Effective Space solutions

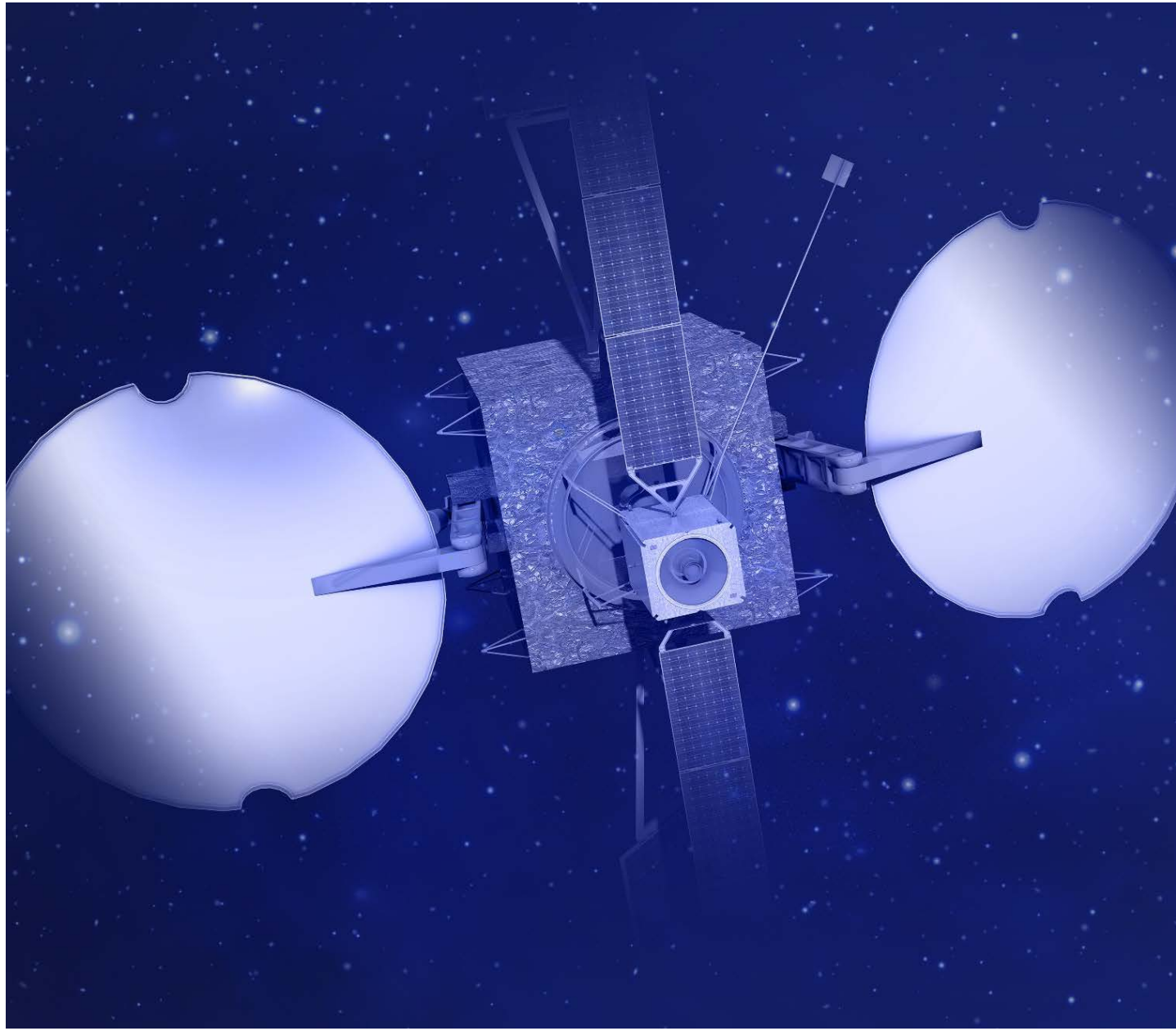
PIONEERING LAST-MILE LOGISTICS IN SPACE

UN COPUOS - The 54th session of the Scientific and Technical Subcommittee

February 2017

ARIE HALSBAND
FOUNDER & CEO

info@effective-space.com



Effective Space solutions

WE BELIEVE THAT SPACE IS THE LAST UNTAPPED COMMERCIAL FRONTIER

WE ENVISION A FUTURE WHERE OPERATING A BUSINESS IN SPACE

CAN BE AS FRICTIONLESS, PROFITABLE AND EFFICIENT AS IT IS ON EARTH

Photo credit: AMNH\Mark Garlick

Effective Space solutions

OUR MISSION IS TO BUILD LAST-MILE LOGISTICS SERVICES

THAT WILL POWER THIS NEW ECONOMY

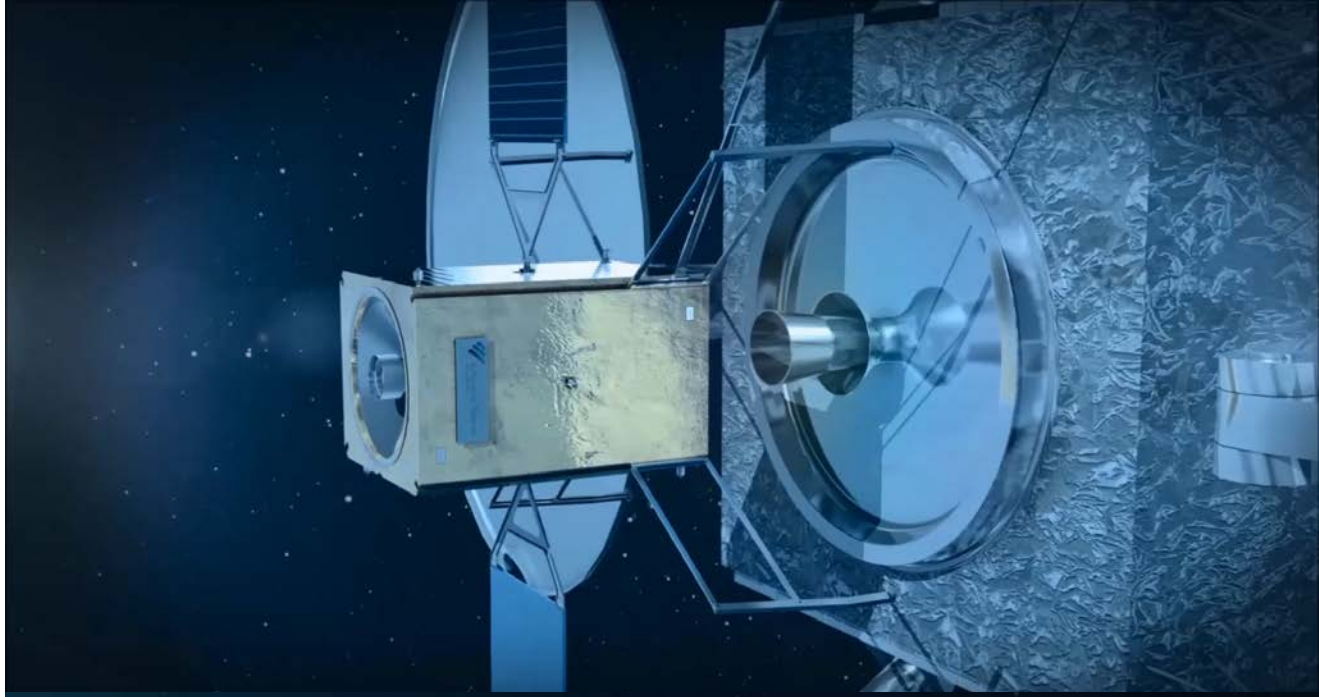
IN SPACE

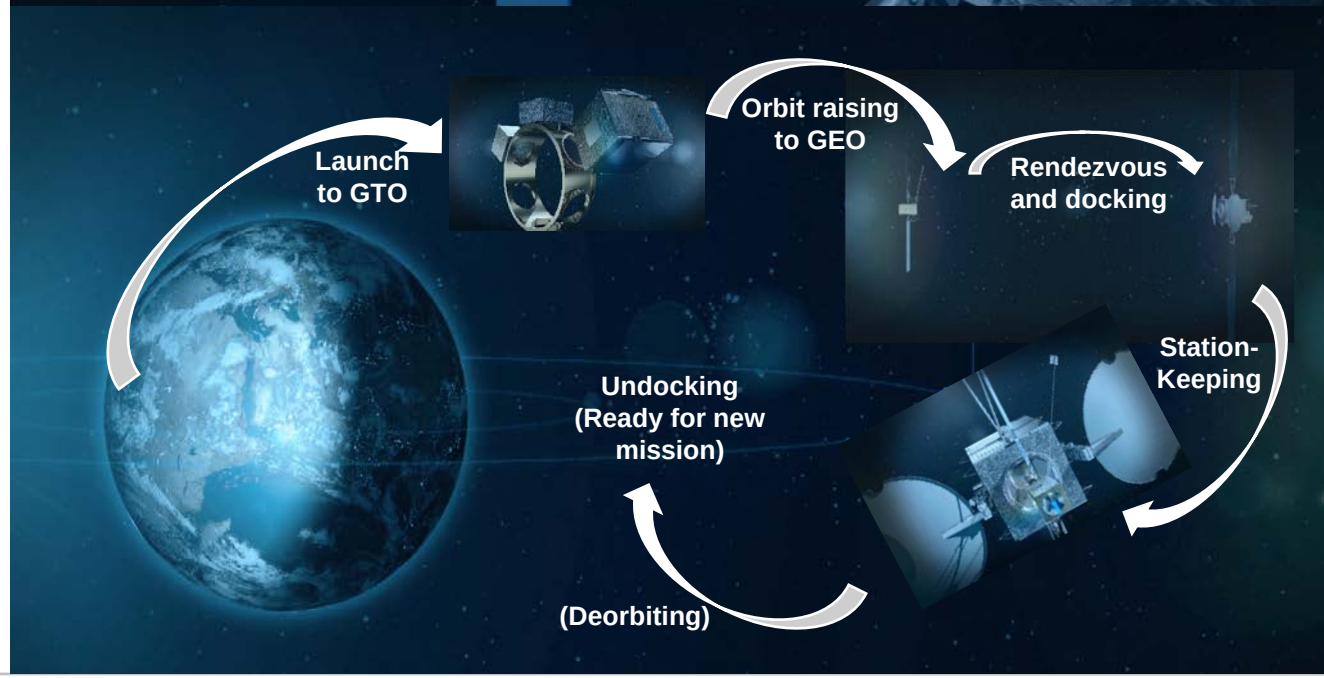
PHASE ONE ROLLOUT – LIFE-EXTENSION

IN-ORBIT SERVICES OPERATOR

- Providing satellite operators with in-orbit services (life-extension, relocation, deorbiting, orbit and inclination correction, bring-into-use)
- Deploying and operating a fleet of small SPACE DRONE™ spacecrafts with a universal docking system

Team holds decades of small satellite design, program and operations expertise





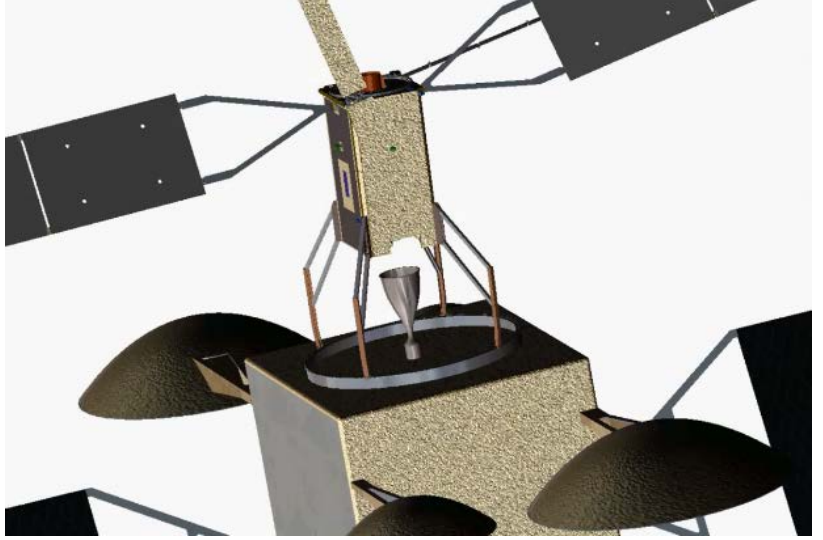
COMMERCIALLY-VIABLE SOLUTION

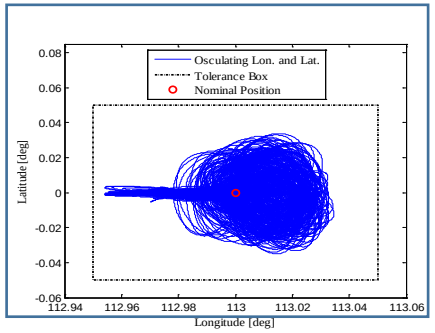
Safe and cost-driven platform design :

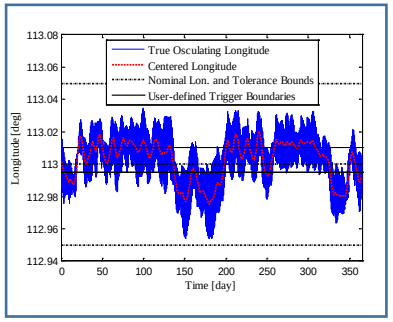
- Small spacecraft *(<350Kg)*
- Rideshare launch compatible *(ESPA-class)*

- Orbit-control-only specialized *(external "jet-pack")*
- Non-intrusive universal docking system *(standard interface ring, 937/1194/1666)*
  (Patent pending)

- >10 years mission life *(for a typical ~2000Kg near-EOL satellite)*
- Multi-missions reusable *(dock/undock, command and control)*







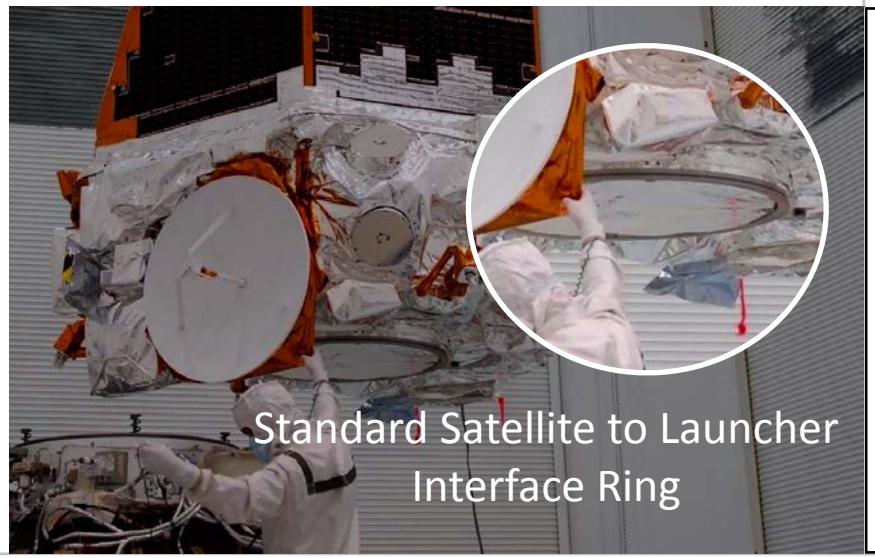
RENDEZVOUS AND DOCKING

Designed for simplicity and reliability

- Proven off-the-shelf sensors and hardware
- Approach algorithms are based on space-proven rendezvous
- Simple, non intrusive and redundant docking system

In-house Visual Lab

- The only common element to all communication satellites
- Robust attach element (designed to absorb launch loads)



Standard Satellite to Launcher Interface Ring

THE PROBLEM: SPACE DEBRIS MITIGATION

- Space debris is rapidly increasing the risk of collision for certain LEO orbits
- Without an active debris mitigation plan, another collision is just a matter of time
- Any collision is exponentially increasing the density of space debris
- When reaching a critical density, amount of debris will increase in a “Kessler Syndrome” mode
- It is predicted that this situation will prevent the usage of certain orbits within the near future
- Removal of only 20 high risk objects per year may stabilize the risk from space debris in the most vulnerable orbits

EFFECTIVE SPACE POTENTIAL CONTRIBUTION

- Effective Space developed technology can be easily adopted for space debris active mitigation:
  - Object detection
  - Line of sight navigation
  - Universal docking and grabbing mechanism
  - Effectiveness - each SPACE DRONE™ spacecraft carries 3,000,000kg-m/sec total impulse

- Each deorbit from 800km to 300 Km perigee needs ~150m/sec while docked to 1 Ton load. Each Rendezvous and Docking to reach the next target requires about 200m/sec standalone.

- Each SPACE DRONE™ spacecraft can perform 12 such deorbit runs equals to the removal of 12ton of space junk.

SPACE DEBRIS
WHO WILL PAY ?

- Advancement in space engineering and availability of sensors and other related technologies allow commercial space debris mitigation
- Currently there is no permanent financing policy and budgets to clean the space from debris. It prevents a commercial “New Space” companies to actively enter to this field based on market investments
- We propose that out of the aggregated space agencies budget, estimated at more than $30B, a permanent contribution of 1% will be devoted to clean the space. This will allow a yearly budget of around $300M that will be diverted into commercial space removal programs
- Such budget will allow “New Space” companies like Effective Space to constantly reduce the space debris into a controlled risk

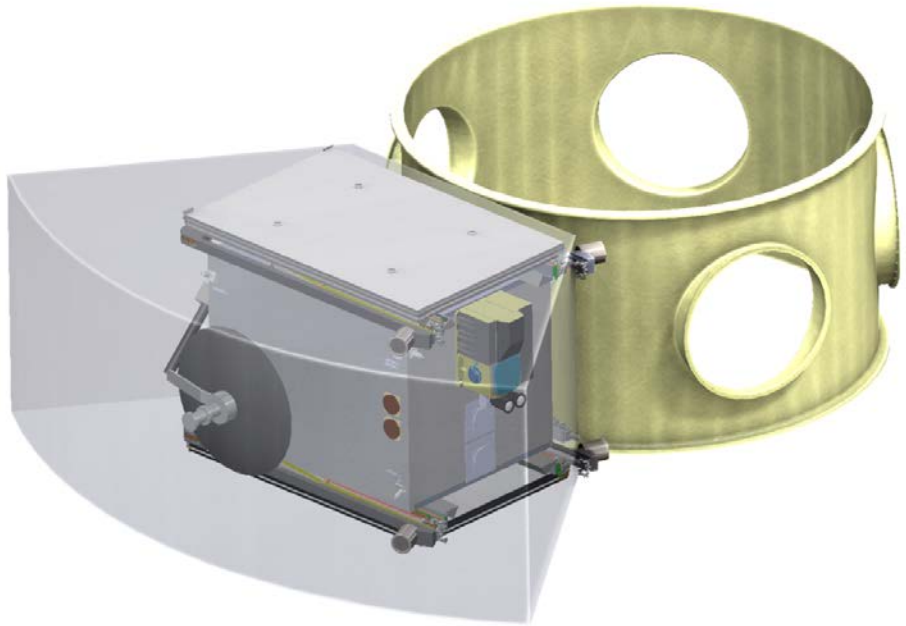
EARTH SUSTAINABILITY THE PROBLEM

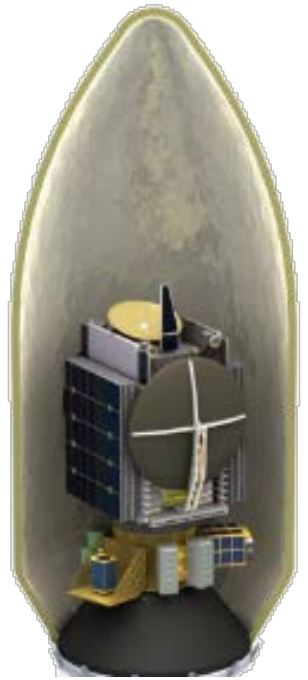
- Space vehicles and their associated launches are extensive earth resources users, by their huge content of electronics, metals and fuels
- The mining of metals for electronic products is fueling a civil war in Africa that has resulted in the loss of more than five million lives so far. (The Guardian)
- The mining of raw materials for electronic products—including silicon, aluminum, copper, lead, and gold—contributes to increased health problems for workers, Gold mines are the leading source of mercury air pollution in the U.S. (The Guardian)
- In orbit service and particularly life extension of satellites could also serve the goal of earth sustainability

EARTH SUSTAINABILITY

EFFECTIVE SPACE POTENTIAL CONTRIBUTION

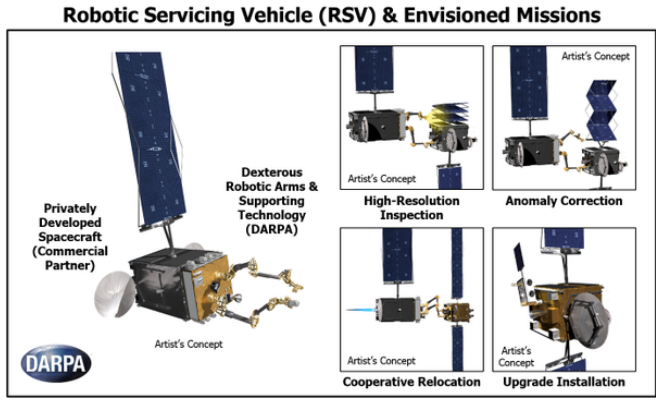
- Each 350 Kg ESS SPACE DRONE™ spacecraft can extend a full communication satellite (4500 Kg at launch) life for 15 years
- One ESS SPACE DRONE™ satellite can typically save 4150 Kg of satellite parts and about 400,000 Kg of launcher parts and fuel





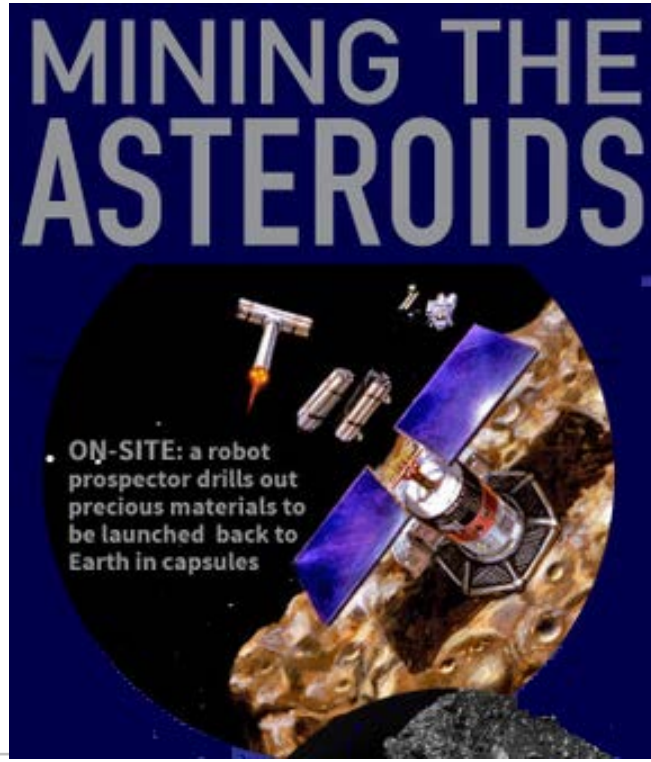
VISION:
MULTI-PURPOSE
SPACE ROBOTIC PLATFORM

Inspection and Repair

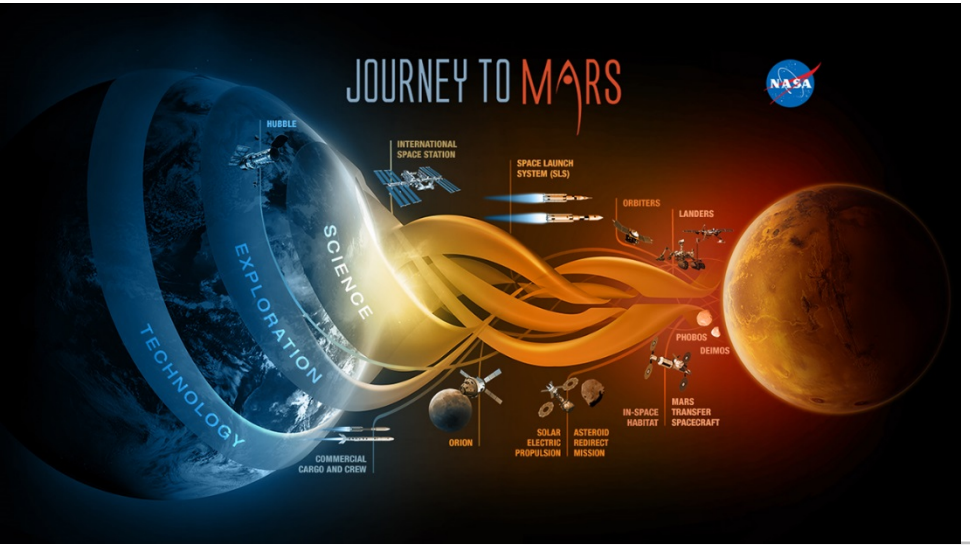


MEO/LEO Constellations Servicing

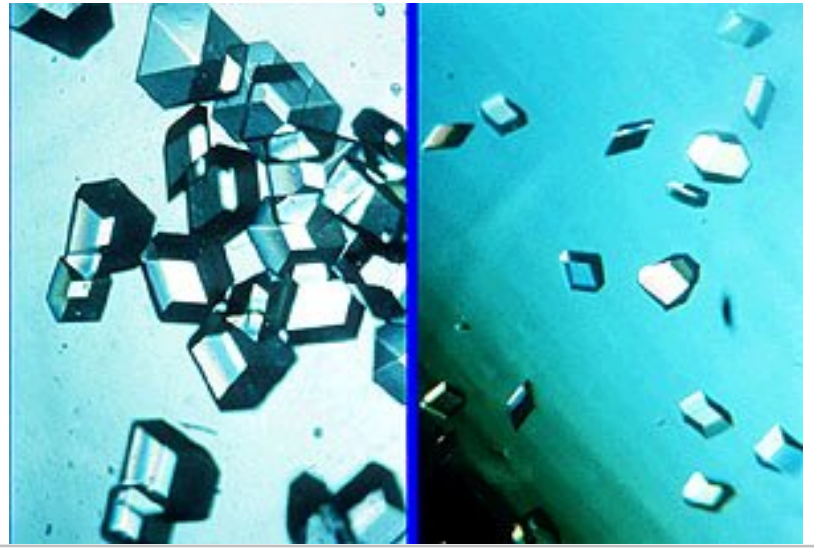
Asteroid Mining



Logistics in Space



Fabrication in Space



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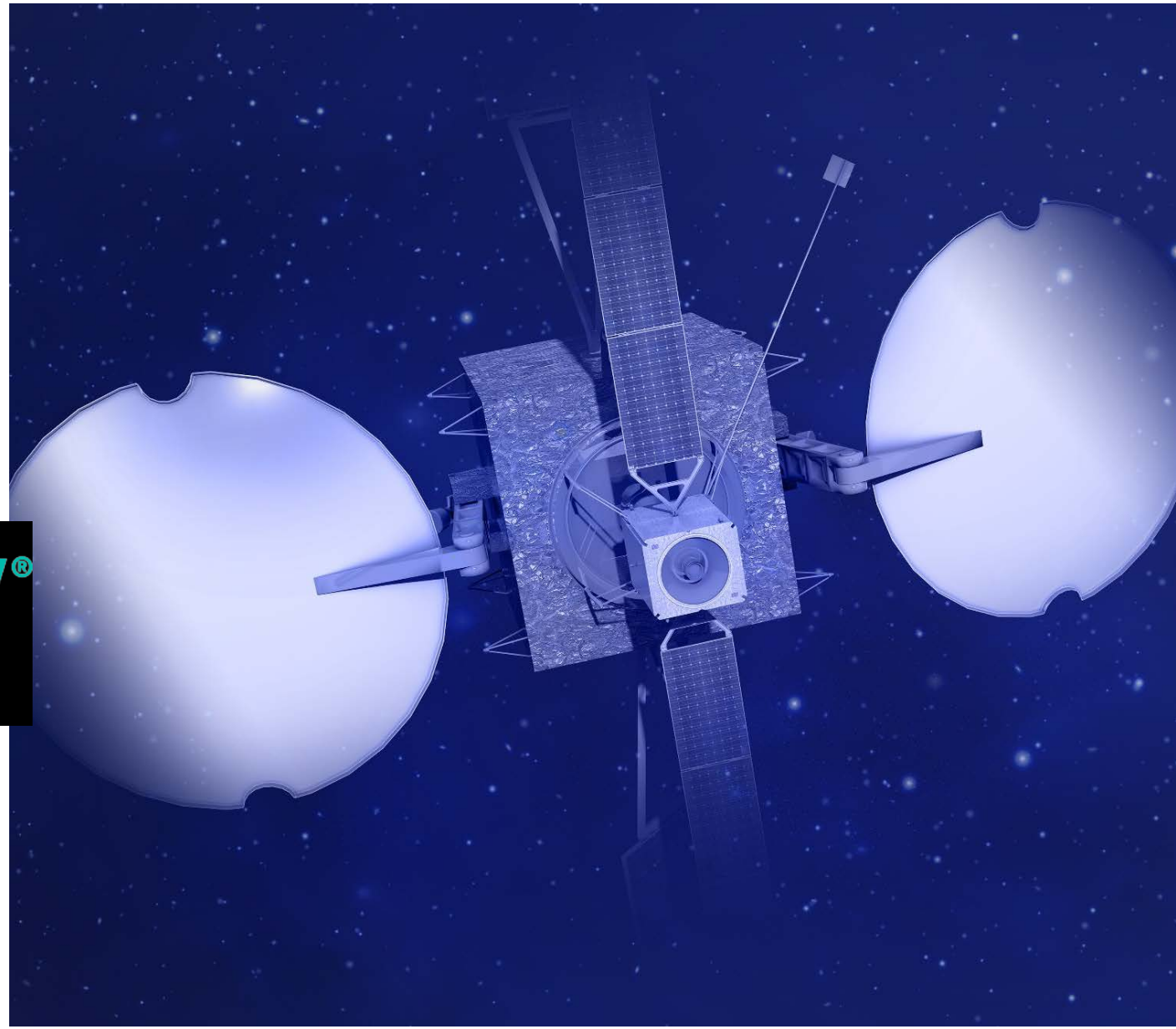
THANK YOU FOR YOUR ATTENTION



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