

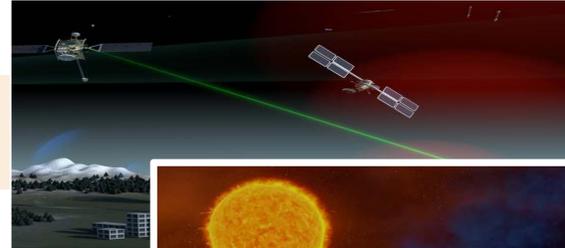
# Space Safety for Space19+



# Space Safety - Cornerstones



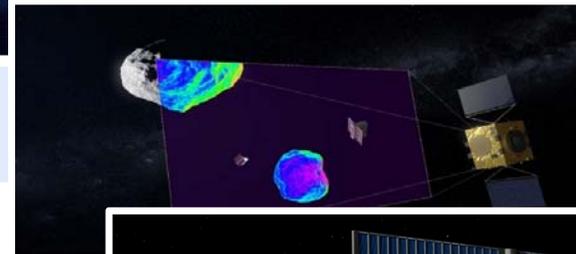
1 Core



2 Space Weather L5 Mission



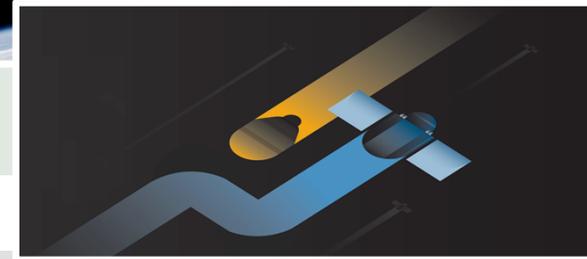
3 HERA



4 In-Orbit Servicing/Removal Mission



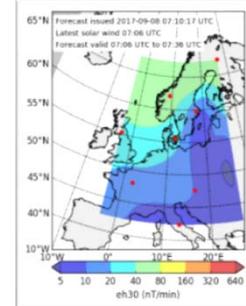
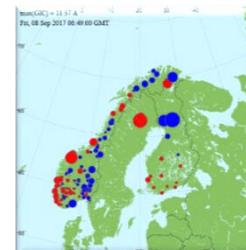
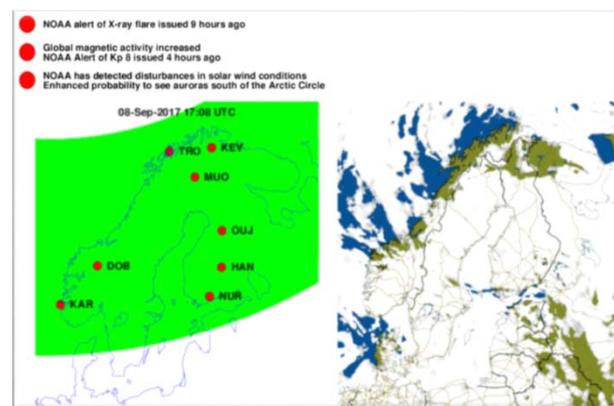
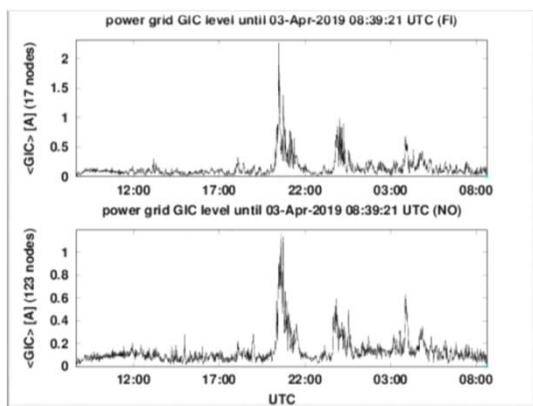
5 CREAM



# 1 Core

## Space Weather Service Network

- System development towards operational maturity
- Regional products for impacted users at high latitudes including underpinning modelling
- Exploitation of new and developing facilities e.g. EISCAT 3D

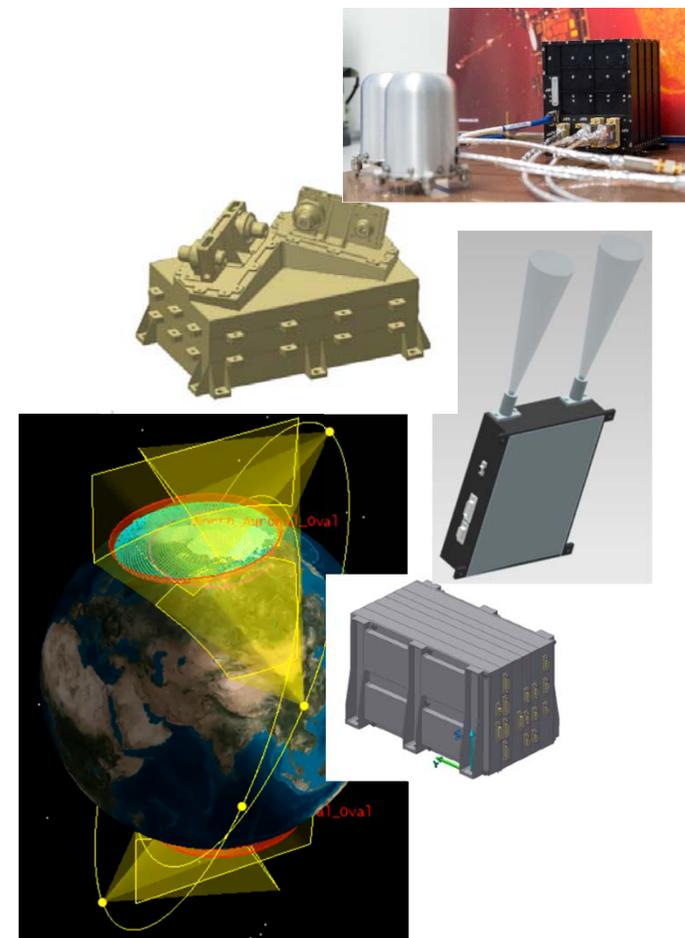


<http://swe.ssa.esa.int>

# 1 Core

## D3S: Space Weather Hosted Payloads & Small Satellites

- Monitoring space weather conditions from inside the magnetosphere
- Ensure & improve underlying data availability for SWE Services
  - Procurement of recurring instruments
  - Dedicated SmallSats



## 2 Space Weather L5 Mission



**L5**

Forecasting  
&  
Event detection

**L1**

The diagram shows a satellite labeled 'L5' with solar panels and a parabolic antenna, positioned in space. To its right, a smaller satellite labeled 'L1' is also shown. The background features a large, bright sun on the left and a glowing solar flare or coronal mass ejection on the right.



Impact & State monitoring

**D3S:**

- Hosted payloads
- SmallSat missions

The diagram shows a central globe with several satellite icons orbiting it, representing the D3S mission components. The background is a dark blue space with a glowing blue aurora-like ring.



## 2 Space Weather L5 Mission



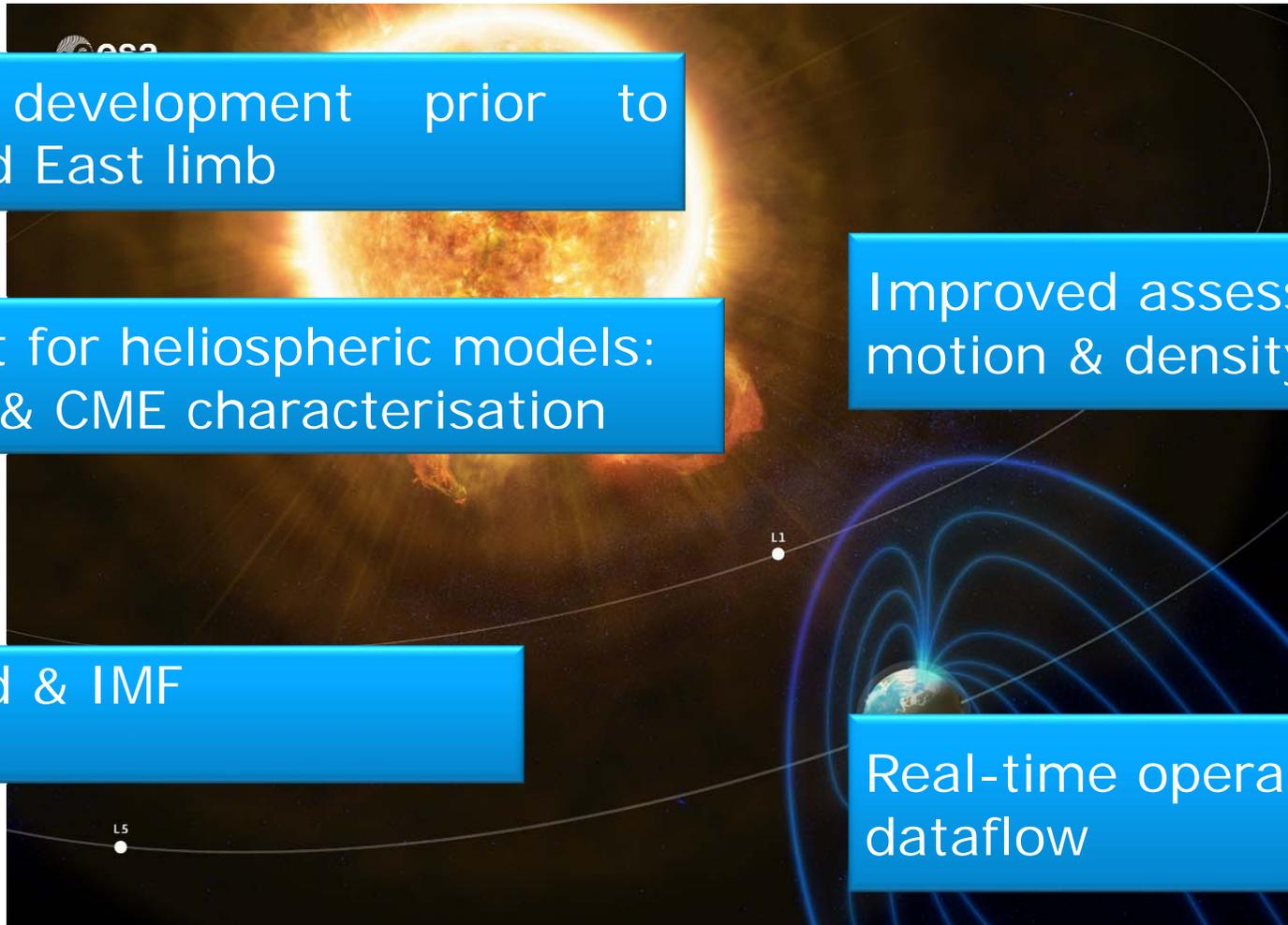
Monitor AR development prior to rotation around East limb

Improved input for heliospheric models: b/g solar wind & CME characterisation

SEP, Solar wind & IMF measurement

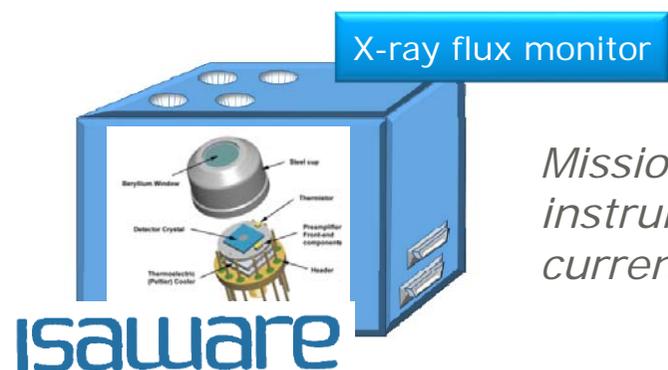
Improved assessment of CME motion & density

Real-time operational dataflow

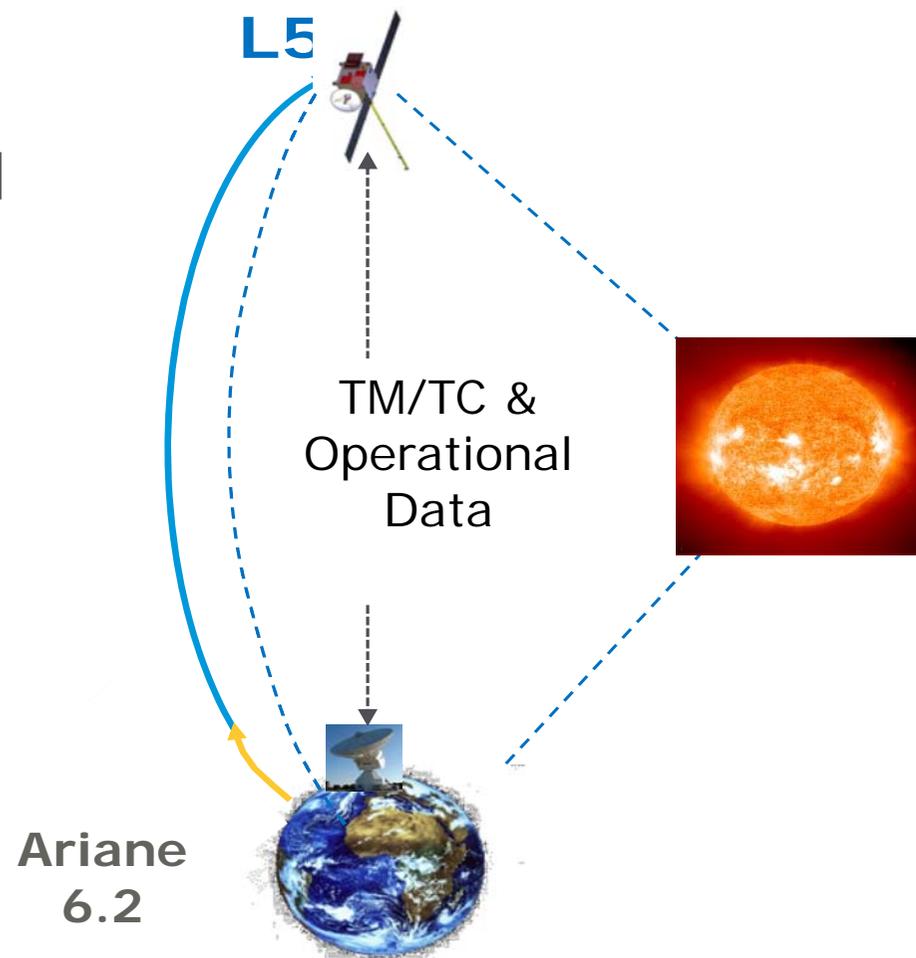


# 2 Space Weather L5 Mission

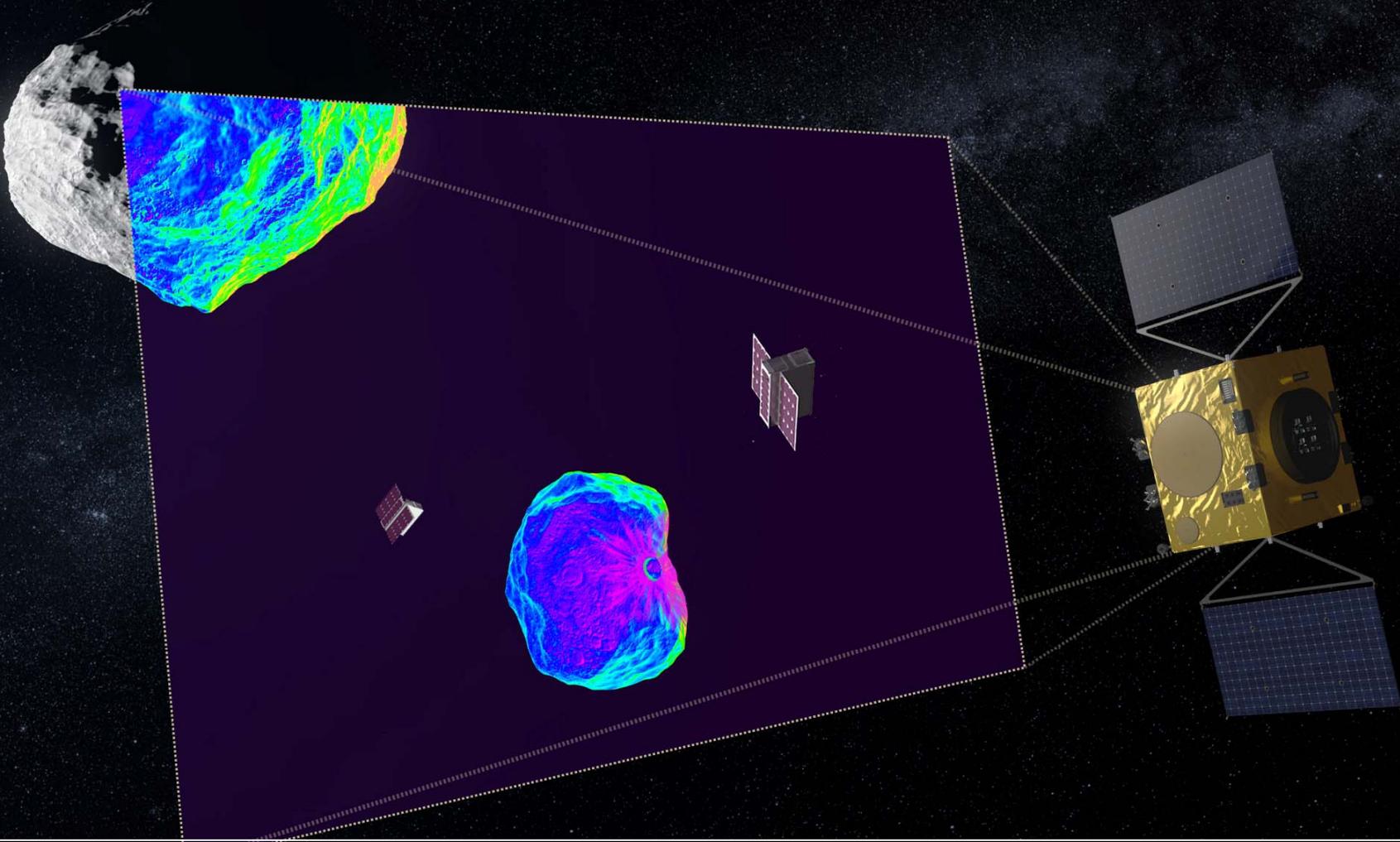
- Mission development Phase-B2/C/D/E1
- Remote sensing and in-situ instrument packages



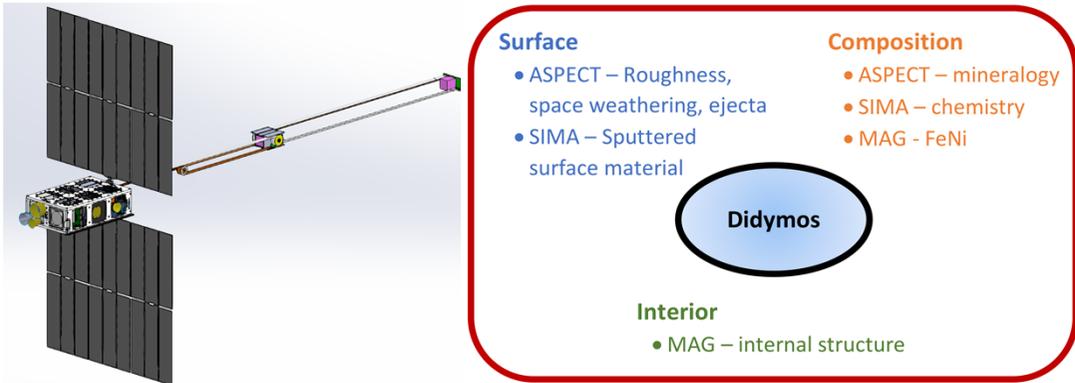
*Mission Phase B1 study & instrument pre-developments currently ongoing*



# 3 HERA



# APEX cubesat and HERA spacecraft contributions

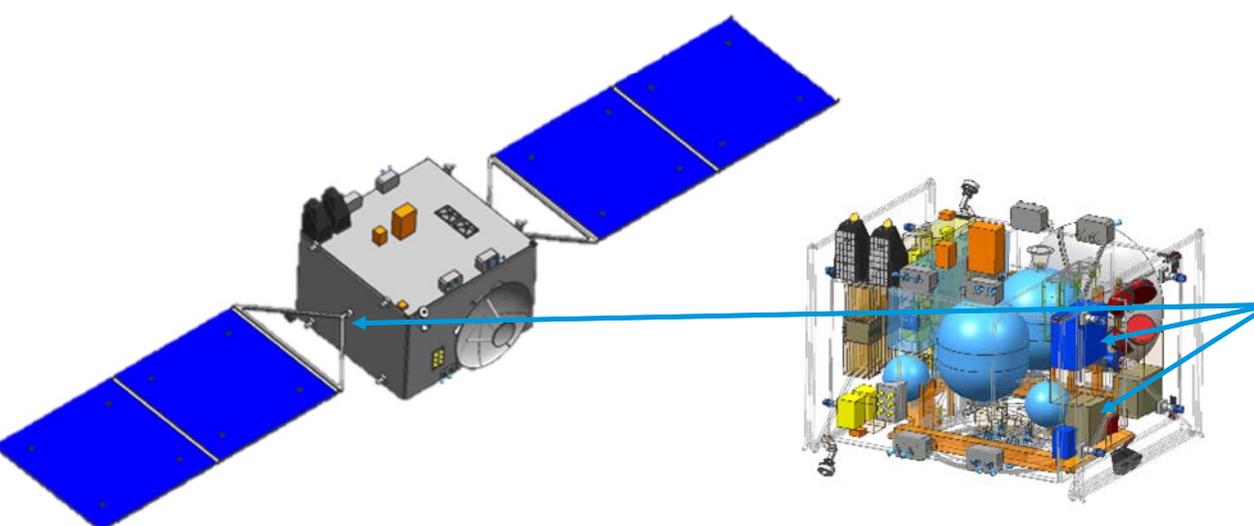


## Baseline Payload

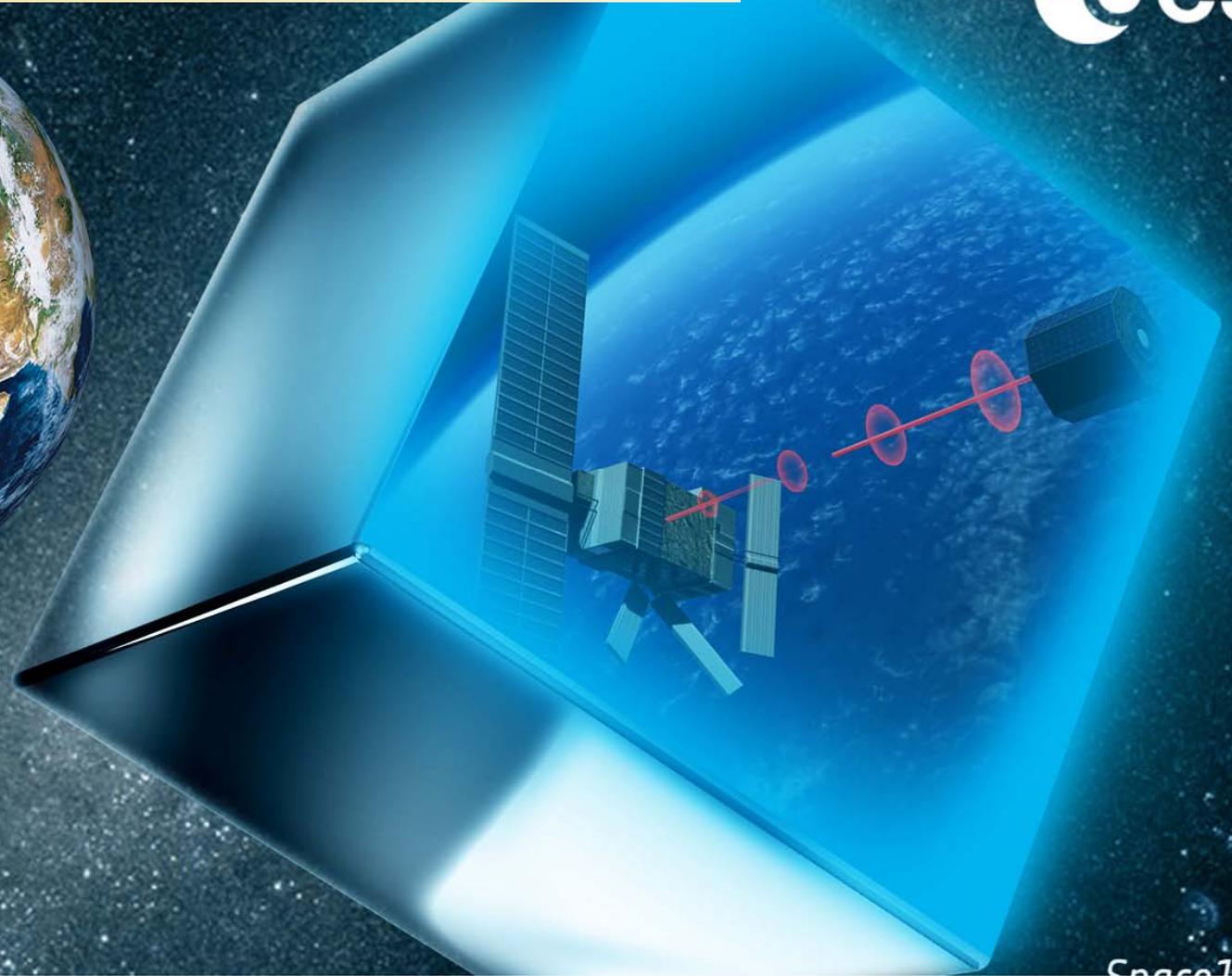
- Asteroid Spectral Imager (ASPECT)
- Magnetometer (MAG)
- Secondary Ion Mass Analyser (SIMA)
- Optical Navigation Camera (NavCam)
- Laser Ranging Sensor (Lidar)
- Three-axis

## Potential technology contributions

- Onboard software (SFF)
- Power and avionics (RUAG Space Finland)



# 4 In-Orbit Servicing/Removal Mission



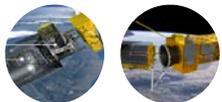
# 4 In-Orbit Servicing/Removal Mission



SEP 18

## REQUEST FOR INFORMATION

- **13 proposals** from LSIs to start-ups
- Scenarii ranging from **re-fuelling** to **removing** ESA small debris VESPA



## CONCEPT ANALYSIS

6 proposals down-selected:



OCT 18



23 NOV 18

## WORKSHOP & DIALOGUE

to present technical ESA know-how



## INDIVIDUAL MEETINGS

with the 6 companies took place in order to gather a deeper understanding of the proposals and provide an initial feedback

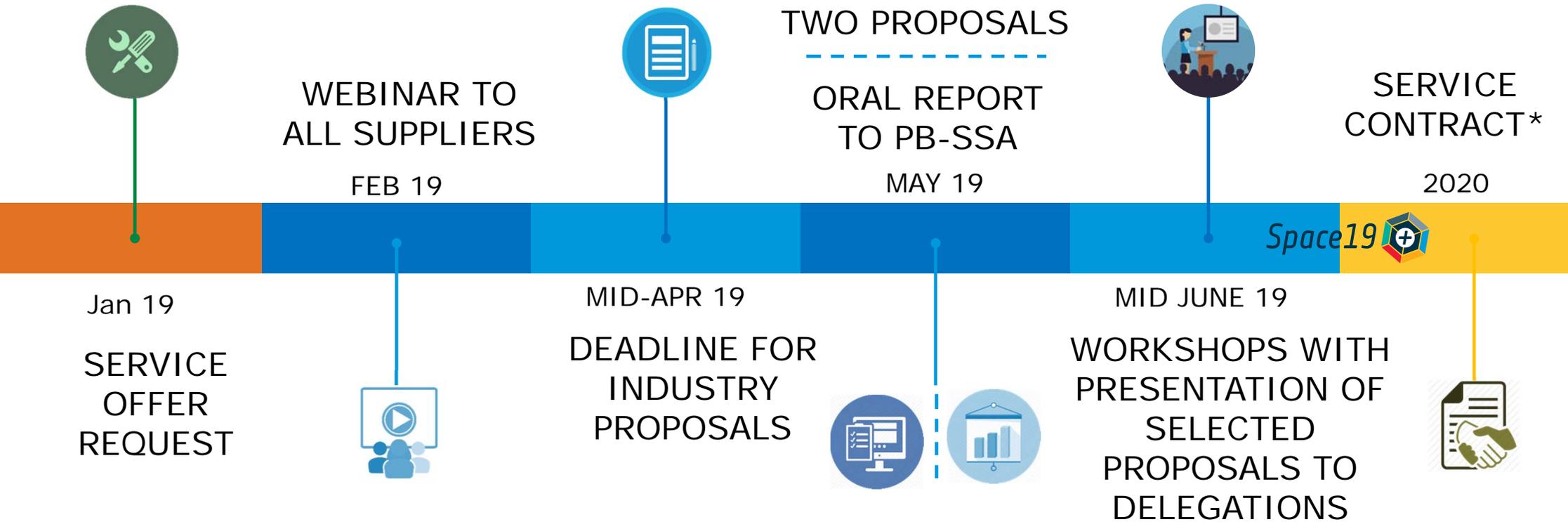
23-29 NOV 18



# 4 In-Orbit Servicing/Removal Mission



## Next steps



\*pending Space19+ decisions by MS



# 4 In-Orbit Servicing/Removal Mission



DEBRIS  
REMOVAL



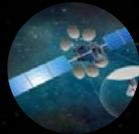
LIFE  
EXTENSION



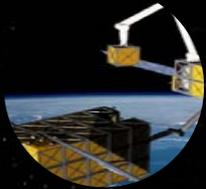
REFUELLING



RECYCLING



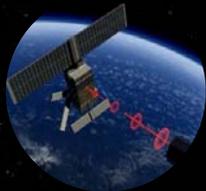
ASSEMBLING



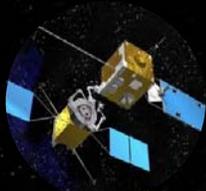
DESIGN  
FOR  
SERVICING



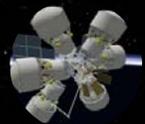
HUMAN  
EXPLORATION



PROXIMITY  
OPERATIONS



MAINTENANCE



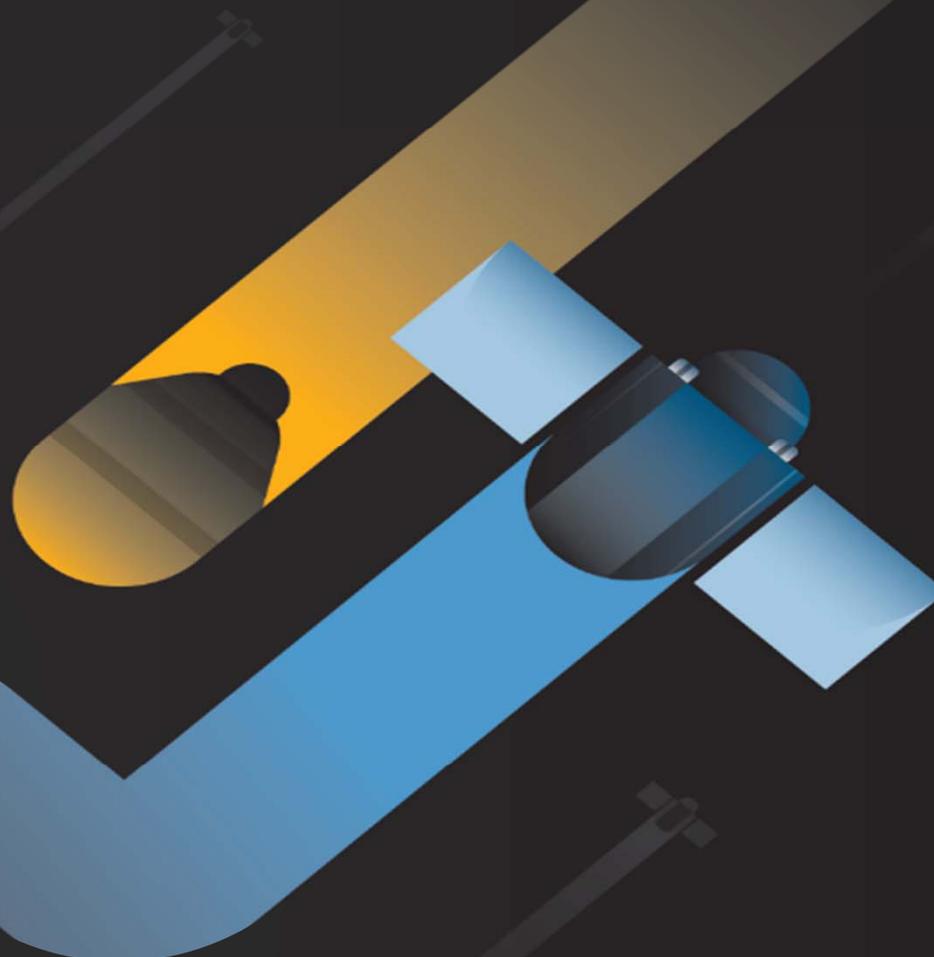
FUEL  
DEPOTS



# 5 CREAM



COLLISION AVOIDANCE  
AVOIDING SPACE JUNK



ARTIFICIAL INTELLIGENCE





**THANK YOU**

[www.esa.int](http://www.esa.int)

European Space Agency