

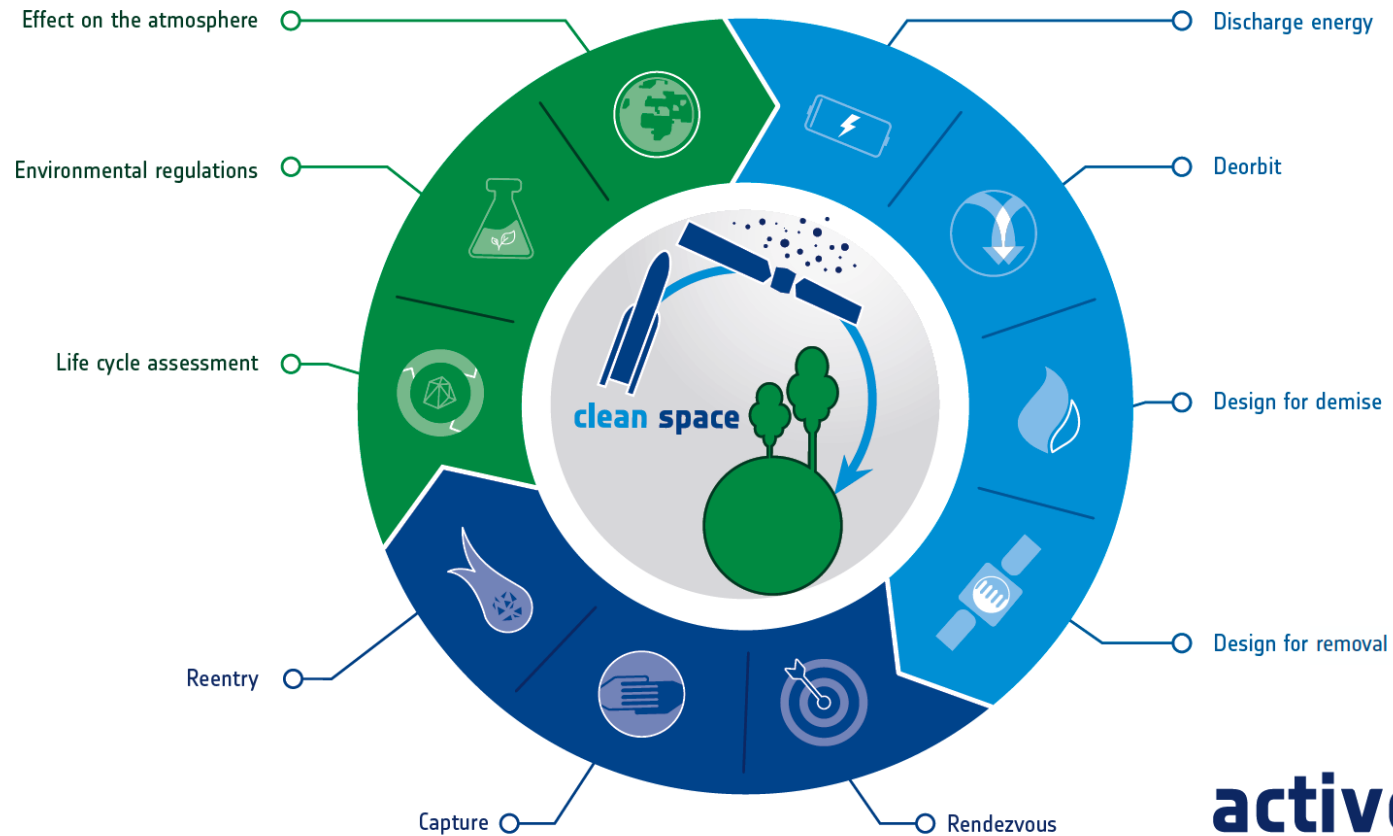


Clean Space

Luisa Innocenti, Head of Clean Space office



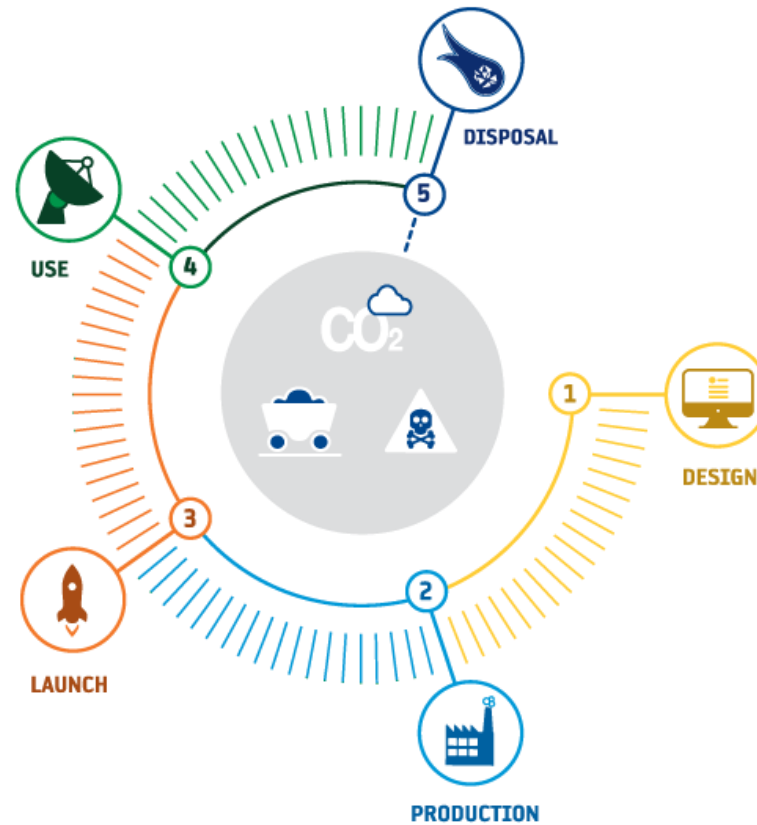
“*Guaranteeing the future of space activities
by protecting the environment*”



active debris removal

→ IN-ORBIT SERVICING

Understand how much space activities pollute and identify alternatives to reduce the environmental impacts



United Nations

A/AC.105/C.1/L.366



General Assembly

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**Committee on the Peaceful Uses of
Outer Space**

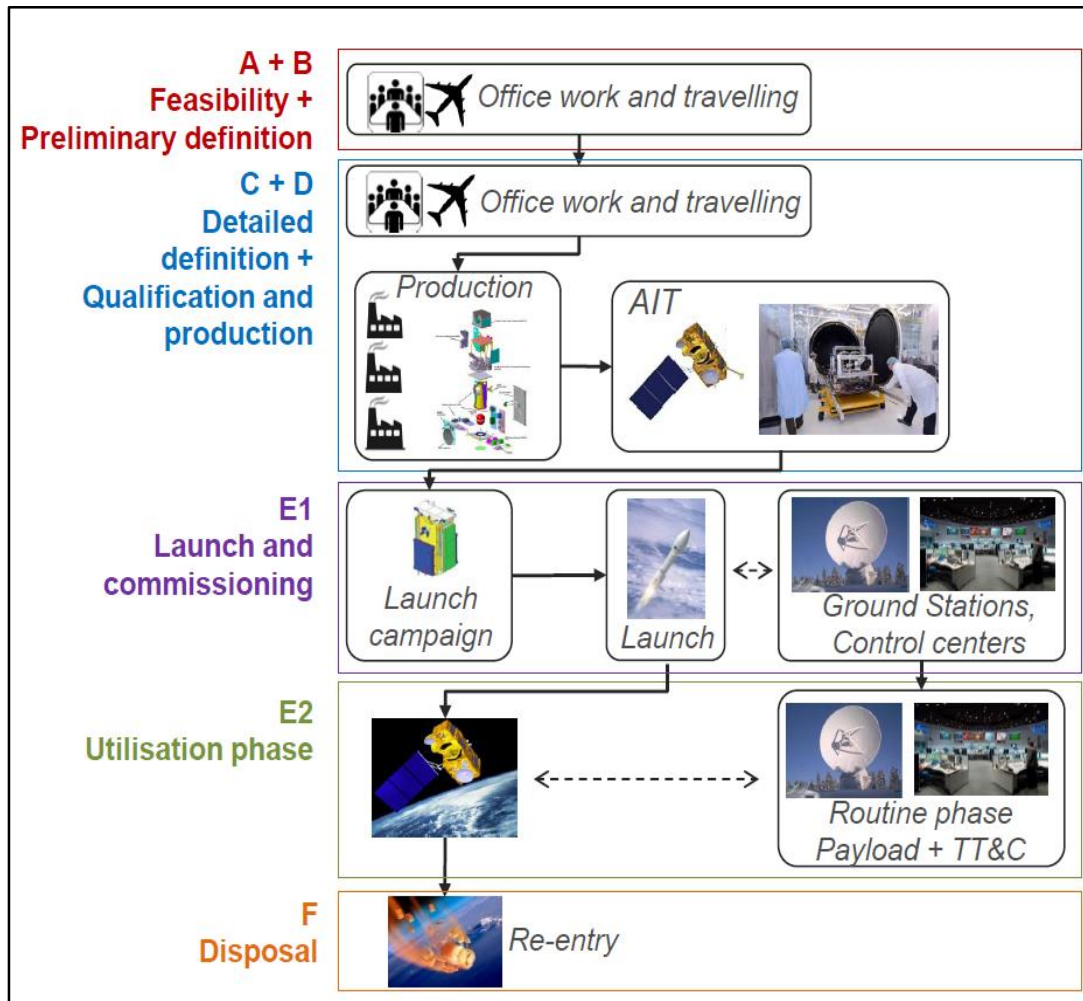
Scientific and Technical Subcommittee

Fifty-sixth session

Vienna, 11–22 February 2019

Guidelines for the Long-term Sustainability of Outer Space Activities

D1.3 States and international intergovernmental organizations should **promote the development of technologies that minimize the environmental impact of manufacturing and launching space assets** and that maximize the use of renewable resources and the reusability or repurposing of space assets to enhance the long-term sustainability of those activities.



Using the Life Cycle Assessment (LCA), ESA assessed the environmental impacts of:

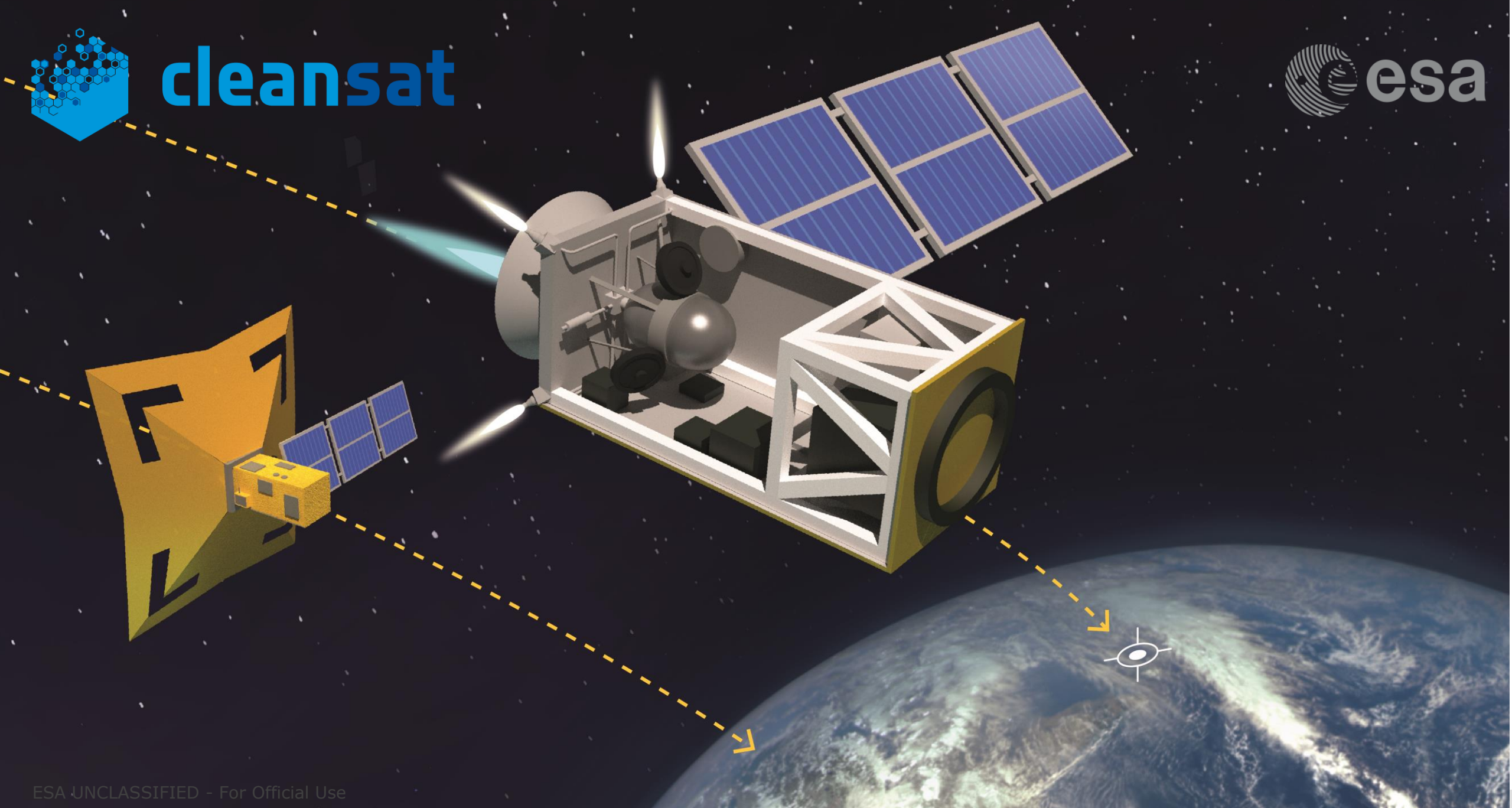
- the entire European launchers family and,
- space missions during their whole life cycle

Leading to:

- the development of the 'Space system Life Cycle Assessment guidelines' and,
- Eco-design requirements in
 - Ariane 6 and
 - Future EO satellites



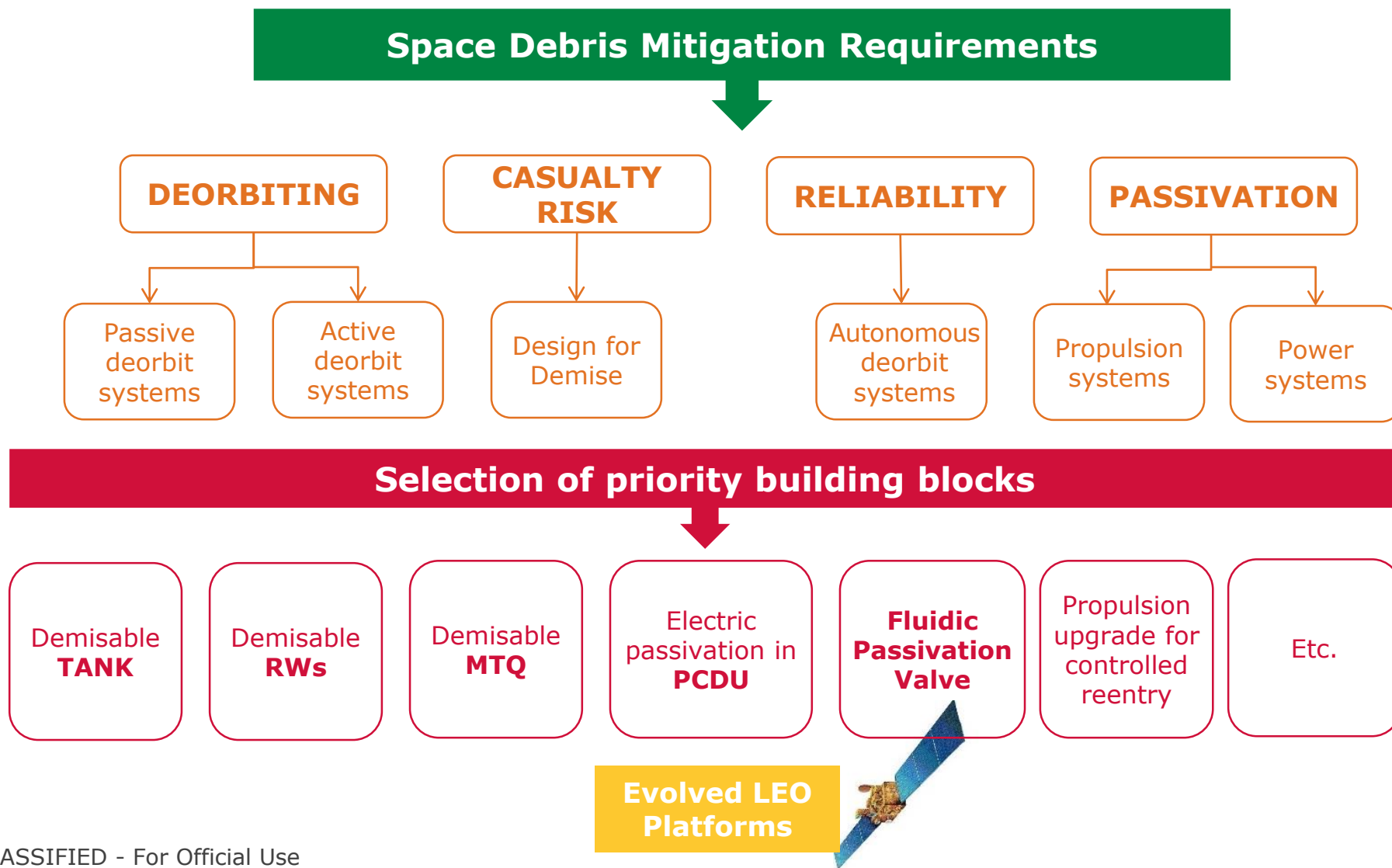
cleansat



ESA UNCLASSIFIED - For Official Use



European Space Agency



RW: Reaction Wheel

MTQ: Magnetorquer

PCDU: Power Conditioning and Distribution Unit

ACTIVE DEBRIS REMOVAL



e.Deorbit Mission Scenario



Service Offer Request objectives



SeR-01 Remove from orbit ESA debris with a total mass greater than 100 kg no later than 2025 ('initial Service')

SeR-02 Demonstrate feasibility of critical technologies enabling other (commercial) in-orbit servicing opportunities

SeR-03 Provide a robust business model for in-orbit servicing activities beyond the Service to be provided to ESA

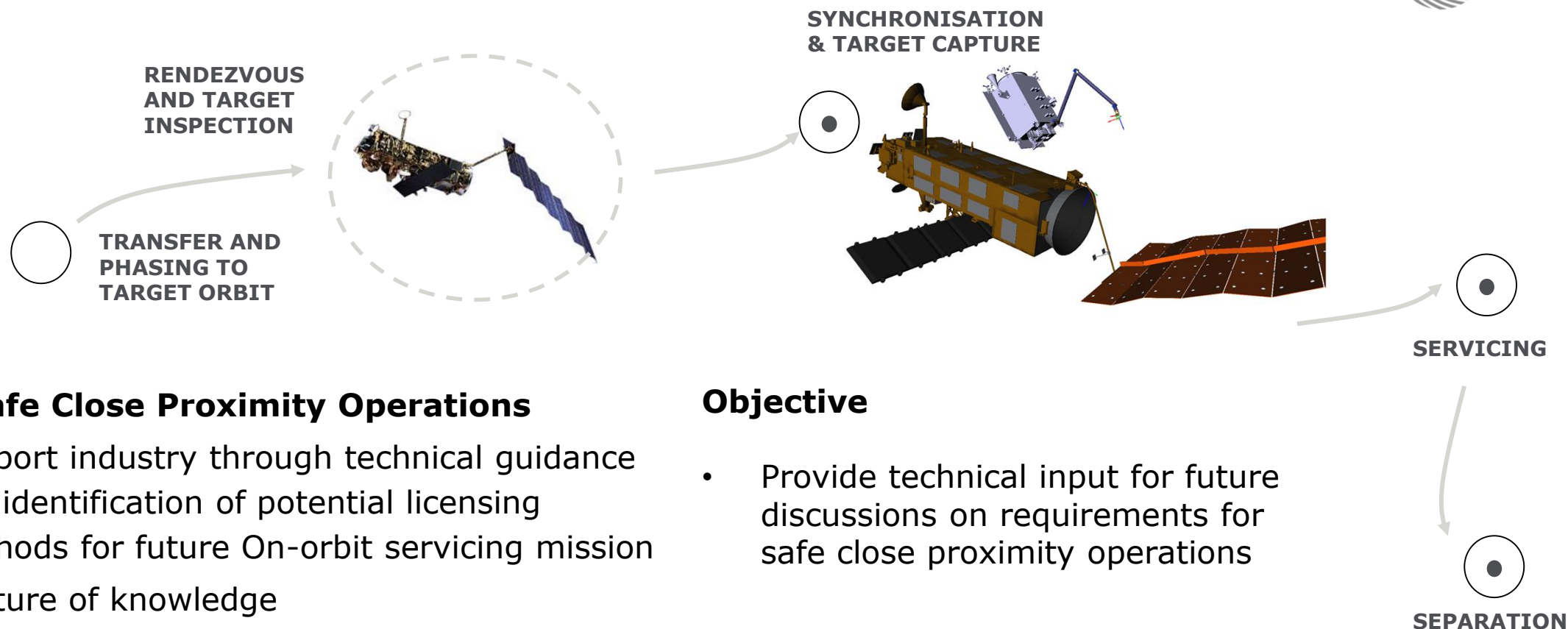
SeR-04 Comply to space debris mitigation requirements

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European Space Agency

Sustainable Close proximity operations



Why Safe Close Proximity Operations

- Support industry through technical guidance and identification of potential licensing methods for future On-orbit servicing mission
- Capture of knowledge
- **Protection to the orbital environment and other assets**
- Enable international engagement

Objective

- Provide technical input for future discussions on requirements for safe close proximity operations

Main messages



Europe and ESA are developing:

- **EcoDesign** of space activities in order to evaluate environmental impacts of space missions, identify hotspots and drive the selection of green technologies
- **CleanSat** to prioritise and develop technologies for a proper management of satellites' end of life. High cooperation with the Copernicus programme is in place
- **Active Debris Removal** is being pursued as an anchor institutional mission through the Service Offer Request issued by ESA on ADR and in-orbit servicing.

→ **SAFEGUARDING SPACE AND
OUR PLANET**

#Space19plus

#CleanSpace





An example: demisable tanks

- Change of materials towards more demisable ones (e.g. Aluminium instead of Titanium)
- Relocation of tanks inside the structure to ensure an earlier exposure to the flow

