

Communal Housing Typology On Mars

Group 4

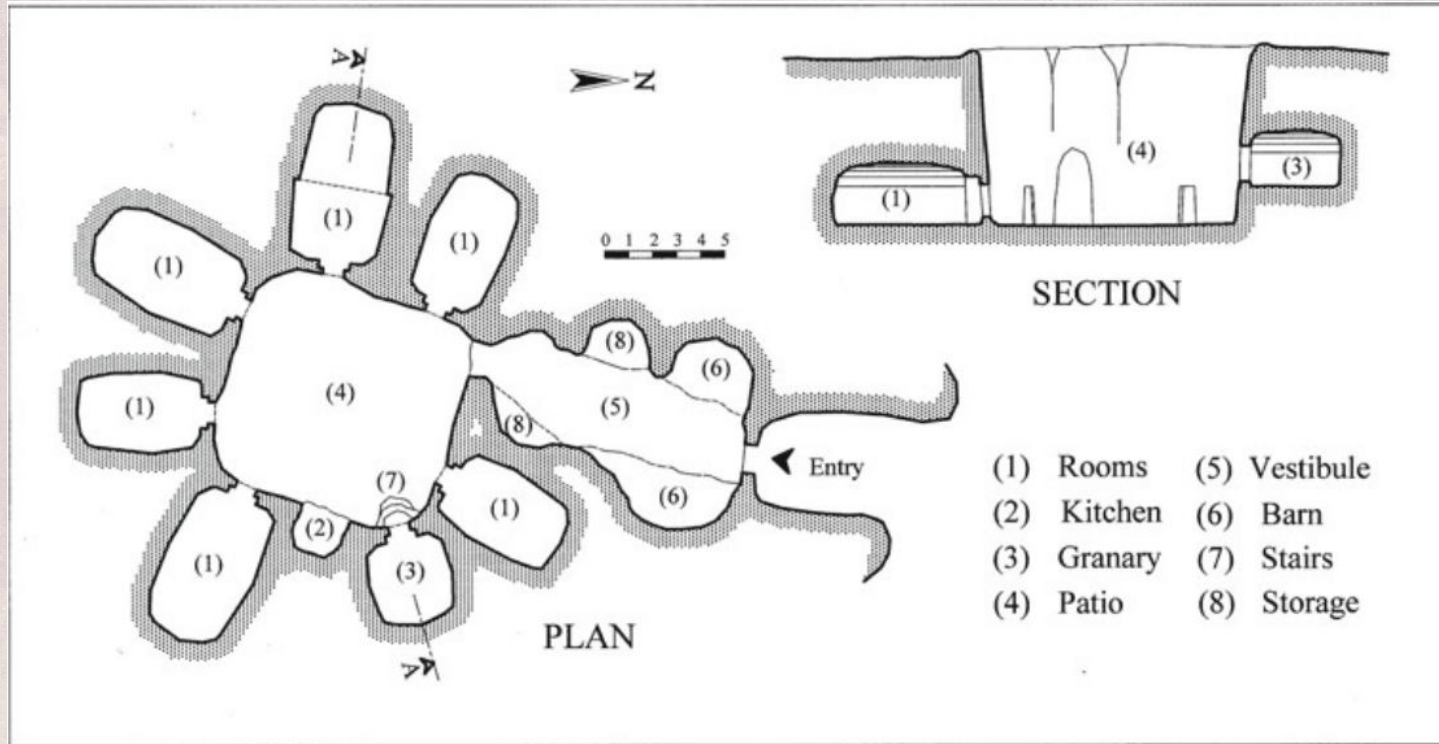
David, Coby, Mikolaj, Simon



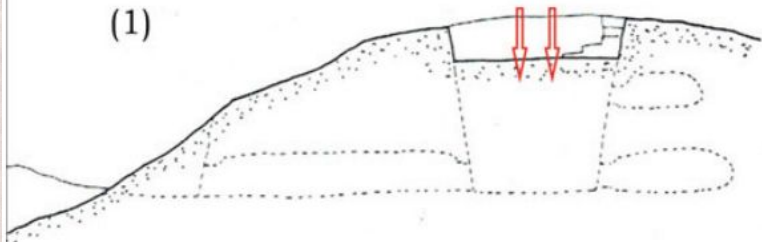
Workflow for conceptual design

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

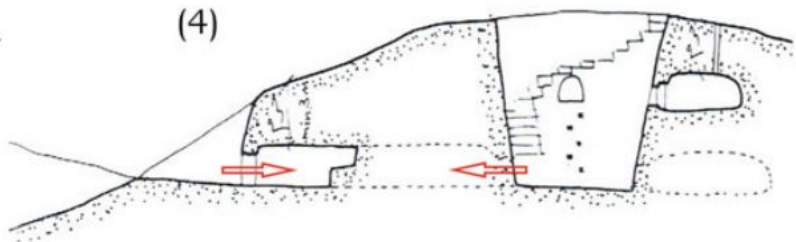
Case Study



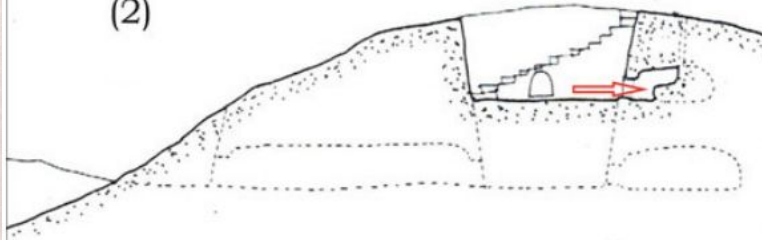
(1)



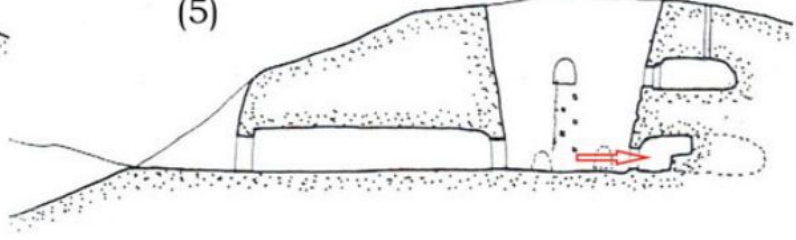
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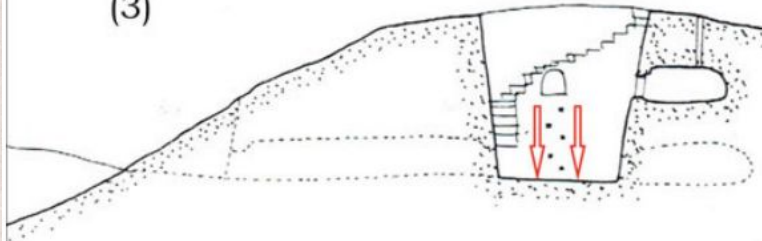
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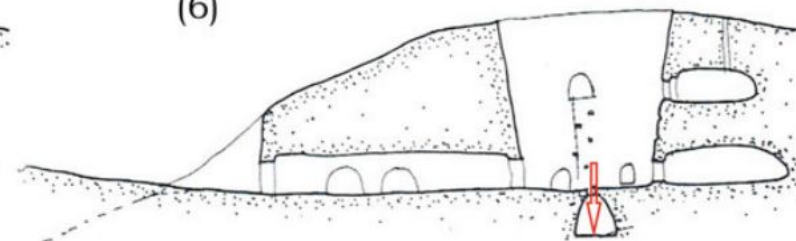
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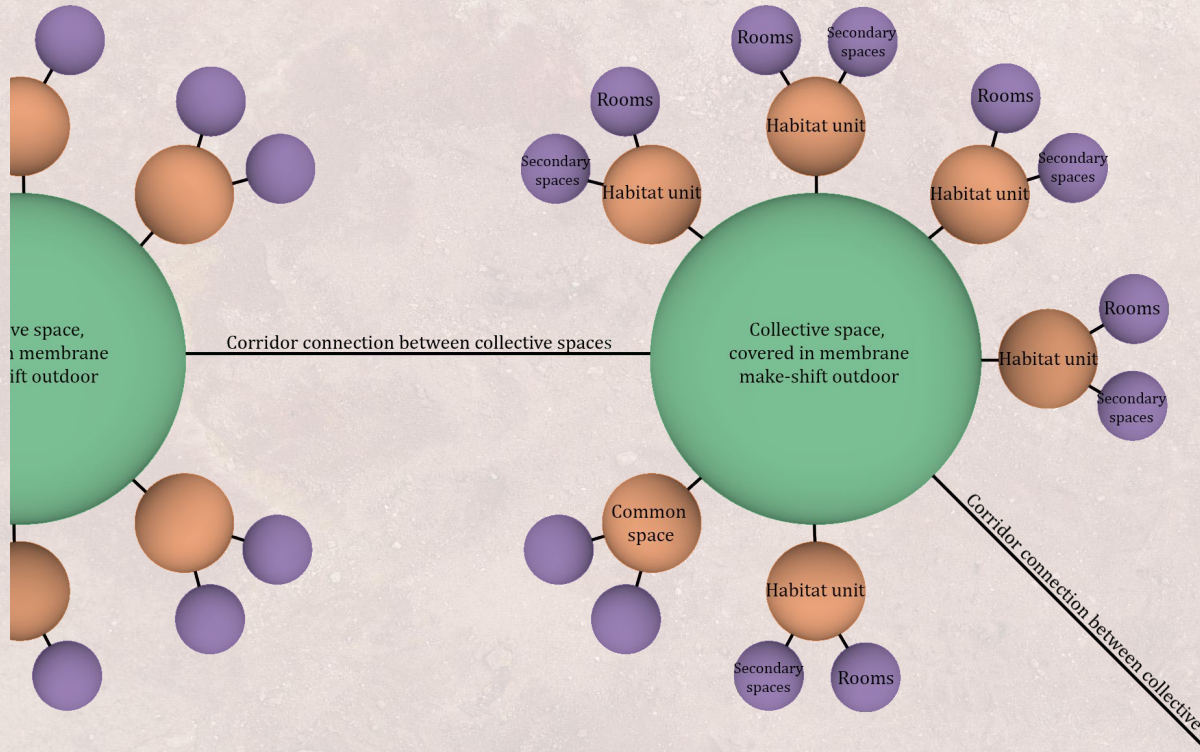
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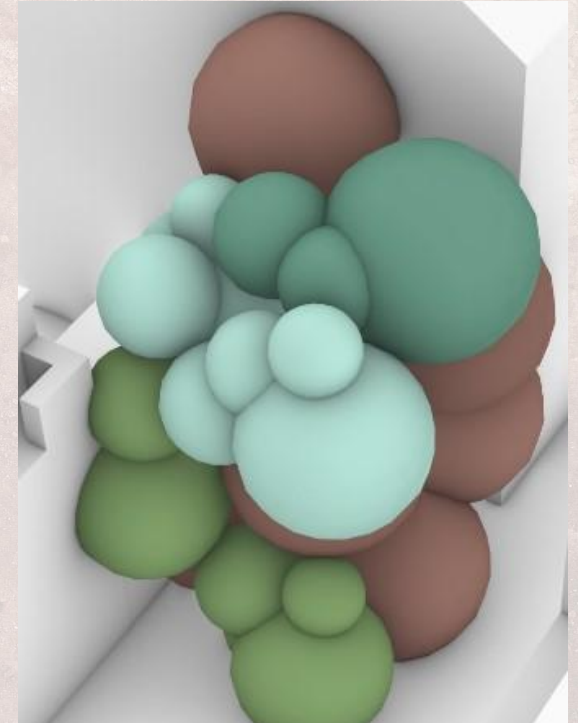
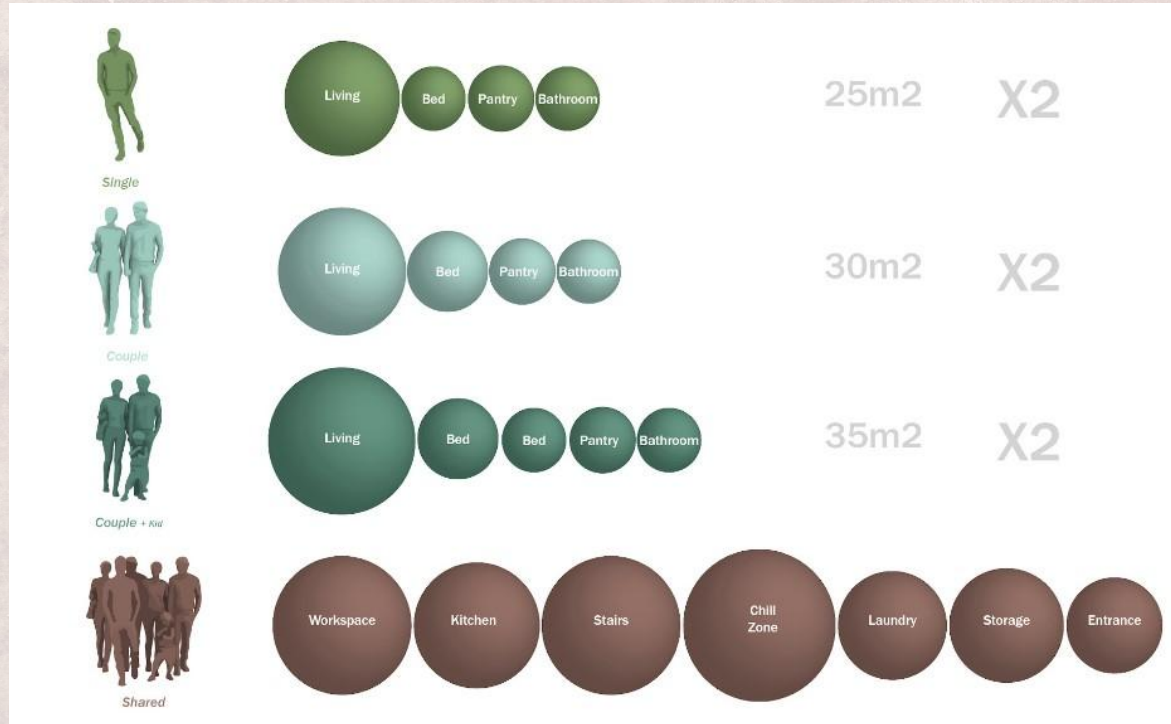
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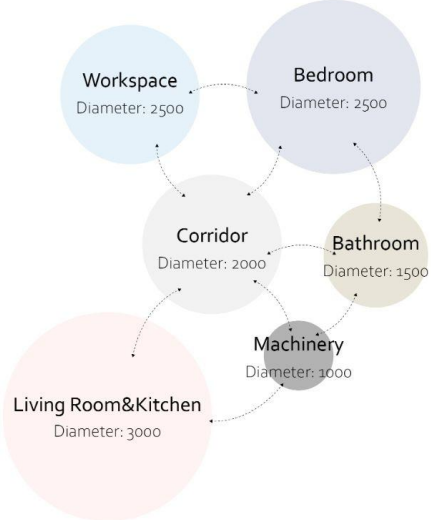
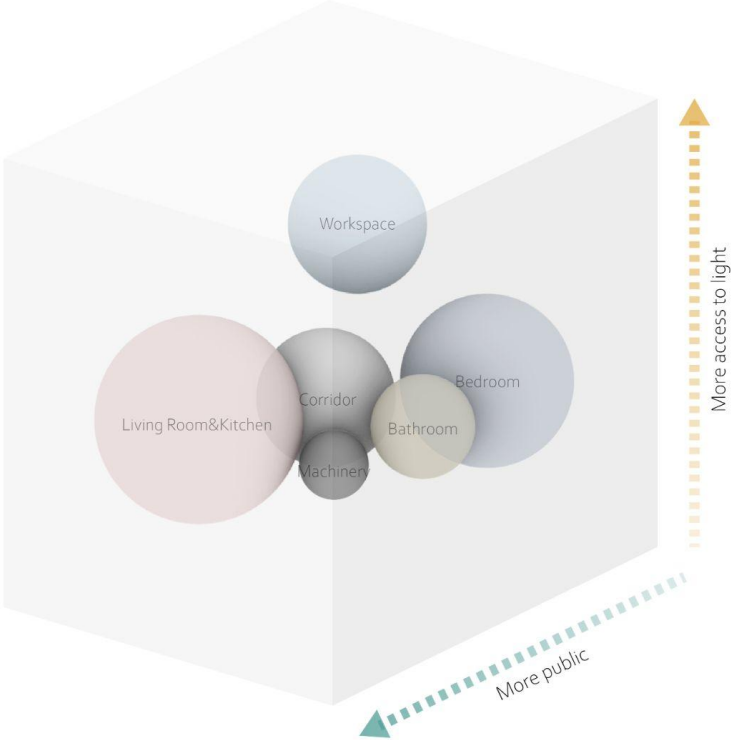
Design - conceptual bubble diagram



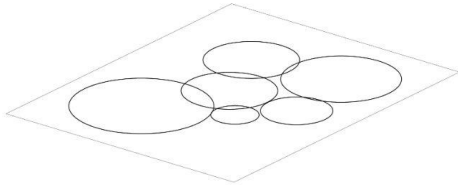
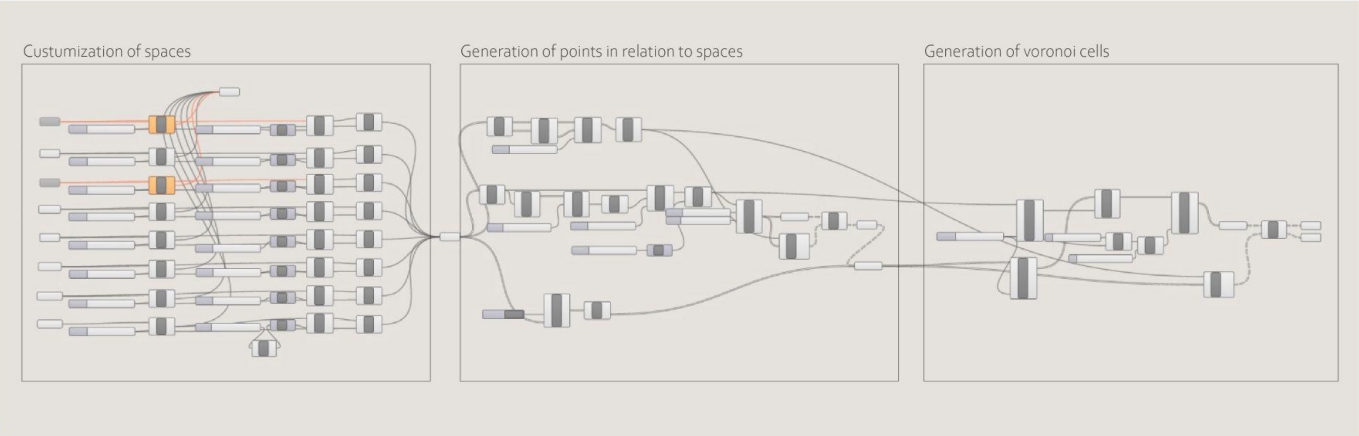
Case study - customization of spaces



Design strategy - customization of volume



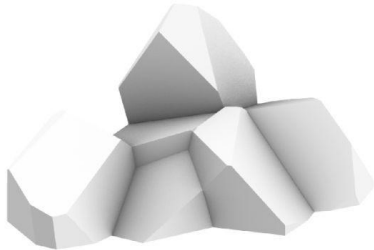
Translation of volume to voronoi



Zoning of spaces



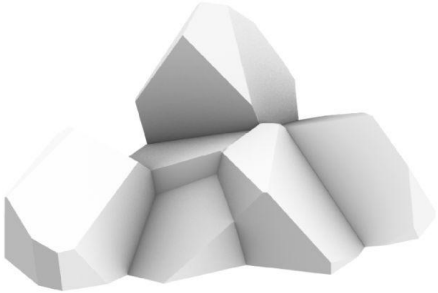
Volumetric arrangement



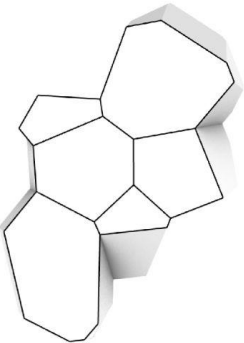
Voronoi generation



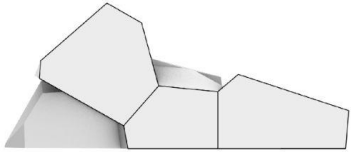
Selection of better options



Voronoi overview

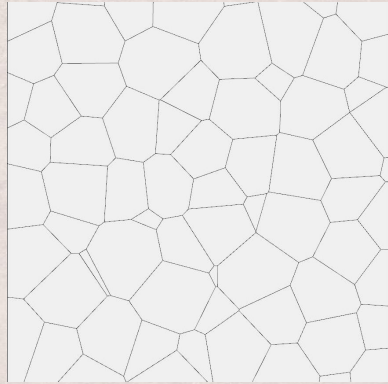


plan



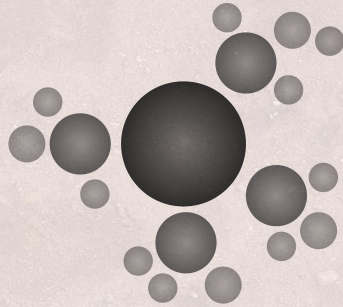
section

Voronoi housings to community

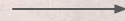


Voronoi cell construction

+

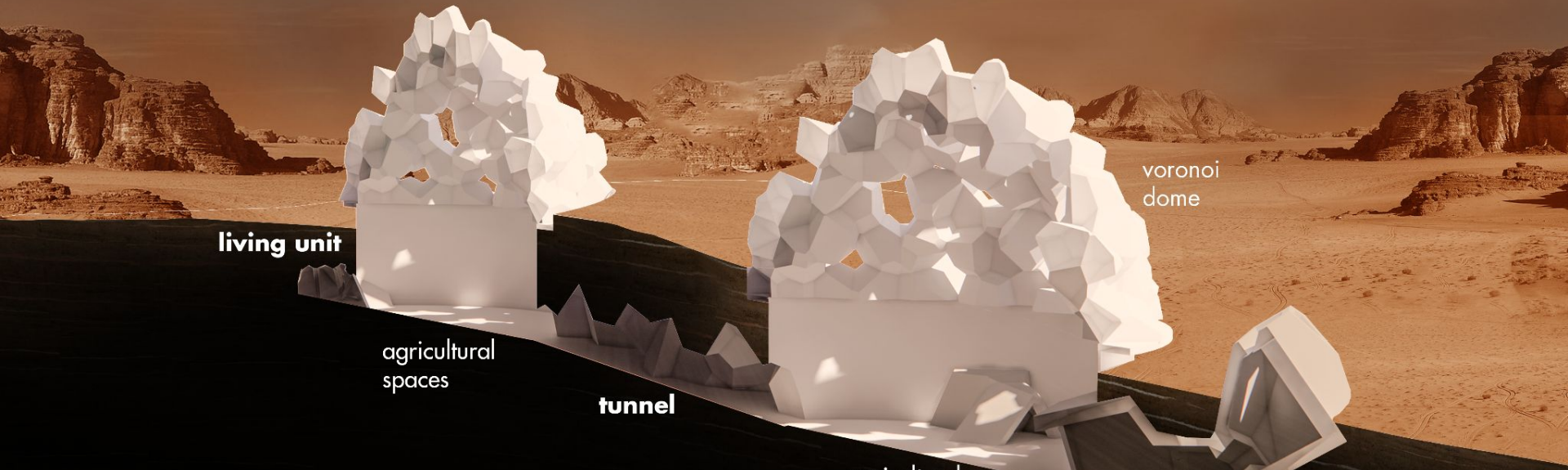


Programme organization



Voronoi cell organization

Option1



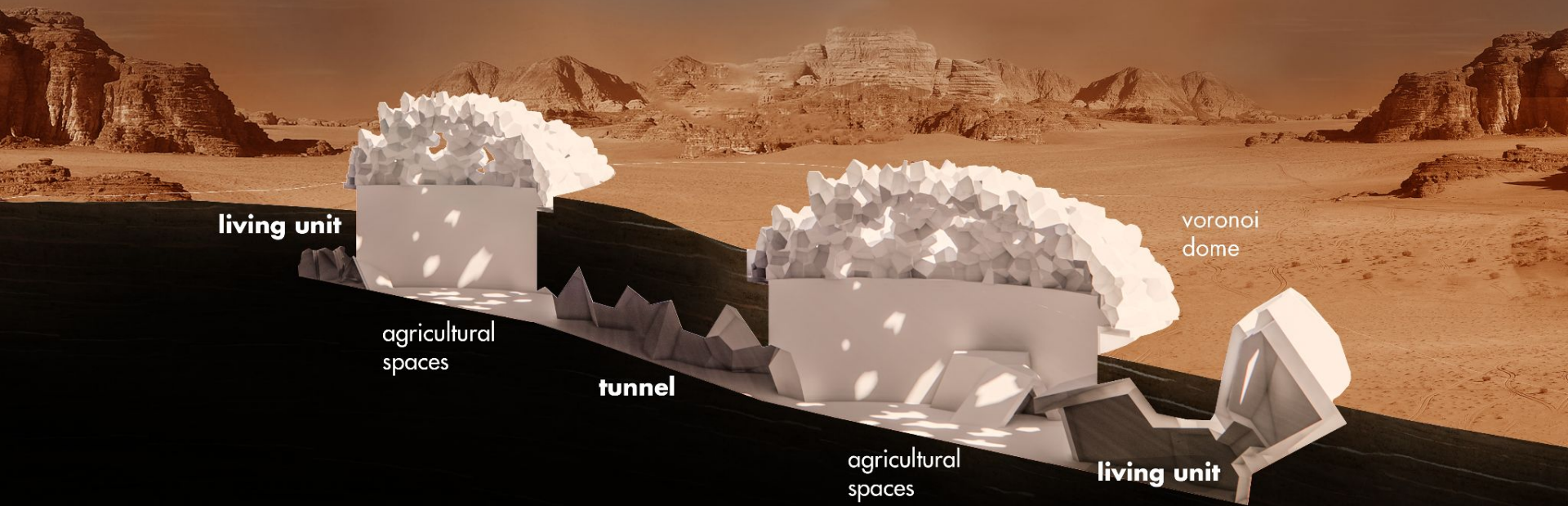
living unit

agricultural
spaces

tunnel

voronoi
dome

Option2



living unit

agricultural spaces

tunnel

agricultural spaces

living unit

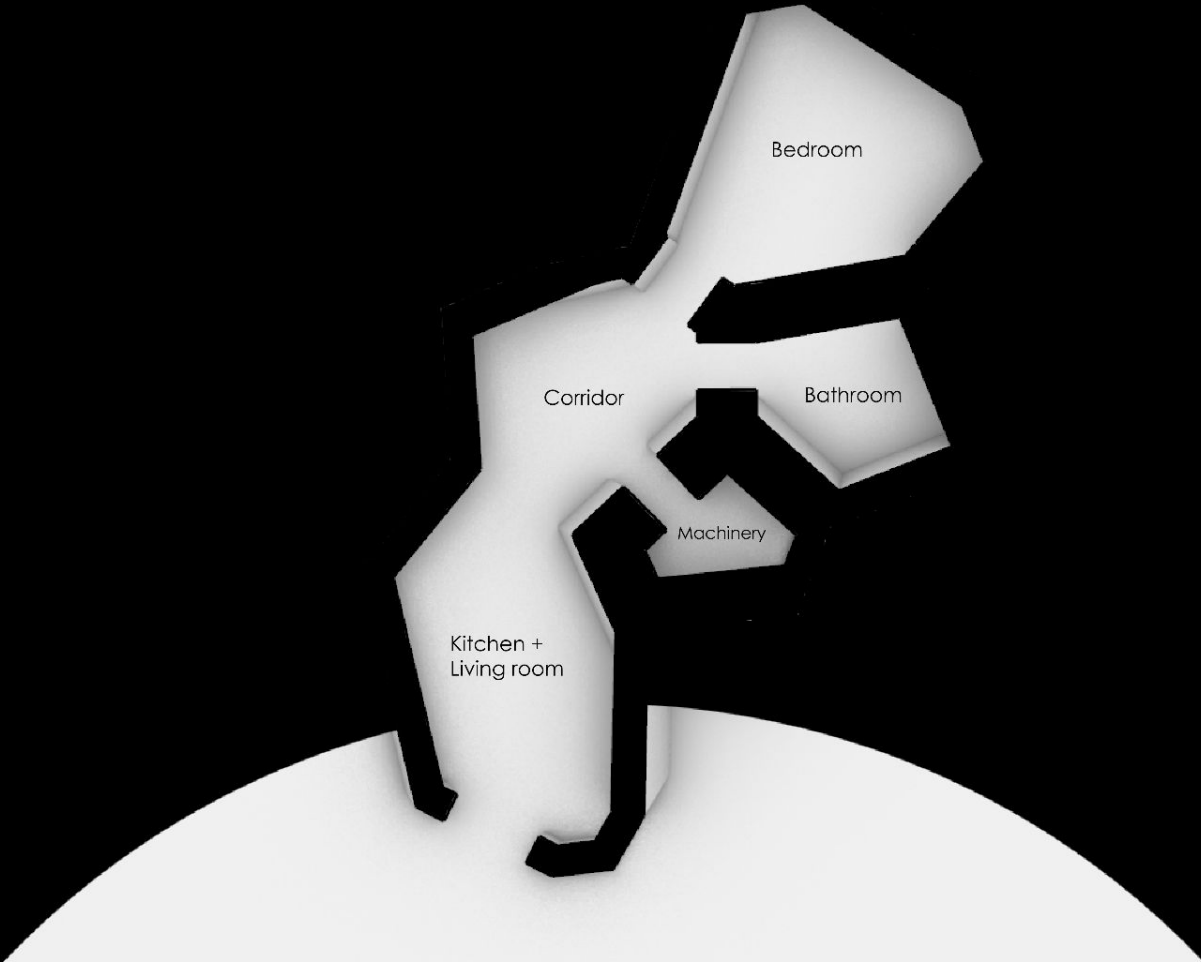
voronoi dome

Option3



Interconnected communities





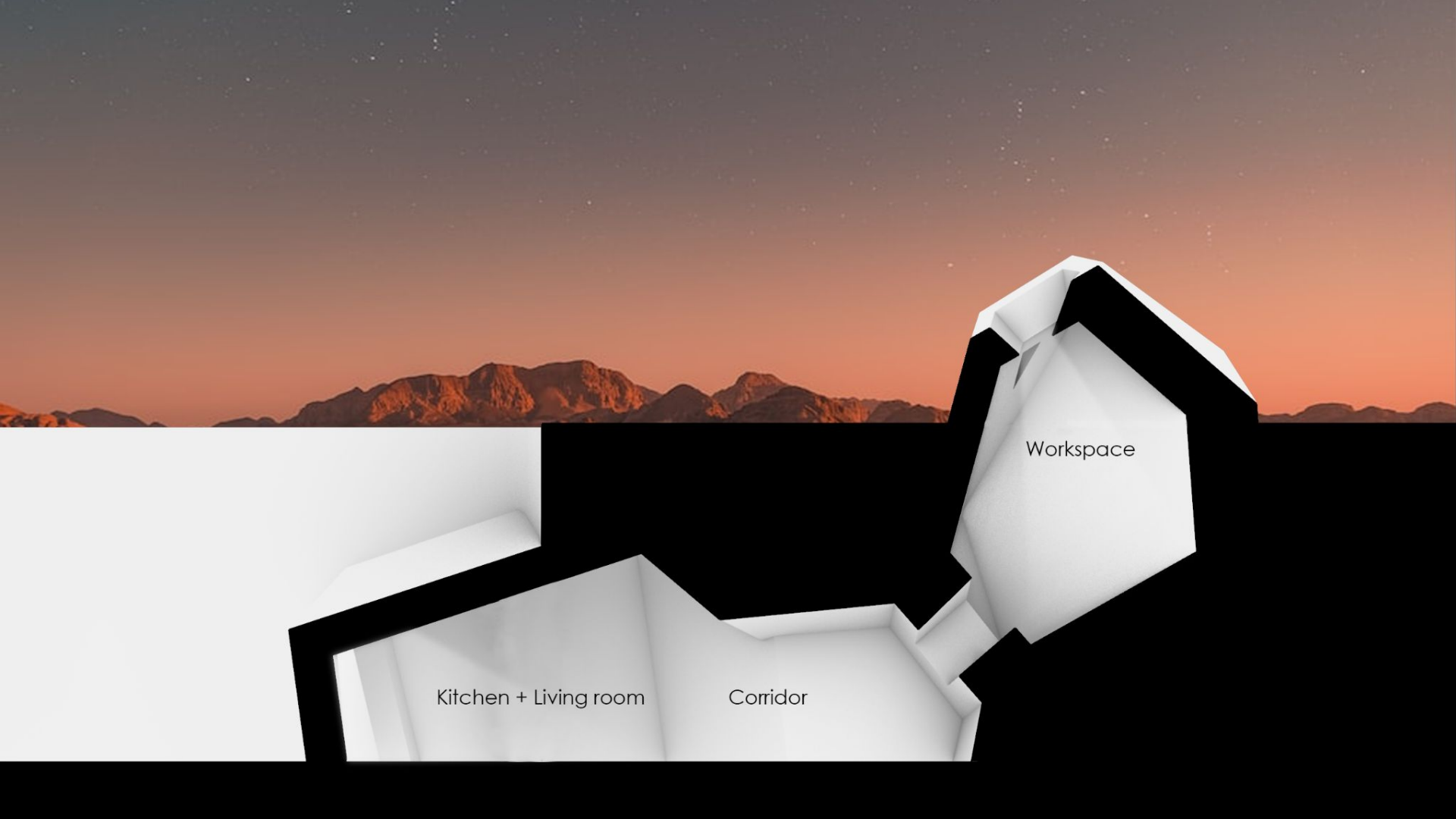
Bedroom

Bathroom

Machinery

Corridor

Kitchen +
Living room

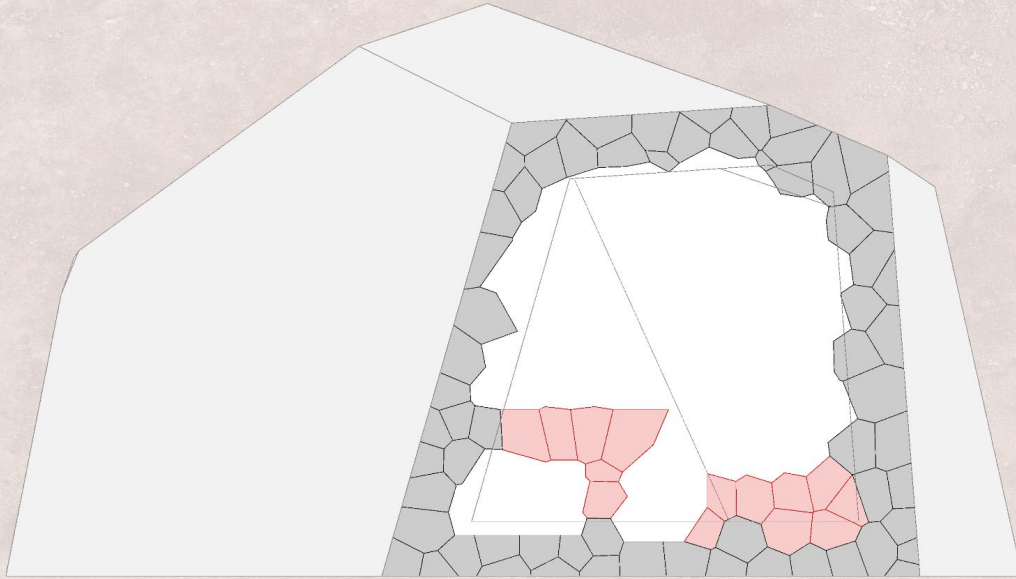


Workspace

Kitchen + Living room

Corridor

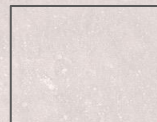
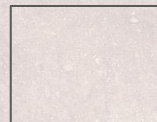
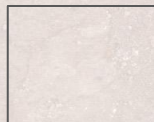
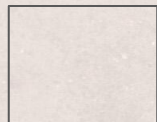
Furniture scale voronoi idea



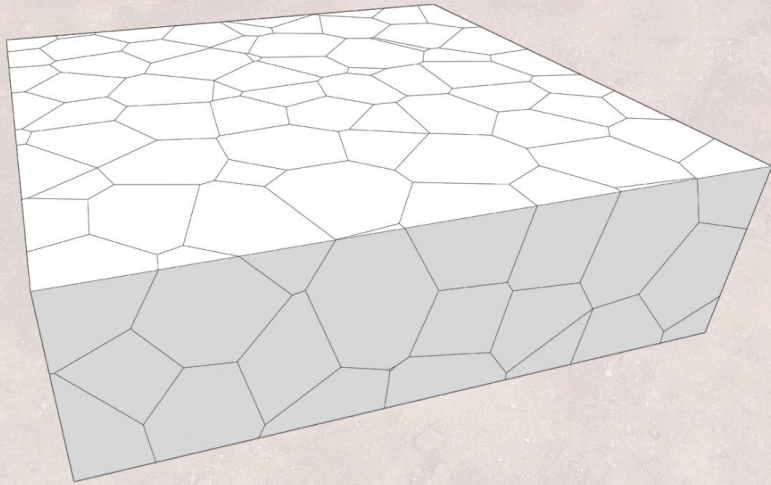
Initial bounding box, here represented in m2



Bounding
box



Creating vornoi3D

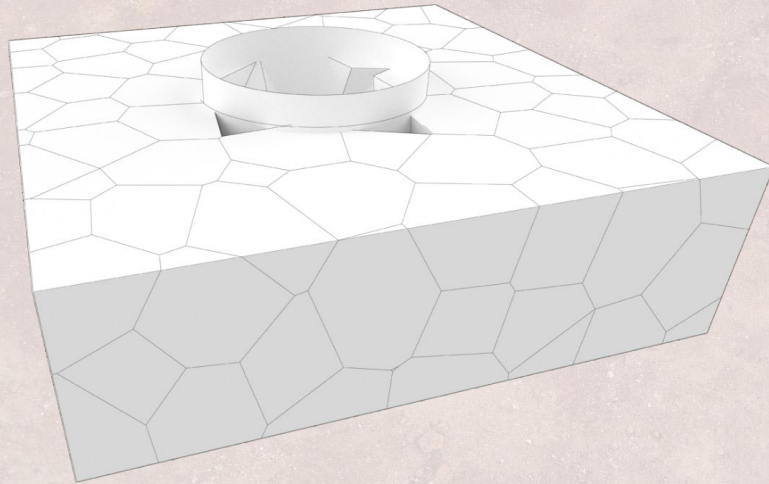


Bounding
box

Vornoi 3D



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



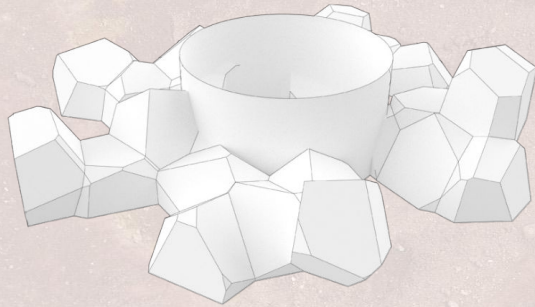
Bounding
box

Vornoi 3D

Remove
conflicting
cells



Hand selection of vornoi cells on a building scale



Bounding
box

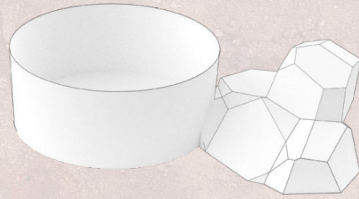
Vornoi 3D

Remove
conflicting
cells

Selecting
cells to
keep



Selection of unit for further work



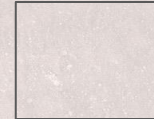
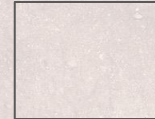
Bounding
box

Vornoi 3D

Remove
conflicting
cells

Selecting
cells to
keep

Choosing
housing
unit



Selection of unit sub-space for further work



Bounding
box

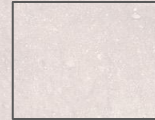
Vornoi 3D

Remove
conflicting
cells

Selecting
cells to
keep

Choosing
housing
unit

choosing
sub-cell



Shell the object to create wall thickness



Bounding
box

Vornoi 3D

Remove
conflicting
cells

Selecting
cells to
keep

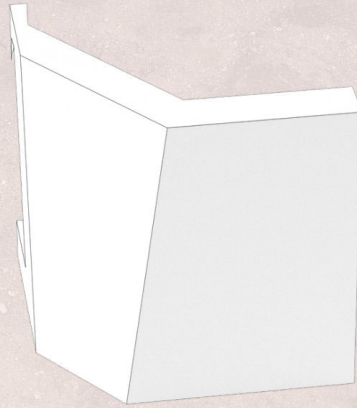
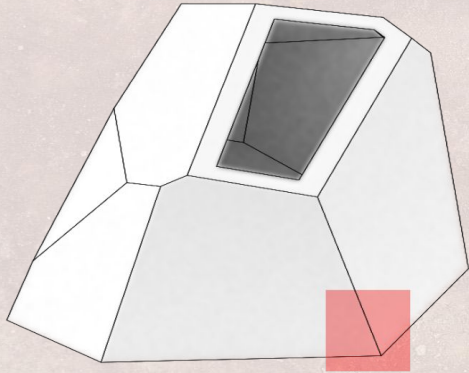
Choosing
housing
unit

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

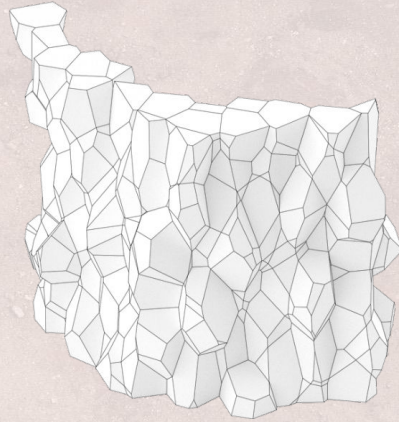
choosing
sub-cell

Shelling

Selecting
fragment



Breaking the wall into smaller vornoi shapes



Bounding
box

Vornoi 3D

Remove
conflicting
cells

Selecting
cells to
keep

Choosing
housing
unit

choosing
sub-cell

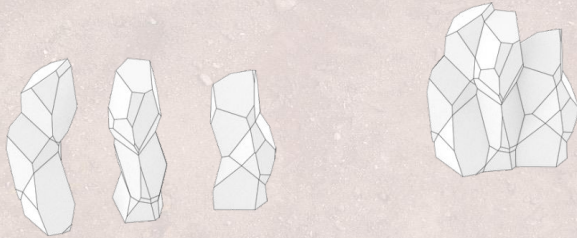
Shelling

Selecting
fragment

Fragment
scale
vornoi



Hand selection of cells for components



Bounding
box

Vornoi 3D

Remove
conflicting
cells

Selecting
cells to
keep

Choosing
housing
unit

choosing
sub-cell

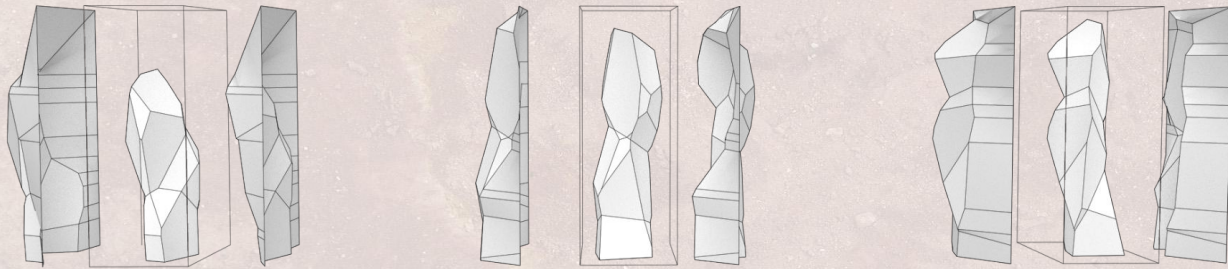
Shelling

Selecting
fragment

Fragment
scale
vornoi

selecting
component
cells

Preparing the components for initial material removal toolpath creation



Toolpath creation, one for each side

