

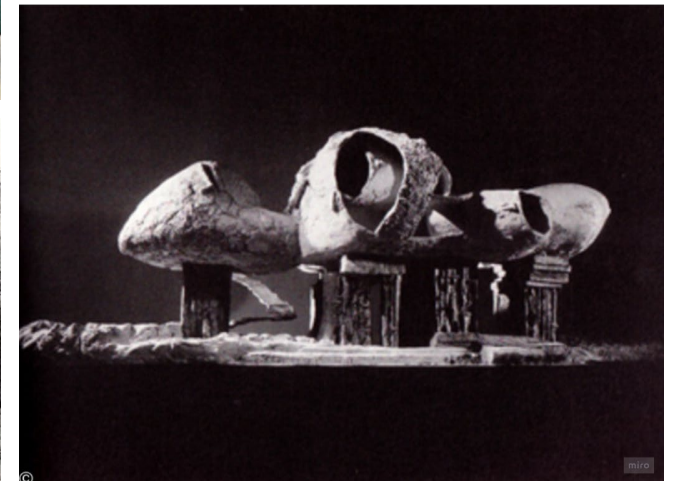
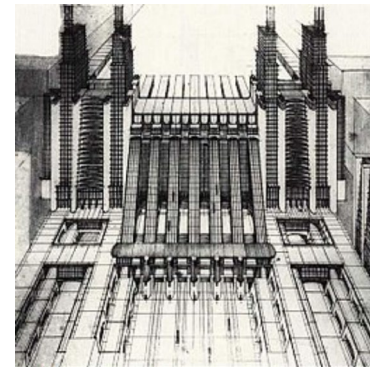
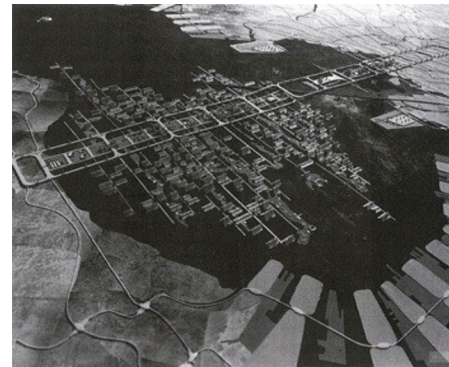
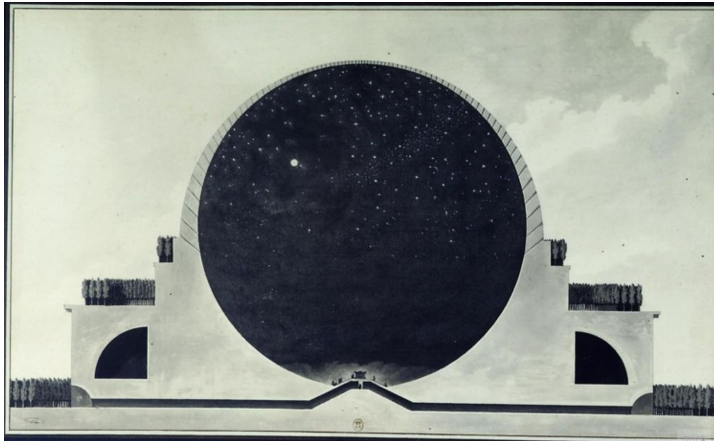
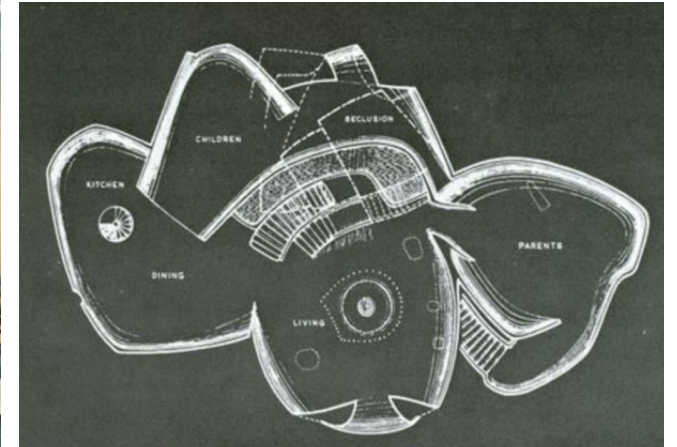
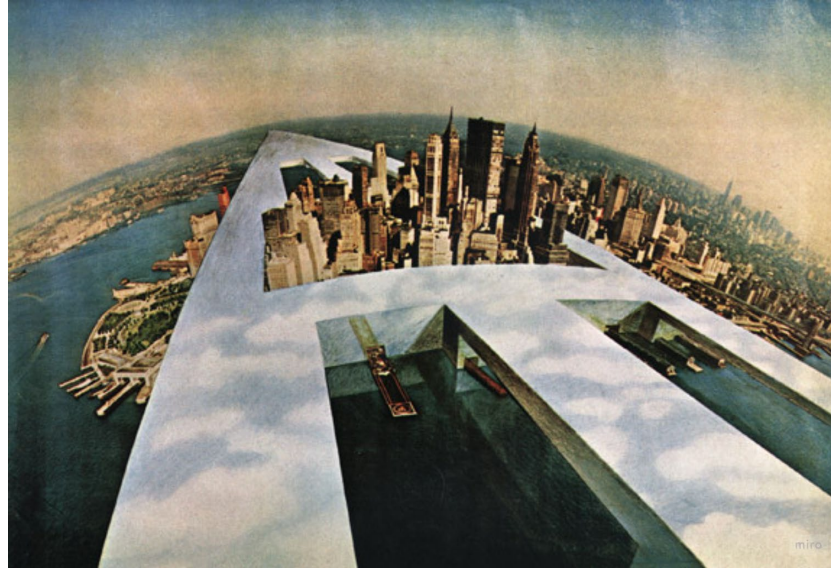
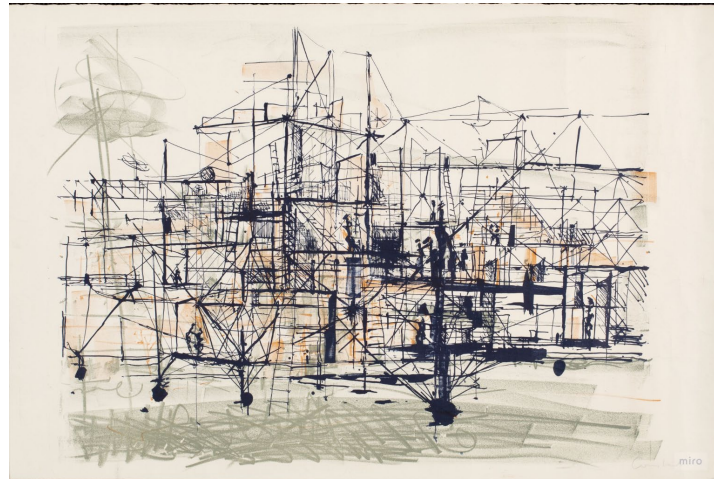
Research

Habitability

LA&I Graduation Studio 2024/25

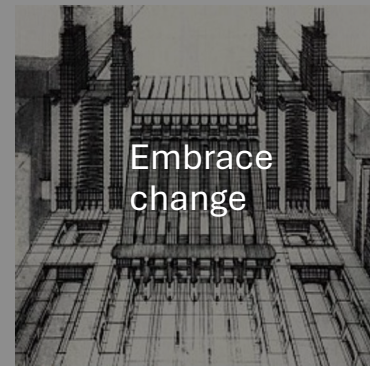
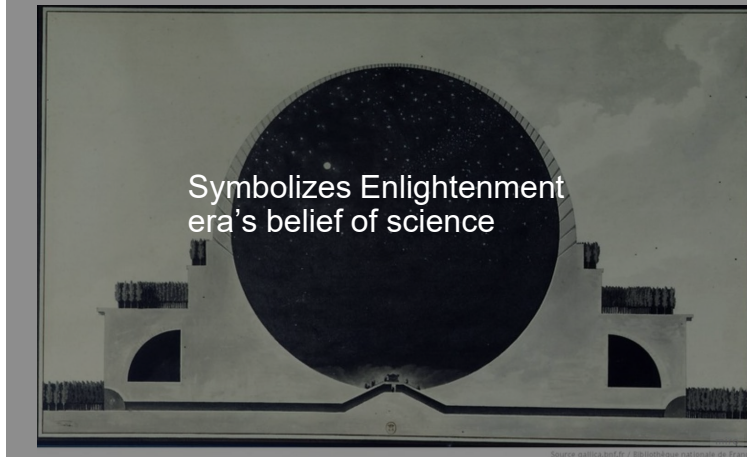
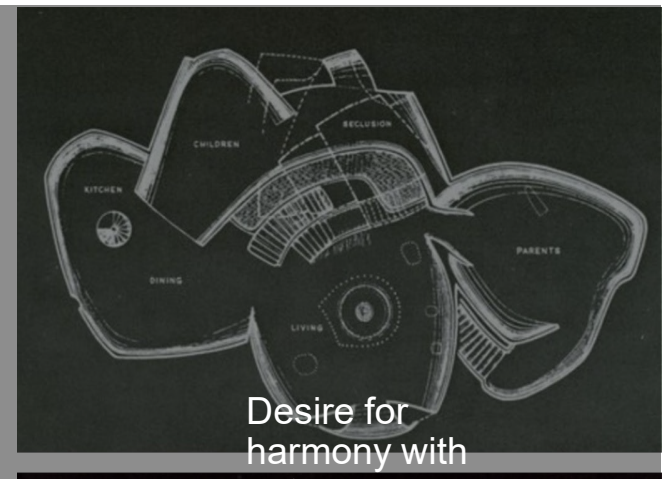
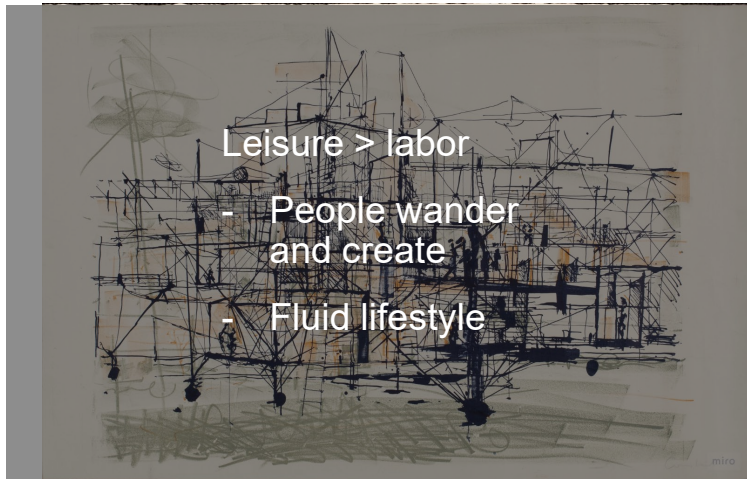
Regina Tania Tan

Utopian



(From left column to right) Constant Nieuwenhuys, New Babylon; Etienne-Louis Boullée, Cenotaph for Newton; Superstudio, Continuous Movement; Kiesler, Endless House; Kenzo Tange, Tokyo Bay Plan; Antonio Sant'Elia's La Città Nuova

Utopian



(From left column to right) Constant Nieuwenhuys, *New Babylon*; Etienne-Louis Boullée, *Cenotaph for Newton*; Superstudio, *Continuous Movement*; Kiesler, *Endless House*; Kenzo Tange, *Tokyo Bay Plan*; Antonio Sant'Elia's *La Città Nuova*

Utopian



a new way of living

(From left column to right) Constant Nieuwenhuys, New Babylon; Etienne-Louis Boullée, Cenotaph for Newton; Superstudio, Continuous Movement; Kiesler, Endless House; Kenzo Tange, Tokyo Bay Plan; Antonio Sant'Elia's La Città Nuova

Utopian

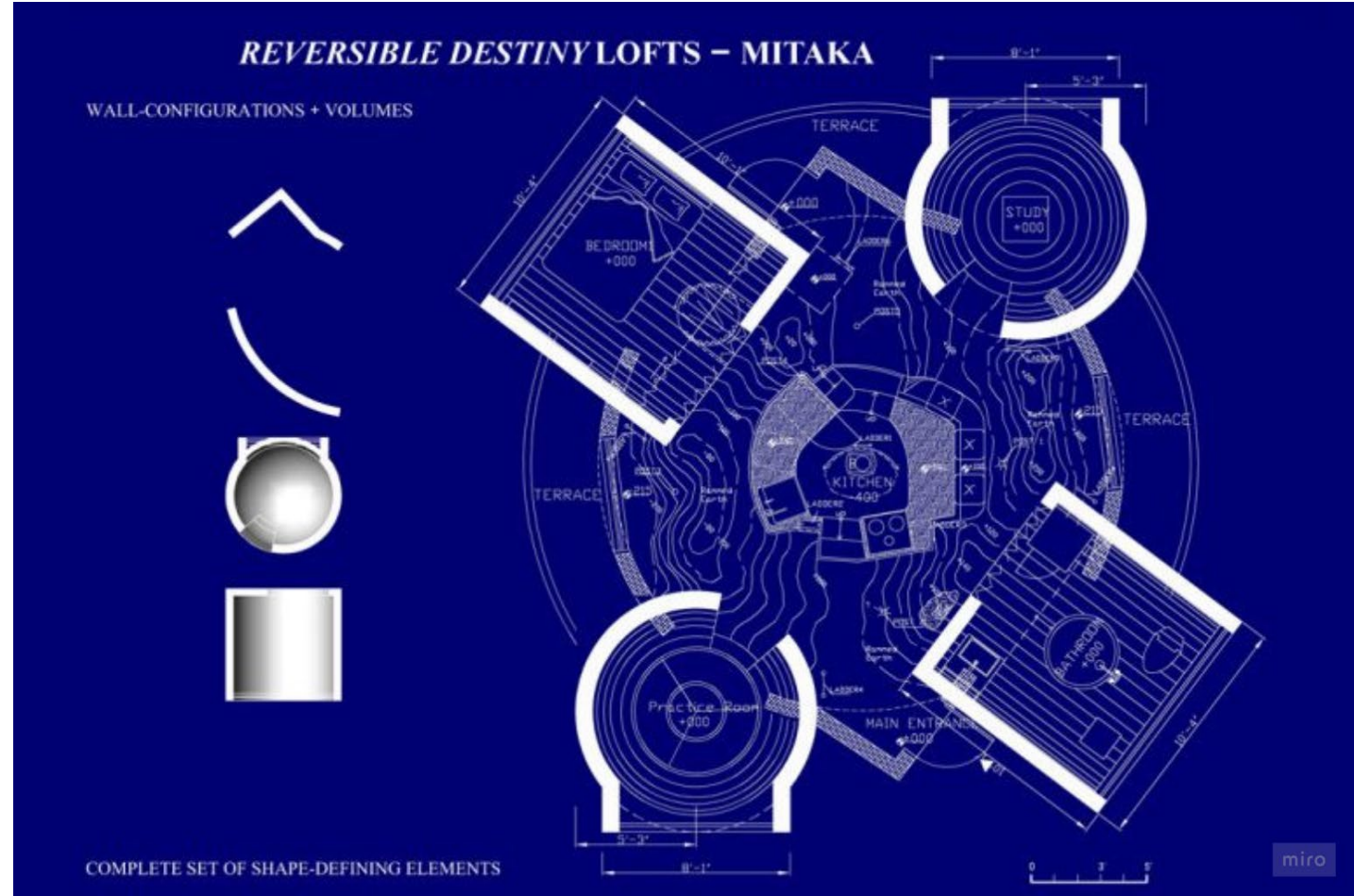
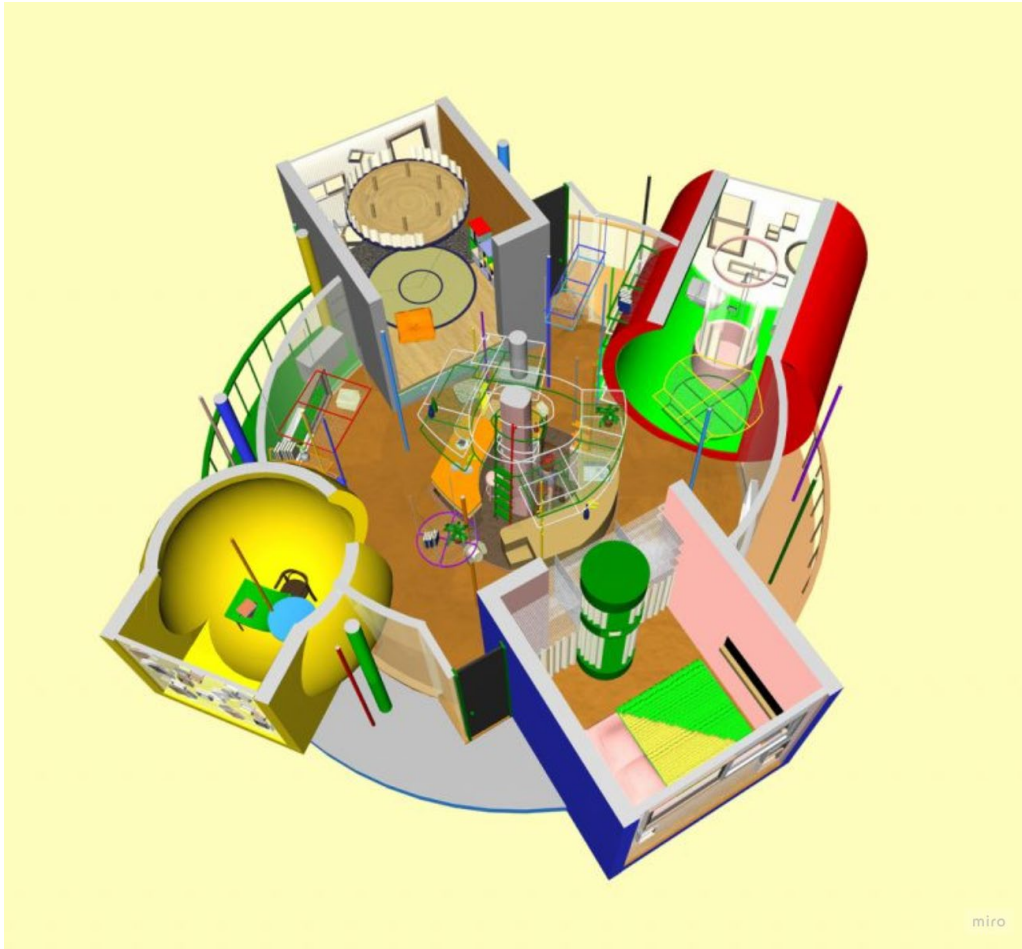
To extend lifespan → architecture as tool to **change** human behavior and even biology



Shusaku Arakawa and Madeline Gin, Reversible Destiny Lofts (Mitaka)

Utopian

"Candy-coloured walls, sloping floors and a serious aversion to right angles would keep residents on their toes"



Shusaku Arakawa and Madeline Gin, Reversible Destiny Lofts (Mitaka)

Utopian Thinking

Driven by a new kind of living

- What kind of society?
- What vision do I want to voice out in my project?
- Death of Architecture: What if we just use VR
- Life of Architecture: Living quality on moon will be dictated by the architecture (no livable nature and surroundings)

Utopian Thinking

Driven by a new kind of living



Basic Needs

What are included will determine the quality of living

Lunar Dust

Materiality → using properties of the material to dictate the design possibilities and opportunities

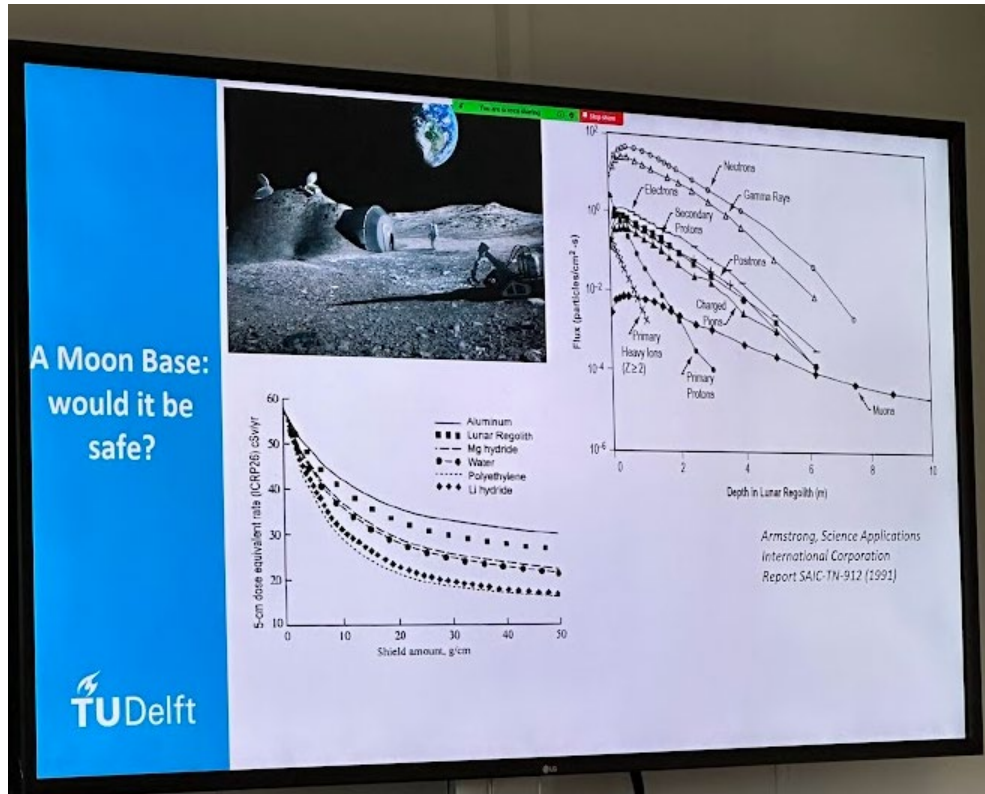
- **Molten Salt Electrolysis of Regolith** to extract oxygen and water from lunar materials (ISRU program) (Robert, ESA)
- **Most problematic challenge for Lunar Base** → Lunar dust's electrostatic properties. (ESA)
- Shielding in construction, reserach of various combinations of regolith:
 - Regolith + binders (geopolymer, urea)
 - Regolith + Heat (microwave)
 - Compacting Regolith
 - 3d-print regolith

Lunar Dust

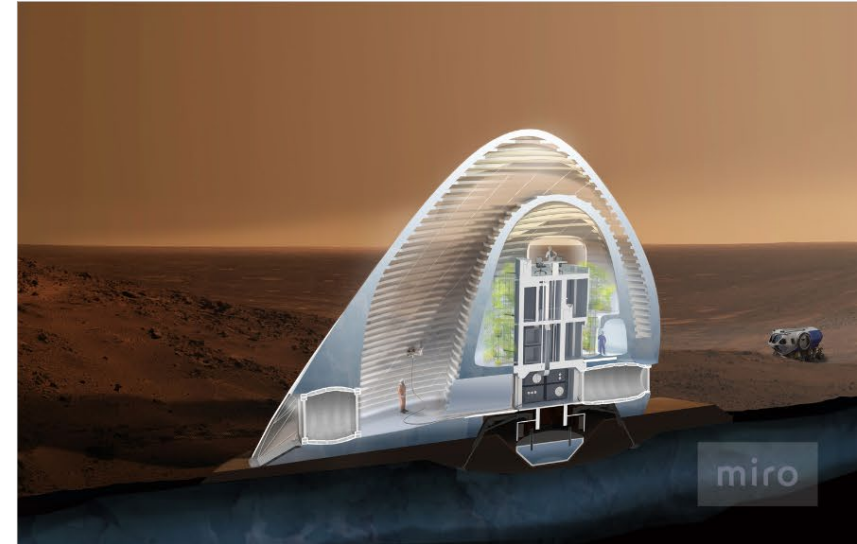
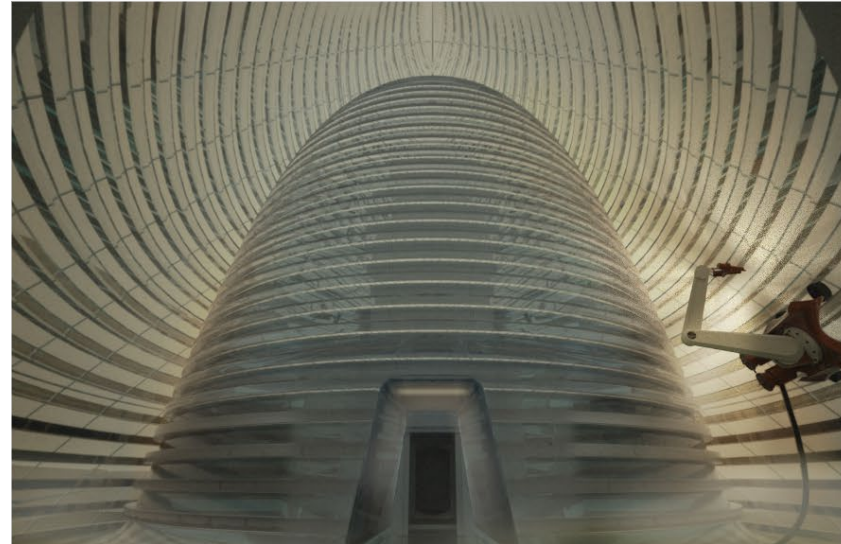
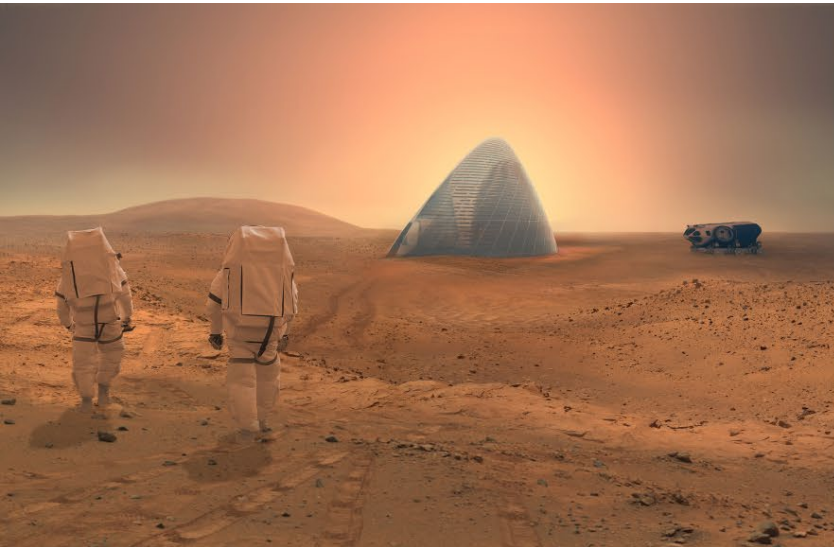


Regolith incorporated to tetrapod construction system

Radiation



Radiation

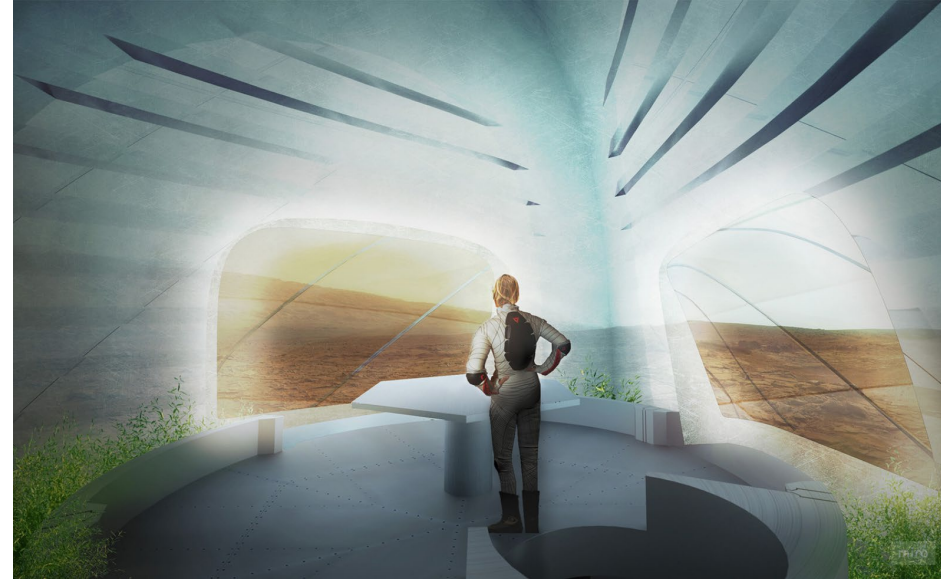


Mars Ice House, SEArch

- Water-ice as radiation barrier and giving daylight variance
- Careful detail of interface inside and outside
- Fresnel lens effect, achieved via robotic printing → alternate color therapy



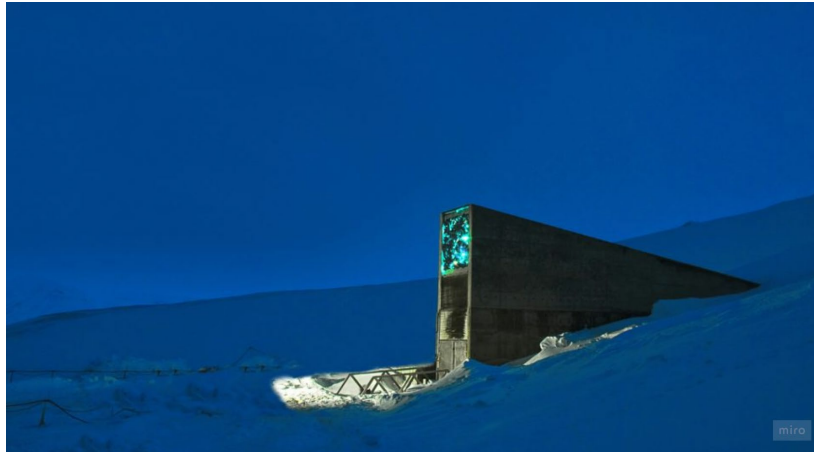
- curvaceous rooms create an illusion of cycloramic space, enhancing perceptions of boundlessness, making a small space seem quite large.



- Where the ice shell thins, large **ETFE inflatable windows filled with radiation shielding gas** further expand the perceived volume and frame views into the landscape.

Mars Ice House, SEArch

Interface



Svalbard Seed Vault, Norway

Lighting



Wieliczka Salt Mine

Human physiology

On living in space:

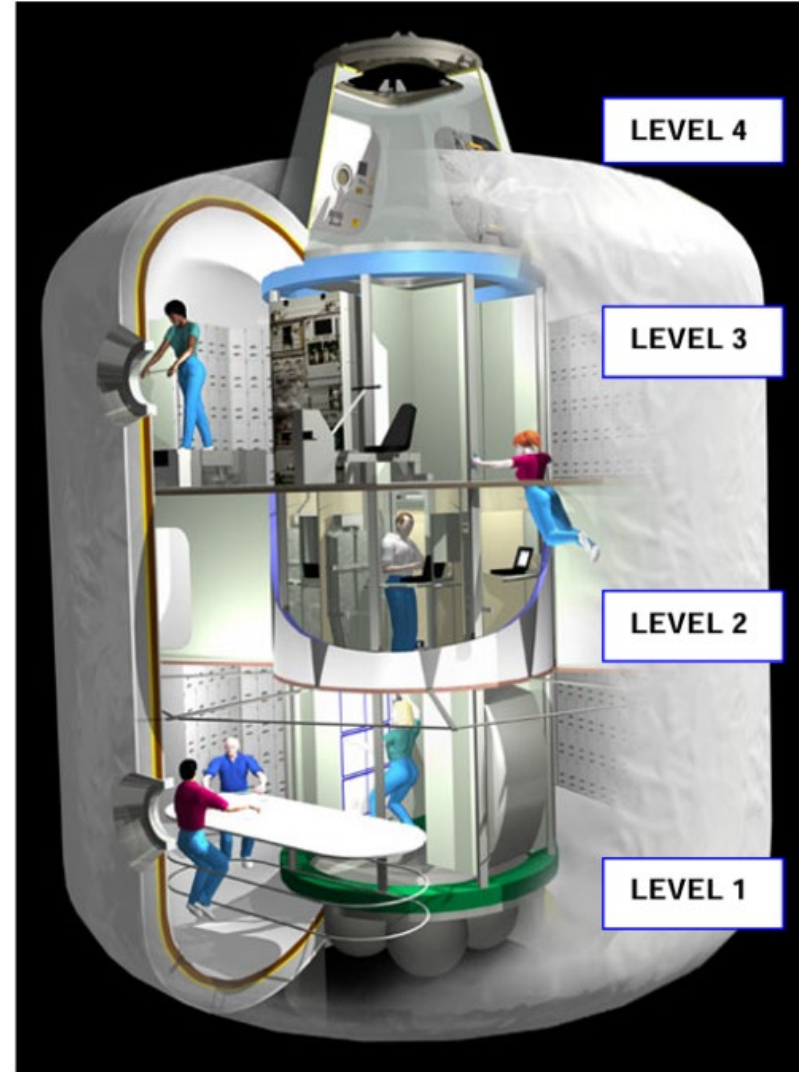
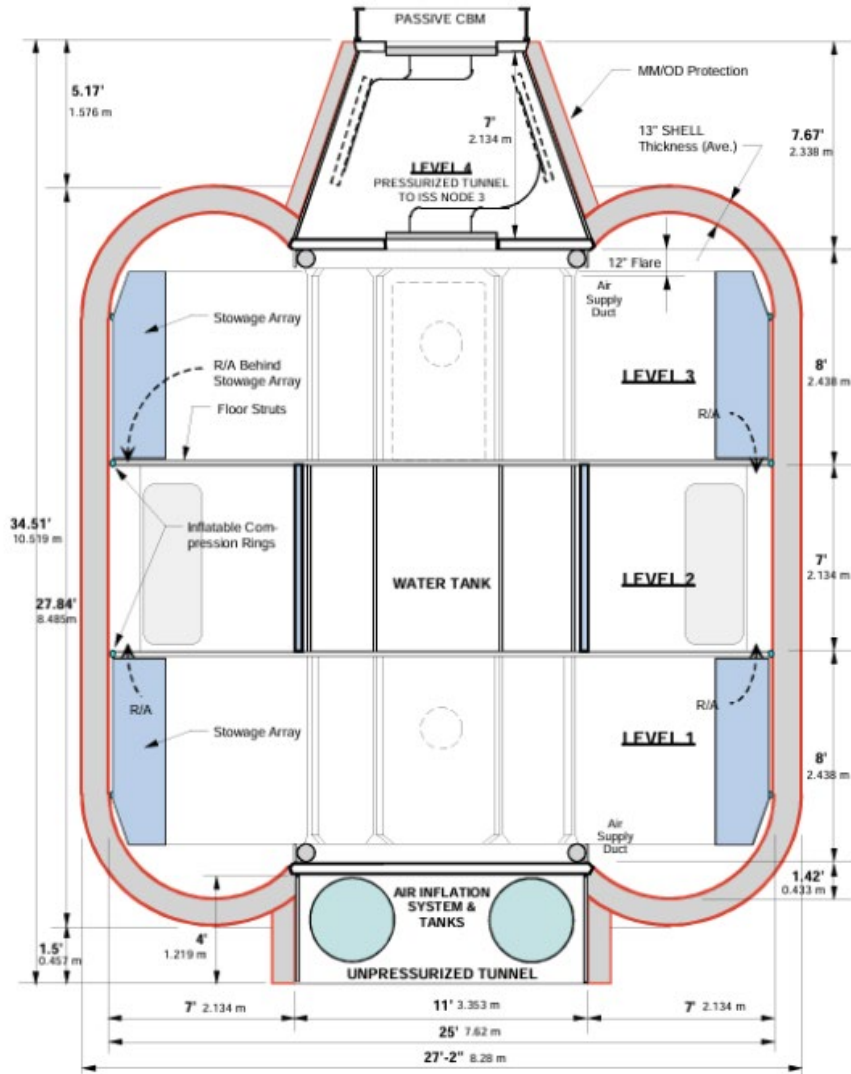
“Technology isn’t the limit, human physiology is”

- A lot of research in hard systems, to close the loop, etc. How about research & design solutions for humans who will use the space?
- Protection: radiation & dust
- Conditioning: physical & mental

Human physiology

Excerpts from NASA

- consistent local vertical orientation in keeping with operational requirements established in all programs since Skylab
- Skylab and Shuttle-Mir experiences have confirmed that the availability of an open, communal area is very important for crew morale and productivity during longduration isolation and confinement in space.
- wardroom or conference area is an important contribution to the challenge of both working and living in space.
- crew quarters are surrounded by a 2.5-in. water jacket for radiation protection during solar flares.



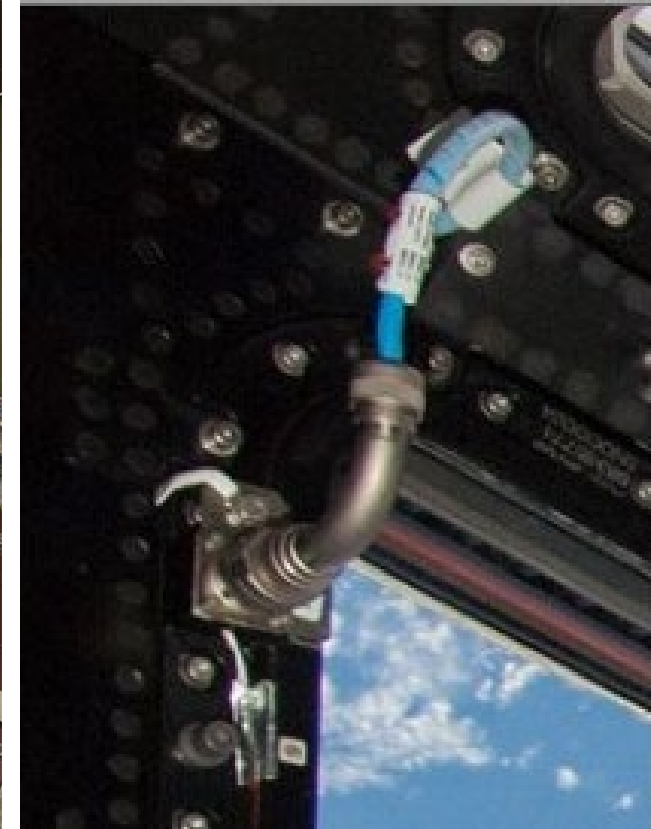
ISS TransHub

**What kind of “furniture” are needed
(wanted!) for grounding?**

“Furniture” | Leisure

“If something is going to stick out and make a nice handhold, it’s going to be used for a handhold.”
– Gerald Carr, Skylab astronaut, 1974

→ **Human instinct!**



Destiny module, ISS. Broken air hose due to extended use for grabbing.

“Furniture” | Sleep



→ Different requirements

Crew Quarters, ISS

“Furniture” | Hygiene

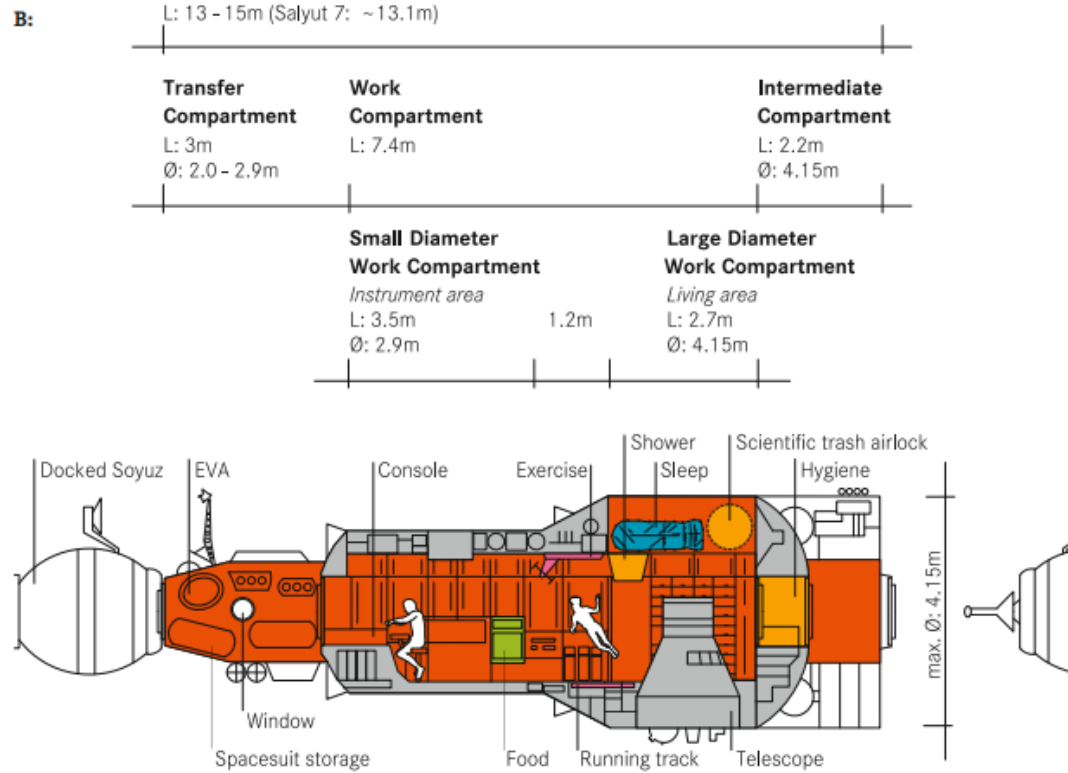


Skylab

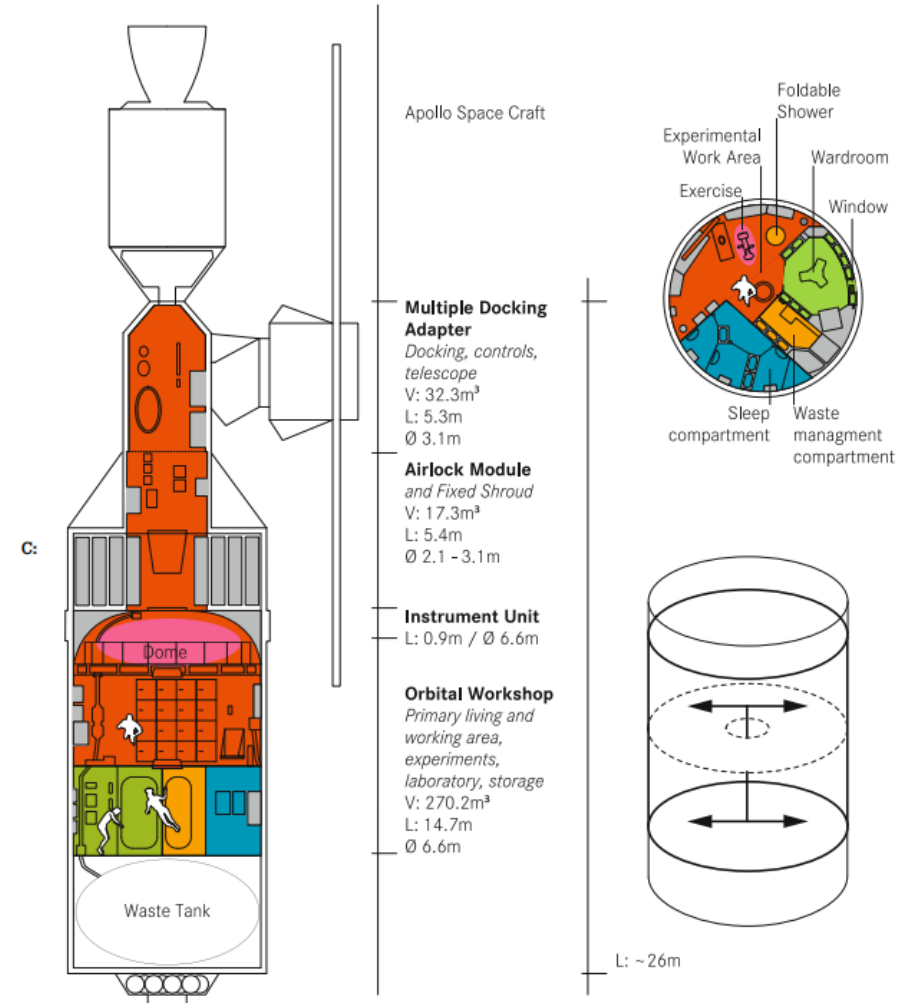


ISS

“Furniture” | Connection

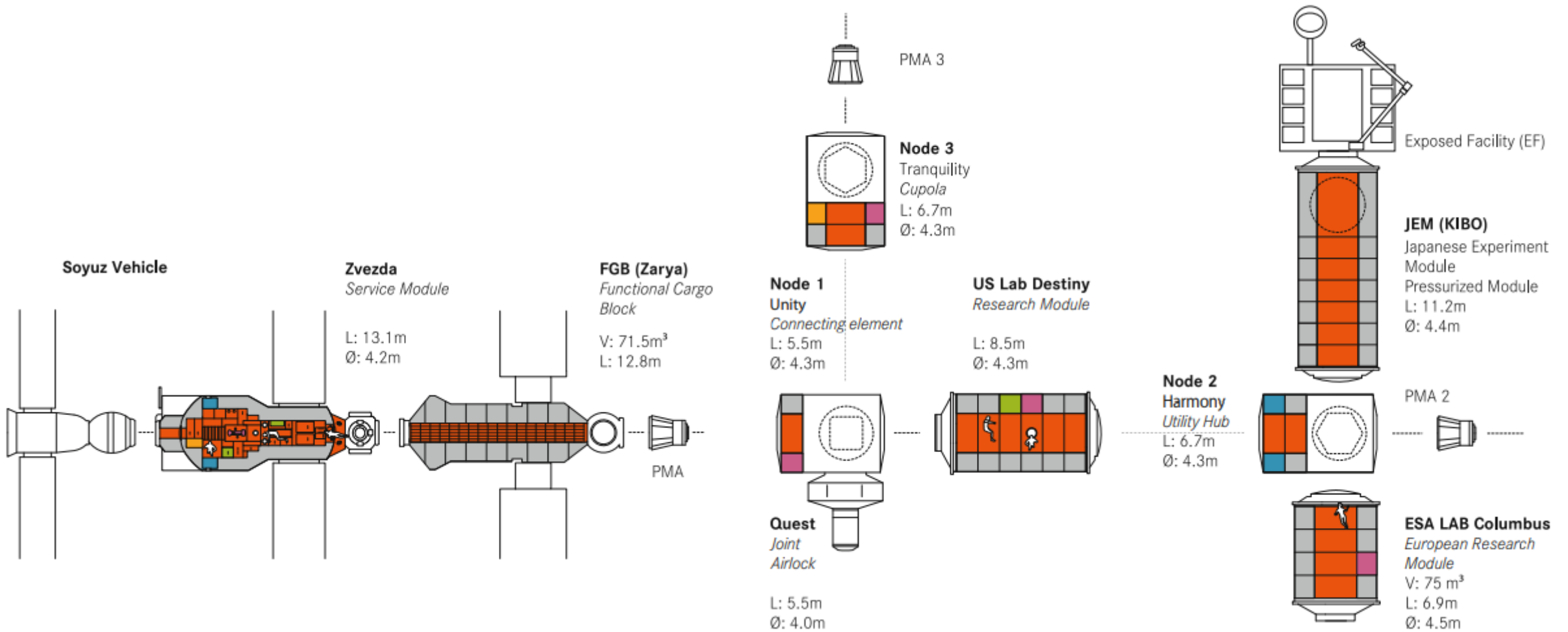


Salyut Space Station



Skylab

“Furniture” | Connection



ISS

utopian



realistic

Nature-inspired
new material?
spinning homes?

compound distribution / self-regulation
regolith / lunar dust
microgravity

applicability / functionality

materiality

What kind of new spatial relationships does it generate?

How to push forward innovation?

Realistic

Research

Inform

Futuristic

Vision

How can humans live (comfortably /
excitingly / sustainably) in space?

What kind of living is suitable?

Realistic

Materialization

How to achieve the vision?