

Communal Housing Typology On Mars

Group 4

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Workflow for conceptual design

- Identify challenges
- Case studies
- Design Strategy
- Computational(Voronoi) design
- Plan and section

Challenges of Mars

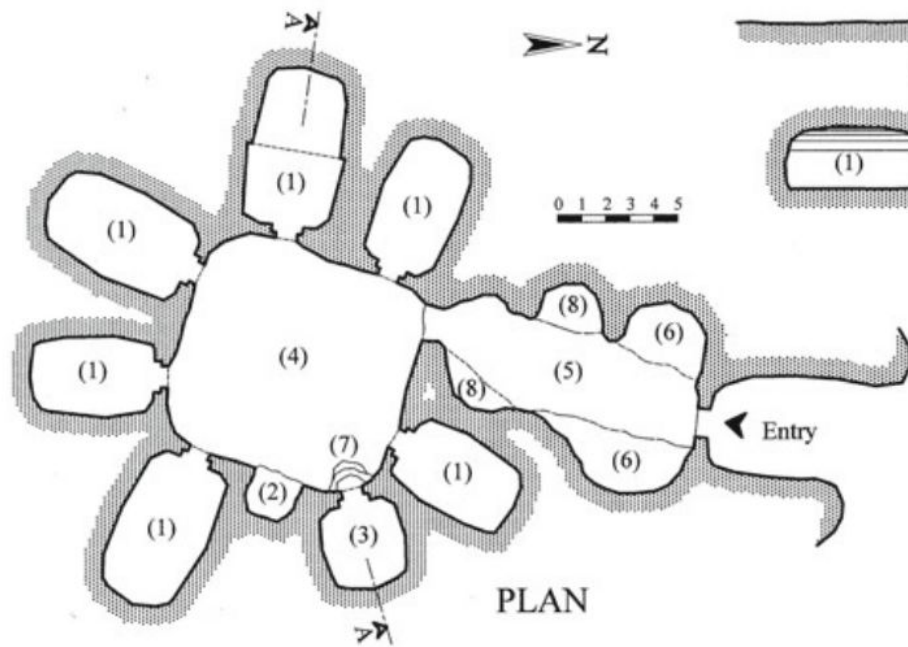
- Radiation (voronoi wall/thick wall)
- Light access for underground construction
- Robotic production/assembly/construction process
- Materials (Regolith)
- Lower gravity environment
- Protection from temperature swing

Reference project



Reference project 1 - Central courtyard

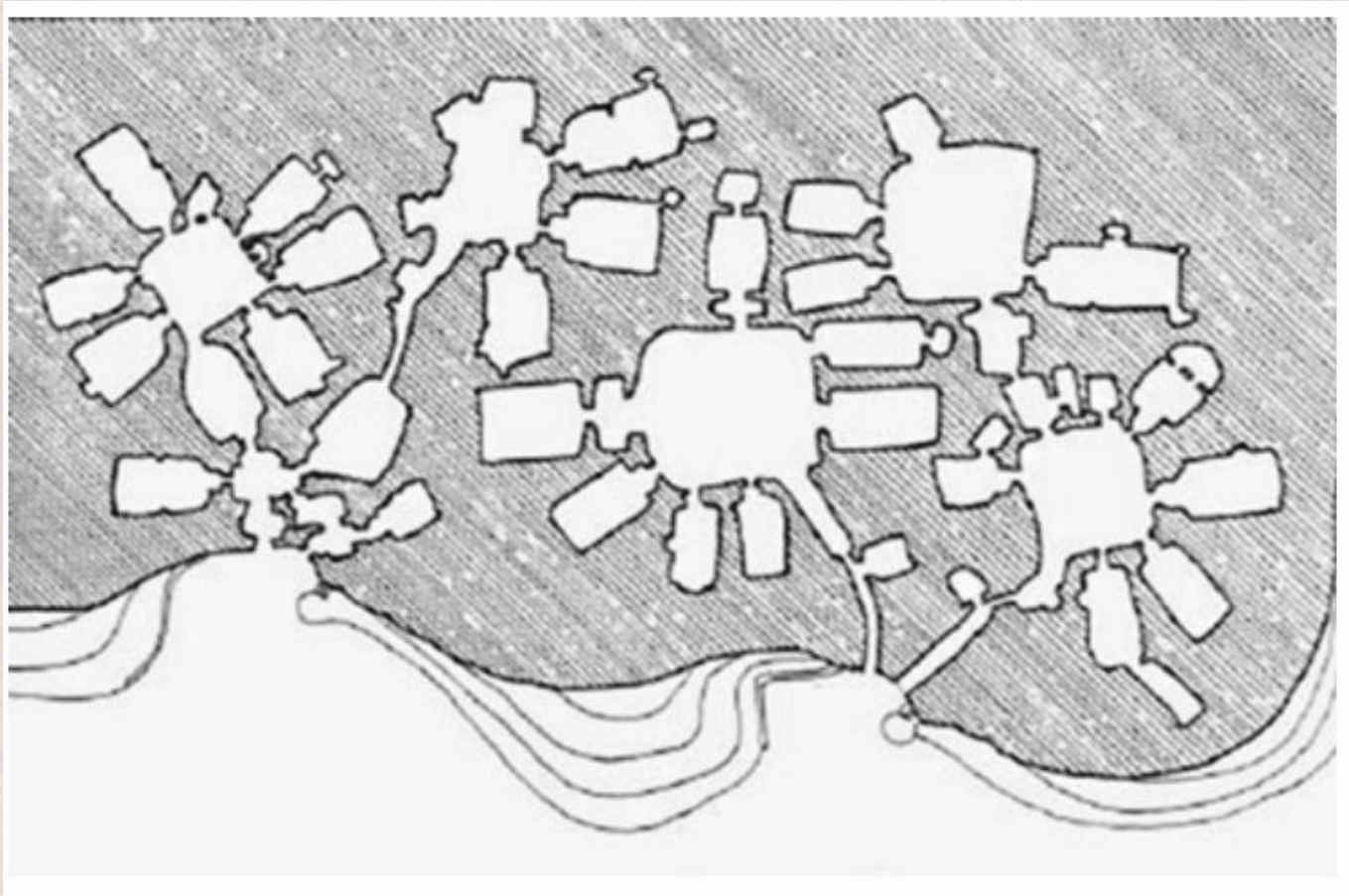




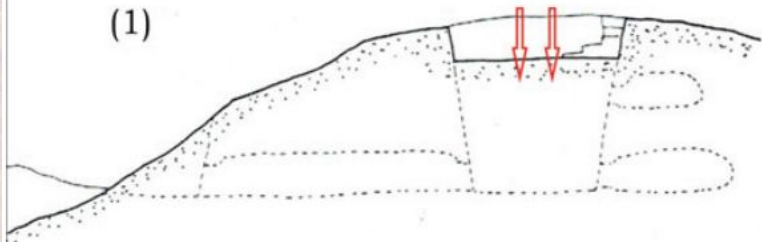
SECTION

- | | |
|-------------|---------------|
| (1) Rooms | (5) Vestibule |
| (2) Kitchen | (6) Barn |
| (3) Granary | (7) Stairs |
| (4) Patio | (8) Storage |

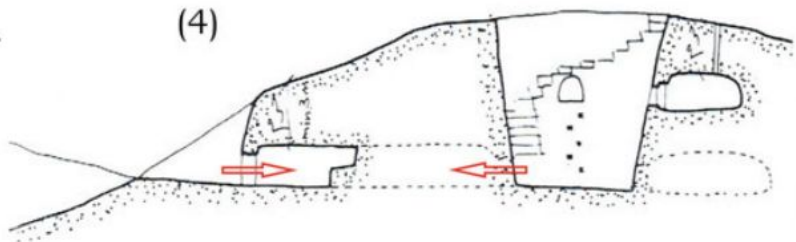
PLAN



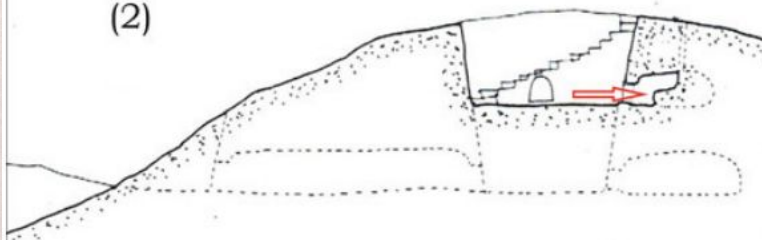
(1)



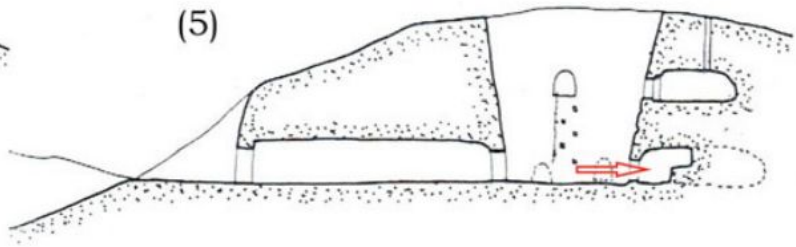
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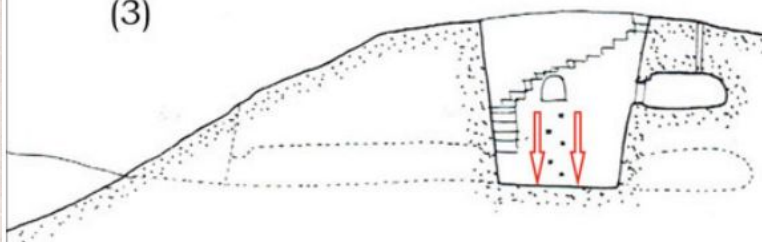
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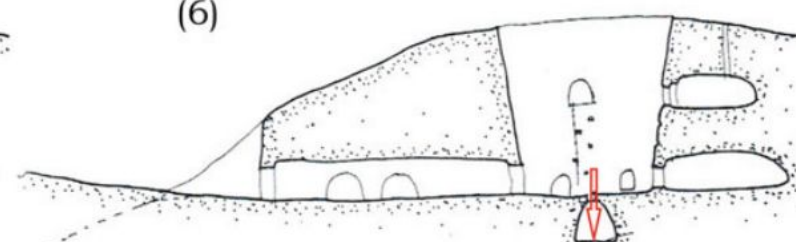
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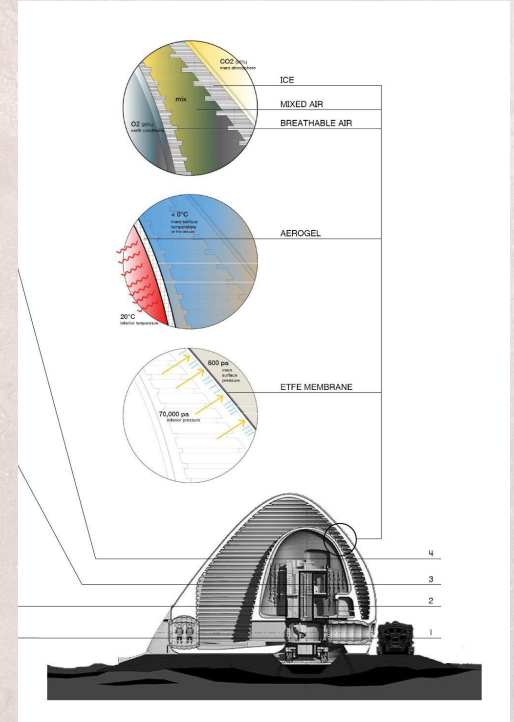
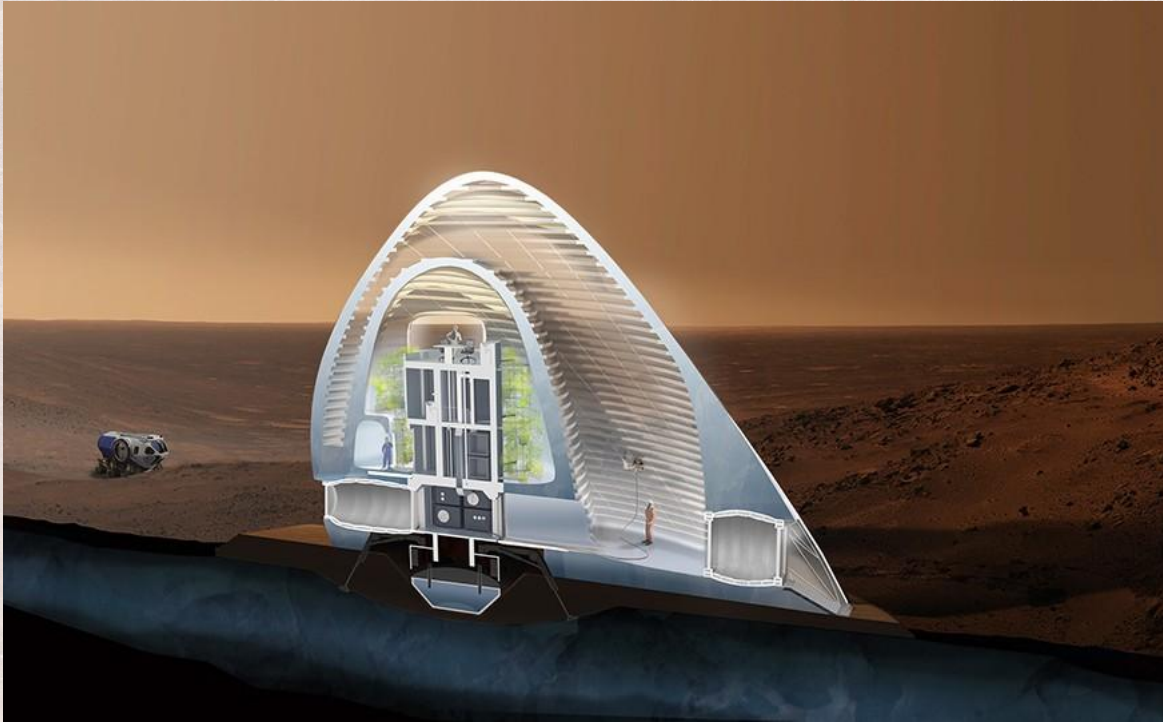


(3)



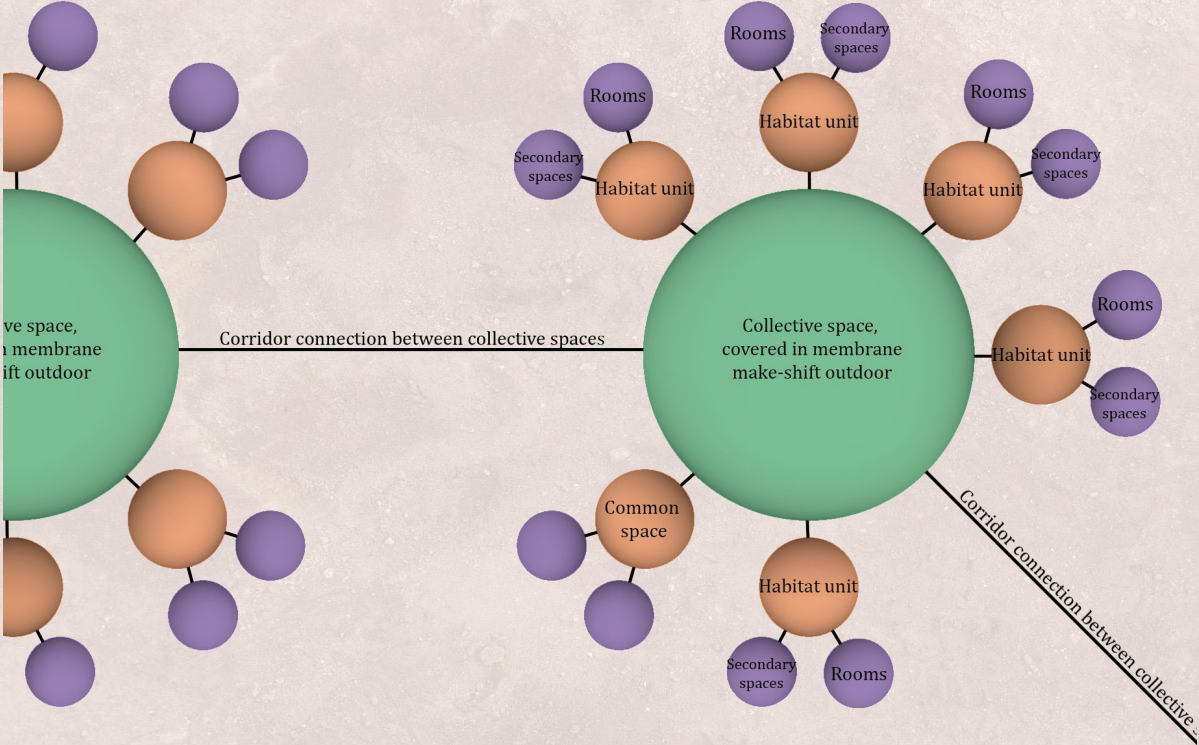
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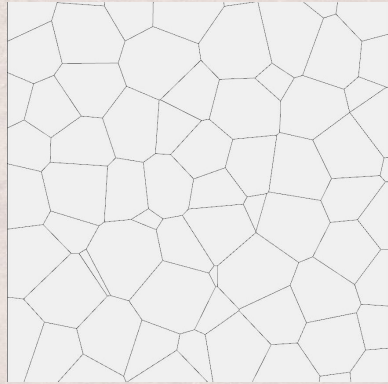


Reference project 2 - Mars ice house - inter-climatic zone

Design - conceptual bubble diagram

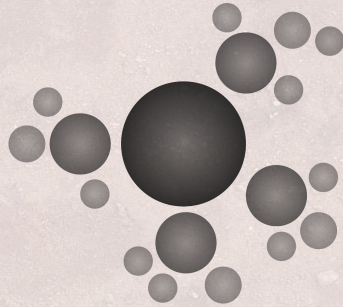


Translation of concept to voronoi design



Voronoi cell construction

+

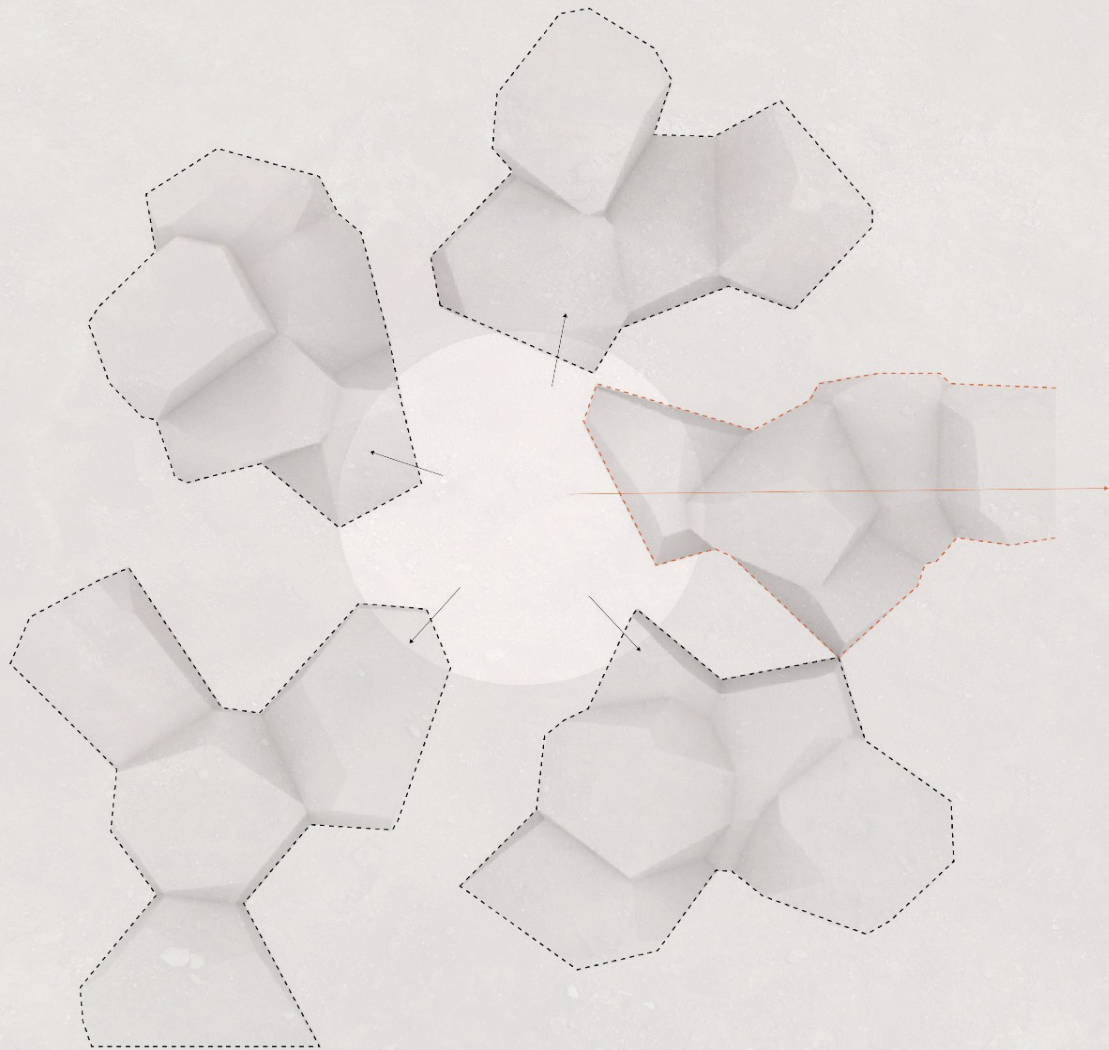


Programme organization

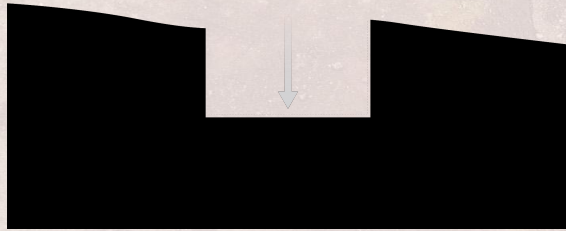


Voronoi cell organization

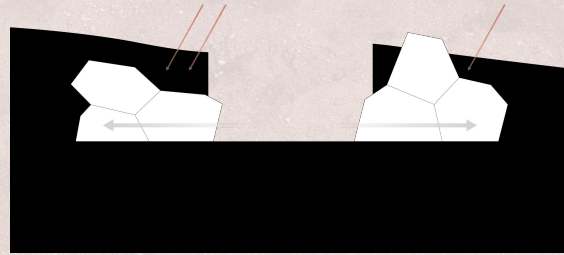
Houses and tunnels



Conceptual cells organization - in one community unit



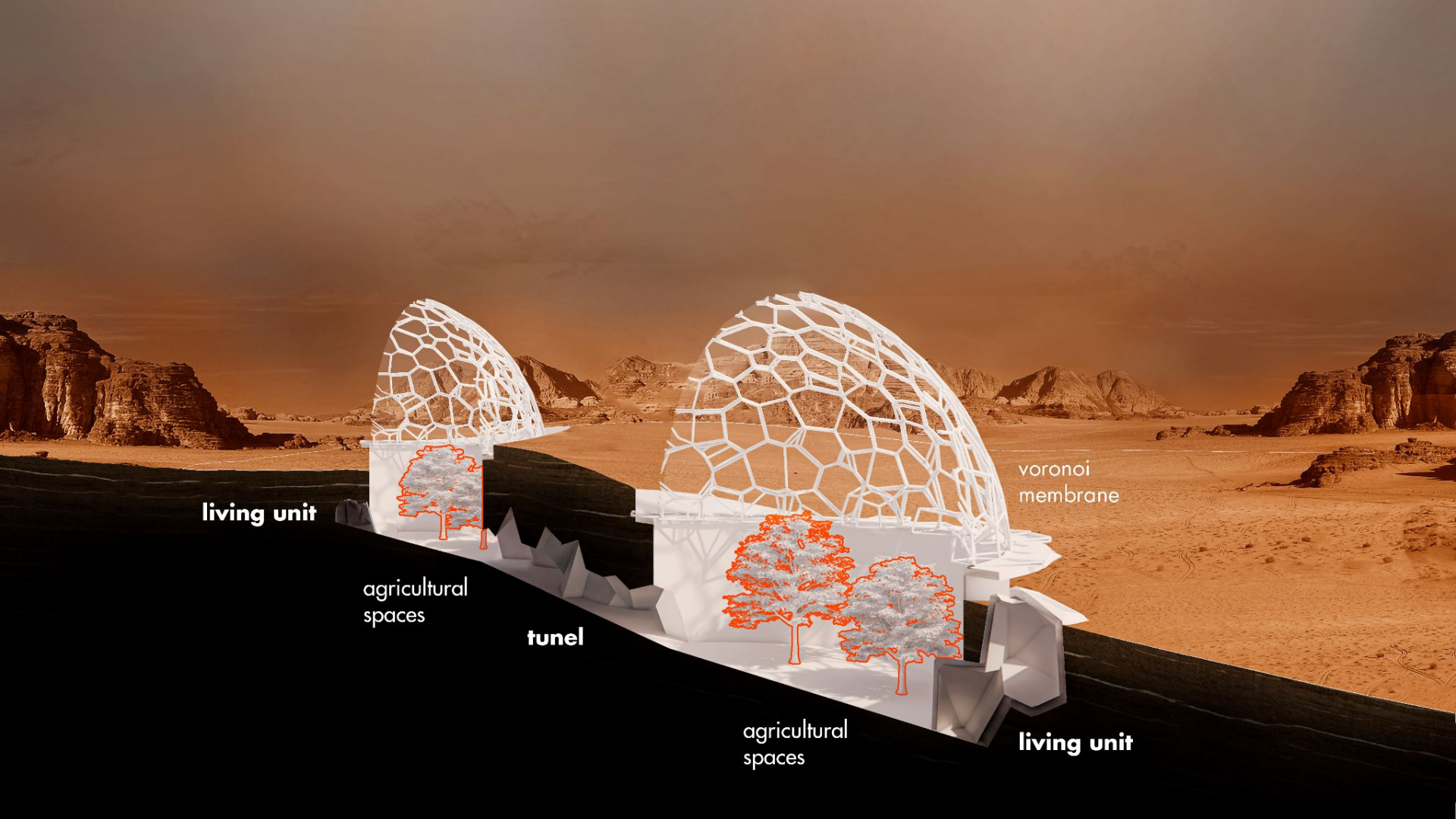
Excavate the ground as courtyard



Create protected underground cell



Central membrane structure (Inter-climatic zone)



living unit

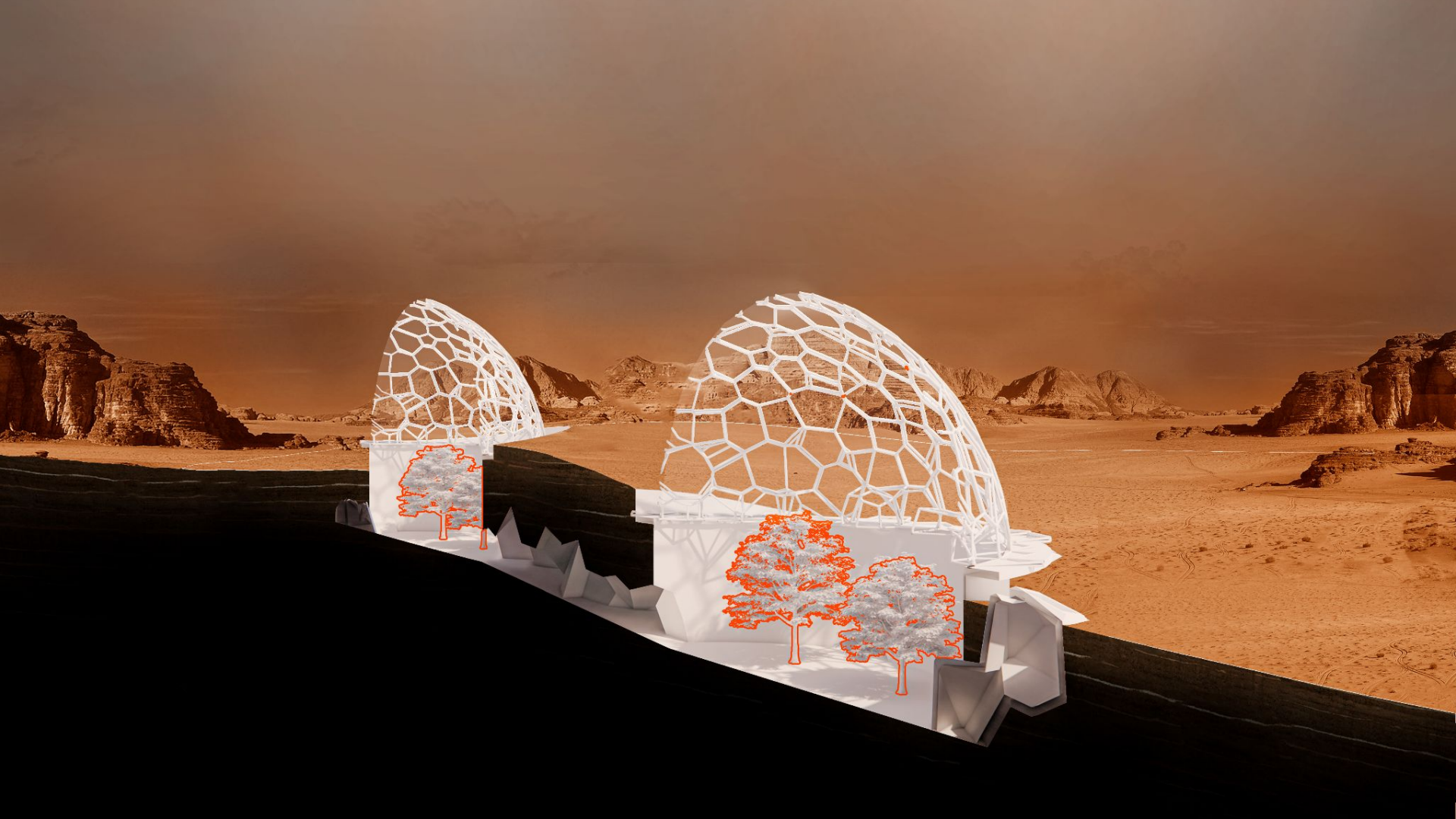
agricultural spaces

tunnel

agricultural spaces

voronoi membrane

living unit

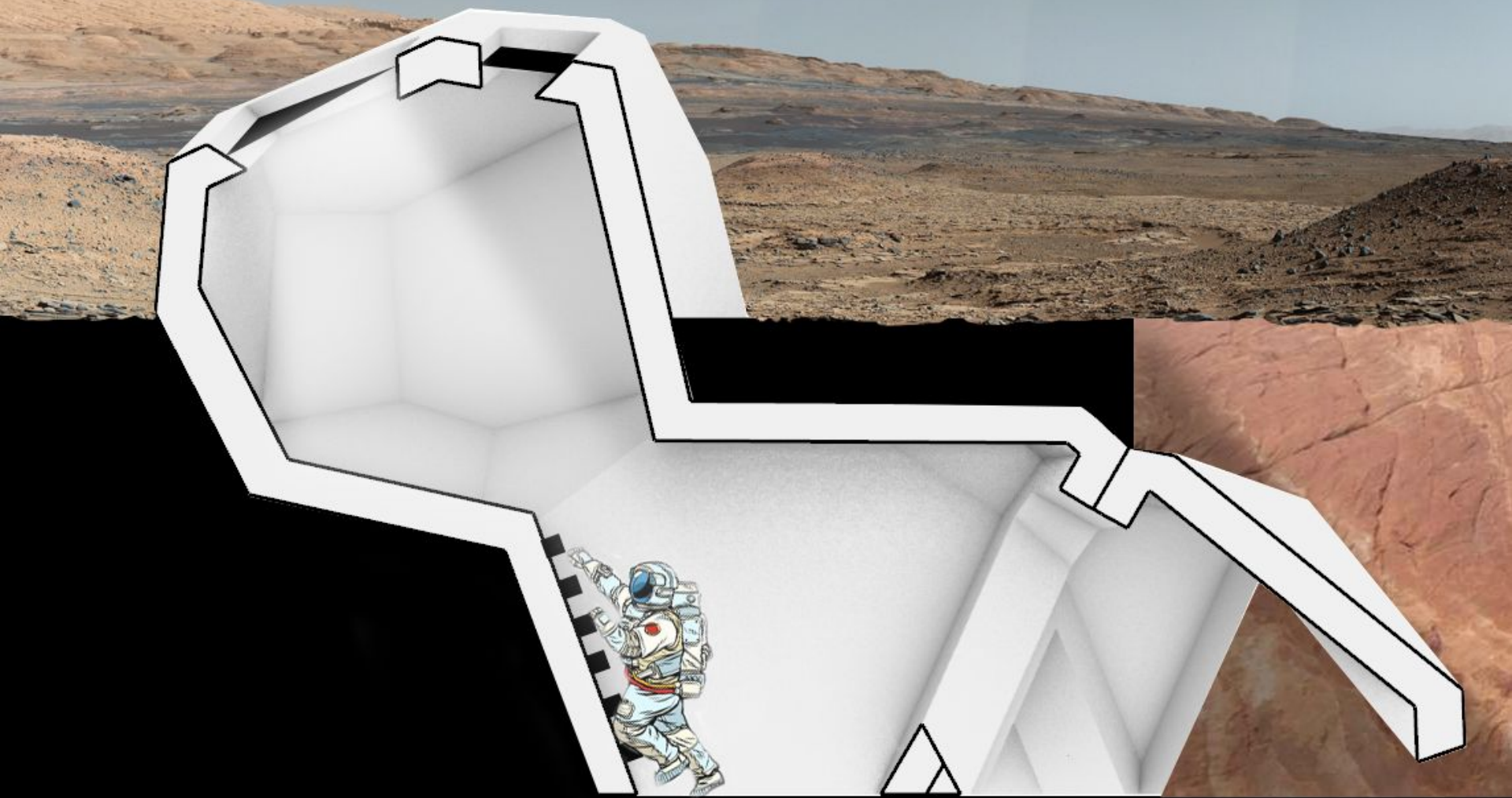


Interconnected communities



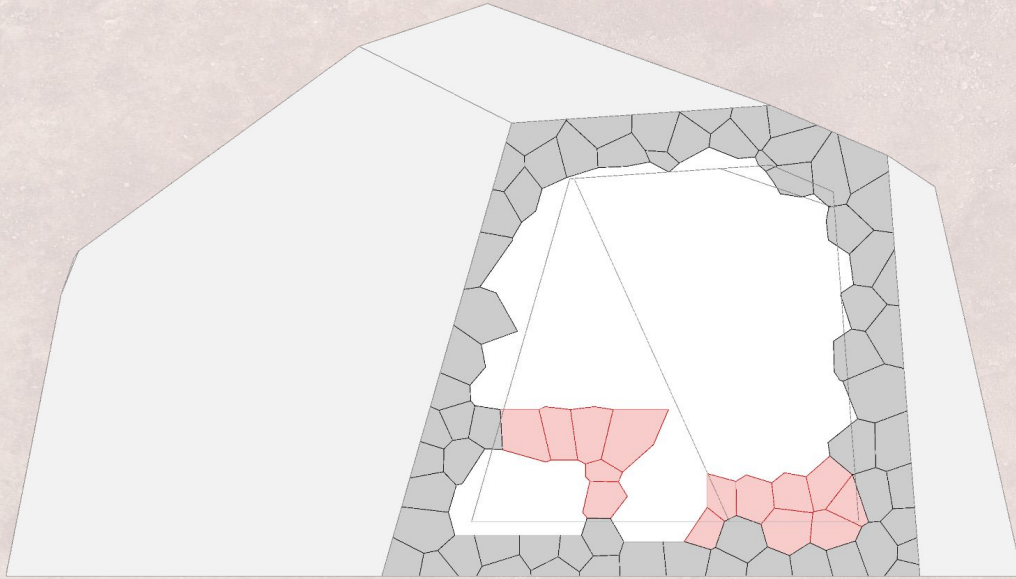
House unit plan





House unit section

Furniture scale voronoi idea



MESO - FORM