



ELSA-d: Building a Stable & Sustainable Future in Space

UN COPUOS STSC April 2021

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Global Head of SSA
Astroscale



Astroscale – who are we?

Our Vision: Safe and sustainable development of space for the benefit of future generations.

Our Mission: Develop innovative technologies, advance business cases, and inform international policies that reduce orbital debris and support long-term, sustainable use of space.

Founded: May 4, 2013

Team: ~185 (75% engineers)

Capital: \$191M



 **Singapore**
Astroscale Singapore Pte. Ltd. 2013

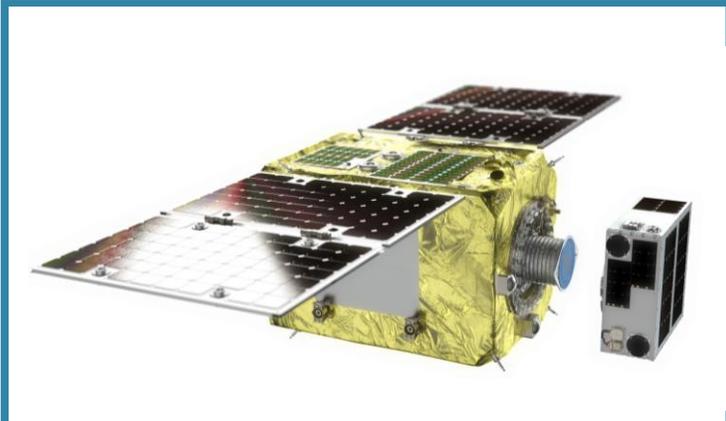
 **Tokyo, Japan**
Astroscale Holdings Inc.
Astroscale Japan Inc. 2015

 **Harwell, United Kingdom**
Astroscale Ltd 2017

 **Denver and Washington D.C., USA**
Astroscale U.S. Inc. 2019

 **Tel Aviv, Israel**
Astroscale Israel Ltd. 2020

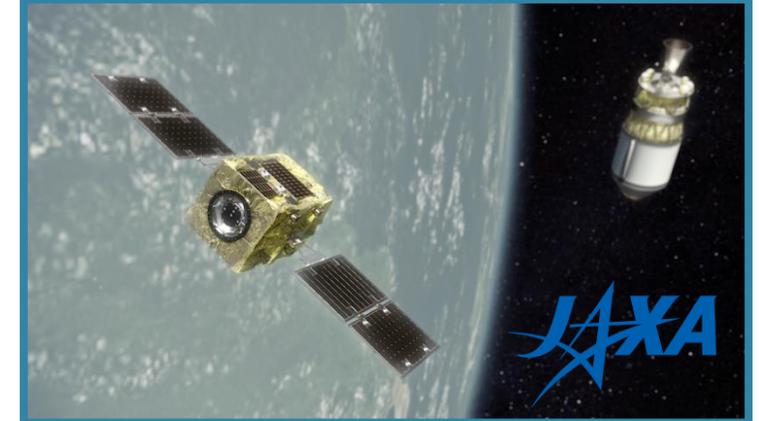
Our Activities



ELSA-d Mission – the world’s first commercial demonstration of **Active Debris Removal (ADR)**



Working on ESA Sunrise Programme with OneWeb towards a future large constellation **End-of-Life (EOL)** service.



Astroscale selected for ADRAS-J inspection mission, part of JAXA’s **Commercial Removal of Debris Demonstration (CRD2)** project



Recent acquisition of Effective Space into Astroscale Israel, moving towards GEO **Life Extension (LEX)** missions



Prime developer for UK National **In-orbit servicing (IOS)** Facility, Catapult, Harwell



Ground segment capability: Totsuka Ground Station, Yokohama, Japan

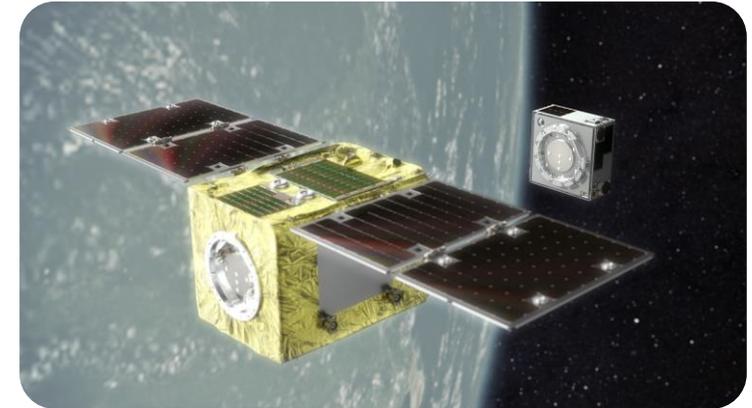
ELSA-d



ELSA-d will be the **world's first** End-Of-Life (EOL) demonstration proving end-to-end debris removal technologies

Consisting of two spacecraft

- Servicer: 180 kg (Japan)
- Client: 20 kg (UK)



A ferromagnetic **Docking Plate** allows prepared servicing of client using the proprietary capture system.

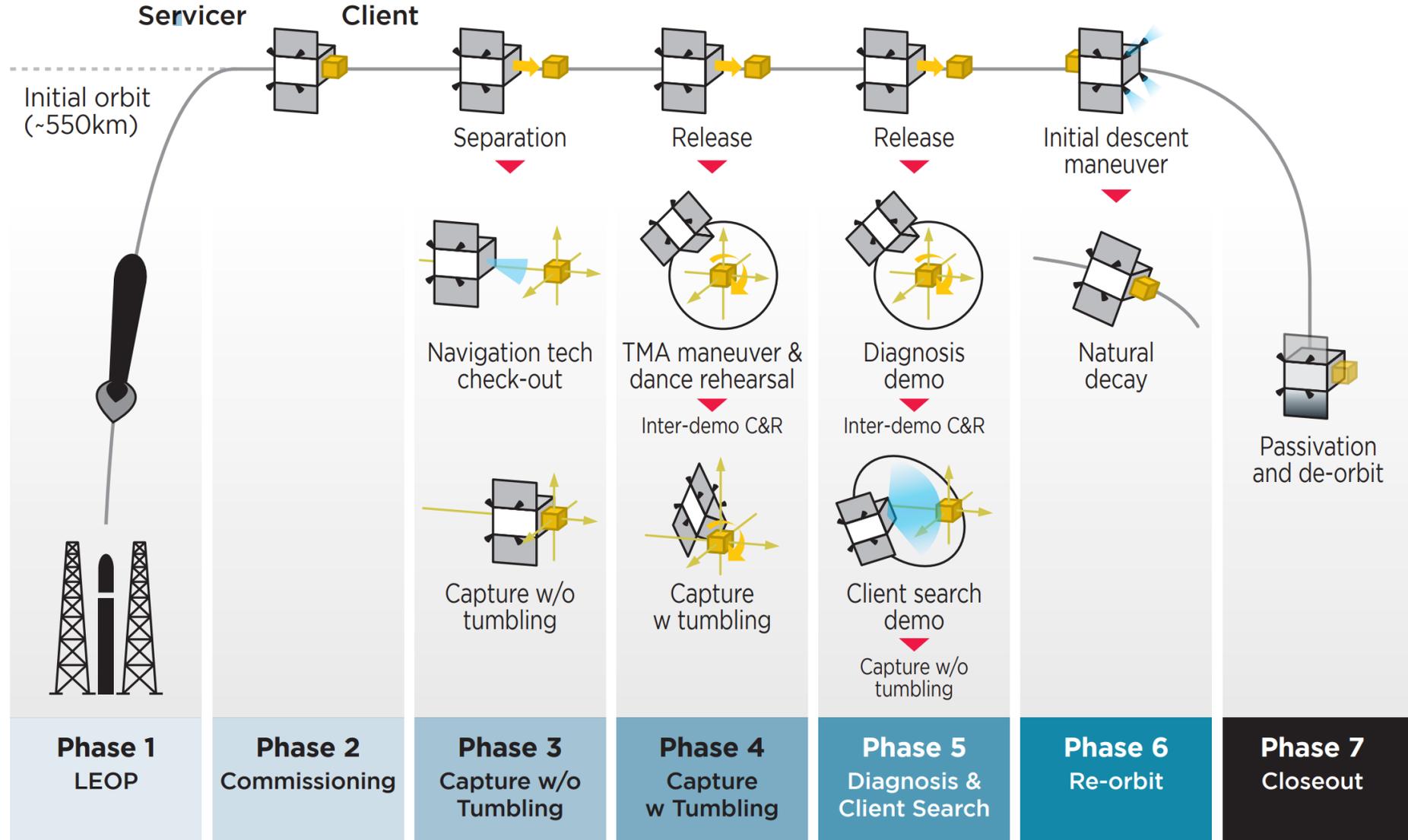
Successfully launched on March 22nd 2021 by GK Launch Services on Soyuz 2 from Baikonur Cosmodrome.

Designed to explore the full phases of operations that would be necessary for a full EOL service, including **client search, inspection, capture, re-orbit** and **de-orbit**.

Successfully **licensed** through the UK following a detailed review and oversight process by UKSA under the Outer Space Act.



ELSA-d mission plan overview



Pre-launch



Feb 2021
Pre-launch checks

Phase 1: LEOPS



Mar 22nd 2021:
Launch from Baikonur
Cosmodrome

Operations from In-orbit
Service Control Centre
(Harwell, UK)

Successful injection into
550km SSO

Signal acquisition

Solar array deployment

Phase 2: Commissioning

April 2021 +

Test interfaces with
the ground segment

Ensure subsystems are
calibrated

Client activation

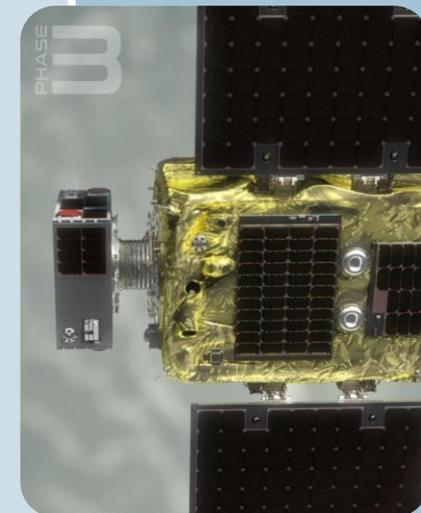


Phase 3: First demo

Summer 2021

Demo phases
begin

First one is
capture without
tumbling



ELSA-d mission status

 We are here

ELSA-d and Long Term Sustainability



Astroscale supports industry implementation of the 21 LTS guidelines

- ELSA-d design and behaviour is underpinned by **international standards** and industry **best practice**
- Ensuring public **transparency** and **communication** of the ELSA-d mission, in advance and during operations
- **Conjunction analysis, coordination** and **data sharing** with other spacecraft operators and SSA service providers



Inter-Agency Space Debris Coordination Committee



Space-Track.org



The ELSA-m (multi-client) programme



- **ELSA-m** is a UK-led programme, following on from the ELSA-d mission.
- For almost 2 years we have been working on ESA/OneWeb Sunrise programme to develop a servicer capable of de-orbiting constellation spacecraft.
- ELSA-m is designed to
 - service multiple full-size clients
 - use electric propulsion ensure efficient orbital transfers
 - use a ferromagnetic capture system to dock with a compatible client docking plates
 - be modular, scalable and relatively customer agnostic for a variety of clients masses and sizes.
- PDR successfully completed with ESA (Oct 2020).
- Targeting a 2024 launch of the ELSA-m In-orbit Demonstrator service of a third party LEO spacecraft.
- Expect a scaled-production of ELSA commercial service from 2024 onwards.



**Small-medium mass
client satellites**

**uncontrolled re-entry*



**Multiple clients per
servicer**

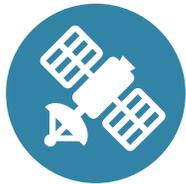


**Suitable for various
LEO altitudes**

Summary



Astroscale is the sole provider dedicated to in-orbit services across all orbits, bringing flexibility, sustainability and resiliency to space.



ELSA-d will soon demonstrate key technologies for future ADR and EOL missions such as ELSA-m.



Astroscale's services will support future space sustainability in a safe and transparent manner

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