



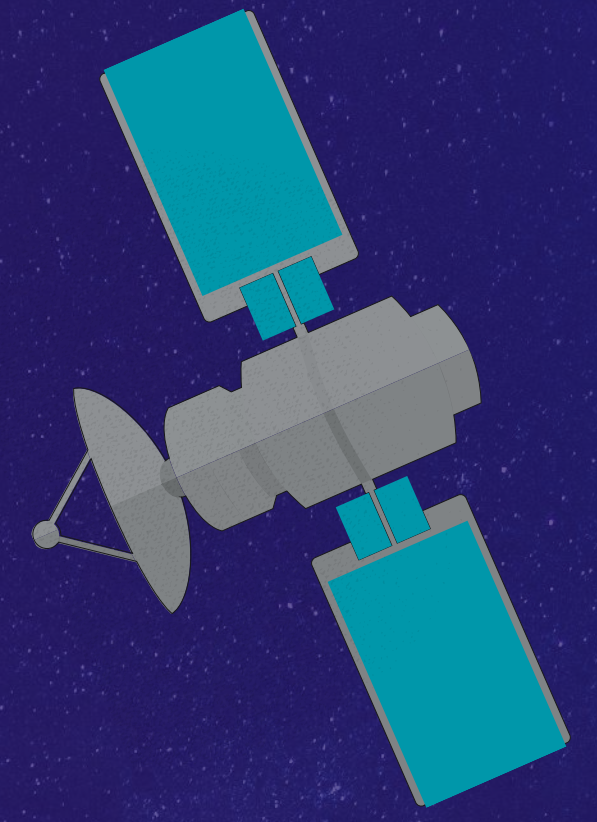
LIVE IN SPACE: A NEW CIVILISATION

Workshop Space & Design

PRESENTED BY KEDGE DESIGN STUDENTS



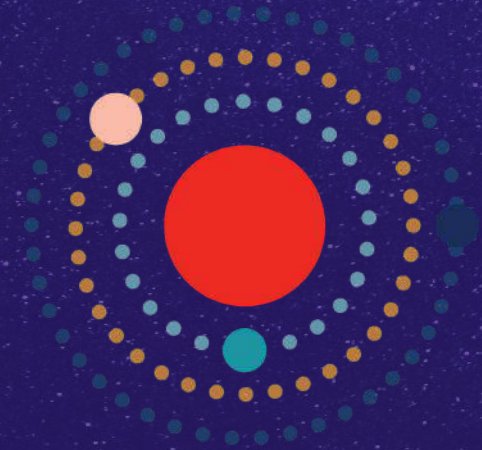
Collaborative partnership



European Space Agency



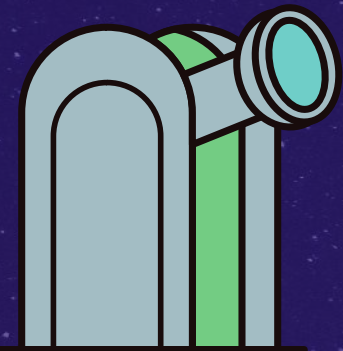
Kedge Design School



Global Space
Economic Workshop

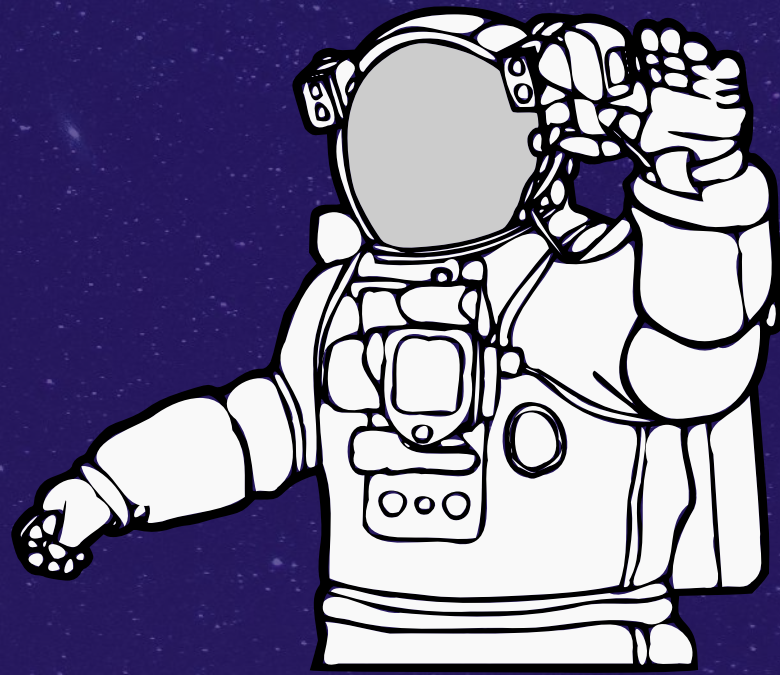


Centre National
d'Etudes Spatiales



HABITAT IN SPACE

A DESIGN TRILOGY



2018



The pioneer's camp

Space exploration and first habitat within 10 years

2019



The settler's village

How to settle on another planet, 20 to 30 years forecast

2020



A new civilisation

How it would develop and the societal impacts, 100 years forecast

CONTEXT

WHERE DO WE START ?

Human have settle down for 50-100 years

Scale: 700-1000 inhabitants

A city-sized territory

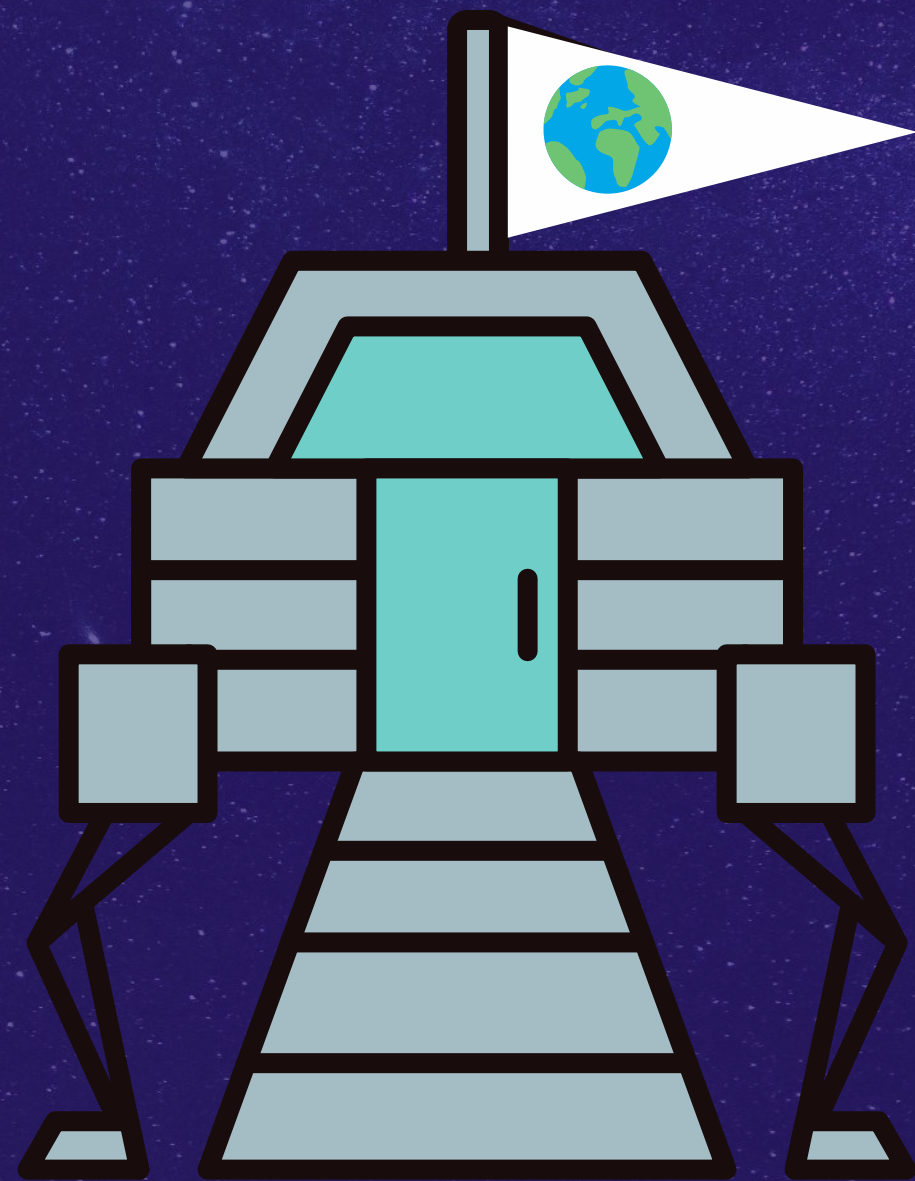
Self-suficiency

Trying to adapt to an hostile environnement

A collaborative way of life



STARTING ASSUMPTION



The first pioneers were scientists, astronauts and space engineers, they created the first moon colony.

Thanks to the collaboration between the Earth countries, we were able to host a more diversified population with the objective to start the first human space civilisation.

The economical and political organisation is inspired by a tribe way-of-life where everyone has his duty based on their skills.

To survive in space, Human had to forget self interest and collaborate to share benefits.

✦ ✦ ✦ ✦ ✦

The moon colony is self sufficient and does not need Earth to survive, however they keep communicating and supplying each other for science benefit and special needs or emergencies.

The moon is politicaly independant from Earth.

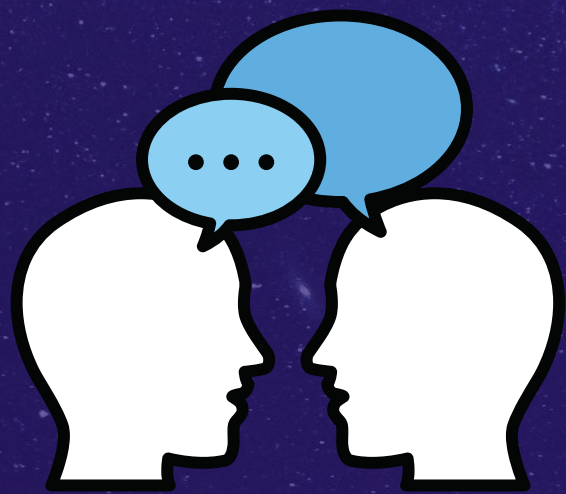


✦ ✦

The first colons already spoke many languages (English, Russian, Chinese, etc.)

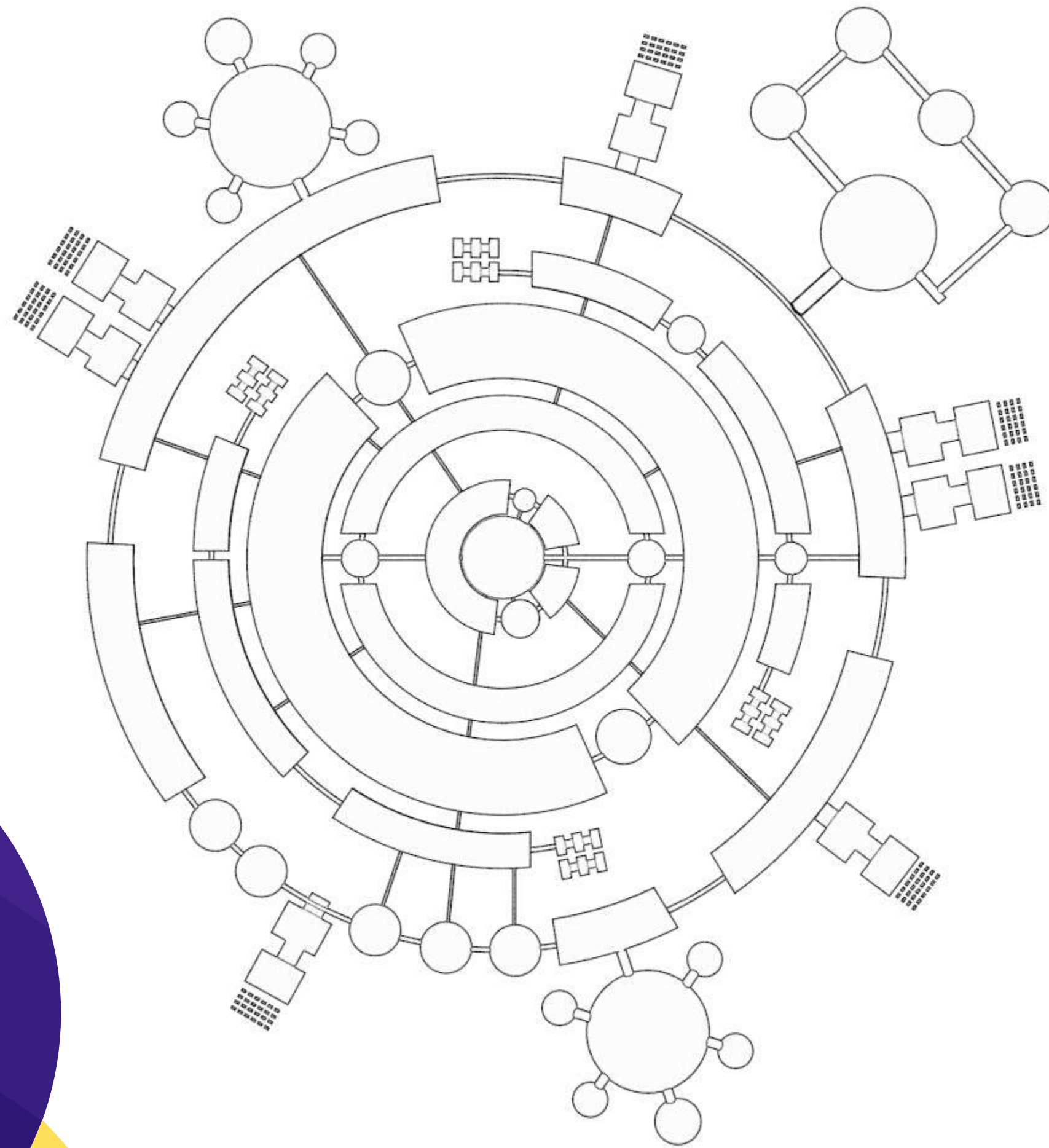
The new civilisation is educated since childhood to speak the most spoken languages.

The technological improvments allows the citizens to use fast translation tools to facilitate pluri-cultural communication.



MAP

THE DOMES ORGANISATION





Everyday Life

PRESENTED BY PIERRE BAGNIS, AGATHE
LARGEAU & BAPTISTE CANO



Context

We have been residents of the moon for 100 years. The issue of mobility for all, leisure, as well as the problem of daily life for the new generations becomes crucial.

How can we put the myth of the Earth on stage to adapt it in hobbie ?

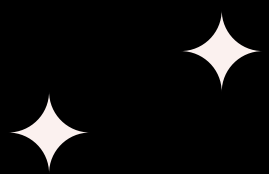
After 100 years on the moon, the new generations have started to ask many questions to the old ones and still want to know more about the earth, the planet they have never known.

How to reinterpret tomorrow's clothes?

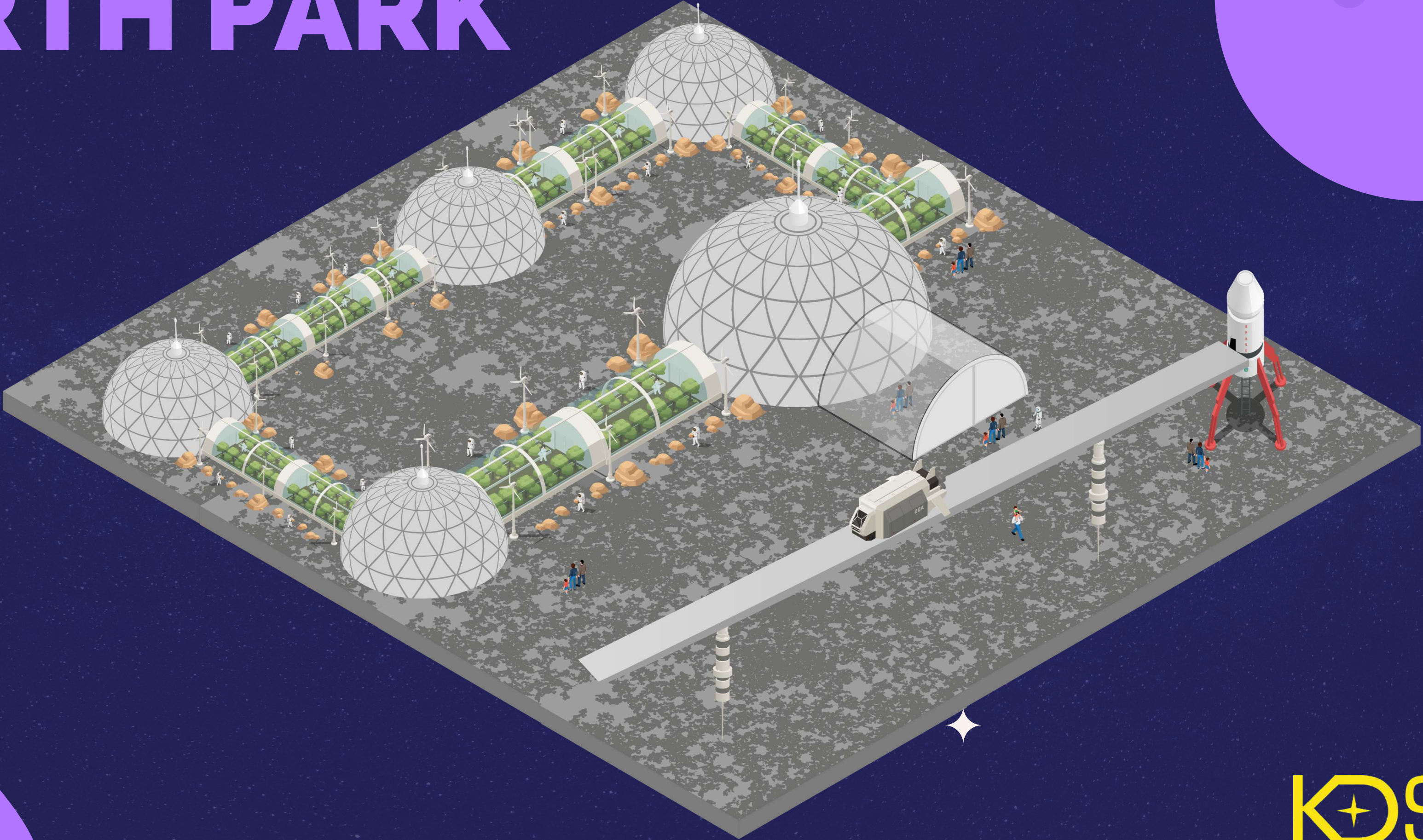
On the moon, our body deforms, stretches, we then found a new material to remedy these problems.

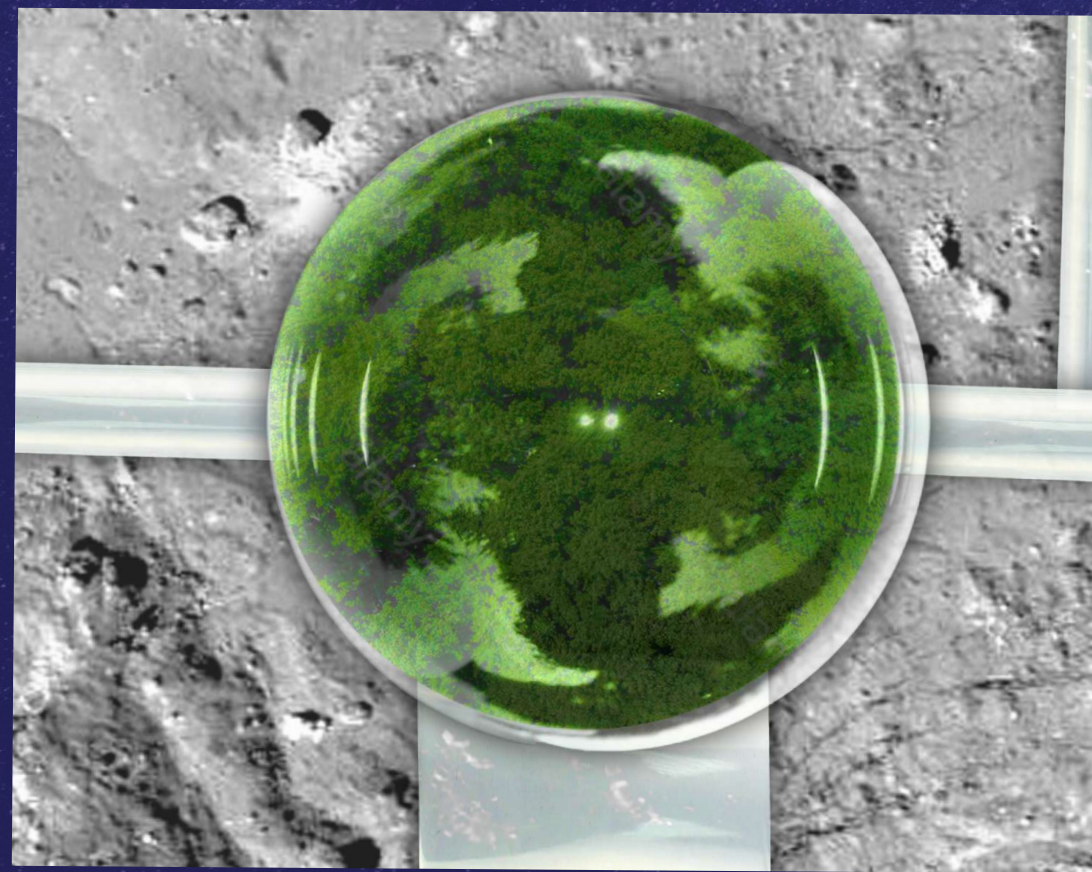
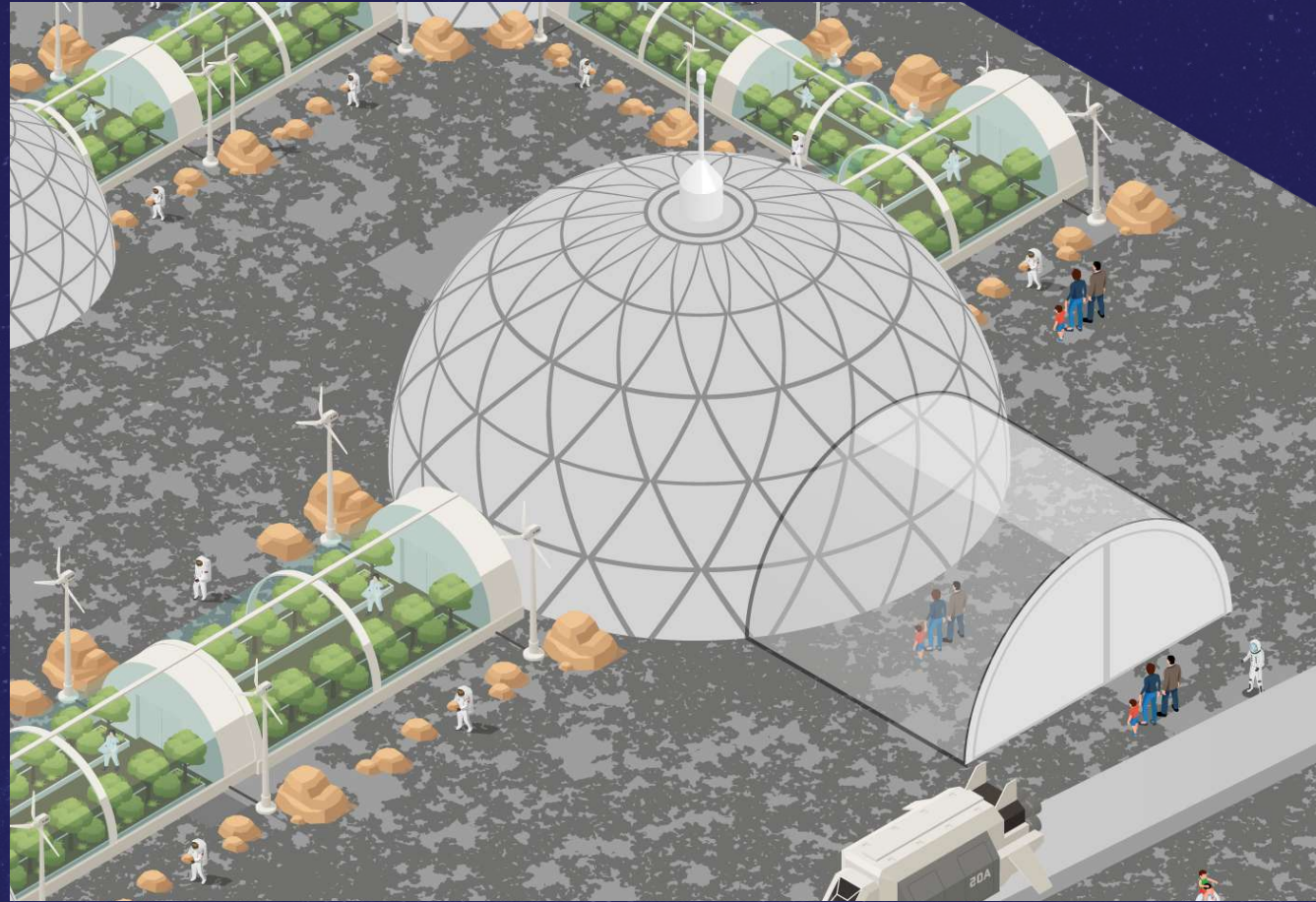
How can we stop today's mistakes with tomorrow's transport ?

Currently, transport occupies a preponderant place in the daily life of man and it will be the same on the moon. The Human is a nomadic being and this results in the daily use of these. Getting around is a major challenge for humans, allowing them to open up to new horizons.



EARTH PARK





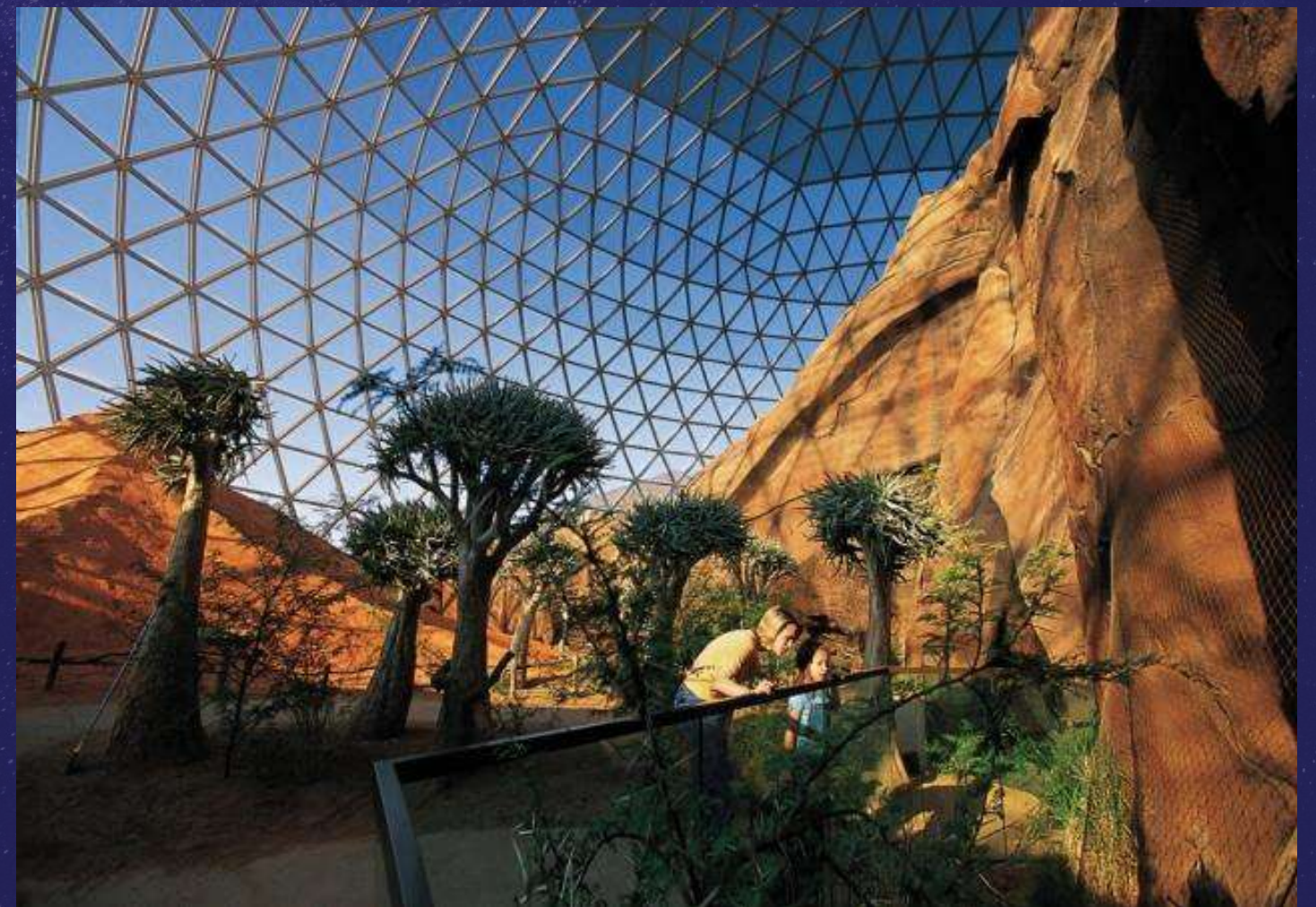
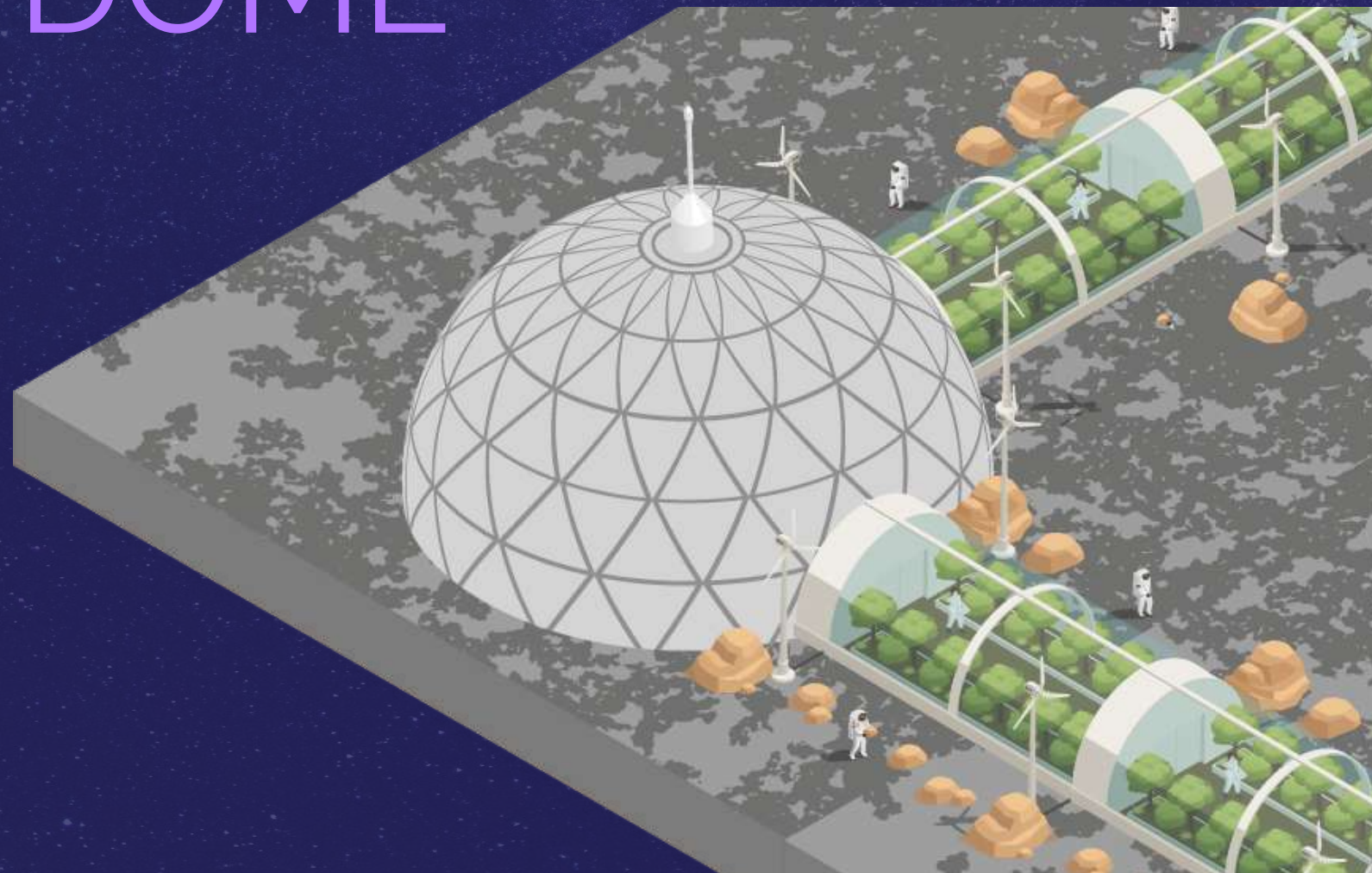
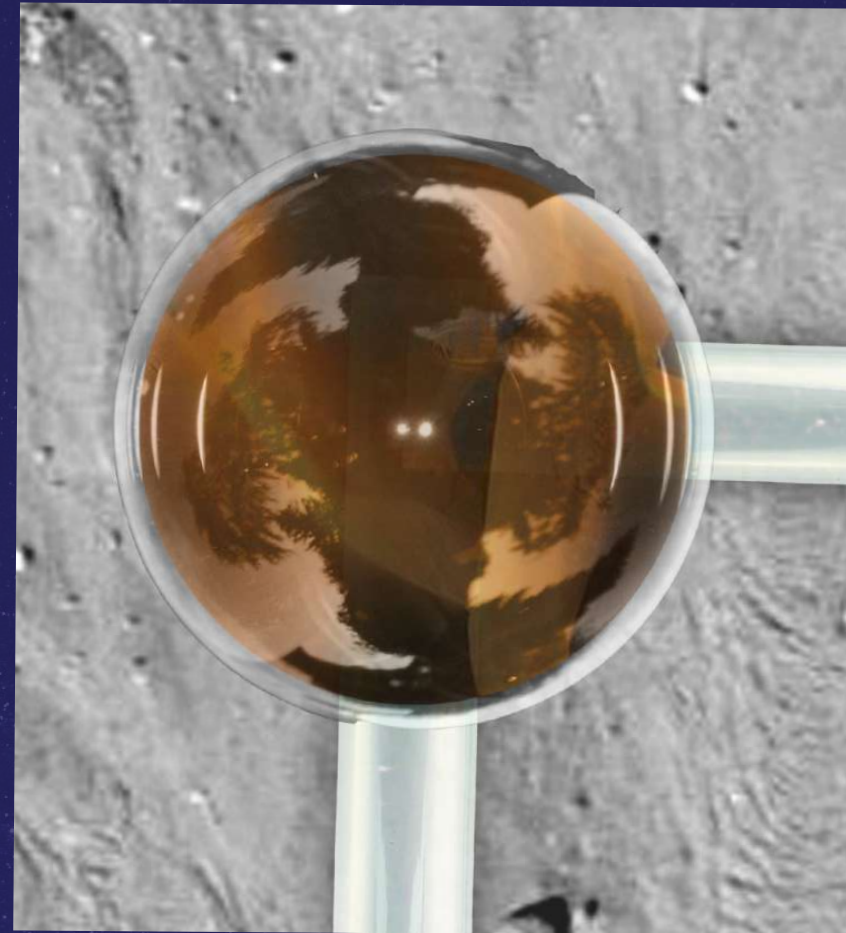
PRINCIPAL DOME

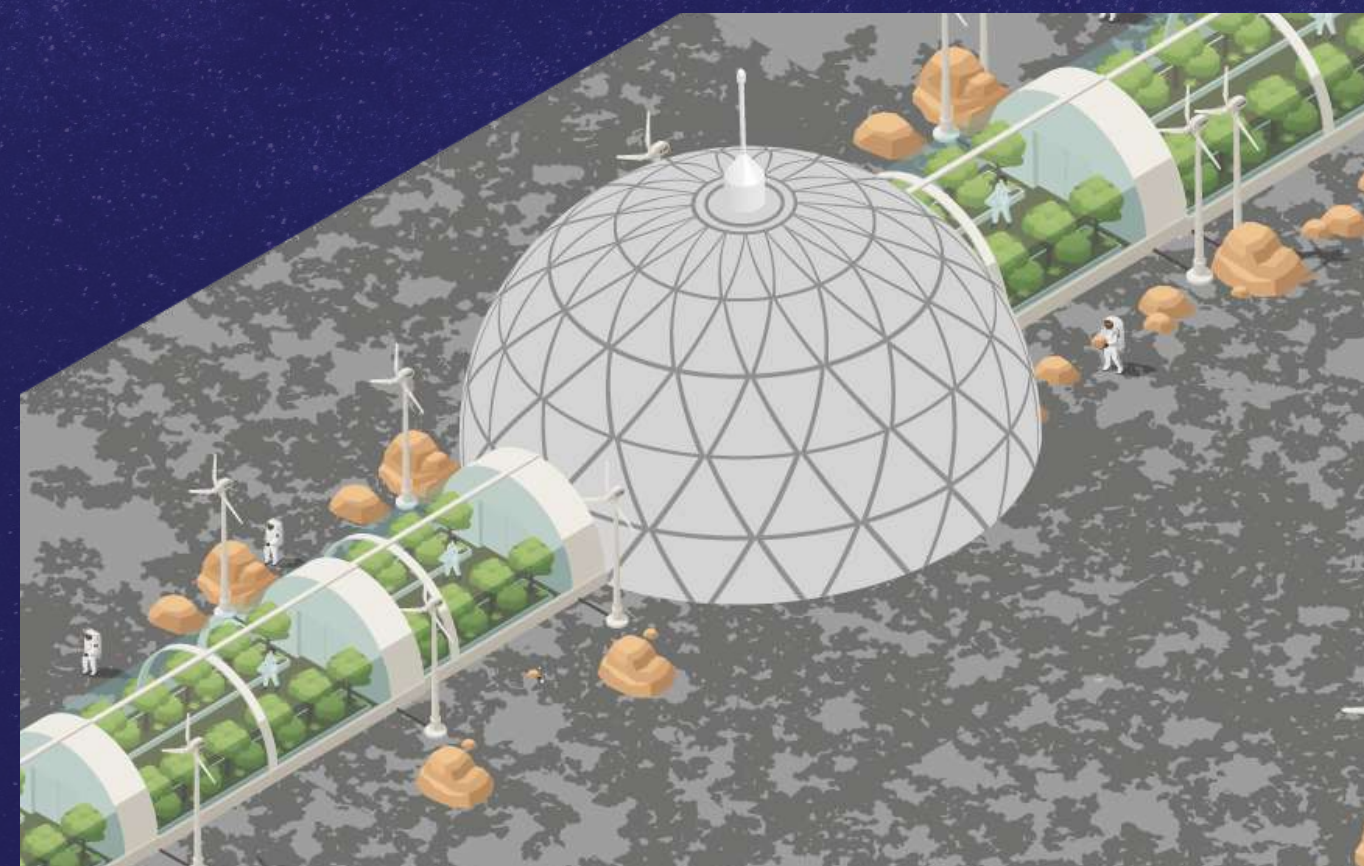
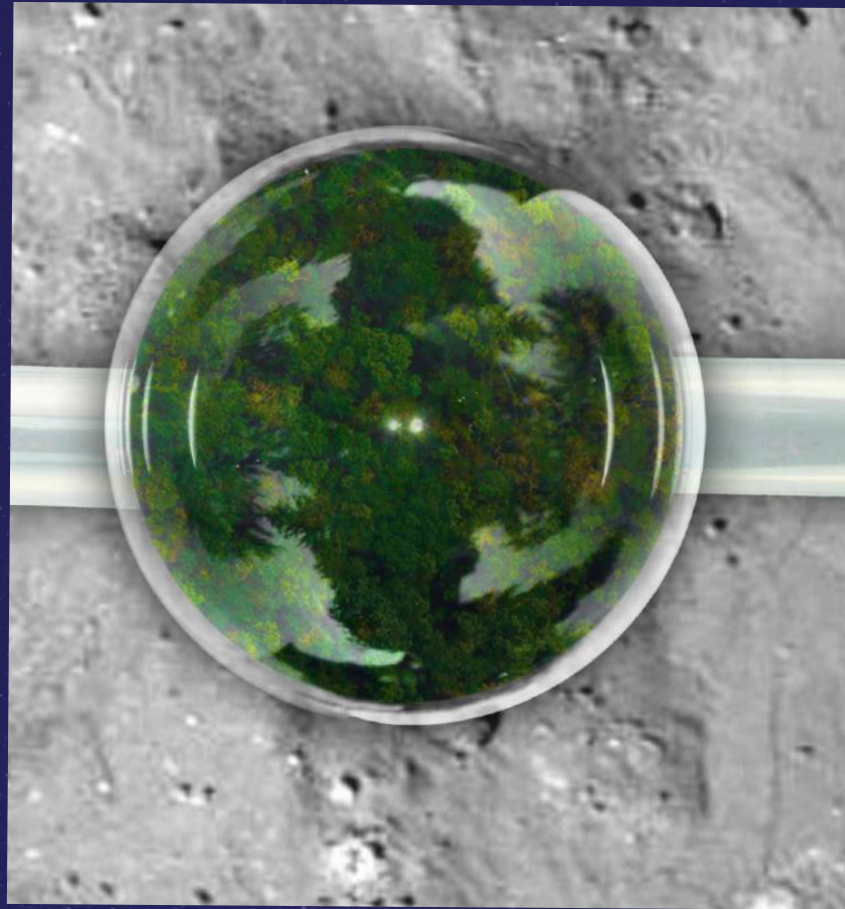
SECOND DOME





THIRD DOME

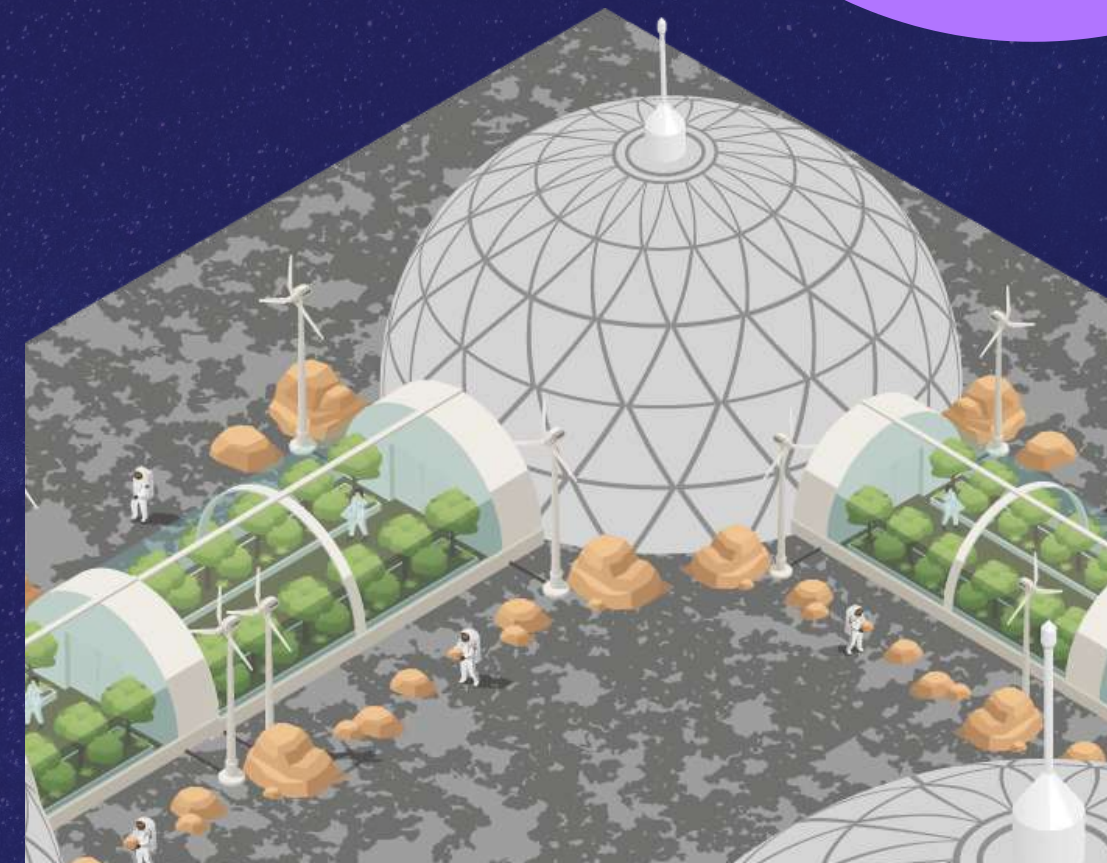
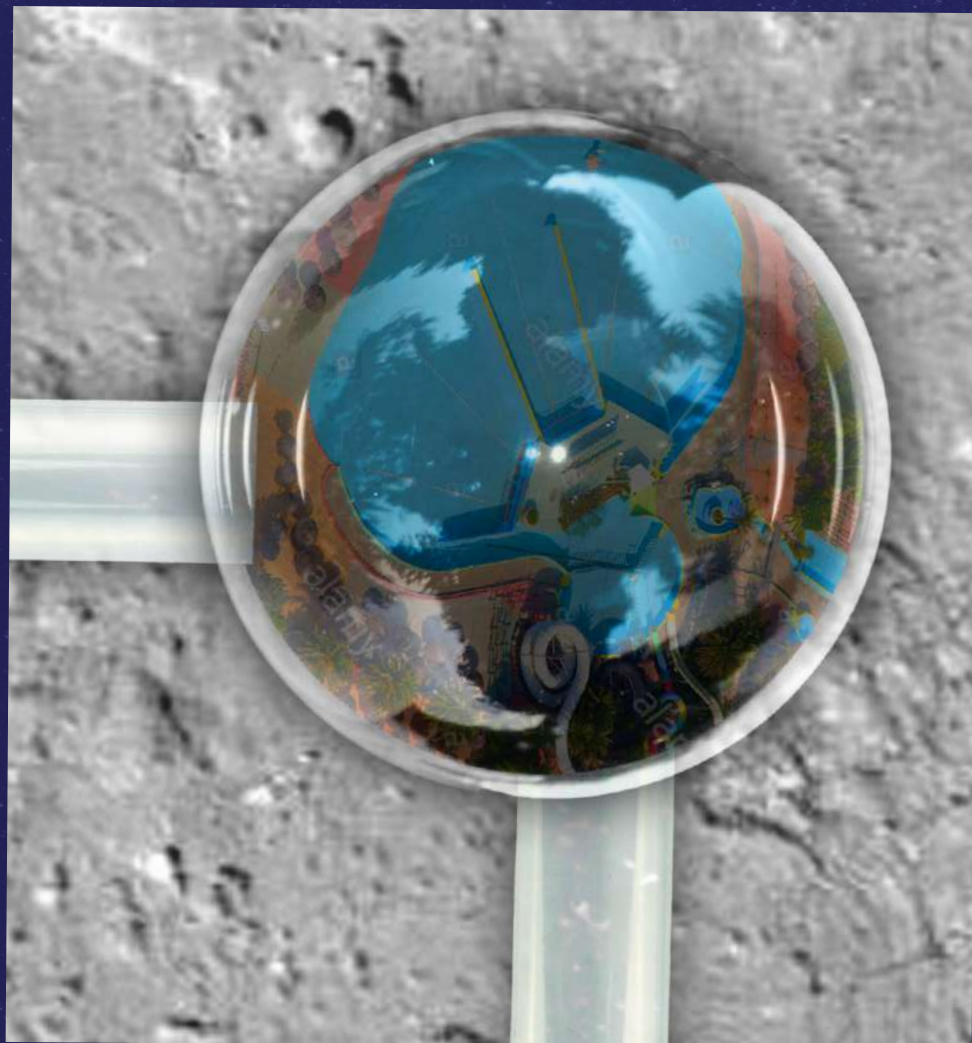




FOURTH DOME



FIFTH DOME



ORION





SPACE X ✨

DRAGON SUPPLY CAPSULE

During the colonization of the moon dozens of supplies will be sent.

The concept is to recover its capsules to make the transport of tomorrow.





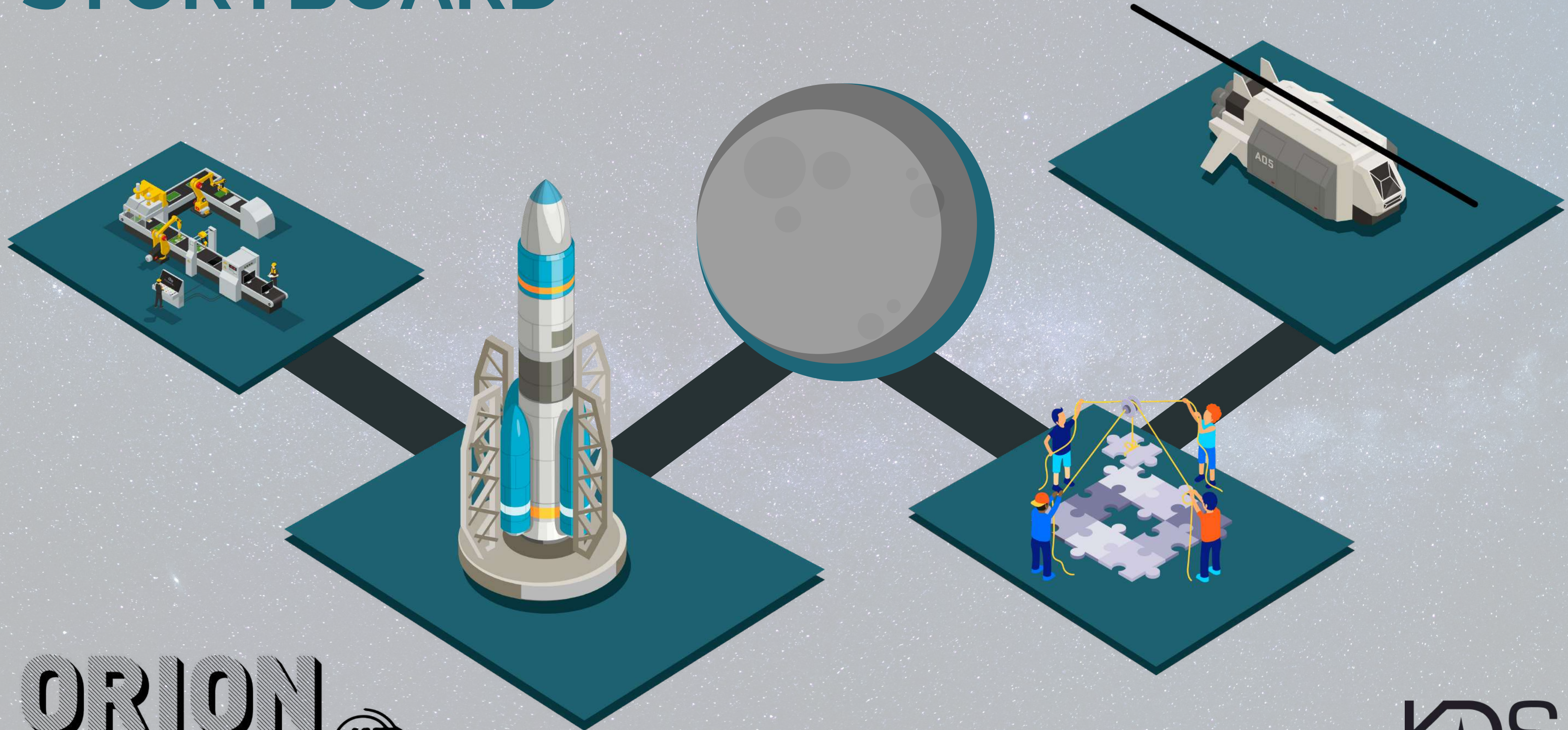
PROCESS

SAME SYSTEM AS A
CHAIRLIFT



To make our refueling capsule work and adapt as best as possible to the constraints of the moon, we have opted for an operation like a chairlift.

STORYBOARD

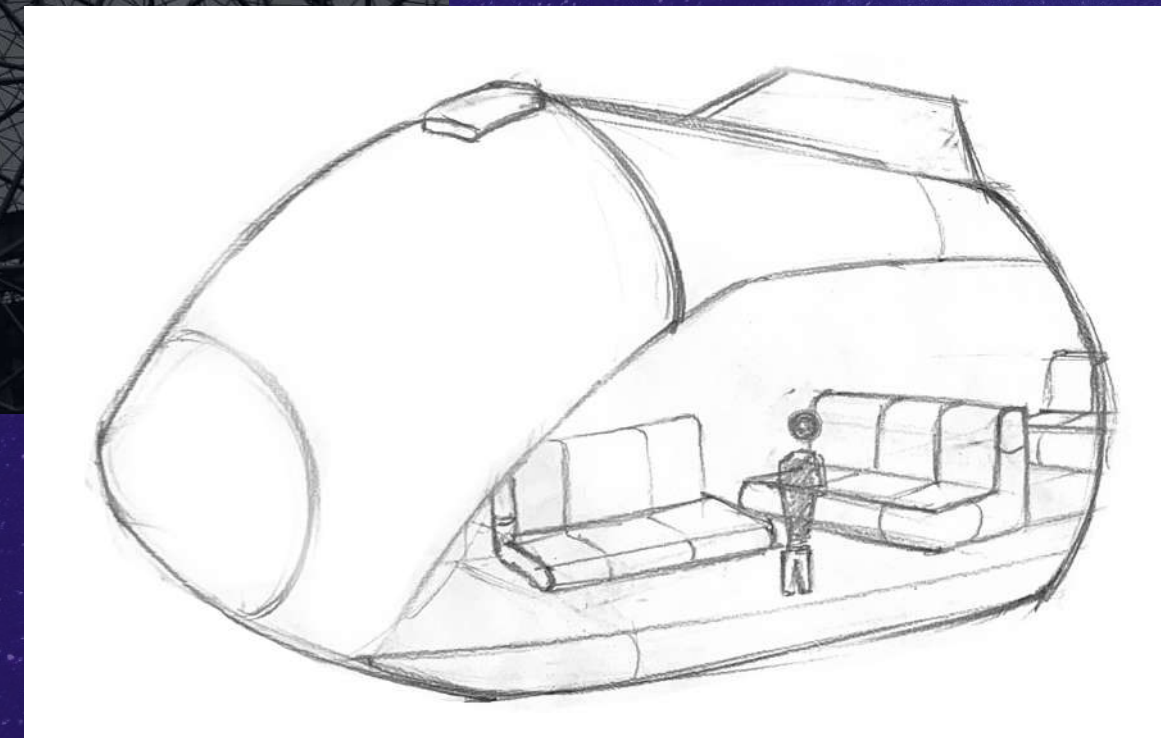


ORION 



ORION

Orion will be the safest form of transportation in your future! Designed on the model of a circular economy, the Orion aims to be a flagship inter-dome transport of the 23rd century.



TOMORROW'S CLOTHES

HOW TO REINTERPRET TOMORROW'S CLOTHES ?



FROM BAMBOO TO TISSU

BAMBOO IS A PLANT GROWING WITHOUT PESTICIDES, WITHOUT FERTILIZERS AND VERY QUICKLY (IT TAKES 1 METER PER MONTH MINIMUM). IT IS NOW USED TO MAKE VERY SOFT AND VERY COMFORTABLE AND ECOLOGICAL CLOTHES.



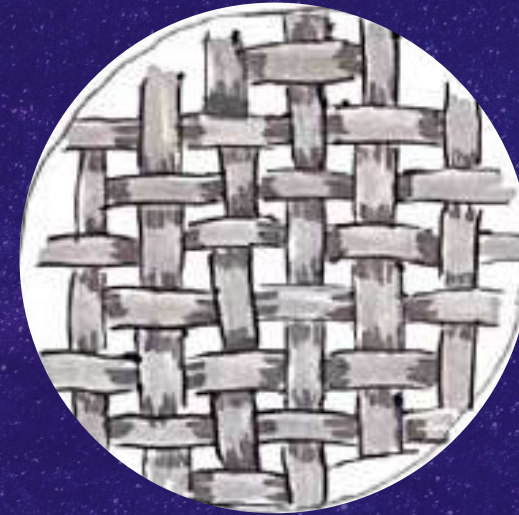


FROM BAMBOO TO TISSU

TRANSFORMATION OF
BAMBOO INTO TISSU



Grow bamboo first.



Then after all the manufacturing processes transform it into fiber and weave the bamboo viscose.



and here you are with a roll of cloth ready to be transformed into clothes or other things

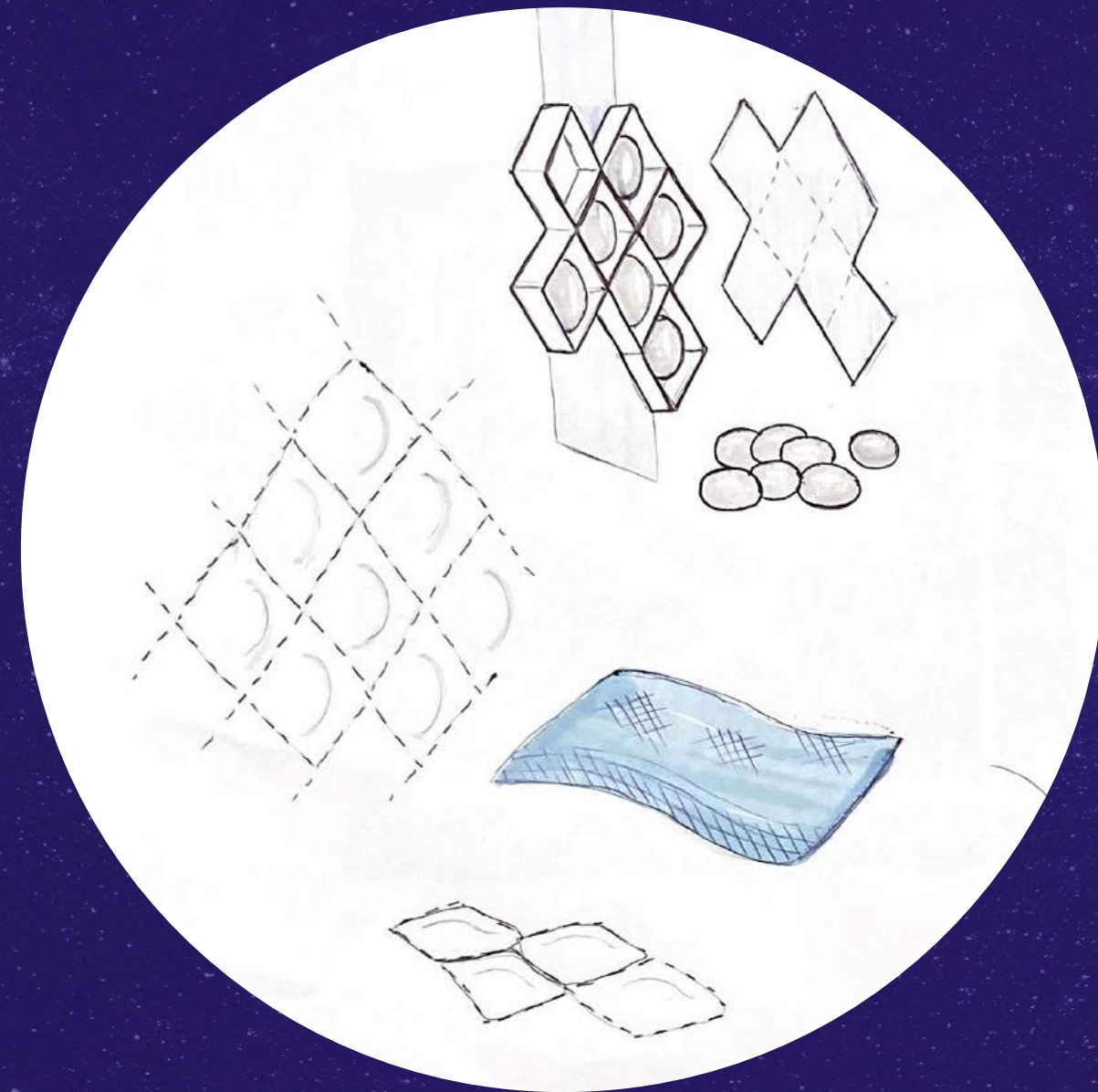
BRING THE BAMBOO TO THE MOON

HOW ?

Obviously there is no bamboo on the moon but it will be enough to bring them back in vessels and to implant them in domes when they arrive on the moon.



little man
with his
bamboo pot



TISSUE ALLY WITH LEAD

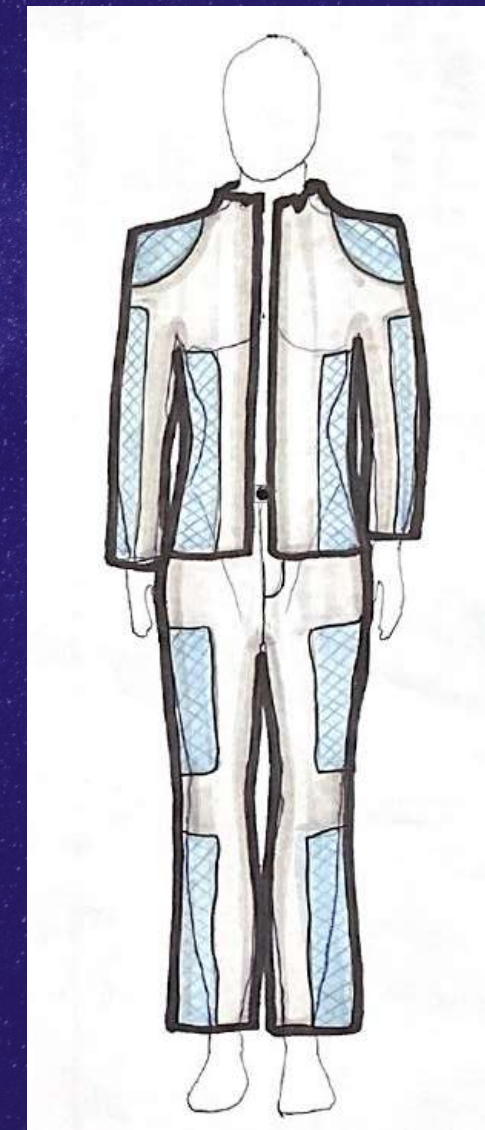
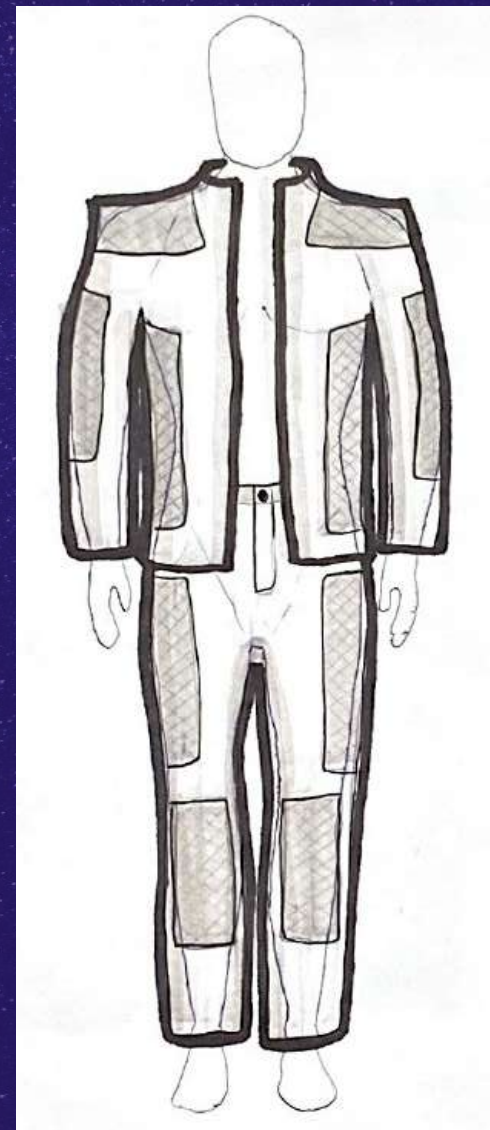
FOR THE FLEECE FABRIC, I COMBINE THE BAMBOO FABRIC WE MADE WITH LEAD TO CREATE A HEAVIER MATERIAL. JUST SEW 2 PIECES OF FABRIC WITH LEAD BEADS BETWEEN THE 2 PIECES. WE THEN GET A FLEECE FABRIC TO FIX ON OUTFITS TO MAKE THEM HEAVIER

THE DIFFERENT OUTFITS



DIFFERENT STYLES, DIFFERENT COLORS

For man



For women



THE DIFFERENT OUTFITS



DIFFERENT STYLES, DIFFERENT COLORS

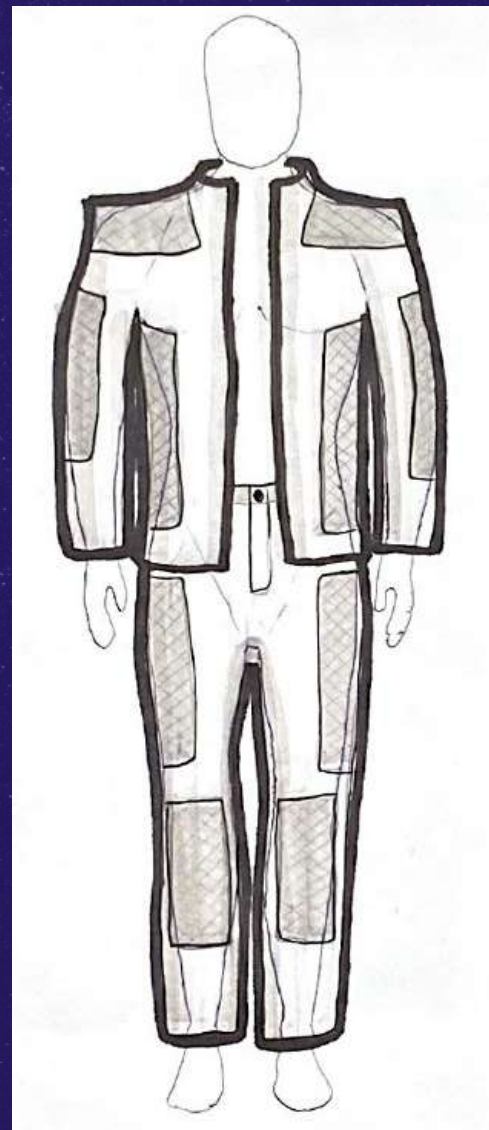


First, you have the work uniforms, for men and women, we've done that to have the fewest differences between man and women for an equality on the moon.

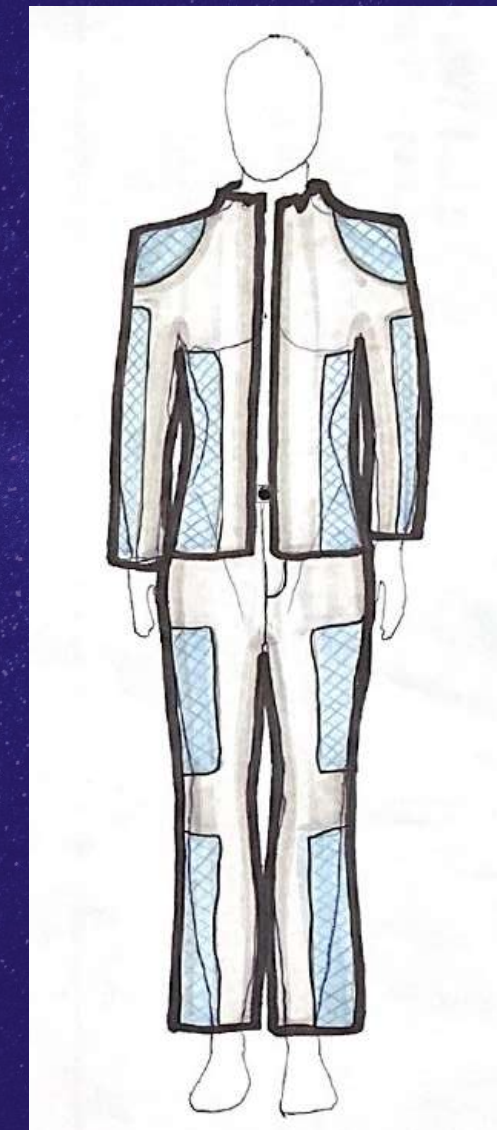


THE DIFFERENT OUTFITS

DIFFERENT STYLES, DIFFERENT COLORS



Second, you have evening, day, Sunday outfits. As for work outfits there are not many differences between that for men and that for women only the colors which can be different according to the tastes.

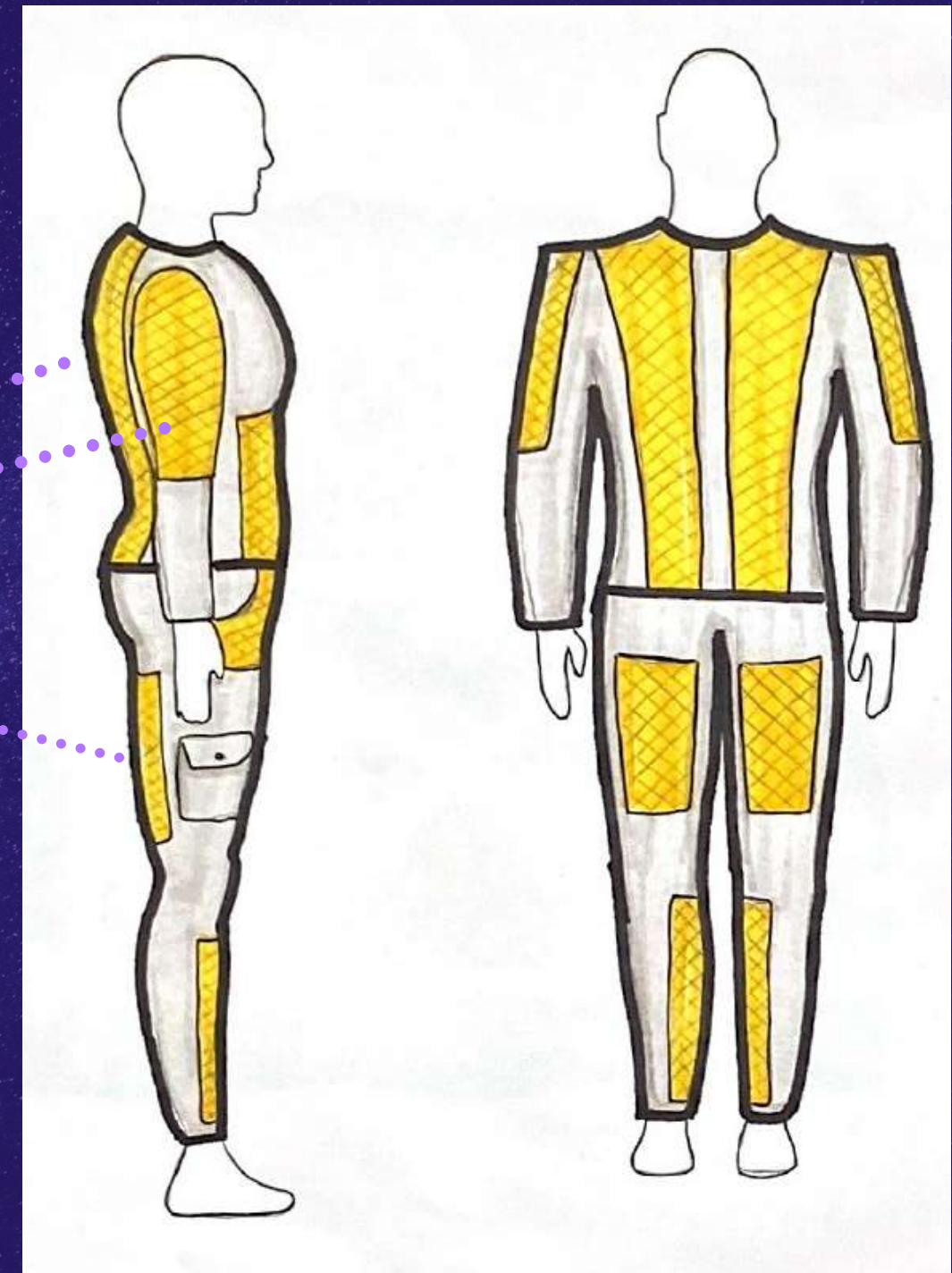


POSITIONING OF THE FLEECE FABRIC

THE FLEECE FABRIC HAS BEEN PLACED AT STRATEGIC LOCATIONS, AT THE LEVEL OF THE BACK TO GIVE A GOOD POSTURE TO THE USER, THEN AT THE LEVEL OF THE ARMS AND LEGS HAS ENDOITS WHICH DOES NOT INTERFERE TO MAKE QUICK AND SIMPLE MOVEMENTS.

Side

Back



THE DIFFERENT COLORS



In addition, there will be different colors of fleece, **red** for the police, **yellow** for engineers, **orange** for farmers, **dark blue** for doctors, **light blue** for scientists and 2 different gray for the evenings. Other colors may be added depending on the business.

PRODUCTION

Energy Solutions on Moon

PRESENTED BY ANTOINE COLSON

“

THE IMPORTANCE OF ENERGY

Energy is what make life possible and one day humans may live and work on the moon for weeks or even months. Energy and power will make it possible to travel to and live on the lunar surface. Humans must choose the appropriate energy source and technological means to produce that power.





“

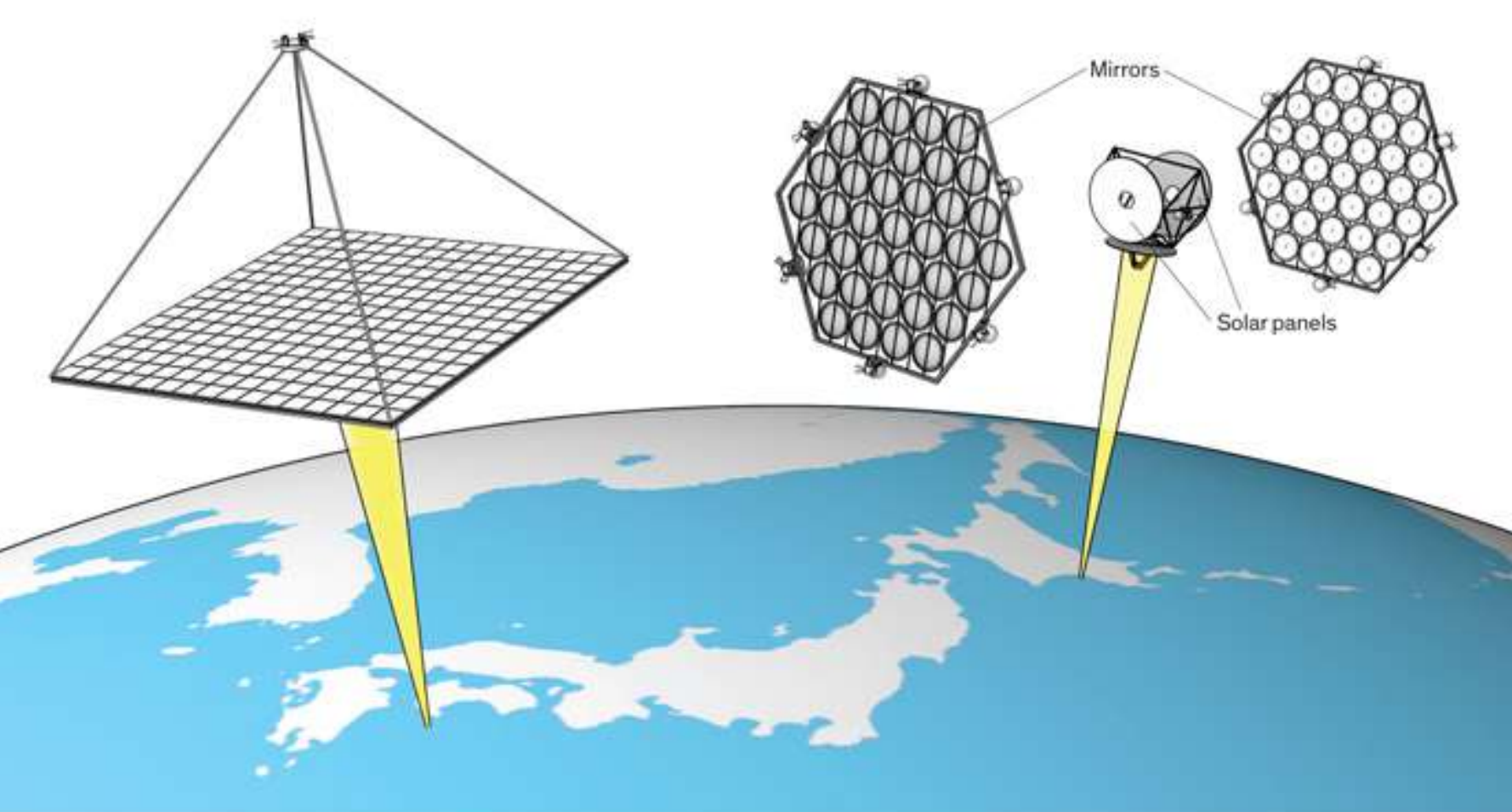
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● **ORBITAL SOLAR STATION**
Sun is the cleaner energy source around why don't we use the maximum of it

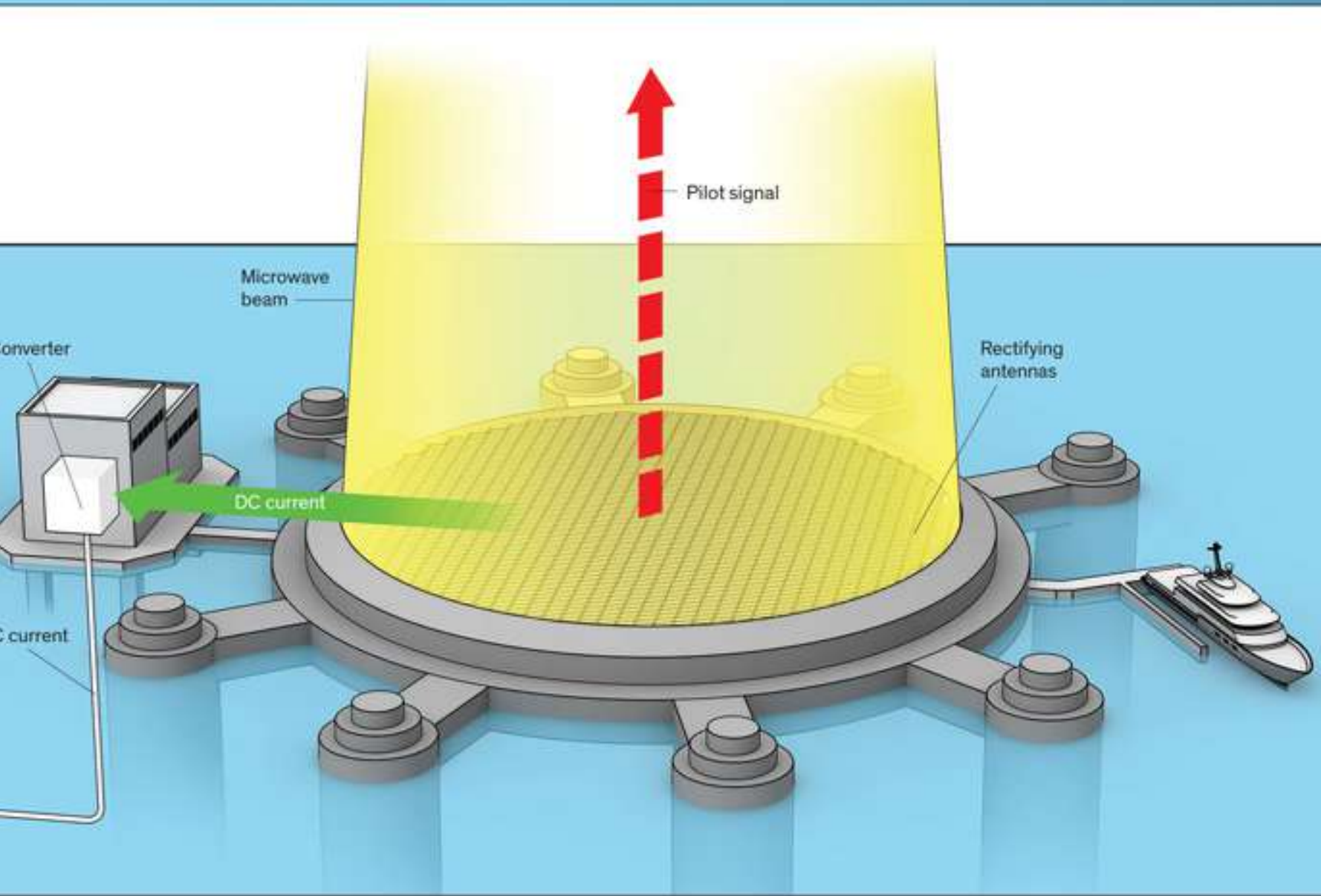
● **THORIUM ENERGY**
Thorium based energy, Cleaner Nuclear source

● **CIRCULAR ECONOMY**
On the moon we cannot let waste be a problem everything must be reuse



ORBITAL SOLAR STATION

[HTTPS://SPECTRUM.IEEE.ORG/GREEN-TECH/SOLAR/HOW-JAPAN-PLANS-TO-BUILD-AN-ORBITAL-SOLAR-FARM](https://spectrum.ieee.org/green-tech/solar/how-japan-plans-to-build-an-orbital-solar-farm)



It would be difficult and expensive, but the payoff would be immense, and not just in economic terms. Throughout human history, the introduction of each new energy source—beginning with firewood, and moving on through coal, oil, gas, and nuclear power—has caused a revolution in our way of living. If humanity truly embraces space-based solar power, a ring of satellites in orbit could provide nearly unlimited energy, ending the biggest conflicts over Earth's energy resources. As we place more of the machinery of daily life in space, we'll begin to create a prosperous and peaceful civilization beyond Earth's surface.

ORBITAL SOLAR STATION

[HTTPS://SPECTRUM.IEEE.ORG/GREEN-TECH/SOLAR/HOW-JAPAN-PLANS-TO-BUILD-AN-ORBITAL-SOLAR-FARM](https://spectrum.ieee.org/green-tech/solar/how-japan-plans-to-build-an-orbital-solar-farm)

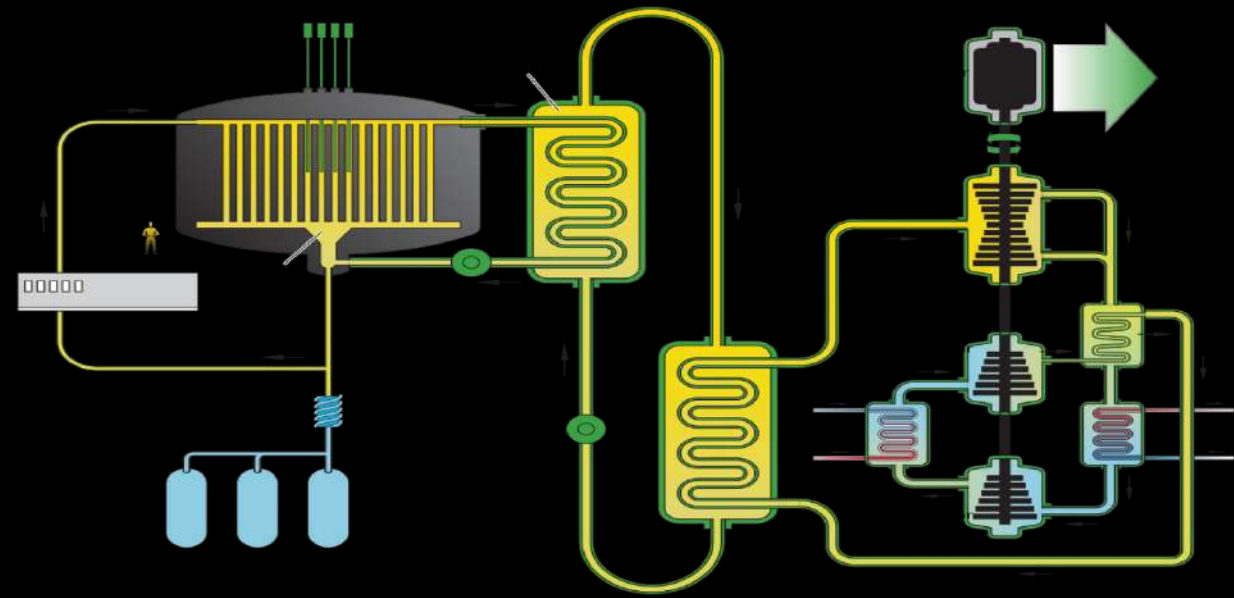
GROUND STATION

[HTTPS://SPECTRUM.IEEE.ORG/GREEN-TECH/SOLAR/HOW-JAPAN-PLANS-TO-BUILD-AN-ORBITAL-SOLAR-FARM](https://spectrum.ieee.org/green-tech/solar/how-japan-plans-to-build-an-orbital-solar-farm)



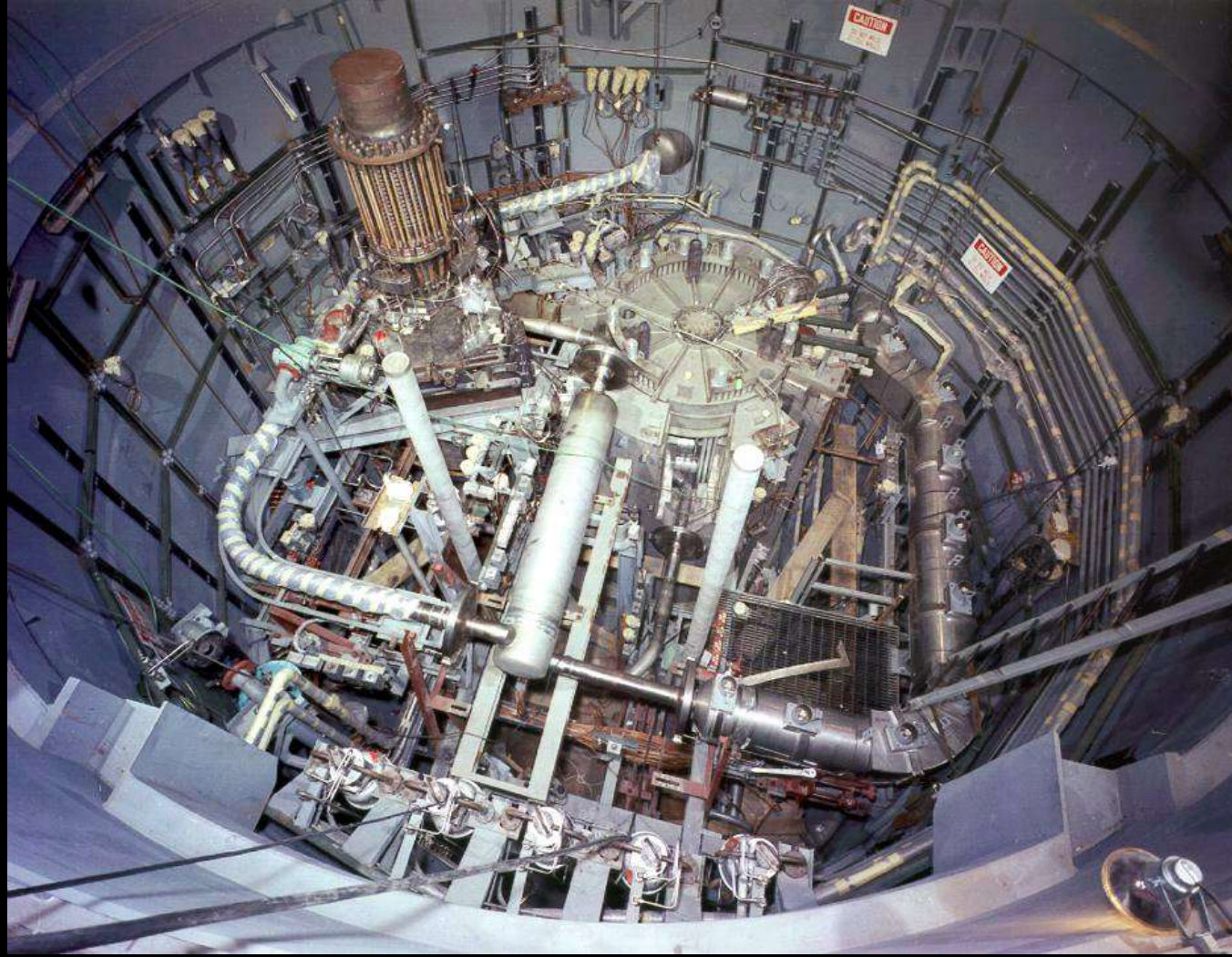
NUCLEAR ENERGY

[HTTPS://SPECTRUM.IEEE.ORG/GREEN-TECH/SOLAR/HOW-JAPAN-PLANS-TO-BUILD-AN-ORBITAL-SOLAR-FARM](https://spectrum.ieee.org/green-tech/solar/how-japan-plans-to-build-an-orbital-solar-farm)



The amount of energy per kg of thorium is huge: 11 million kW-hr per kg. Besides having a lot of thorium on earth, a lot of thorium deposits have been detected on the moon.



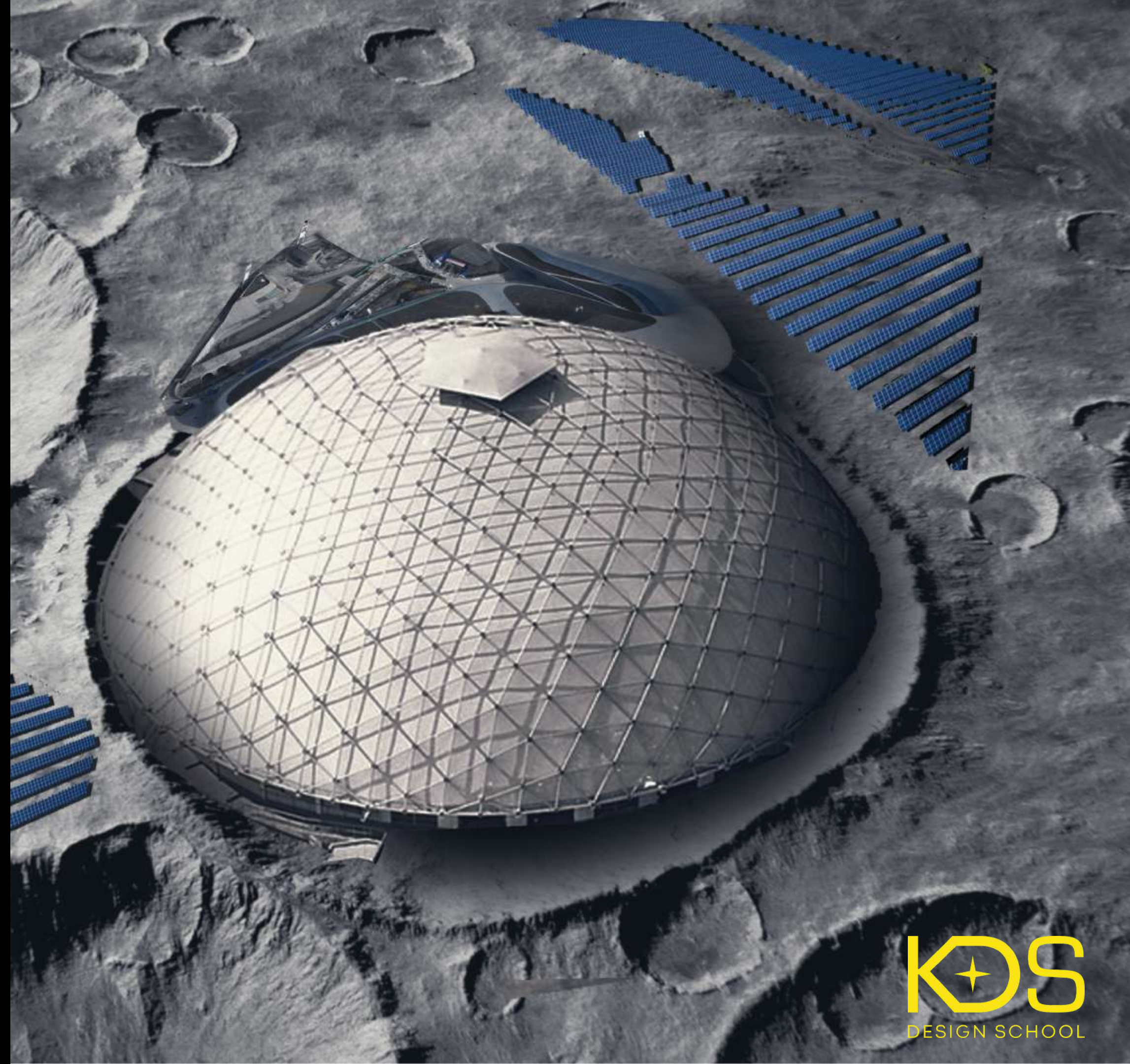


Some believe thorium is key to developing a new generation of cleaner, safer nuclear power. Thorium-based power can be a 1000+ year quality low-carbon solution bridge to truly sustainable energy sources

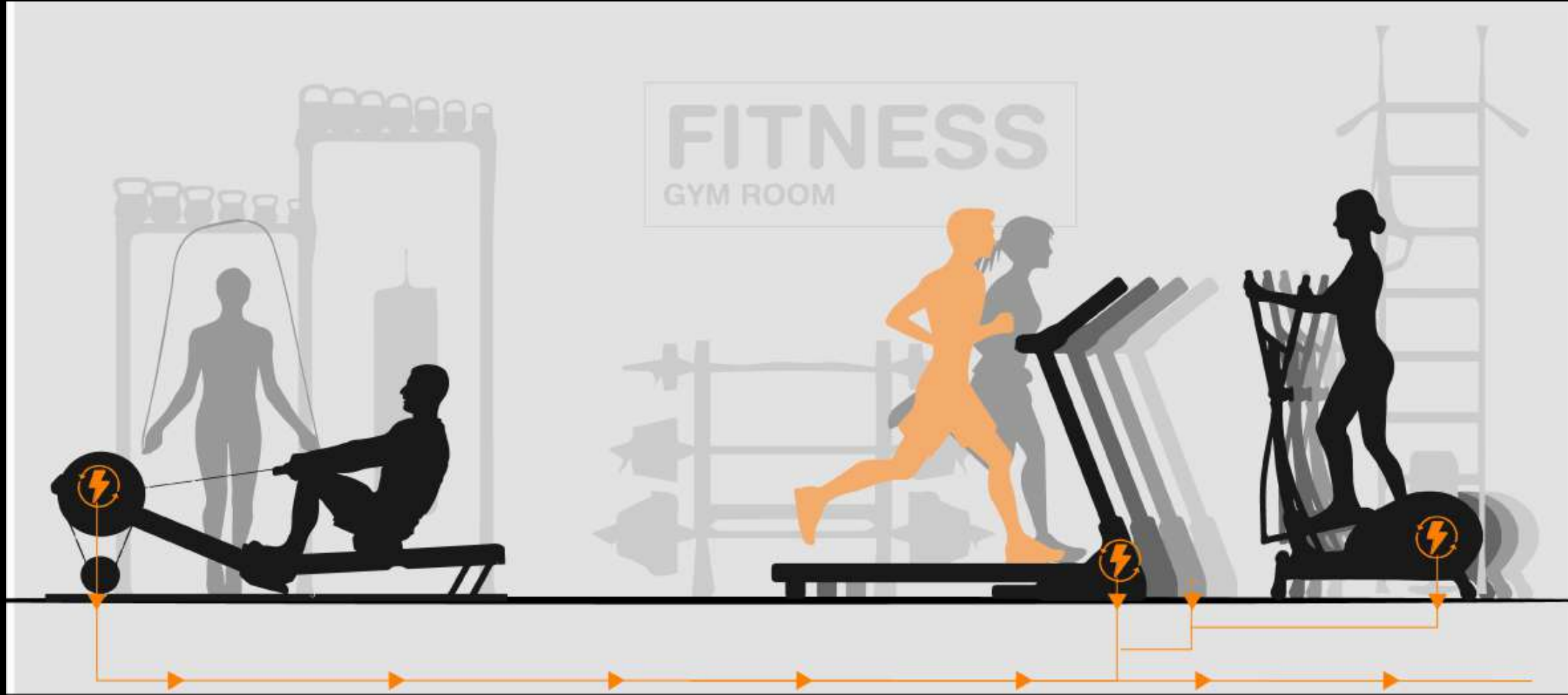




In the long term in order to save valuable human resources and optimize energy management, production will be left to a robotic workforce that will be responsible for the production of good for the colony. This will give precious time for potential workers to concentrate on more complex and Important tasks



CIRCULAR ECONOMY



On the moon the energy will be precious and we cannot afford to lose it.

So nothing must be left behind. Human and non-human waste will be recycled, those that cannot be recycled will be burned and heat will heat homes. The sports equipment will be equipped with dynamo to transform mechanical energy into electricity

This society would be based on a circular economy by necessity and everything will be reused as possible in order to generate the less waste possible.

LIFE WITHIN SPACE

Lunar Habitat

PRESENTED BY JOEL KOFFI

GROUP B

SUMMARY

CONTEXT & CONSTRAINTS

UNDERGROUND BUILDING CONCEPT

LUNAR DISTRICT

URBAN PLAN

ORBITING SPACE STATION


CONCLUSION

CONTEXT

- o Human have settle down for **50-100 years**
- o Scale: Around **700-1000** habitants
- o A **city-sized** territory
- o Trying to adapt to a **harsh environment**
- o A **collaborative** way of life

CONSTRAINTS

- o A harsh environment
- o Energy resources
- o Mental health
- o Habitat's design

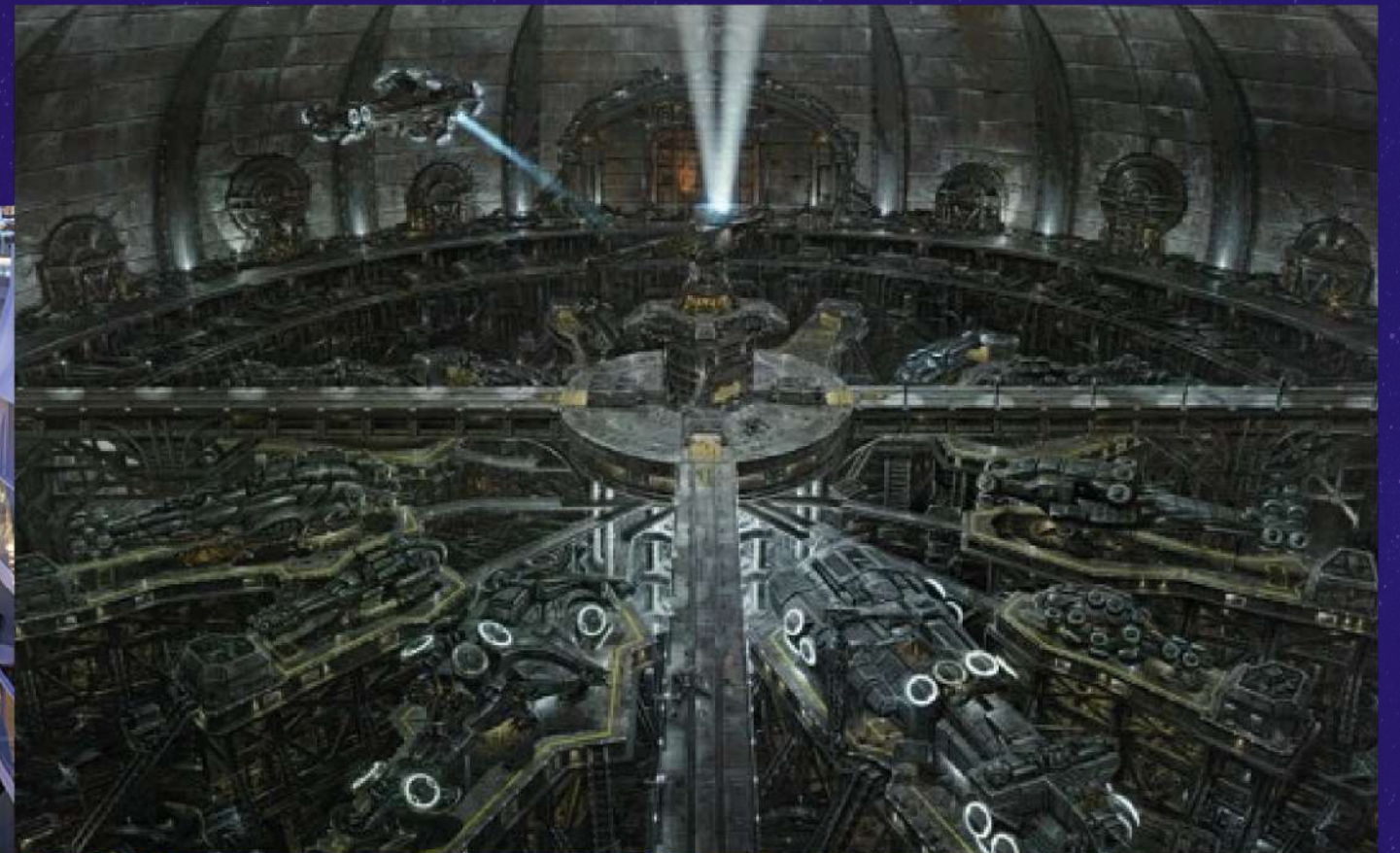


**What are the
habitat solutions
on the moon?**

MICRO-CITY INSPIRATION.

In a hostile environment, people are brought together and live in a community.

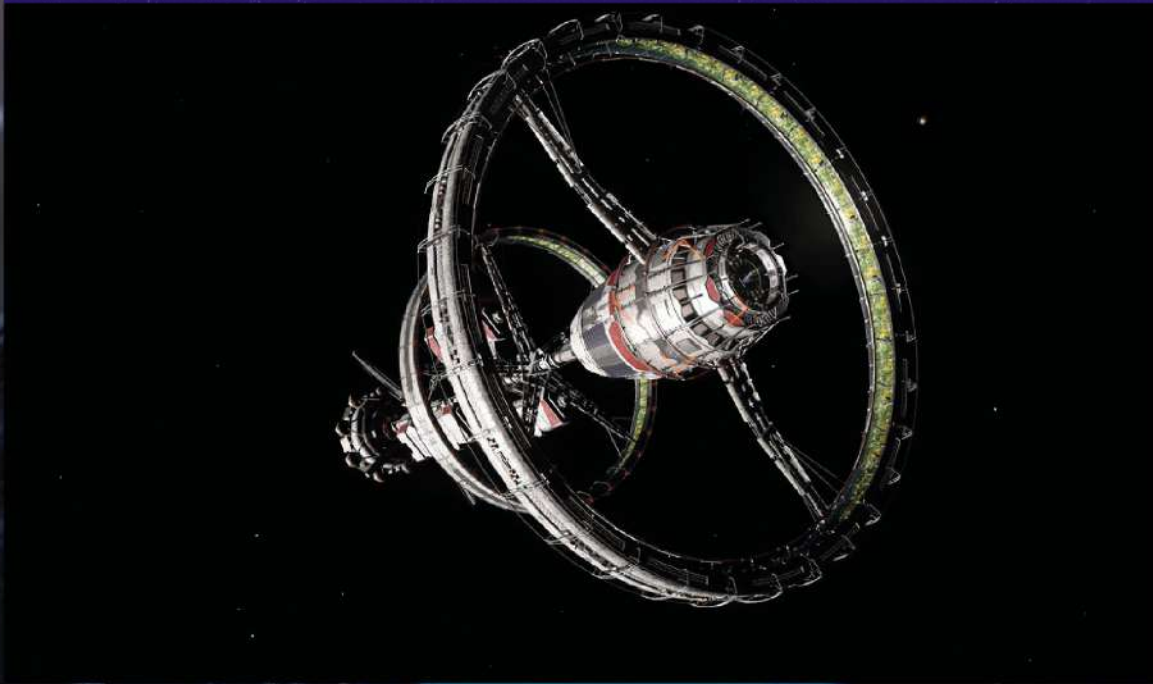
These places bring solutions to meet vital humans functions.



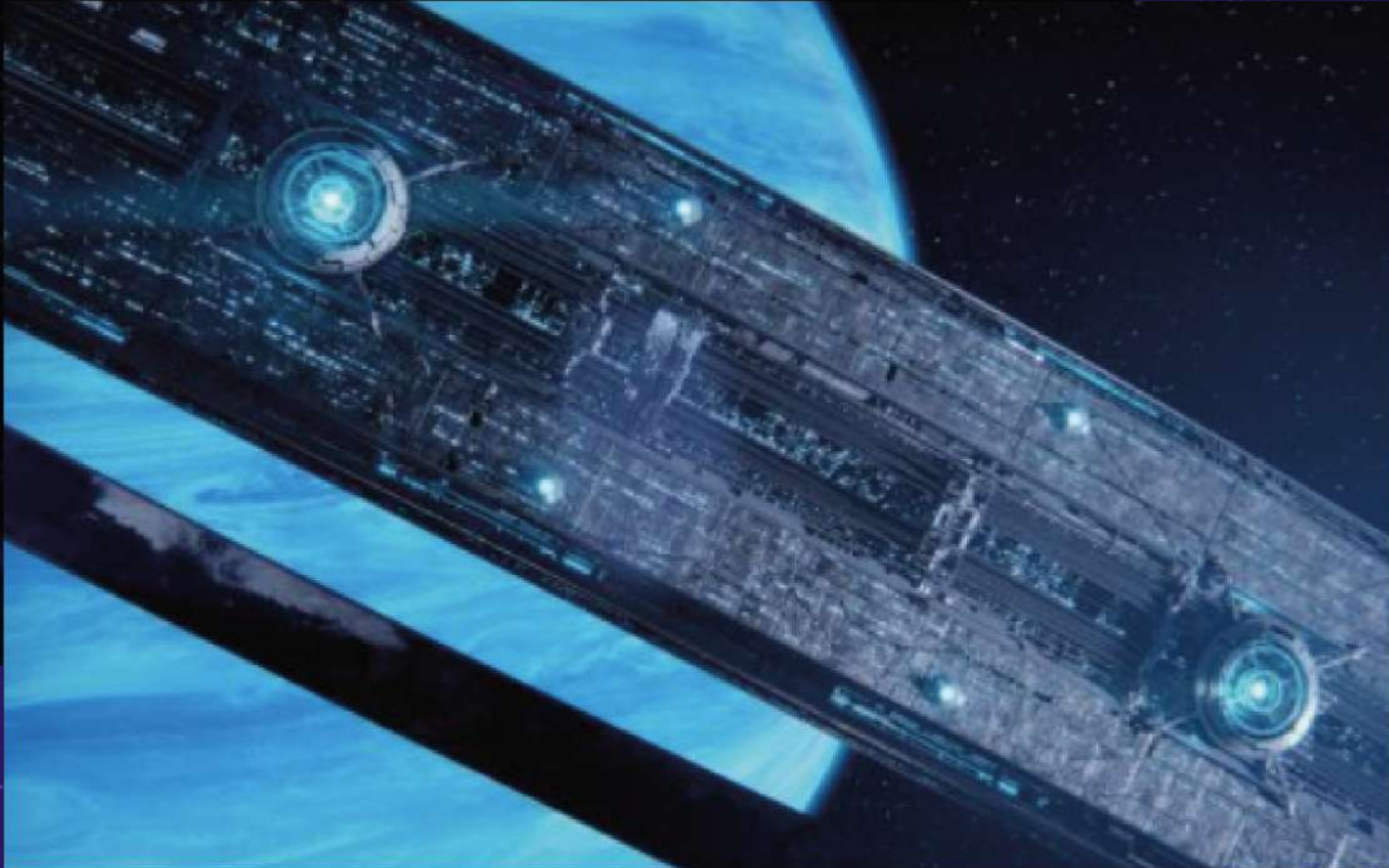
We assume that humans already solved the gravity issue within the lunar habitat, for exemple with special clothe or weight equipment (agathe largeau & felix grass)



SPACE HABITAT INSPIRATION.



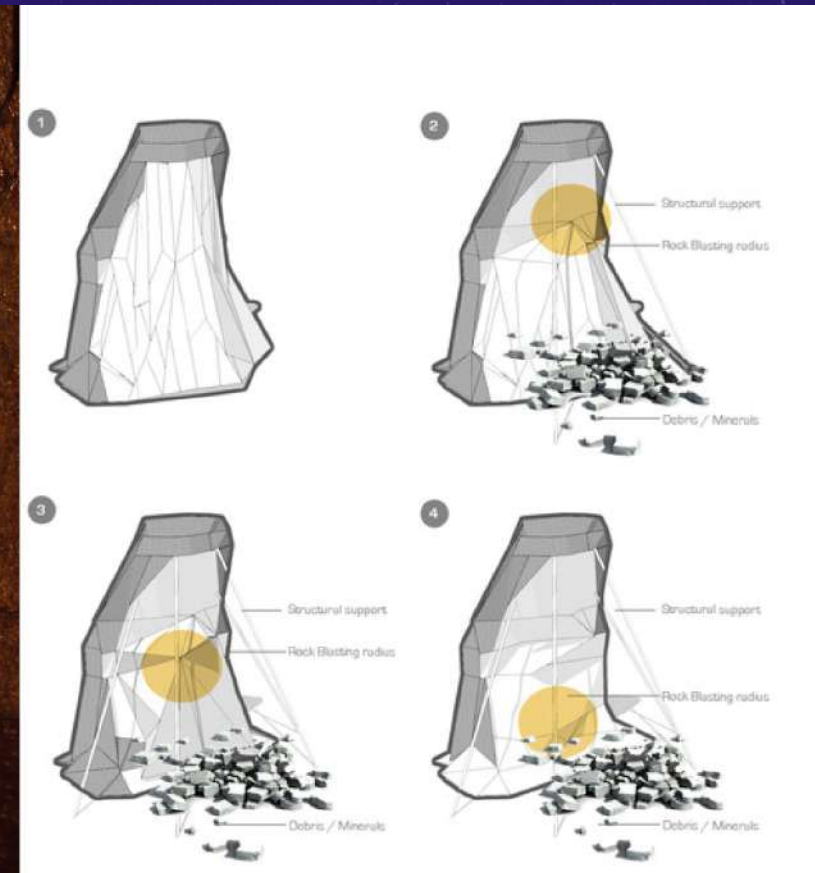
The circular ring for living in space are interesting concepts that can be found in some movies and space video games.



GALLERIES HABITAT INSPIRATION

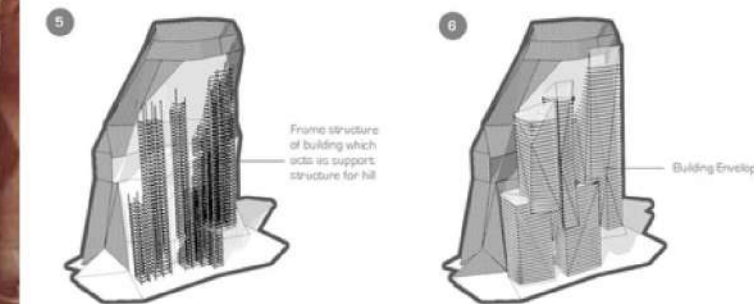


Habitats in caves or caverns are interesting solutions, especially concerning the protection of the population against external dangers (solar radiation, meteorites ...).



LIMESTONE MINING

- (1) Suitable limestone hill designated for limestone mining
- (2) Reinforced rods are used to support the peak of the mountain. First sequence of controlled blasting is right below the structural rod support.
- (3) Blasting proceeds to the centre of the hill. More structural rods are introduced to prevent the hill from collapsing.
- (4) Final blasting is at the foot of the hill. Mineral and rocks are transported



LIMESTONE ARCHITECTURE

- (5) The empty shell of the limestone hill is then reinforced with steel structures which acts as the frame structure of the building
- (6) Building envelope is then installed onto the frame structure creating beautiful spaces underneath the limestone.

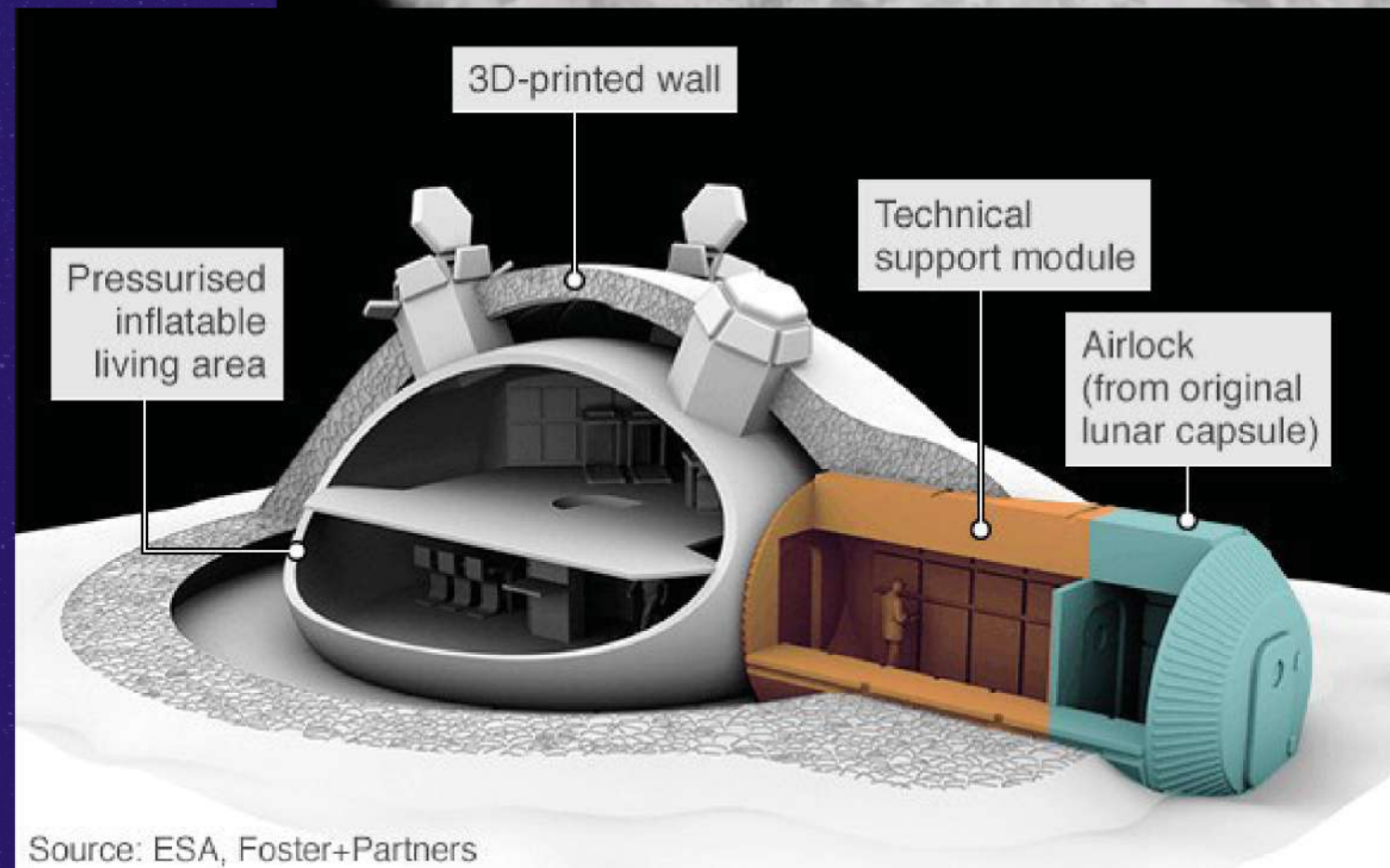
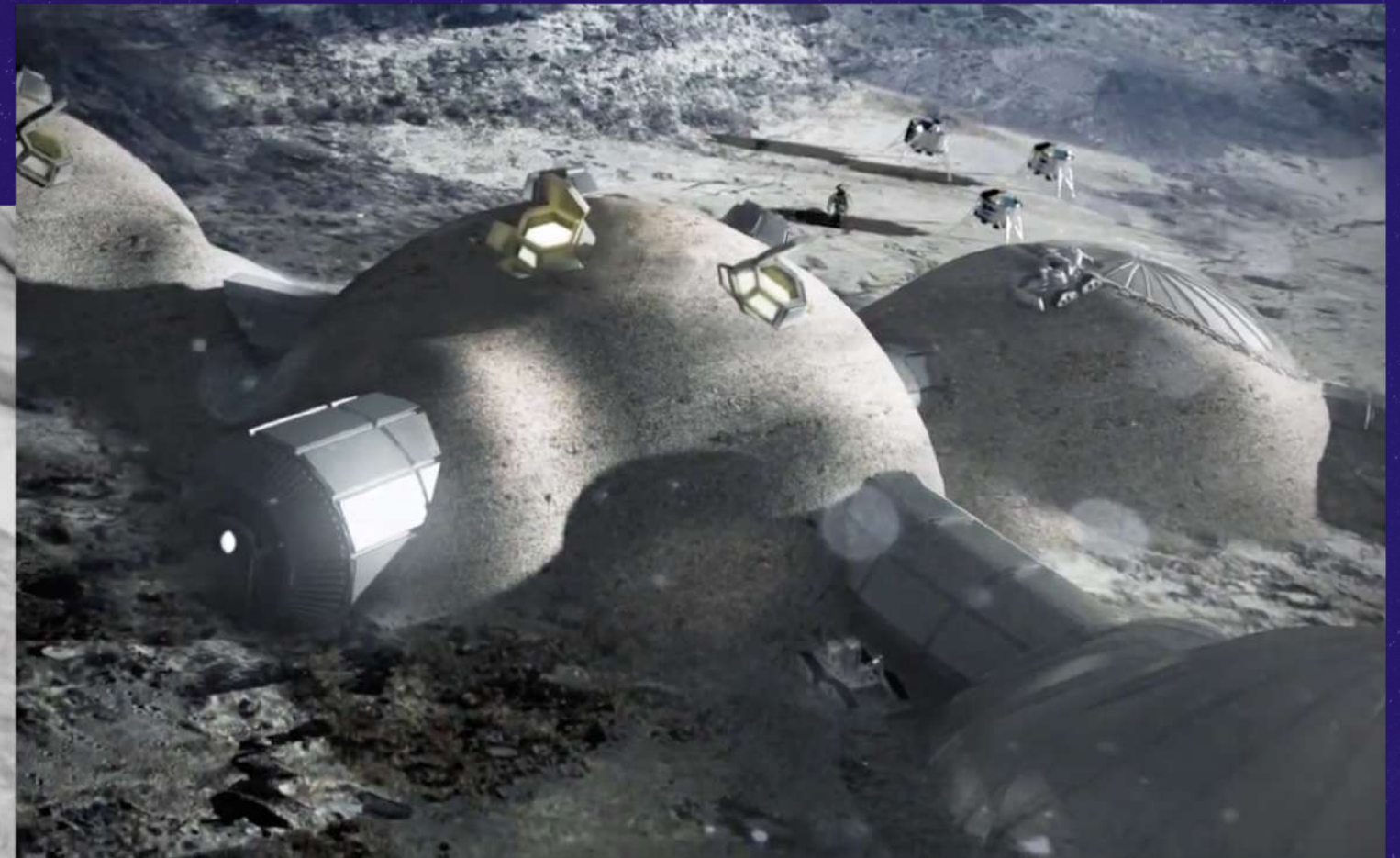


CONCEPT SCALABILITY

The concept of re-using any limestone mining site can be further explored to different types of monolithic mountains as well as mountain belts with architecture that truly adapts itself to the surrounding terrain. However, it is imperative that proper planning of limestone mining has to take place to create a city-scape of monumental buildings.

SURFACE HABITAT INSPIRATION.

ESA already offers some solutions for living on the moon surface, covered by a regolith-based wall 3D printed.

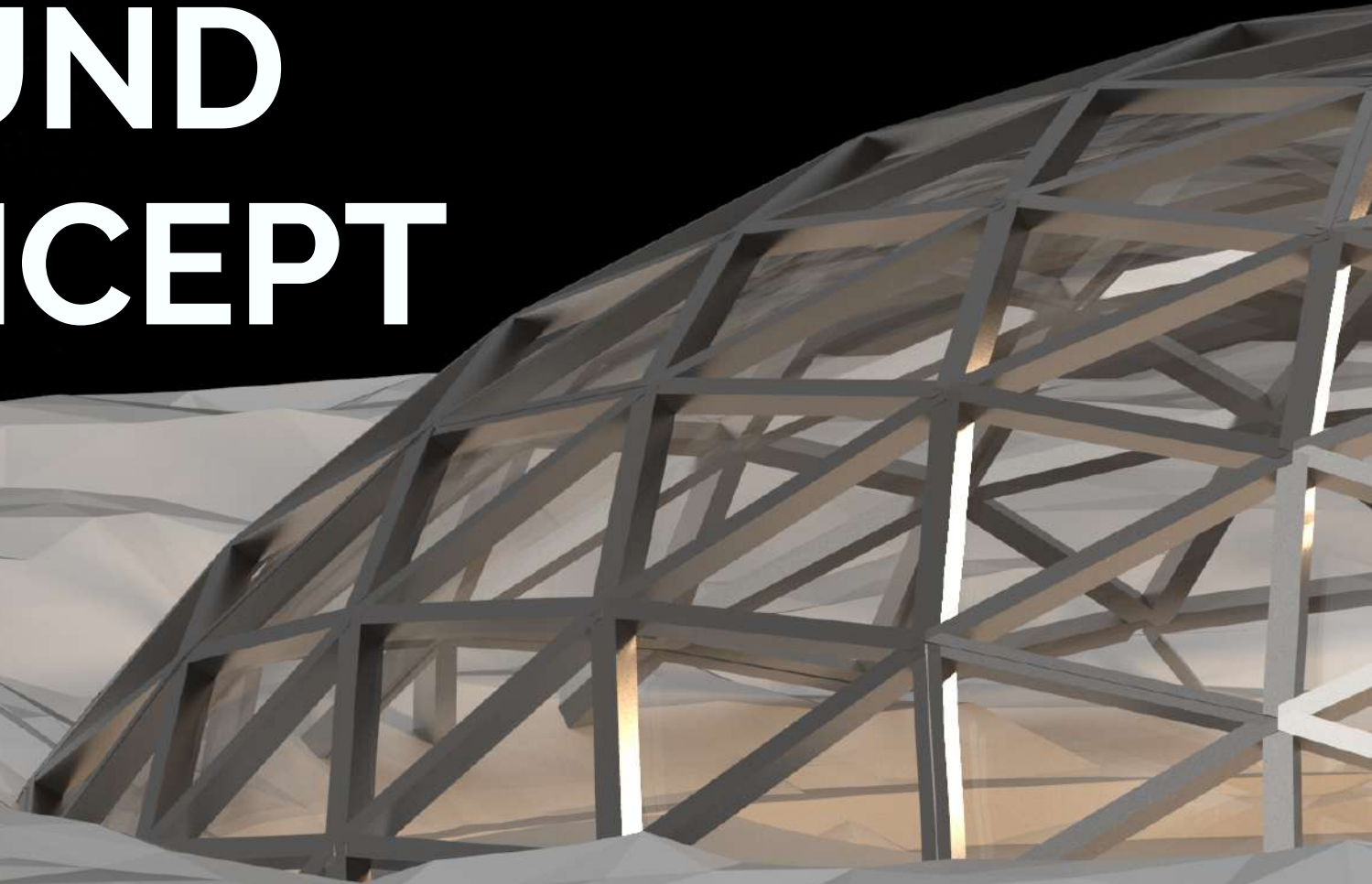


Source: ESA, Foster+Partners

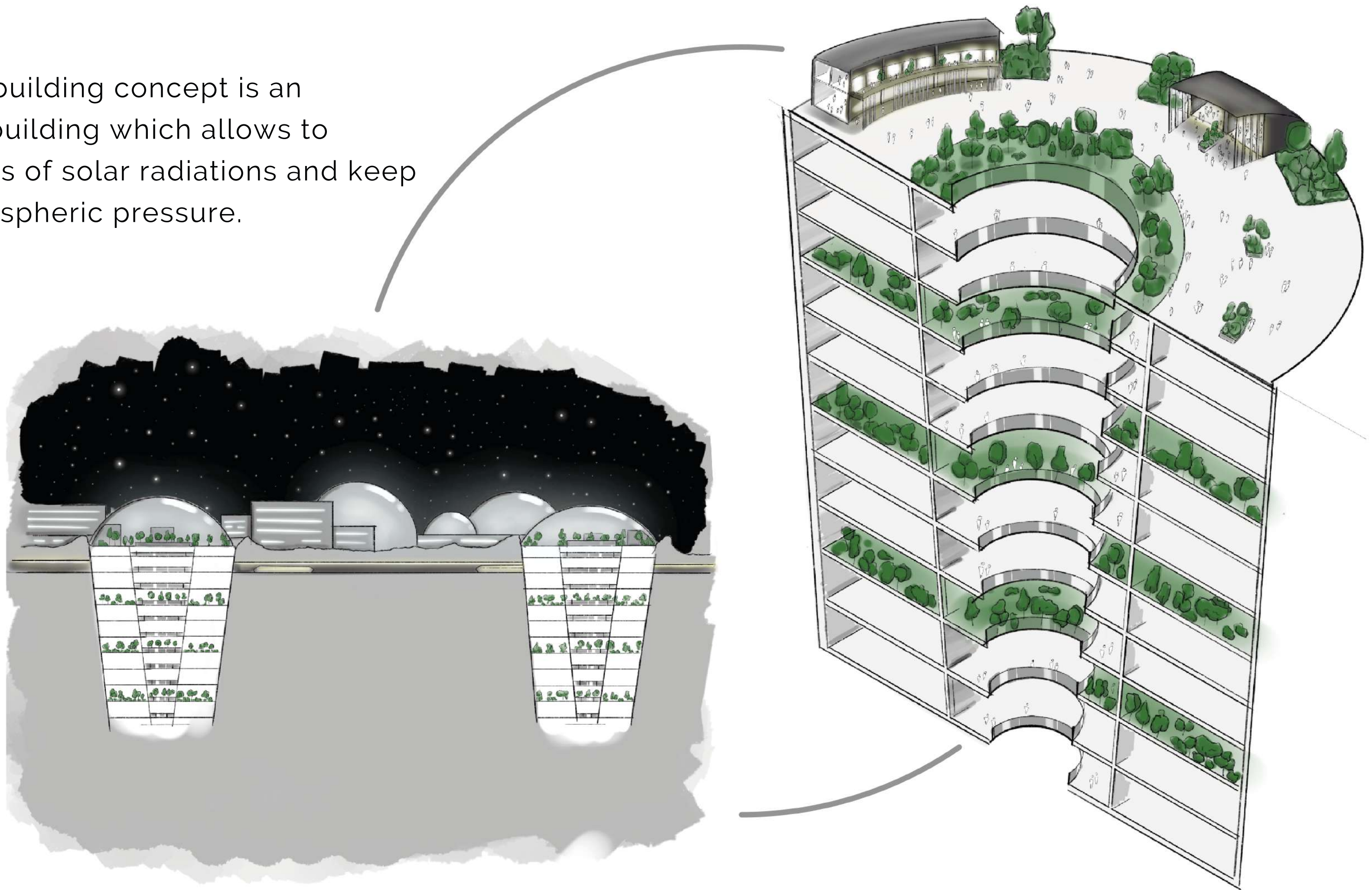


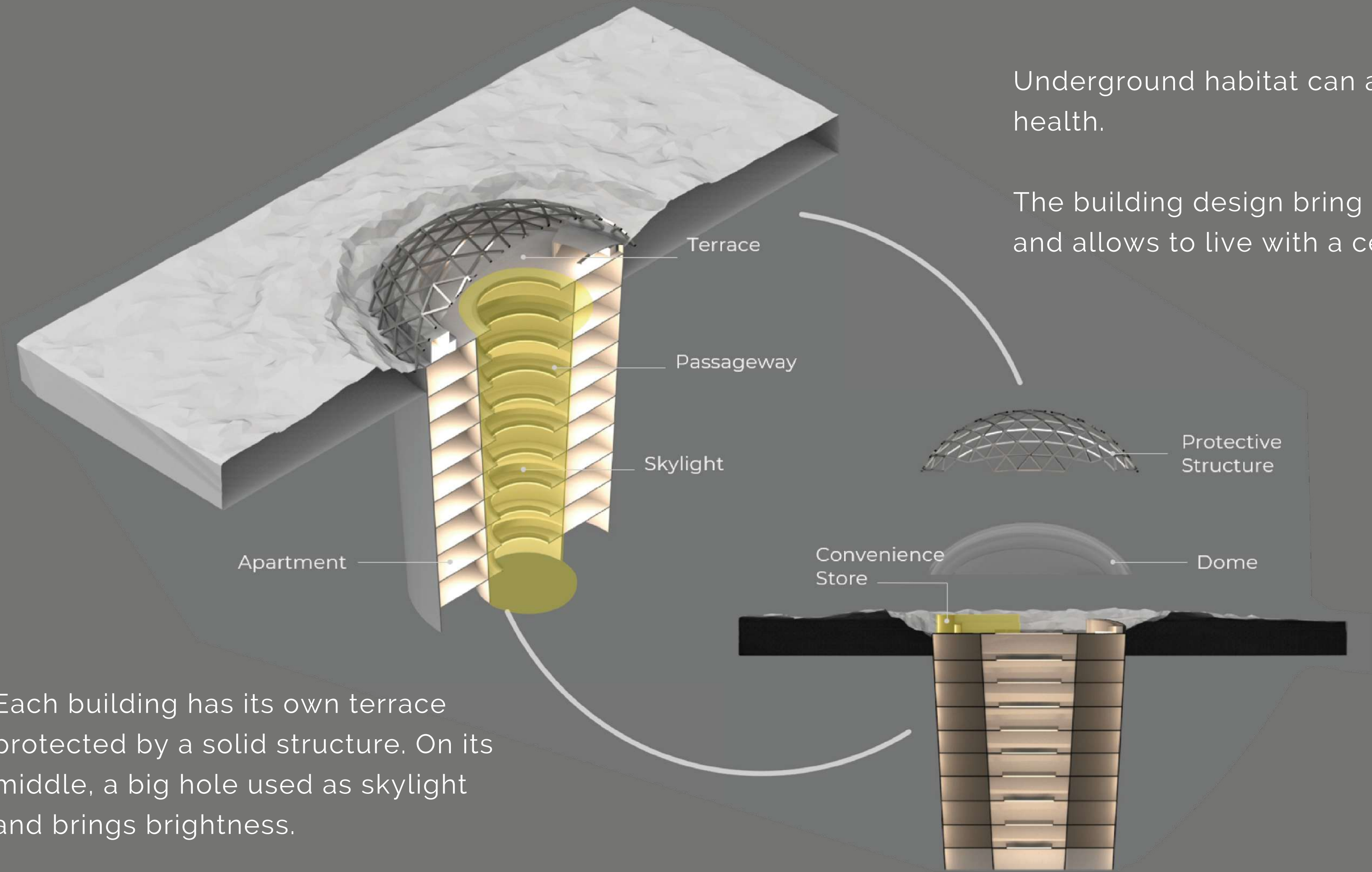


UNDERGROUND BUILDING CONCEPT



Underground building concept is an underground building which allows to protect humans of solar radiations and keep a correct atmospheric pressure.



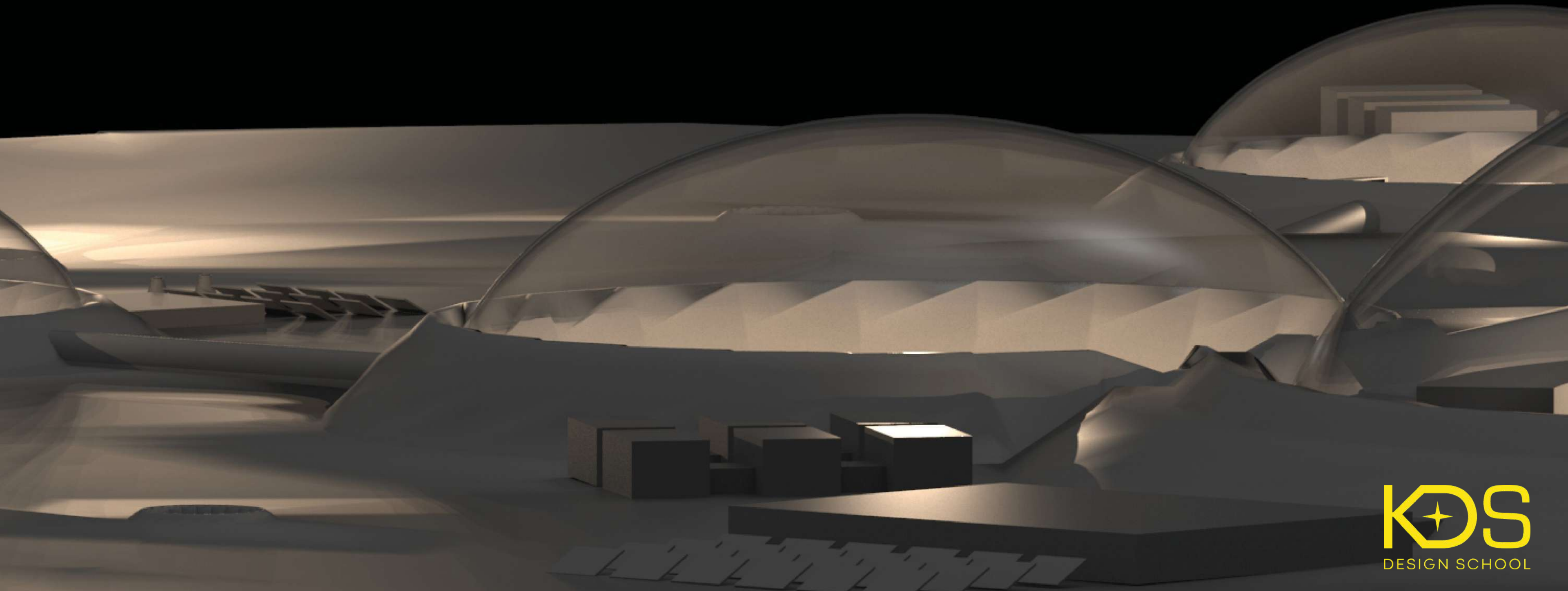


Underground habitat can affect mental health.

The building design bring light gain and allows to live with a certain liberty.

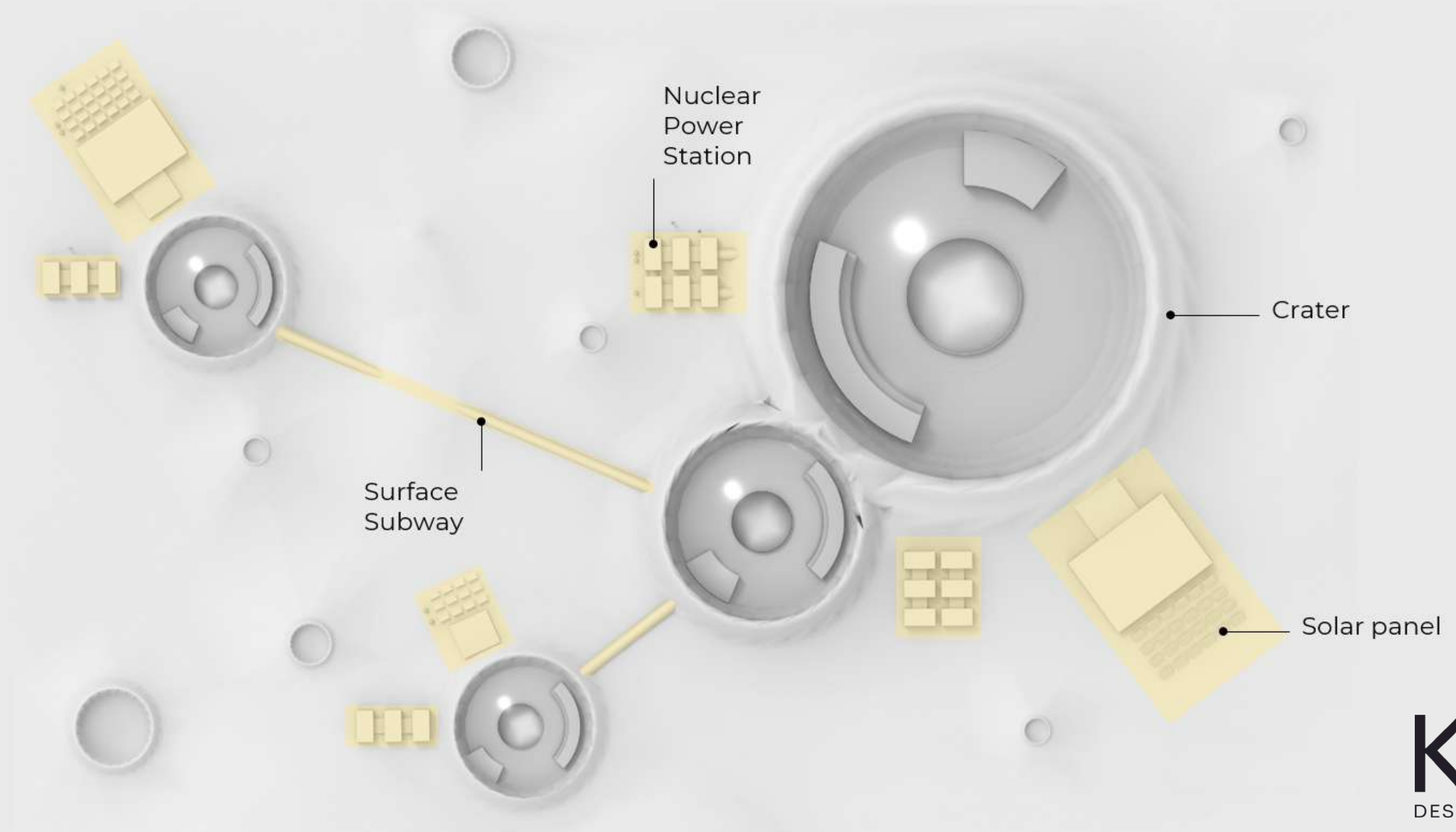
Each building has its own terrace protected by a solid structure. On its middle, a big hole used as skylight and brings brightness.

LUNAR DISTRICTS



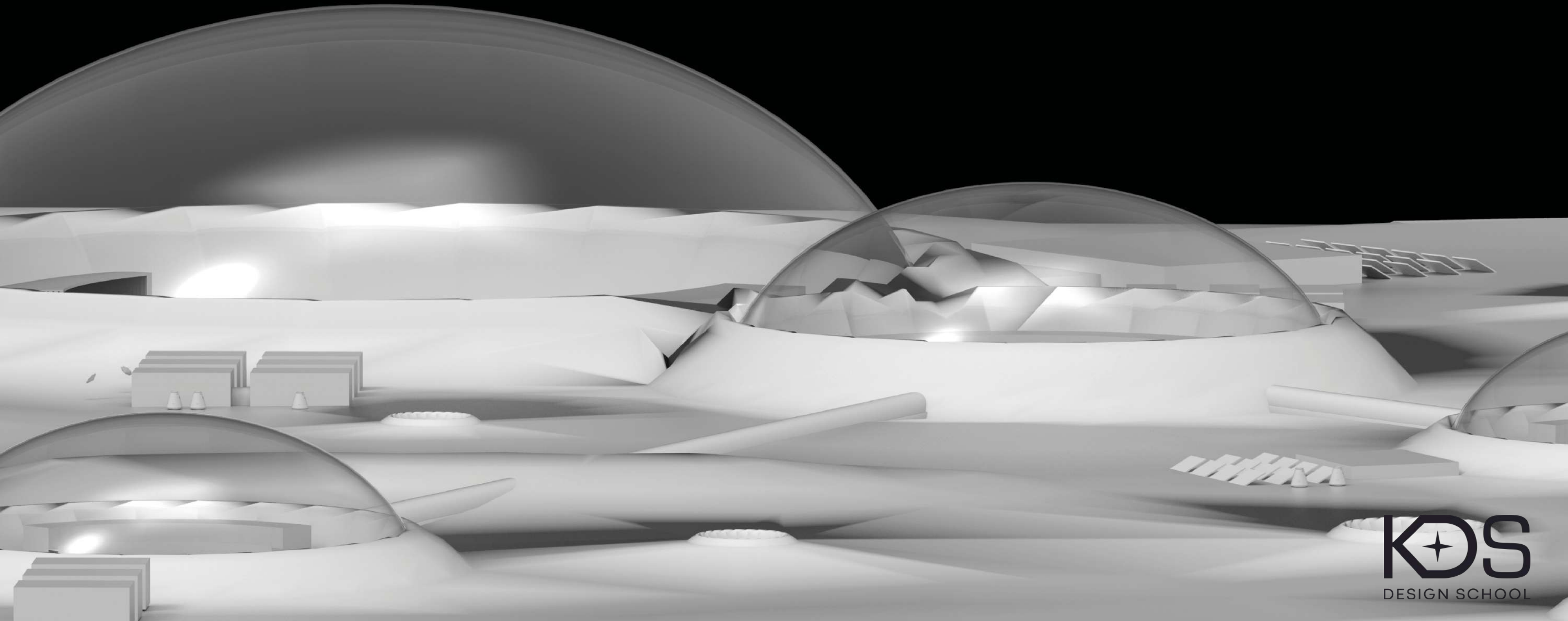
Each building are **linked together** thanks to **galleries** and **subway** which forms a **lunar district**.

Lunars districts are **spacious** in function of **crater's sizes**.



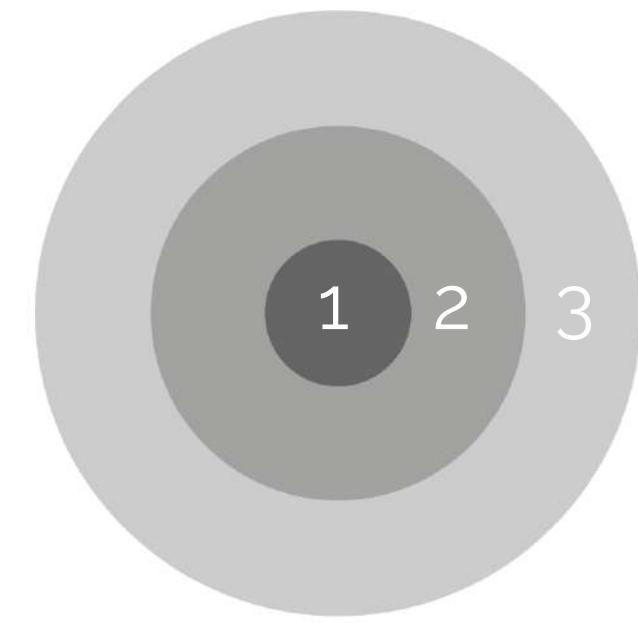
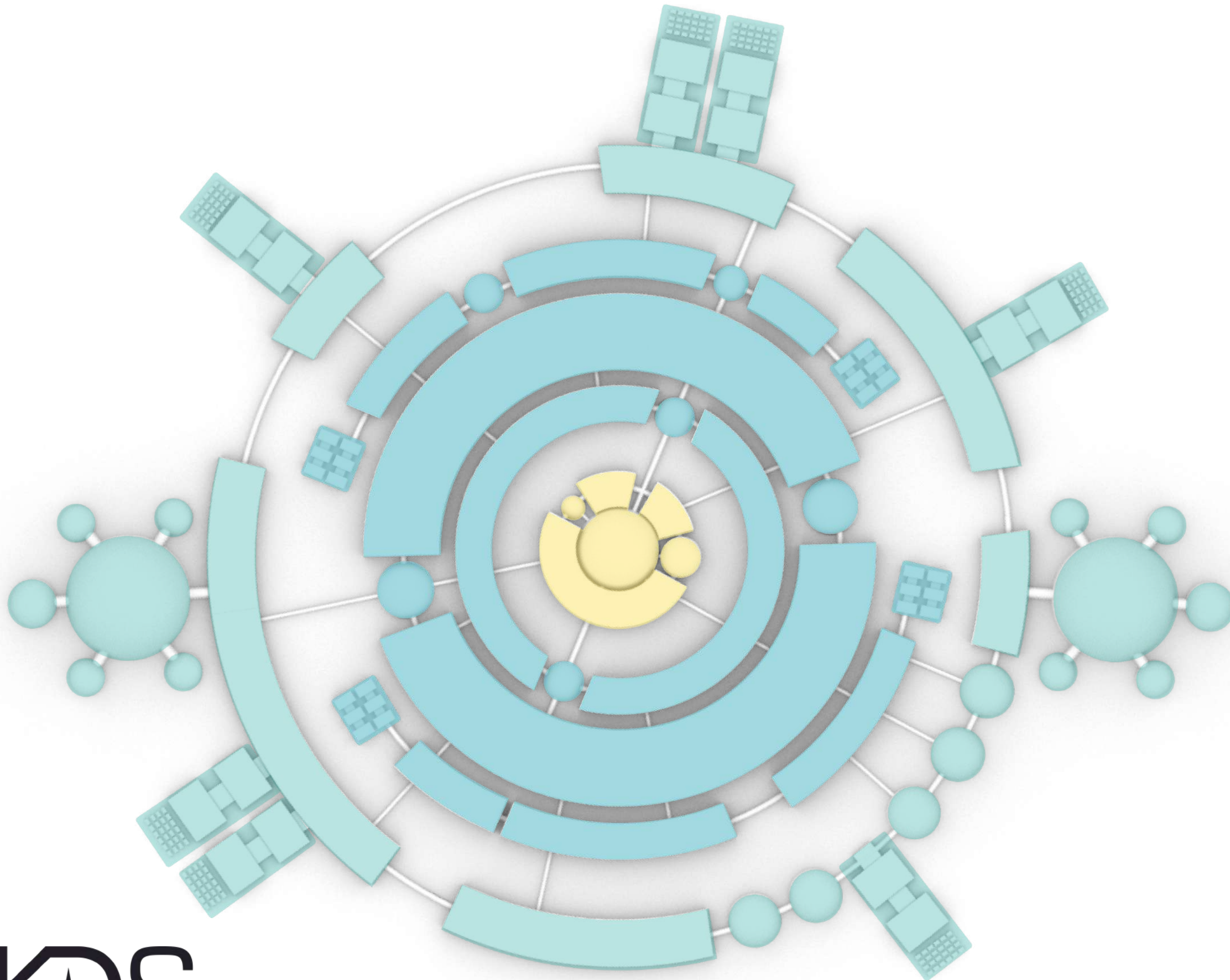
This **logistic** was designed to have **simple** and **fast** means of **transport**.

Lunars districts are all **linked together**, but also linked to all the parts of the **city**.



URBAN PLAN





1 CULTURAL AND HISTORICAL CENTER

(policy, decisional, justice, law)

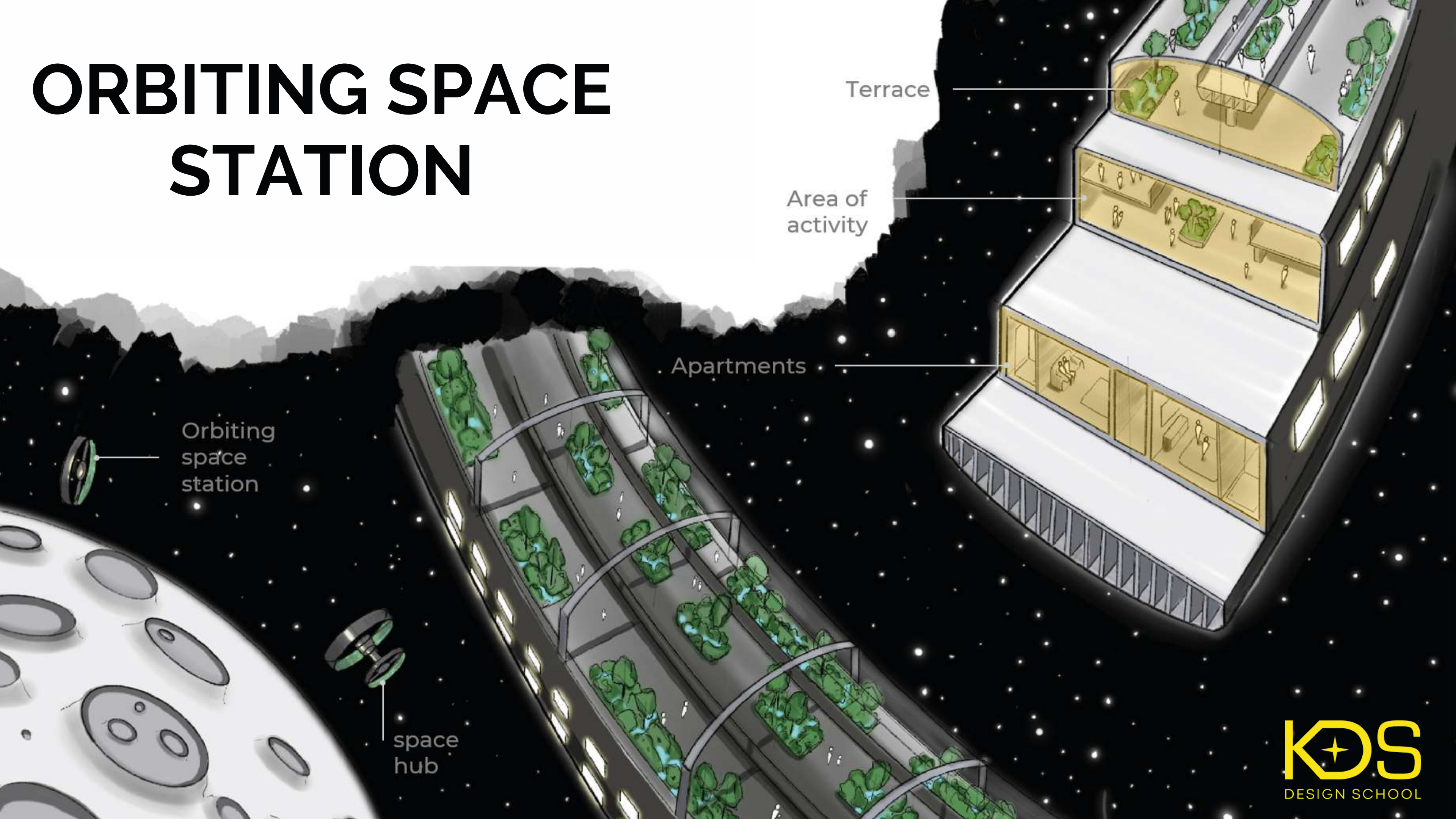
2 AREA OF ACTIVITY AND LIGHT INDUSTRY

(convenience store, craft, entertainment centre, business districts and health field)

3 INDUSTRIAL SUBURB

(heavy industry, agriculture production and storage)

ORBITING SPACE STATION



Orbiting
space
station

Terrace

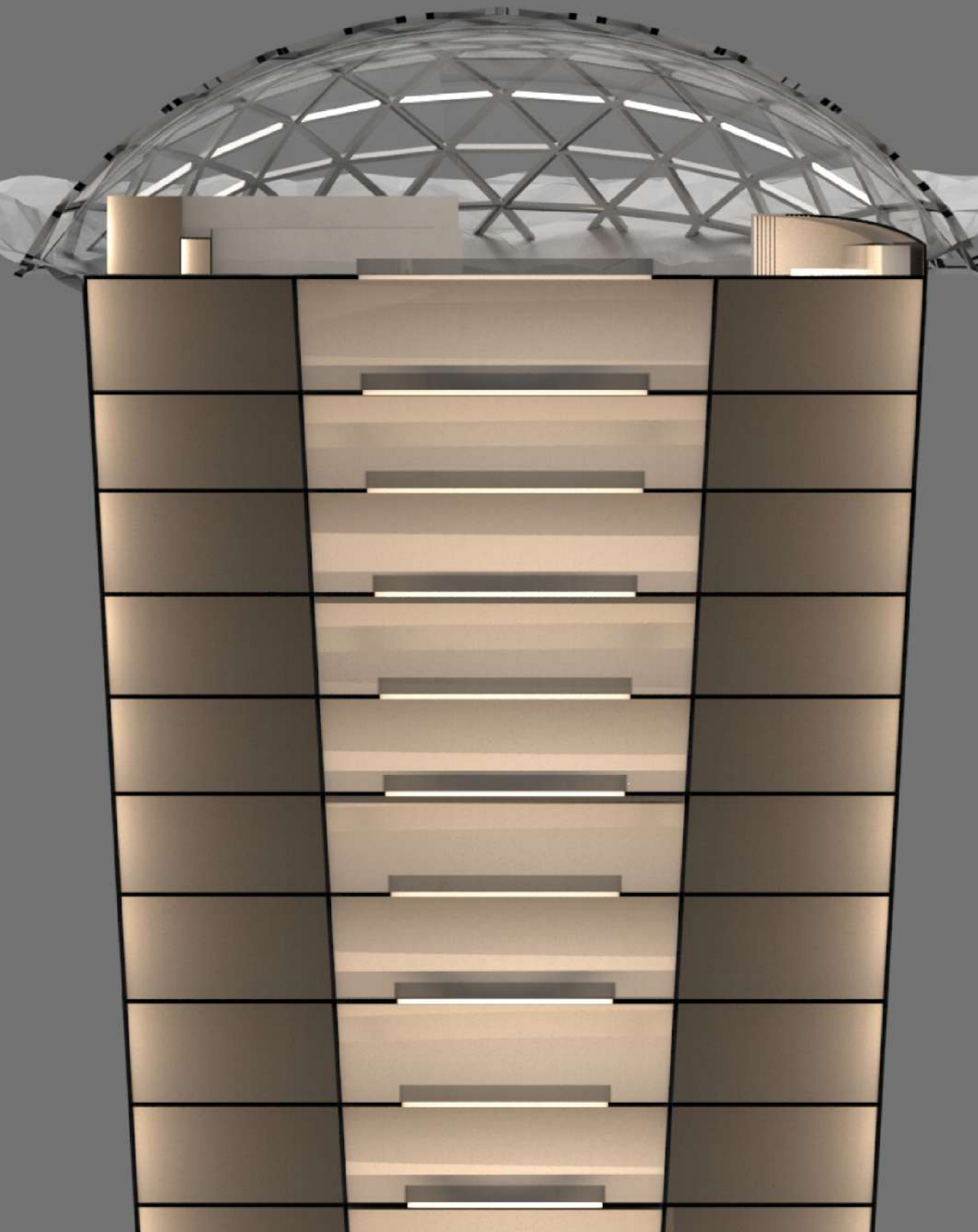
Area of
activity

Apartments

space
hub

CONCLUSION

The **Underground building concept**, **lunars districts**, **urban plan** and the **orbiting space station** match with this lifestyle and respond to the problems posed by constraints.



Live on the moon can **become a reality** and humans have enough knowledges to reach this goal. **Solutions** are real and **appropriate**.

PRODUCTION

TURTLE DOME

PRESENTED BY MARIE-ANGE BEMKA

TODAY'S PRODUCTION



POLLUTION

OVERPRODUCTION

RESSOURCES DEPLETION

DEFORESTATION

SPECIES EXTINCTION

EXPECTED
PRODUCTION BY
ESA



- OXYGEN
- HOME
- STRUCTURE

We could imagine a fertilizer made from regolith dust and some exported materials from earth, but mainly made from human excrements and compost.

REGOLITH The only one resource on the moon

HOW WE COULD MAKE THE PRODUCTION OF
RESOURCES MORE SUSTAINABLE AND
AUTONOMOUS WITHIN THE SPACE?

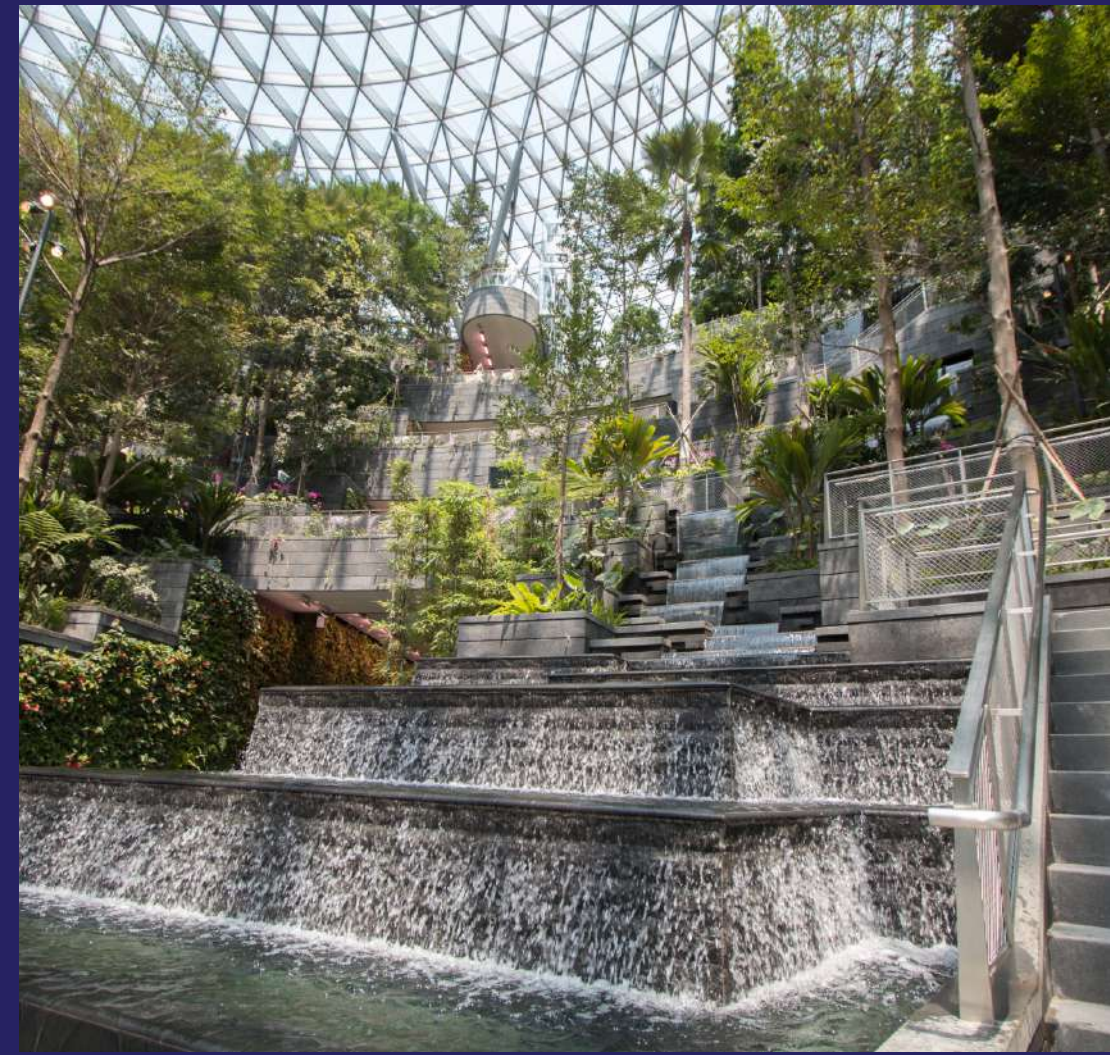
FIND AN ANSWER TO THIS QUESTION
WILL ALLOWS NOT TO REPEAT THE SAME
MISTAKES ON EARTH.





INSPIRATION

SINGAPORE AIRPORT



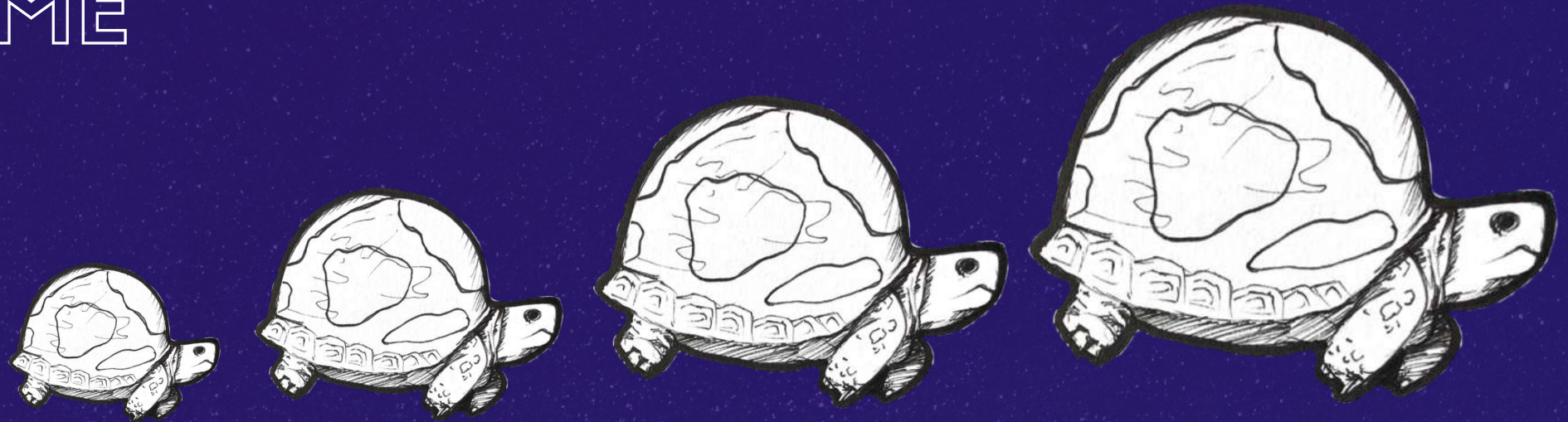
ECOSYSTEM:TURTLE DOME

WHY TURTLE?

Religion

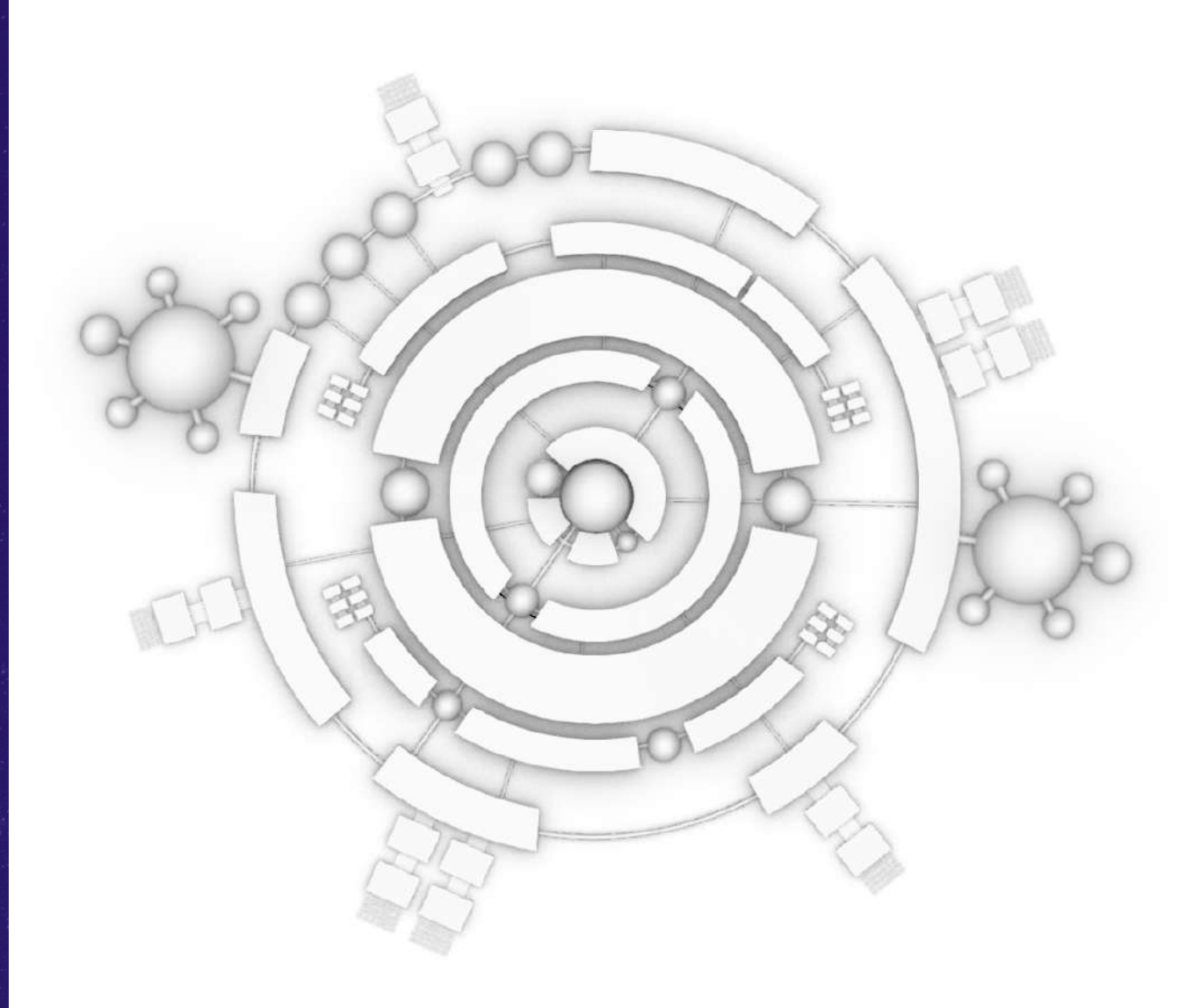
Culture

Mythology



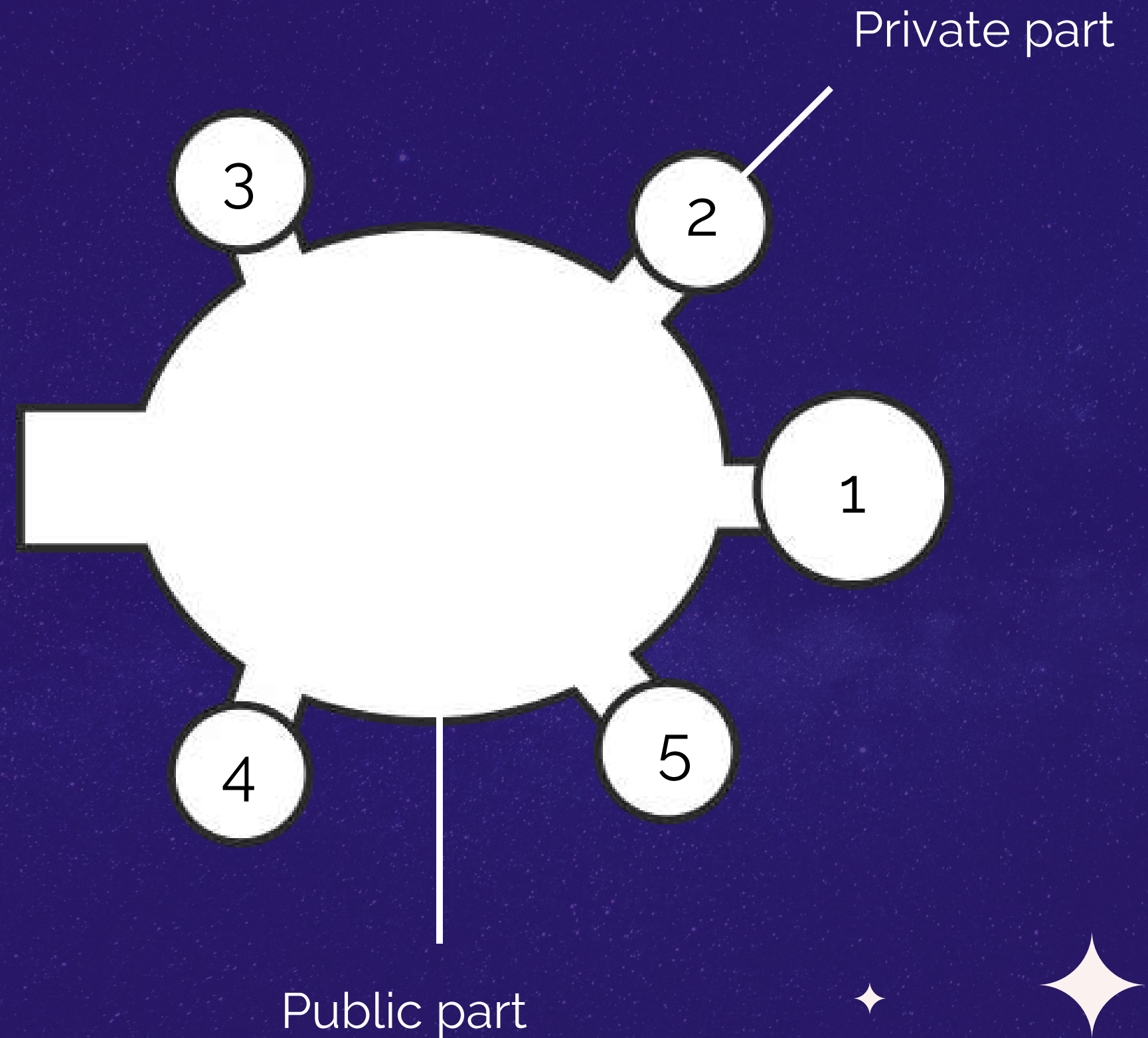
SHE CARRIES THE WORLD ON HER BACK.





THE TURTLE IS SUSTAINABLE:

It corresponds to a particular Production Cycle in the different private parts that are the turtle's legs.



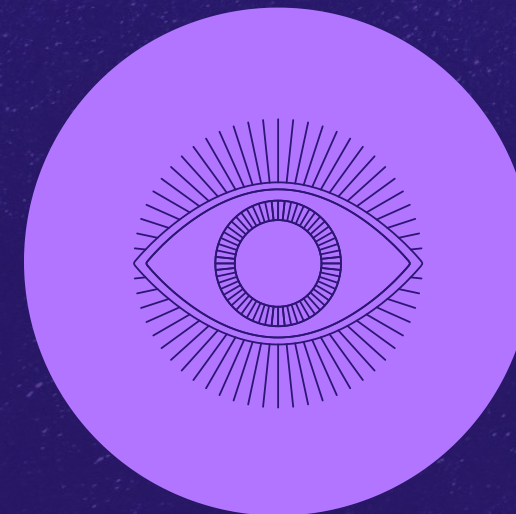
FOCUS : PRIVATE PART



Specialists:
Botanists / Biologists

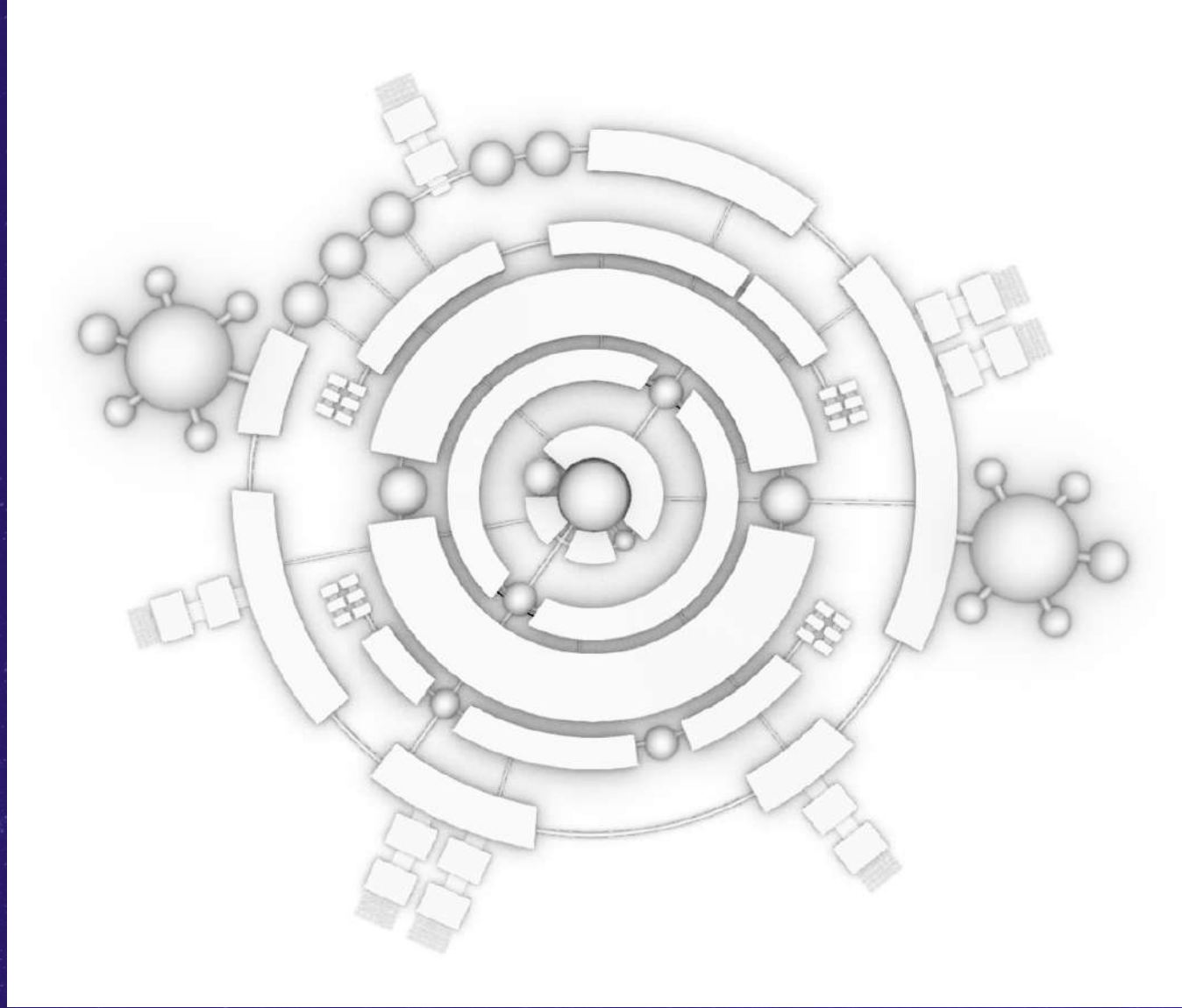


Reserved: Cultivation



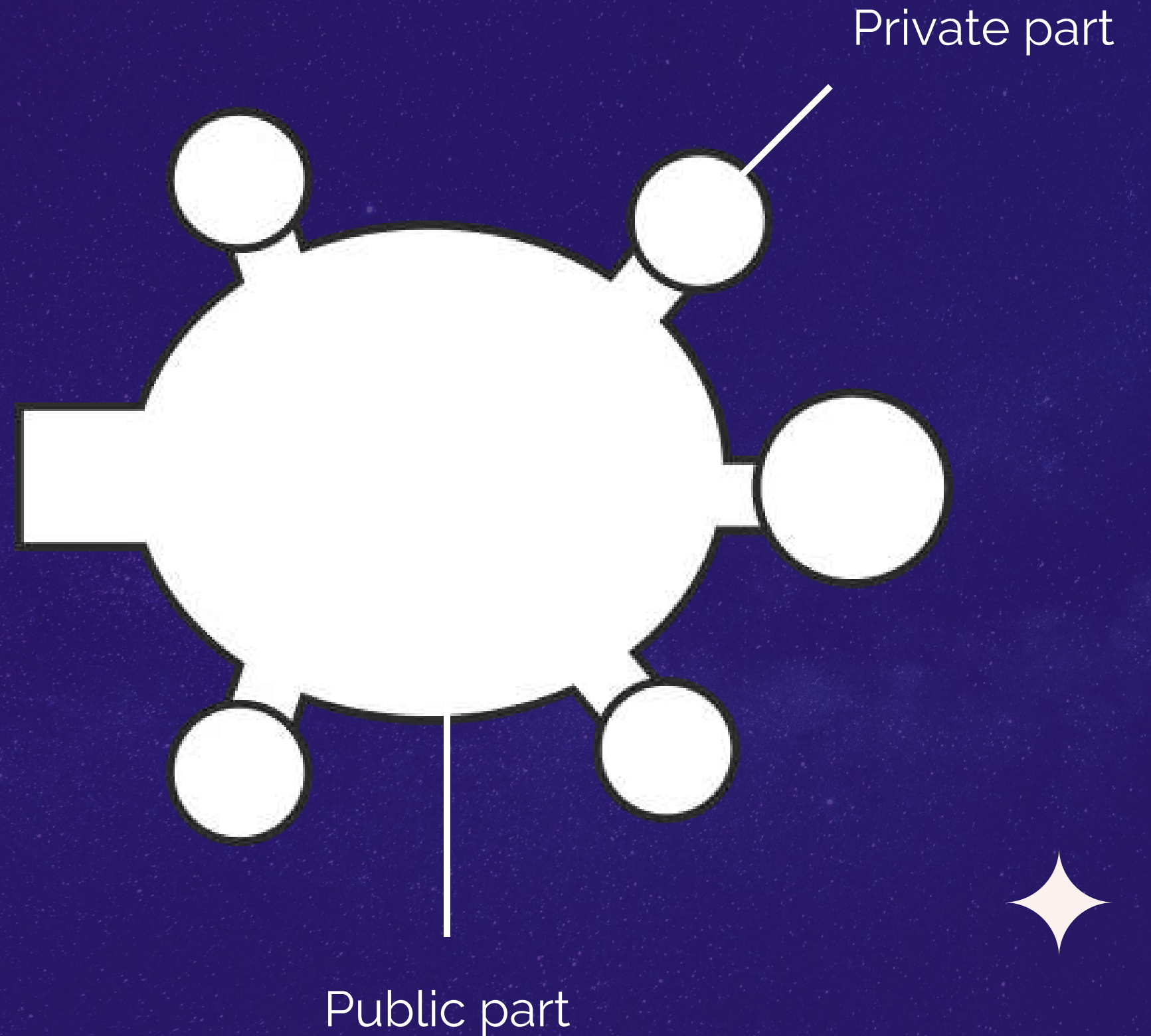
Analysis / Control /
Test





THE TURTLE IS SOCIAL:

The body of the turtle, unlike the legs,
is the public part of the dome.



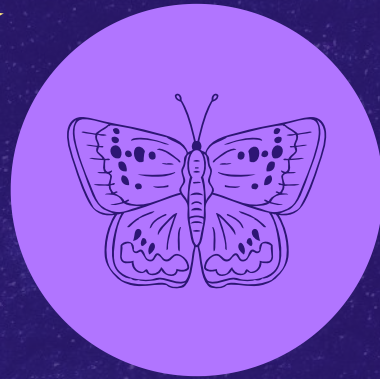
FOCUS : PUBLIC PART

Plantation / Trees / Insects

Without gravity, plants growth follows the light



Bug Hunt: Social cohesion / equity

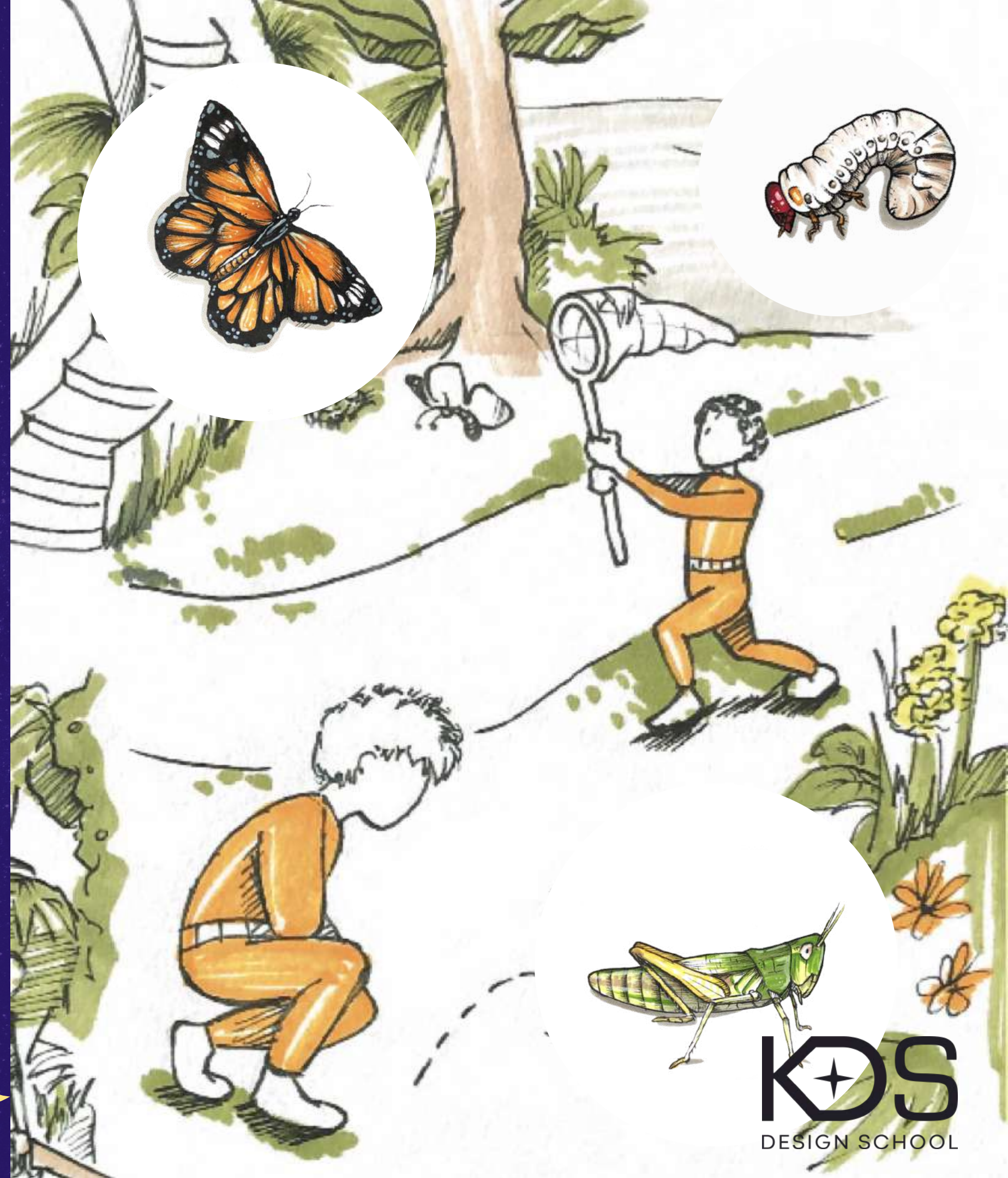


Insects : Food of tomorrow



In parallel, there are insects farms, it is very practical as it takes very small space and insects provides a lot of proteines.

It will change our diet plan





TO CONCLUDE:

PRIVATE PART

PRODUCTION
SUSTAINABLE

CONTROLLED
REGULATED

PUBLIC PART

SOCIAL
INSTRUCTIVE

ESCAPE
TO LEARN
EQUITY



LIVE IN SPACE: A NEW CIVILISATION

Principles

PRESENTED BY PIERRE & FABRICE



GOVERNMENT



POLICE/ARMY

FRONTIERS

LAW



WORK/EMPLOYMENT

POLITICS

SAFETY

CRIMINALITY

TRADE

COMMUNITY LIFE

JUSTICE

SHARE/EXCHANGES

CULTURE

EDUCATION

PENALTY

KNOWLEDGE

HISTORY

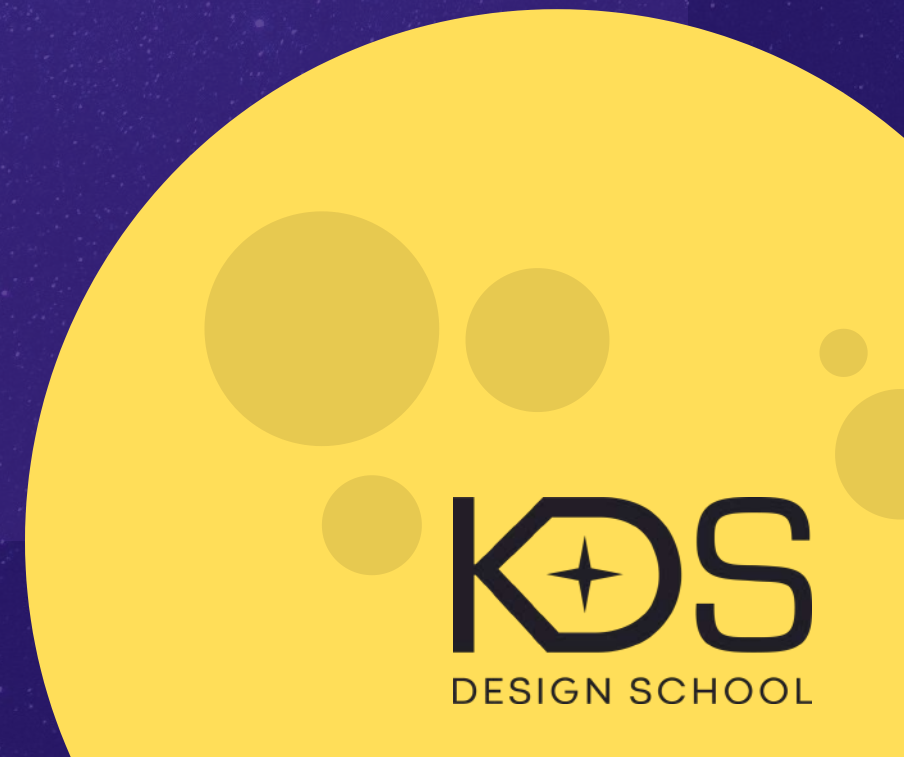


SCHOOL



ART

LEGACY



KDS
DESIGN SCHOOL

3 Themes



POLITICS

How are voted political decisions ?



CULTURE

How do citizens acces culture ?



JUSTICE

How humanize convicts within a collaborative society ?

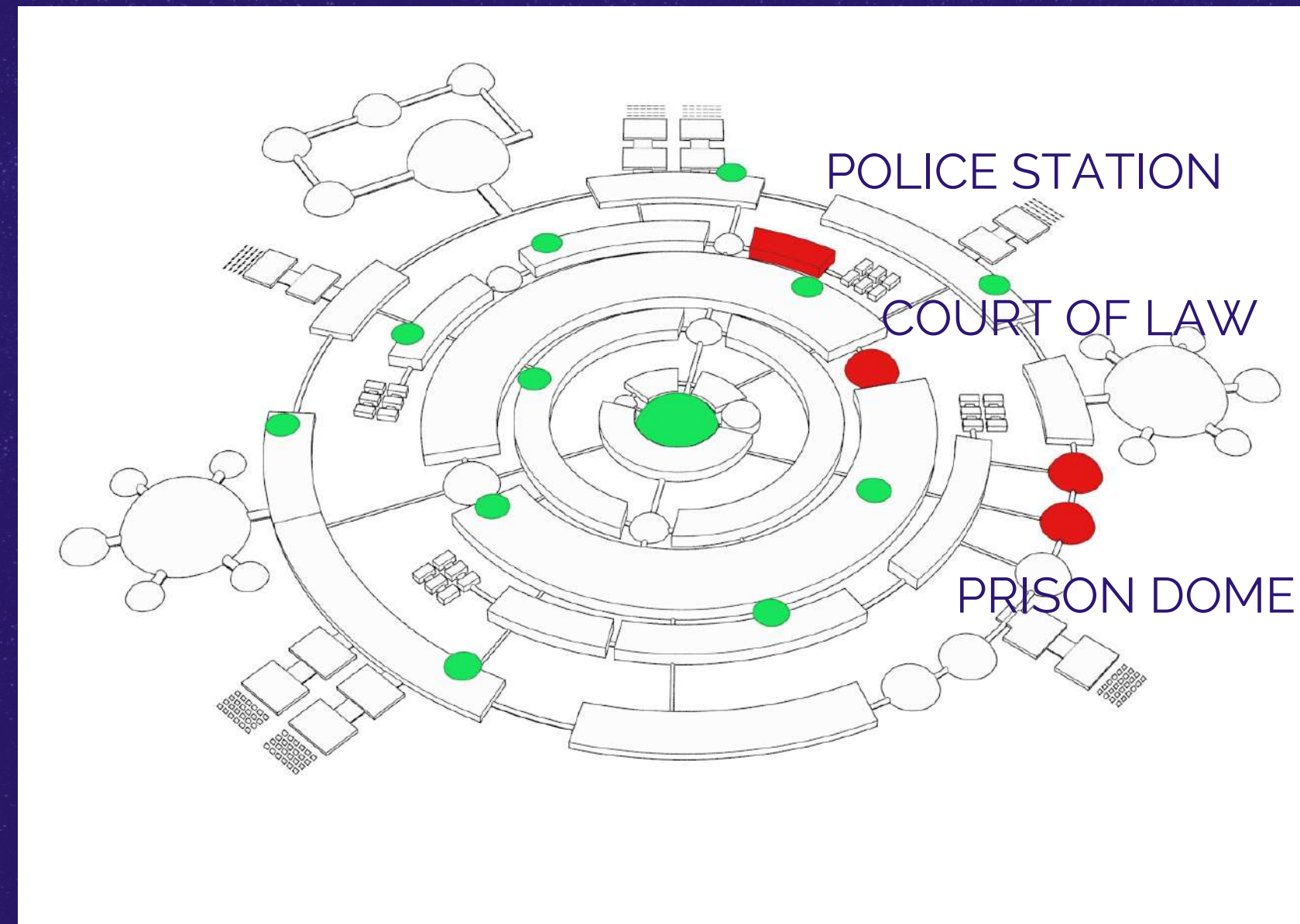


Justice



The **Court of Law** deals with all kind of infractions and crime committed in the city of Néapolis. Judges and Jurors decide together sentences.

Any citizen can attend trials.



Police Station guaranties citizen safety within the city boundary. They favor dialogue and **sensibilization** with people

The **penal instition** keeps convicts away from the rest of the population. Convicts on Open Custody can come and go during the day.



Justice

A new Civilization means new **opportunities** to learn lessons from the past.



Recidivism rate **raises** when no solid **rehabilitation** program is planned.



A **human-sized** city is thereby ideal to set program based on **open custody**.

On Earth, being a convict mainly meant "**doing his time**".

In small cities like **Néapolis** everybody knows and takes care of each other.



Justice

Make people *change their way of thinking* regarding convicts.

Promote *Communauty Service*



Mixing convicts with the population.



Any man has significant assets and can be a great benefit to the society.



Justice

Marc explains how he gained some free time doing his community service.



Paul used to give him Computer lessons.



"Look Gaspar what my watch cand do !"



"Hey Marc, your watch is blinking, why is that ?"



Gaspar, 10 years old, is talking walk with his GrandPa Paul. On the way they meet Marc.



Justice



Top Layer : Duties

2nd Layer : Administrative

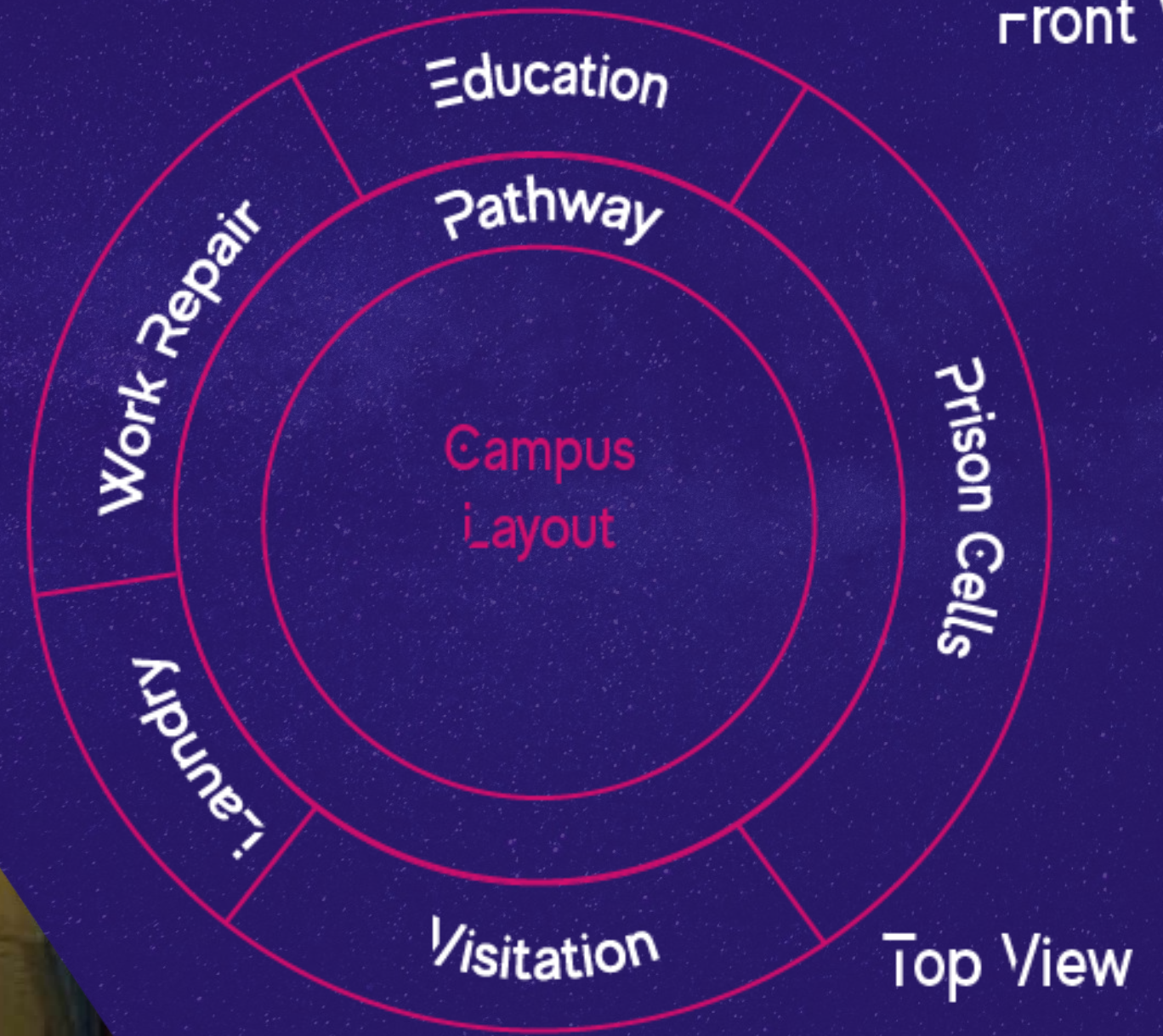
3rd Layer : Schedule Managment

Bottom Layer : Entertainment



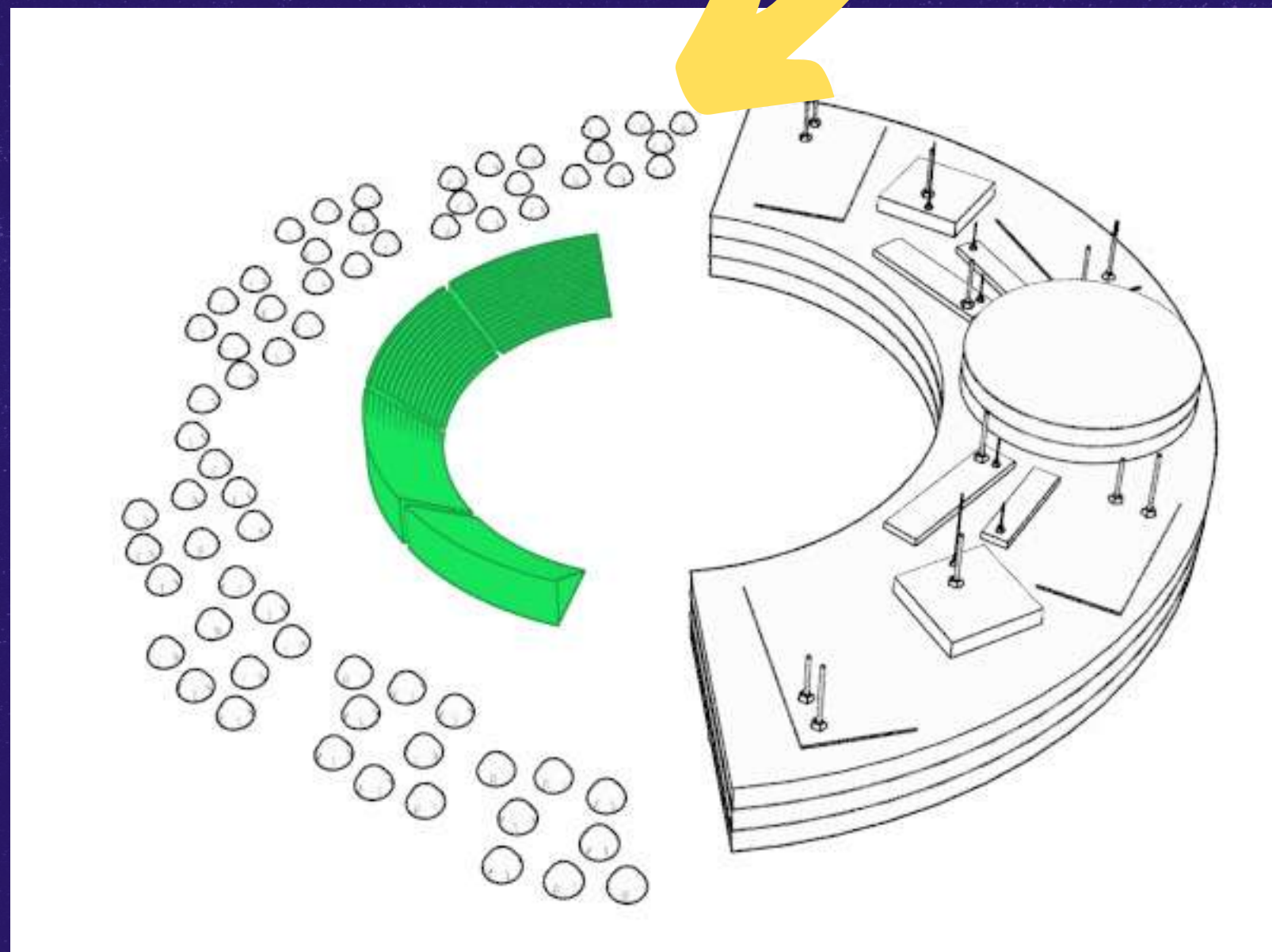
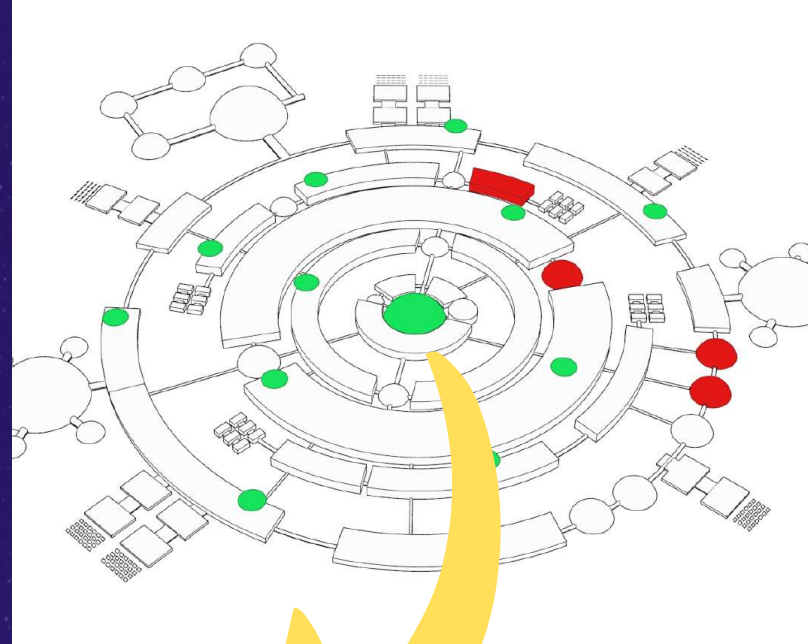


Justice





Politics



Politics is **very important** to the citizen of Néapolis.

As most of them have participated to build the colony, they feel **very concerned** by the public affairs.

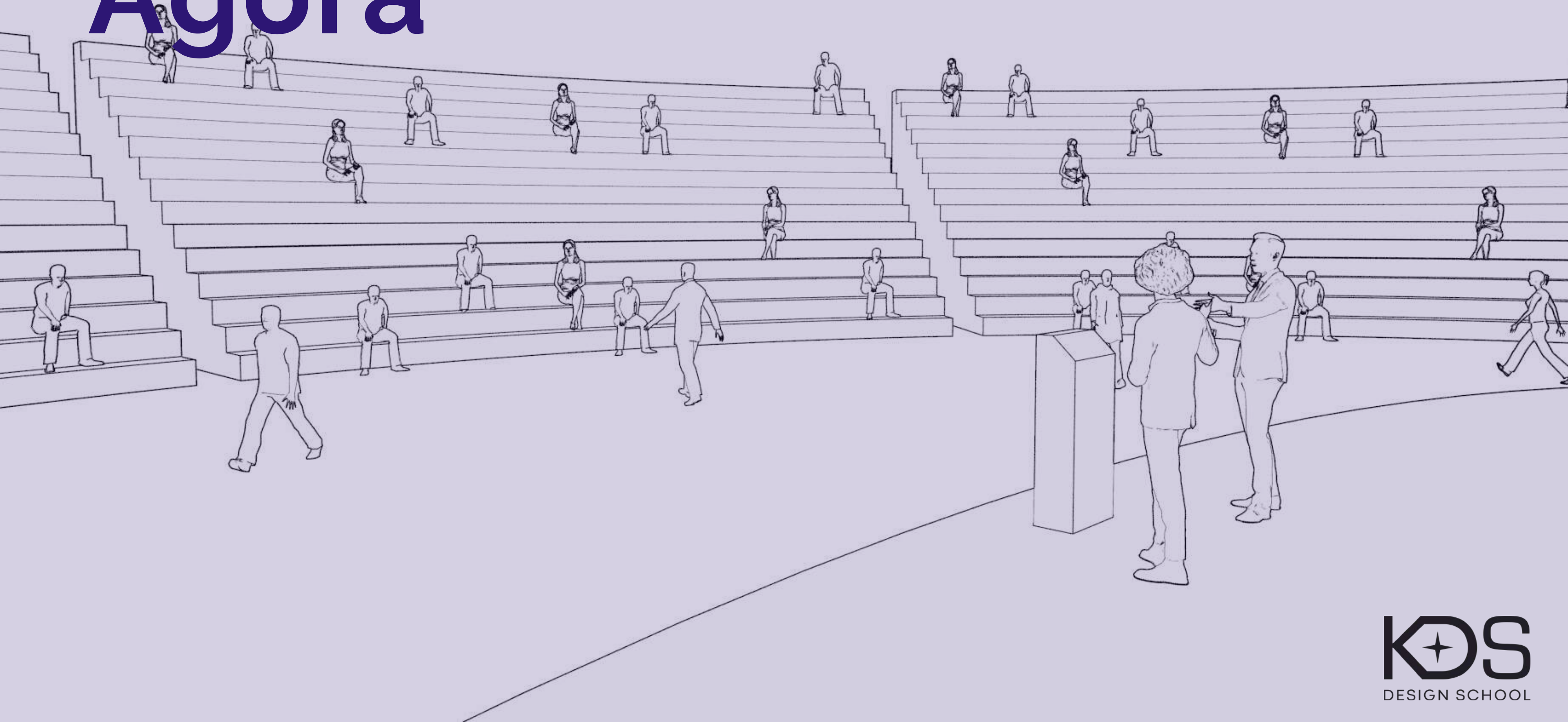
A committed **democratic system** has been chosen in Néapolis to avoid manipulation and flatten old vertical hierarchy model

An Agora has been placed in the very center of the city. People can stand and talk to the public of the agora. Speeches are broadcasted on web channels afterward.

Agora



Agora





Politics

Politics is **everyone's** responsibility.



Do not hide anymore from the decisions related to your city



CiviSpeak

is a platform designed to provide all the **information** needed to make **advised decisions** regarding politics topics.

✦ Debate / Lecture
On Demand & Upload Mode

✦ Referendum Online

✦ Vote Mode

✦ Chat Mode





Politics



Gaspar is at Turtle dome today. His parents took him with his little sister.

His dad Sylvain promised last week to play with him the whole day.

Sylvain's watch is vibrating, he received a notification from CiviSpeak.

Greg completely forgot to vote today.



Greg put his AR contact lenses on and enter the virtual voting booth.



"Please Gaspar wait a moment. I have to vote. It won't take too long !"



Politics

Sylvain is using the screen of his watch when voting.



Account Access
Retina identification in Process

Welcome Sylvain!
Please select one candidate

CONFIRM SELECTION
RETURN

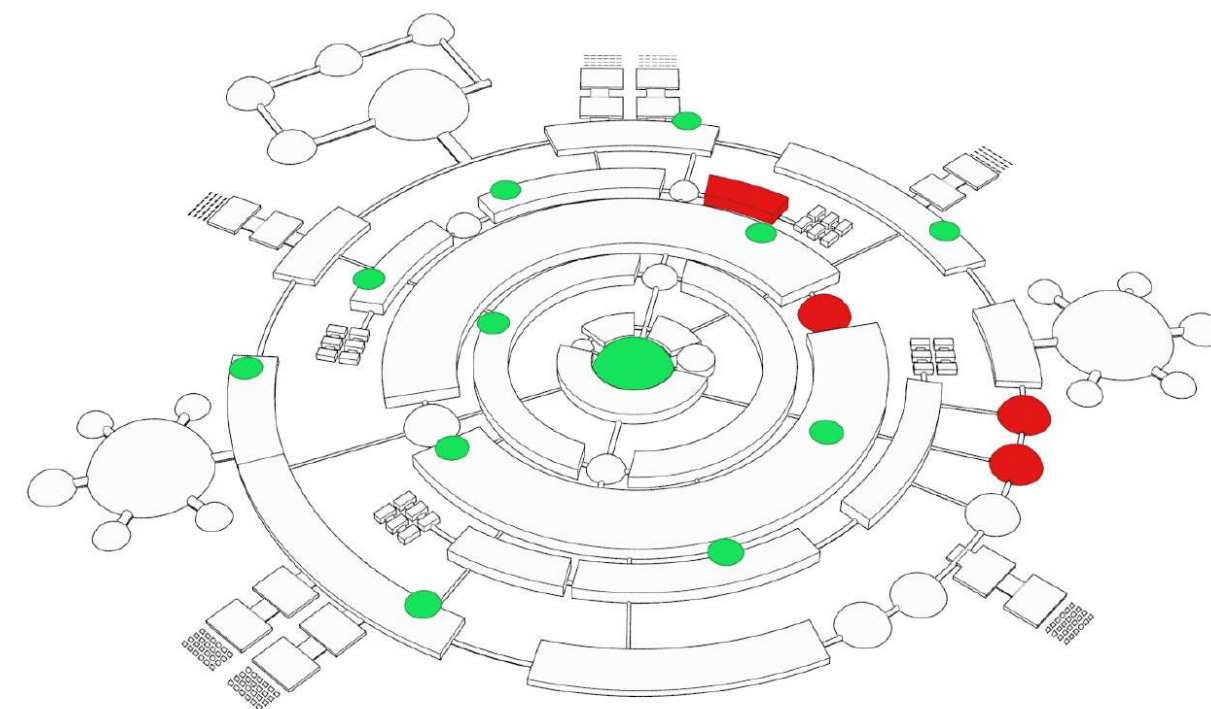
You
have Voted!

VOTE APPLICATION PROCESS

Culture



All over the city are placed self expression walls where citizens are allowed to play or created when ever they want to, it seems crucial in a free democratic way of life



Creative capsules

Intergenerational legacy

Know-How transmission

Responsabilisation

Repair & Create Village Lab

Cardboard Creation
Workshop

Electronic Device
Repair Workshop

Regolith
Pottery Creation

As Paul and his grandson Gaspar walk by the Cultural Center they end up in the Village Lab. Paul remembered when the Culture Ministry decided to use pioneer spaceship capsules to set up creative workshops. Living on the Moon with such a hostile environment involves to take great care of its resources. This place offers people to get trained on multiple techniques to repair, maintain or reuse domestics appliances.

The Village Lab also promotes artistic creations through several workshops. Local material such as Regolith or reusable material such as cardboards are for example used to either make artistic or useful daily life objects

Organization is based on a participative mode where people share skills and knowledges to others for free.

Paul is a volunteer at the pottey workshop and will propose soon to Gaspar to attend a session.



Legacy

Since humans could only transport the essentials to the moon, the historical legacy is transmitted thanks to dematerialised means like holographic projections or VR photorealistic journey

It seems quite important for the incoming generations to learn where they are from and what Earth is, all the more so as it is a way of escaping a bit from the harsh reality of living in space...



DESIGN STUDIO 4

HUMAN

HEALTH, BODY, MIND AND VITAL
FUNCTIONS

CONTEXT

IN A HOSTILE ENVIRONMENT SUCH AS THE MOON, THOUSANDS OF KILOMETERS FROM THE EARTH AND ALL HELP, IT IS INTERESTING TO LOOK AT THE HEALTH AND WELL BEING OF THE SETTLERS. IN FACT 50 YEARS AFTER THE ARRIVALS OF THE FIRST SHUTTLES, THE ROLE OF THE COLONISTS WILL BE TO BE THE PIONEERS AND THE FOUNDERS OF THE BASES OF A NEW CIVILIZATION.

EACH INDIVIDUAL WILL THEN CONTRIBUTE TO THE BUILDING OF THIS SOCIETY, FROM WHERE THE IMPORTANCE OF ENSURING THEIR HEALTH AND WELL-BEING



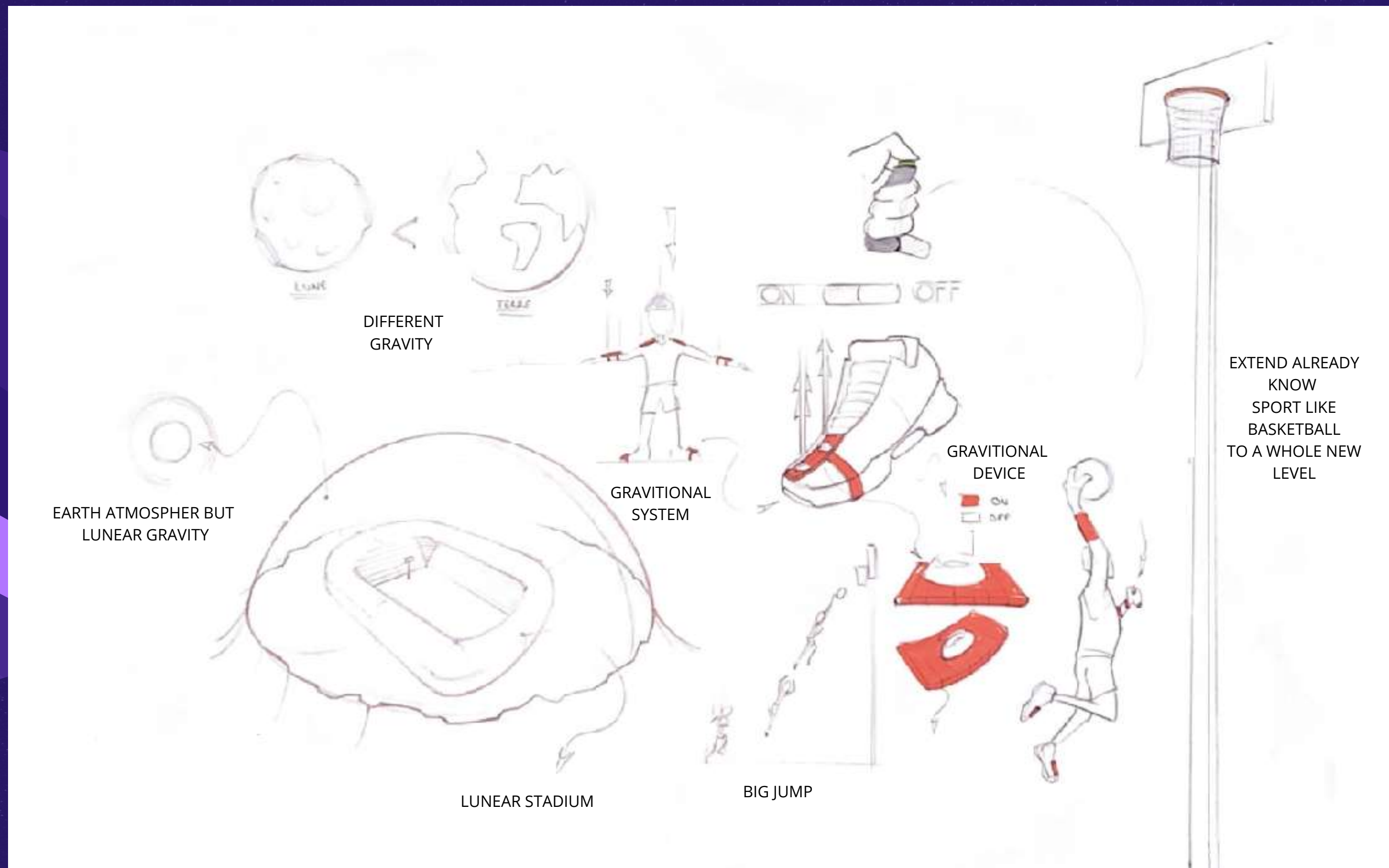


OUR AREAS OF WORK

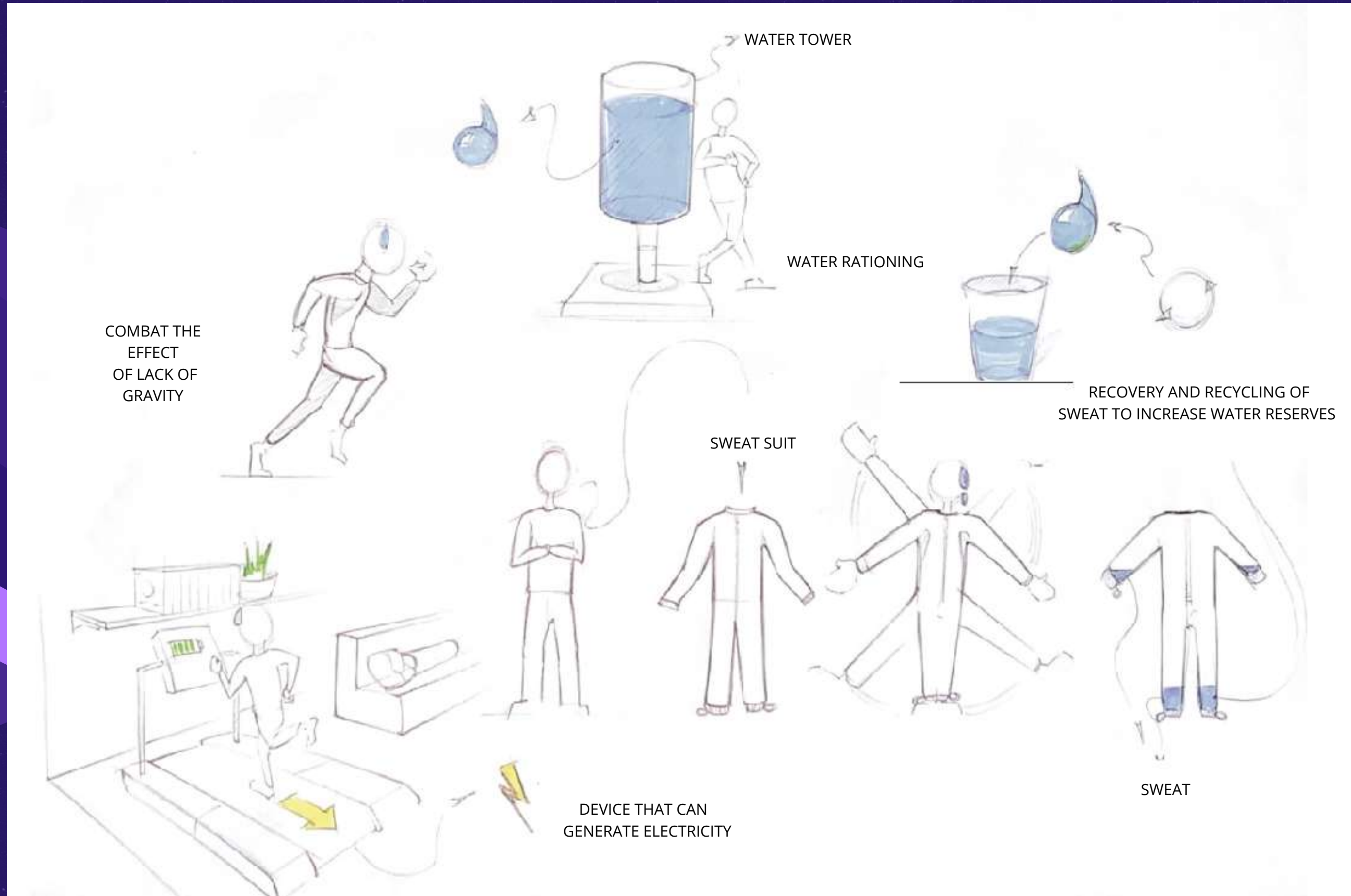
.SPORT , A VECTOR OF WELL-BEING
.PREVENTION/DETECTION.
.MENTAL HEALTH



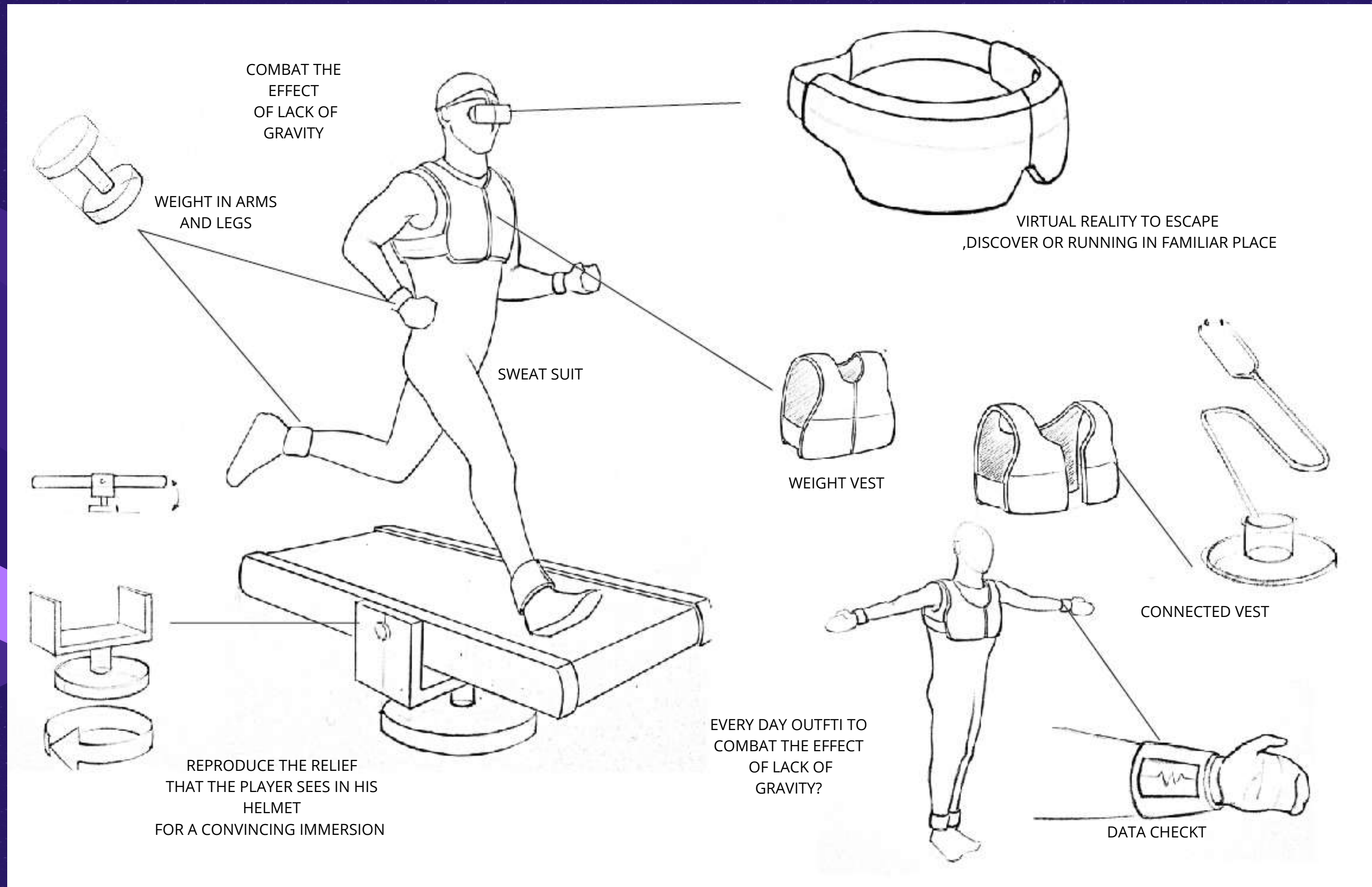
SPORT , A VECTOR OF WELL-BEING



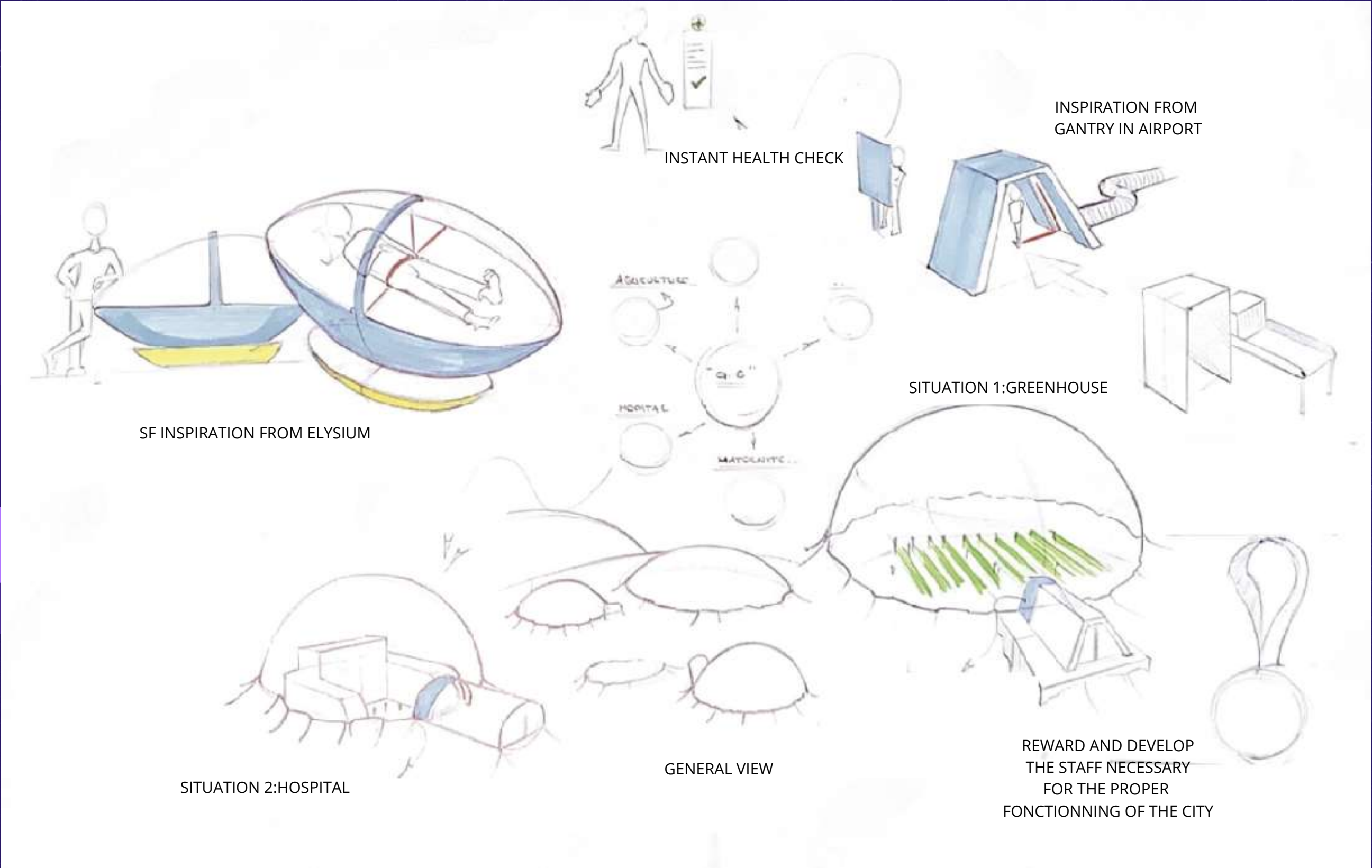
SPORT , A VECTOR OF WELL-BEING



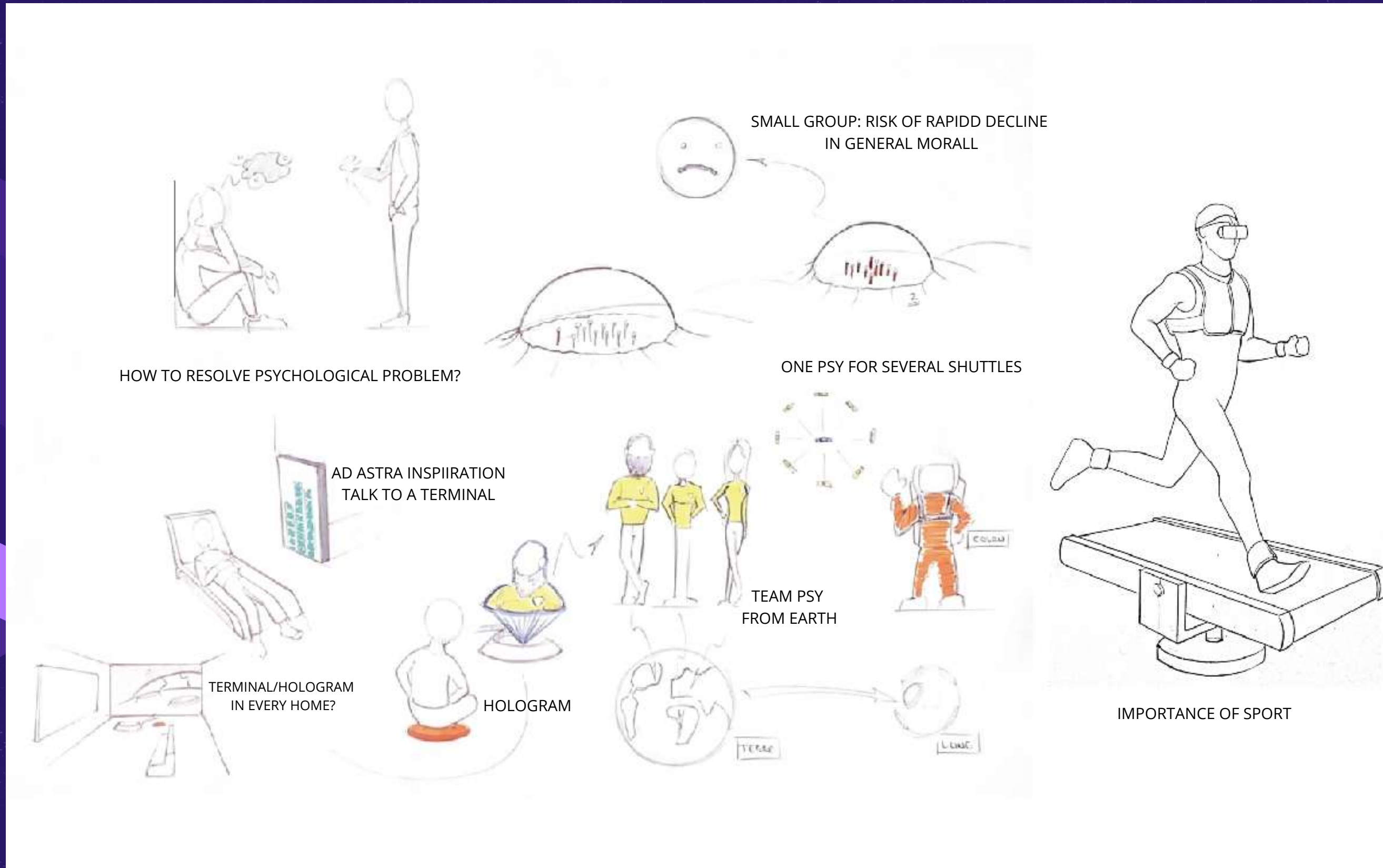
SPORT , A VECTOR OF WELL-BEING DETECTION AND PREVENTION



DETECTION AND PREVENTION



MENTAL HEALTH



The background of the image is a deep space scene. On the right side, the curved horizon of the Earth is visible, showing brownish and tan terrain. In the upper left, a bright star or sun is shining, creating a lens flare effect. In the lower left, a complex satellite or space station structure is shown, featuring a central cylindrical component and several rectangular panels extending outwards.

THANKS !

HEBRARD Pierre
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& PINCIN Fabrice