



2018

## A systems approach to sustainability in space

Mehta, Neel and Richard, Christopher and Raut, Shubham and Nahar, Praveen

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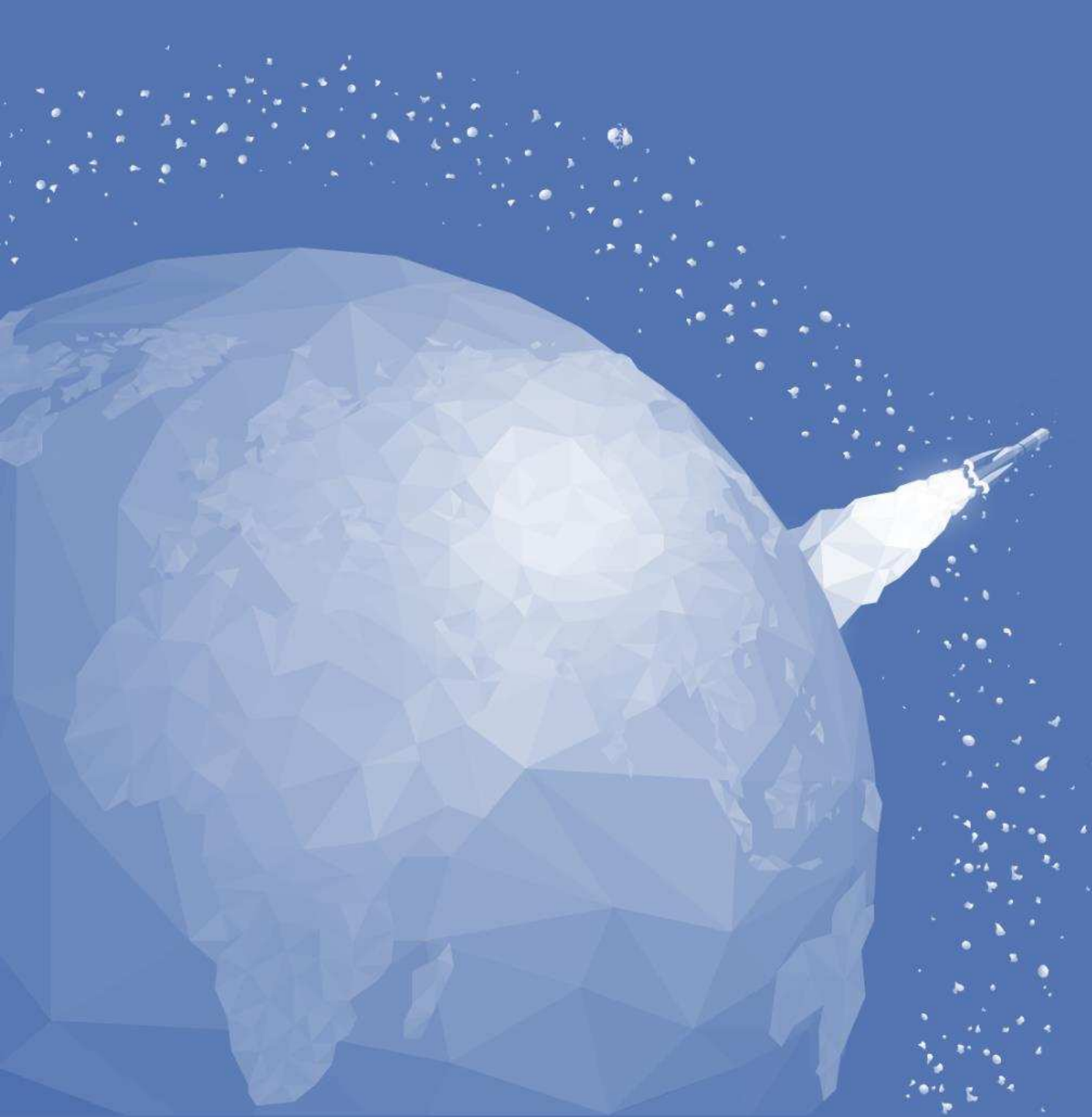
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THE  
cosmic  
corner



# The Cosmic Calling

*Why Space Debris?*

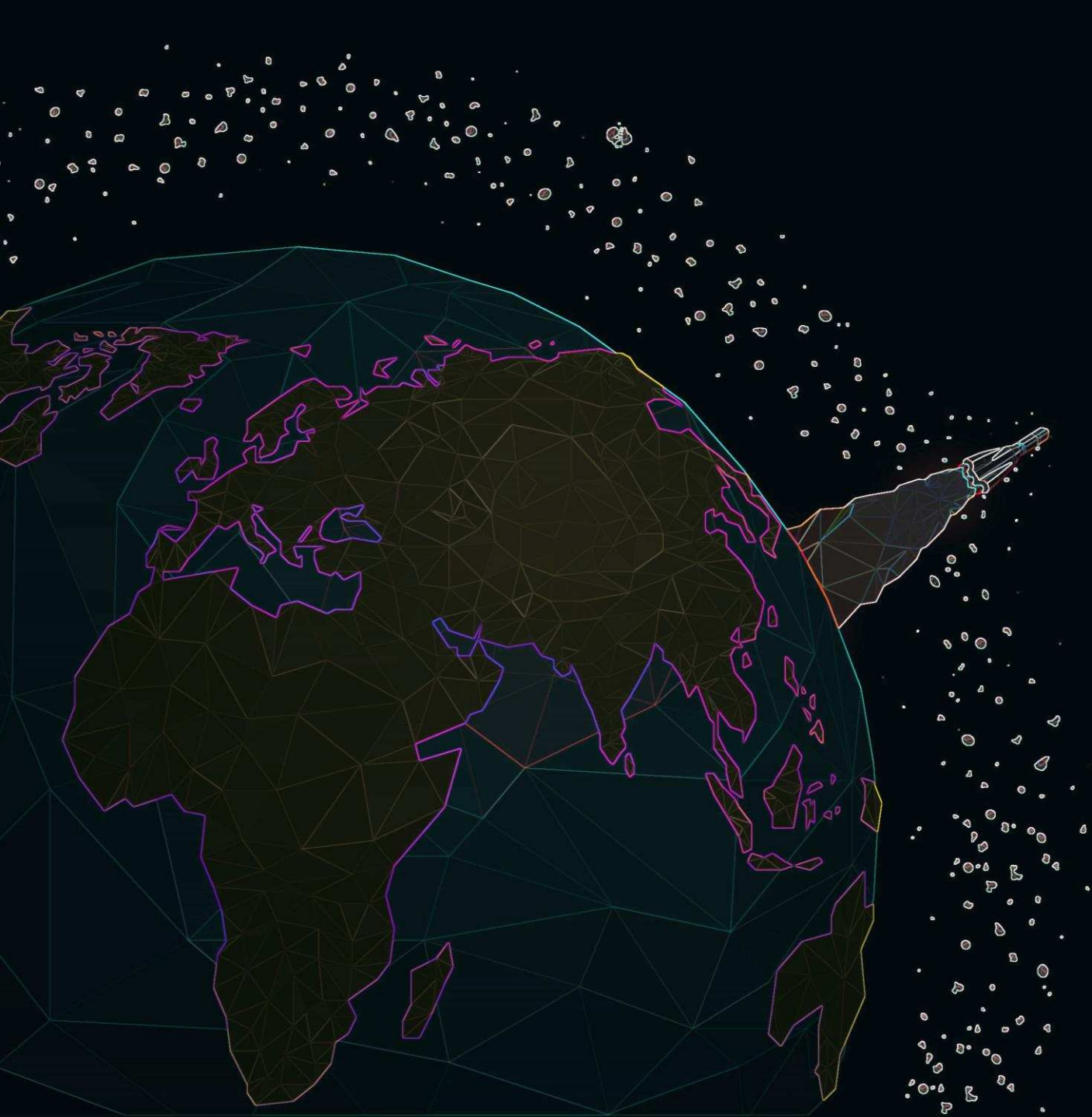


Out of sight

Out of mind



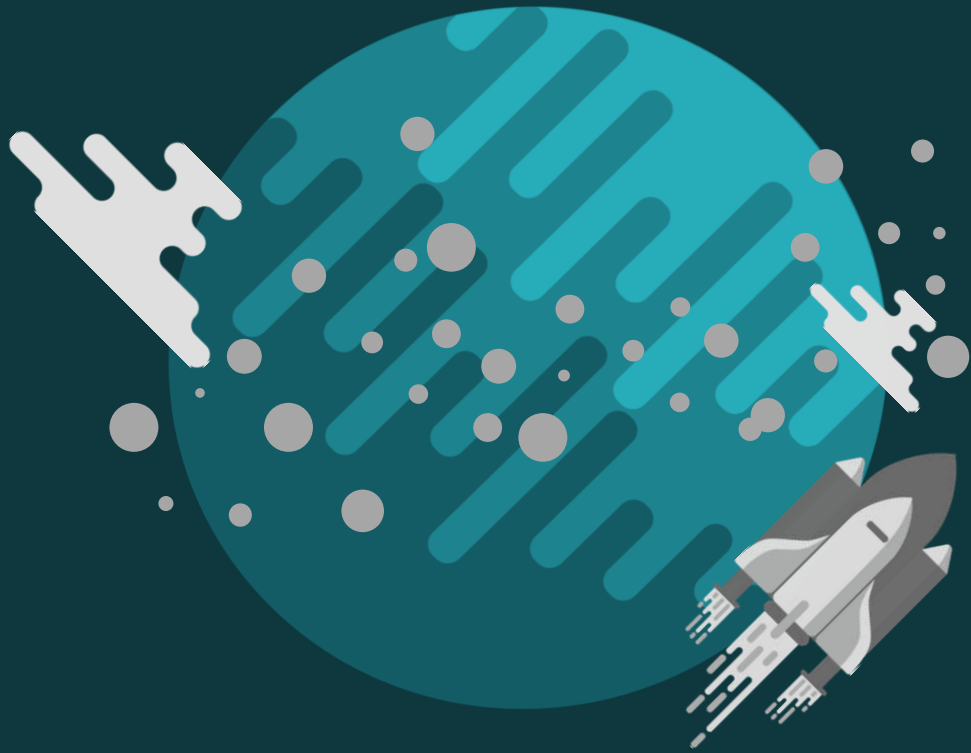
What is  
**Space Debris ?**



What makes it a  
**Wicked Problem?**



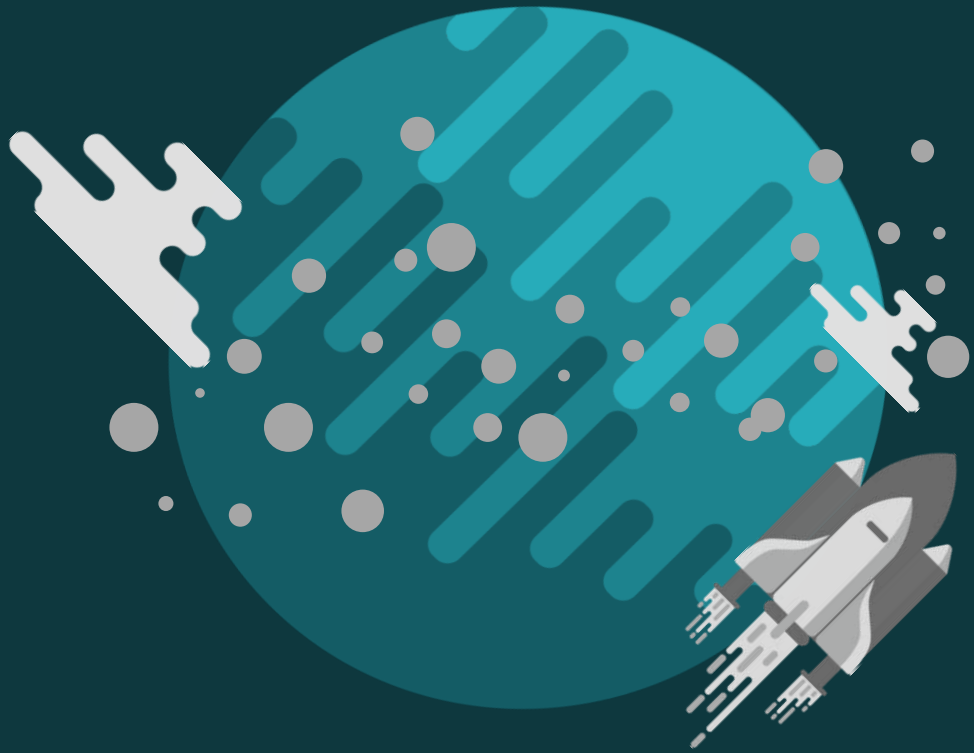




23,000 regularly tracked

7500 tn of space debris

750,000 debris between the size of 1cm to 10cm



# Research

*Widening our Knowledge base.*



## Sustainability

Lifecycle Assessment  
Effect on Environment  
Manufacturing  
Material Selection

## Policies

Binding Rules  
International Co-operation  
Revision of Treaties

## Economics

Privatization  
Democratization  
New Business Models



# Sharing our Journey

*Blog, Booklet and Abstract*

# Secondary Research

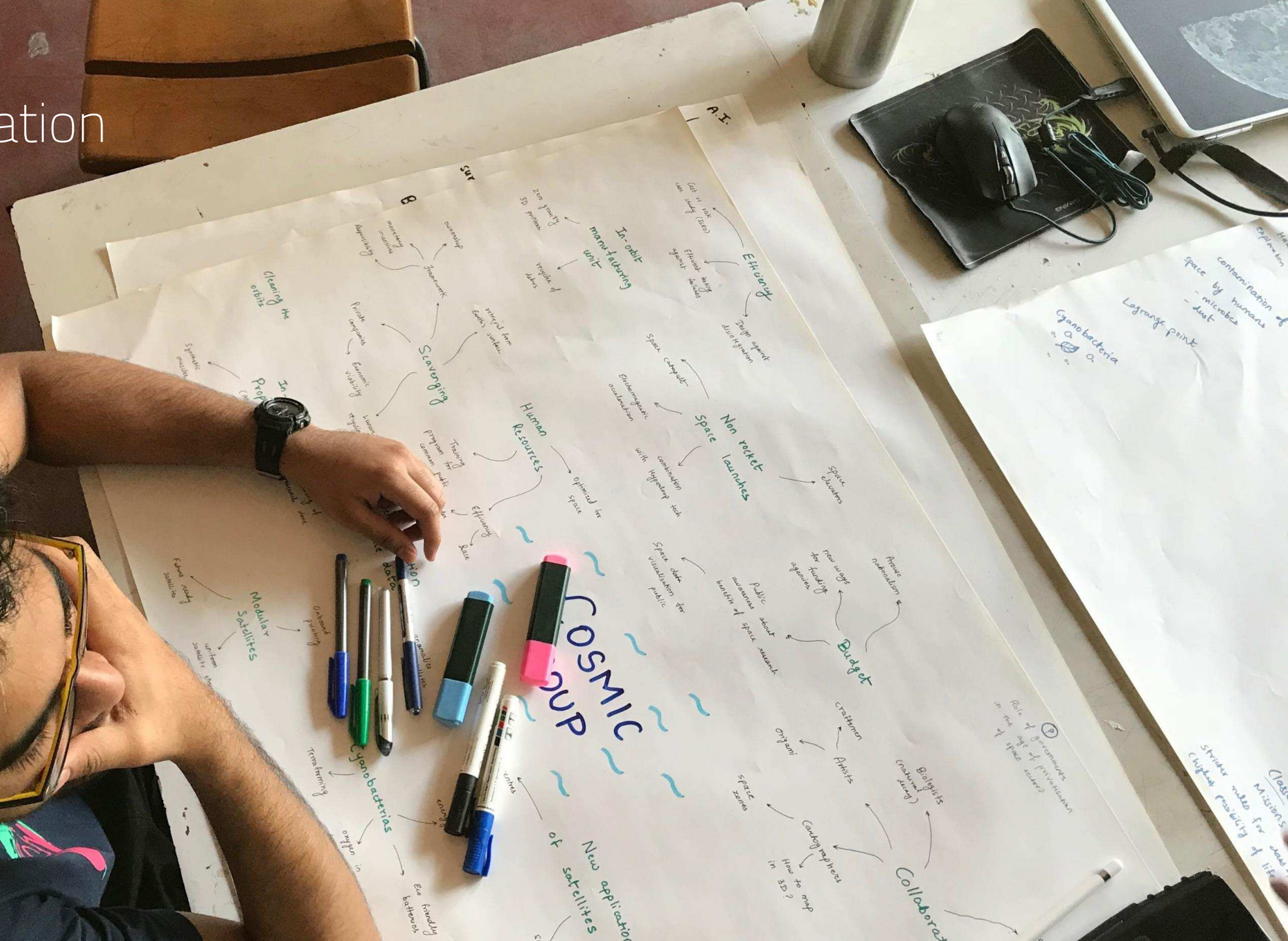
- *Current Policies around Space Debris*
- *Guidelines*
- *Dual Use Technologies*
- *Checks & Balances*
- *Use of Space Tech on Earth*
- *Spin-Off Tech*
- *Commercialisation*

# Case Studies

- Impact of Gender on Space Exploration
- Impact of Space on UK Economy
- Space Elevator Sustainability
- Handbook of New actors in Space

# Idea Generation

Process Reversal

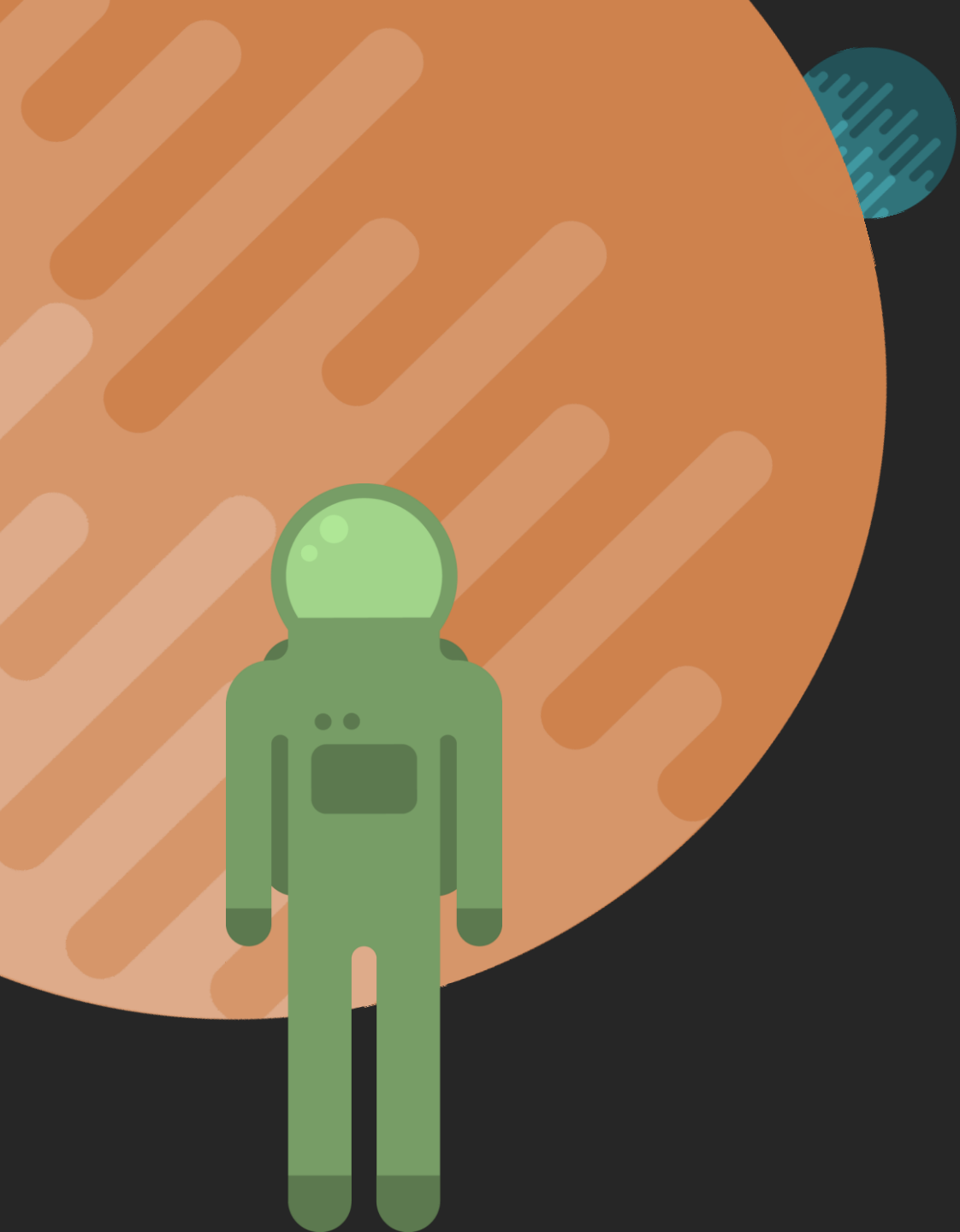




## Approaches

- *Space Debris*
- *Democratization of Space*
- *Economics of Space*
- *Design Approach in Space Industry*
- *International Policy Framework*
- *Space & Relatability*





## Narrowing down

### Space Debris

- Is burning on re-entry the best way to end a satellites life

### Democratisation of Space

- Who keeps check on how data from satellites are processed?
- How can treaties be revised for the new Space age?

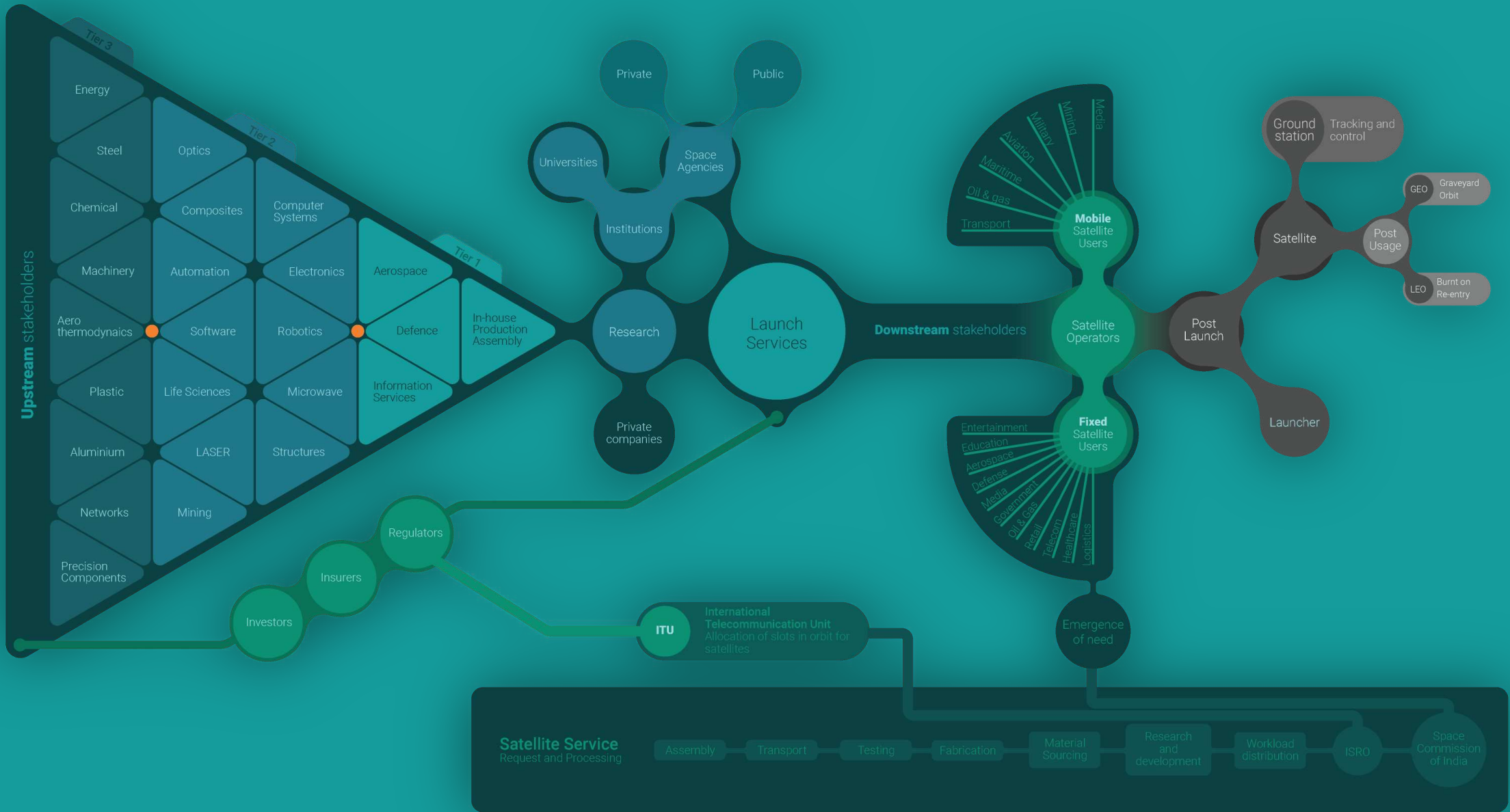
### Space & relatability

- How can common man relate more to Space?
- How do you kindle interest and fascination on a larger scale towards Space?



# Research & Mapping

- *Structured view of the Space industry.*
- *Finding new problems, opportunity areas and intervention points*
- *Understanding Upstream and Downstream of the Industry*

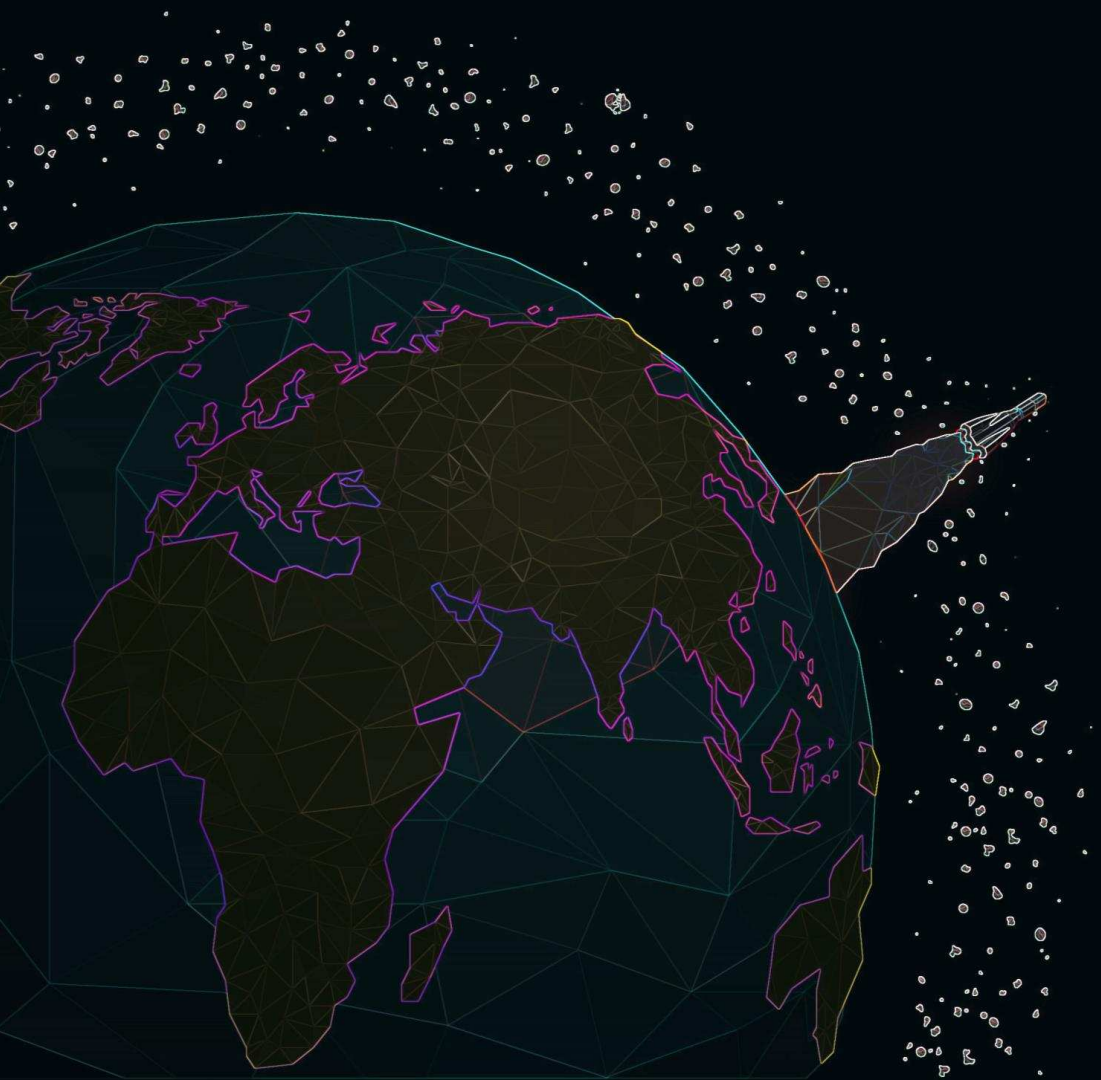


A stylized, low-poly Earth is shown on the left side of the image. The Earth is composed of dark green and blue triangular facets, with the continents of North America, South America, and Europe highlighted in a vibrant purple. A space probe, depicted as a small, multi-faceted object, is shown in the process of landing on the Earth's surface. The background is a dark, starry space filled with numerous small, white, irregularly shaped objects that resemble stars or distant galaxies. The overall aesthetic is futuristic and digital.

# Houston! We've made Contact

*Primary Research*





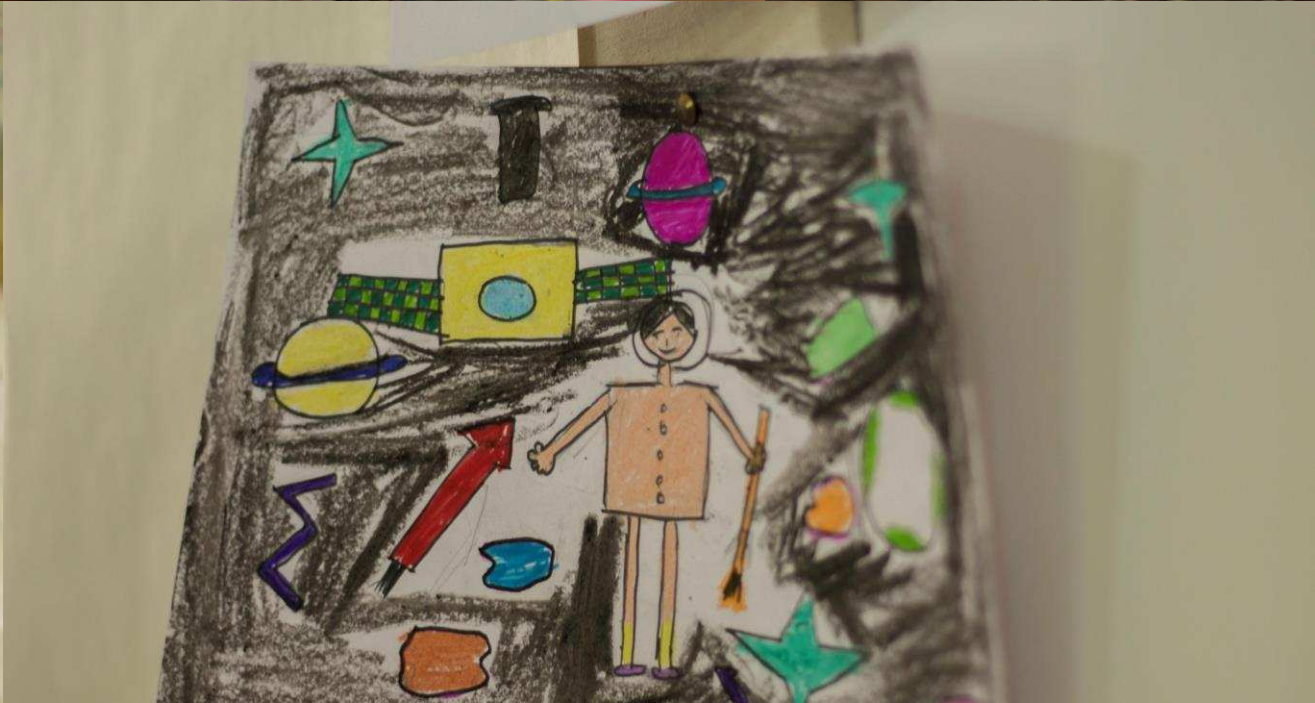
Harnessing Wisdom

# Why conduct a workshop with **kids**?

*Idea Generation & Awareness*  
*Unhindered Creativity*







# Flow of the **workshop**

Write down facts about Space and fact about Earth.

Presentation

Make your own superhero/super-heroine

Humanising a Satellite

Teaching them the parts of a Satellite

Make your own Satellite

Workshop with the **professionals**

# Scenario

Based idea generation

**The Past:** Restart the Space Age with your current understanding.

**The Present:** Deal with present space debris.

**The Future:** How can we mitigate Debris creation?

# Triggers

For idea generation

Design for **Collision**

Design for **Modularity**

Design for **Trackability**

Design for **demise**

Design for **Re-use**

Design for **Secondary use**

Design for **Transformation**

Design inspired from **Nature**



# Outcomes

Of the idea generation

Past group:-

- Disallowed launching of satellites into the Geostationary orbit.
- Standardisation of satellite parts, and creation of modular buses which could be repaired or replaced easily

Present group:-

- Mitigating space debris using nets
- Increased global co-operation
- Better ground segments to track the orbital debris.

Future group:-

- Artificial envelope of gases that reflect communication signals
- Developing microwave and infrared waves to carry out the function of broadband communication

# Frameworks

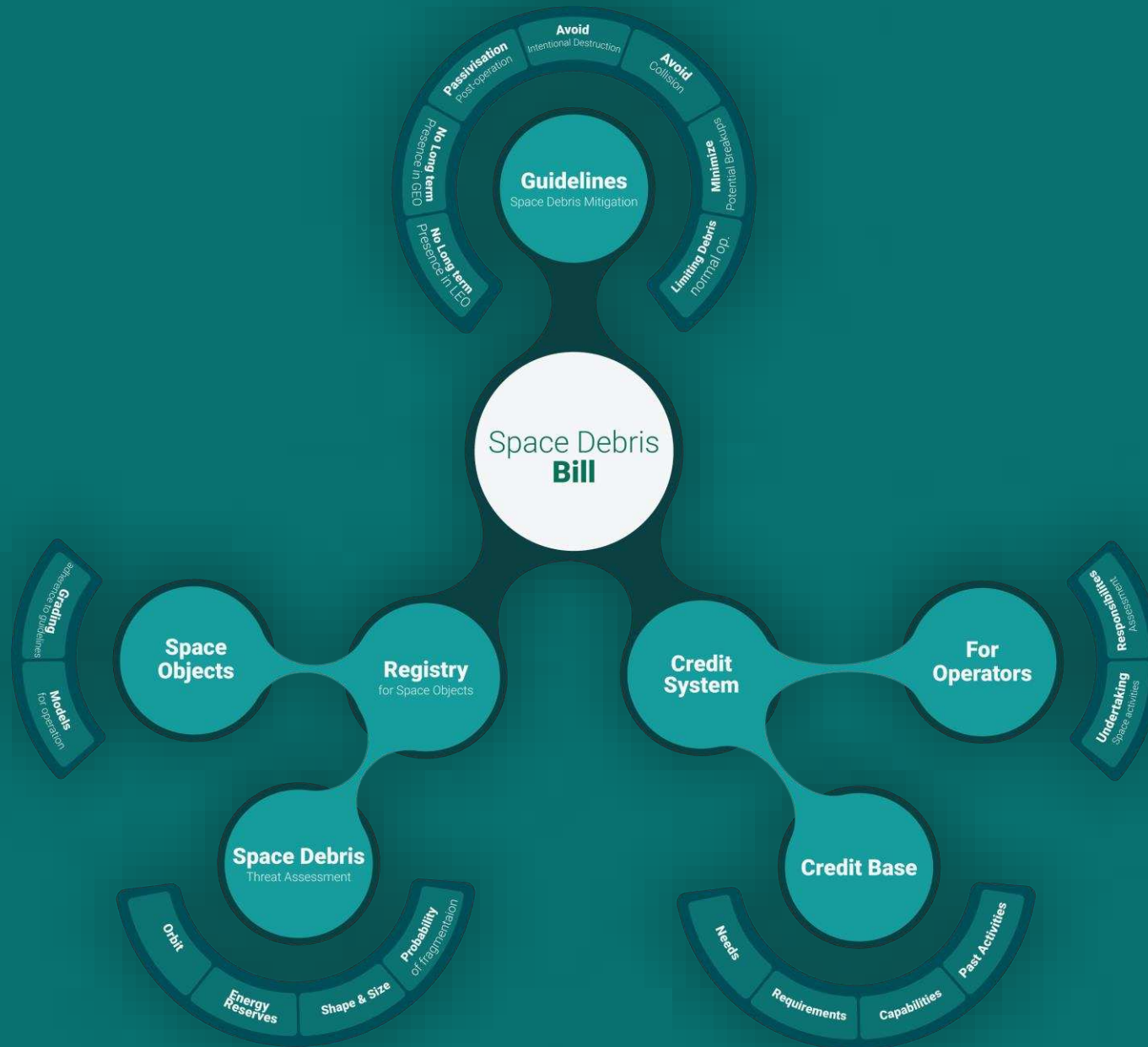
LCA

Policy

Design Octaves







# Awareness

Time capsules

Comic

# Solutions

Developing concepts based on the  
workshop

Satellite designs

