CubeSat Constellation for Interplanetary Market Intelligence and Private Claims in Space

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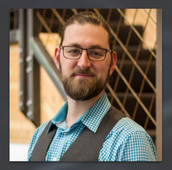
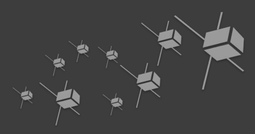


Challenges

- **Property Ownership and Usage Rights in Space**
- **Historical Norms**
  - ***Societal*** **and** ***Economic***
- **Registration (e.g., UN Registry for Objects in Space[1])**

Mission Objectives

- ***Deployment*** **of Beacons, each rendezvous with NEAs' Small-Body Orbit**
- ***Data Collection*** **comprising a *universal cadastre***
  - **Sensors/Instrumentation: *Geolocations* and *In-Space Activity Capture***
- ***Integration*** **with Service Providers through API**
- ***Cooperation*** **with Domestic and International Regulatory Agencies**



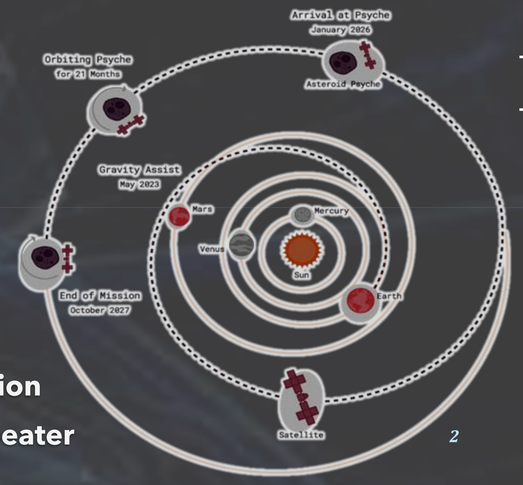
Mission Overview

User-facing Software

- ***Users***:
  - **Intuitive interface (robust python API)**
  - **Secure e.g., quantum key encryption (QKD)**
- ***Developers***:
  - **Possible use cases, applications not limited–based on validated property and usage rights**

Missions Involving Secondary CubeSat Deployments

- → **Psyche[2]**
- → **Proteus[3]**
- → **BASiX[4]**
- → **MarCO[5]**



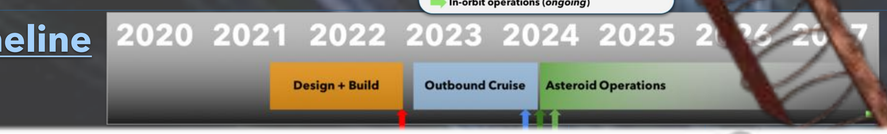
Hardware Architecture

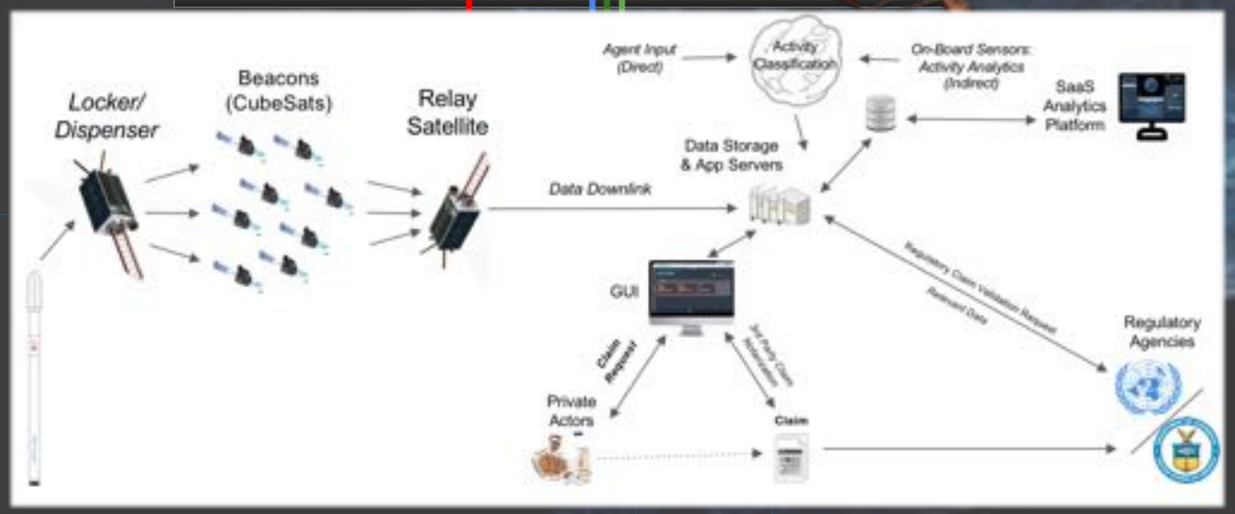
- **Locker in Cis-Lunar Orbit**
  - **Cis-Lunar Comms Base station**
  - **Constellation Network Repeater Node**
  - **Downlink Relay**
- **8x Deployable Beacons**
- **RF & Optical Comms**
  - **Directional High-Gain**
  - **Downlink Antenna**

Communication Architecture

Illustration portraying the system's picosats and main bus.

Timeline





Further Investigation

- **Optimization Algorithm for *Constellation-Scale* Deployment**
- **Comms Improvement**
- **Sensor Suite**
- **Modularity**

Works Cited

[*1*] UNOOSA, Ed., "United Nations Office for Outer Space Affairs," Search OSOidx, 31–May–2021. [Online]. Available: https://www.unoosa.org/oosa/osoindex/. [Accessed: 31–May–2021].

[*2*] Greicius, T. (2017, May 9). "Psyche Asteroid Mission." NASA. https://www.nasa.gov/psyche.

[*3*] Meech, K. J. and Castillo–Rogez, J. C., "Proteus – A Mission to Investigate the Origins of Earth's Water", vol. 29, 2015.

[*4*] Anderson, R. C., Scheeres, D., & Chesley, S., "Binary Asteroid in–situ Explorer Mission (BASiX): A Mission Concept to Explore a Binary Near Earth Asteroid System" (2014). In 45th Lunar and Planetary Science Conference. https://www.hou.usra.edu/meetings/lpsc2014/pdf/1571.pdf.

[*5*] McGregor, V. (2018). Mars Cube One (MarCO) Mission Overview. NASA JPL. https://www.jpl.nasa.gov/cubesat/missions/marco.php.