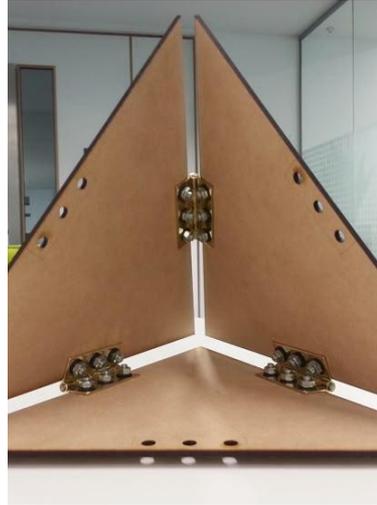
- Combine prefabricated structural modules with on-site customization
  - Balance between industrial efficiency and local adaptability
  - Enhances both design flexibility and logistical feasibility

## 05 Material Assembly

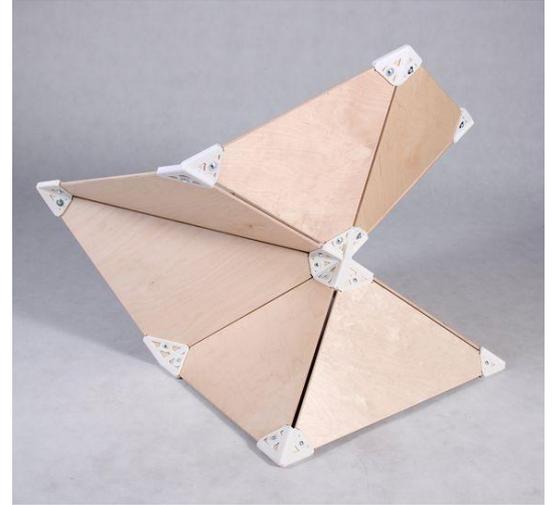
By Box



By Panel - Edges



By Panel - Vertex



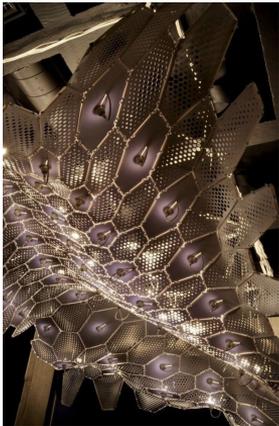
## 05 Material Visualization



# Lighting and AI Integration **Lighting types**

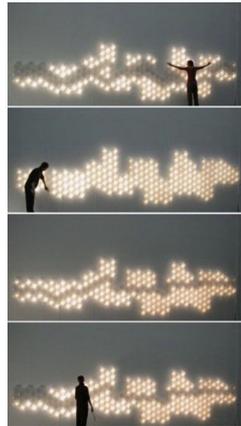
## (I) Skylight

- + Human Activity Recognition (HAR)
- + Reacting to a daylight cycle
- + Performative Uses (i.e. Wind blowing through leaves)



## (II) Light as Spectacle

- + Computer Vision (CV) translates outdoor environment into spectacle
- + Performative
- + Cognitive Stimulation and Psychological orientation
- + Shows live from outside



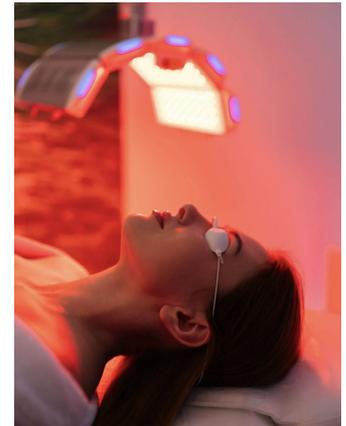
## (III) Individual Lighting

- + Autoregressive (AR)
- + Personalized circadian cycle
- + Personalized atmospheric lighting
- + Reaction to physiological factors eg. heart rate



## (IV) Light Therapy

- + Red-light (630–850nm) for recovery + mood
- + 10,000 lux daylight therapy for winter activation



# Lighting and AI Integration **Goals for AI integration**

## **01: Circadian Rhythm Preservation**

- + Simulates a full Delft daylight cycle inside the container
- + Any date selectable — captures seasonal variation across the year
- + Maintains sleep, melatonin and mood cycles during polar night

## **02: Environmental Energy Optimisation**

- + Outdoor conditions drive indoor light levels automatically
- + Bright sun outside —> dims indoor lights
- + Heavy cloud / polar darkness —> boosts indoor light
- + Minimises energy use

## **03: Personalised Physiological Response**

- + Neural network predicts ideal light from body signals
- + High stress detected —> warm dim light to lower heart rate
- + Balanced state —> model prediction applied directly
- + Lighting actively responds to each researcher's biological state

## **04: Ability to choose own lighting**

- + Overrides system lighting for user needs (Have 4 simulation modes for users to choose from - or full RGB range)

(I) Skylight

(II) Light as Spectacle

(I) Skylight

(III) Individual Lighting

(IV) Light Therapy

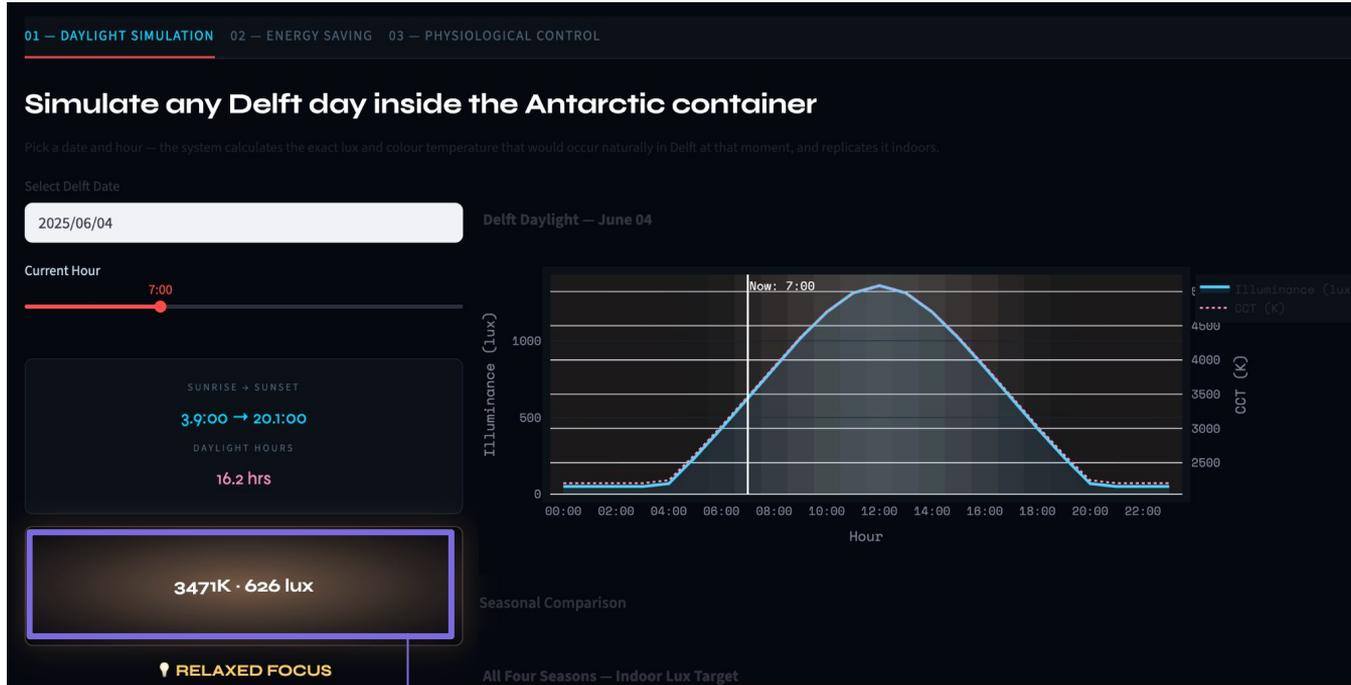
(I) Skylight

(III) Individual Lighting



# 99 Lighting and AI Integration

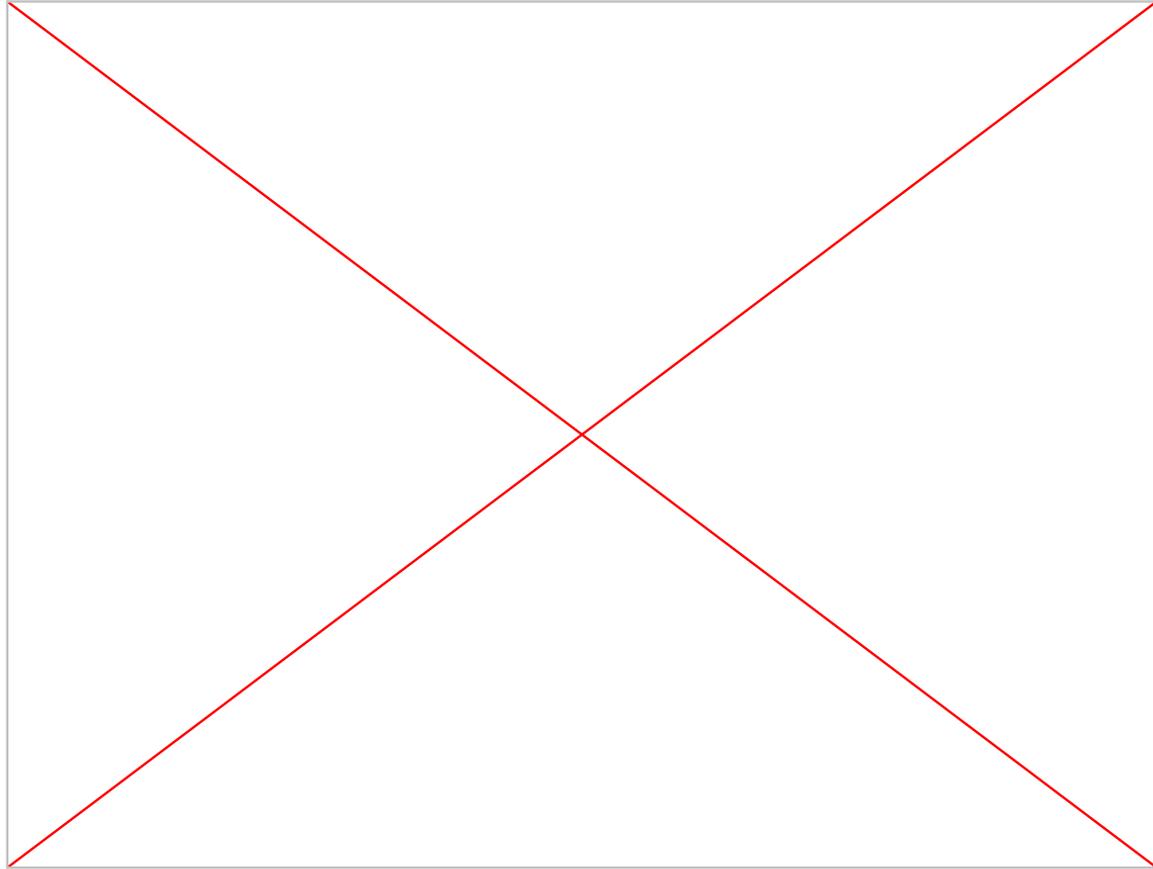
## Step 1: Visualization of model



How can these results be realized practically in the container?  
1. Color temperature 2. Lux (the unit of illuminance)

## 99 Lighting and AI Integration

**Video showing visualization of output**



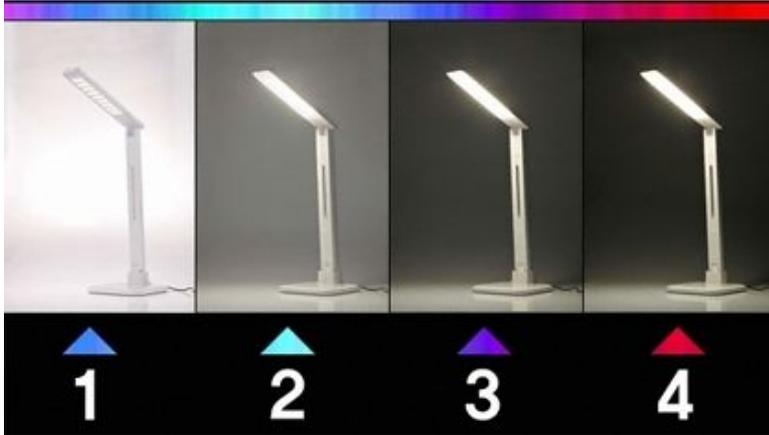
## 99 Lighting and AI Integration

### Step 2: Light configuration

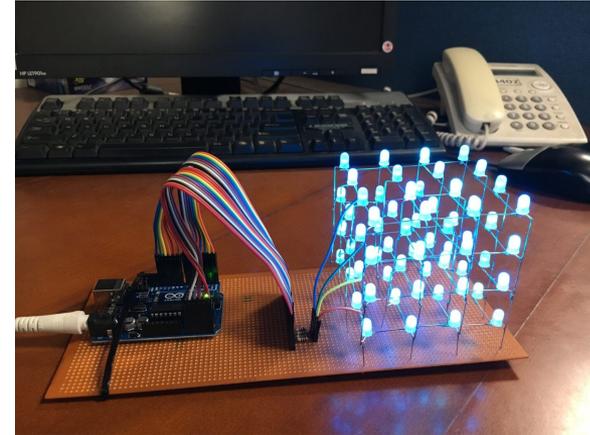
How can these results be realized practically in the container?

1. Color temperature **2. Lux (the unit of illuminance)**

3471K · 626 lux



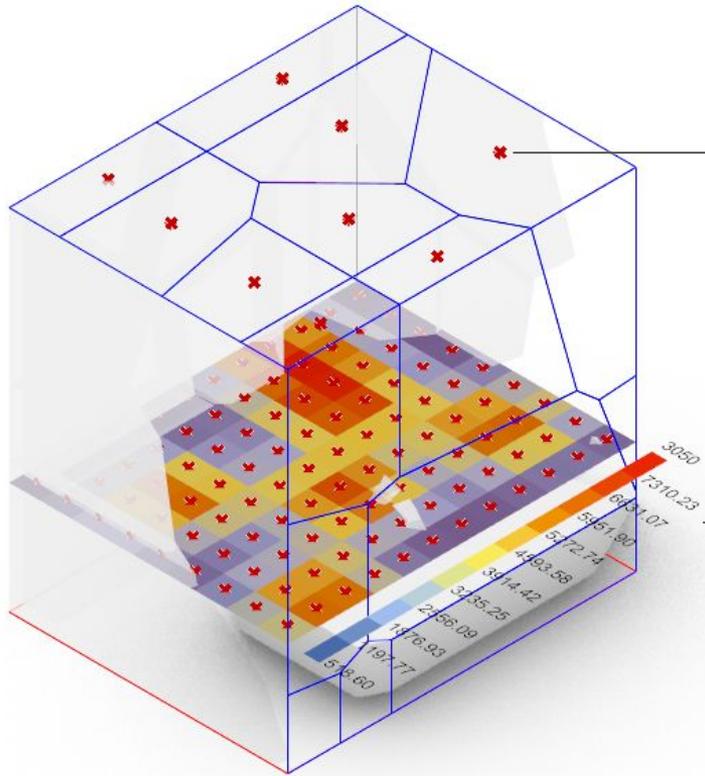
Each cell has its own luminance management system



By selectively turning on and off certain ceiling lights

## 99 Lighting and AI Integration

### Step 2: Concept for light configuration



Each Lighting Component  
: light temperature manageable

If List length : 9

Generating Combination

- {0} 0, 0, 0, 0, 0, 0, 0, 0, 0
- {331} 0, 1, 0, 1, 0, 0, 1, 0, 1, 1
- {332} 0, 1, 0, 1, 0, 0, 1, 1, 0, 0
- {333} 0, 1, 0, 1, 0, 0, 1, 1, 0, 1
- {334} 0, 1, 0, 1, 0, 0, 1, 1, 1, 0

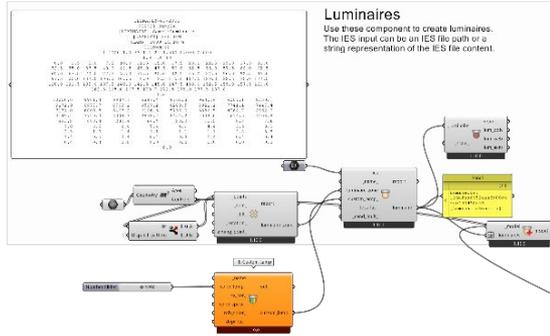
Average lux of the container

# 99 Lighting and AI Integration

## Step 2: Concept for light configuration

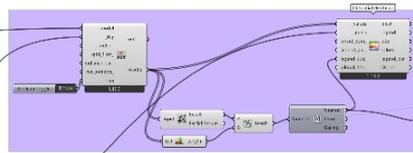
### Input 1:

Lighting data  
(brightness,  
temperature)



### Calculating lux

Lux  
luminous flux per unit area



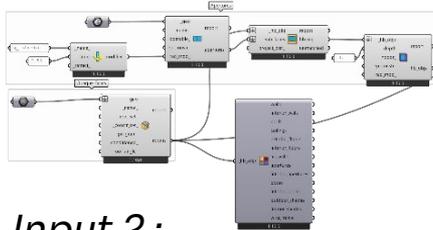
### Enumerating Data

3455

Generating all possible search states for lighting joints

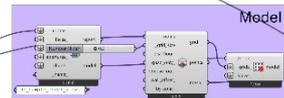
10

### Geometry Preparation



Input 2:  
geometry

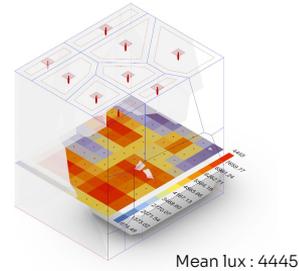
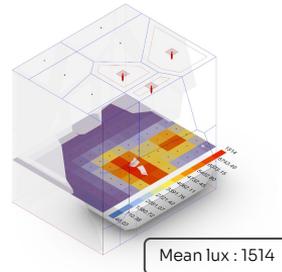
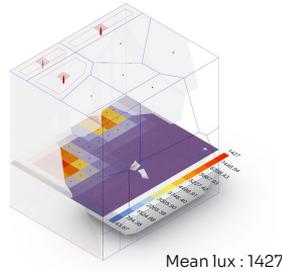
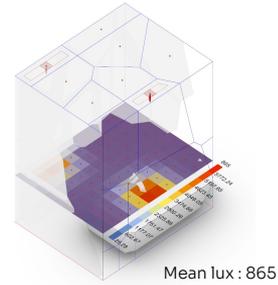
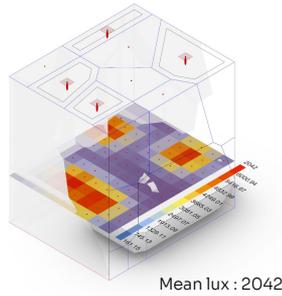
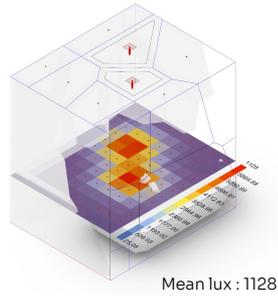
Sky brightness : 0



# 99 Lighting and AI Integration

## Step 3: Light configuration

*If the AI result is  
3471K  
1626 lux*

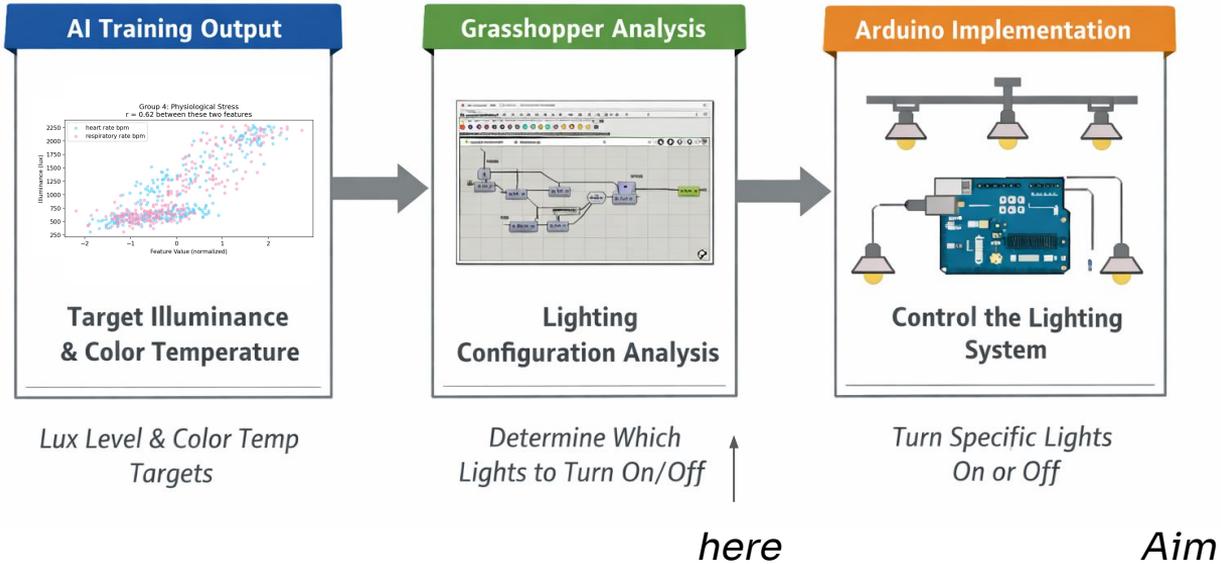


*Output :*  
0, 0, 0, 1, 0, 0, 1, 1, 1, 0

*Already enumerated data set*

# 99 Lighting and AI Integration

## Step 4: Future Goal



**Thank you**

**:>]**