



ΠΟΛΥΤΕΧΝΕΙΟ ΚΡΗΤΗΣ

ΤΜΗΜΑ ΑΡΧΙΤΕΚΤΟΝΩΝ ΜΗΧΑΝΙΚΩΝ

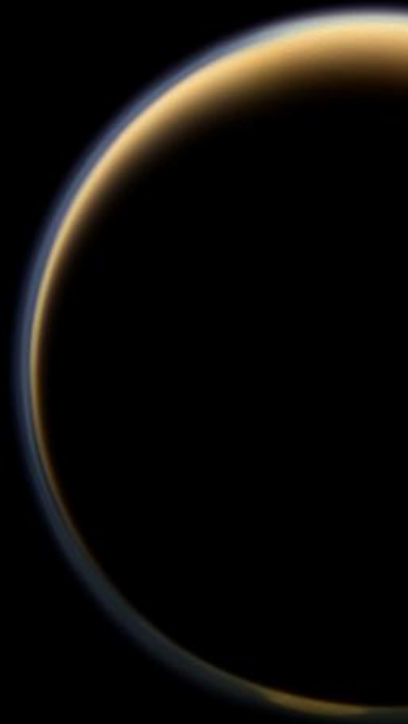
ΤΙΤΛΟΣ: THE GREAT XANADU DOME

ΦΟΙΤΗΤΗΣ: ΜΑΪΡΟΠΟΥΛΟΣ ΔΗΜΗΤΡΗΣ

ΕΠΙΒΛΕΠΩΝ: ΟΥΓΓΡΙΝΗΣ ΚΩΣΤΗΣ

THE GREAT XANADU DOME

BY D.MAIROPOULOS / SUPERVISED BY K OUNGRINIS



WHY SHOULD WE COLONIZE SPACE ?

Ethical

- Situation resembles Europe of 1400 / Discovery of the New World brought a profound difference.
- Give new perspective on the human life / Look problems outward rather than inwards.
- Survival of the human race.
- Unite humanity into a common cause.

Economical

- Precious Materials, energy, new marketable technologies.

Technological/ Scientific

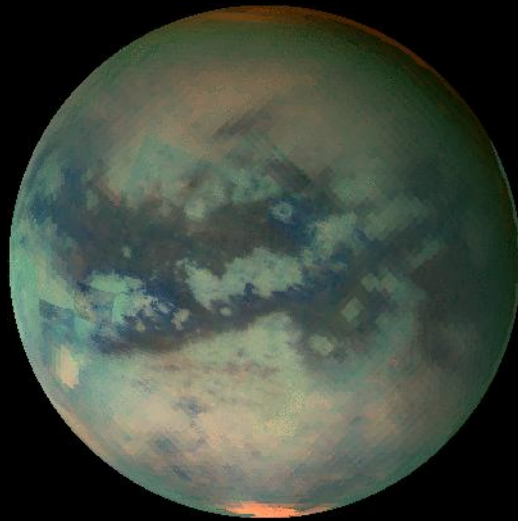
- Learn more about our worlds and explore new worlds (explorer's spirit).
- Discover new technologies that can help everyday life.

Social

- Creation of societies with different dynamics and interactions.

THIS IS

TITAN



TITAN'S CELESTIAL BODY FEATURES

- Largest moon of Jupiter.
- Diameter 50% larger than the Moon / 80% more massive.
- Second biggest moon in the SS after Jupiter's Ganymede.
- Larger than Mercury (SS smallest planet).
- First known moon of Saturn, discovered in 1655 by the Dutch astronomer Christiaan Huygens.

MOON



TITAN

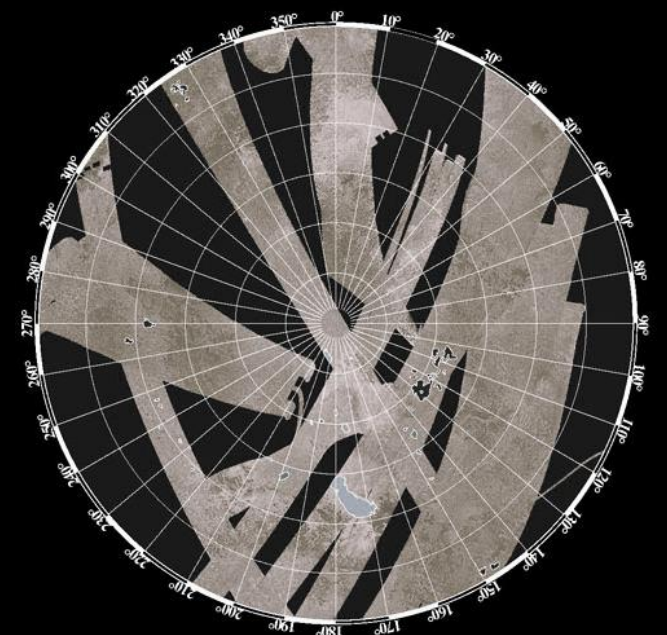
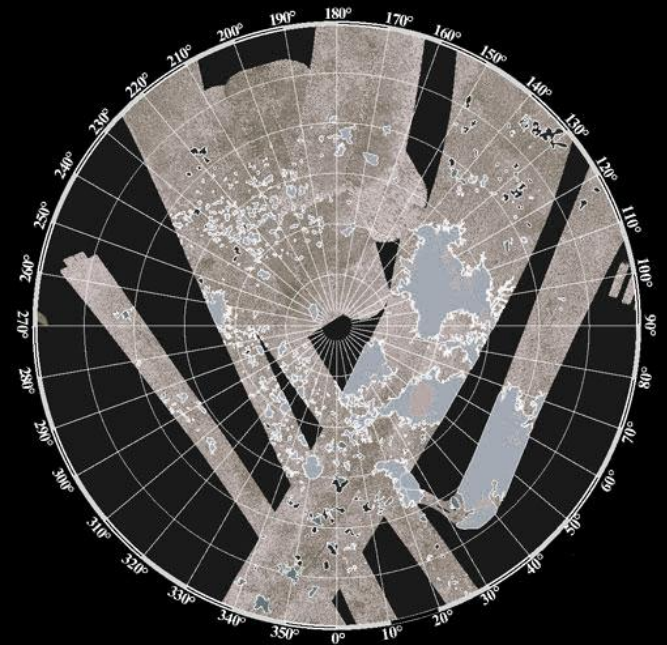


EARTH



CASSINI HYUGENS

- Robotic spacecraft launched in 1997 to investigate the Saturnian System.
- Includes Saturn orbiter (Cassini) and atmospheric probe lander (Huygens- landed on Titan in 2005).
- Huygens was the first landing in the outer Solar System.
- Titan flybys by Cassini revealed Titan's haze covered surface.



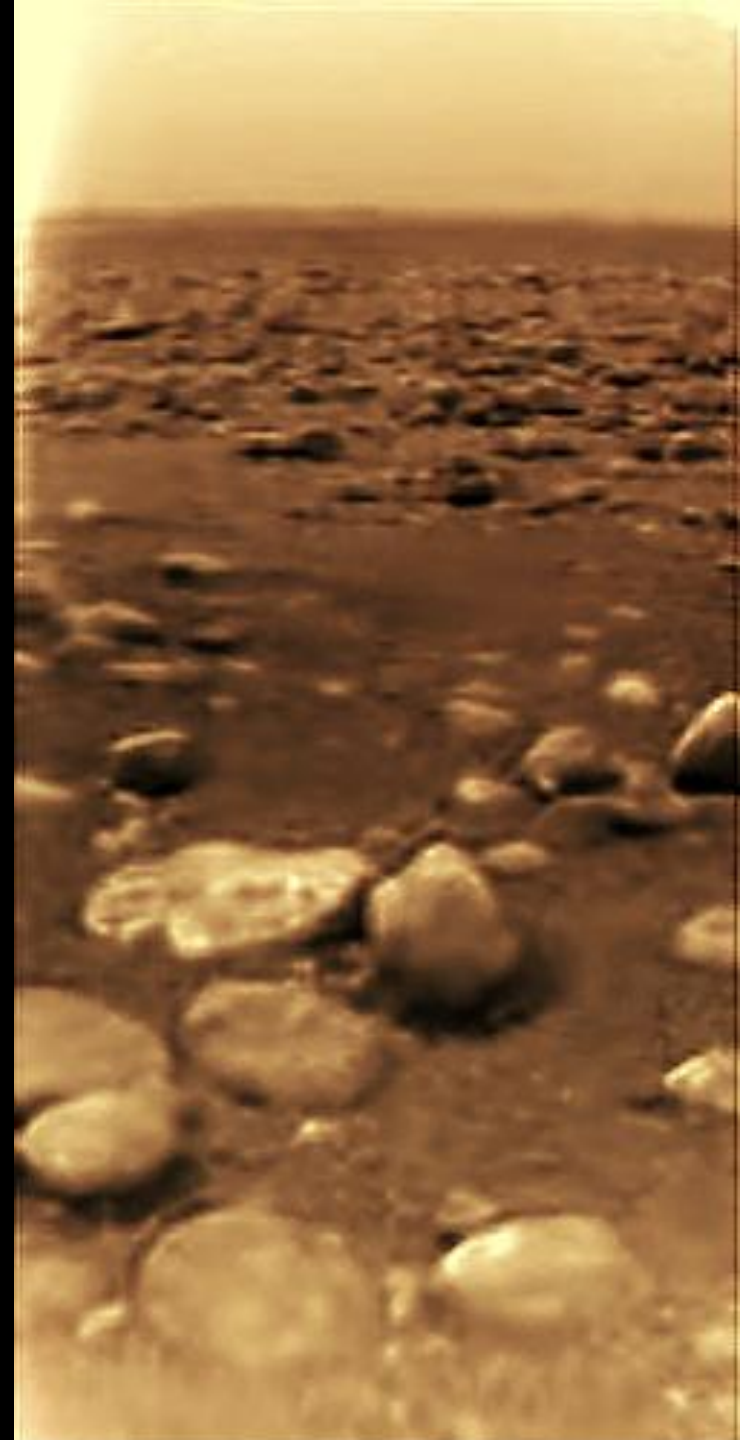
TITAN'S ATMOSPHERE

- Only known moon with more than a trace of atmosphere.
 - Only nitrogen-rich dense atmosphere in the Solar System aside from Earth's.
 - Atmospheric pressure one and a half times that of Earth -- approximately the same as 5 meters underwater on Earth.
- Atmospheric composition in the stratosphere is 98.4% nitrogen with the remaining 1.6% composed mostly of methane (1.4%) and hydrogen (0.1–0.2%).
- Titan is just covered in carbon-bearing material—it's a giant factory of organic chemicals—like earth in deep freeze.

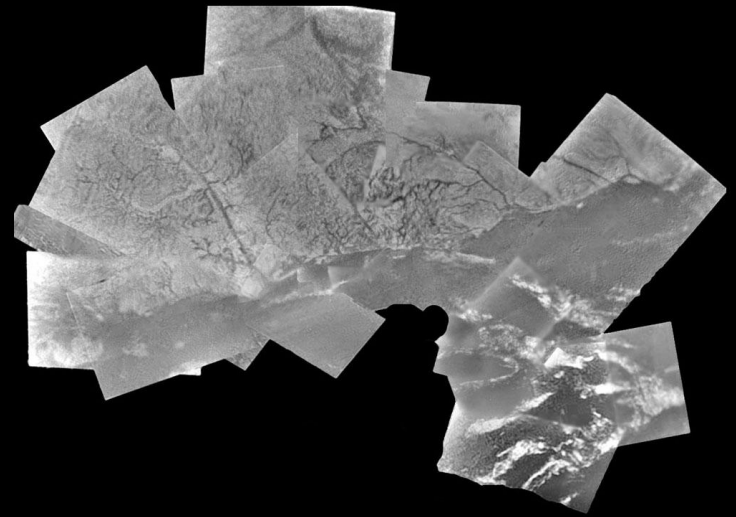


TITAN'S COMPOSITION

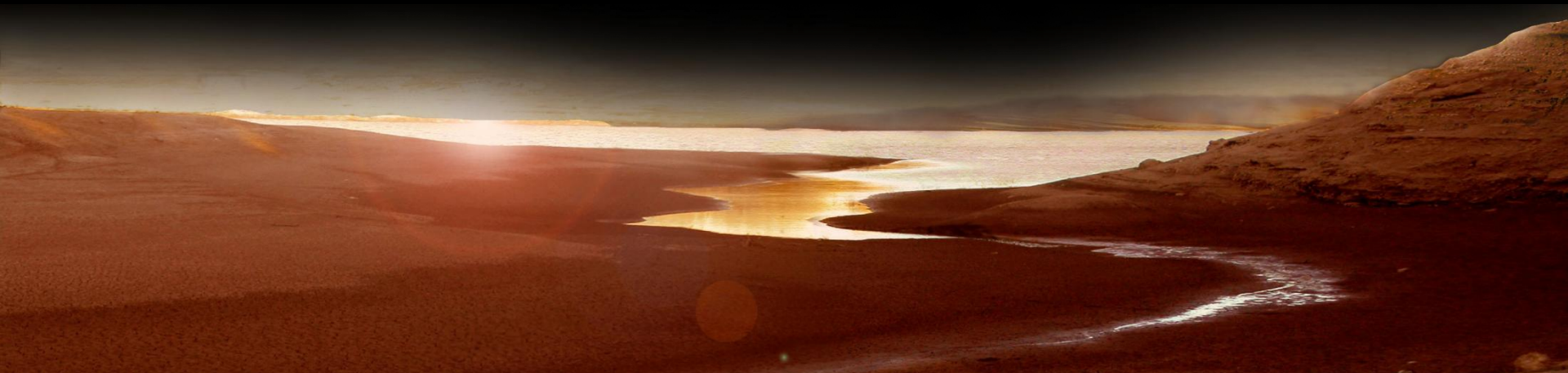
- Rocky center surrounded by several layers composed of different crystal forms of ice.
- Underground ocean.
- Geologically young surface.
- Ground temperature about 94K(−179C).
- Surface composed of ice and rocky materials.
- Titan is covered in carbon-bearing material—it's a giant factory of organic chemicals.



TITAN'S LAKES AND RIVERS



- The only object other in the SS than Earth that accommodates stable bodies of surface liquid.
- Lakes seas and rivers of liquid carbohydrates such as ethane and methane.
- Methane evaporates and forms clouds which occasionally leads to methane rain.
- Methane rain consists of large methane drop that fall slowly to the ground.
- Methane cycle is viewed as an analog to Earth's water cycle.



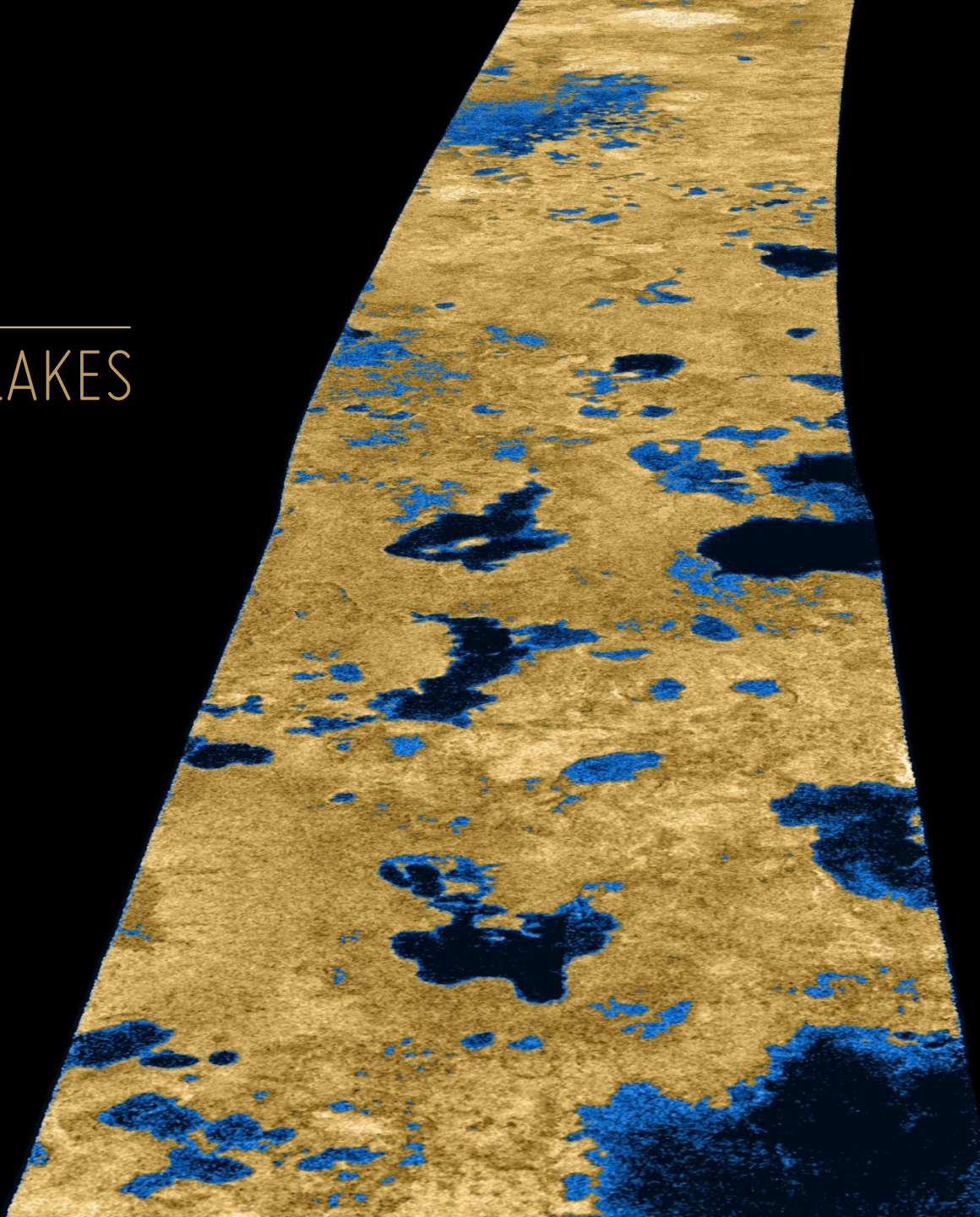
SO, WHY
TITAN ?

TITAN HAS

METHANE LAKES

i

They surpass
Earth's oil
reserves. This
means a cheap and
abundant source of
energy.



TITAN HAS

A THICK ATMOSPHERE

i

Unlike many other planets
titan's thick atmosphere
blocks harmful radiation.
Also structures are easier
to build than zero pressure
environments.



TITAN HAS

LOW GRAVITY

i

Low gravity allows structural engineering freedom. Objects on Titan have 1/10 of their Earth's weight. Also, it allows a wider 3d movement since a regular human in Earth that can jump 50cm high while in Titan can jump 3m!

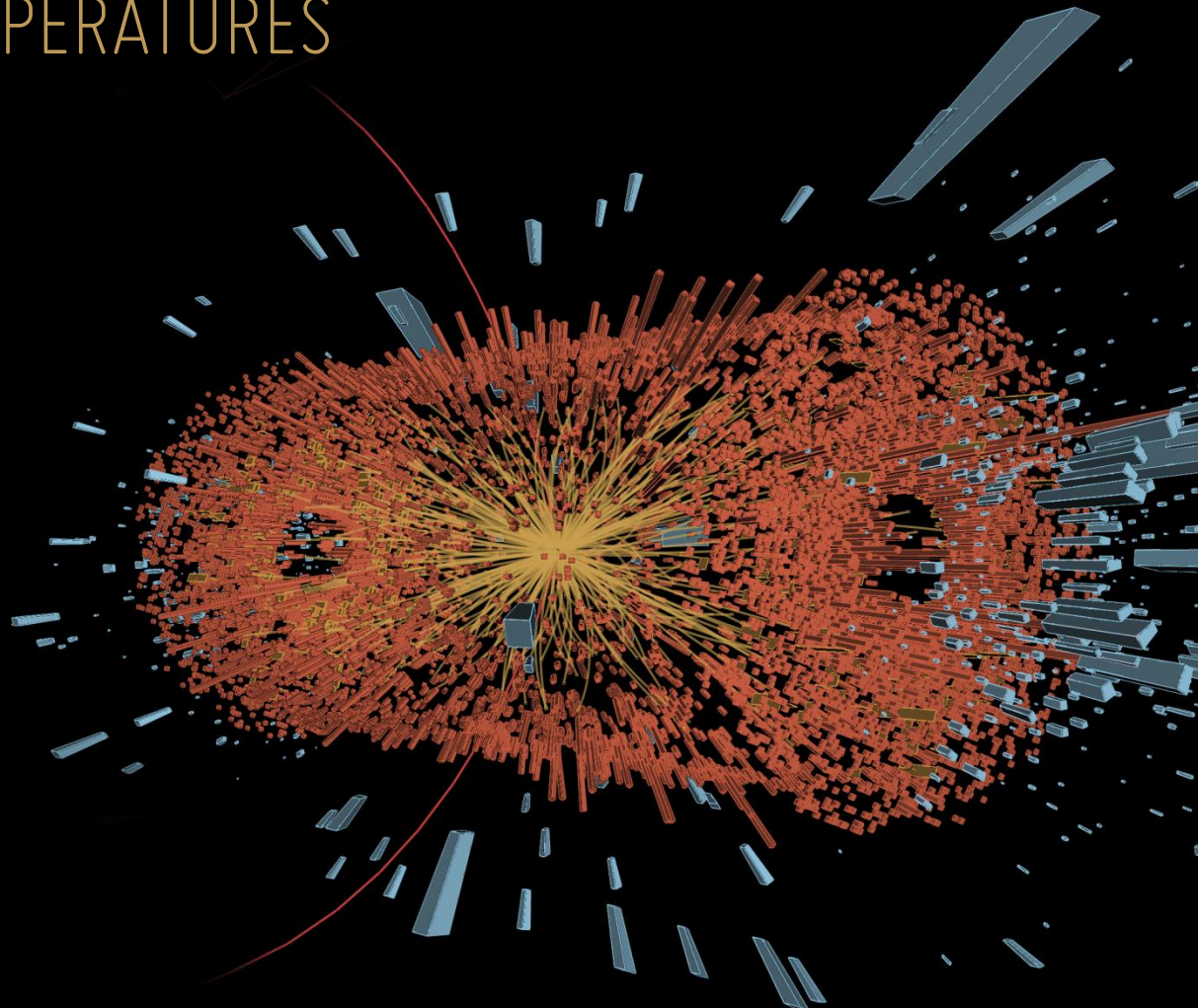


TITAN HAS

LOW TEMPERATURES

i

Titan has extremely low temperatures that can cool down machinery and improve radically their efficiency.

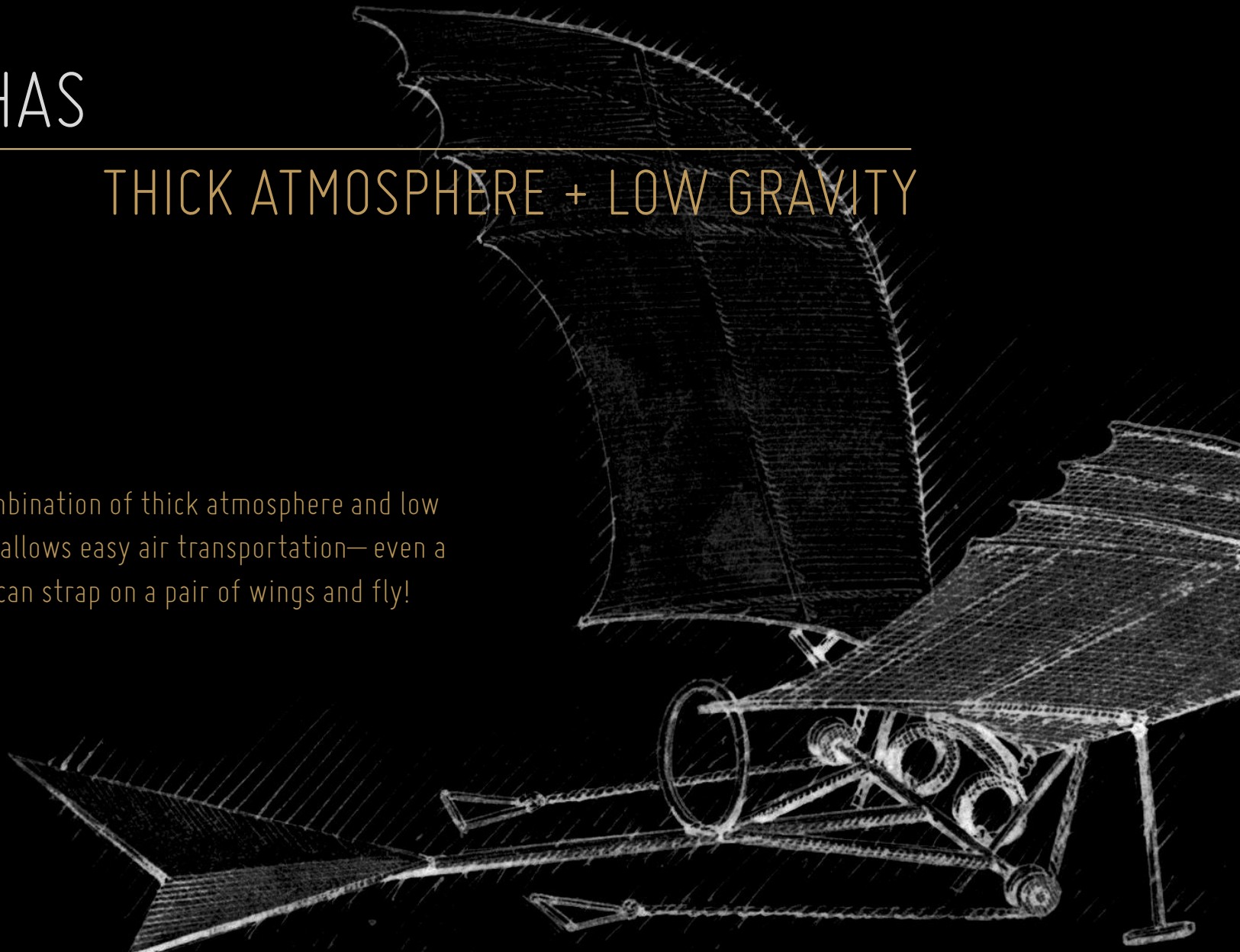


TITAN HAS

THICK ATMOSPHERE + LOW GRAVITY

i

The combination of thick atmosphere and low gravity allows easy air transportation— even a human can strap on a pair of wings and fly!

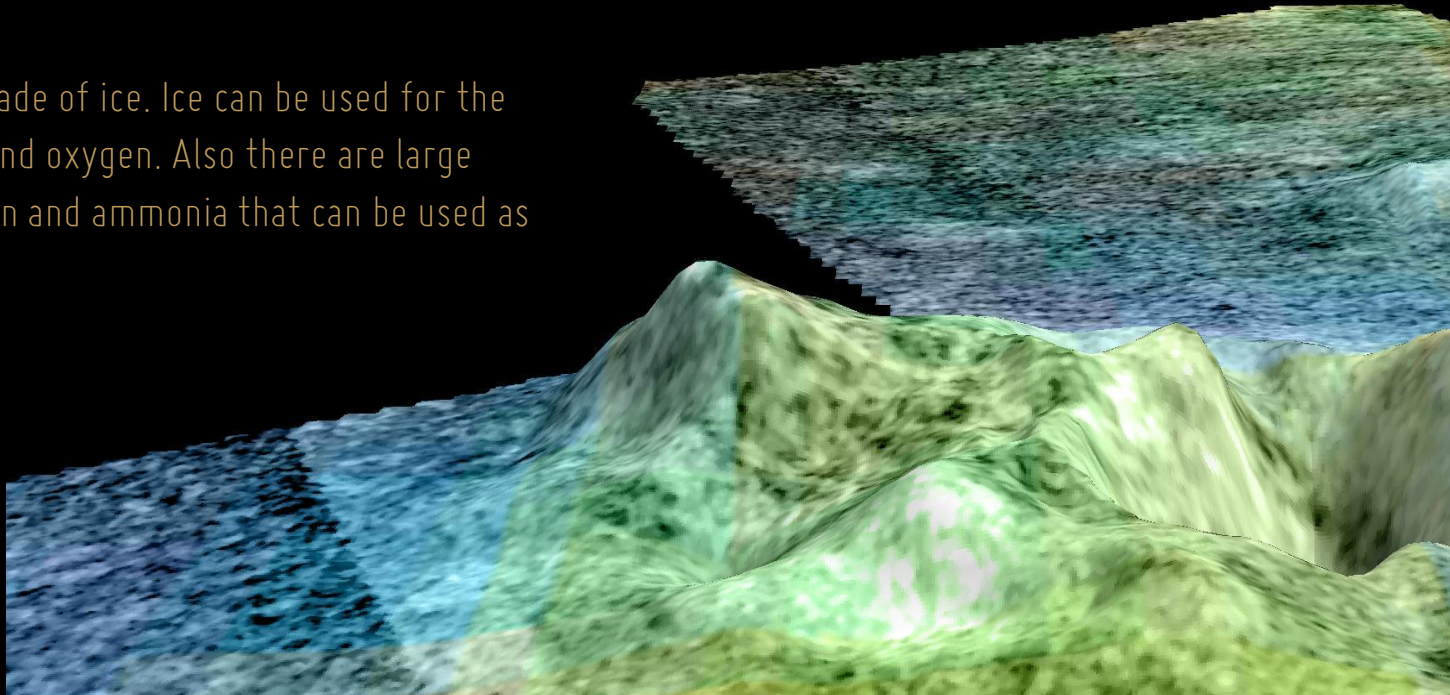


TITAN HAS

IMPORTANT ELEMENTS FOR LIFE

i

Titan is partially made of ice. Ice can be used for the creation of water and oxygen. Also there are large amounts of nitrogen and ammonia that can be used as plant fertilizer.



LAST BUT NOT LEAST...

TITAN IS

AMAZING

IMAGINE A WORLD WHERE YOU CAN SEE SATURN IN THE SKY
REFLECTING IN BIG BLACK LAKES WHERE HUGE DROPS OF
METHANE WILL BE FALLING SLOWLY FROM THE SKY...

BUT...

— LOW GRAVITY CAN POSE HEALTH ISSUES IN BONE DENSITY AND THE IMMUNE SYSTEM

— TEMPERATURES ARE EXTREMELY LOW FOR HUMANS

— THICK ATMOSPHERE MAKES INSULATION REALLY HARD

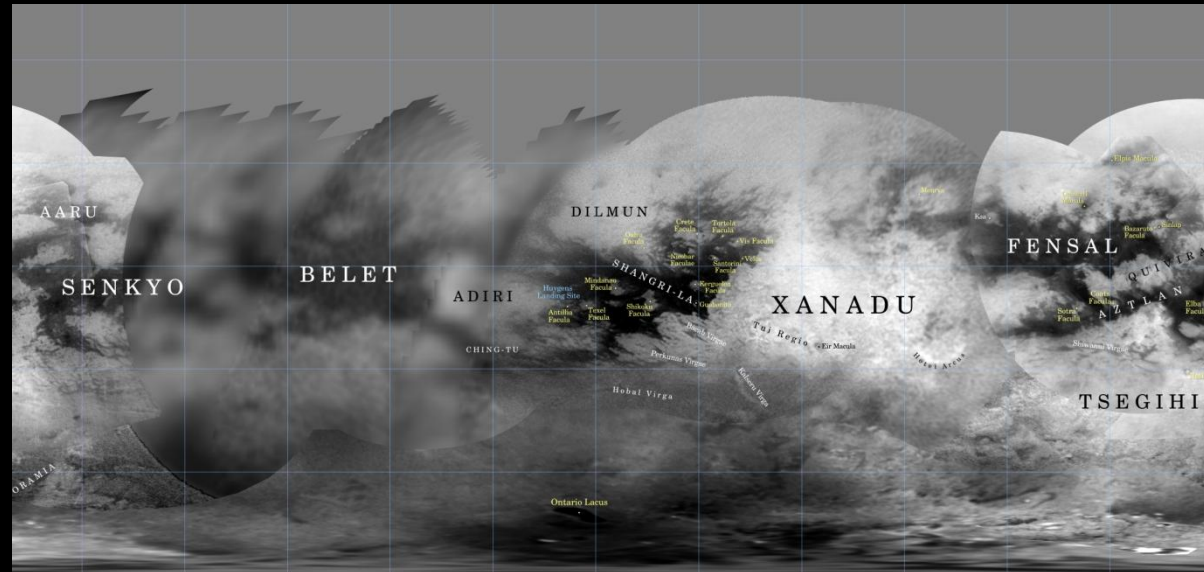
— ATMOSPHERIC GASES THAT COME IN CONTACT WITH BREATHABLE AIR WILL CAUSE EXPLOSION

— THE DISTANCE FROM EARTH IS 6-9 YEARS

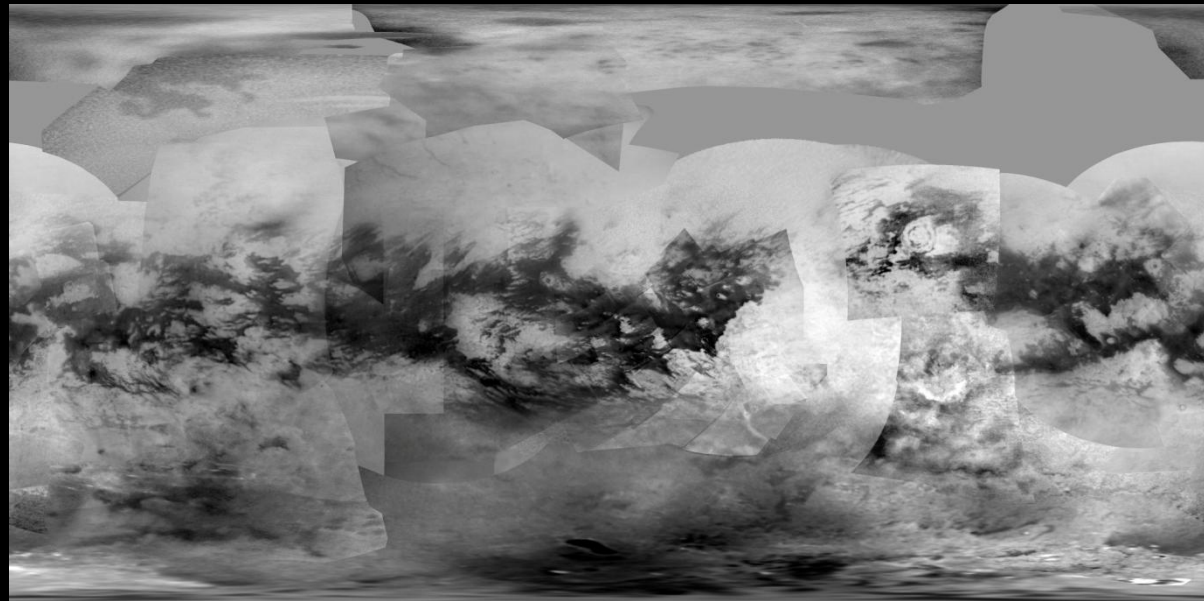
— SUNLIGHT IS 1% OF EARTH'S

TITAN'S MAPS

2006



2011



INTRODUCING THE

GREAT XANADU DOME



DOME'S

LOCATION

Lake proximity and high altitude offer:

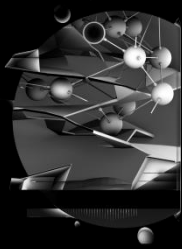
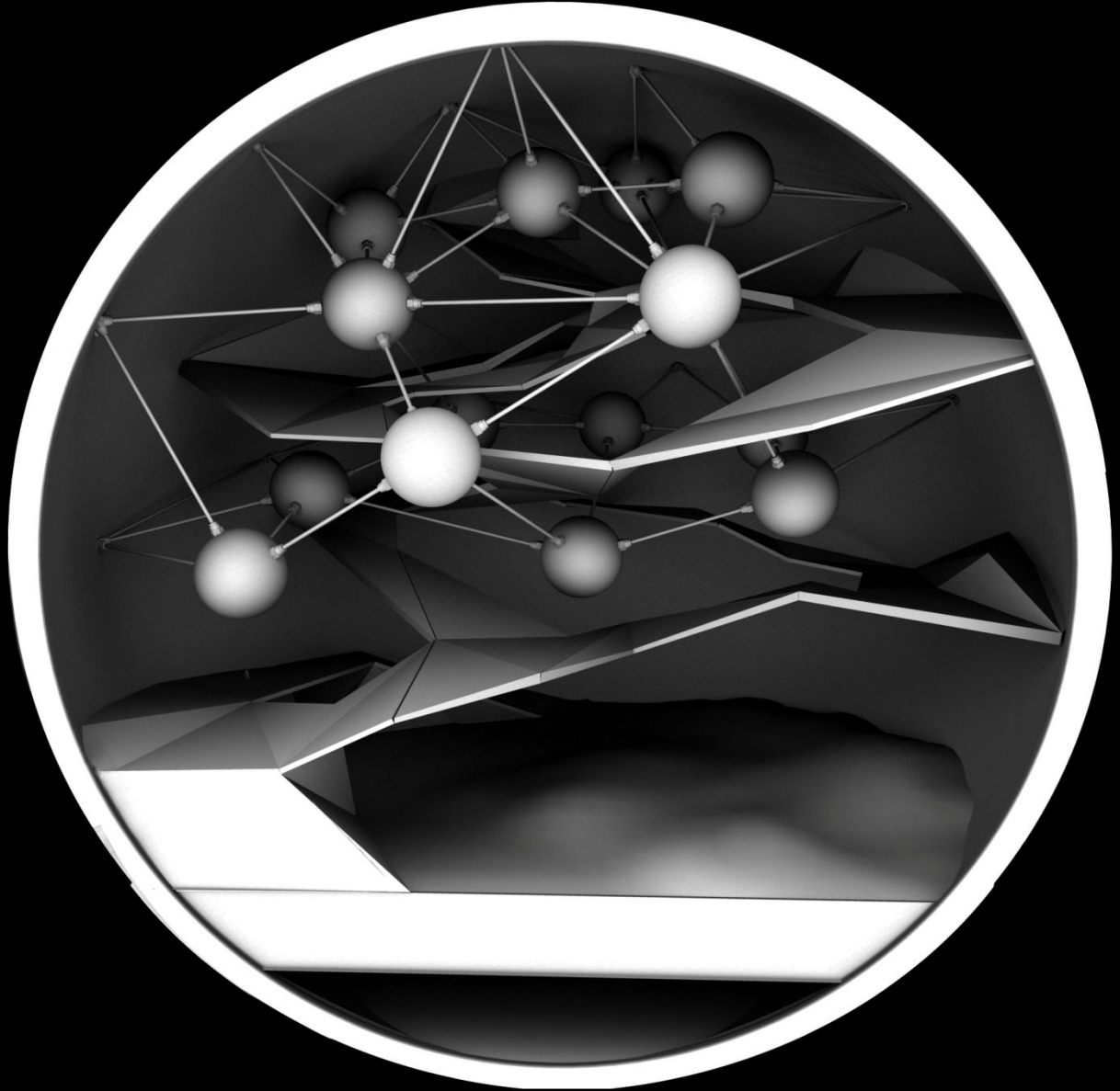
Scenic view, No waves, Easy energy access, Access to lake- transportation Observation point, Landmark creation



DOME'S

GEOMETRY

- Cave like geometry offering:
- Protection from atmospheric conditions.
 - Less contact with atmospheric gases- less risk of shell bridge that can cause explosion.
 - Very few earthquakes- no molten core.
 - Exploitation of low gravity- structures great high creating a 3d environment.



DOME'S

FEATURES

SPHERE MESH

Habitable modules

RAMPS

3d landscape for
outdoor activities

THE FOREST

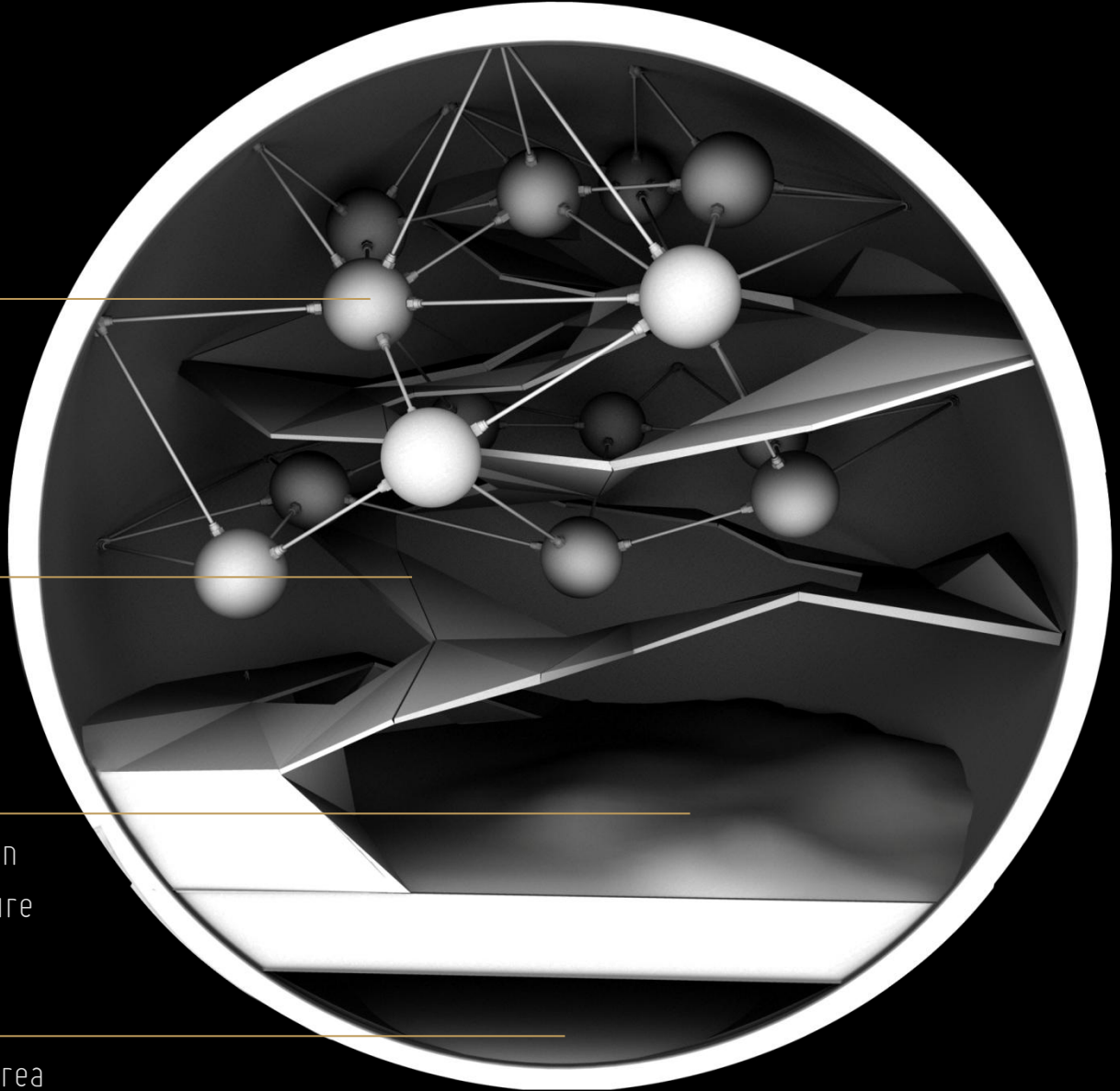
Vast garden for relaxation
and connection with nature

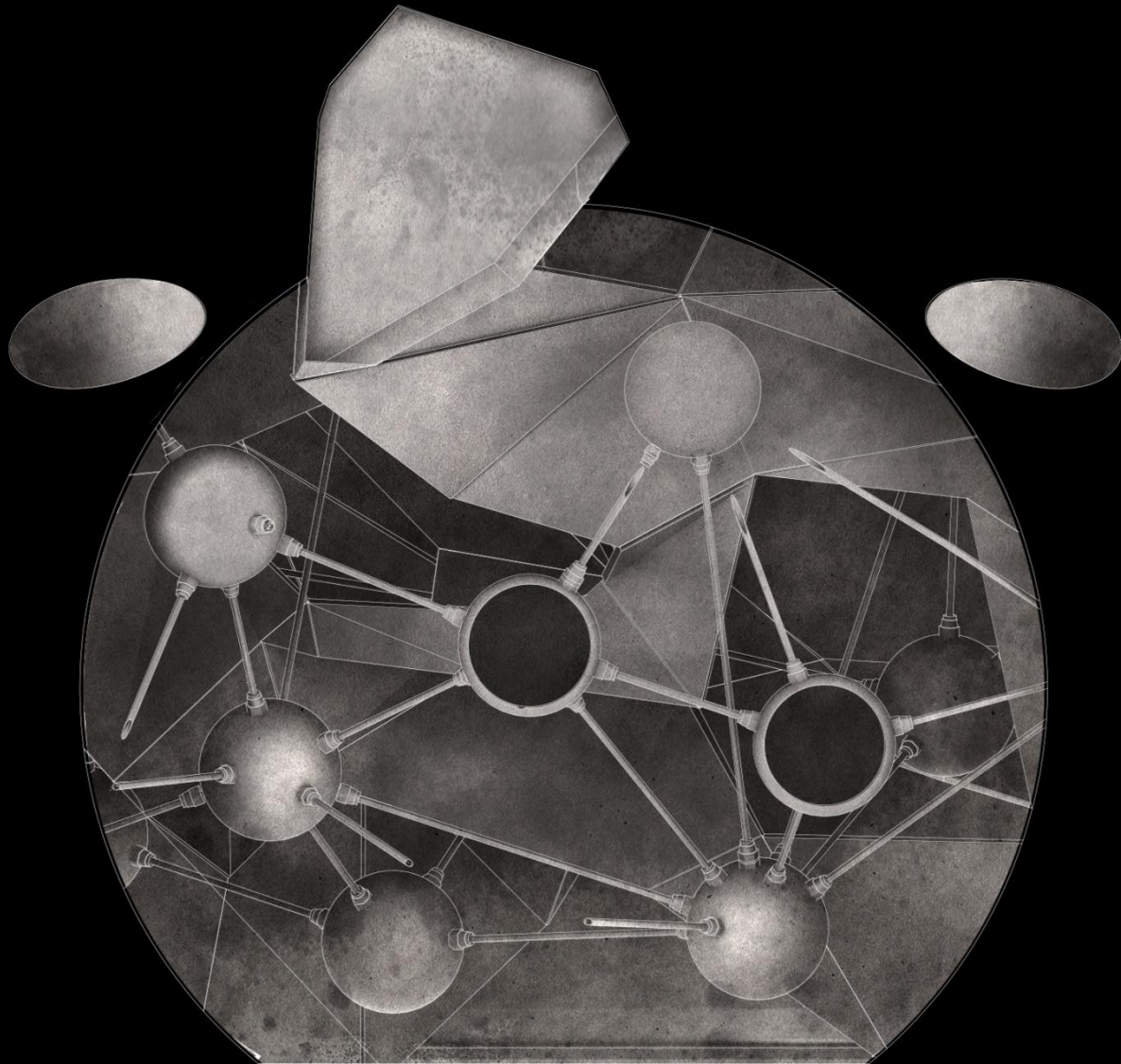
LABS

Laboratories and farms area

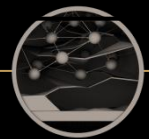
LIVING

WORKING



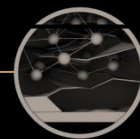


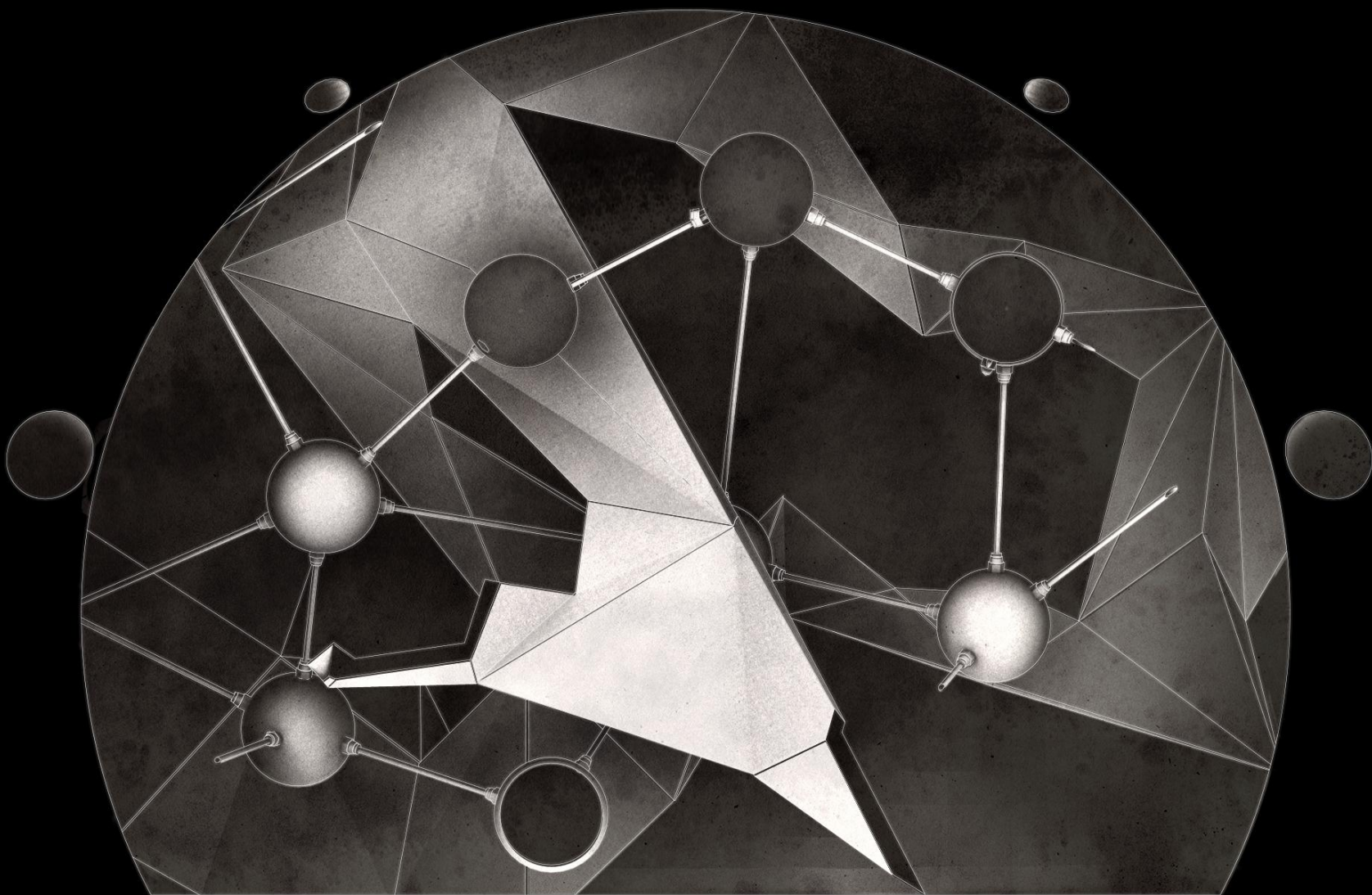
PLAN A





PLAN B



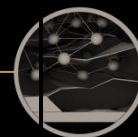


105m

85m

11m

SECTION

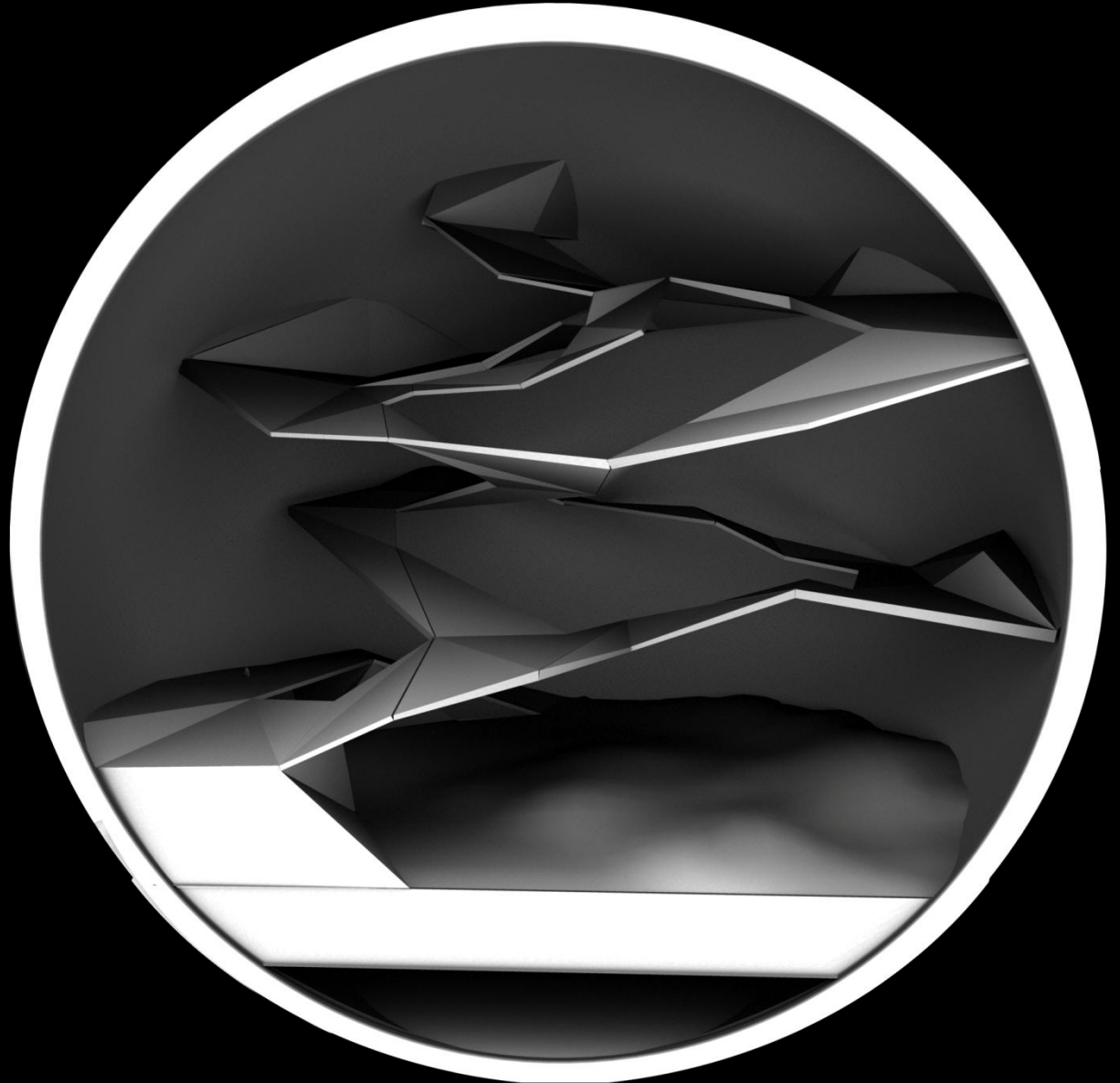


L VING

DOME'S

RAMPS

The Dome's ramps serve as a huge 3d outdoor landscape. Titan's low gravity allows humans to move freely in a three dimensional space without having to worry about tiresome ascends. Therefore the Dome's ramps multiply the open space while minimizing the volume of the whole construction. Furthermore, instead of a flat open space the landscape folds into the tree dimensions creating unique sites in terms of geometry and view.



DOME'S

RAMPS

CONTROL ROOM

PLAYGROUND / CANTINE

SCHOOL

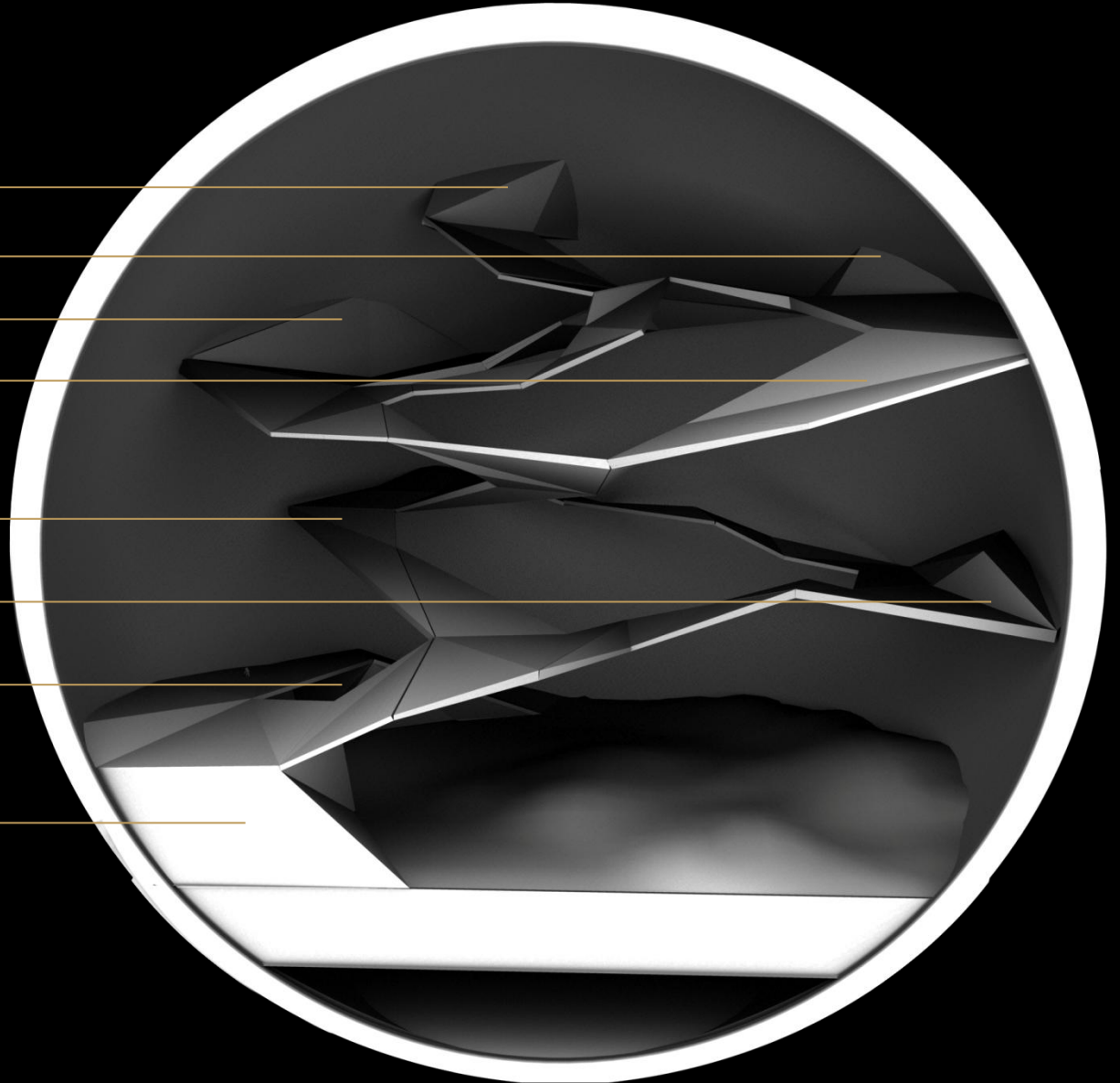
OBSERVATION SPACE

EXCIBITION SPACE

EVENT SPACE

THEATER / LIBRARY

GYM / DINING SPACE



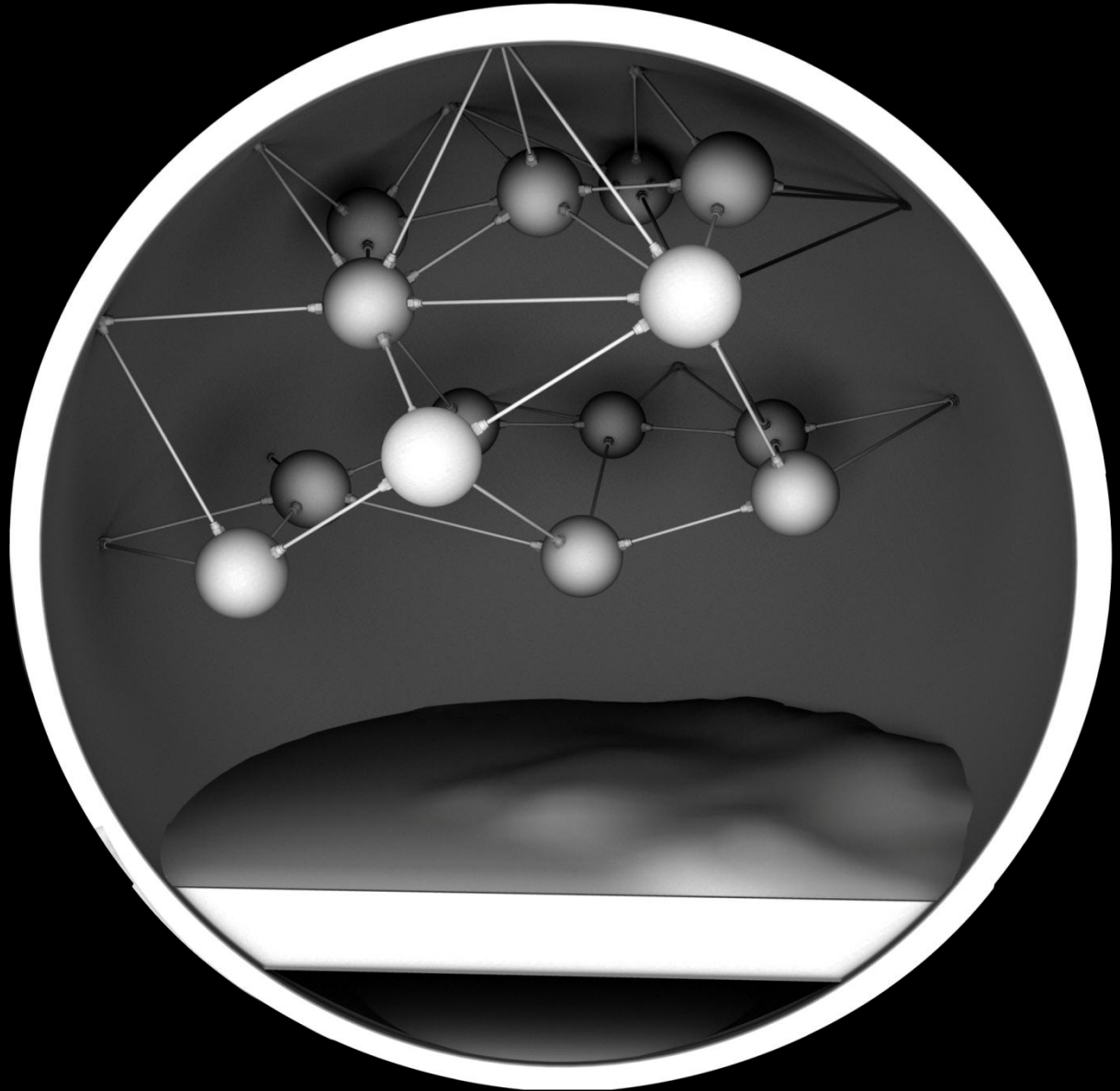
The ramps facilitate most of the everyday activities providing a wide spectrum of spaces.

DOME'S

SPHERES

The sphere mesh floating over the ramps facilitates the residential part of the Dome. The spheres are connected with aeropneumatic muscles that allow their 3d movement in space. This configuration was chosen in order to achieve:

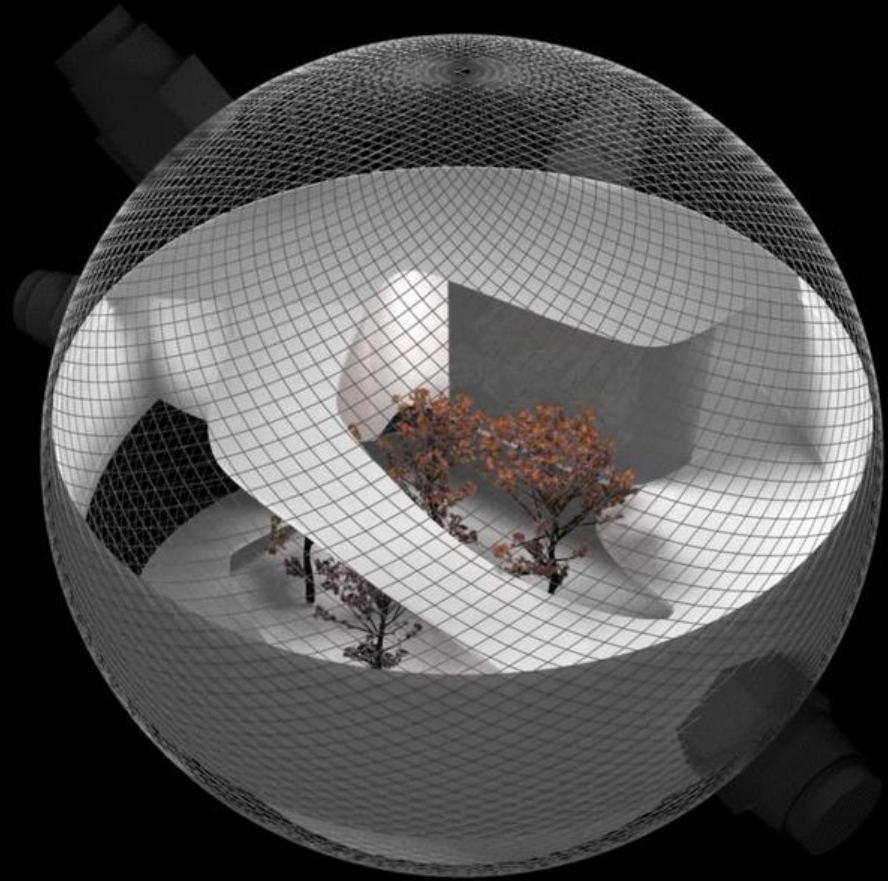
- Full exploitation of 3d space.
- Privacy when it is needed.
- Unobstructed view.
- Variation of the geometries.



DOME'S

SPHERES

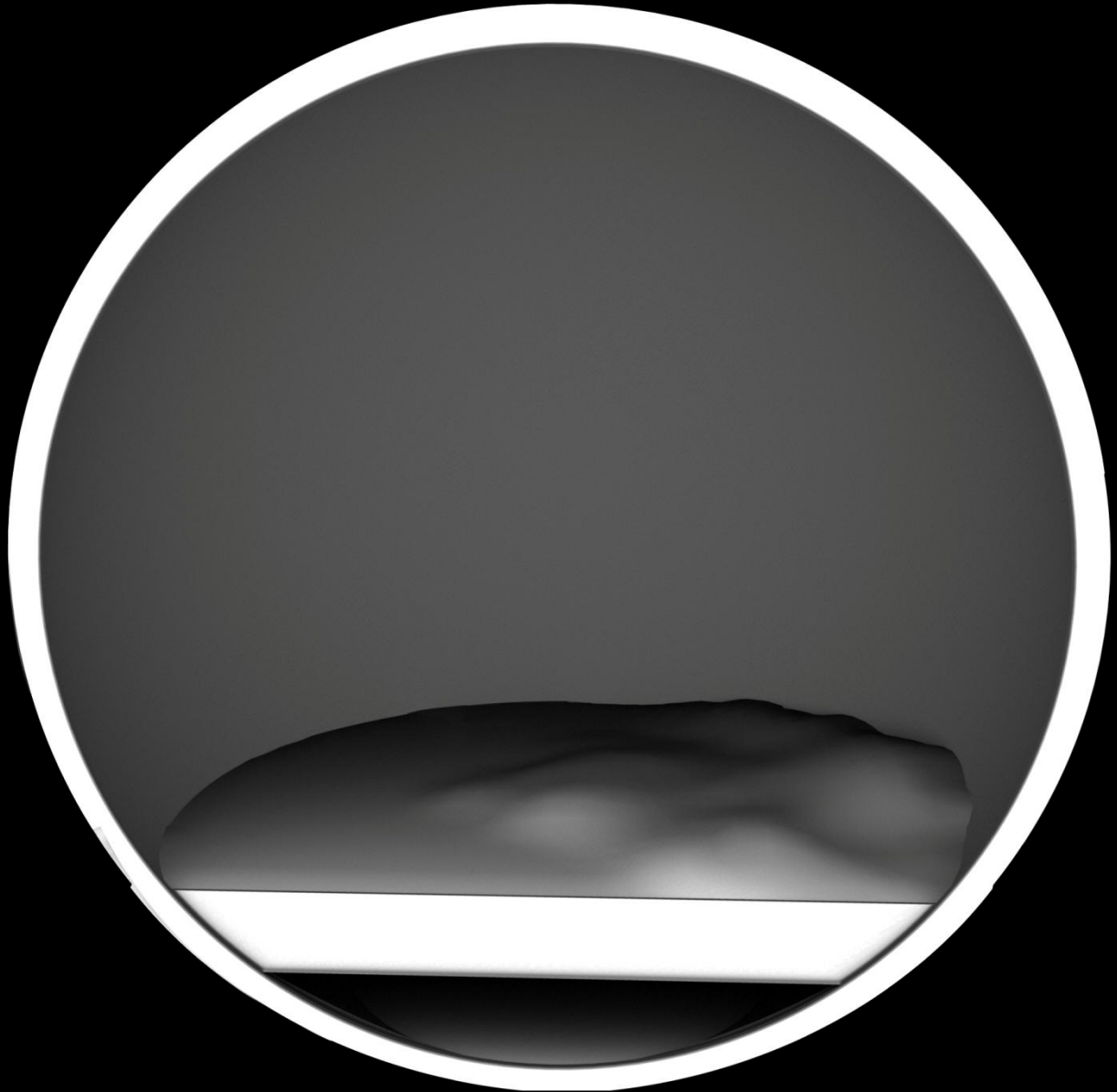
The spheres, apart from a glass insulation, are covered with an metallic mesh that supplies electricity to the muscles. The muscles are kept attached to the mesh thanks to electromagnets that are located on their tips. Liquid waste is recycled. The basic spaces of the sphere is a living room on the top floor a bedroom on the middle and a personal garden in the lowest. The tenants go to sleep in a specially designed room which rotates, by exploiting the spheres geometry. This rotation simulates more intense gravity conditions, by centrifuge force which are necessary for preserving a healthy bone density.



DOME'S

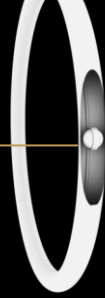
DOME...

The dome's surface is used to deal with the inevitable sense of confinement of a semi-underground space. The dome is covered with an led screen that stimulates different environments. Its goal is to enhance the natural environment of Titan rather than to create a detached world. Also it simulates the sensation of earth's 24h day.



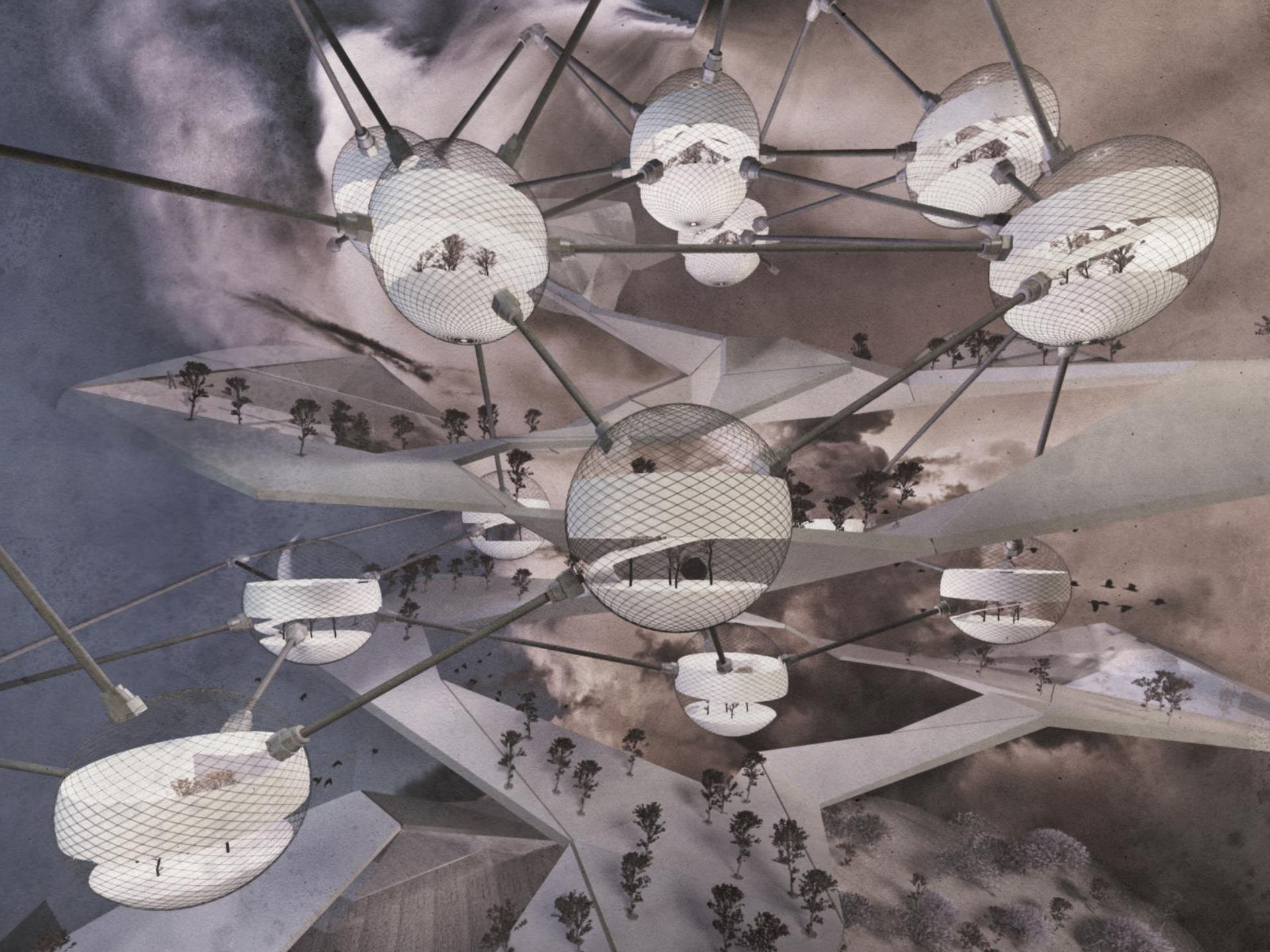
HOME'S

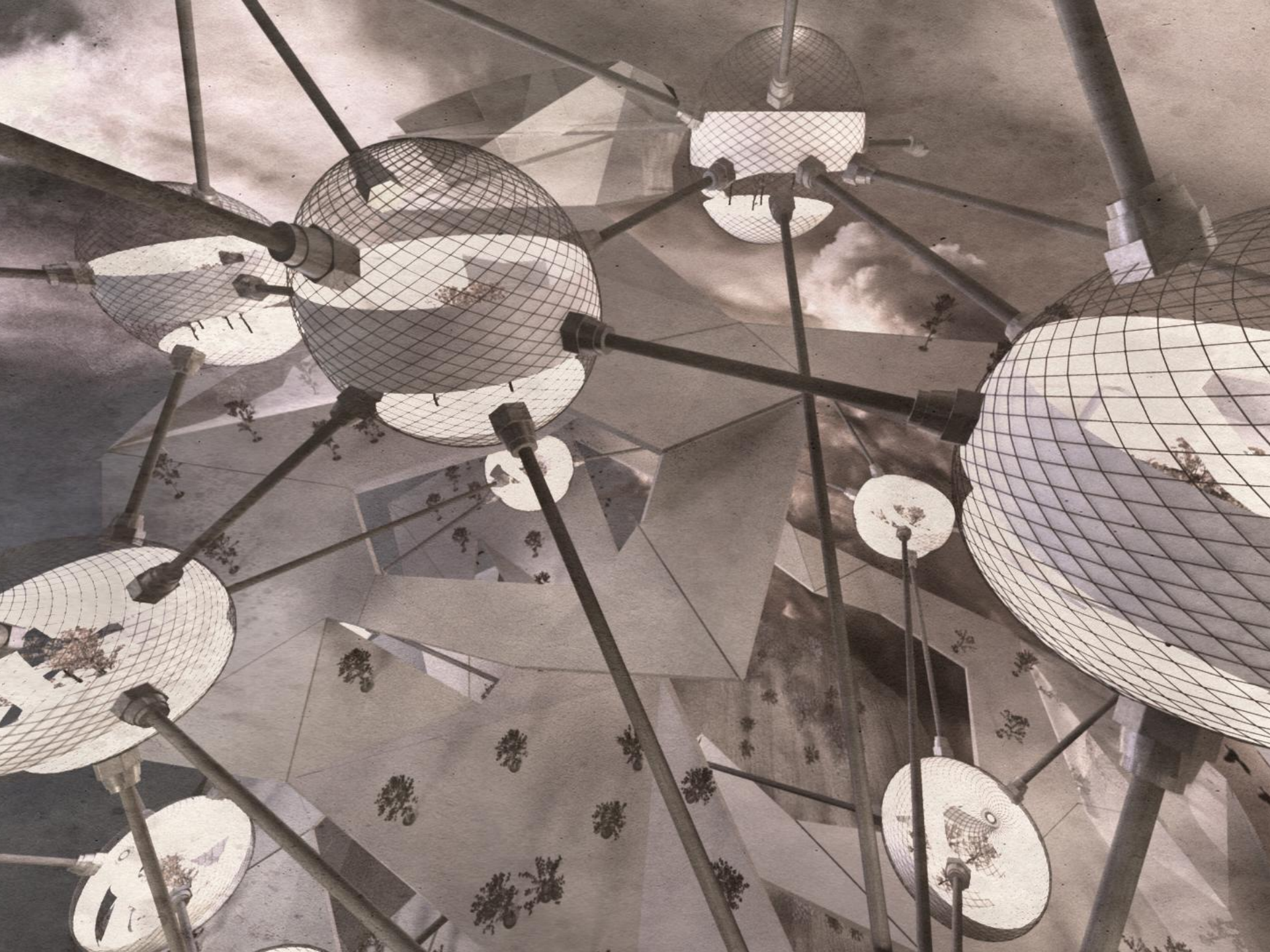
TRAIN



The first ring that surround the Dome is the train ring. The train ring provides quick and easy access to key parts of the dome and connects the working space with the living space.









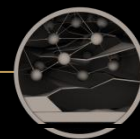
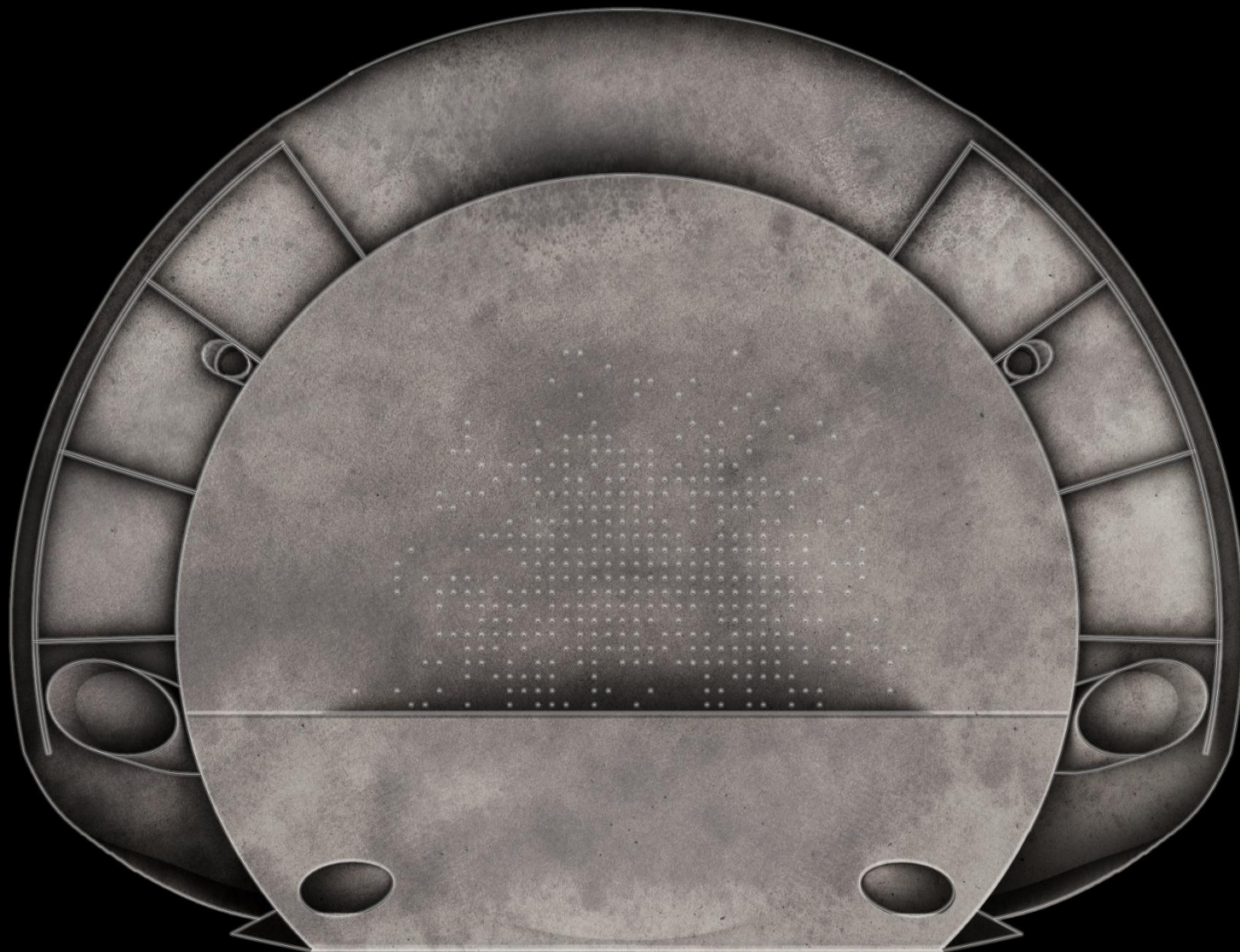
WORKING



DOME'S

LABS

The working area is located right over the dome. There is no immediate connection in order to ensure it's safety. A reverse garden hangs from the center of the ceiling . The surround the garden and have unobstructed optical contact with it. The farms intersect with the labs to provide easy access to food for gathering and experimenting. In the front part of the working area there is an opening for people and vehicles to enter and exit the Dome.





DOMES

FARMS



The second ring contains the Dome's farms. The system makes use of the Omega hydroponic gardens. These are cylinders rotating around a grow lamp. The gardens are organized on moving rails to minimize the occupied space and to achieve instant access to the complete farm system from the labs.



SUMMING UP...







THE GREAT XANADU DOME