



Responsible Space

TEAM 21 – TEAM "WORKS IN THEORY"

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The Space Debris Problem

- 8000 satellites launched in the entire human history
- 5000 of them still in space
- 1950 of them still working
- Sustainability of a 600 satellites constellation?
- Long-term consequences

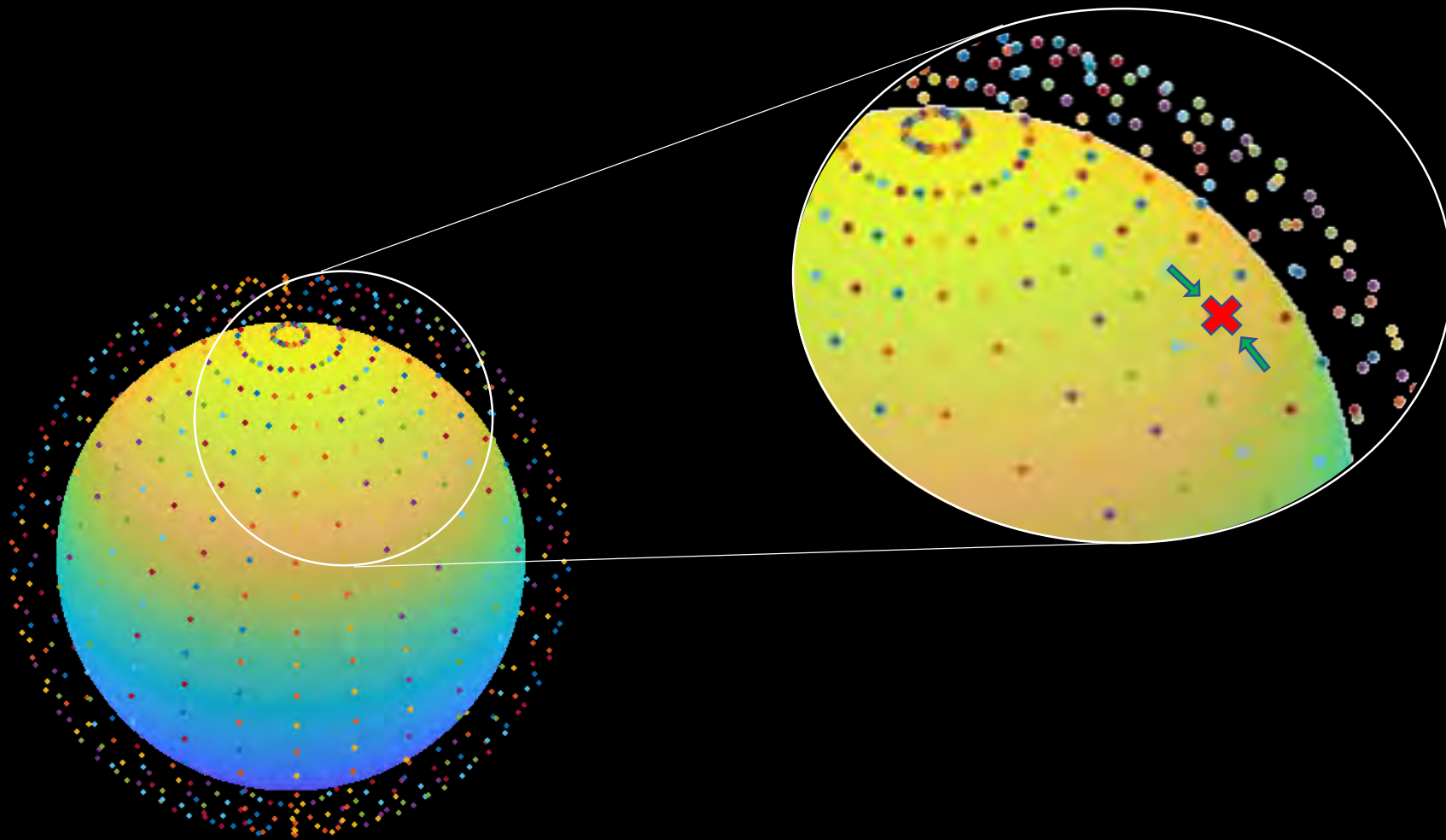


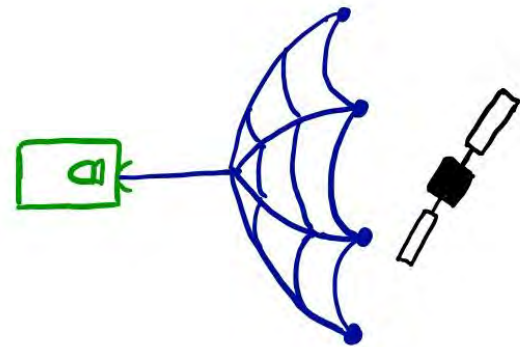
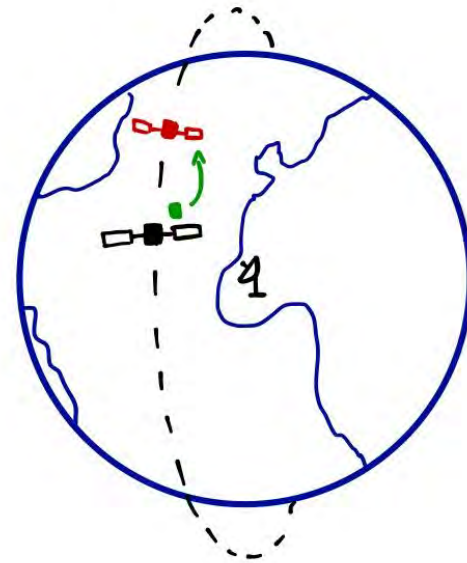
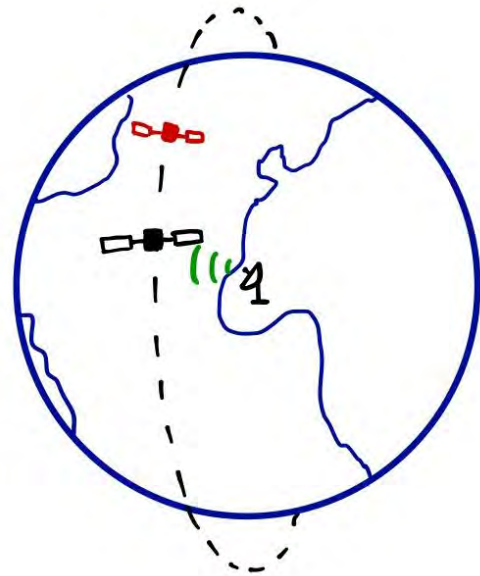
Deorbiting

- Currently, satellites take years to deorbit before burning up in the atmosphere.
- This increases costs and risk of collisions with other satellites
- We aim to accelerate this process with our design

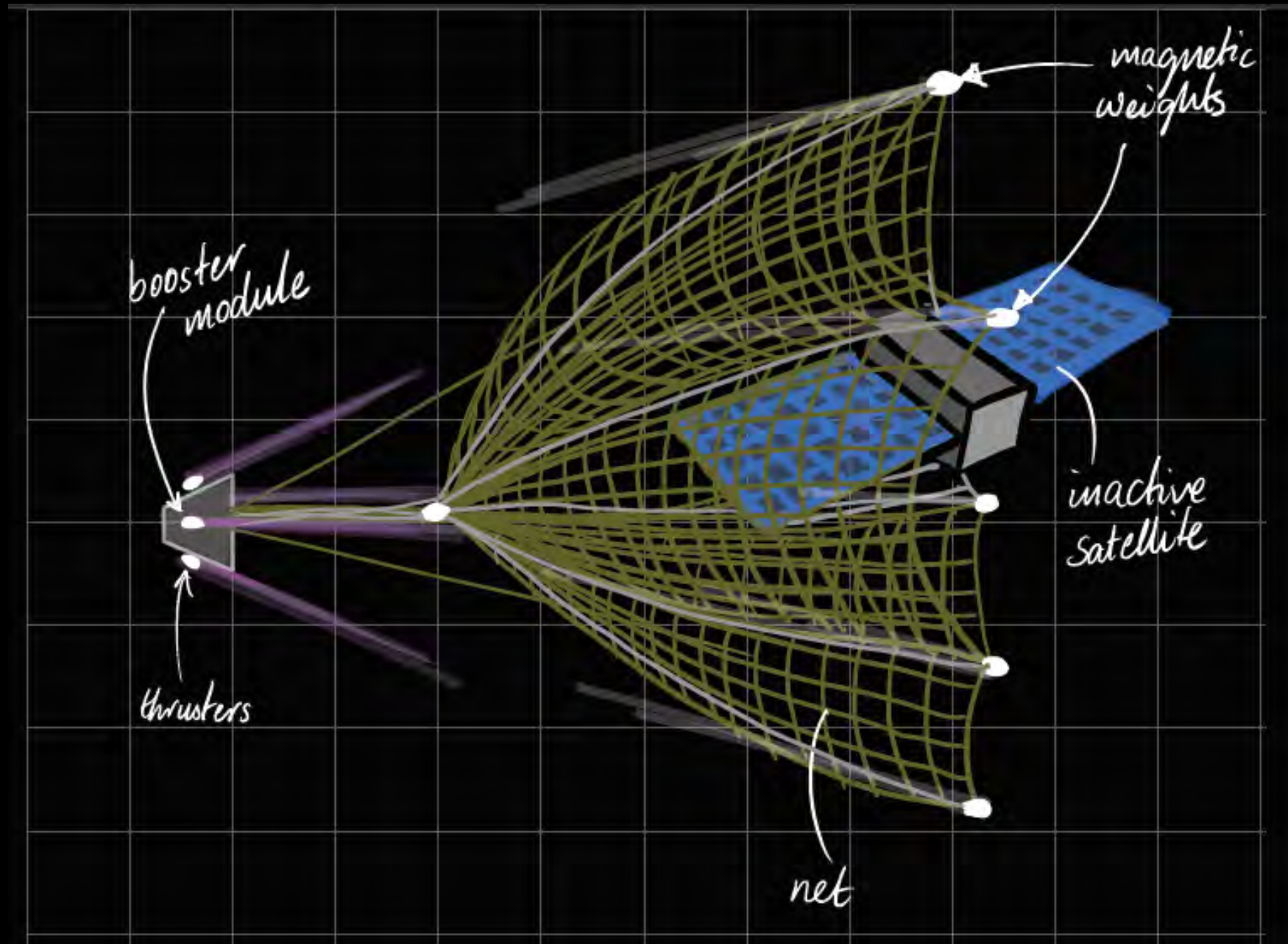
Design

- Need a design that does not require any input from the target satellite
- Able to use the existing constellation of satellites to achieve this.
- Minimise space debris in the process.



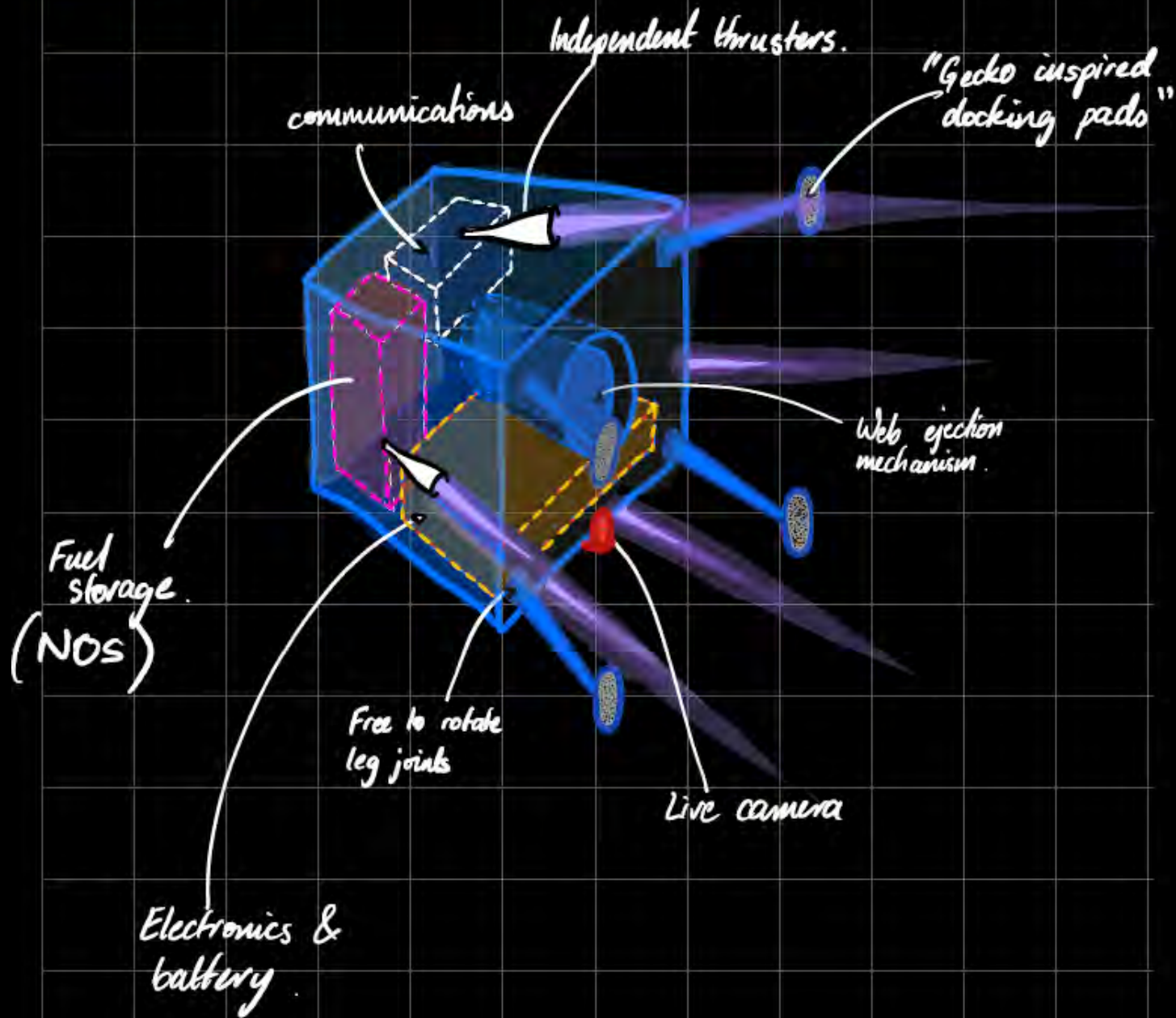


Our Design



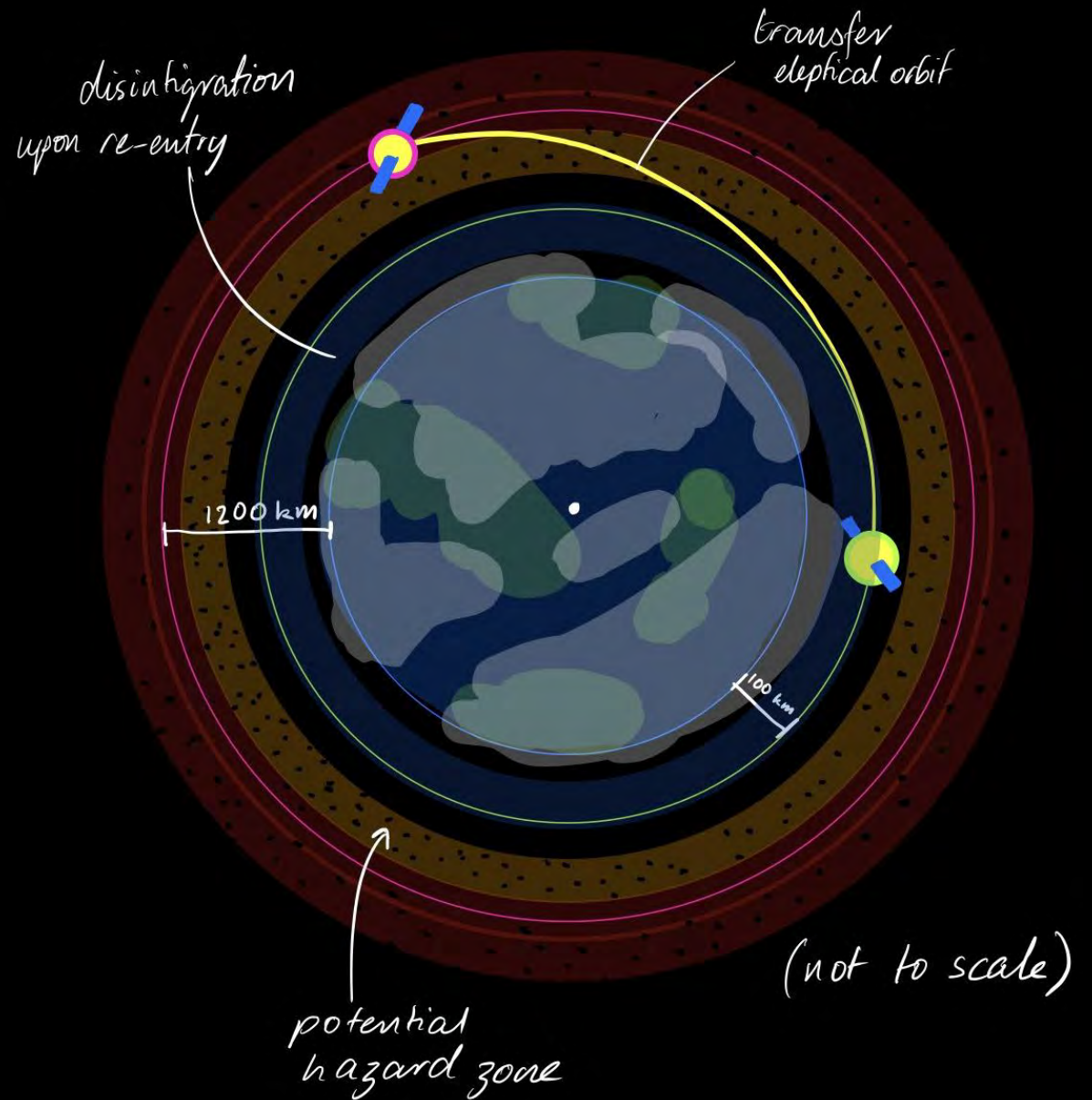
BOOSTER MOD

Our Design



Future Developments

- New propulsion methods
- Reusable
- Recovery of deorbited units
- Operation automation



Central Body

μ [km³/s²]:

Earth

398 600.

Radius [km]:

6378

Min Flyby Radius [km]:

6478

Orbits

r_1 [km]:

Custom

7578

r_f [km]:

Custom

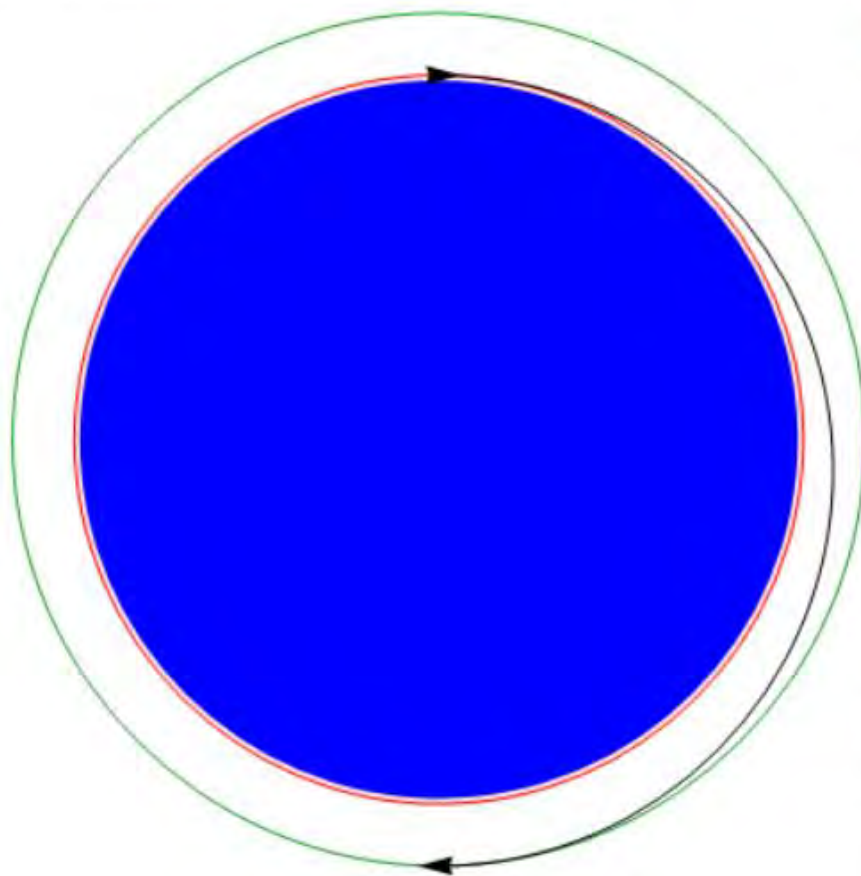
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Other Settings

Length: m km AU ly

Time: s min h day year

Sun to Scale:



Example orbit: Custom to Custom

Warning: Orbiter crossing the Earth's atmosphere.

Initial orbit

r_1 [m] = 7.578×10^6

h_1 [m] = 1.2×10^6

v_{c1} [m/s] = 7252.56

T_1 [s] = 6565.12

Final orbit

r_2 [m] = 6.478×10^6

h_2 [m] = 100 000.

v_{c2} [m/s] = 7844.2

T_2 [s] = 5188.87

Transfer orbit

a [m] = 7.028×10^6

ecc = 0.0782584

Δv_1 [m/s] = -289.568

Δv_2 [m/s] = -301.156

Δv_{Total} [m/s] = 590.724

$t_{\text{transfer}} = T/2$ [s] = 2931.76

Print data (m-kg-s)