

SERAPHIM IN-SPACE ECONOMY ECOSYSTEM MAP 2023

IN SPACE SERVICES

Servicing the needs of satellites in orbit by providing transport, communication, life extension, situational awareness, or removing debris.

ORBITAL TUGS

Transport satellites to the correct orbit after launch.



ORBITAL SERVICING, LIFE EXTENSION & REFUELING

Help satellites live longer by providing power or fuel in orbit.



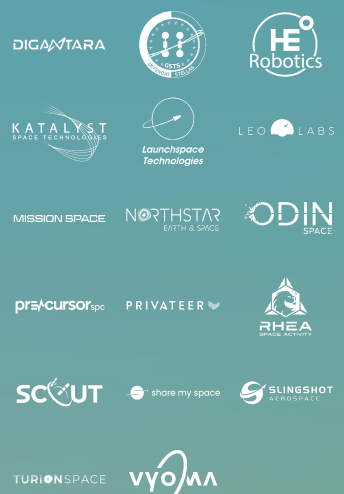
DEBRIS REMOVAL

Protect existing satellites by removing debris or dead satellites.



SPACE SITUATIONAL AWARENESS

Companies improving our understanding of the orbital environment. Forecasting space weather, tracking debris and satellites.



IN-SPACE COMMUNICATIONS

Intra-satellite communications, that allow satellites to communicate with Earth more frequently and for longer. Also includes companies that are bidding to replace NASA's deep space communications network.



SPACE INFRASTRUCTURE

Basic building blocks and facilities needed to enable the in-space economy.

SPACE STATIONS

Manned space stations in LEO. Typically replacements for ISS though some have artificial gravity.



FREE FLYERS & RETURN

Autonomous satellites, structures, or capsules used to perform manufacturing and R&D. Typically targeting return to Earth capability.



SPACE PLANES

Differs from a launch vehicle in that it tends to move to different orbits and then return to Earth. High reusability.



SPACE ENERGY

Provides power for other operators in space, e.g. to power lunar rovers or mining. Typically nuclear or radioisotope sources.

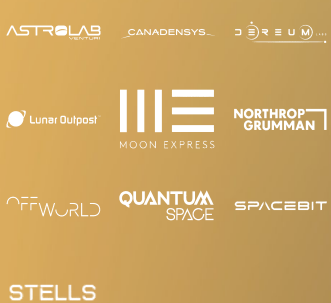


LUNAR

All activity focused on the lunar economy.

LUNAR LOGISTICS

Combines transport and mobility. Anything that get spacecraft to the moon or around the moon.



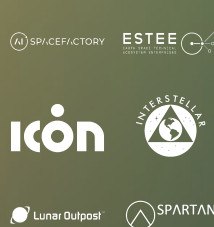
LUNAR LANDERS

Will land people and large structures on the moon.



LUNAR HABITATS

Facilities for human habitation on the moon.



LUNAR RESOURCE UTILISATION

In-situ resource utilisation i.e. turning materials readily available on the moon into useful compounds.



IN-SPACE R&D & MANUFACTURING

Companies performing R&D and manufacturing in space

PHARMA, LIFE SCIENCES & BIOENGINEERING

Companies working on any biotech activities in space including drug development, tissue growth, and manufacturing.



MATERIALS

Developing and manufacturing new or improved materials in space e.g. optics or semiconductors.



LARGE STRUCTURES

Making or assembling large structures in space, often using robotic assembly.



MANNED SPACEFLIGHT

Companies transporting and supporting humans in space.

MANNED SPACE TRAVEL

Companies transporting humans to space for short or long duration missions. Includes space station companies focused on space tourism or astronauts.



SERVICES

Companies that will support humans in space including training.



SPACE EXPLORATION & UTILISATION

Focused on interplanetary exploration or exploiting the resources on other planets and asteroids.

NEXT GENERATION PROPULSION

Advanced propulsion systems required to access other planets or solar systems. Typically nuclear or radioisotope powered.



PLANETARY & ASTEROID MINING

Companies that will mine on other planets, for return to Earth or use in space.

