http://competitions.uni.xyz

X-plor

ORIGYN

Architecture that defines the unknown.

Credits: http://dikaseva.com

Premise

The movement.

Physicist Stephen Hawking in 2017 reasserted his view that humans must become an interstellar species in the near future or risk **"being annihilated".**

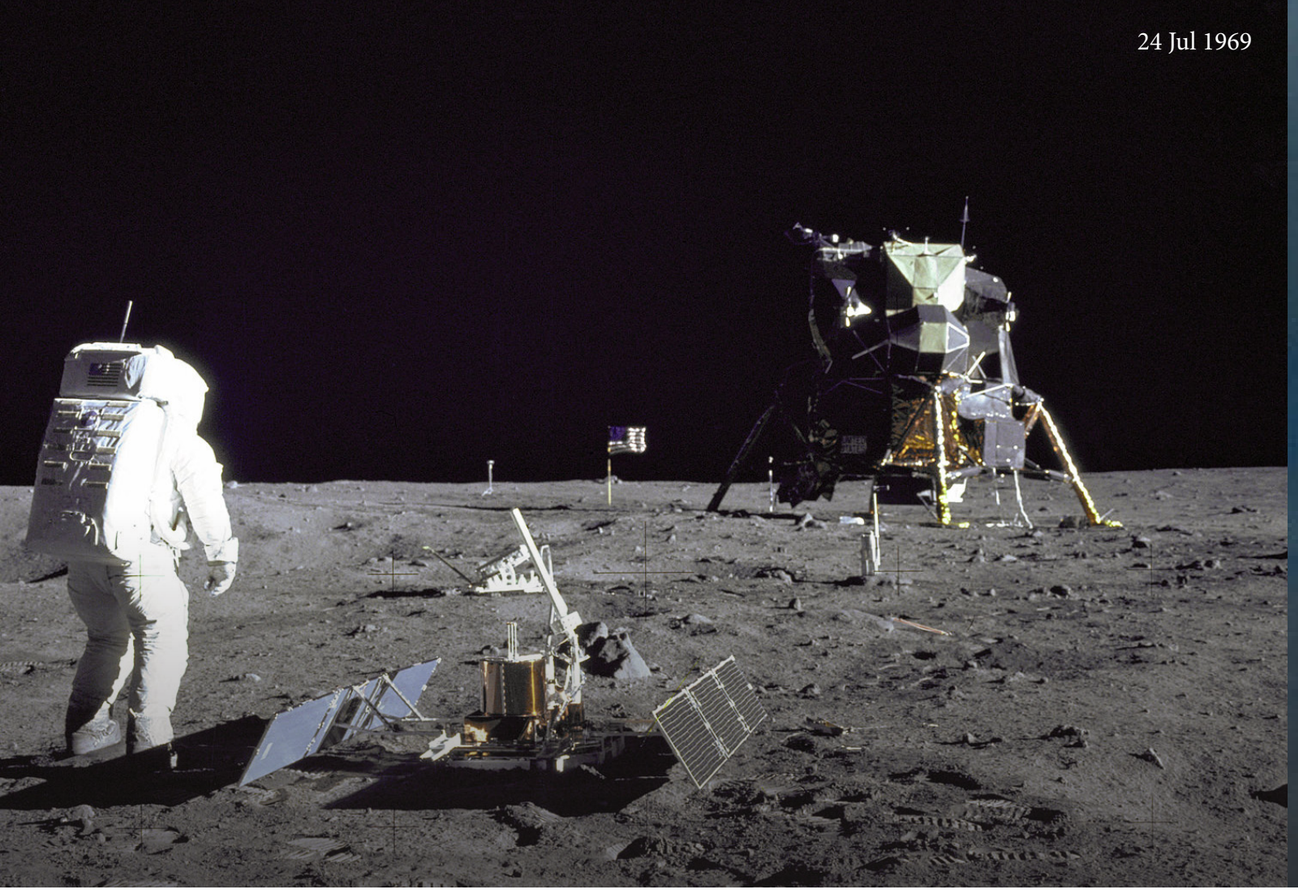
"The Earth is under threat from so many areas that it is difficult for me to be positive," the professor said in a speech given via video link to the Starmus science conference in Trondheim, Norway.

Hawking has previously predicted that climate change, epidemics and population growth all pose major threats to our survival on Earth. In November of 2016, he said **humans would need to find a new planet within the next thousand years.**

In May 2017, he shortened that prediction to 100 years.

"It is time to explore other solar systems. Spreading out may be the only thing that saves us from ourselves. I am convinced that humans need to leave Earth" Hawking said. "To stay, risks being annihilated."

With almost every human has a responsibility of the boundaries of how human civilizations survive and thrive - Architects and designers are no different. We need to push into the sky as soon as we can with whatever we have to make sure we expand before we go extinct.



Credits: NASA

Present

Existence.

With our childhoods full of stories about space odysseys, and missions like Appollo - Voyager - Saturn V, we have been surrounded by these adventures of humankind raising the bar in the last century. But as we entered the 21st Century, there has been **an unignorable slowdown in how humans are pushing towards space.**

A major reason for this have been the wave of accidents/launch fails and budget restraints due to the shift in political agendas in the 21st century. This has caused Government lead space agencies - to a slowdown with only them having the collective responsibility of space exploration.

Our take on earth conflicts has also changed how we see and spend our resources today. **The argument begins where people compare spending for space exploration with a much huge population to feed.** Its surprising to note that the defence budget of many front lining countries is 30 times more as their space exploration budget. It clearly indicates human conflict as a major priority for humanity today than exploration, which is somehow **a reflection of what people want in a predominantly democratic planet.**

In 60's (during the first manned mission to the moon) USA had 4.5% of total GDP spent on space programme, and by 2018 - that spending has been shrunken to 0.5% today. At the same time mining out earth resources at an alarming rate combined with pollution, wars and climate change - the responsibility is not just left to space agencies but the people of this planet as well.

And that's where **Space Race 2.0** has begun.

Credits: SpaceX

The Race

The sprint to the space.

Space Race 1.0

The Big 6 - State Government led organizations began the advent of space race which was the center stage of the latter half of 20th Century and are operational even today.

ROSCOSMOS | NASA | CNSA | ESA | ISRO | JAXA

Space Race 2.0

With ease in regulations, businesses which are promoting a profit led vision towards space exploration & tourism in first two decades of 21st Century.

Rocket LAB | SPACE-X | Orbital ATK | Blue Origin | SNC | Virgin Galactic

SPACE RACE 3.0

With space travel becoming cheaper and quick due to reusability and optimizations - our expanse to space is much much closer than we can imagine.

?

Credits: The Bohemian Blog

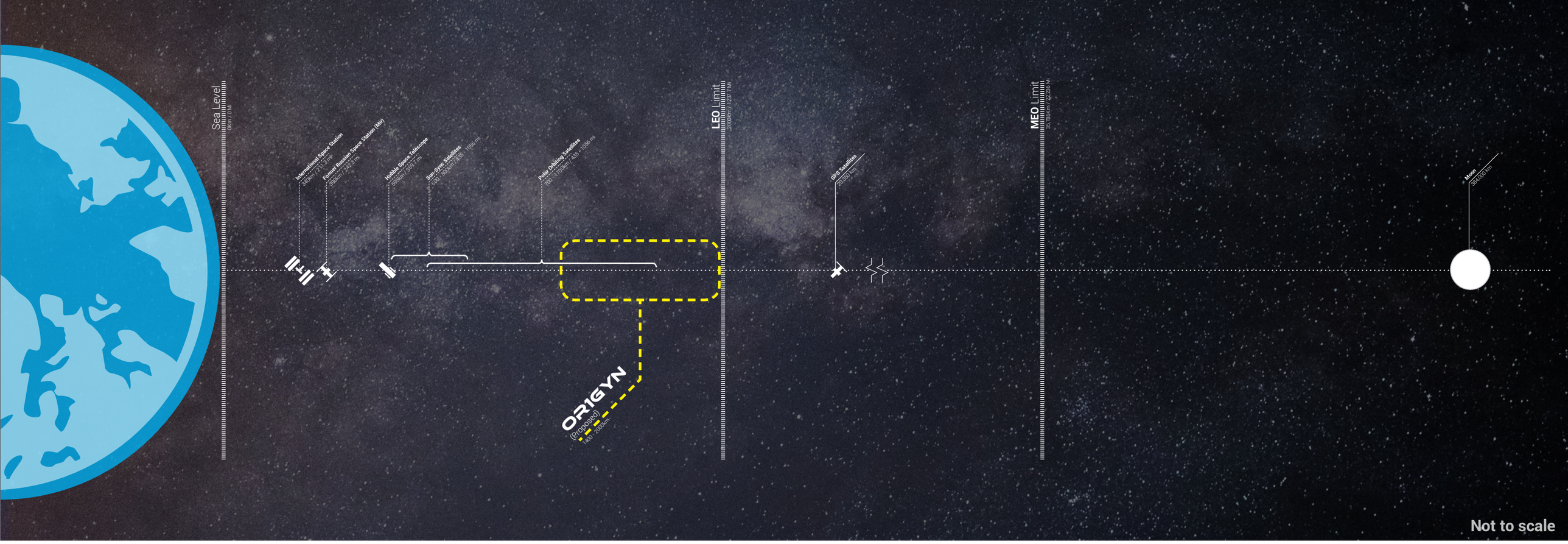
The Shift

The change of course.

Back in 19th century when the industrial revolution was taking shape, designers were in a similar dilemma to participate in shaping the industries/work environments. Eventually industrial age today not only stands as an example for human production / manufacturing breakthroughs - but also as a time when human living - working conditions were pushed to the extremely inhuman limits whose evidences are visible even today.

It took us a century to realize that design cannot stay far behind, when technology takes the lead, and in this case when human survival is the aim. 200 years ago it was industries and today it is the colonization of space.

The shift is majorly visible when we see practices like BIG and Foster+Partners taking the leap in crafting ideas that are educating the fraternity with brave concepts of how our future colonies could look like. Building on that we need to capitalize on how we see designers and their ability to shoulder these ideas hand in hand with cutting-edge engineering.



Challenge

The design brief.

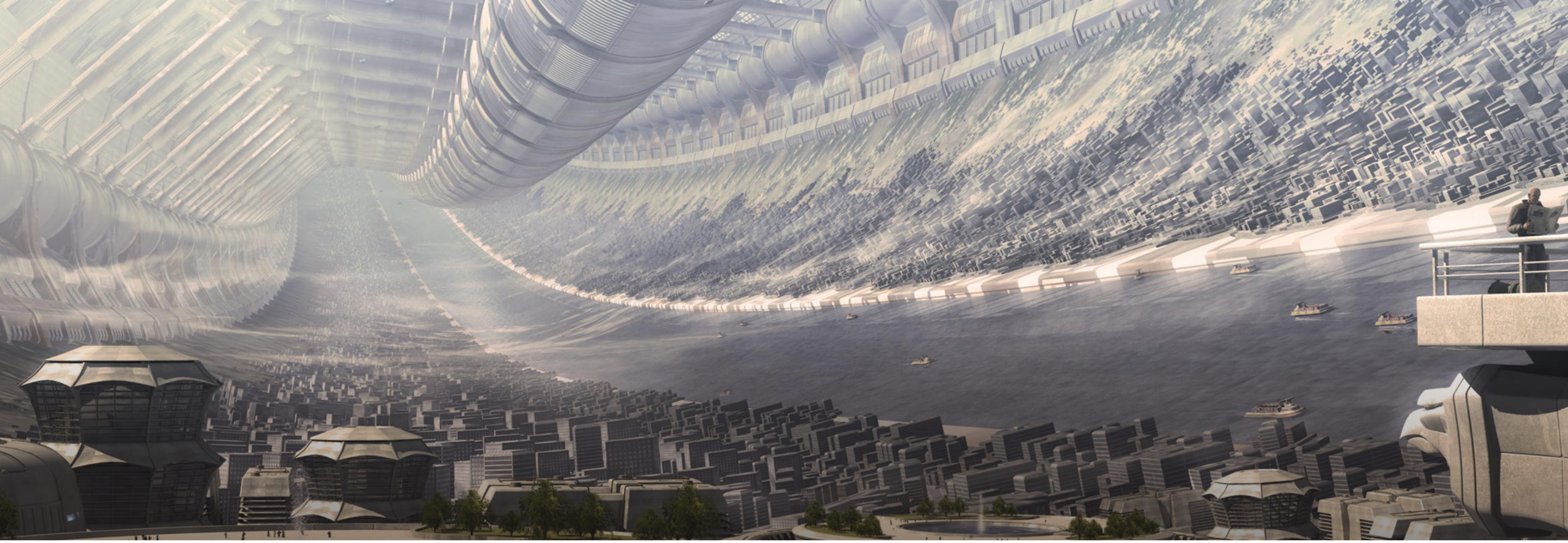
The challenge here is to design a space habitat for **2000 Astronauts / Space travellers / Recreationers which should be expandable to 10000** codename: **ORIGYN**.

ORIGYN is the first space settlement commissioned by planet earth collectively in the year 2040 - which will host as a staging area for all our space missions here on. This staging base will be a point of interest for space recreationers at the same time a part of it will also be the origin of all the space programmes in the coming 3 decades in our endeavor to explore the solar systems and beyond.

The primary functions of this space habitat will be:
1. Staging,
2. Re-Fuelling,
3. Recreation,
4. Research-Training,
5. Service / Maintenance

The **ORIGYN** station will be situated in Low Earth Orbit, not on a planet or moon.

Orbits are far superior to the Moon and Mars for early and long-term settlement, and other planets and moons are too hot, too far away, and/or have no solid surface. The materials for these settlements, however, must have to be imported from Earth, the Moon or Near Earth Objects (NEO's - asteroids and comets).



Credits: Alexander Preuss

User?

Who will inhabit this.

The major users for this space habitat would be: You. or People a lot like you. Space habitat will be a place for people from earth.

It's reasonable to expect that the vast majority of space settlers will be ordinary people - In Individual or Families. Eventually, most people in space settlements may be born there, and someday they may vastly exceed Earth's population in the longer run.

In today's scenario only highly trained and scrutinized selected astronauts go to space. A space habitat will need inexpensive, safe launch systems to deliver thousands, perhaps millions, of people to orbit, like the Space Race 2.0 companies are already making. A space habitat like this is not very far if we are already able to achieve 100s of faster recyclable space flights every year.

A part of this habitat will be dedicated to space exploration and technical missions which will further propel our explorations in future. This staging area can also be a place to expose astronauts to zero gravity environment for longer durations - before they explore deep space travel. And there can be many modes of Zero-G recreation that popularizes space travel as well.

Basics

This part of the brief is just a hands on technical reference to the outline of problem.

Radiation protection : Cosmic rays and solar flares create a lethal radiation environment in space but settlements in Equatorial Low Earth Orbit (ELEO) are protected from most space radiation by the Earth itself and Earth's magnetic field. Further out, beyond Earth's magnetic field, settlements must be surrounded by sufficient mass to absorb most incoming radiation, about 7-11 tons per square meter depending on the material.

Materials : Launching materials from Earth is expensive, so for far away settlements bulk materials such as radiation shielding should come from the Moon or Near-Earth Objects (NEOs - asteroids and comets with orbits near Earth) where gravitational forces are much less, there is no atmosphere, and there is no biosphere to damage. Our Moon has large amounts of oxygen, silicon and metals, but little hydrogen, carbon, or nitrogen. NEOs contain substantial amounts of metals, oxygen, hydrogen, carbon, and at least some nitrogen.

Energy : Solar energy is abundant, reliable and is commonly used to power satellites today. Massive structures will be needed to convert sunlight into large amounts of electrical power for settlement use. Energy may be an export item for space settlements, using microwave beams to send power to Earth.

Transportation: This is the key to any space endeavor. Present launch costs are very high which are decreasing thanks to reusable launch vehicles being developed as a priority. You can take reference of these launch vehicles to design the habitat. We also have to avoid serious damage to the atmosphere from the thousands, perhaps millions, of launches required. Transportation for millions of tons of materials from the Moon and asteroids to settlement construction sites is also necessary once settlements expand beyond Earth's magnetic field. One possibility is to build electronic catapults on the Moon to launch bulk materials to waiting settlements.

Communication: Compared to the other requirements, communication is relatively easy. Much of the current terrestrial communications already pass through satellites. Early space habitats in the orbit close to Earth can plug into Earth's communication system.

Life support: People need air, water, food and reasonable temperatures to survive. On Earth a large complex biosphere provides these. In space settlements, a relatively small, closed system must recycle all the nutrients (including CO_2 and waste) without "crashing." The Biosphere II project in Arizona has shown that a complex, small, enclosed, man-made biosphere can support eight people for at least a year, although there were many problems. A year or so into the two year mission oxygen had to be replenished, which strongly suggests that they achieved atmospheric closure. For the first try, one major oxygen replenishment and perhaps a little stored food isn't too bad. Although Biosphere II has been correctly criticized on scientific grounds, it was a remarkable engineering achievement and provides some confidence that self sustaining biospheres can be built for space settlements.

You can use these pointers to identify each of these concerns in your design while explaining in presentation boards.

The major technical elements of space habitat roam around 6 pointers viz. **Radiation protection, Materials, Energy, Transporation, Communication and Life support.**

Working

How the space habitat will work?

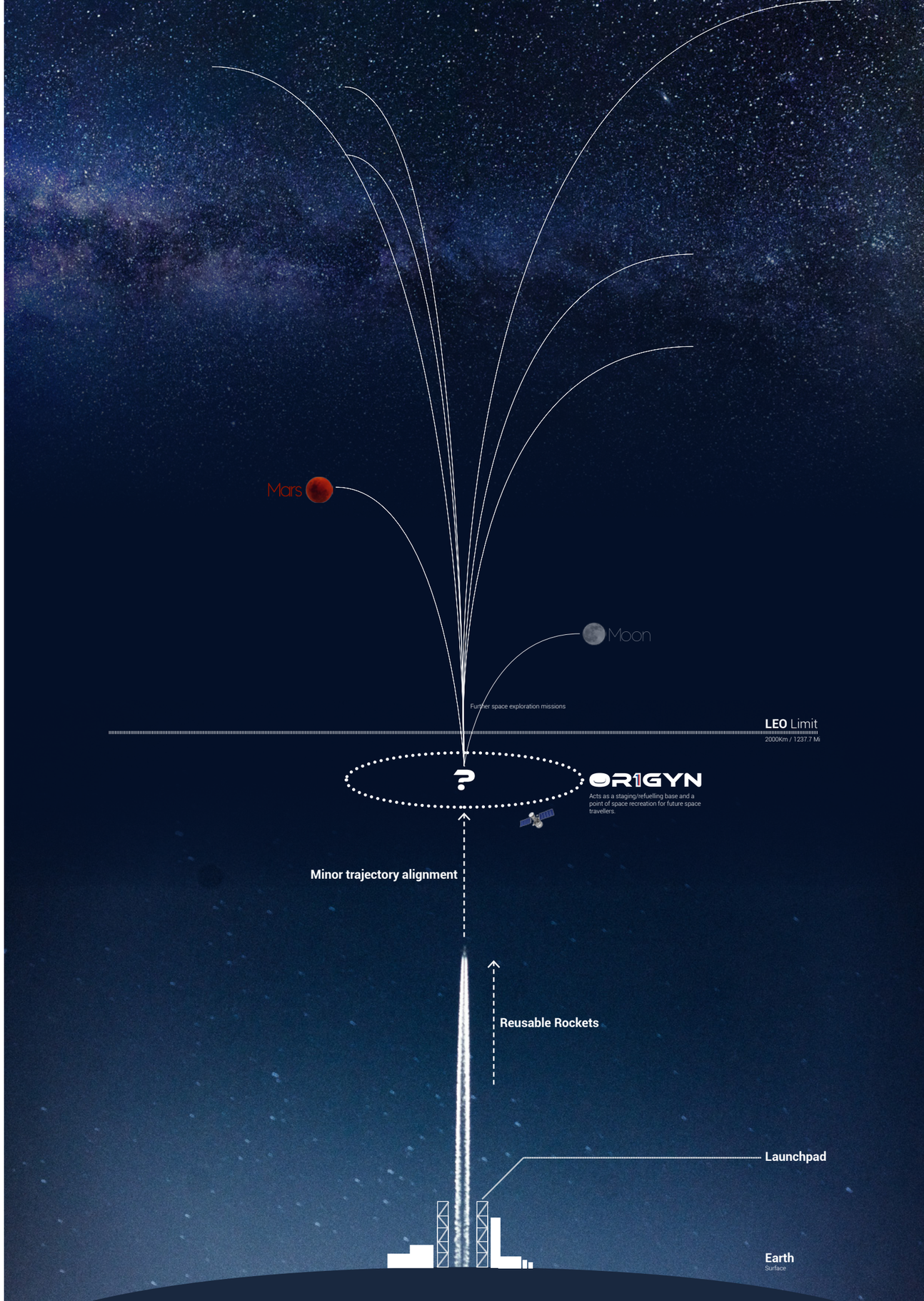
The purpose/function of space habitat **ORIGYN** would hence be:

1. Staging - For all future space mission in the coming 3 Decades and beyond
2. Re-Fuelling - Refilling all the Moon and Mars exploratory space crafts
3. Recreation - Recreation for enthusiast space travellers
4. Research & Training - For Space Organizations and expermentations
5. Service / Maintenance - Maintenance of Launch vehicles before the begin next missions.

This also makes **ORIGYN** as the beginning point of our first orbital habitat.

One of the major issue with a lot of space missions is associated with the exit and re-entry of launch vehicles through earth's atmosphere. Not only the launches destroy our atmosphere with a massive amount of fuel burning at the same time it makes the launch expensive as well. During re-entry, the launch vehicles have to face massive heat - and tension to land back into the surface which has costed us a lot of loss (life and resources) in past.

ORIGYN station eliminates the need to enter - exit, Earth's atmosphere again and again by these launch vehicles. There also can be a possibility of a huge catapult (Mass driver) will propel these launch vehicles from earth to almost Quarter or Half way without any fuel after which these frequent flying vehicles will dock to **ORIGYN.** Once resources, equipments, and humans are staged here - they will leave for outer space on exploratory vehicles - instead of all the payloads entering back to earth to land. Thus increasing frequency of space exploration. The same can happen for missions that mine resources from moon.



Submission

The minimum requirements.

You will have to conceptualize the primary functions of this space habitat : **1. Staging, 2. Re-Fuelling, 3. Recreation, 4. Research-Training, 5. Service / Maintenance** - in terms of the given parameters of **Radiation protection, Materials, Energy, Transporation, Communication and Life support.**

• A maximum 8 nos. – 1440 x 2540 sheet in portrait digital format (JPEG)
• Answer 6 mandatory questions and 2 self formulated questions in the discussion section as given on the next page.

Minimum requisites in the sheets (For a complete submission):
• Key plan (Compulsory) with span dimensions
• Key cuthrough conceptual sections x 2 (Minimum)
• 3D views x 2
• Cover image of size 2000 x 800 px or larger in aspect ratio 5 : 2.
• Floor plans, images, sketches (if any) can be added to support the entry in the form of additional images.

+ Use exploded views to discus multi levelled conceptual models better.
+ Ensure that the final sheets which are submitted do not include your name or any other mark of identification. Also mention a small sheet number on corner of every sheet.
+ To learn about the best practices of submission refer to this pdf here. https://goo.gl/fmmcP7
+ Plagiarism of any idea/form/design/image will be disqualified with a notice.

Credits: EA Mass Effect

Rewards

For the best of the best.

1500$
Winner
For Students & Professionals

750$
Runner - Up
For Students & Professionals

500$
People's Choice
Most appreciated - Students

500$
People's Choice
Most appreciated - Professionals

The Award will include a trophy and certificate.

Institutional Excellence Award
Trophy & Certificate | For Each participating Institution & Best Entry Respectively
For Students only

Learn more about this award here:
http://competitions.uni.xyz/institutionaccess.html

200$
Honorable Mention
1. Students

200$
Honorable Mention
2. Students

200$
Honorable Mention
3. Professionals

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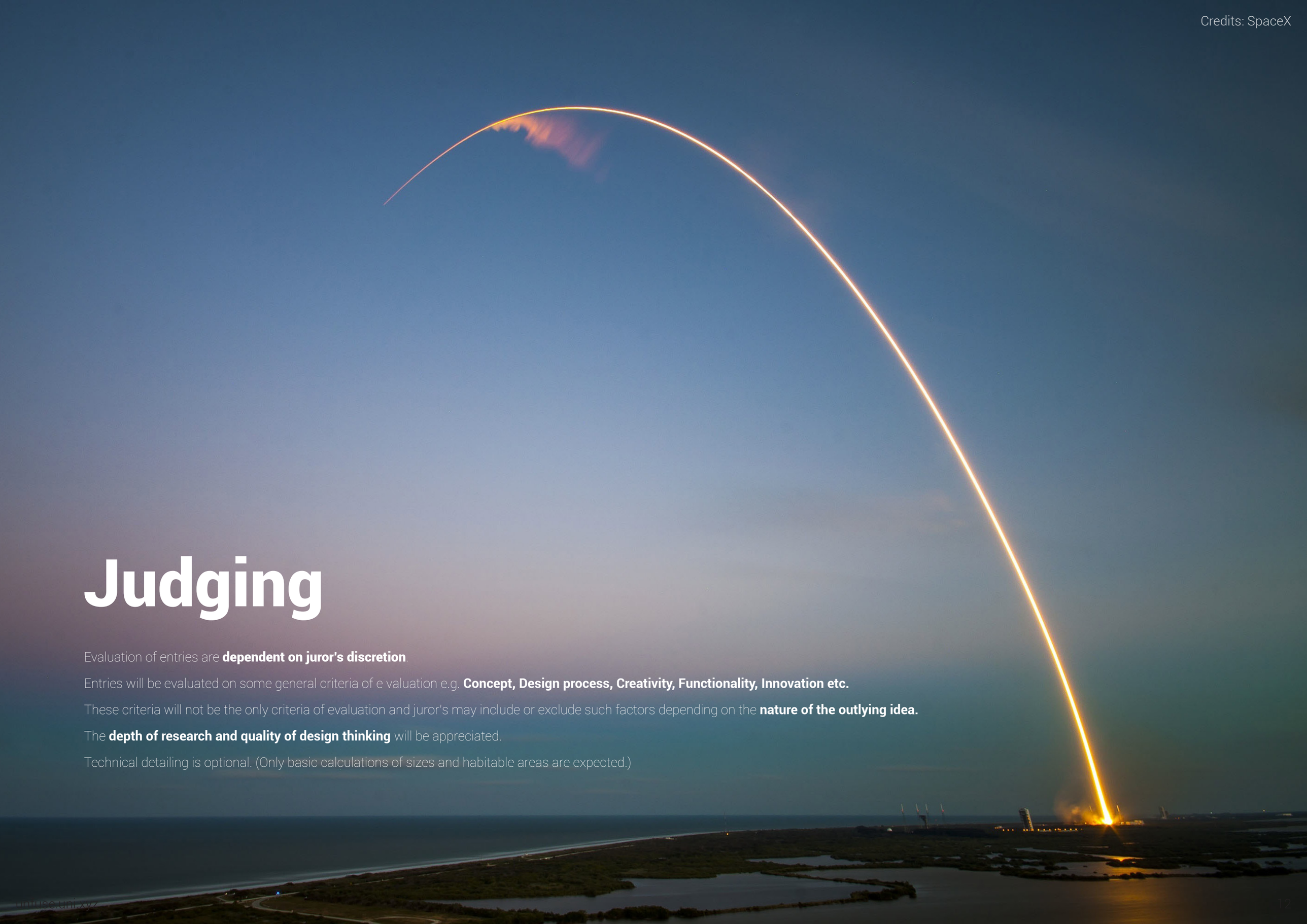
Honorable Mention
4. Professionals



Credits: SpaceX

Judging

Evaluation of entries are **dependent on juror's discretion**.

Entries will be evaluated on some general criteria of e valuation e.g. **Concept, Design process, Creativity, Functionality, Innovation etc.**

These criteria will not be the only criteria of evaluation and juror's may include or exclude such factors depending on the **nature of the outlying idea.**

The **depth of research and quality of design thinking** will be appreciated.

Technical detailing is optional. (Only basic calculations of sizes and habitable areas are expected.)

Credits: Faaiq Ackmerd

Timeline

The ETA.

Register here: **http://origyn.uni.xyz**

Submission Deadline: April 10, 2019
Submission closes for Origyn.

Public Voting begins: April 11, 2019
Submitted entries are open for voting.

Public Voting ends: May 11, 2019
Voting ends on this date.

Result Announcement: May 20, 2019
Result day!

What's X-plor?

X-plor is an exploratory ideas arm of Uni, where participants are exposed to challenges with an entirely new subject / premise in terms of design. **X-Plor** competitions allow participants learn simultaneously, beyond traditional problems and invite fresh design ingenuinity to solve them.

Primary theory associated with these problems are supplied with the problem statement. The design outcomes are judged by the combinations of logics applied in resonance to proven + speculative ideas that stand most innovative amongst all.

References:

Space Habs: http://www.spacehabs.com/
Kalpana One Space Settlement: http://space.nss.org/media/Kalpana-One-2007.pdf
Wikipedia: https://en.wikipedia.org/wiki/Space_habitat
Greenspace: Habitat Concept: http://space.nss.org/settlement/nasa/Contest/Results/2014/GREENSPACE.pdf
Space colonies and Lunar Bases: http://www.ifa.hawaii.edu/~meech/a281/oldlectures/Colonies.pdf

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