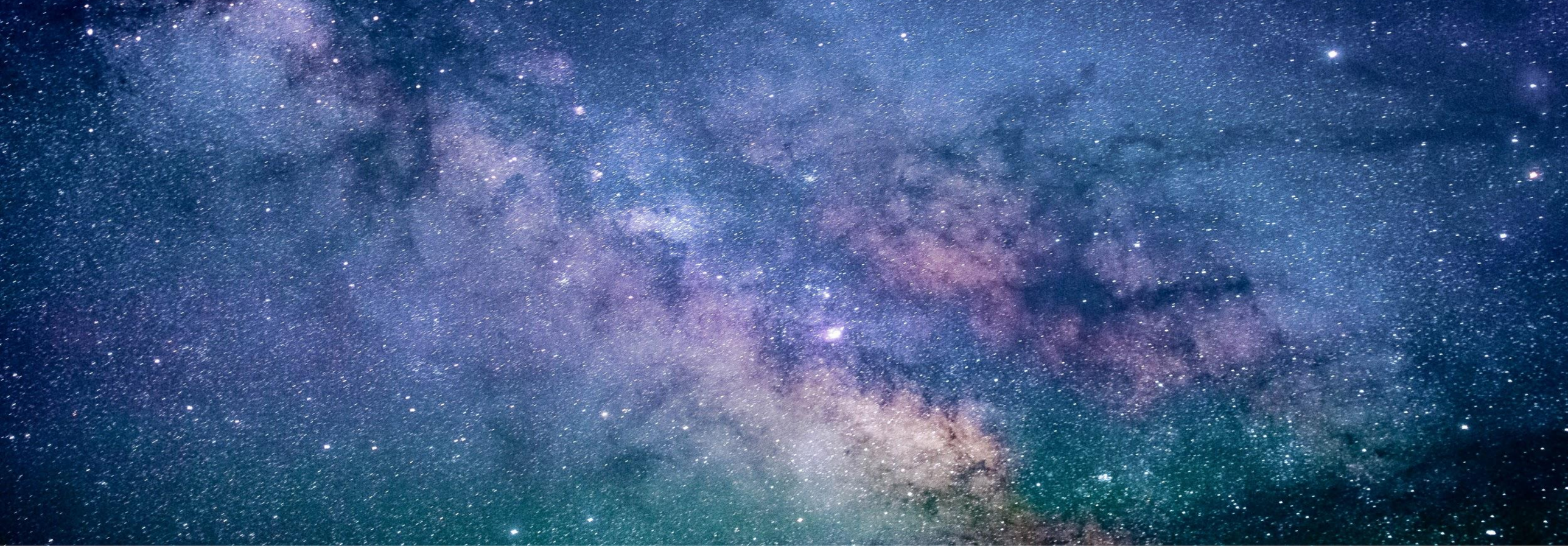
X-PLOR

LEAP

Space Habitat Design Competition

https://**competitions**.uni.xyz



Img 1: Universe.

Premise

50 Years ago, when Neil Armstrong kept his foot on the surface of the Moon, it inspired a moment of awe and pride for humanity. The *New York Times* newspaper argued that “man, from this day on, can go where so ever in the universe, his mind wills and his ingenuity contrives…to the planets, sooner rather than later, man is now certain to go.”

We are living at a moment of great promise. Humanity’s breakout into space is underway. Yet success is not inevitable. The Internet or Digital Economy that began out of nowhere in the last two decades and has been on an exponential growth surpassing physical economy. **Space Economy** would be taking over, on even vaster expanse increasing by many folds. Space Exploration, travel, tourism and asteroid mining are ongoing ventures of private as well as government aided space firms turning it into reality.

This bound to not only generate untold wealth - but also contribute in making the environment greener. But how?



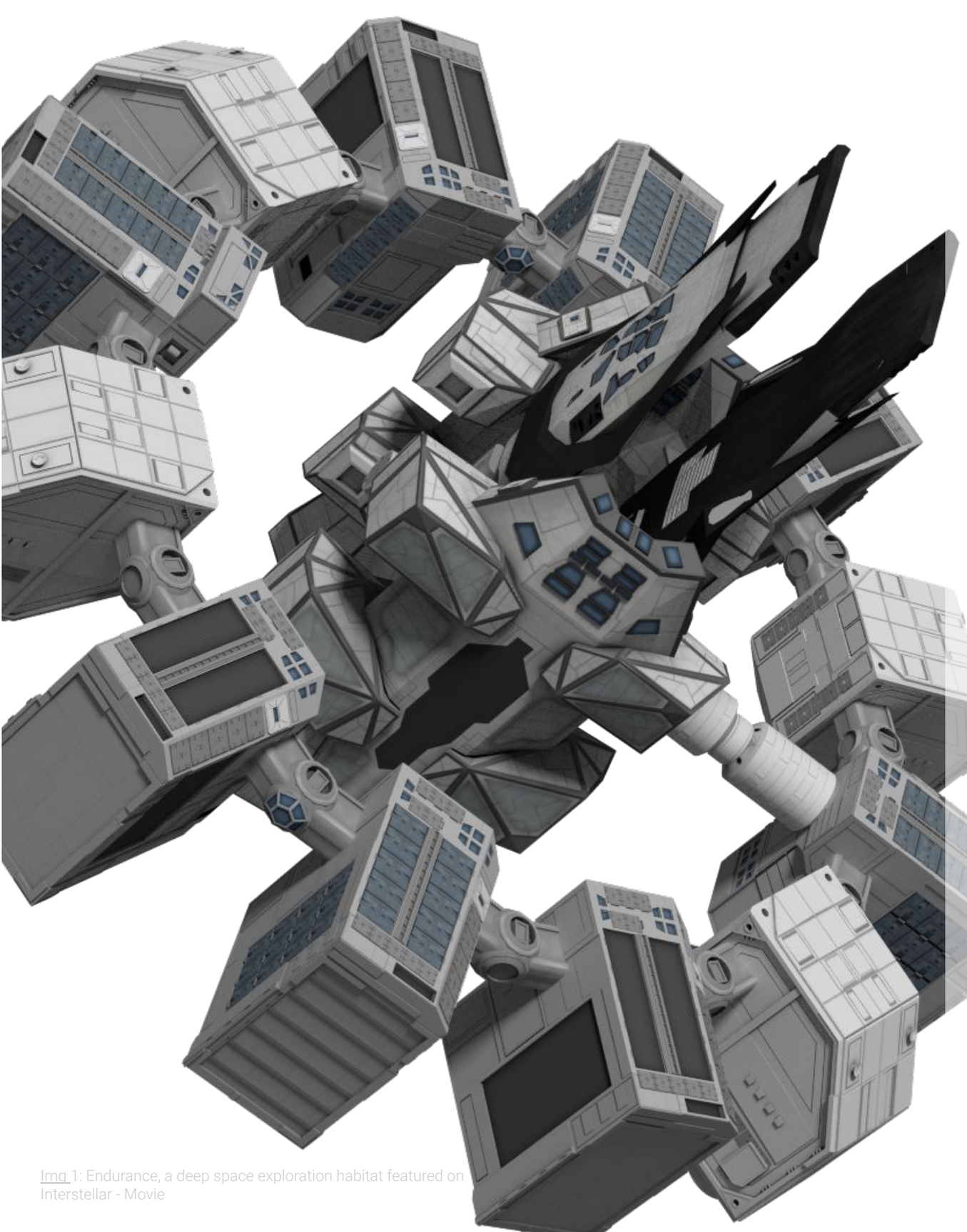
Img 2: Transitioning from digital economy to space economy. Source.

Space Economy

Space Economy is the commercial utilization of technology in space, and its potential is currently limited to satellite navigation, satellite television and commercial satellite imagery. Private companies like **Blue Origin**, **SpaceX**, **Rocket Lab**, ***Virgin Galactic* - Virgin**, **Bigelow Aerospace**, **Planetary Resource** are some of the few that are already preparing to make the space business thrive by exploring options. Regularizing space travel for all, for better communication, mass tourism, and space exploration for minerals - asteroid mining etc are some of the proposals in pipeline.

Since the potential value of minerals in these asteroids is staggeringly large, space organizations have already begun their quest in developing the technology required to make it happen. Our solar system is filled with millions of asteroids, ranging from the size of a feet to 975 kms. The amount of iron found in asteroids 16 Psyche alone is worth an estimated $10 quintillion.

Such possibilities could see the annual revenues of the space industry go from **$340 billion** to **$926 billion** by the year **2040**—creating a potential opportunity for venturing into creating space habitats for specific needs as well as research.



Img 1: Endurance, a deep space exploration habitat featured on Interstellar - Movie

What?

The challenge is to design a space habitat specifically tuned for asteroid mining.

Why?

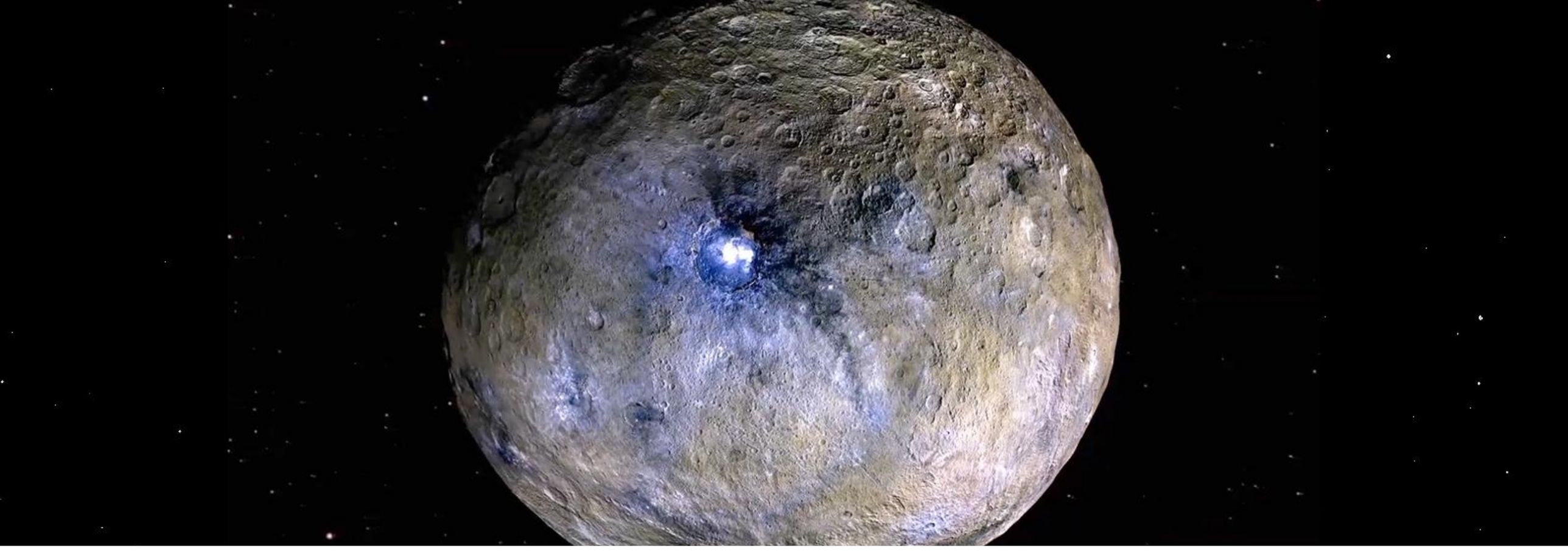
Essentially, while our civilization is growing our energy consumption has also grown, making expansion into beyond our realm necessary. So, while searching for new resources may be inevitable, it will also become beneficial for us in the long term. It will automatically enable us to leap a grade higher in the Kardashev Scale, a scale identified based on energy consumption, where we currently stand at Grade 1.

On the other hand, economic feasibility of asteroid mining and mineral extraction does not only favour a huge investment return for the industries but would also support space habitats or other facilities in space to sustain themselves by the virtue of water and oxygen available on them.

How?

Companies like **Planetary Resources**, **Spacex**, **Blue Origin** have begun the race of turning asteroid mining into a reality. The first step — landing on an asteroid — requires a craft that is powerful enough to switch between low-Earth orbit and orbit around the asteroid. It can be done in unmanned missions where the rocket reaches near the vicinity of an asteroid and scans it for its feasibility i.e. the amount of minerals that can be extracted. Once the asteroid has been verified as useful enough, it can be towed back to earth or the minerals can be extracted in situ. Eventually as the mining becomes profitable, a manufacturing unit can be set up in space itself.

The construction and functioning of a manufacturing unit would be facilitated by technology such as 3D printing and AI which reduces the risk and expenses. The making of parts would be done using materials extracted in situ. The manufacturing unit will then act as a habitat in itself where extracted materials are processed and sent back to earth for use. Space passive technology, including solar sails/solar satellites and cosmic radiation would be used for harnessing for powering the **LEAP**.



Img 5 : Ceres- A Dwarf Planet

Challenge

LEAP is the first self sustaining industrial space settlement that will be commissioned by planet earth collectively in the year **2032**. The challenge here is to design a space habitat module for 100 “Astro Miners”. The habitat module would be replicable in nature that can be expanded based on the requirement.

The primary functions of this space station will be :

1. Metal/Mineral Extraction
2. Processing
3. Accommodation
4. Recreation
5. Space for Physical Exercise
6. Communication Satellite
7. Research - Training
8. Service / Maintenance
9. Production Unit
10. Powering unit
11. Aquaponic or Aeroponic Farm

This space station would be a base for material extraction and processing. After the processing the facility will have features to enable deployment of the material back to earth for use. The participants are free to decide the nature of LEAP space habitat, i.e. Planetary Or Orbital depending on their design story.

Location

For this challenge, the region near asteroid (dwarf planet) Ceres located in the asteroid belt between Mars and Jupiter is chosen. It is also one of the first and largest asteroids known to mankind. Ceres itself is a dwarf planet and its mass is considered to be one-third of the total mass of the belt. It would be closest to the earth on Feb 2032 according to the predictions based on its trajectory data. A few weeks prior to this, **LEAP** would be launched for the deep space mission.

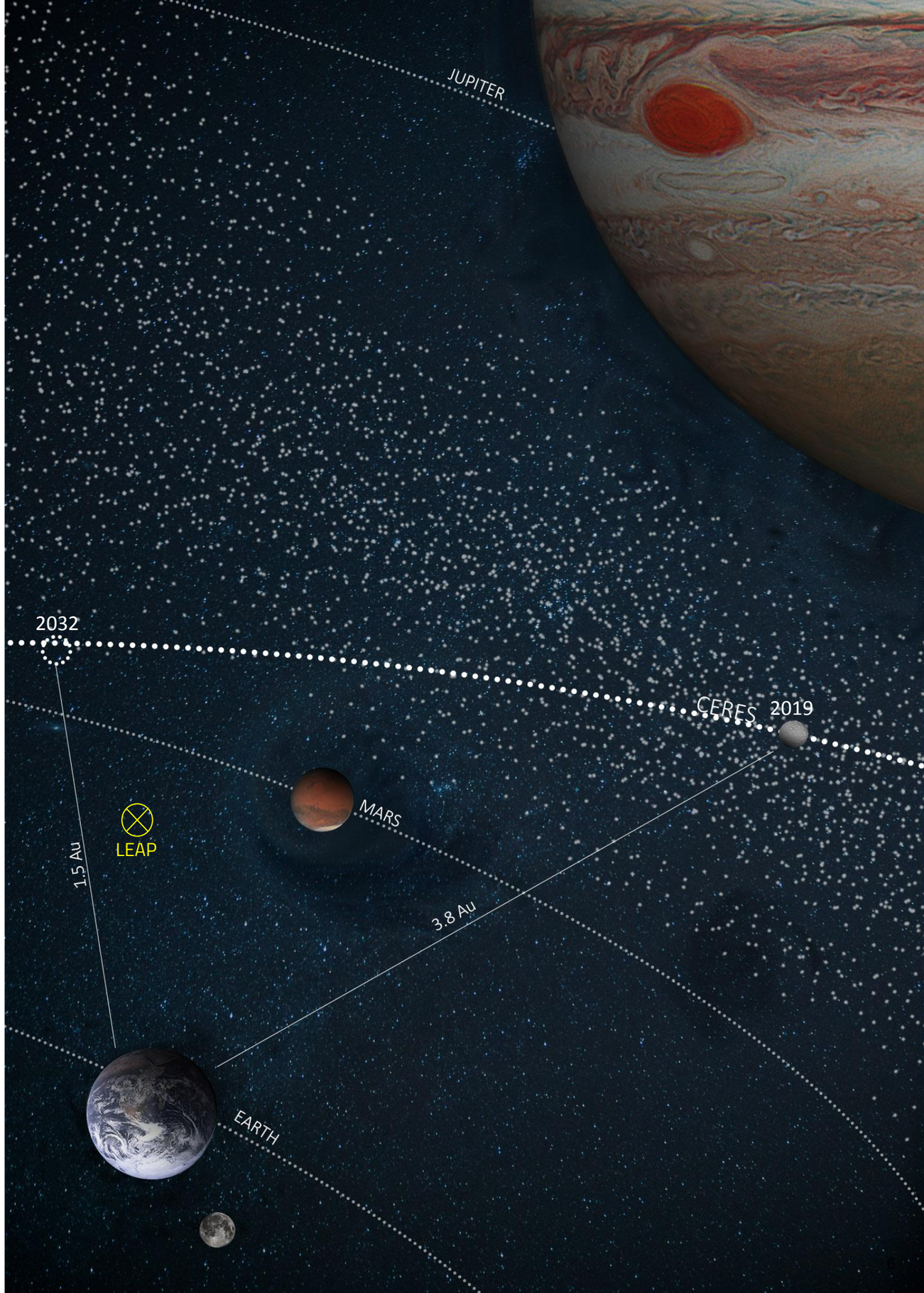
The distance between the Asteroid Belt and Earth varies considerably depending on where we measure to. Based on its average distance from the Sun, the distance between Earth and the closest edge of the Belt can be said to be between 1.2 to 2.2 AUs. But, at any given time, part of the Asteroid Belt will be on the opposite side of the Sun relative to us.

Naturally, any exploration or other kind of mission launched from Earth is going to take the shortest route, unless it is aiming for a specific asteroid. And even then, mission planners will time the launch to ensure that we are closest to the destination.

User

The users for this space station would constitute of a group of space scientists, Medical specialists, astrophysicists, space engineers, maintenance engineers and workers in the asteroid mining factory, space station maintenance staff, etc. A part of the space station can be dedicated for research and space exploration comprised of scientists and space explorers.

The participants can modify the ratio and add to the occupation/roles of the user already mentioned group depending on their design story.



Design Outline

The design outlines mentioned below can be used as beginning point to conceive the design. Design exercise does not expect the participants to have technical and scientific accuracy, however the outcome is expected to have logical hypothesis for certain design ideas and their execution in the space station.The materials for initiating these settlement and setting up the base can be imported from Earth for a smaller base unit. Once the station has been set up, its growth and repair can be regulated using the materials extracted from the asteroids. The space station is expected to be maintained by privately owned space exploration organizations solely for commercial purpose and research.

MISSION DESIGN: The brief discusses some of the possible approaches how the mission for “Leap” can be carried out based on factual data. The participants must take cues from the data and curate the mission story for their respective projects.

CREW COMPOSITION : A basic outline of the purpose of the space station that has been stated previously in the brief can be used to compose the crew members of the space station.

SAFE HAVEN : In case of an emergency an immediate evacuation must be strategized for the people on board. It does not require technical facts and accuracy.

SPACE STATION LIVING AND WORKING ENVIRONMENT : The basic functioning strategy of the living and working environment of “LEAP” must be designed using plausible hypothesis and using the given facts.

HUMAN FACTORS AND ERGONOMICS : The design teams must consider and accommodate human factors such as circadian rhythm, medical support facility, emergency unit etc. in their principles in design. Both the medical support facility and the recreation facility should be approached comprehensively to enable physical recreation and monitored exercise for the crew.

BASE DESIGN : The base provides the living and working spaces and all other accommodations to sustain the crew and effectively support them in accomplishing mission objectives.

Submission

You have to deliver an architectural outcome on the following site, based on the given outlines.

• Recommended number of boards/sheets - 6 boards/sheets. – **[2362px** x **3544px]** or **[400mm x 600mm** in **150 dpi]** in portrait digital format (JPEG). Minimum 3 boards/sheets & no maximum boards/sheet limit.
• Each image should be less than **15MB**
• You can find the preset PSD, AI and INDD template files in the 'additional resources folder and here.

This additional resources folder contains: FAQ Questions and References

Minimum requisites are sheets/boards + Cover image containing:

• Site plan (Compulsory)
• Key conceptual sections x 1 (Minimum)
• 3D views x 4
• Cover image/Thumbnail of size 2000 x 1000 px or larger in aspect ratio 2:1.
• Floor plans, images, sketches (if any) can be added to support the entry in the form of additional images.
• Answer 6 FAQ questions in the discussion section as given on the 'additional resources folder'.

+ Use exploded views to discuss multi levelled conceptual models better.
+ Ensure that the final sheets which are submitted do not include your name or any other mark of identification.
+ Mention sheet number on corner of every sheet.
+ This is a design ideas challenge only. There is no built commission/realization is associated with the problem
+ Plagiarism of any idea / form / design / image will be disqualified with a notice.

Registration page here: https://competitions.uni.xyz/leap

Discover the competition schedule and deadlines here: Schedule

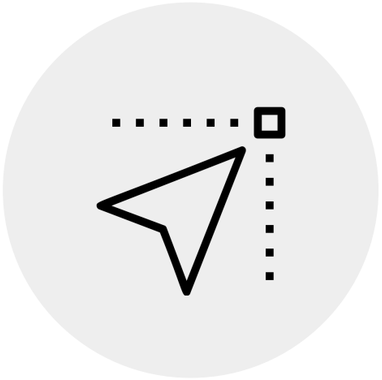
Rewards



Grants of up to a total of **20,000$** can be won on this challenge. Learn more about the full conditions on the competition page here.

Judging Criteria

The entries will be judged by an international jury of the competition on the following criterions:



Presentation

The fundamental to a good entry is a good presentation.



Concept/Idea

Quality of thought and intent in pre-design phase.



Spaces/Programme

How the spaces are calculated and ordered.



Design Output

The final architectural outcome of the solution.



The judging panel can also add other criterions based on their internal discussions - which will be in line with the problem statement. Eg. Design Execution, , etc. Participants are advised to fulfil above given criterions first in their design.

(Ad) Unist Subscription:

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Unist Subscription™ is world's only premium pass to compete in various design competitions at a flat fare. Unist subscription is aimed to enable participants to compete better - faster - stronger in world class design challenges. You also save on various gateway charges and can make multiple teams for various challenges. Click to learn more.

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About

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 ingenuity 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.

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