ARCHI_MARS

HIVE MARS:

DESIGN OF A HYBRID-CLASS, SCALABLE SETTLEMENT, ON THE MARTIAN SURFACE

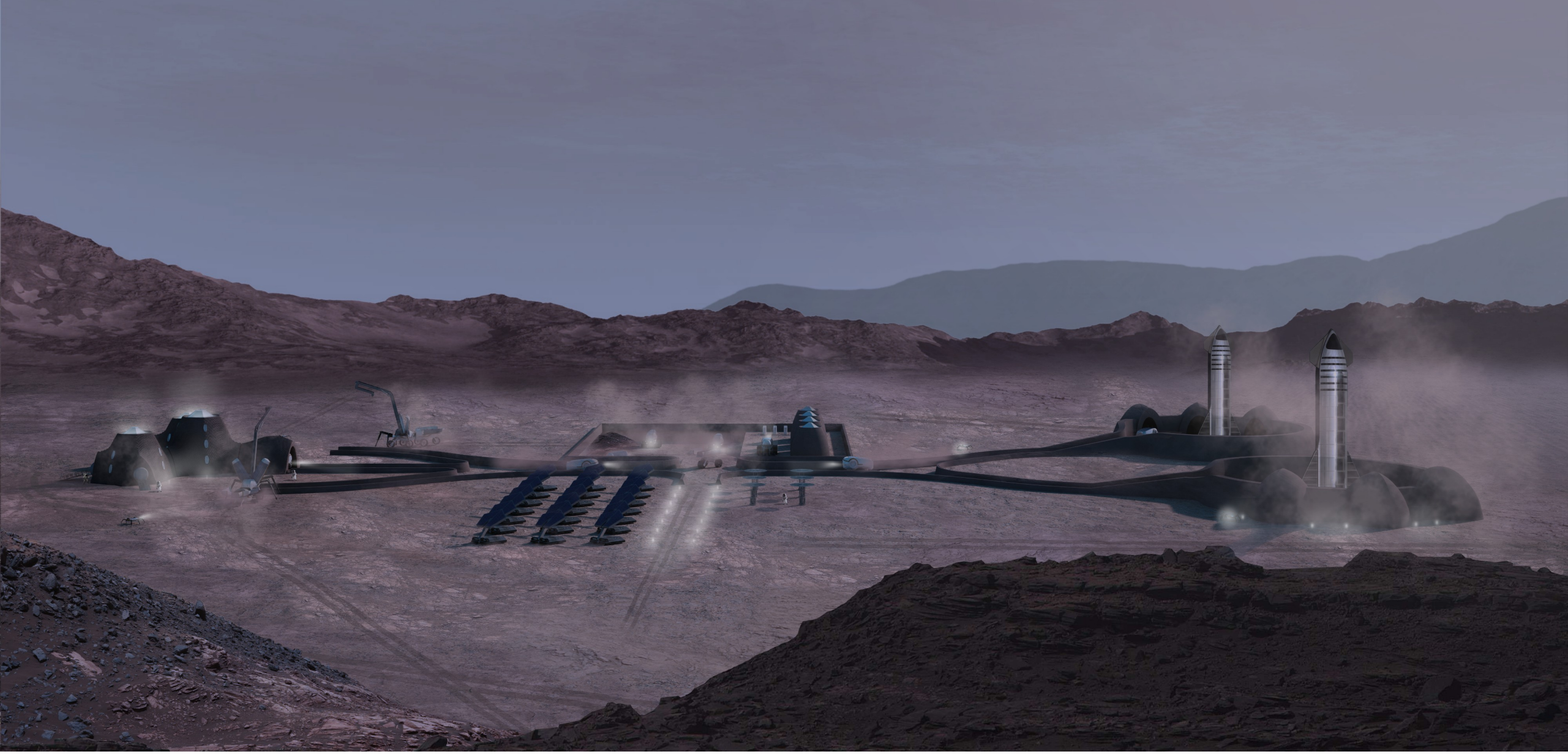
Supervisor:
Prof. Arch. **Giuseppe Fallacara**

Assistent supervisor:
Space Arch. **Vittorio Netti**

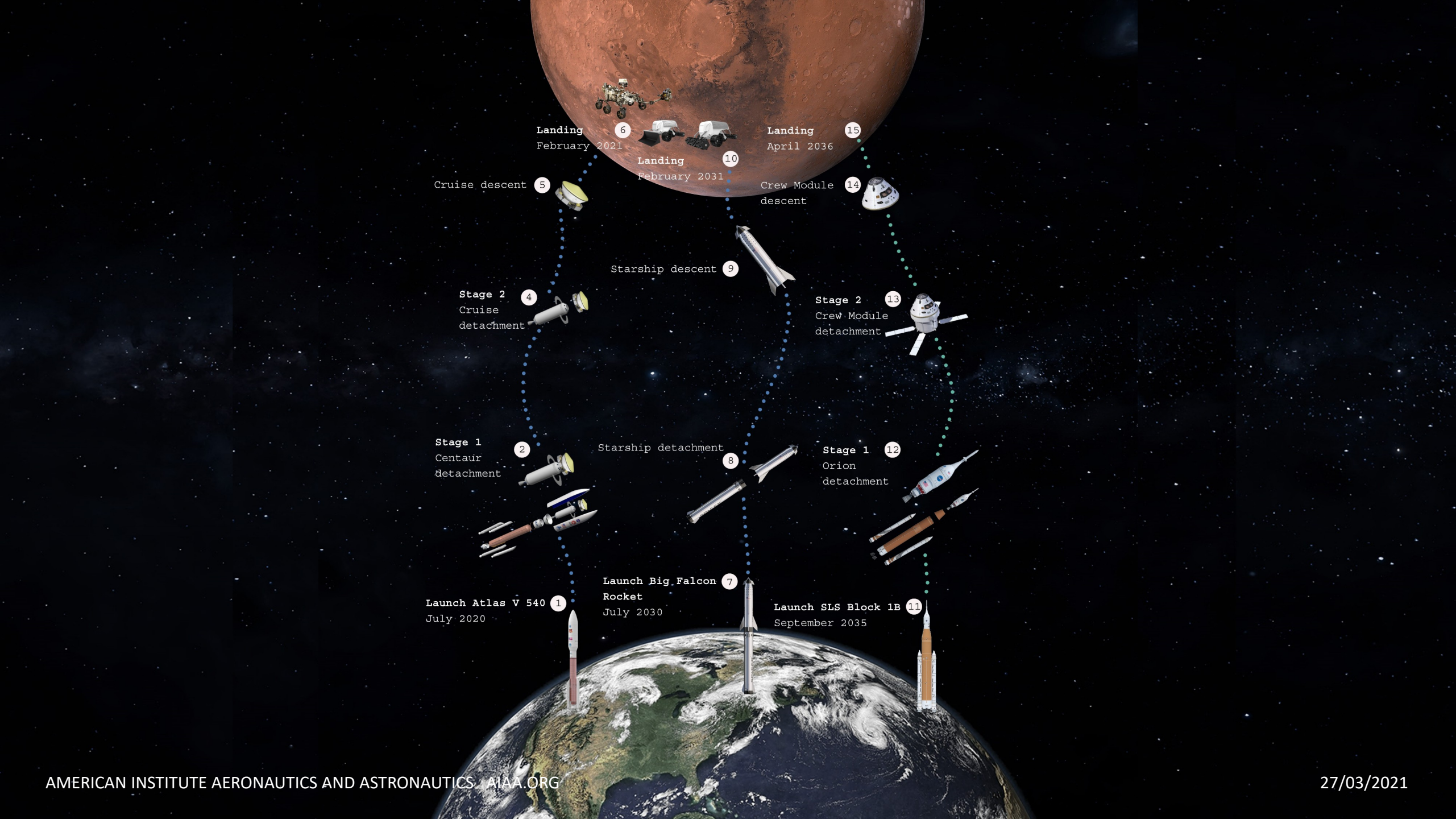
Team Archimars:
Alessandro Angione
Federica Buono
Ivana Fuscello
Isabella Paradiso
Mirha Vlahovljak
Hana Zecevic

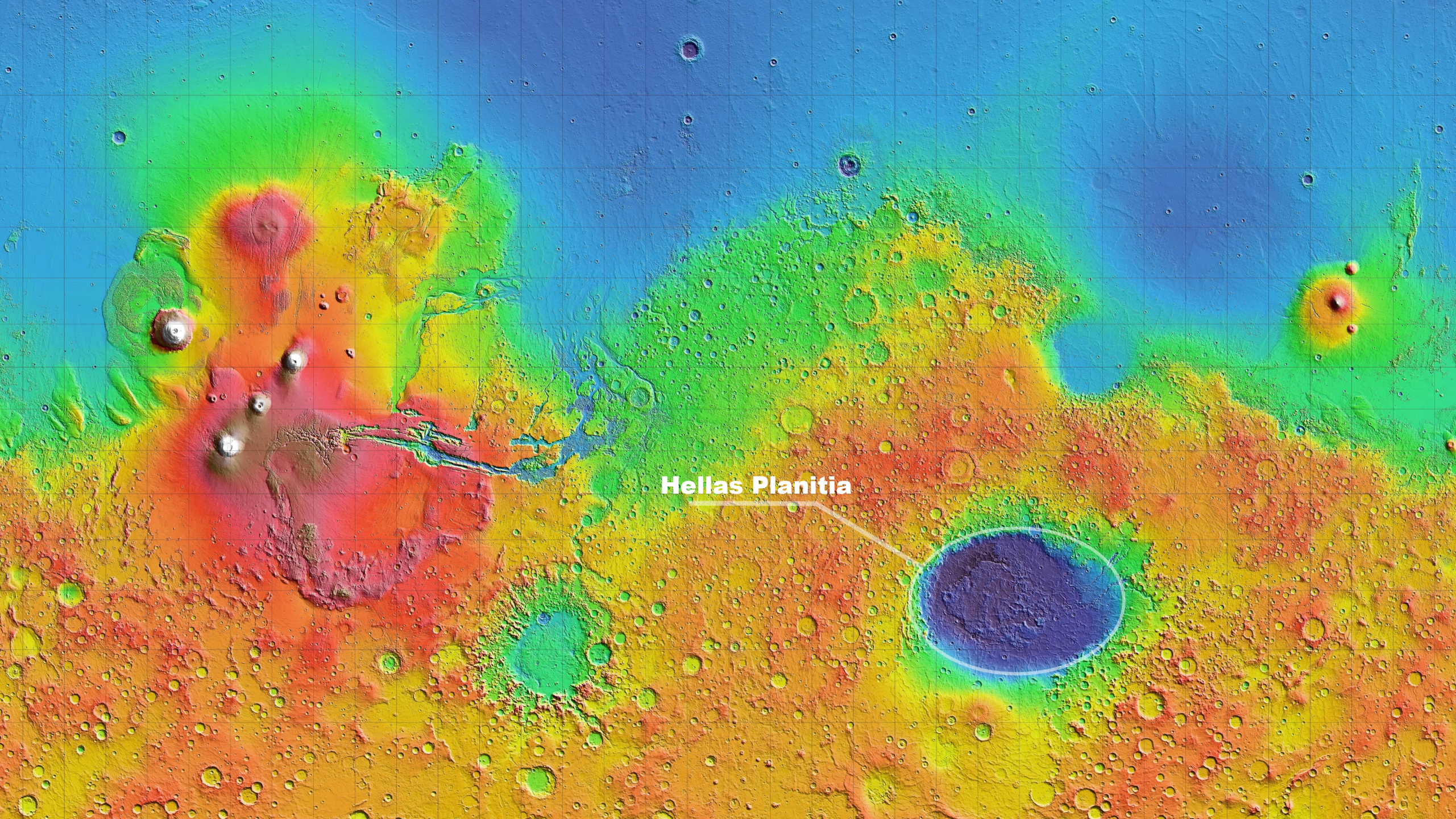
de' remi facemmo ali
1990
POLITECNICO DI BARI

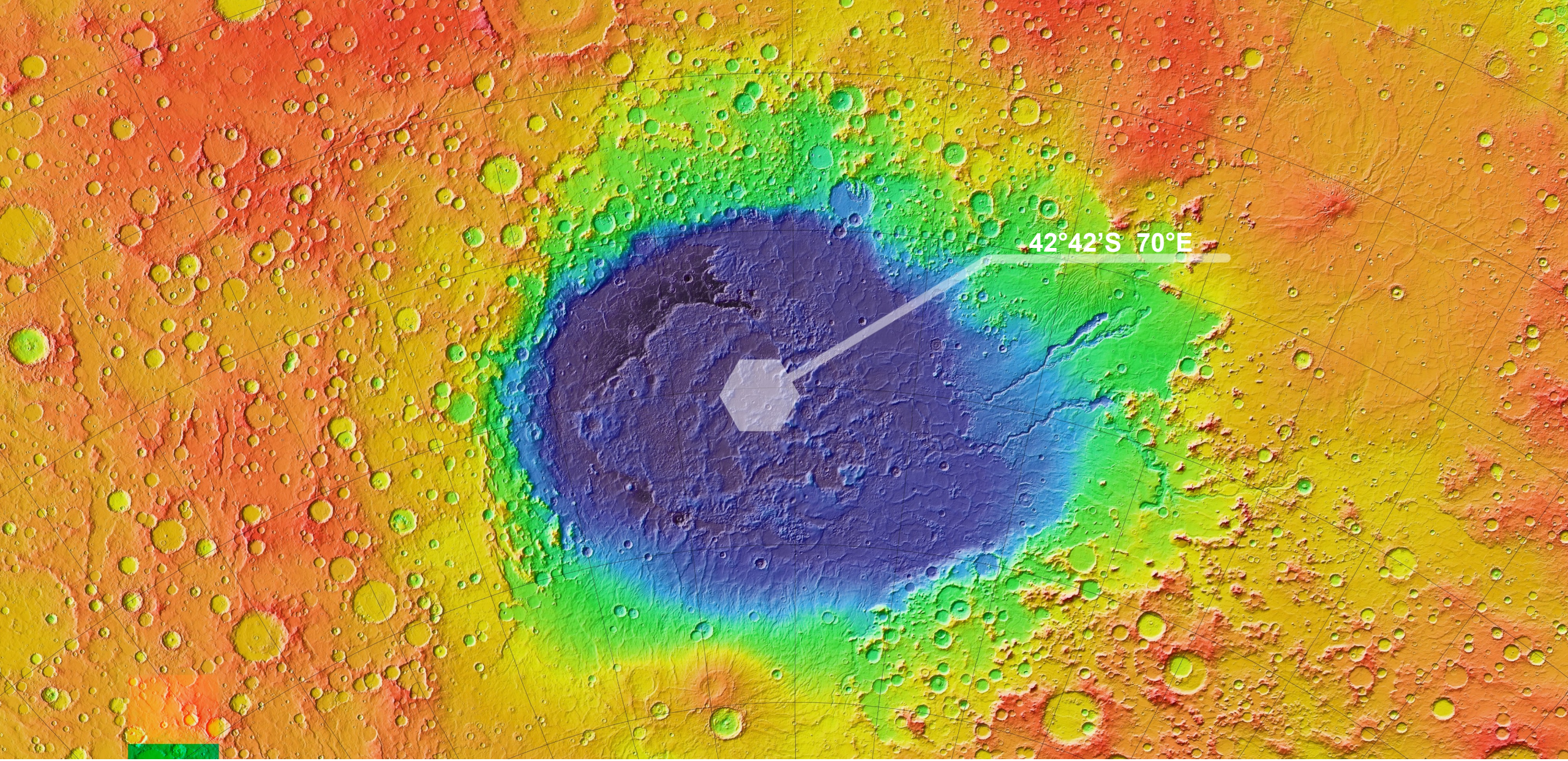
SICSA
Sasakawa International Center for Space Architecture



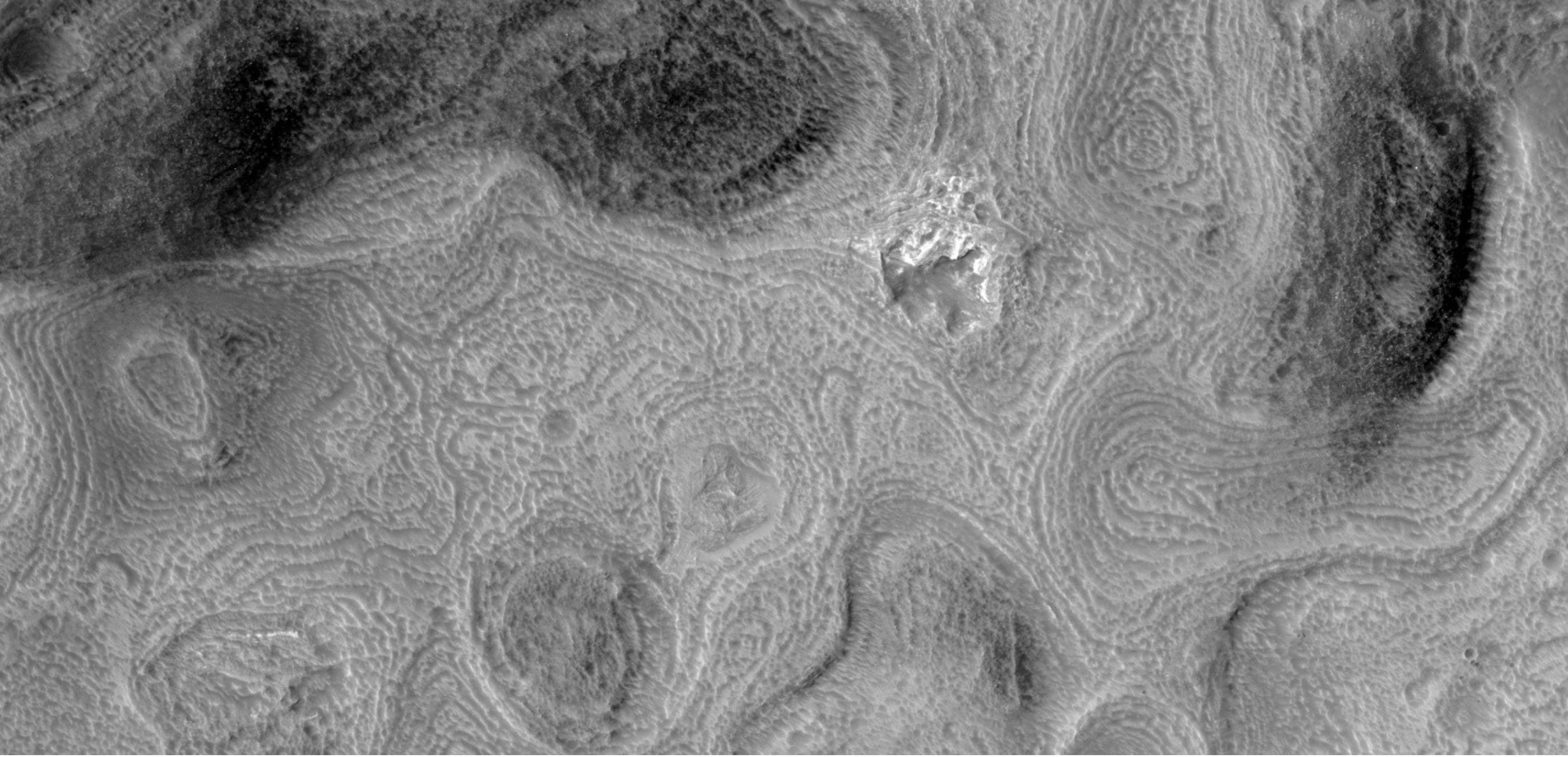
THE PROJECT


Landing
February 2021
6
Landing
February 2031
10
Landing
April 2036
15
Cruise descent
5
Crew Module
descent
14
Starship descent
9
Stage 2
Cruise
detachment
4
Stage 2
Crew Module
detachment
13
Stage 1
Centaur
detachment
2
Starship detachment
8
Stage 1
Orion
detachment
12
Launch Big Falcon
Rocket
July 2030
7
Launch Atlas V 540
July 2020
1
Launch SLS Block 1B
September 2035
11


Hellas Planitia

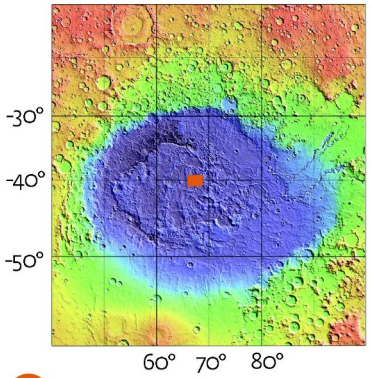


Hive Mars sight



Honeycomb terrain

Planet: **Mars**
Location: **Hellas Planitia**
Map: **Topographic**
Tipology: **Albedo**
Latitude: **-40.0°**
Longitude: **68.0°**
Depth: **-7152 Km**



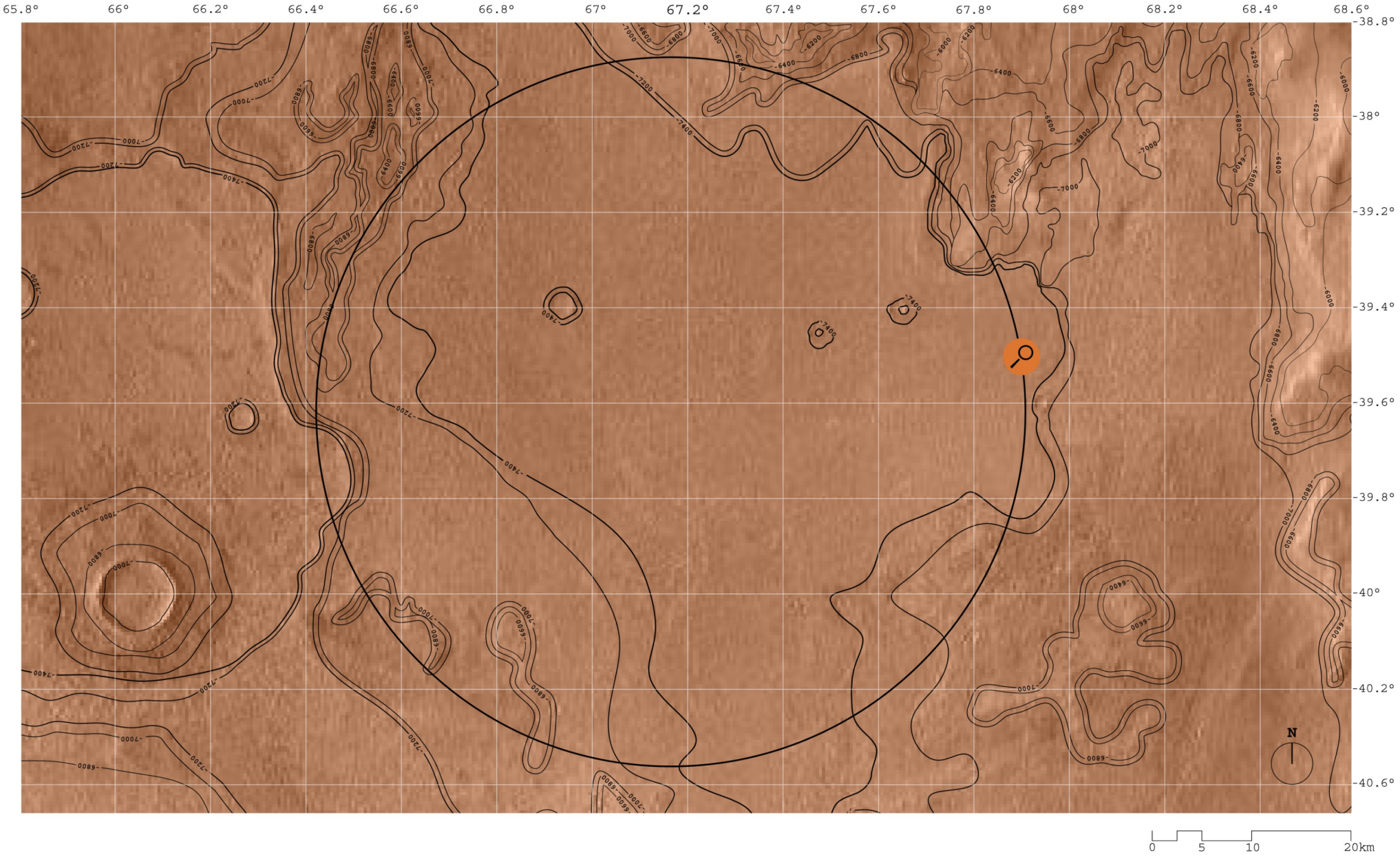
EXPLORATION AREA

SCIENTIFIC REQUIREMENTS

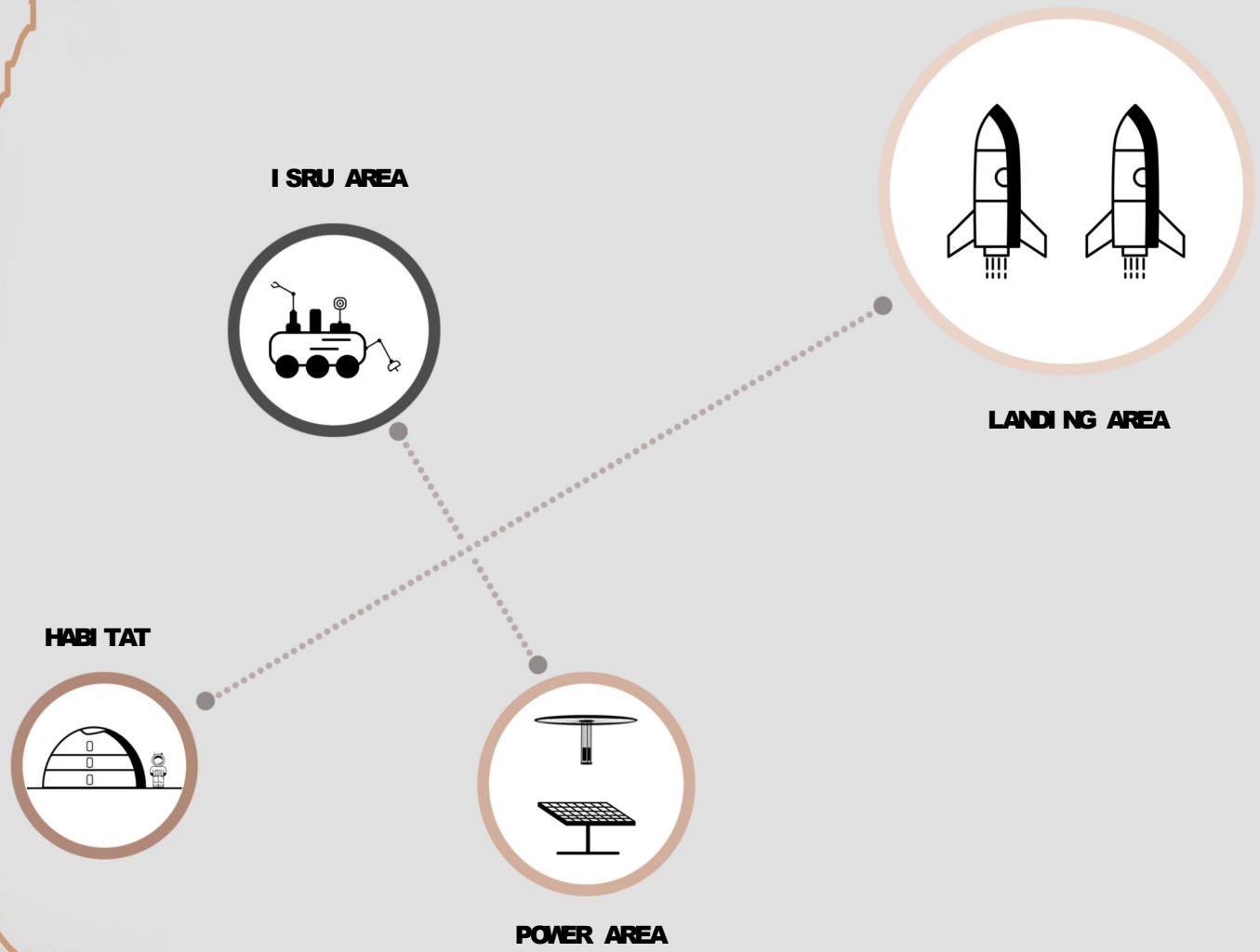
- Geological variety
- Presence of hydrated minerals
- Pressure of 1155Pa
- Presence of Hydrogen
- Deposits of underground glaciers
- Presence of underground lava caves

ENGINEERING REQUIREMENTS

- Low elevation of the site
- Moderate relief and slopes
- Reduced presence of rocks
- Moderate radiation due to the depth of the site



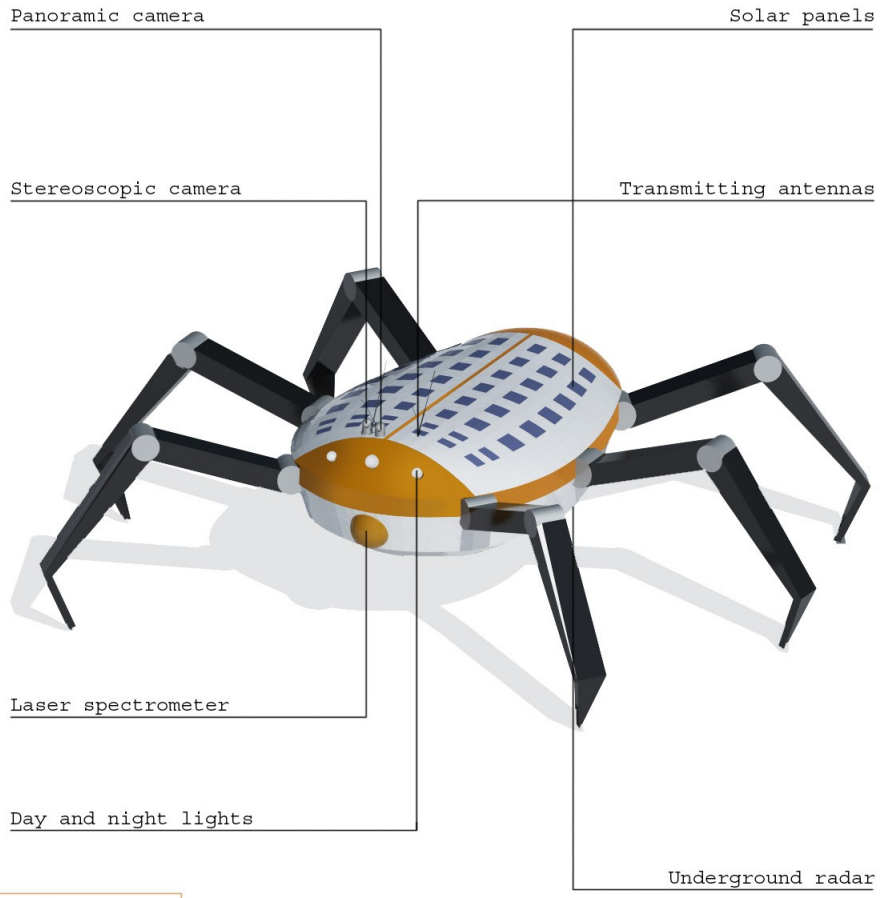
HIVE MARS



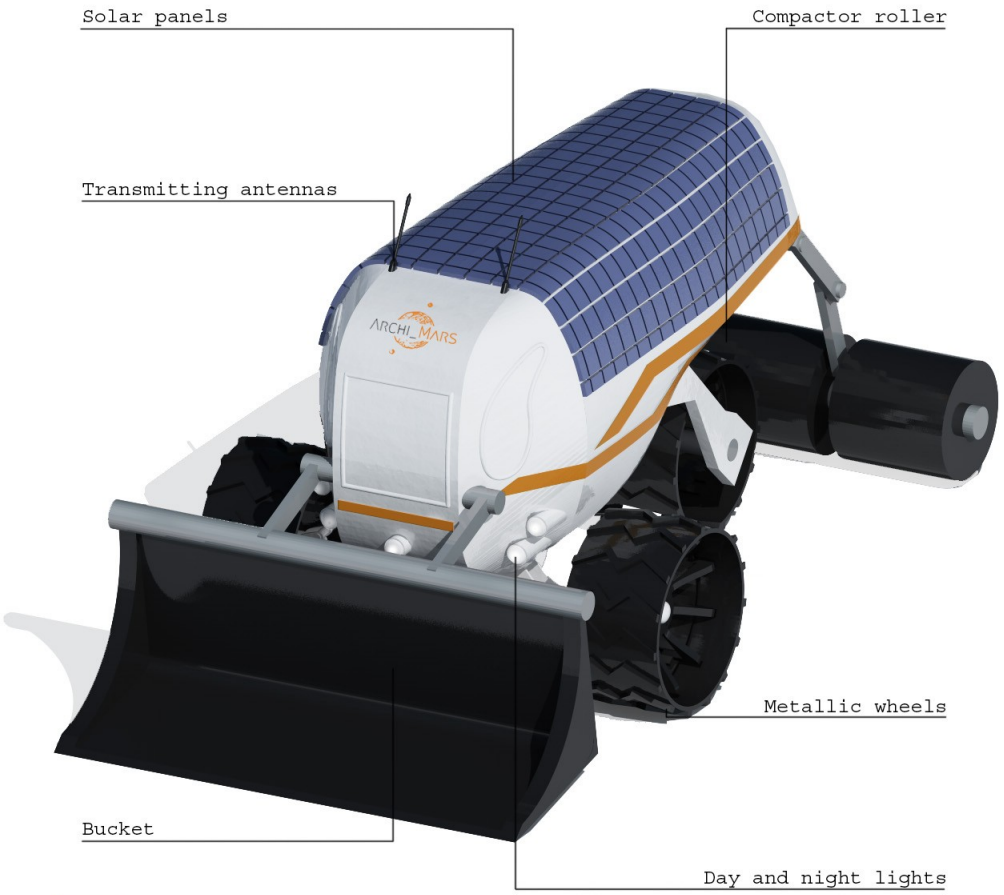
- **LANDING AREA** (600sqm) **6km** away from the **SCIENTIFIC EXPERIMENT AREA;**
- **HABITAT AREA** (> 1km) **min 3.5** km from the **LANDING AREA;**
- **POWER AREA** 250 sqm;
- **ISRU AREA max 5km** away from the **LANDING AREA;**
- **SCIENTIFIC EXPERIMENT AREA;**
- **Crew members and Rover routes**

Bee Family Rovers

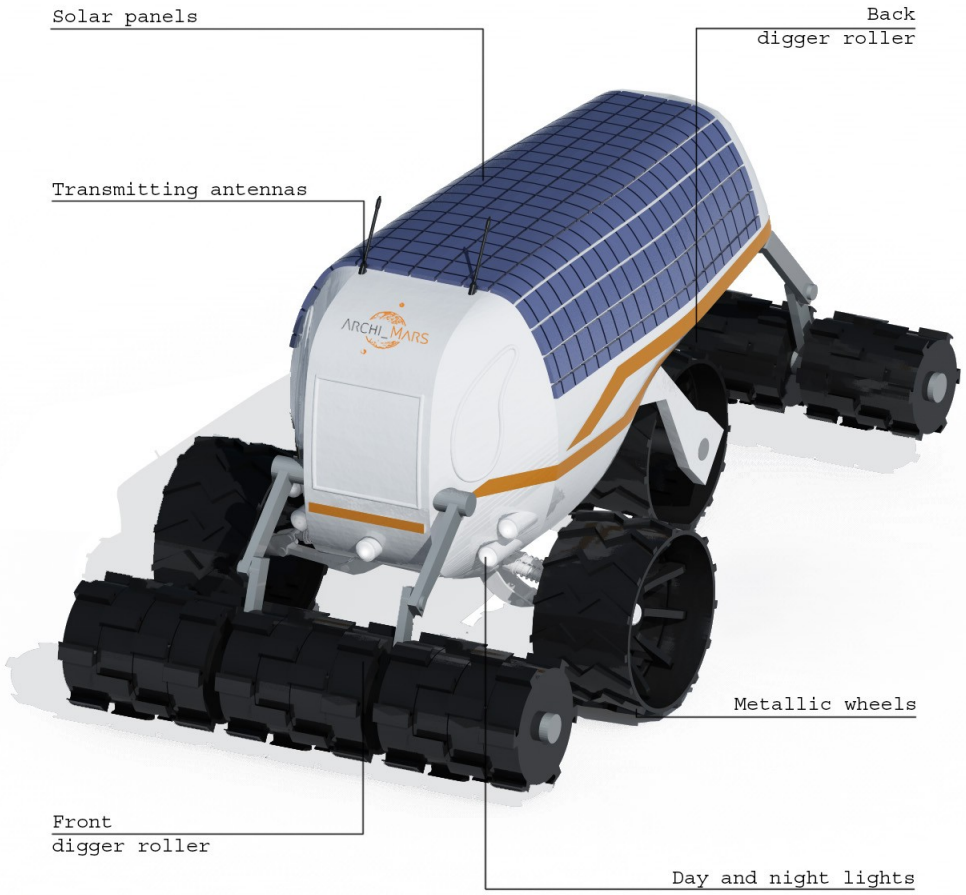
Spider Explorer



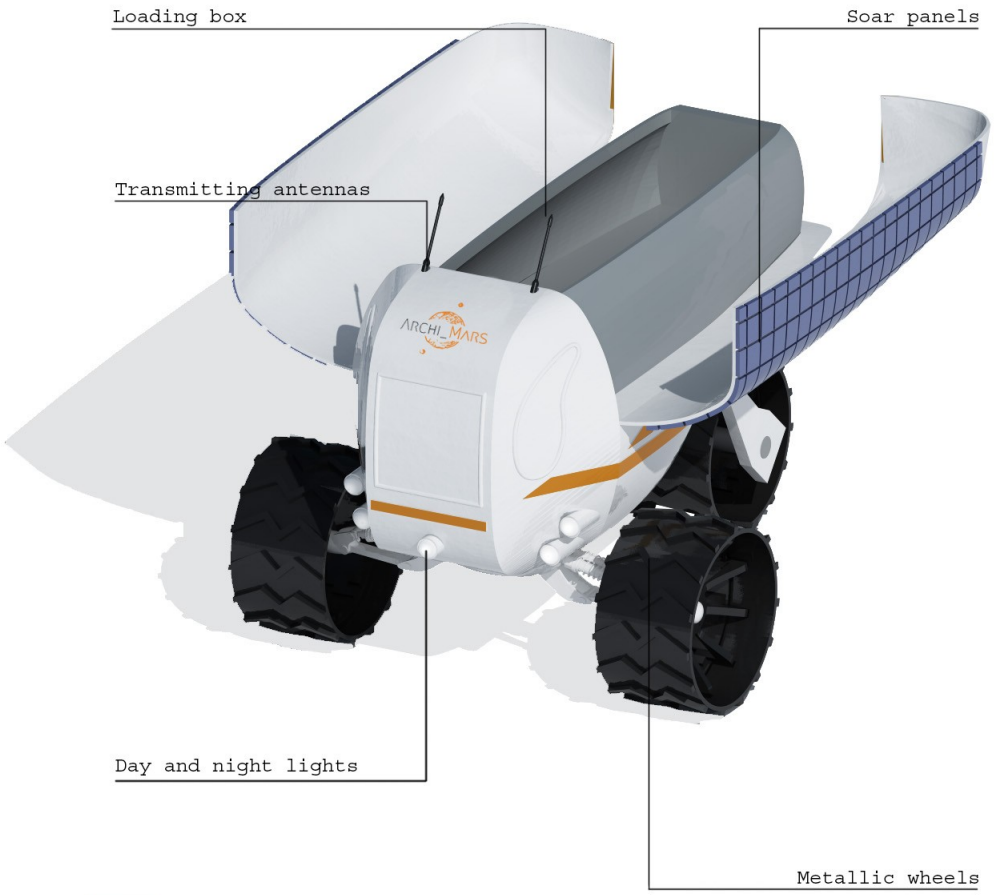
Bee Flattener



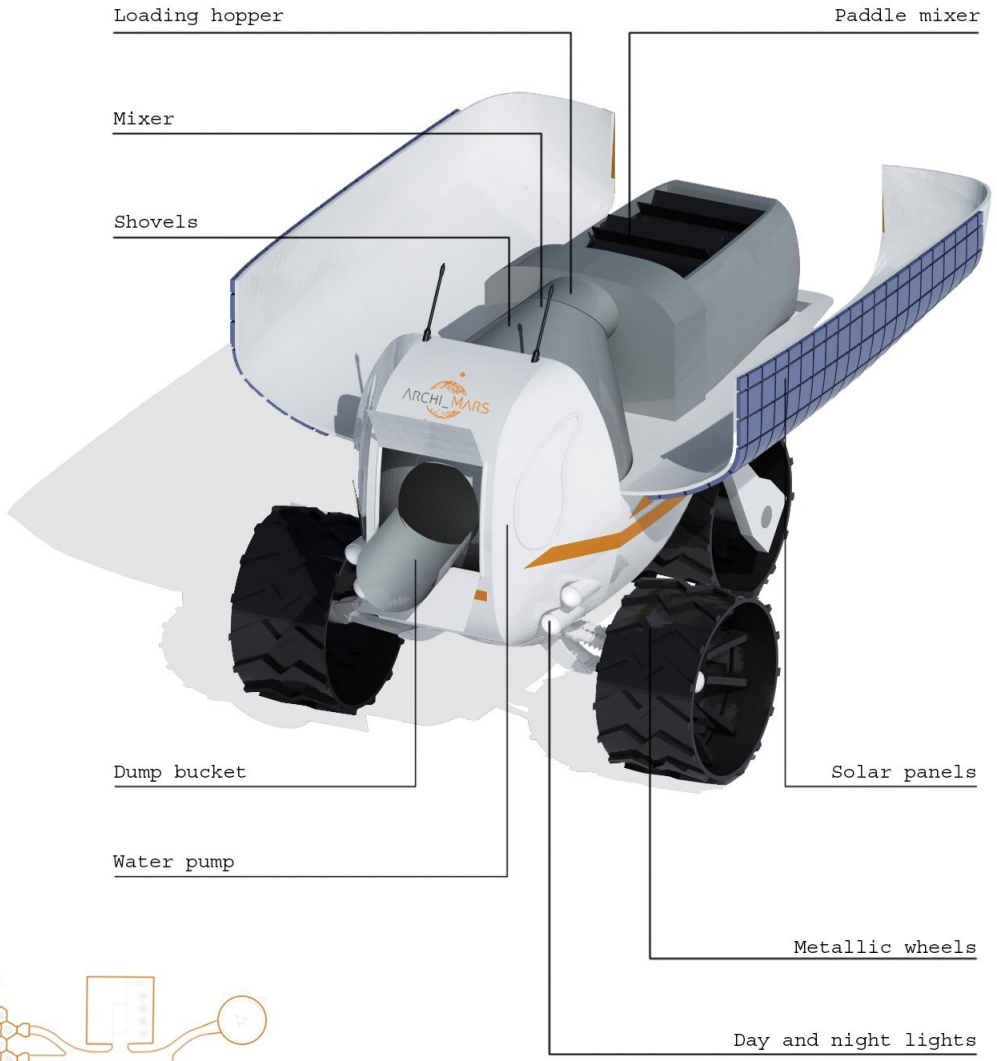
Bee Escavator



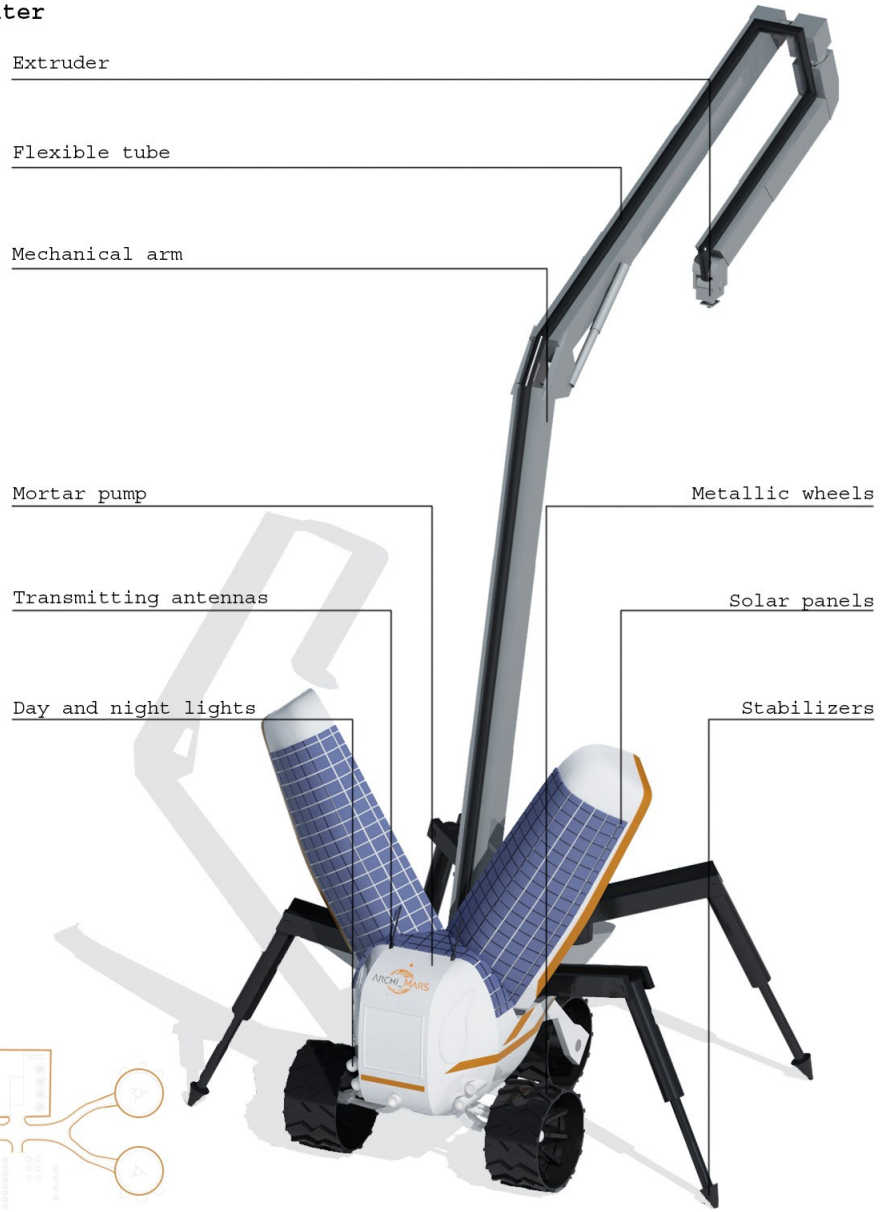
Bee Transporter



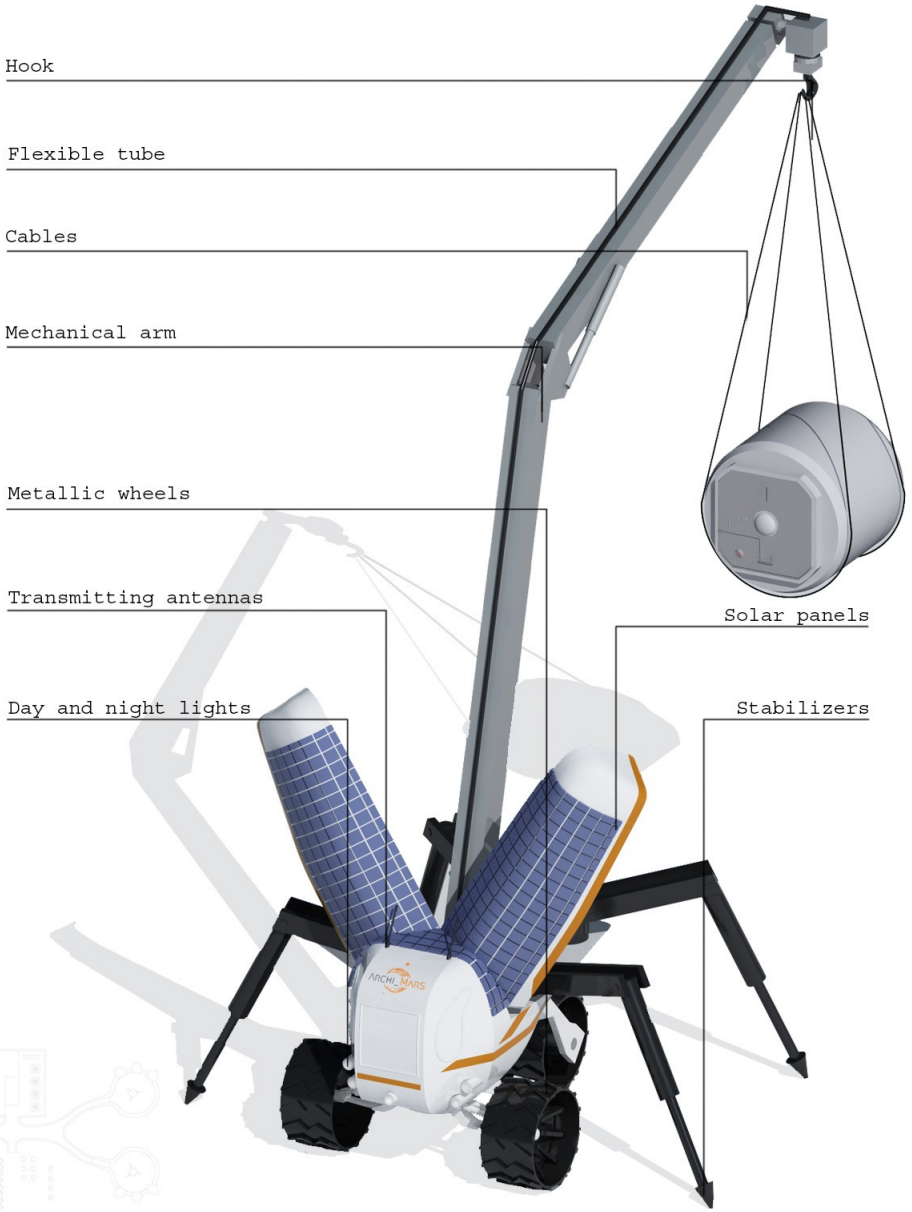
Bee Processor



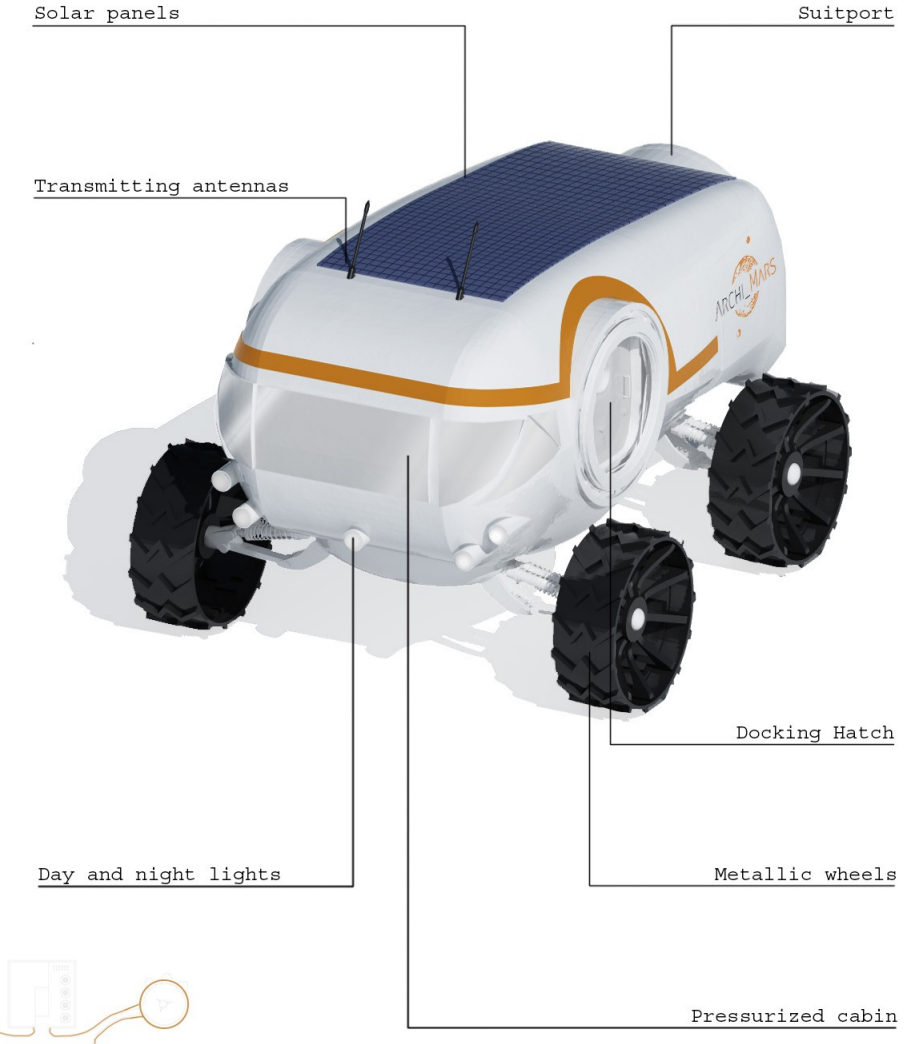
Bee 3D Printer



Bee Lifter



Archimars Pressurized Rover



Starship

Spider Explorer

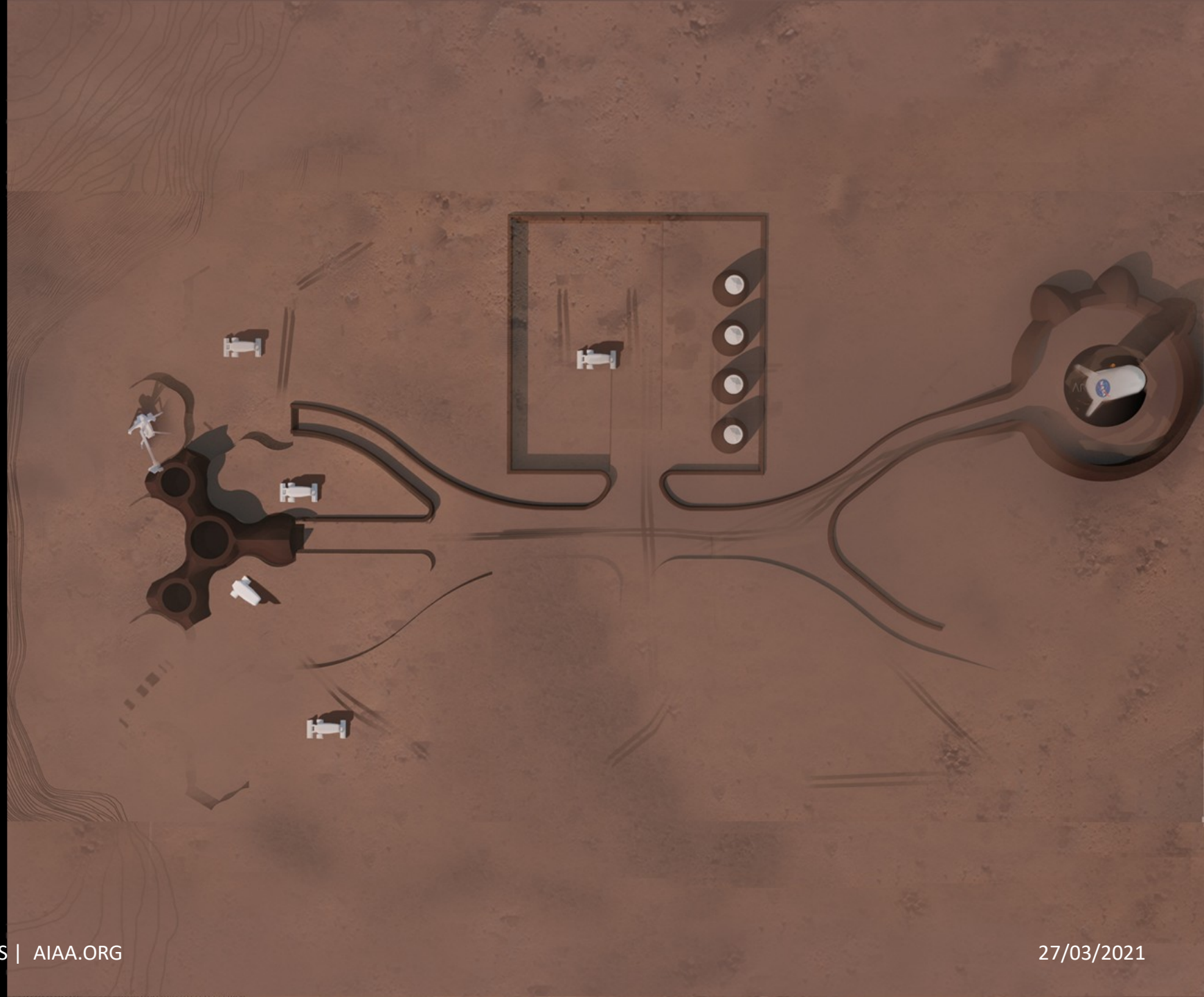
Bee Flattener

Bee Escavator

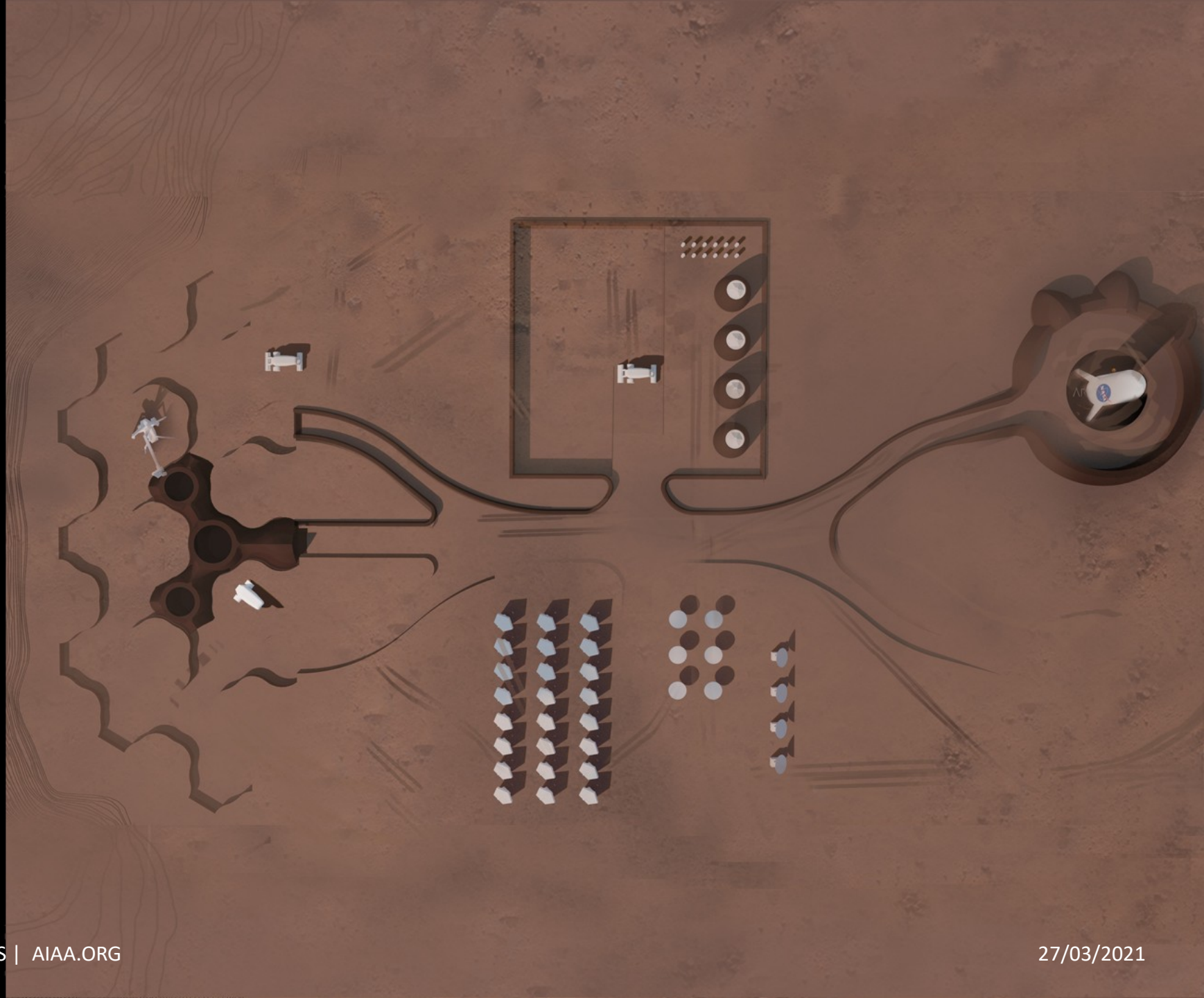
Bee Transporter

Bee Processor

Bee 3D Printer

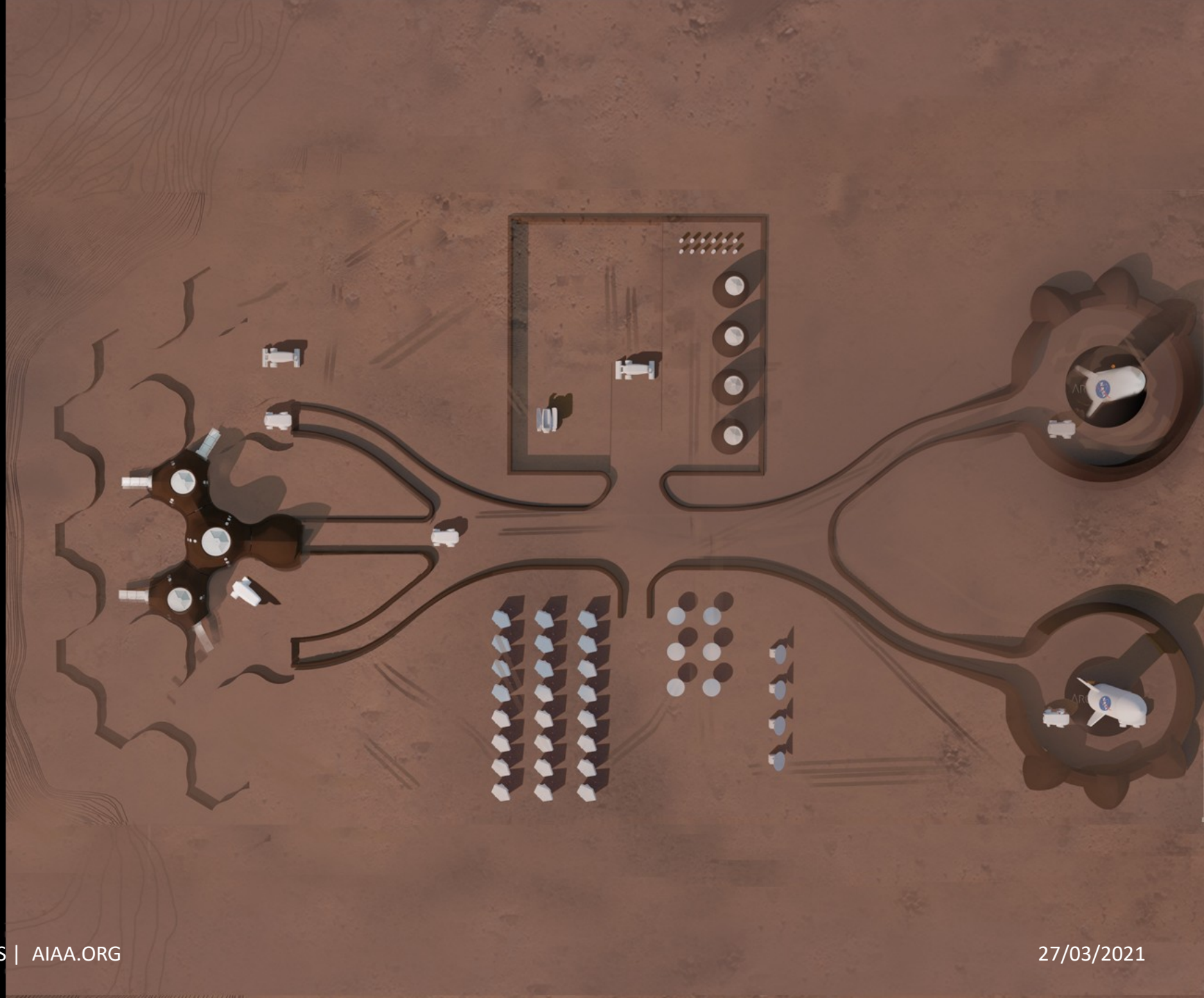


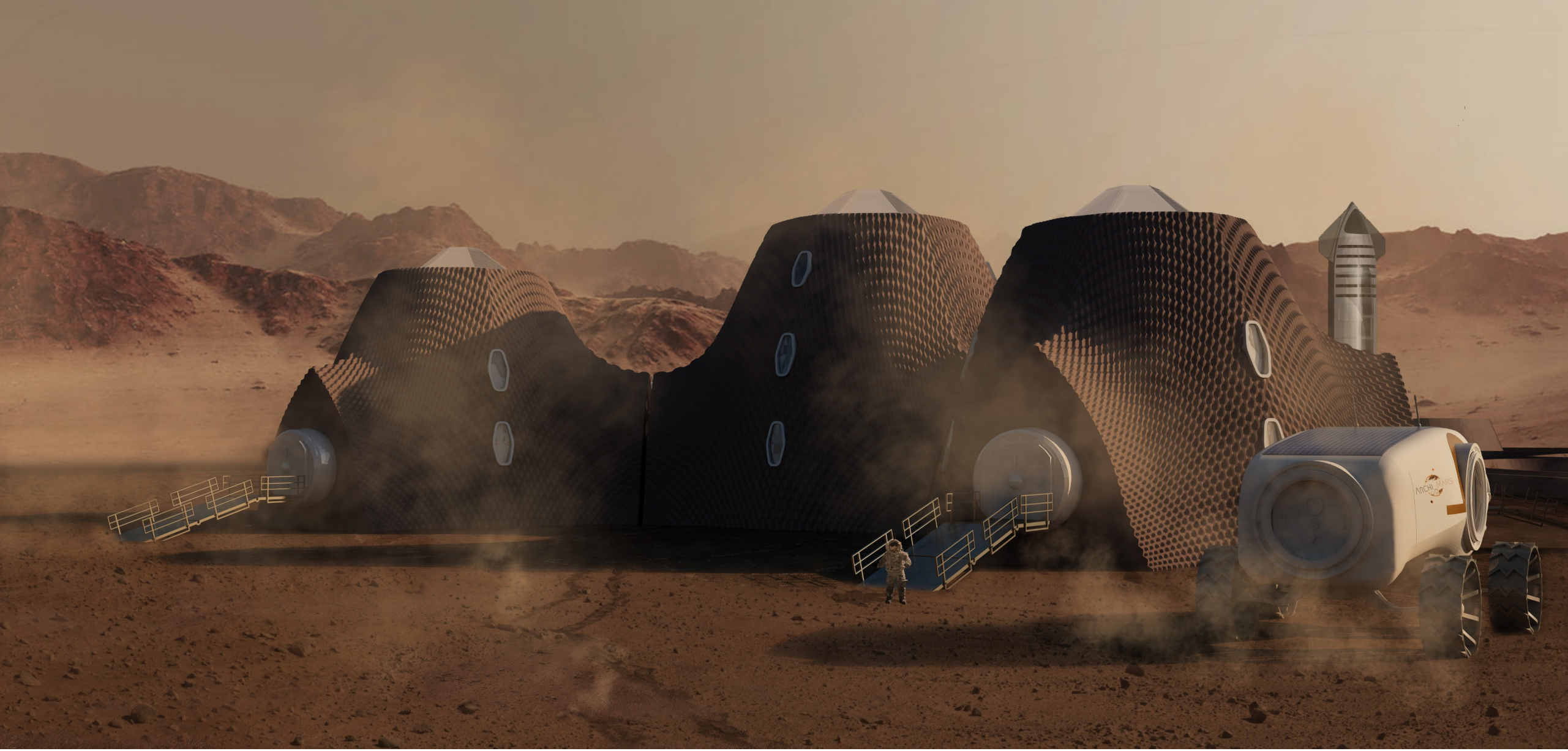
Bee Lifter



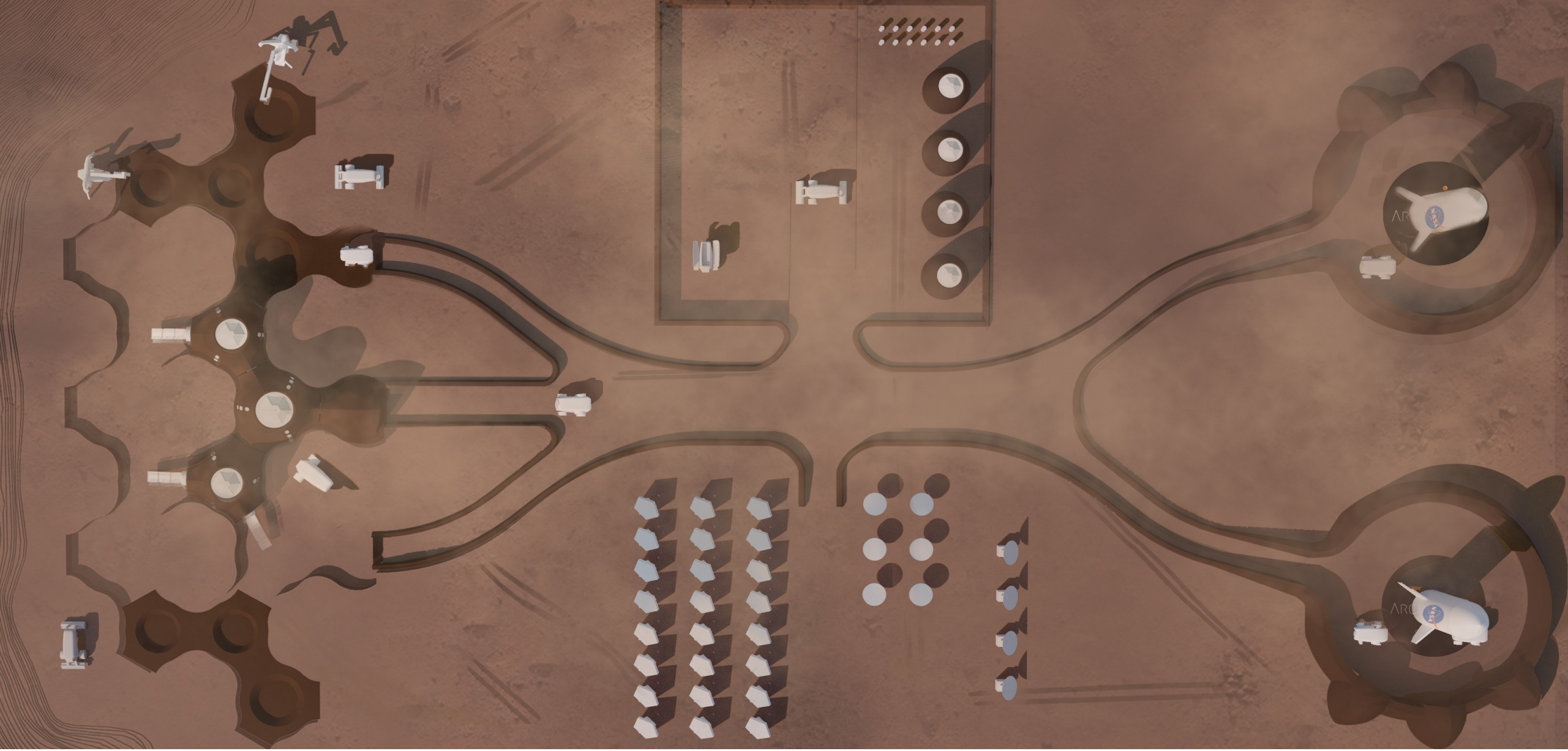
SLS Block 1B

Archimars Pressurized Rover

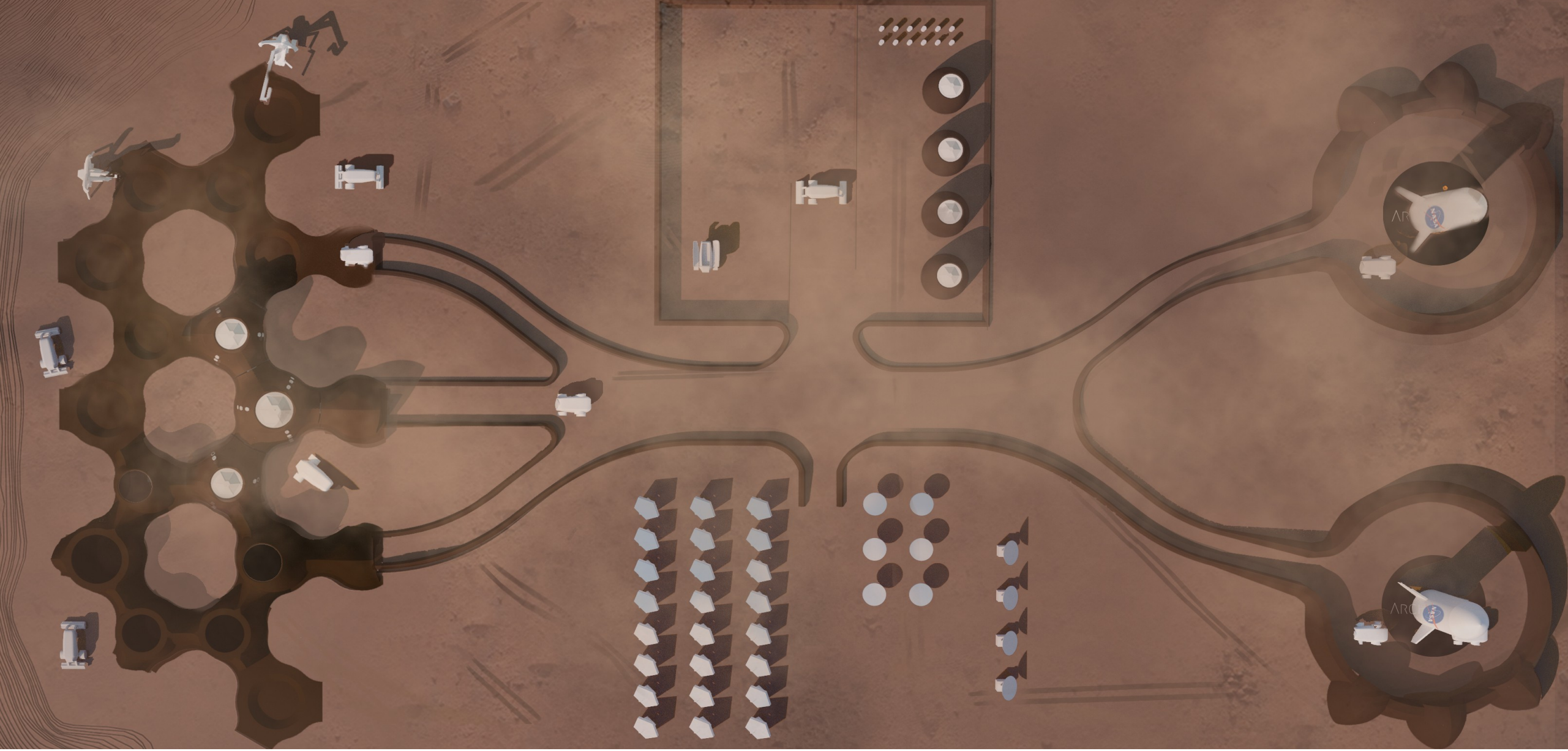




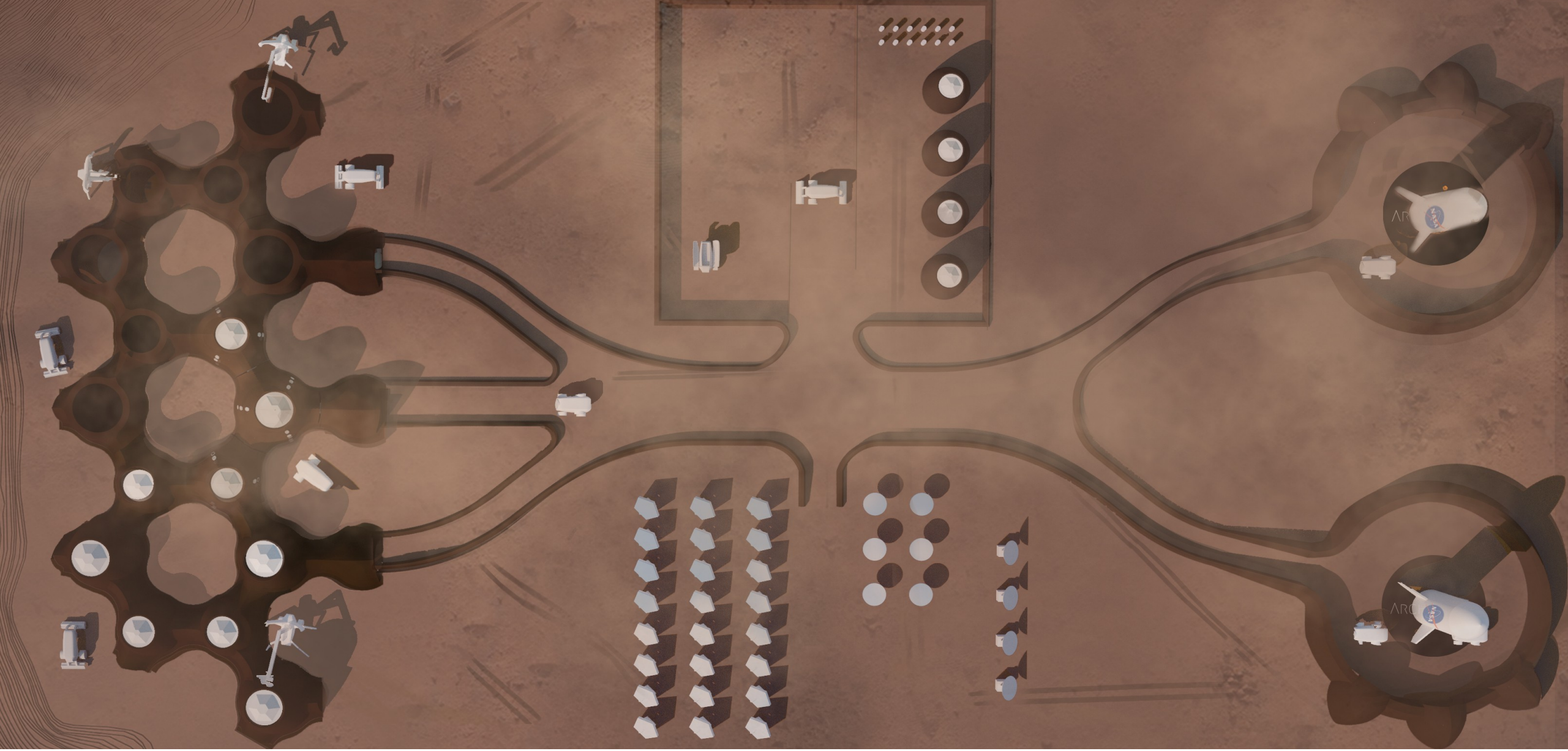
External view of the habitat



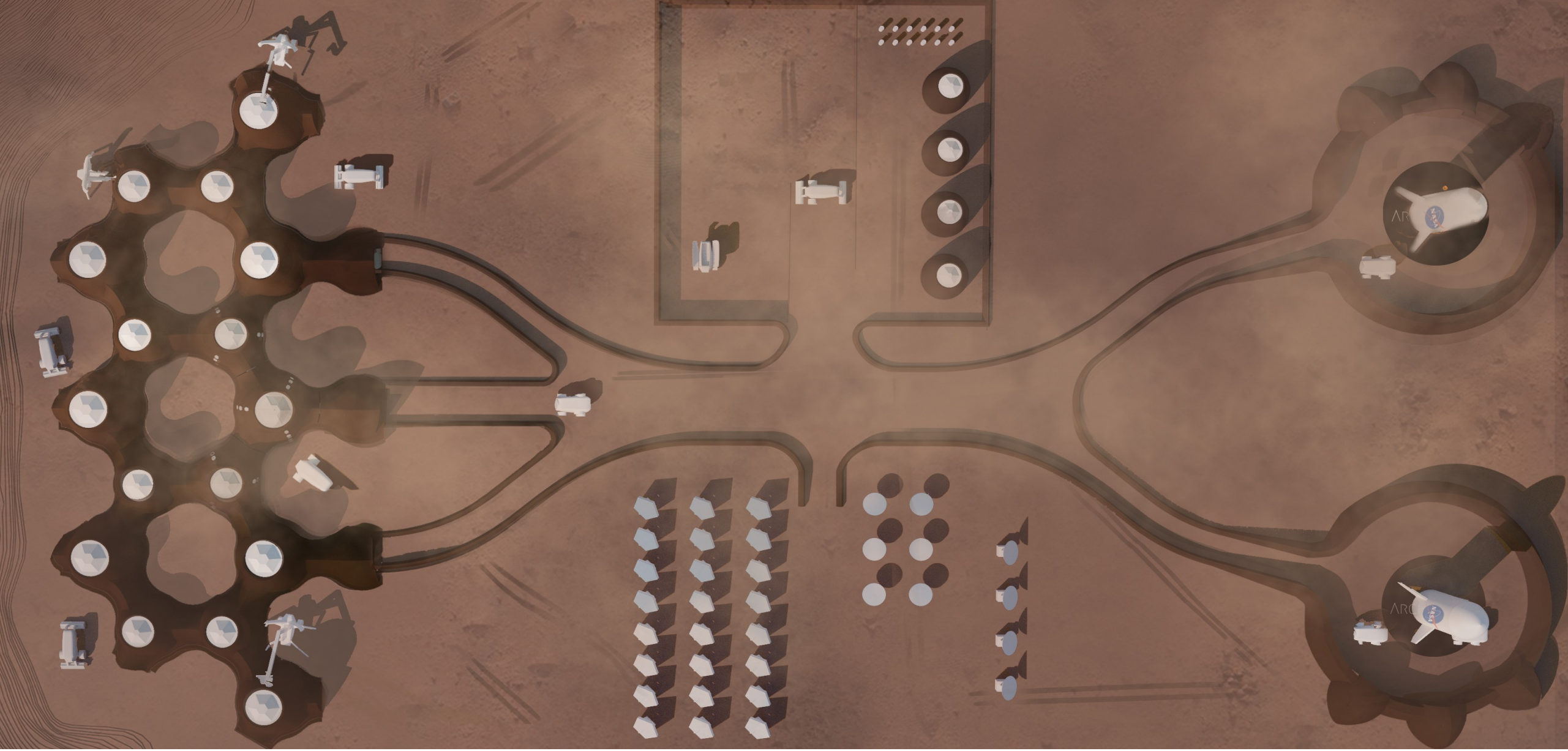
First phase of expansion of the settlement



Second phase of expansion of the settlement

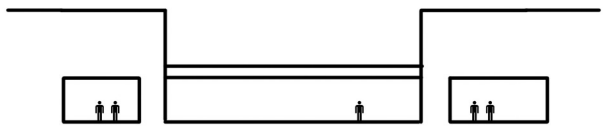


Third phase of expansion of the settlement



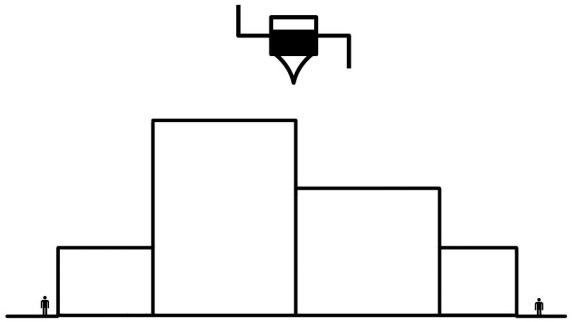
Fourth phase of expansion of the settlement

EXCAVATED



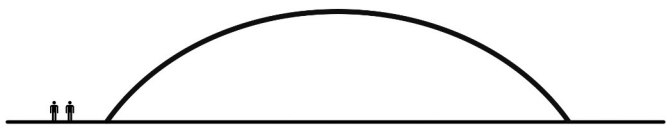
Resistant to radiation	✓
Thermal insulation	✓
Pressurization	✓
Sunlight	✗
Functional space	✓
Comfortable space	✗

3D PRINTED



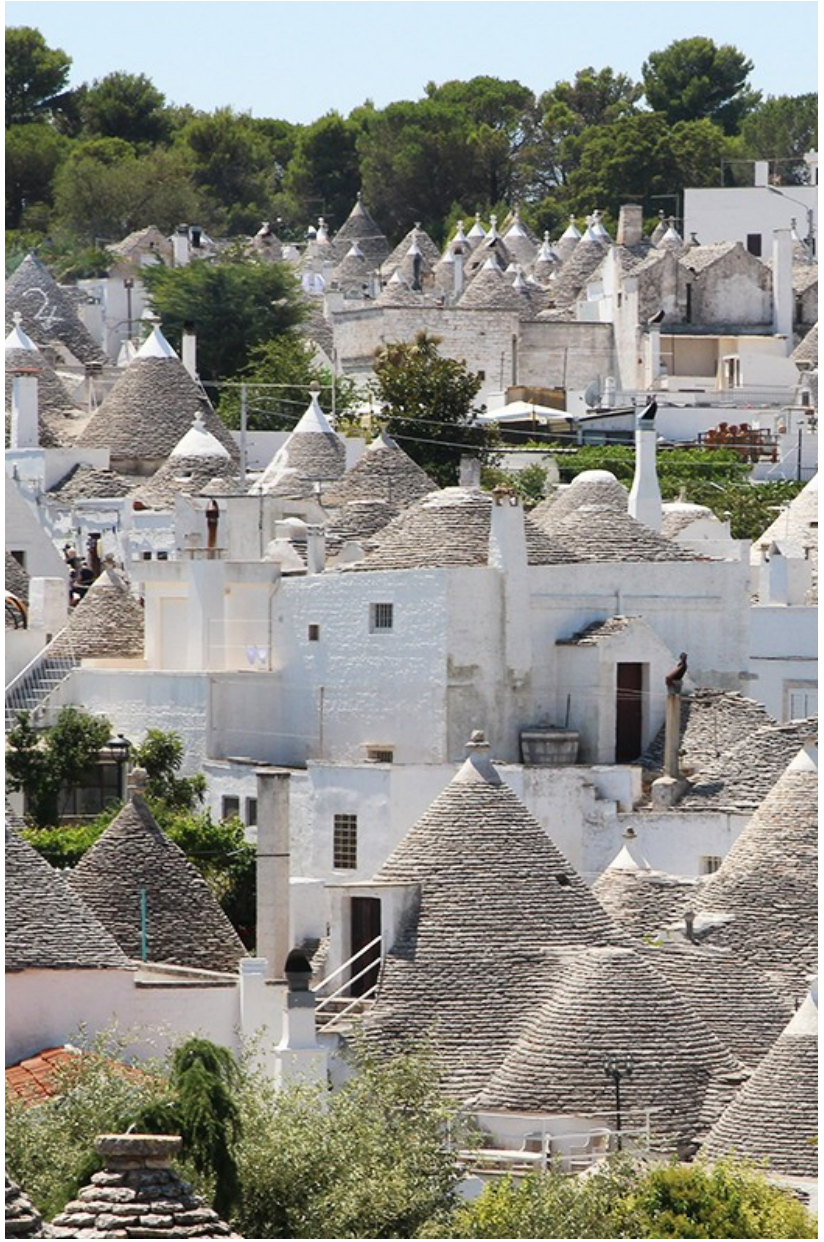
Resistant to radiation	✓
Thermal insulation	✓
Pressurization	✗
Sunlight	✓
Functional space	✓
Comfortable space	✓

INFLATABLE

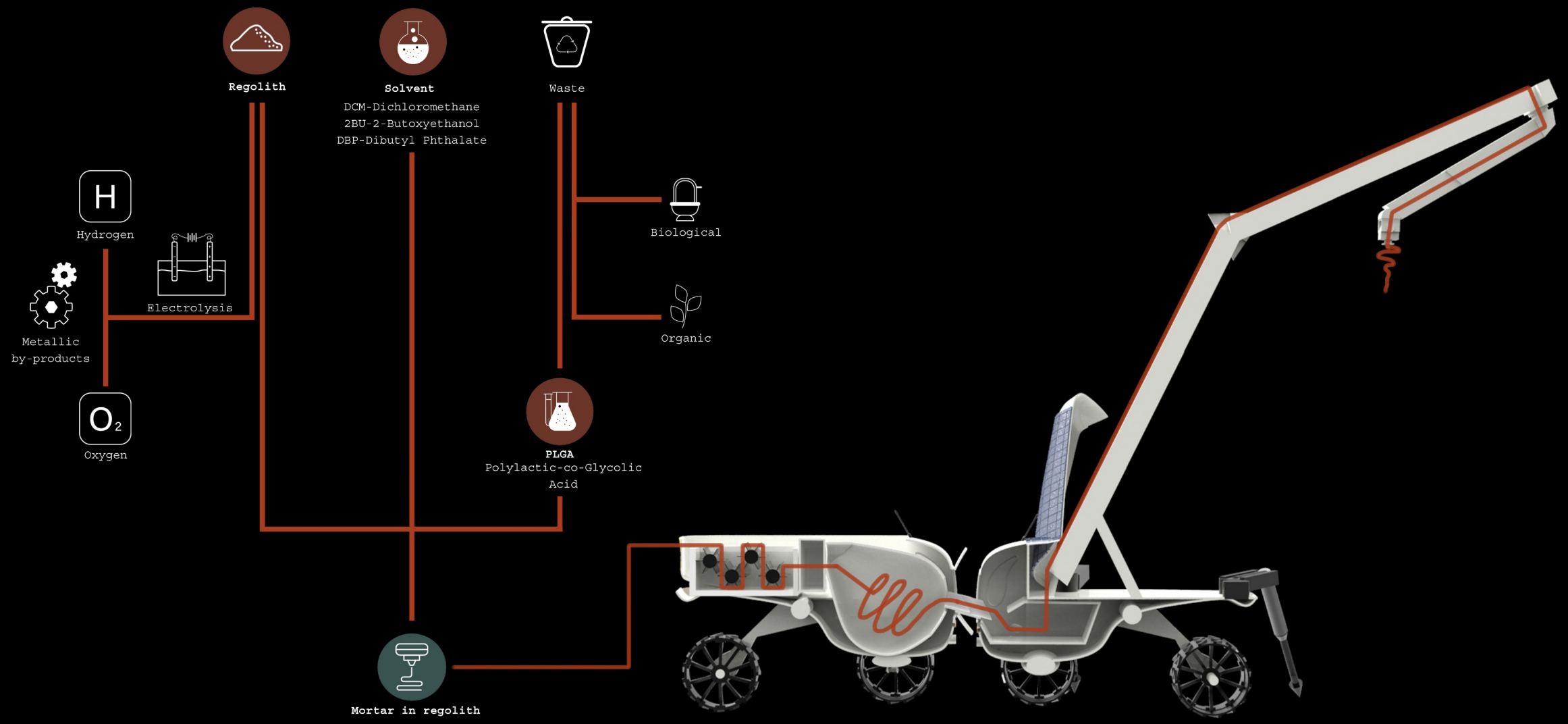


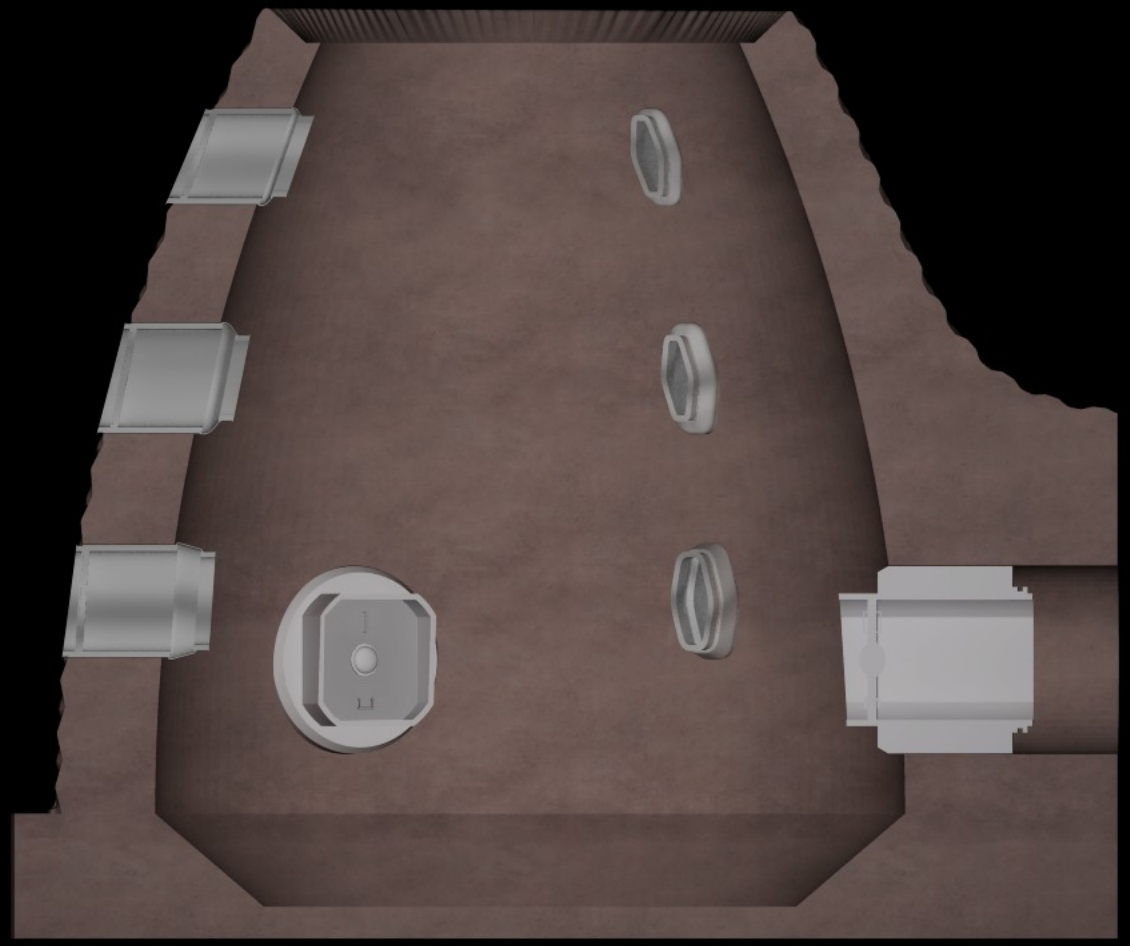
Resistant to radiation	✗
Thermal insulation	✓
Pressurization	✓
Sunlight	✓
Functional space	✗
Comfortable space	✓

Nubian domes, Bamako

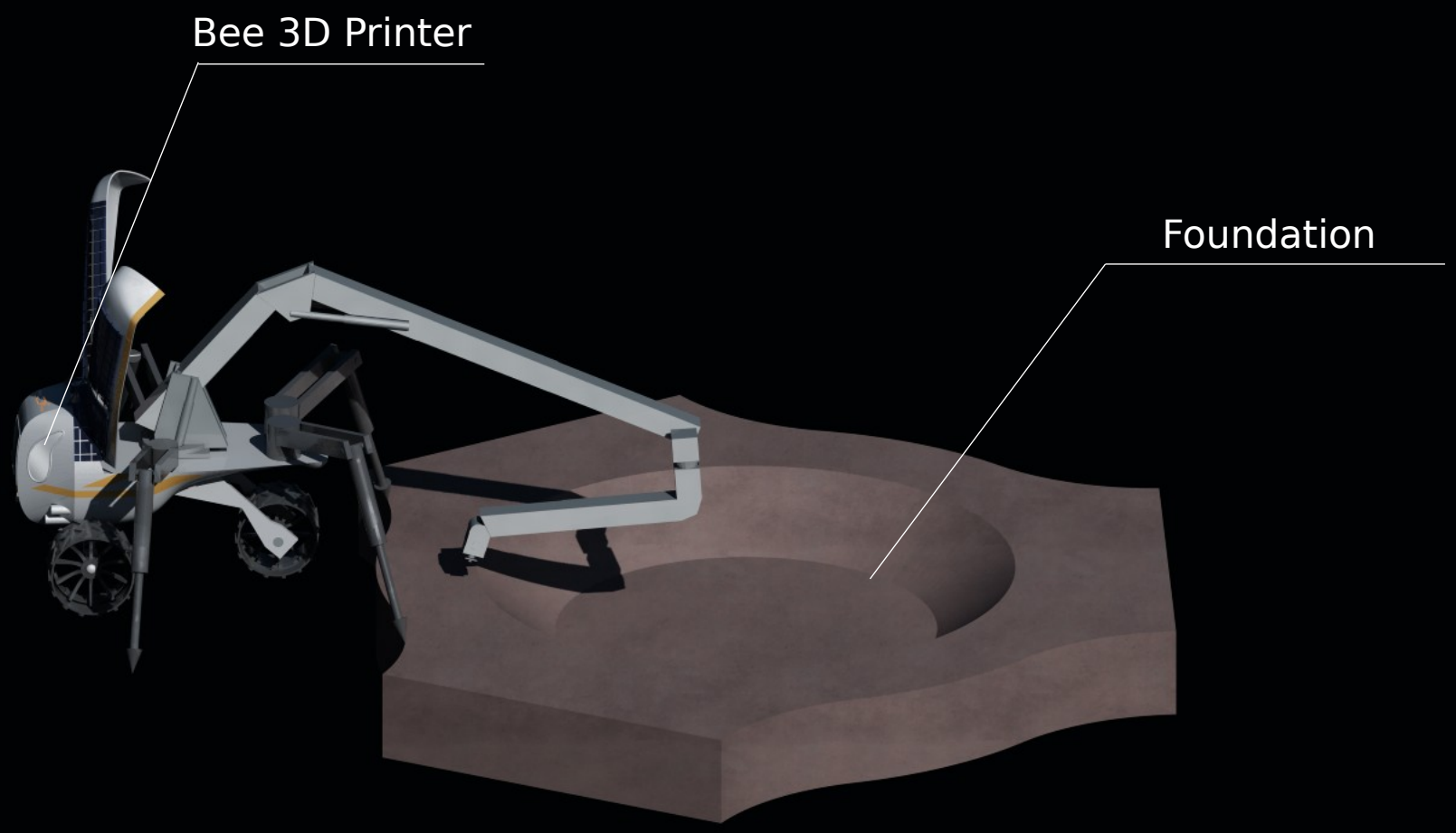


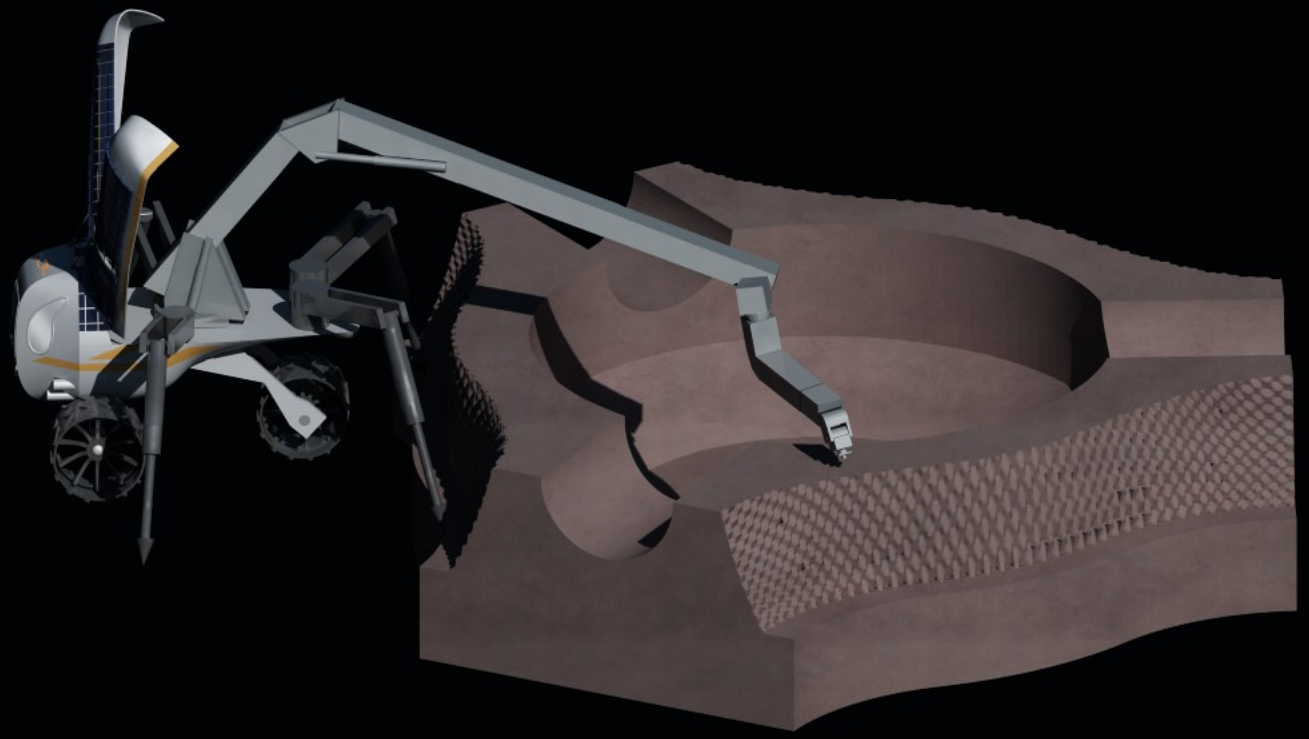
Trulli, Alberobello, Italy

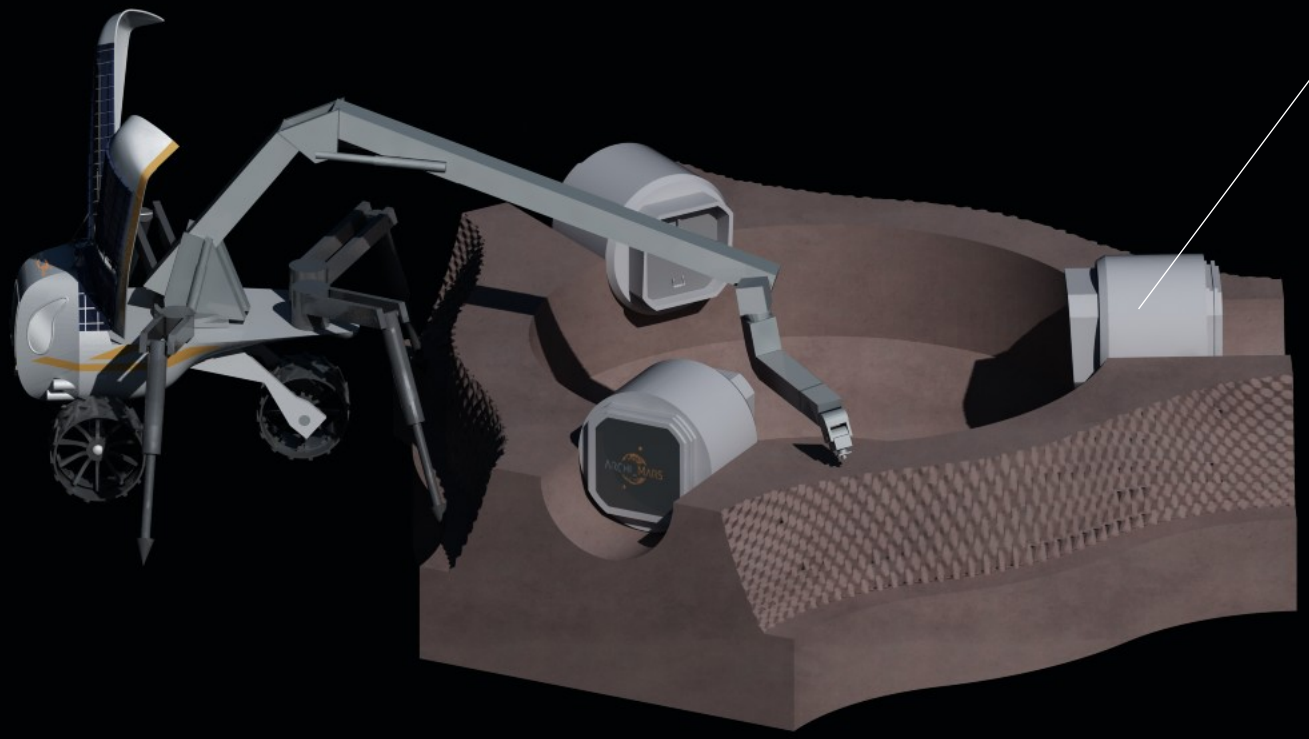

Regolith
Solvent
DCM-Dichloromethane
2BU-2-Butoxyethanol
DBP-Dibutyl Phthalate
Waste
H
Hydrogen
Electrolysis
Biological
Organic
Metallic
by-products
O2
Oxygen
PLGA
Polylactic-co-Glycolic
Acid
Mortar in regolith

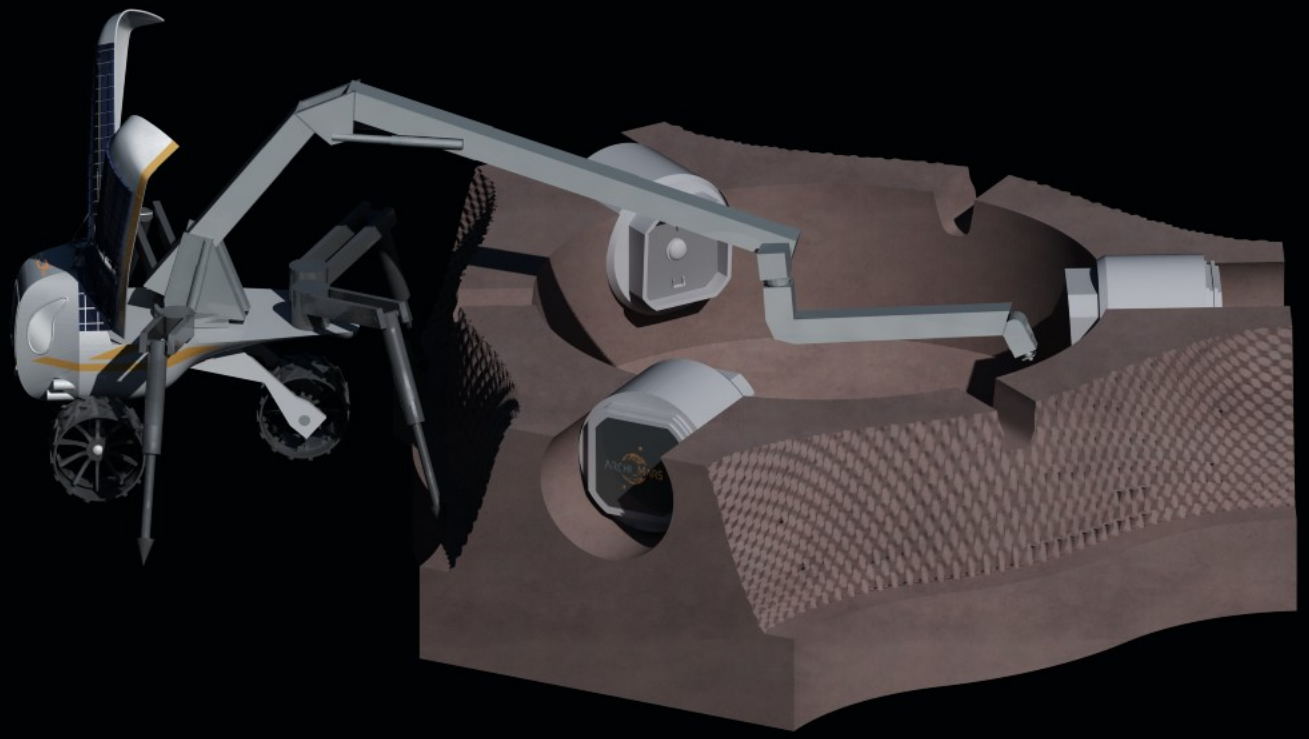


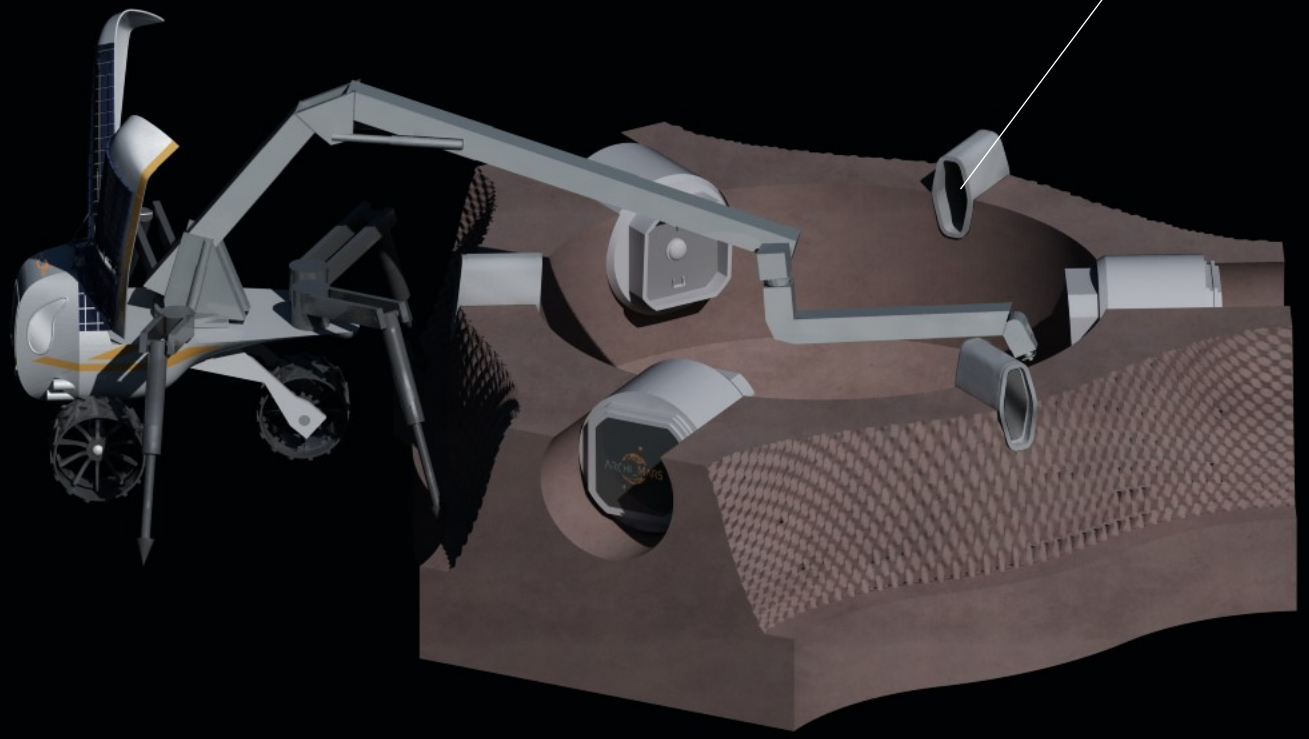
Section of the external structure

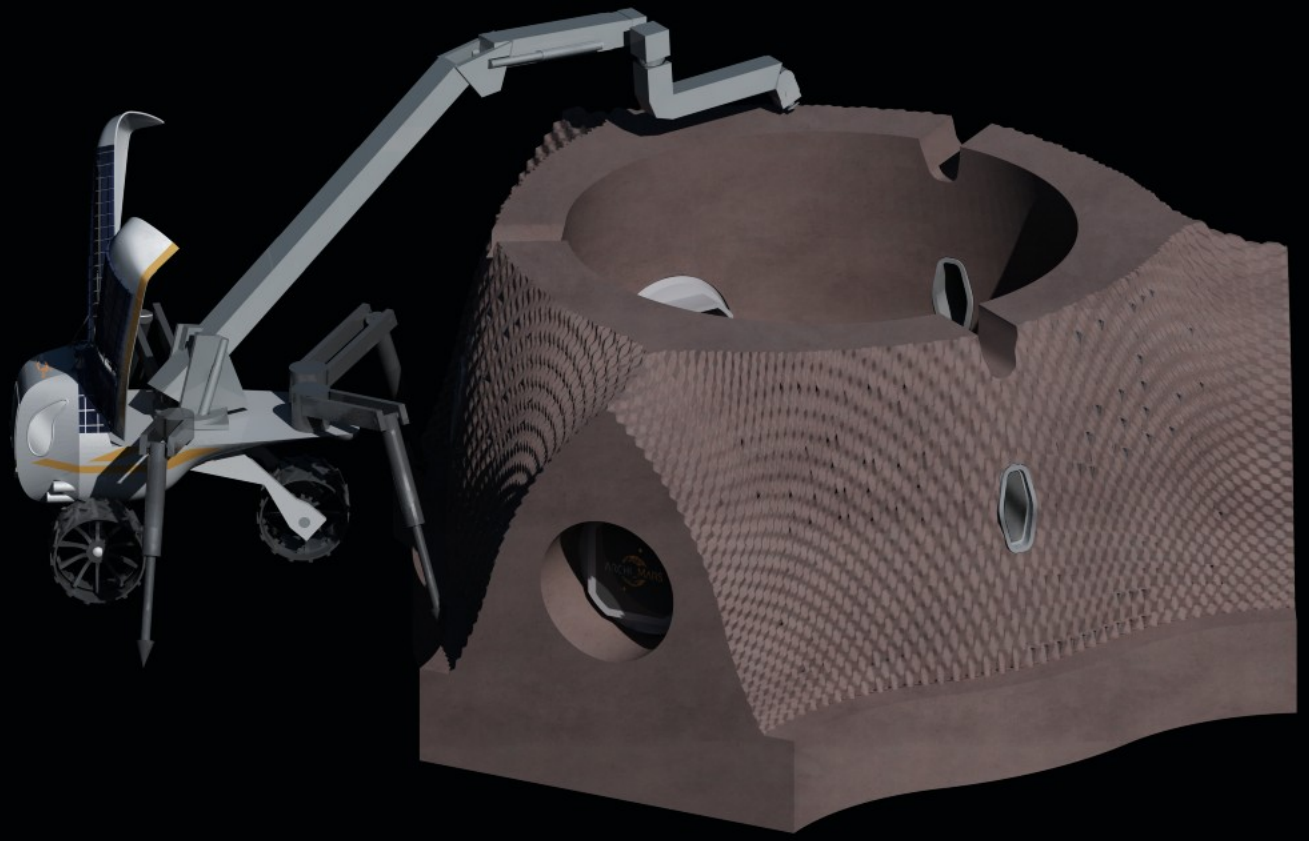

Bee 3D Printer
Foundation

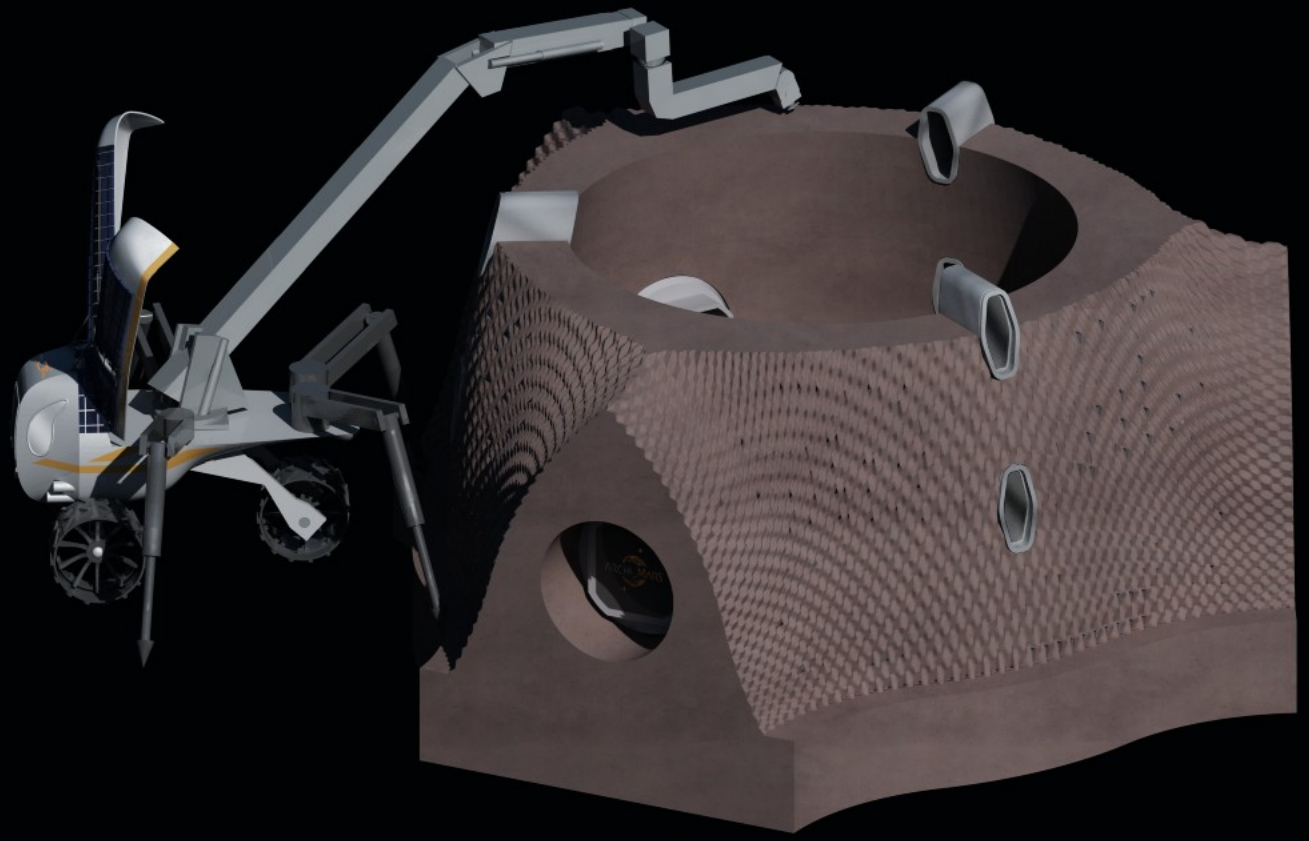


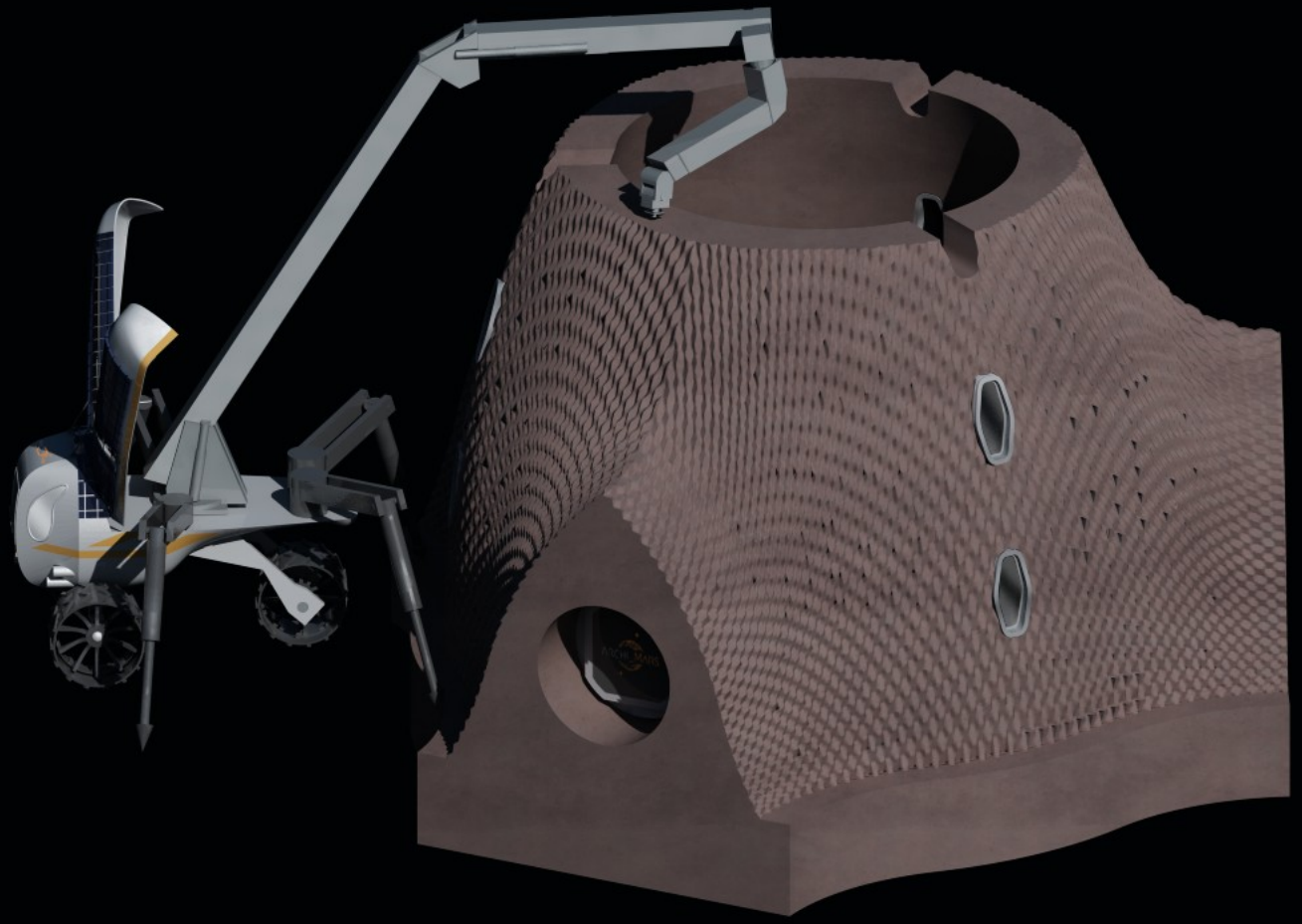

Undeployed airlock

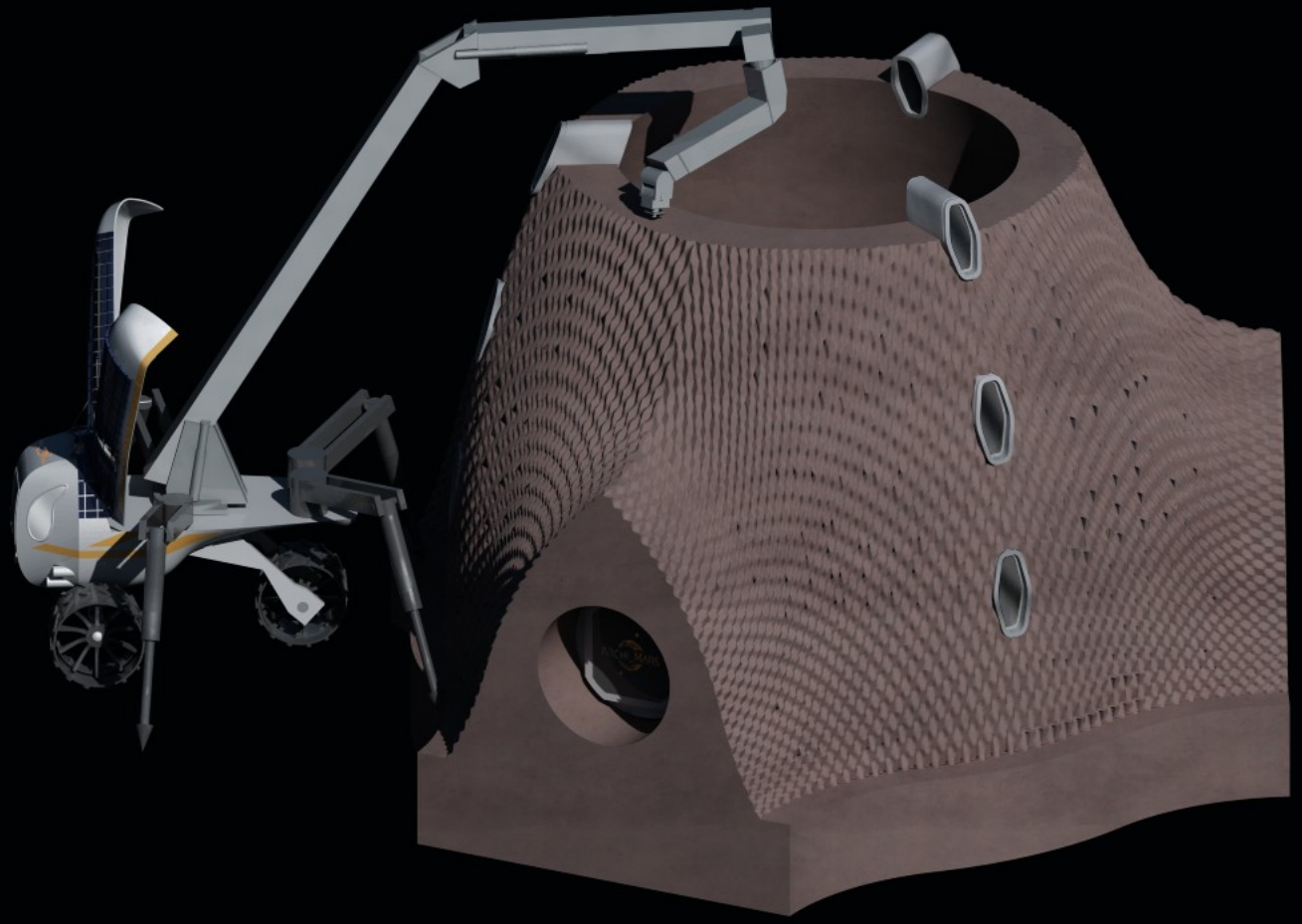


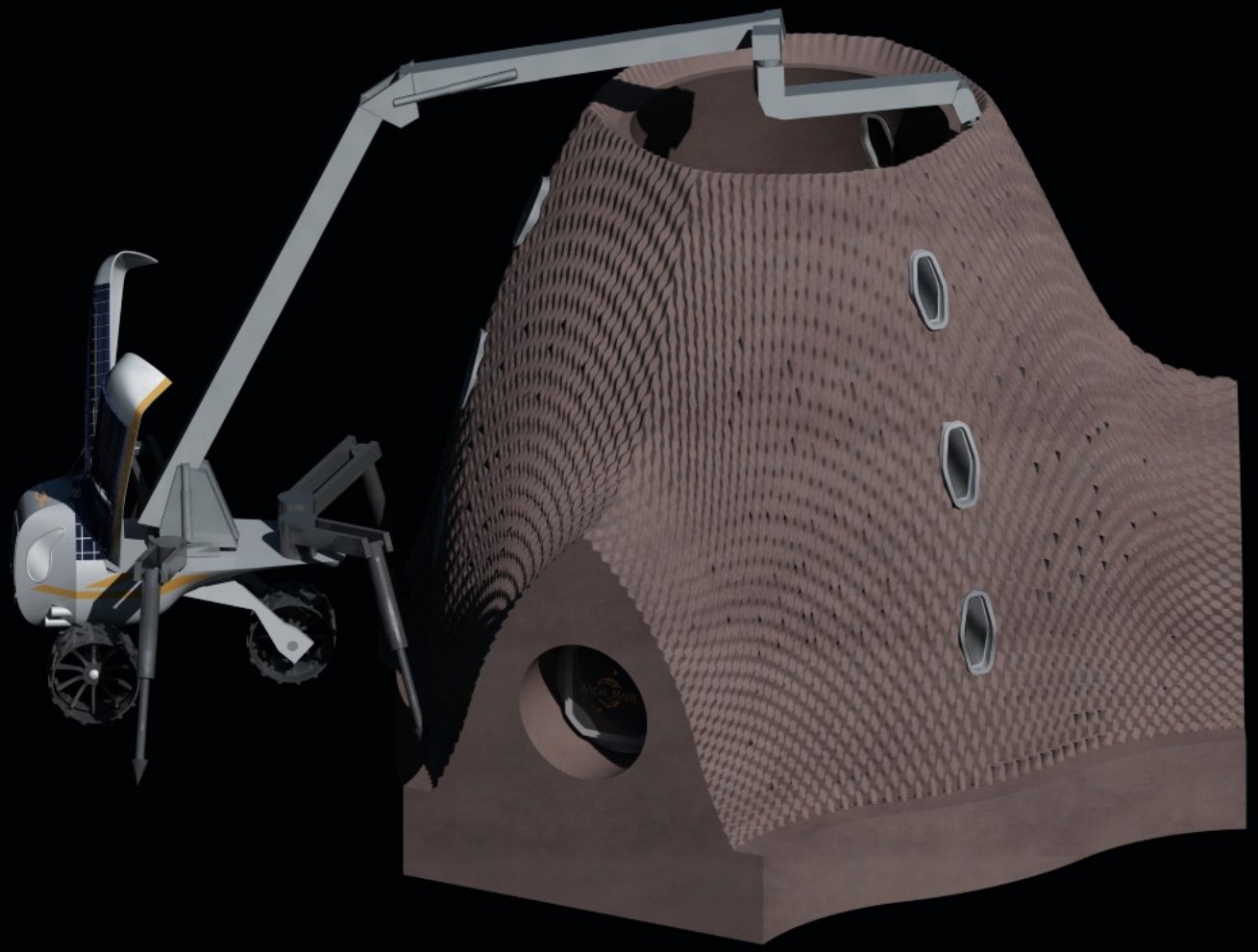

Windows



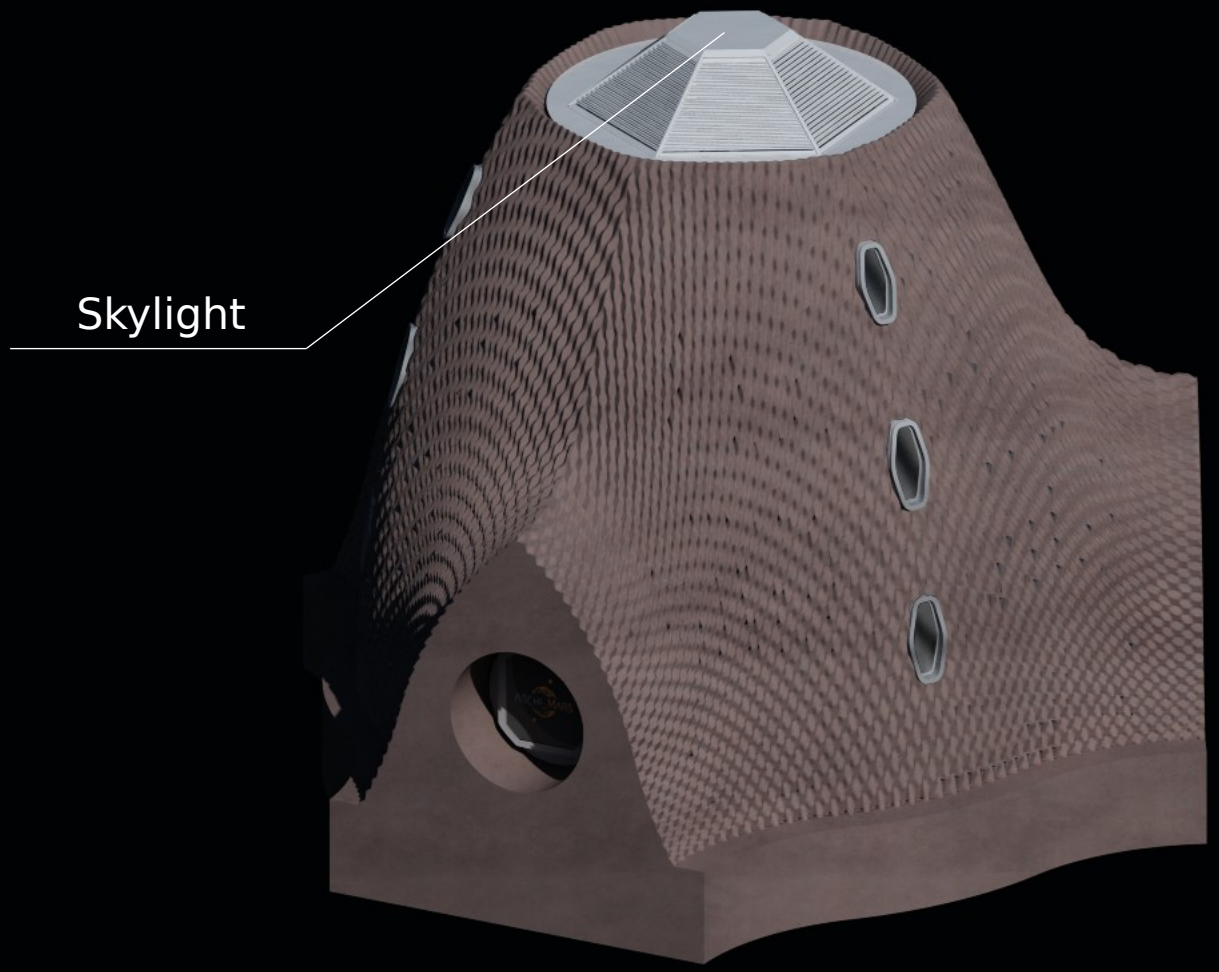


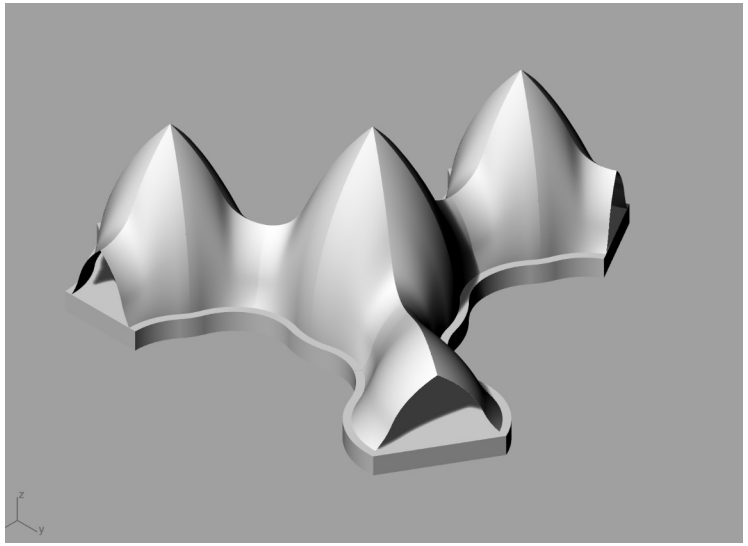


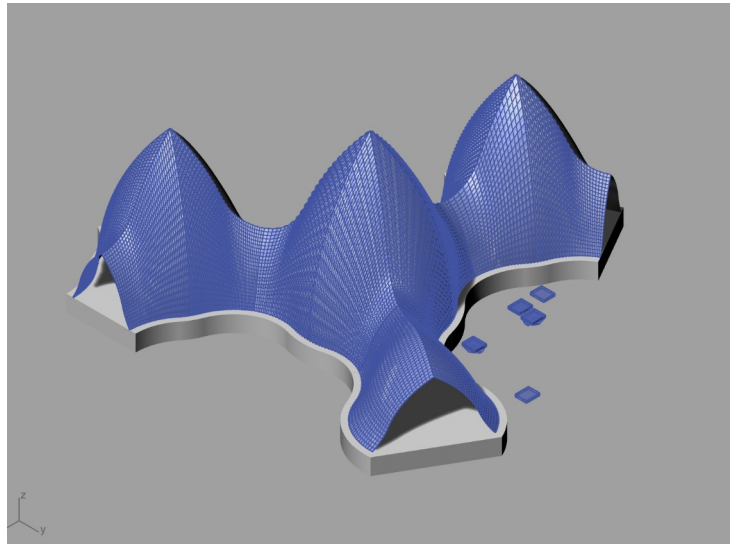


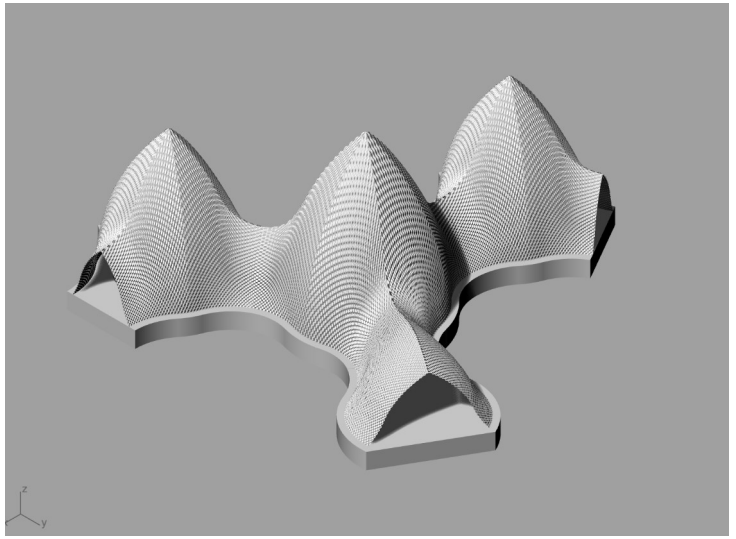


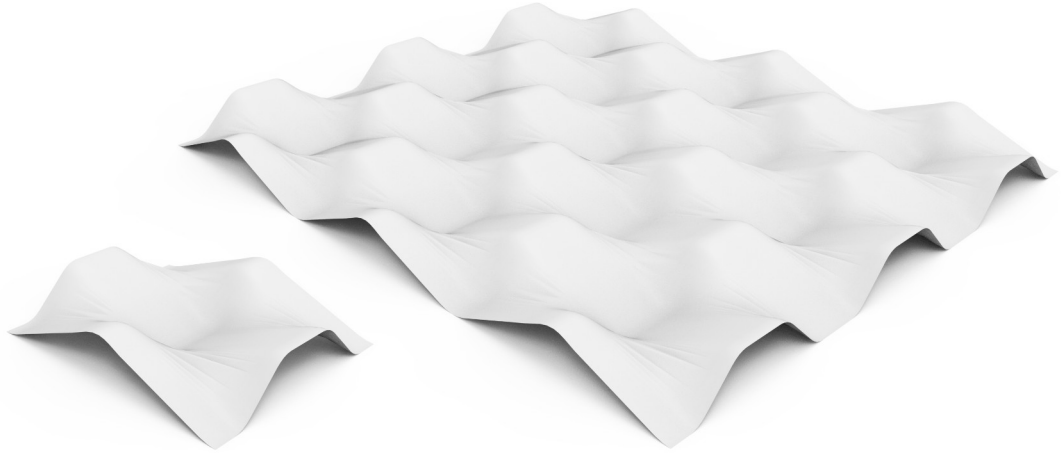

Undeployed internal module

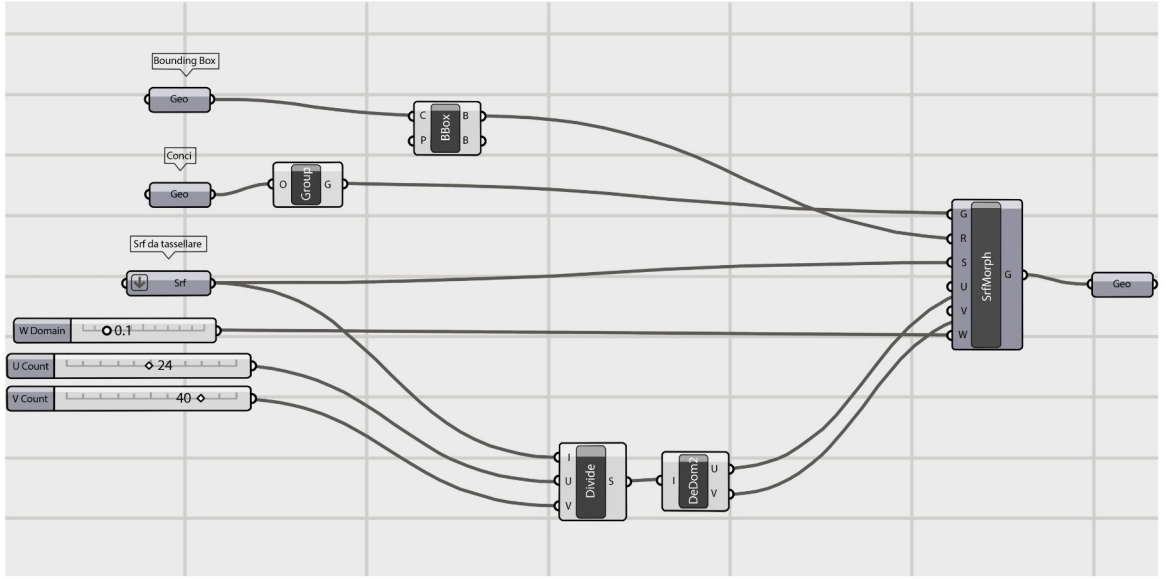

Skylight





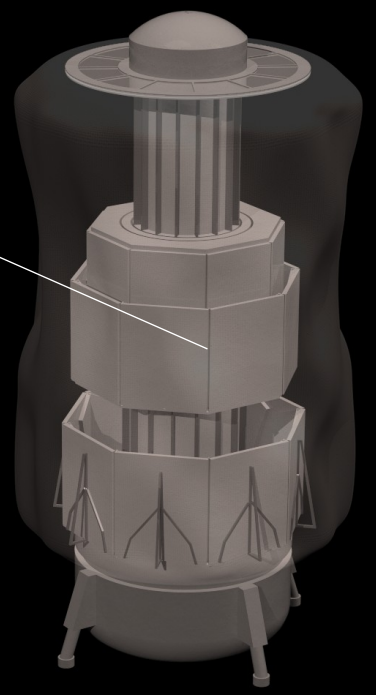


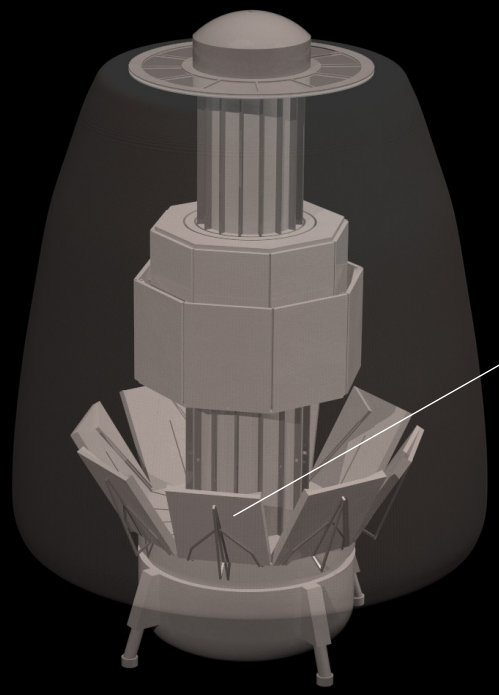



Bounding Box
Geo
BBox
C
P
B
B
Conci
Geo
Group
O
G
Srf da tassellare
Srf
W Domain
0.1
U Count
24
V Count
40
Divide
I
U
V
S
DeDom2
I
U
V
SrfMorph
G
R
S
U
V
W
G
Geo

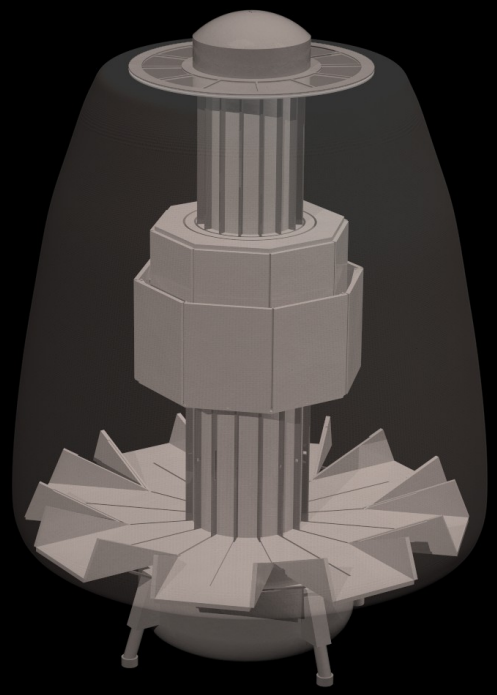

Undeployed internal module

Deployment of central core

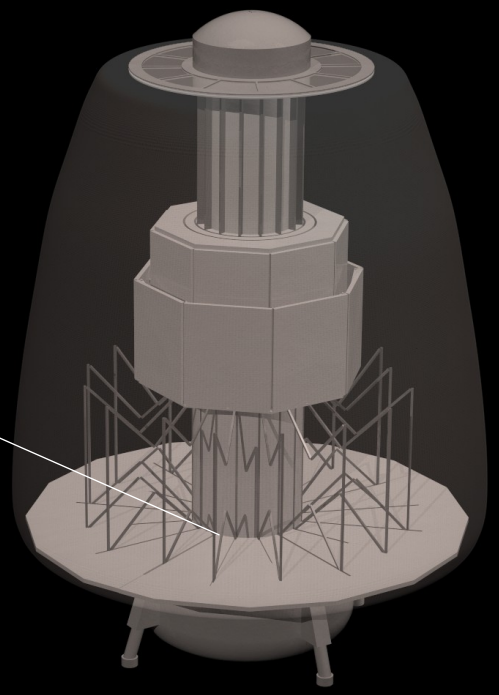


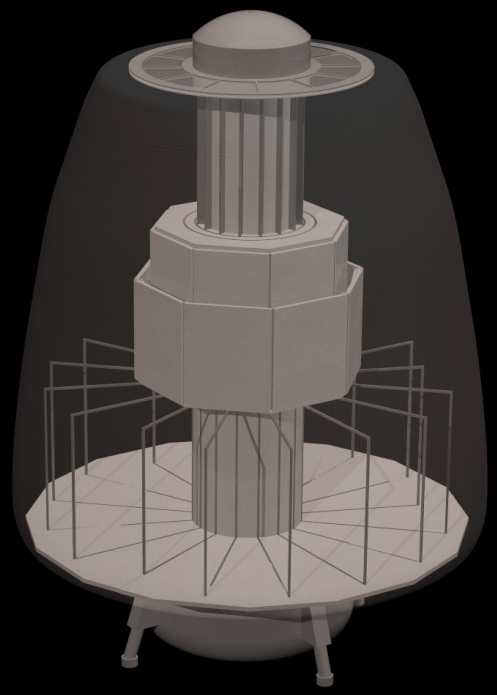


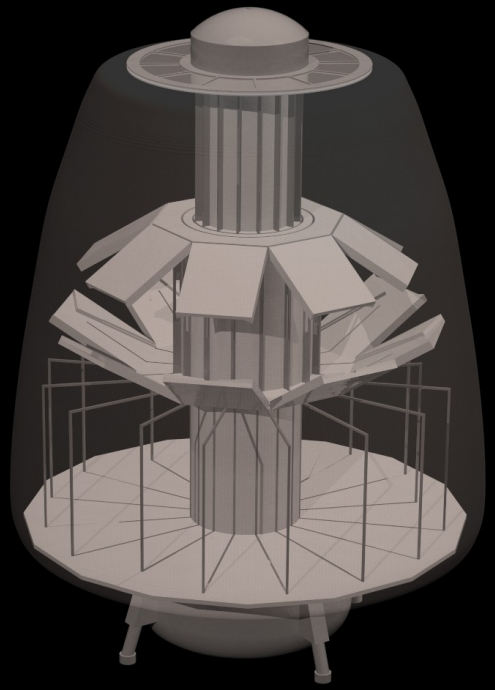
Deployment of the floor

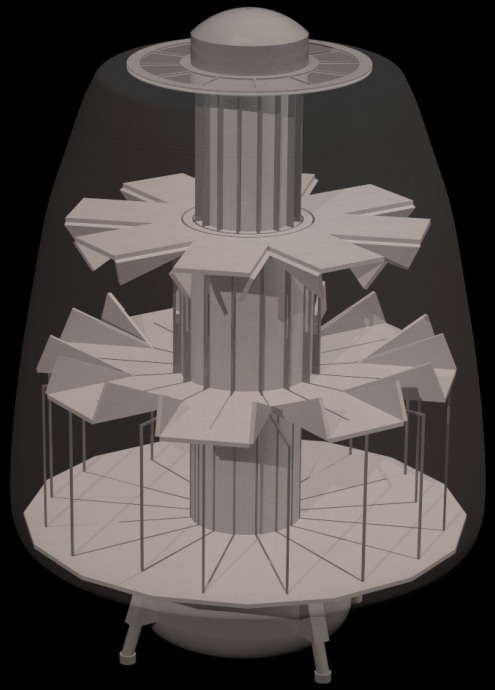


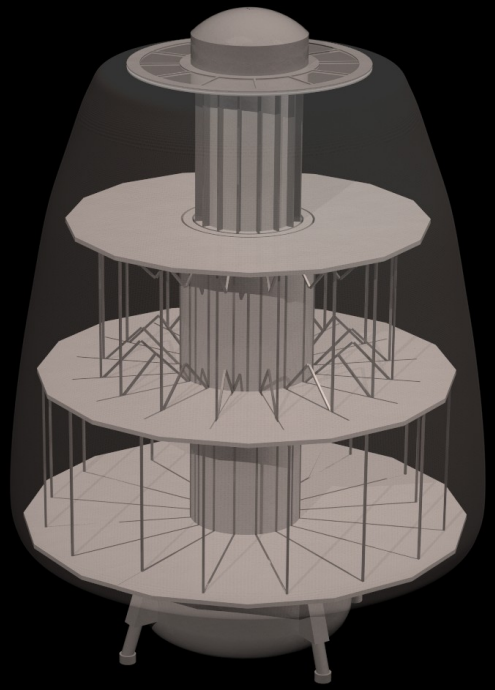
Deployment of pillars

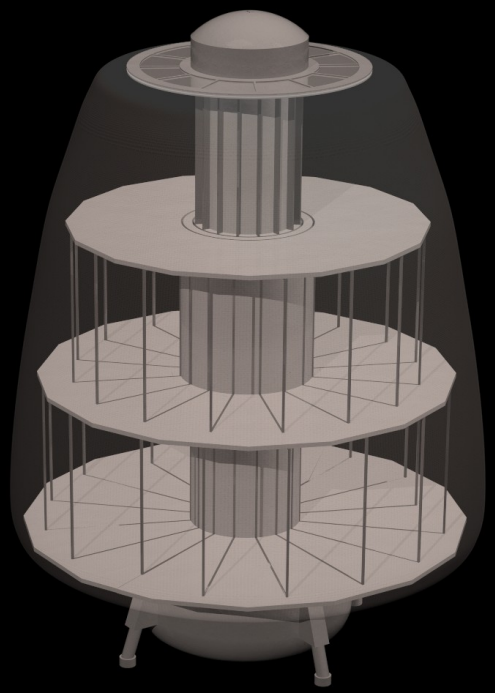


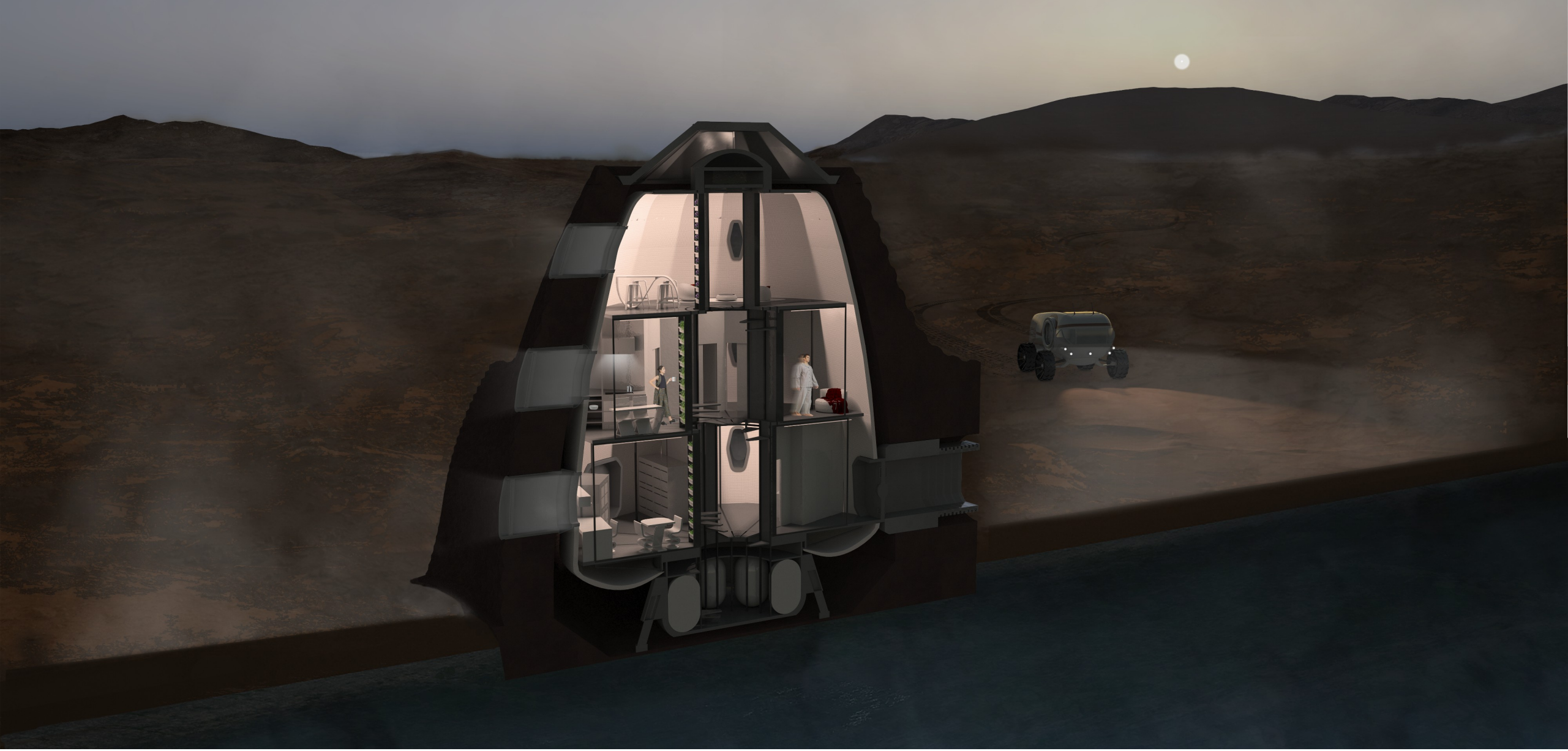




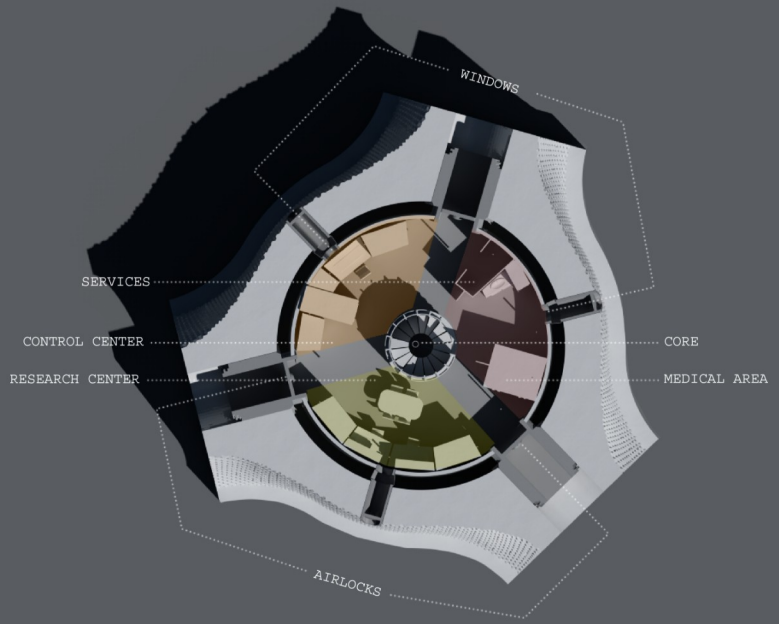


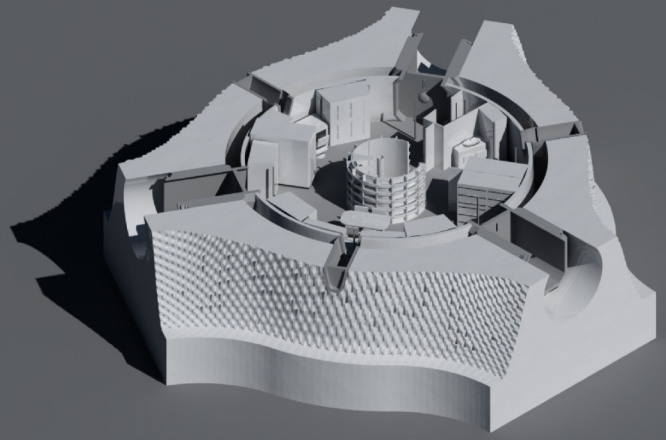


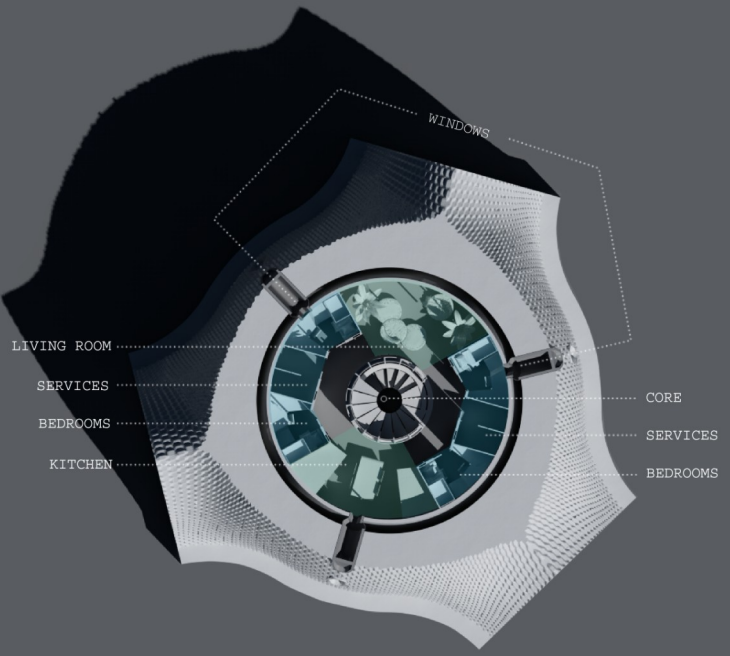


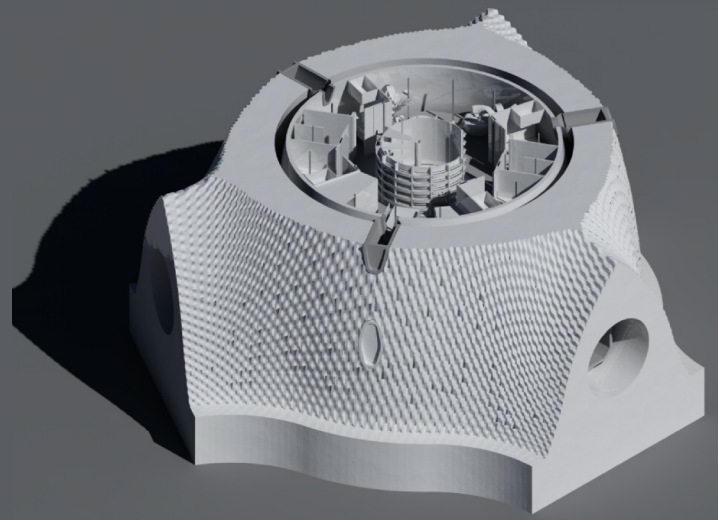


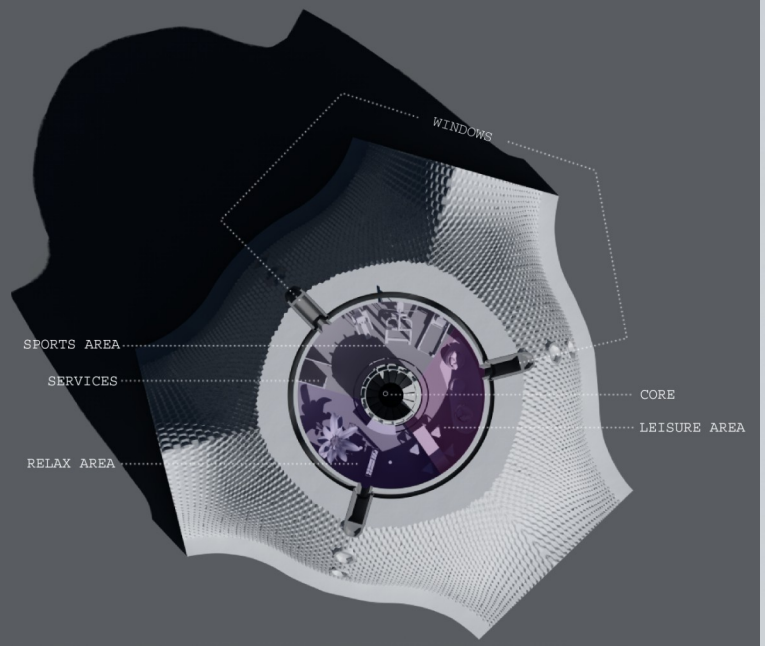
Section of the housing module

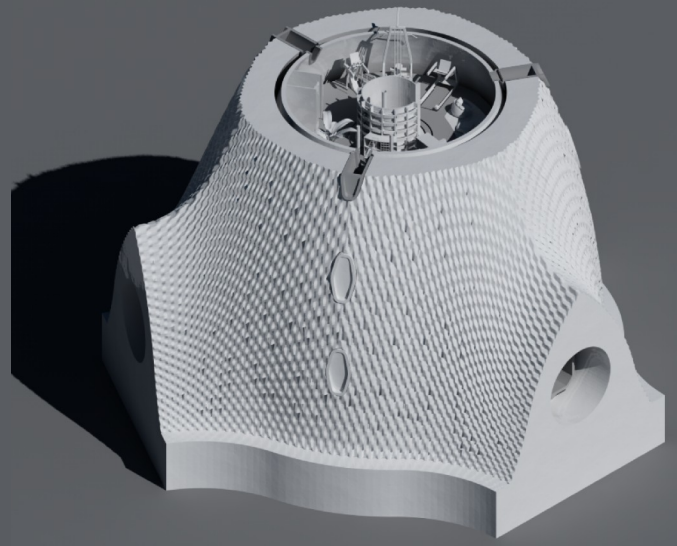

WINDOWS
SERVICES
CONTROL CENTER
RESEARCH CENTER
CORE
MEDICAL AREA
AIRLOCKS



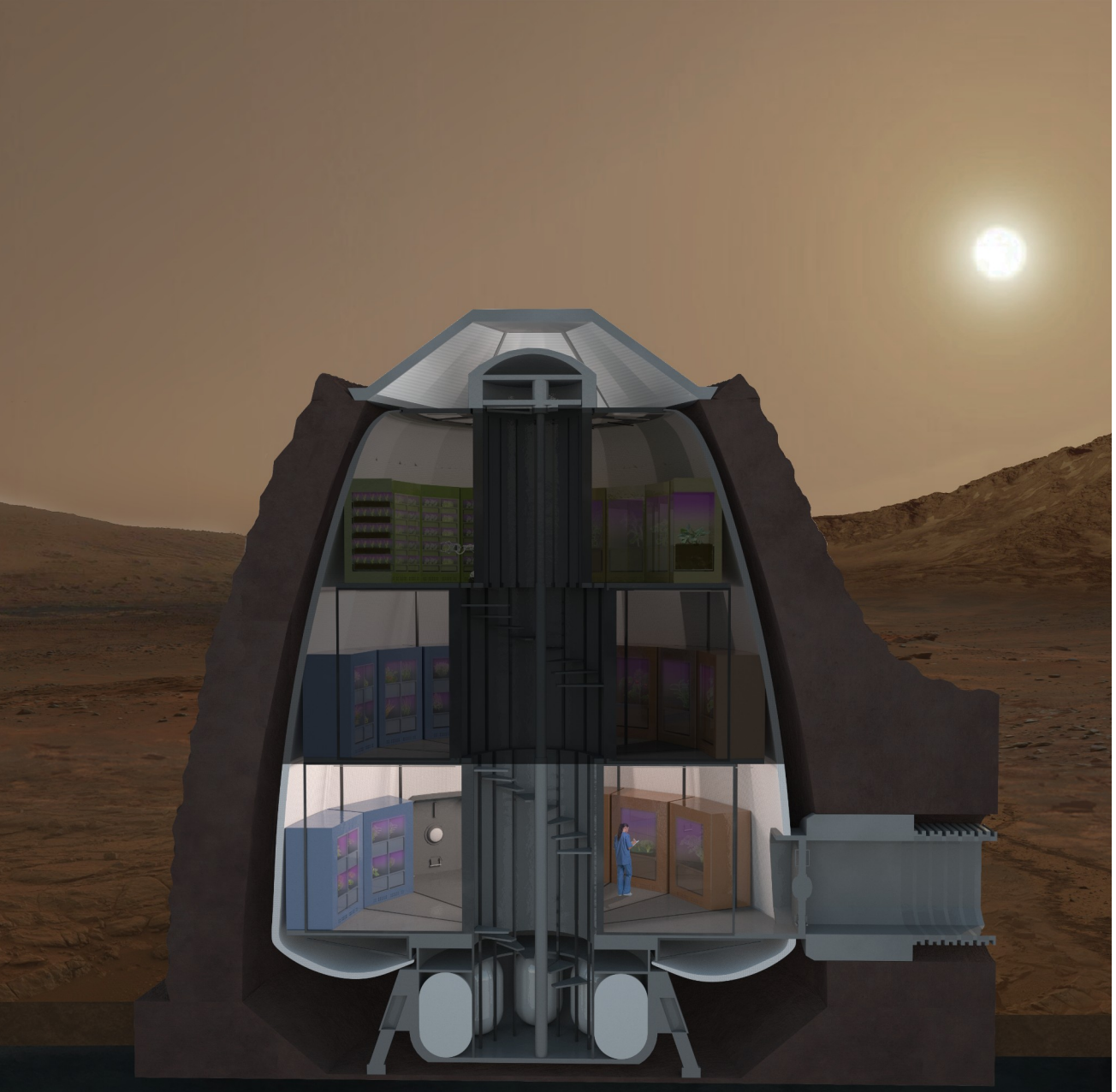

WINDOWS
LIVING ROOM
SERVICES
BEDROOMS
KITCHEN
CORE
SERVICES
BEDROOMS



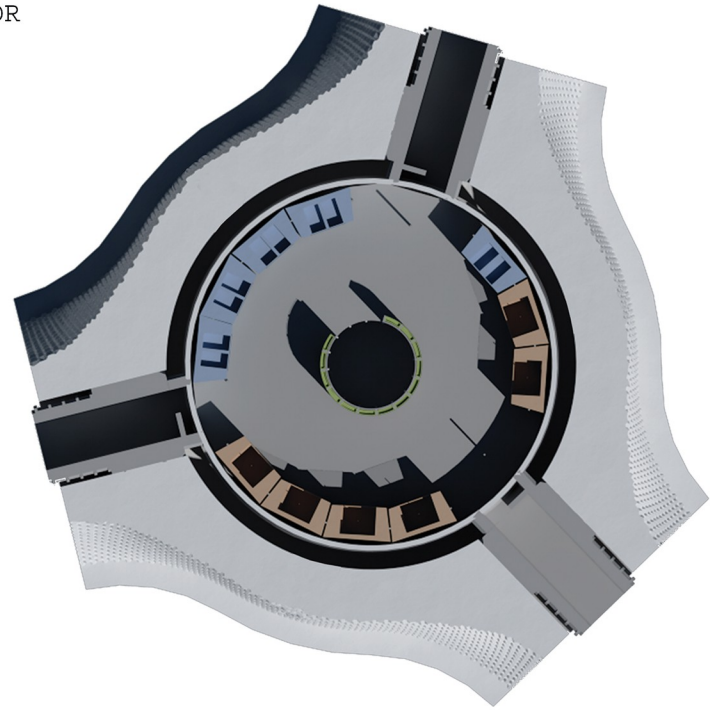

WINDOWS
SPORTS AREA
SERVICES
CORE
LEISURE AREA
RELAX AREA



Green system for food production



GROUND FLOOR



Outer ring

Central core

Boxes

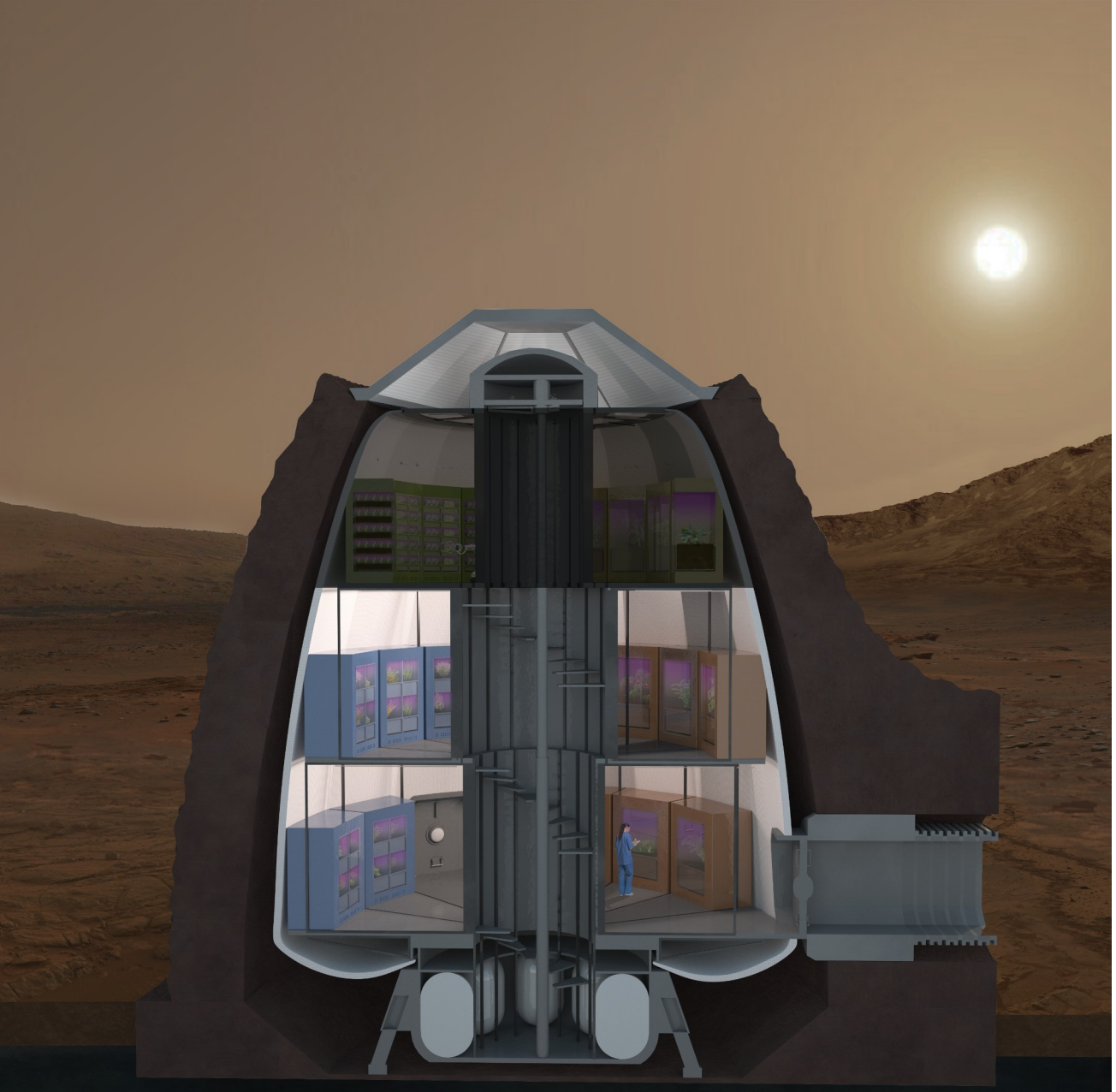
Beans
Chickpeas
Lentils
Peas
Tomatoes
Cucumbers

Bracket

Cauliflowers
Broccoli
Carrots
Beets

Core walls

Spices



FIRST FLOOR

Outer ring

Central core

Boxes

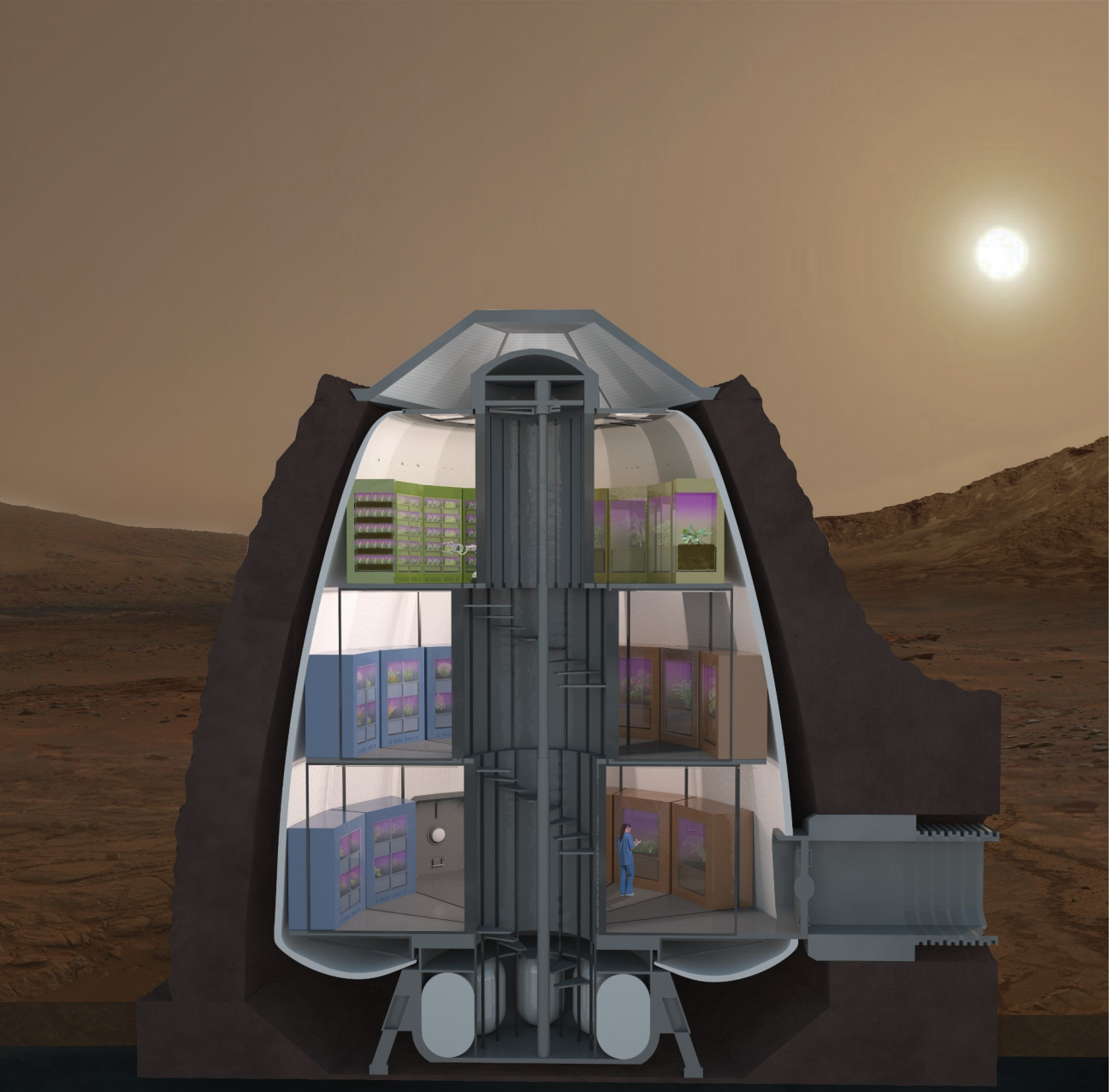
Cauliflowers
Onions
Strawberries
Blueberries
Raspberries
Corn
Rice x3
Barley x2

Bracket

Chickpeas
Lentils
Peas
Tomatoes

Core walls

Spices



SECOND FLOOR

Outer ring

Central core

Boxes

Grain x 2

Box

Potatoes x3
Potatoes sweets x2
Taro x2
Peanuts x2

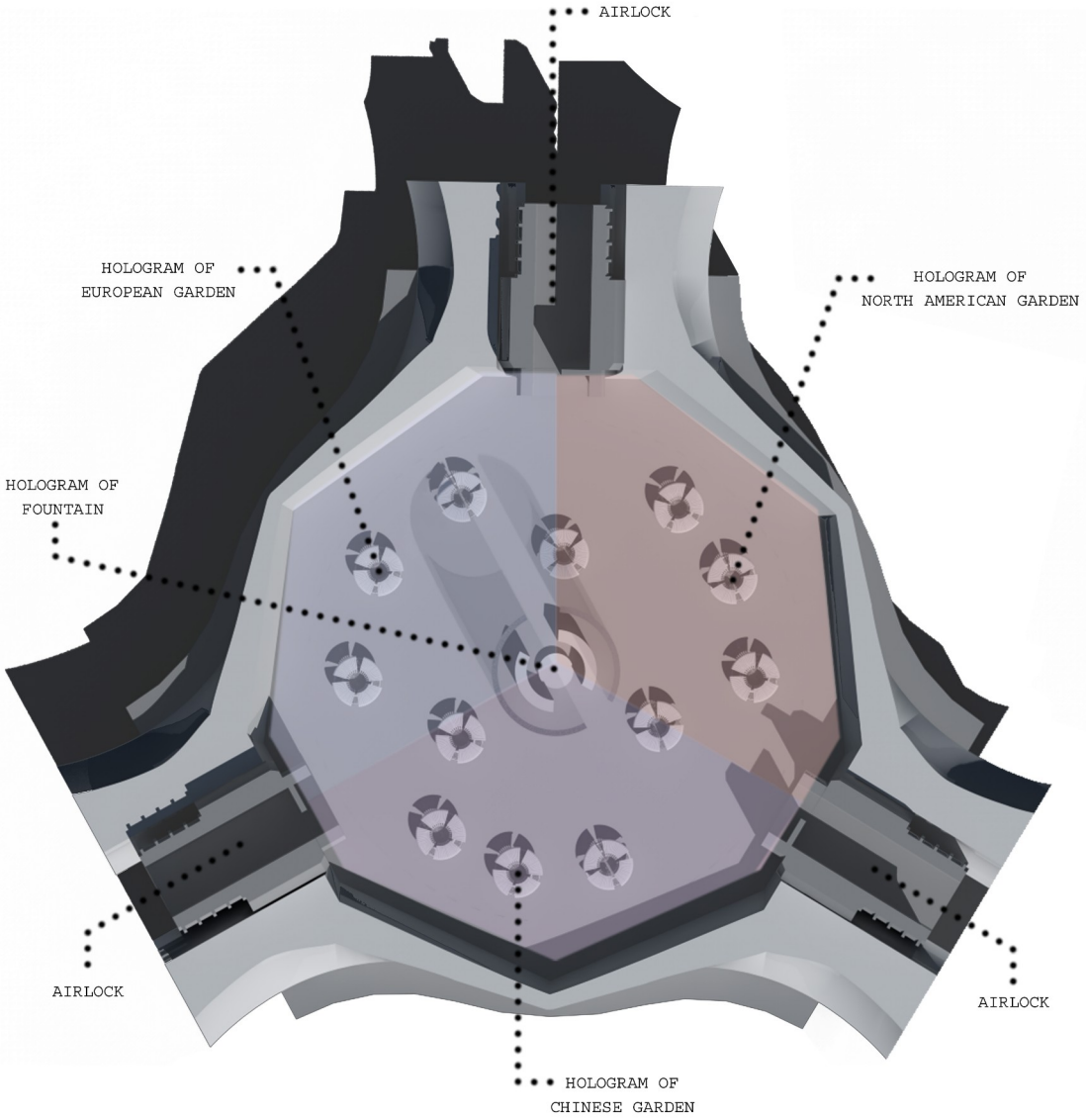
Rack wall

Lettuce x3
Radicchio x2

Core walls

Spices

Green system of the virtual garden


AIRLOCK
HOLOGRAM OF EUROPEAN GARDEN
HOLOGRAM OF NORTH AMERICAN GARDEN
HOLOGRAM OF FOUNTAIN
AIRLOCK
AIRLOCK
HOLOGRAM OF CHINESE GARDEN

Hive Mars in 2066: The Colony

‘’MARS IS THERE, WAITING TO BE REACHED’’

Buzz Aldrin

THANK YOU FOR YOUR ATTENTION!