Communal Housing Typology On Mars

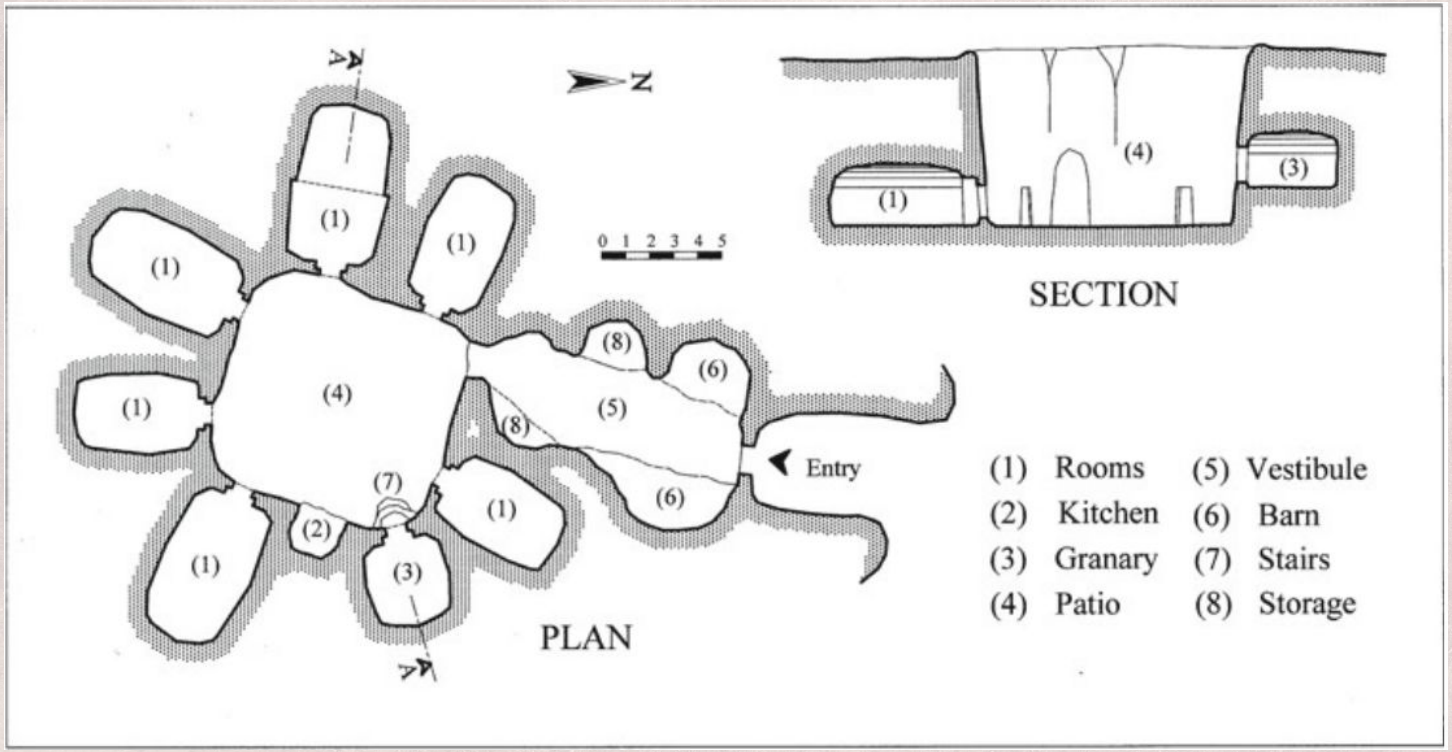
Group 4

David, Coby, Mikolaj, Simon

Workflow for conceptual design

-Update of housing unit design
-Furniture design
-Update of membrane structure

Case Study


N
0 1 2 3 4 5
(1)
(2)
(3)
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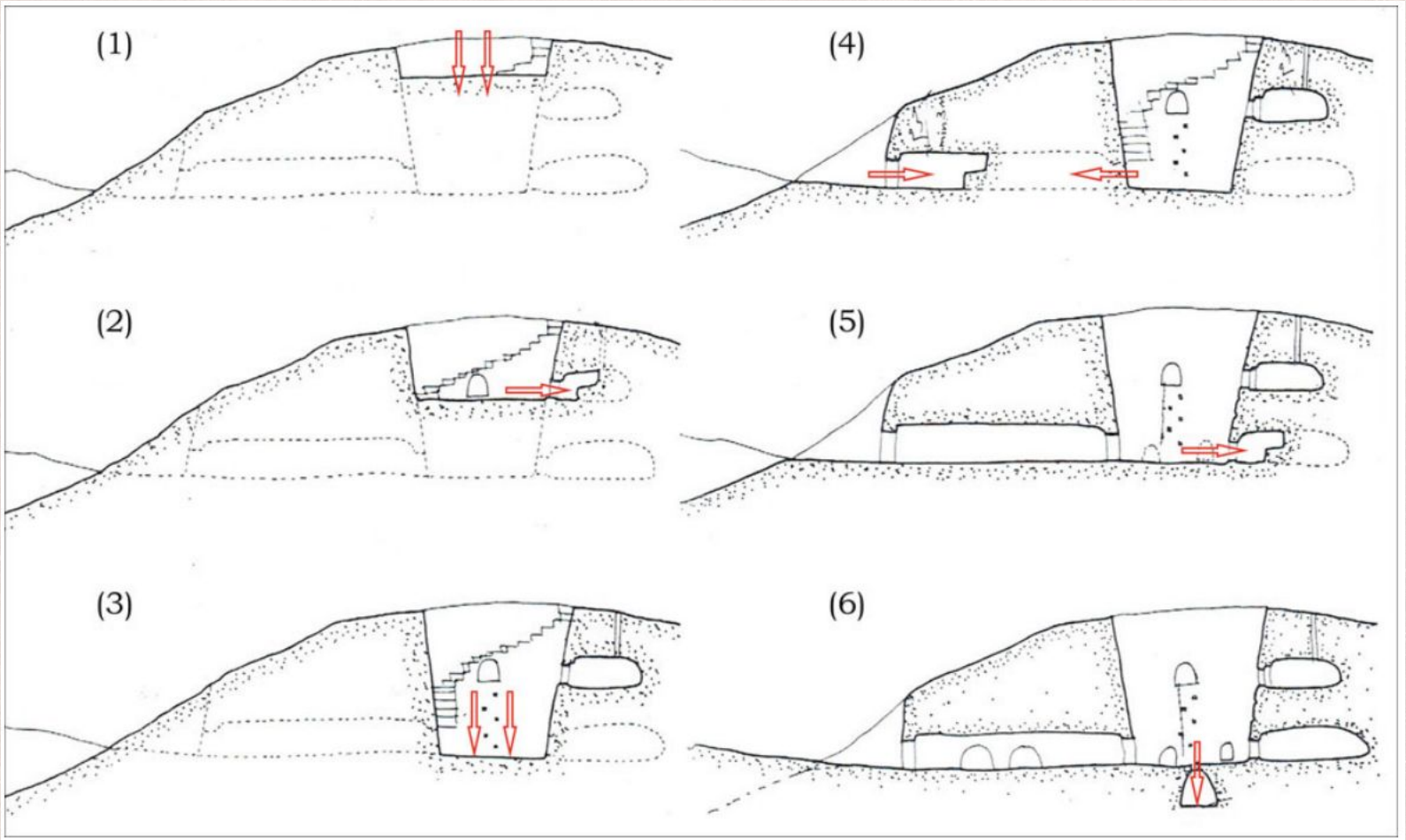
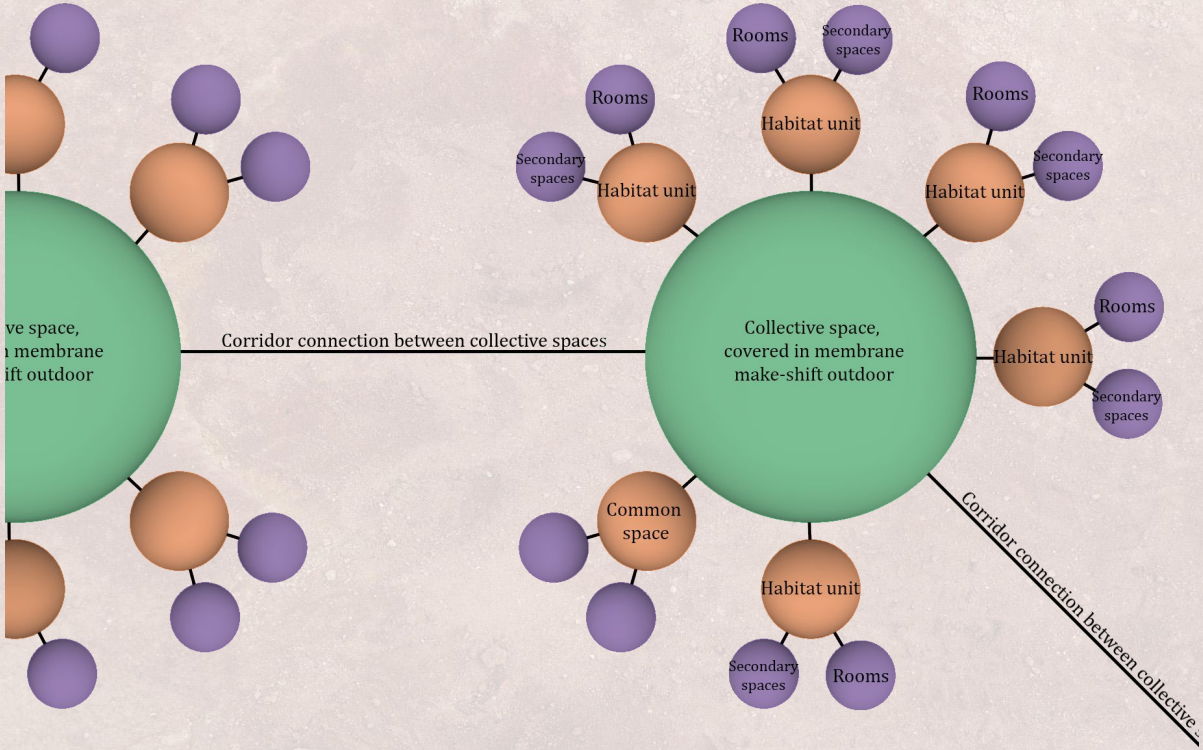
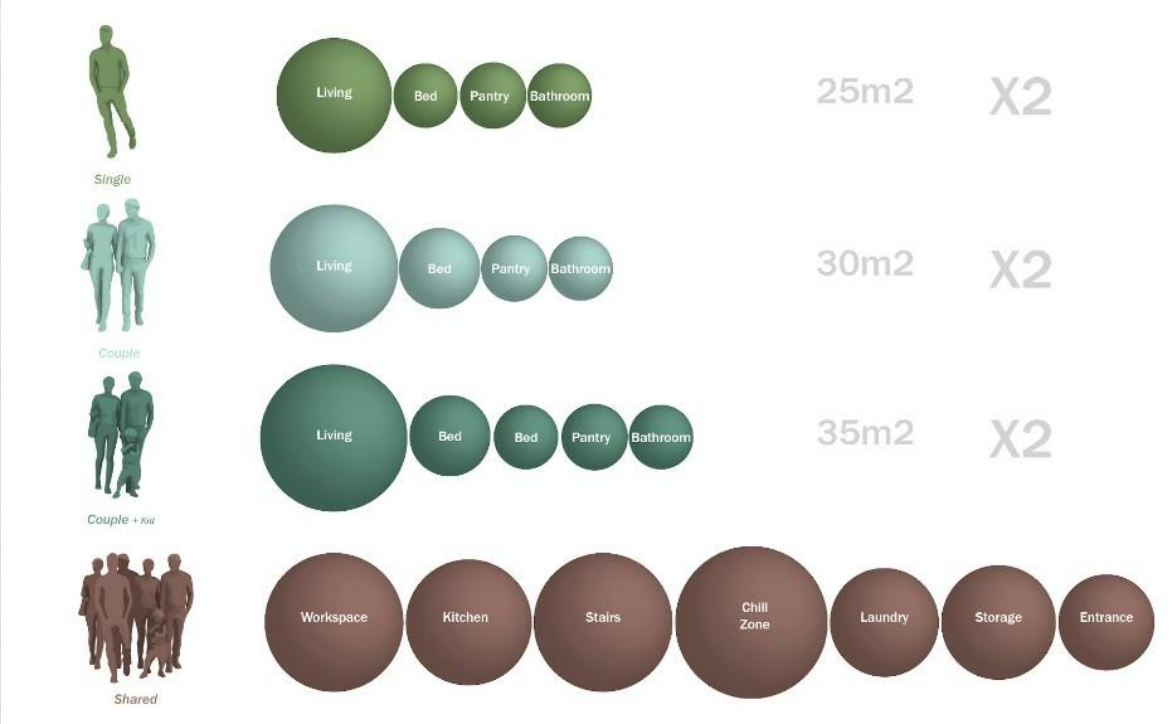
(7)
(8)
Entry
PLAN
SECTION
(1) Rooms
(2) Kitchen
(3) Granary
(4) Patio
(5) Vestibule
(6) Barn
(7) Stairs
(8) Storage

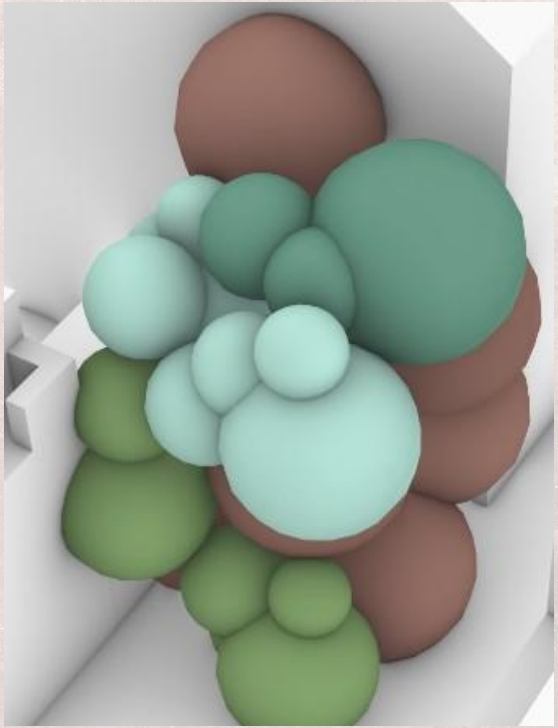

(1)
(4)
(2)
(5)
(3)
(6)

Design - conceptual bubble diagram

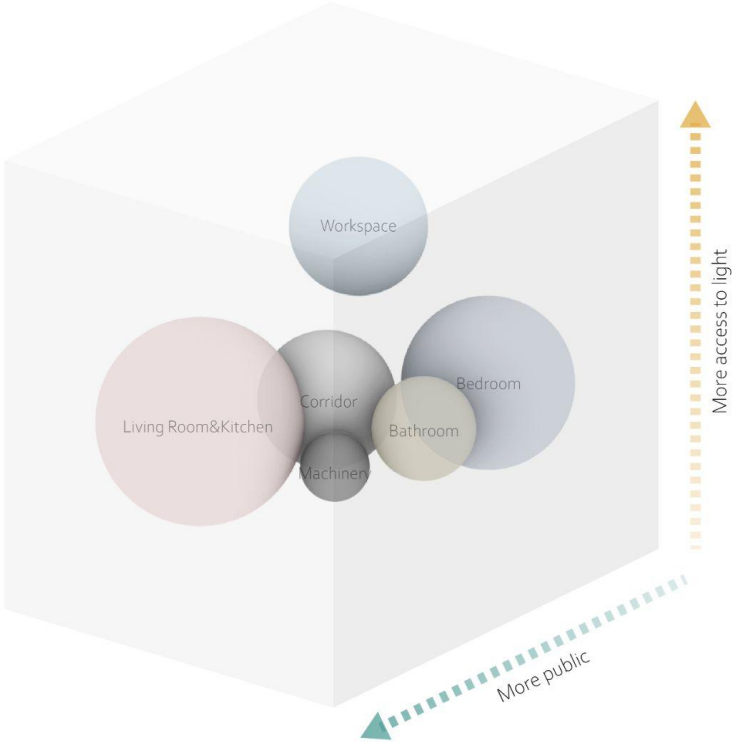


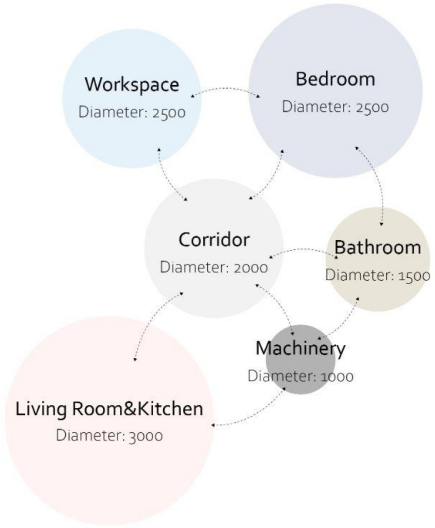
Case study - customization of spaces



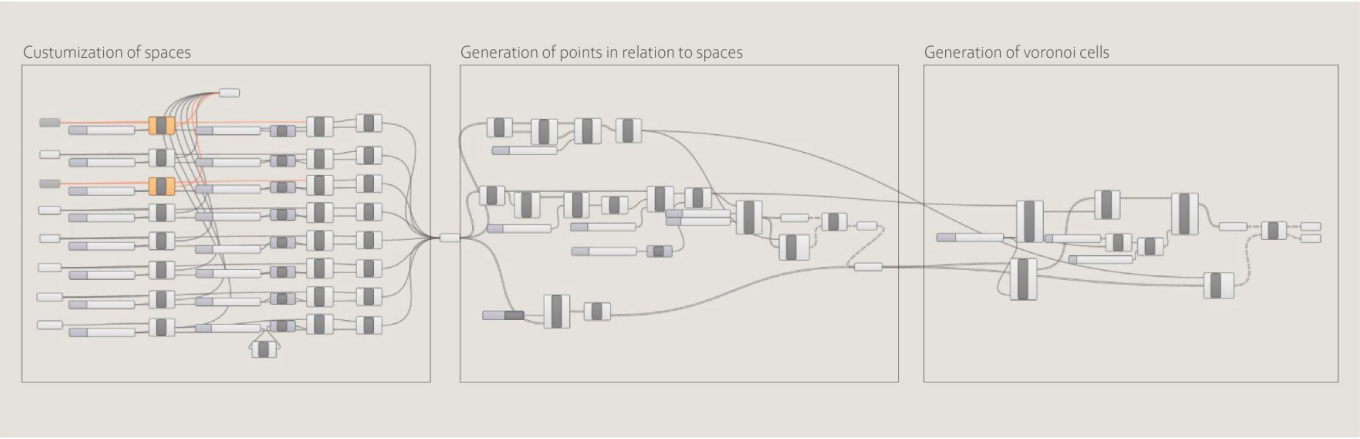


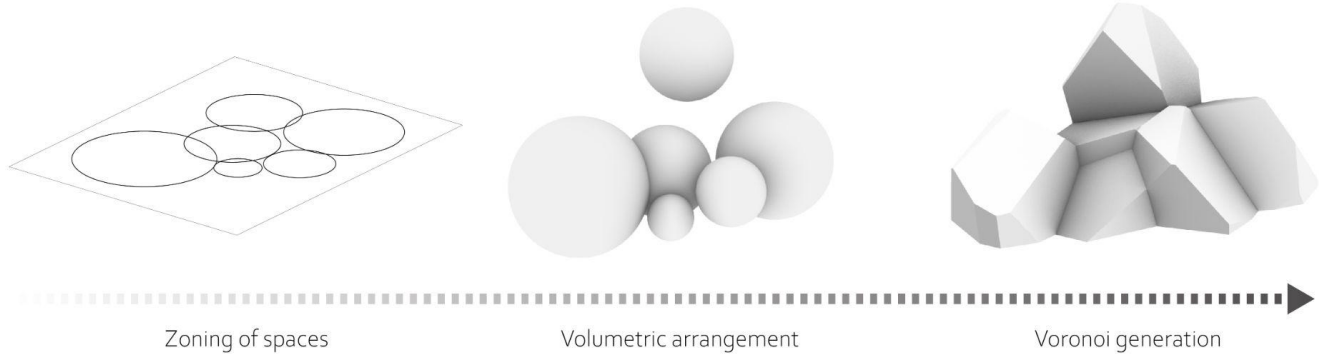
Design strategy - customization of volume



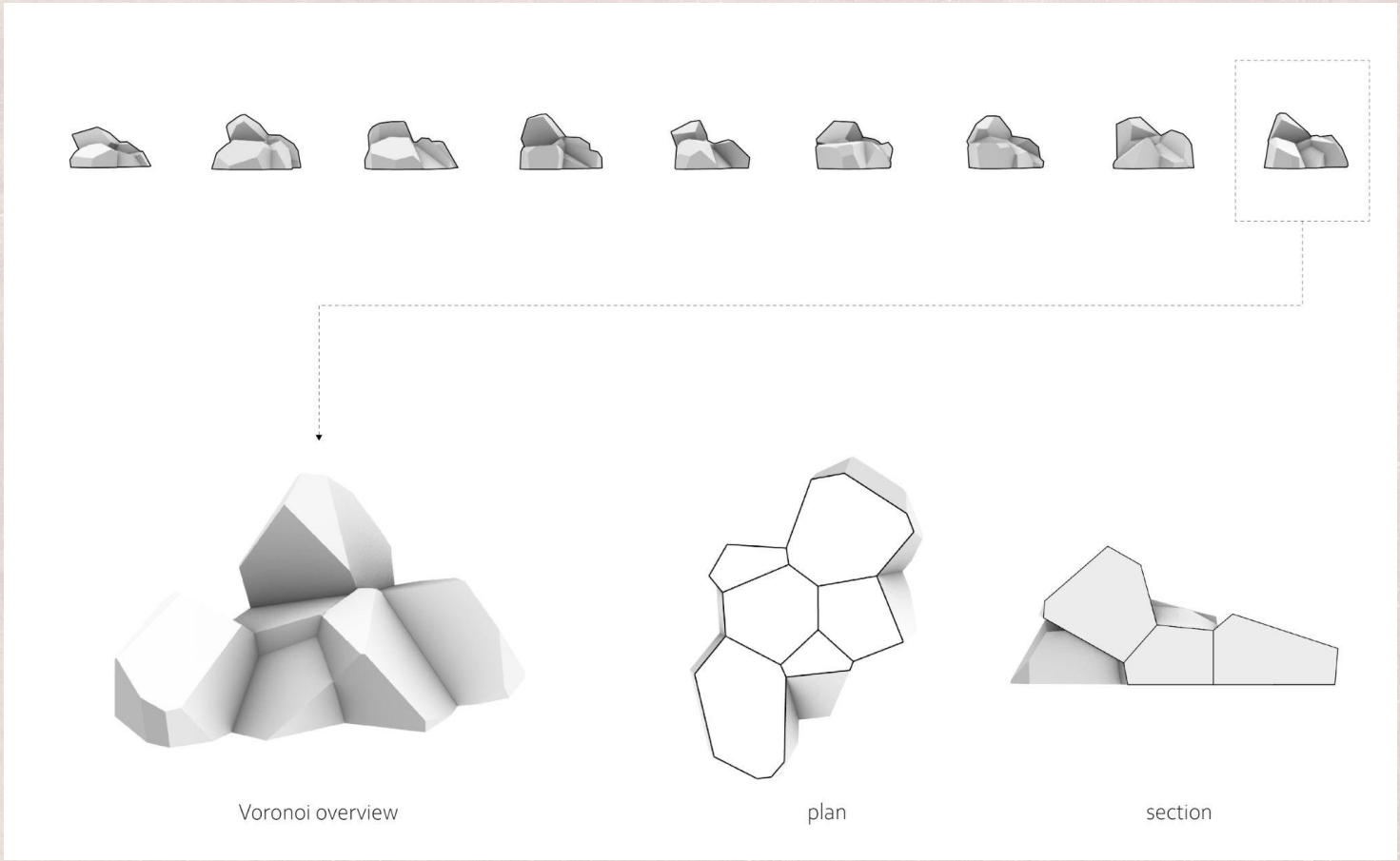


Translation of volume to voronoi

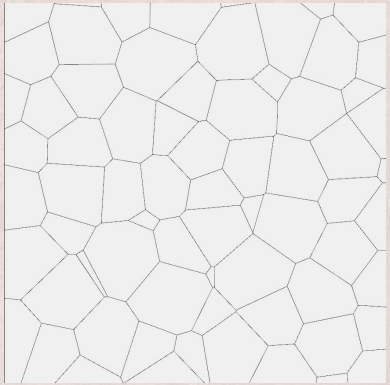




Selection of better options



Voronoi housings to community



Voronoi cell construction

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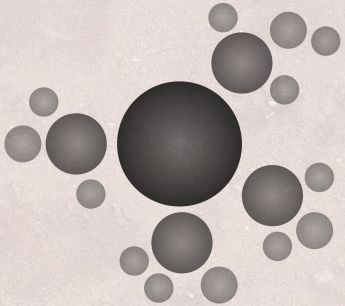
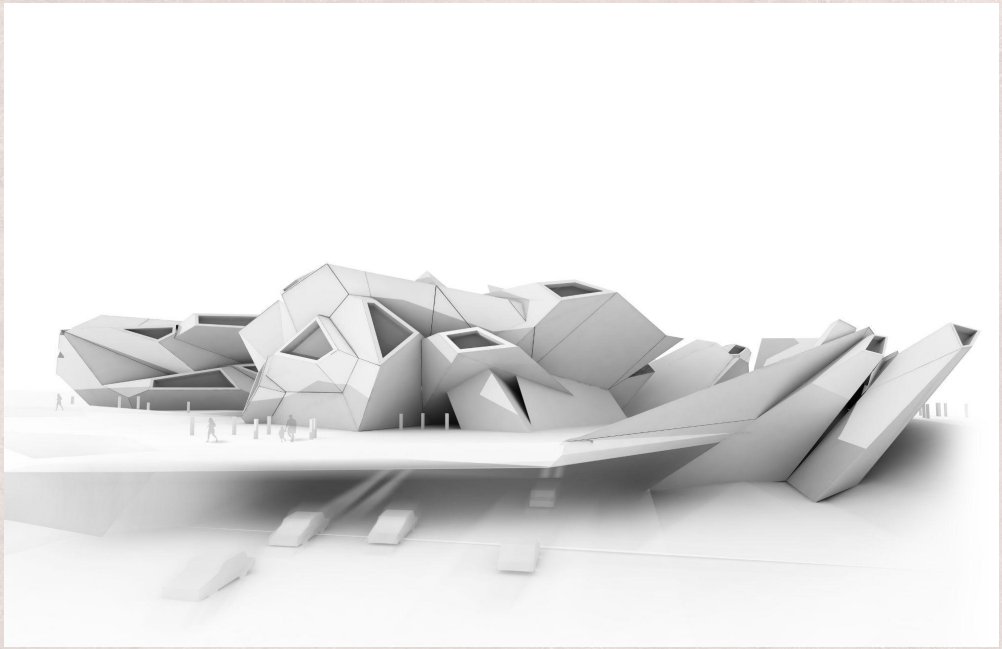


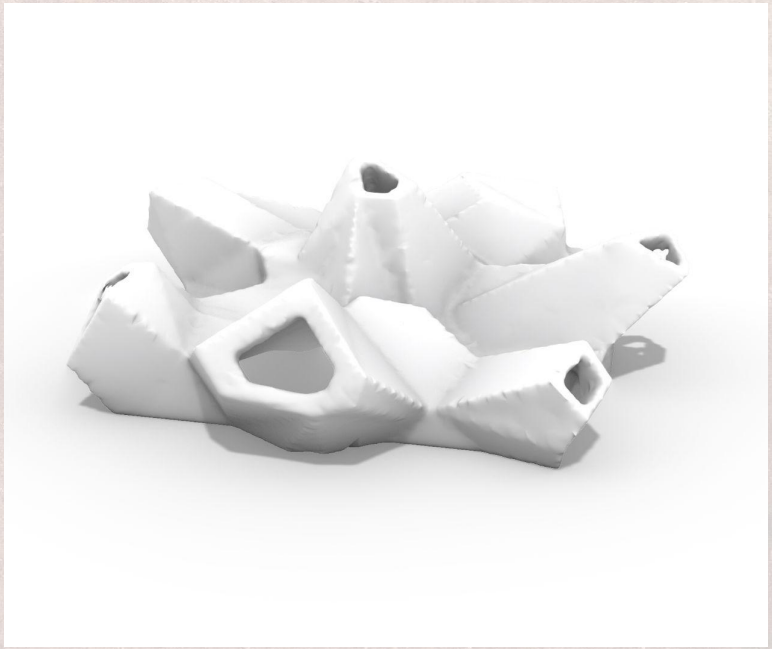
Programme organization

Voronoi cell organization

Inspiration - option1

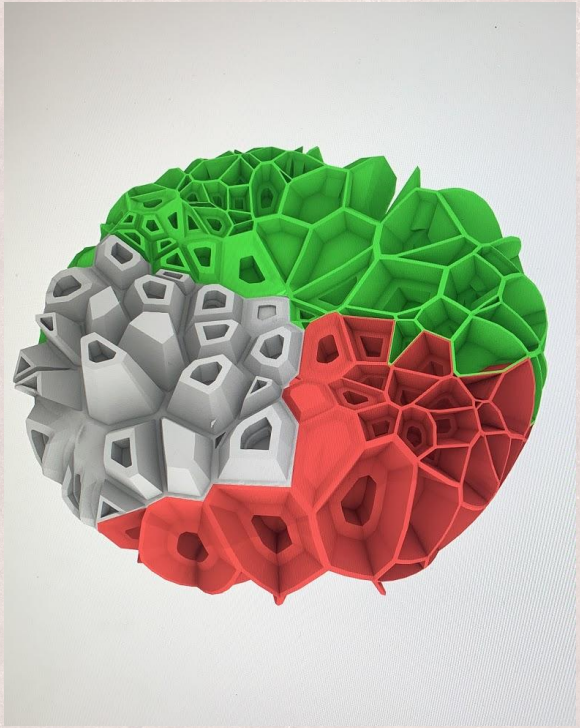


Student example

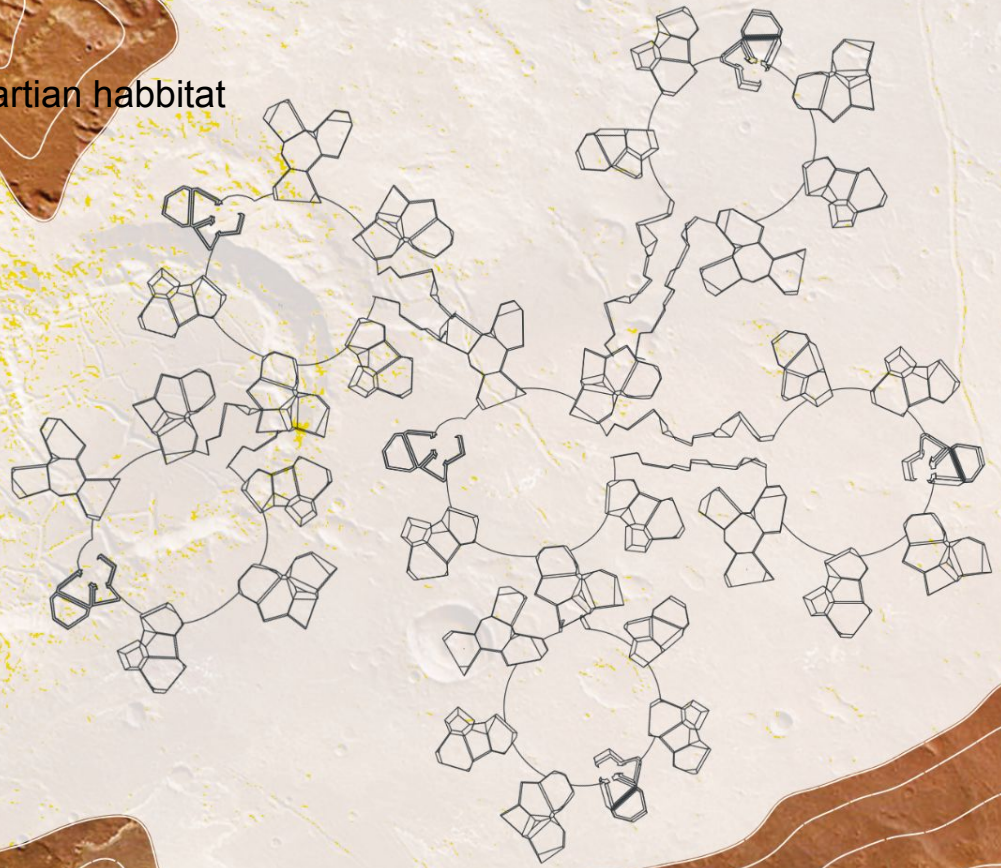


Voronoi dome generation

Option2

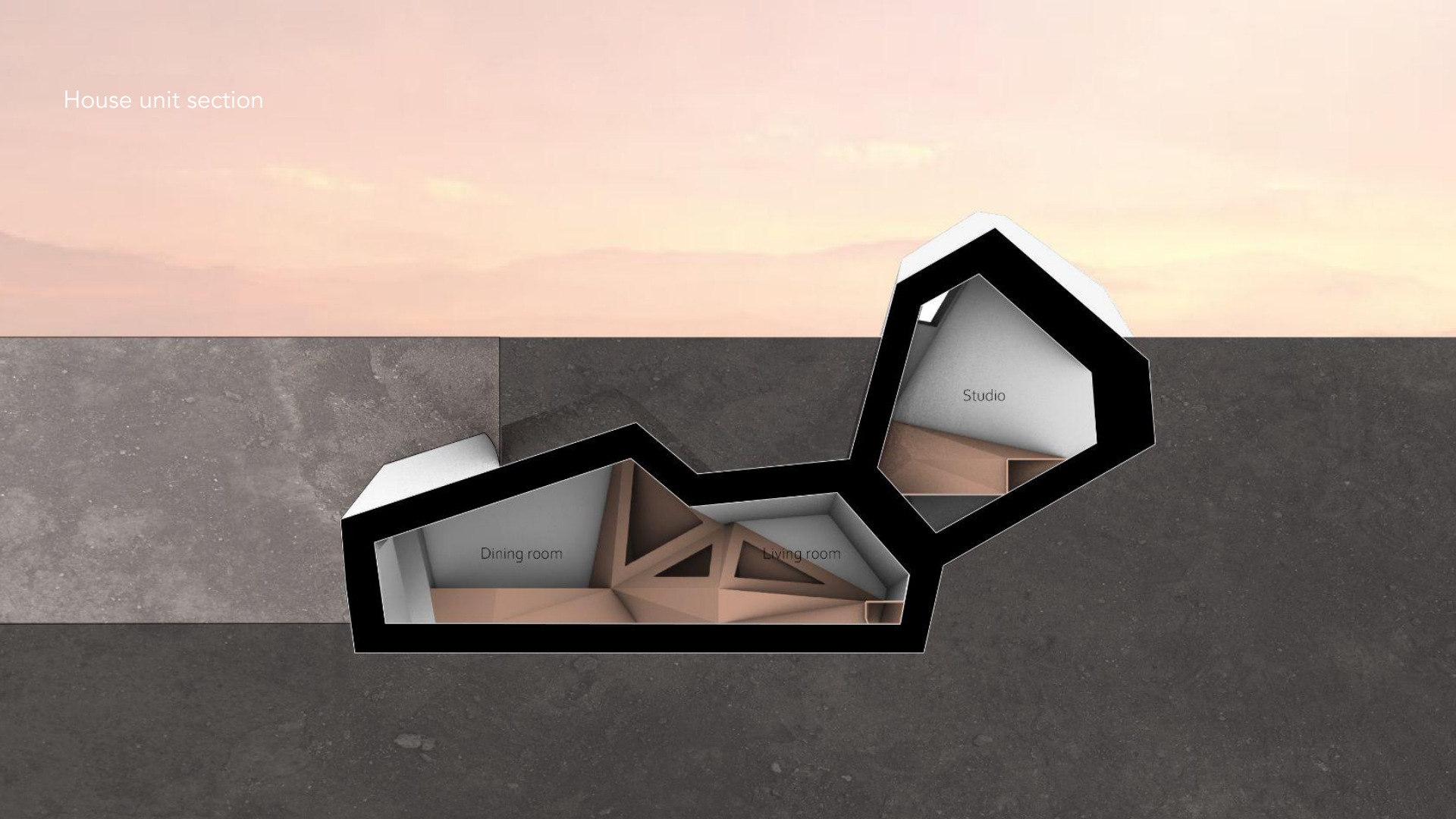


Martian habbitat

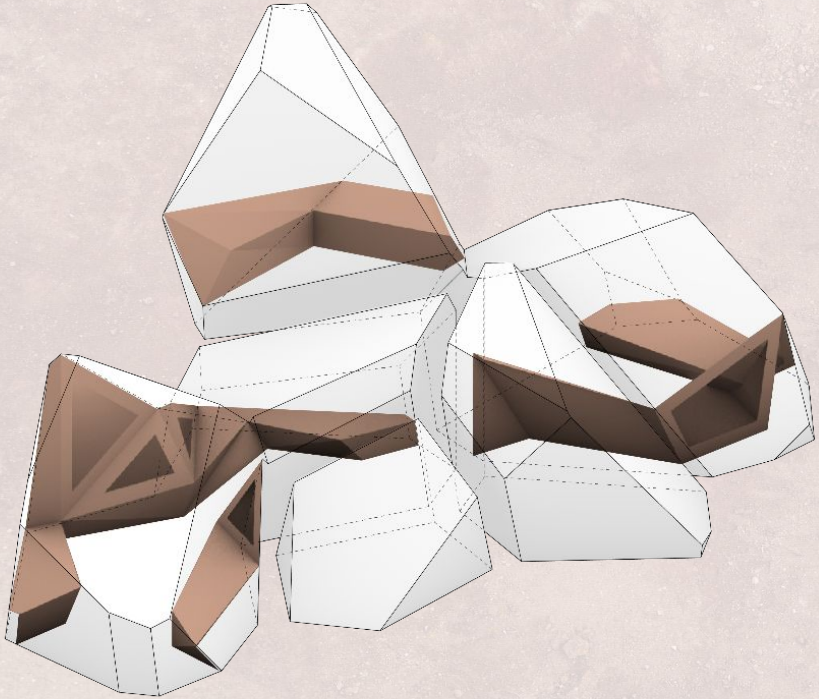


House unit plan

House unit section

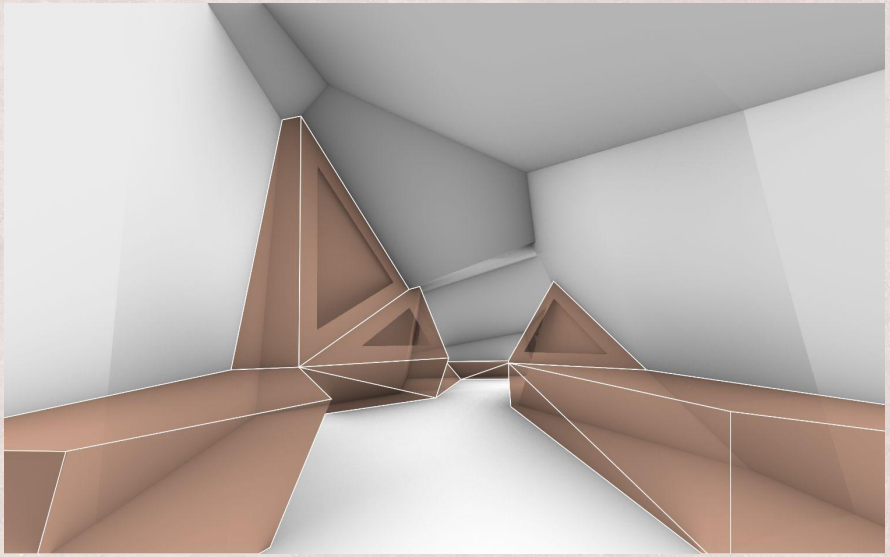


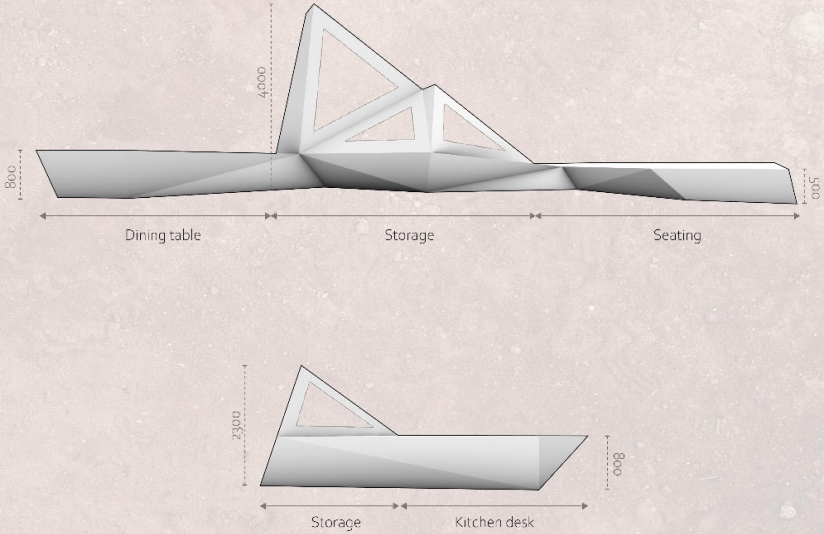
Furniture design



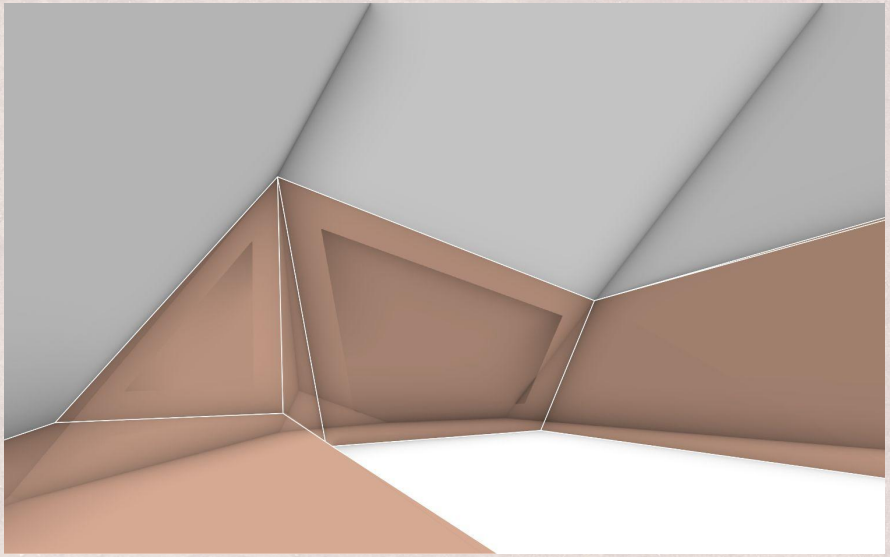
-extended from the wall
-continuous triangulated plane
-variations in form for different usage

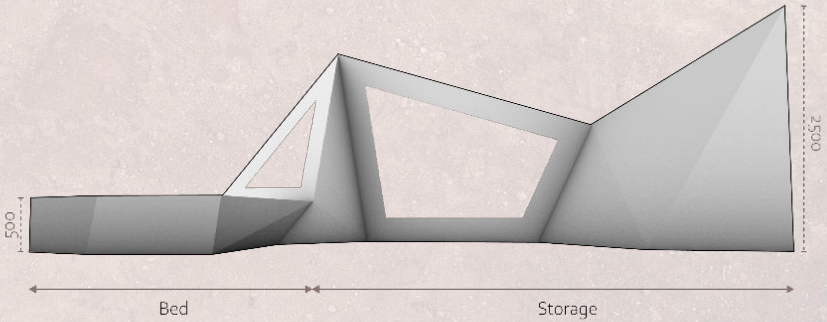
Furniture design - dining room



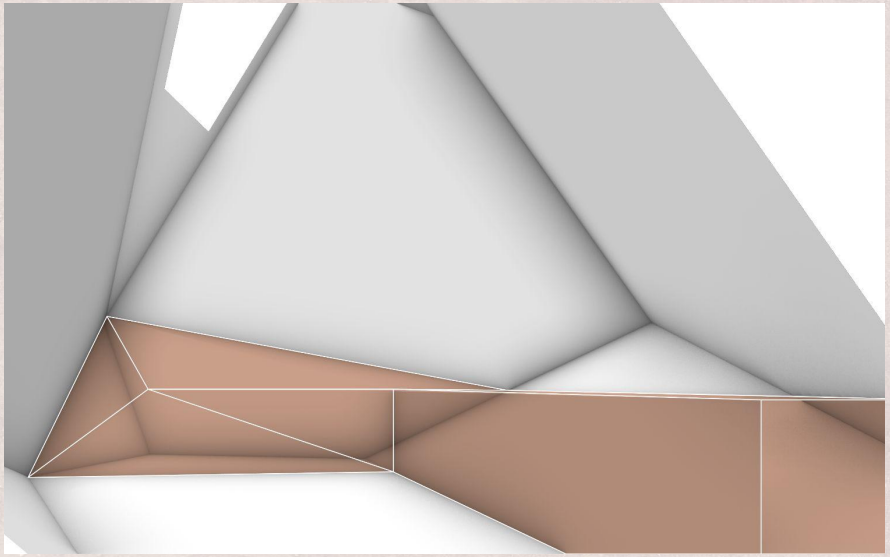


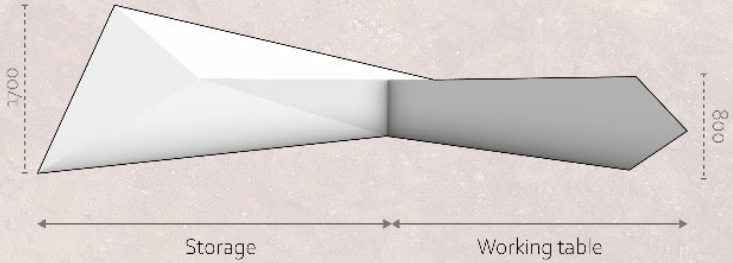
Furniture design - bedroom





Furniture design - studio





Initial bounding box, here represented in m2

Creating vornoi3D

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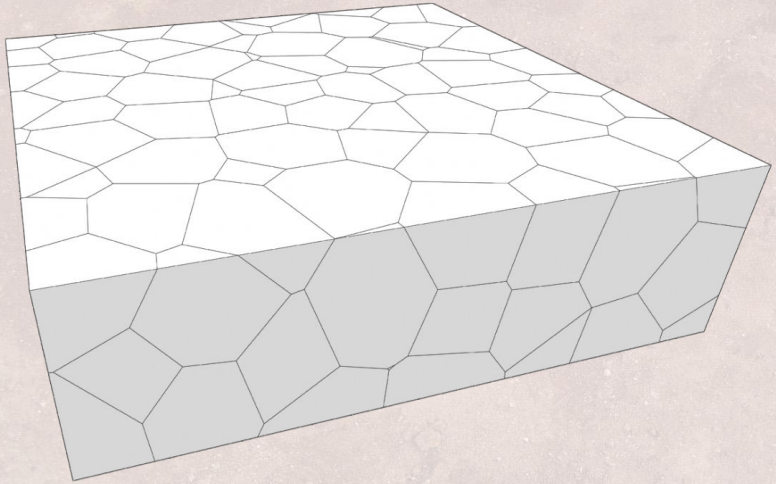

Bounding box

Vornoi 3D

Removing vornoi cells that conflict with other spaces (a central open area in this case)

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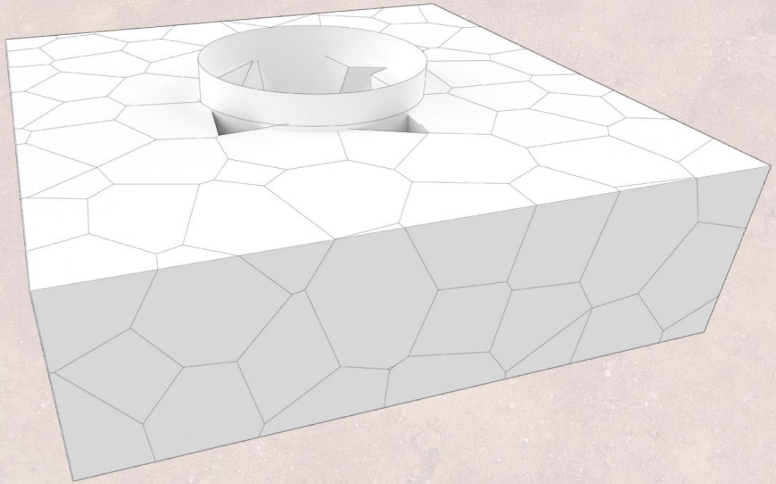

Bounding box → Vornoi 3D → Remove conflicting cells

Hand selection of vornoi cells on a building scale

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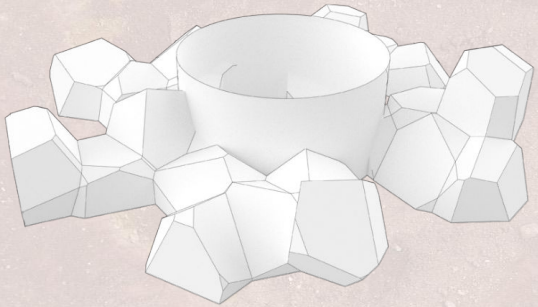

Bounding box → Vornoi 3D → Remove conflicting cells → Selecting cells to keep

Selection of unit for further work

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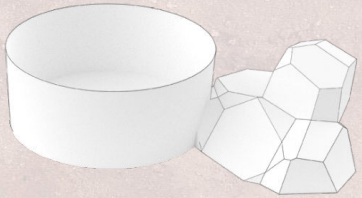

Bounding box — Vornoi 3D — Remove conflicting cells — Selecting cells to keep — Choosing housing unit

Selection of unit sub-space for further work

Bounding box — Vornoi 3D — Remove conflicting cells — Selecting cells to keep — Choosing housing unit — choosing sub-cell

Shell the object to create wall thickness

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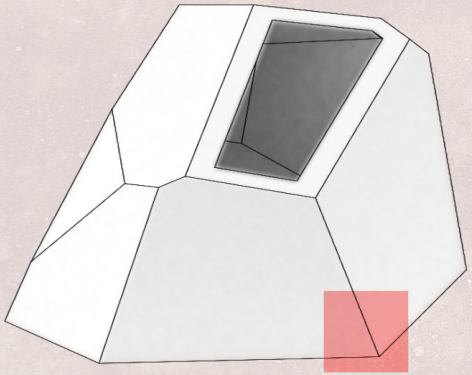
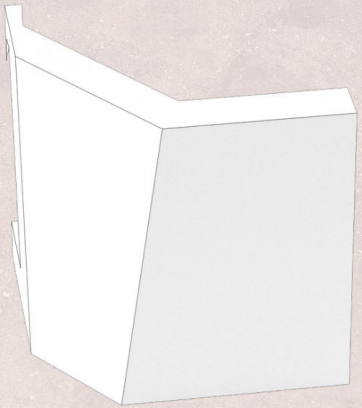
Bounding box | Vornoi 3D | Remove conflicting cells | Selecting cells to keep | Choosing housing unit | choosing sub-cell | Shelling

Select fragment of wall for further work





Bounding box → Vornoi 3D → Remove conflicting cells → Selecting cells to keep → Choosing housing unit → choosing sub-cell → Shelling → Selecting fragment

Breaking the wall into smaller vornoi shapes

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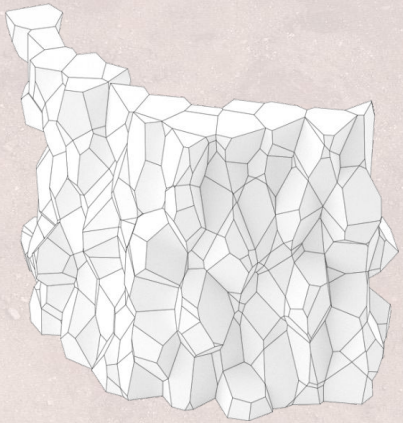

Bounding box → Vornoi 3D → Remove conflicting cells → Selecting cells to keep → Choosing housing unit → choosing sub-cell → Shelling → Selecting fragment → Fragment scale vornoi

Hand selection of cells for components

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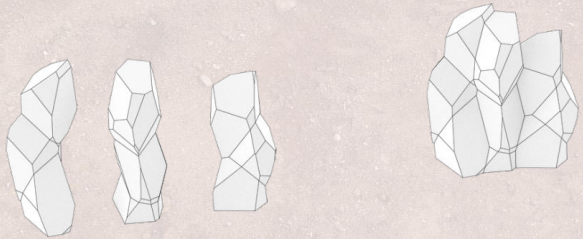
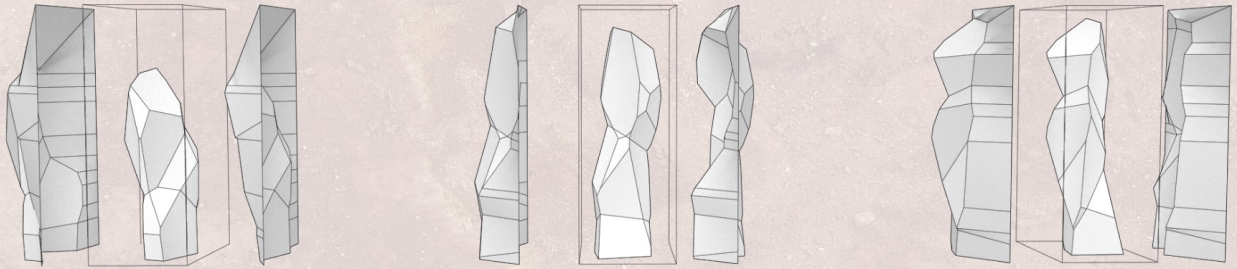
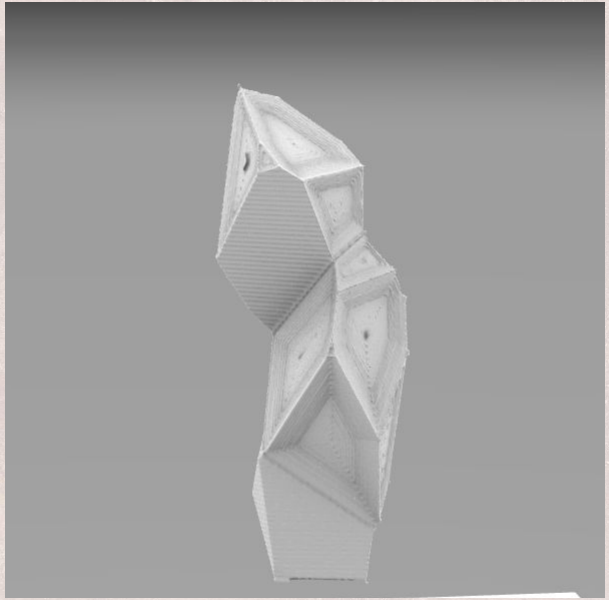


Bounding box → Vornoi 3D → Remove conflicting cells → Selecting cells to keep → Choosing housing unit → choosing sub-cell → Shelling → Selecting fragment → Fragment scale vornoi → selecting component cells

Preparing the components for initial material removal toolpath creation



Preparing for the texture and holes



Toolpath creation and milling procedure

https://youtu.be/uCaYDAomf1I