

# NIMBUS PLATFORM IN THE IRIDE CONSTELLATION



# THE IRIDE CONSTELLATION

/// IRIDE Upstream can be considered as one of the most complex and comprehensive Satellite Systems worldwide.

/// The Upstream system includes six constellations equipped with both optical and radar sensors for Earth observation.

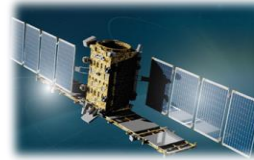
/// Currently, there are 34 assigned satellites, with the potential integration of an additional 35 satellites.

/// Each of the six constellations is distinguished by the different types of sensors they carry:

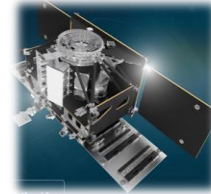
- Radar Sensors capable of observing the Earth day and night, regardless of atmospheric conditions,
- Optical Sensors providing observations with various spatial and spectral resolutions in the visible and infrared spectra.

## SYNTHETIC APERTURE RADAR (SAR) INSTRUMENTS

SAR Constellation #1



SAR Constellation #2

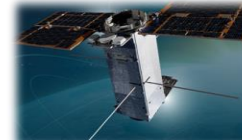


## MULTISPECTRAL OPTICAL INSTRUMENTS

High-Res. Multispectral Constellation #1

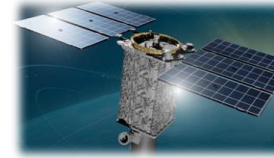


High-Res. Multispectral Constellation #2



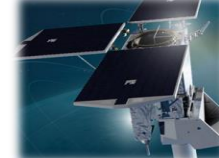
## OPTICAL INSTRUMENTS

Very high-Resolution Optical Constellation



## HYPERSPPECTRAL OPTICAL INSTRUMENTS

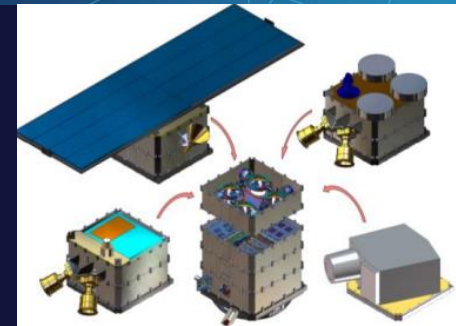
Hyperspectral Constellation



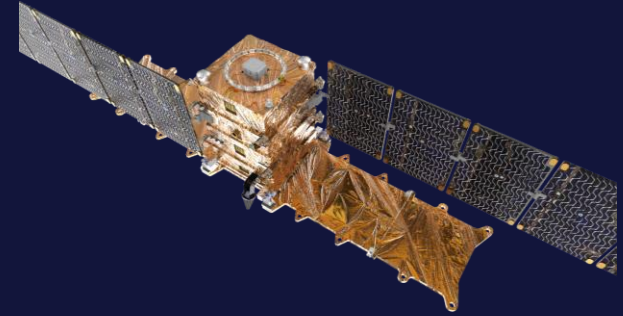
# THE IRIDE CONSTELLATION

*designed to be a reference for high revisit LEO constellations..*

- ! Thales Alenia Space contributes to IRIDE with a constellation of 12 satellites based on the NIMBUS concept
- ! This constellation will provide sensor – SAR and Optical – with submetric resolution and a very high revisit rate.
- ! The NIMBUS platform has been designed with a modular concept to cover a broad class of satellites from 80 to 220Kg
- ! High production rate
- ! High reliability (from 5 to 7 years in low cost range)



# IRIDE NIMBUS – SAR OPTICAL



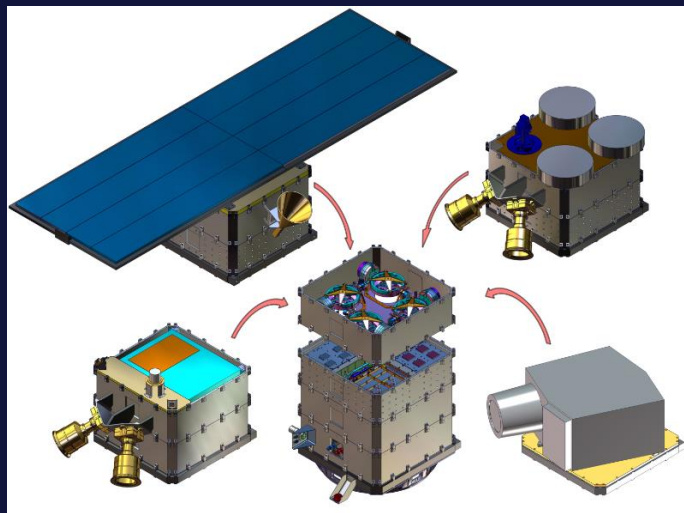
- / Constellation of 10 satellites for the LEO radar observation mission H24, all weather, 475-505 km
- / Constellation of 2 satellites for the LEO optical observation mission, 460-475 km
- / SAR operational modes Stripmap, Scansar, Spotlight
- / Optical Payload multispectral at high resolution and high revisit.
- / Highly Agile platform, for theater acquisitions and long spotlight
- / P/L Data Storage 2Tb P/L Down-link Rate 1Gbps



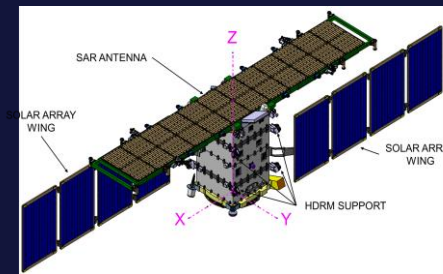
# NIMBUS PLATFORM : FLEXIBILITY FOR MULTIMISSION

/// Spacecraft multimission feature: the NIMBUS platform is based on the “open architecture” concept.

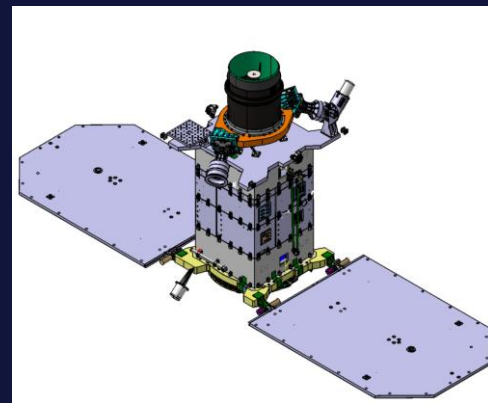
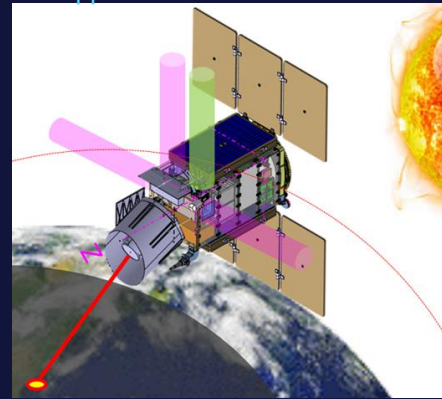
- ✓ Plug and play trays for fast integration and test
- ✓ Dedicated P/L tray
- ✓ Compatibility to Vega-C / Falcon9.
- ✓ Open Architecture options like:
  - ✓ high attitude agility
  - ✓ electric propulsors
  - ✓ HPC and ISL



/// Example of Radar Application

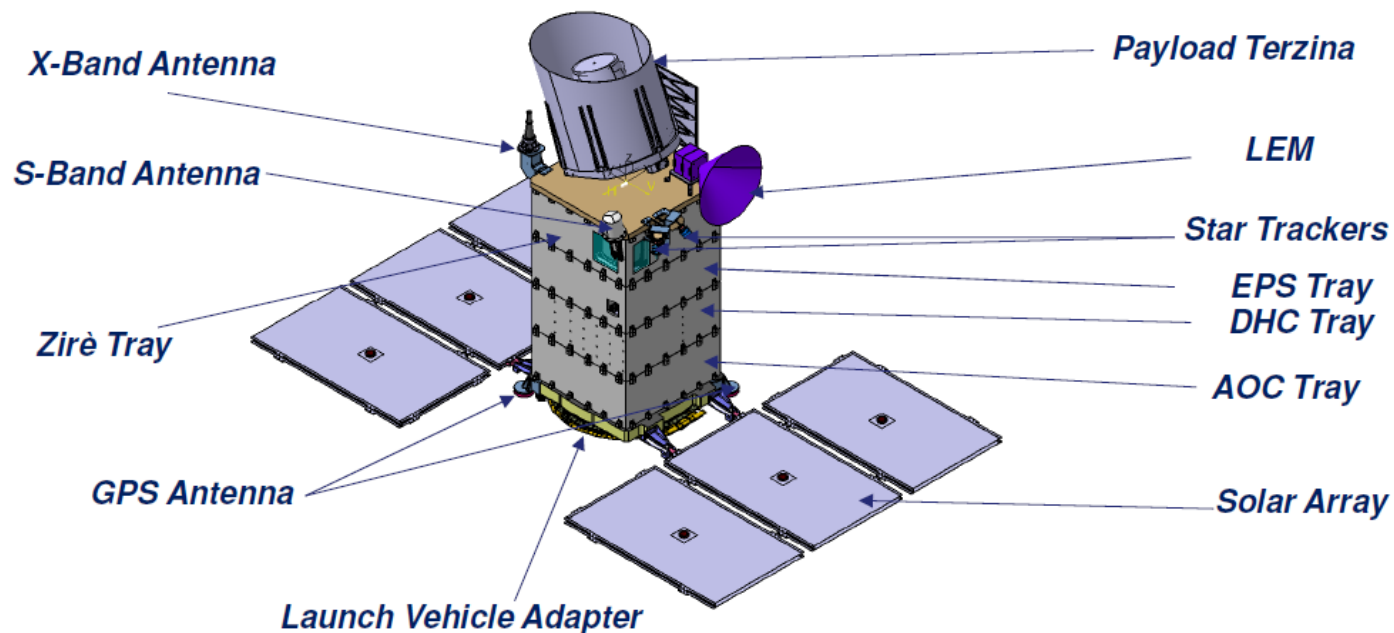


/// Examples of Optical Applications



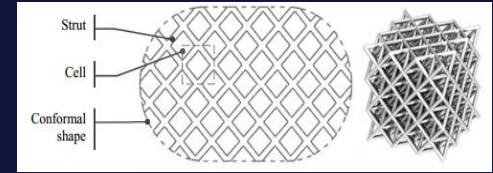
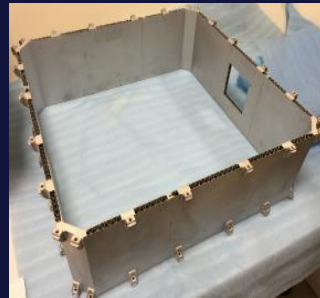
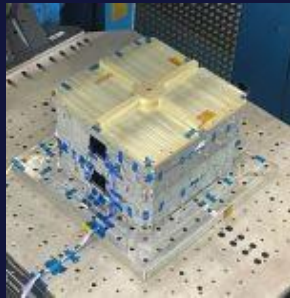
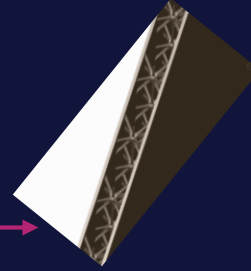
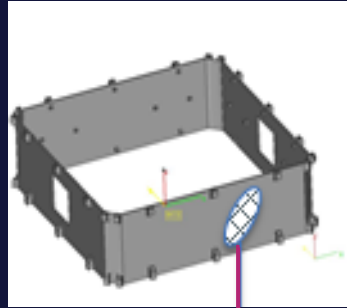
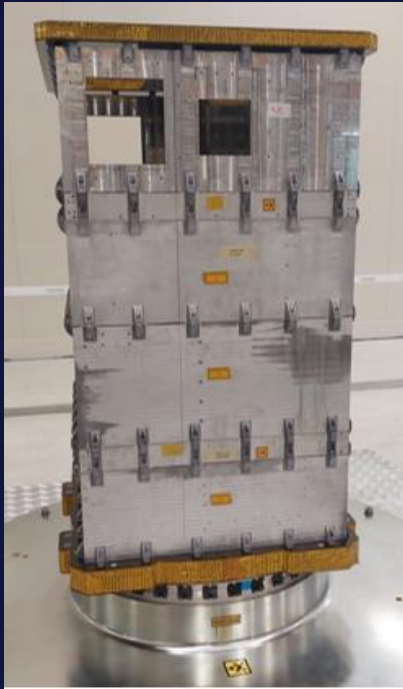
# NIMBUS – SCIENTIFIC APPLICATION

## CONFIGURAZIONE ATTUALE DEPLOYED

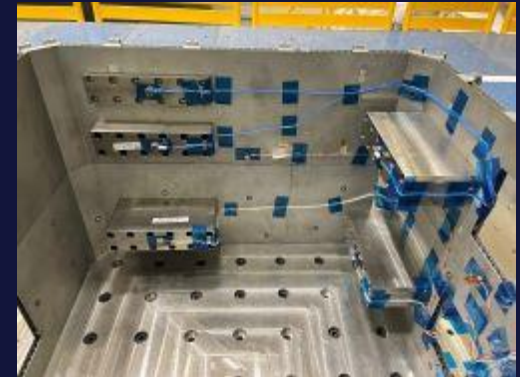


# HR-R EVO - NIMBUS PLATFORM : TRAYS' CONCEPTION

/// HR-R Evo / NIMBUS platform is conceived through functional trays



Example of Lattice Structures

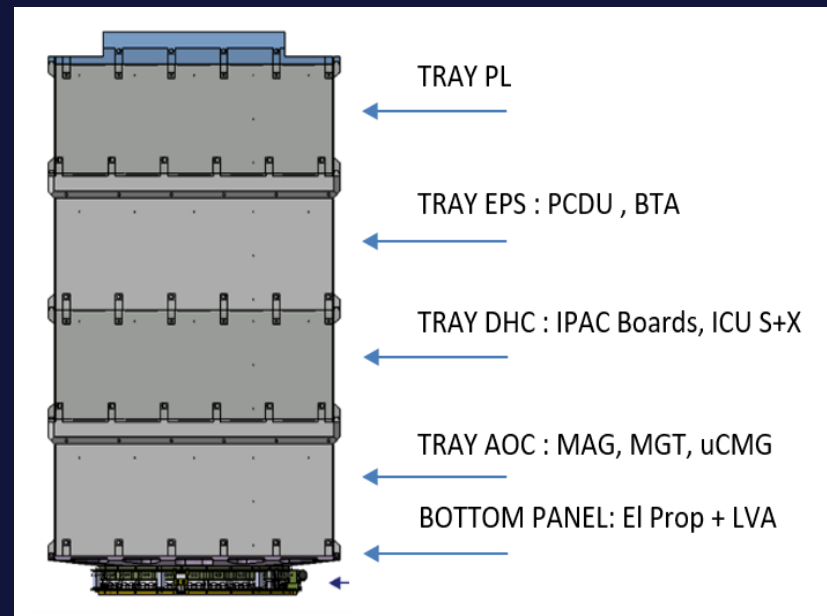


# HRREVO - NIMBUS PLATFORM : TRAYS' CONCEPTION

/// Trays are physically integrated one-over another, and the mechanical integration grants the electrical one at the same time, thanks to inter-Trays connectors.

/// Platform trays are Bottom Panel (includes Propulsion) AOC, DHC and EPS, and they are recurrent (except some slight missionization) in any mission.

/// Payload Tray is reconfigurable and dedicated to each Mission, as far as the Top Panel above it.



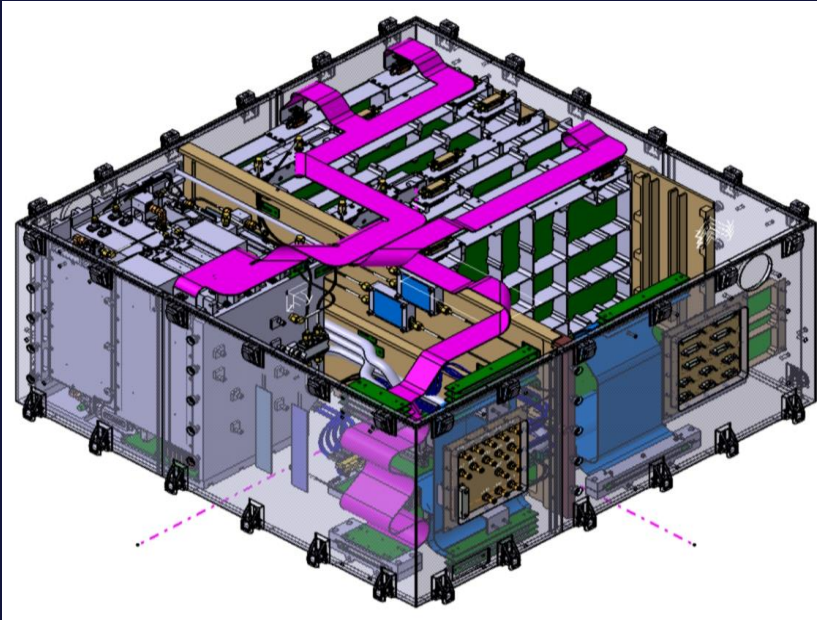


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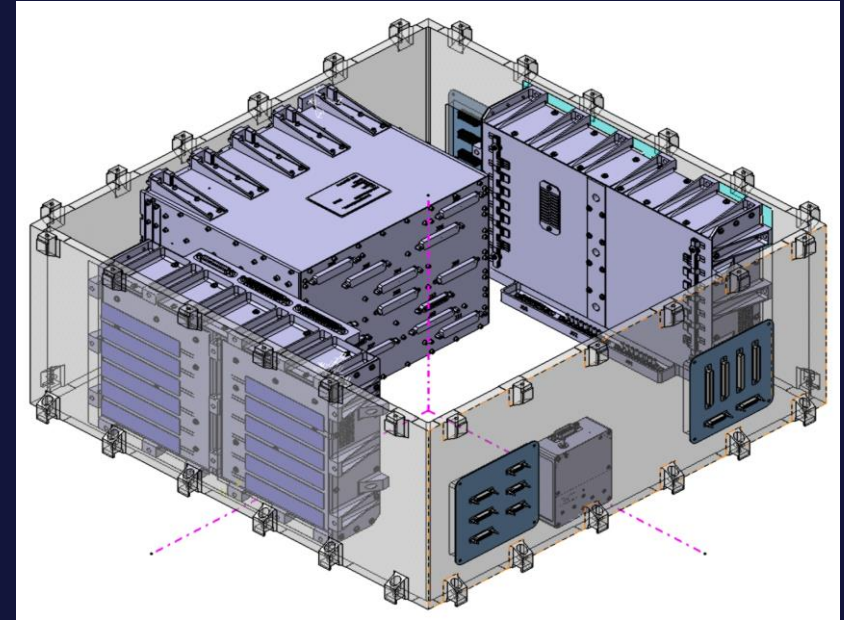
/// NIMBUS subsystems are able to provide very accurate Attitude Control Capability (AOC) and good stability. Capability to add a dedicated optional Gyroscope if needed.

/// Moreover it is designed to have a very flexible Data Handling and FDIR system. The Core is based on IPAC On Board Computer (including GNSS RX and PL MM as option)

DHC Tray

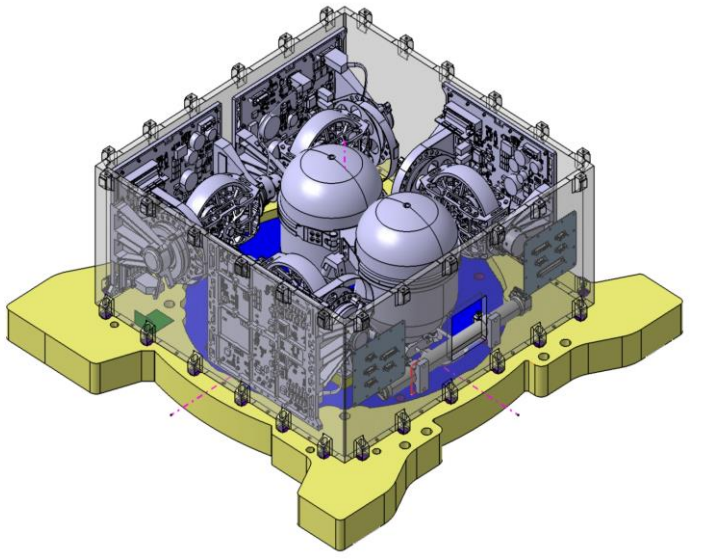


EPS TRAY

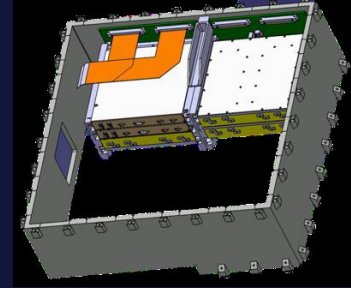


# HRREVO - NIMBUS PLATFORM : TRAYS' CONCEPTION

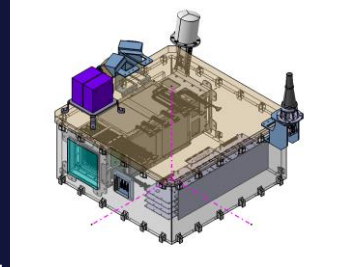
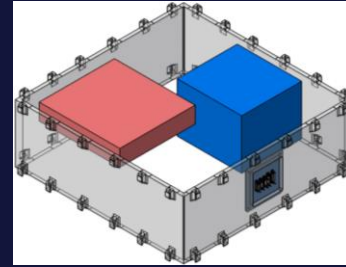
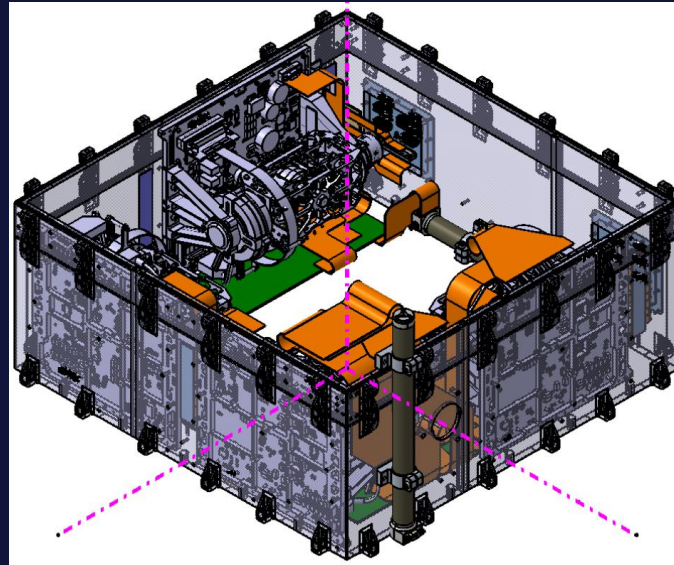
Bottom, AOCs and Propulsion Panels integrated



Mission Specific Payload Trays



AOCs TRAY

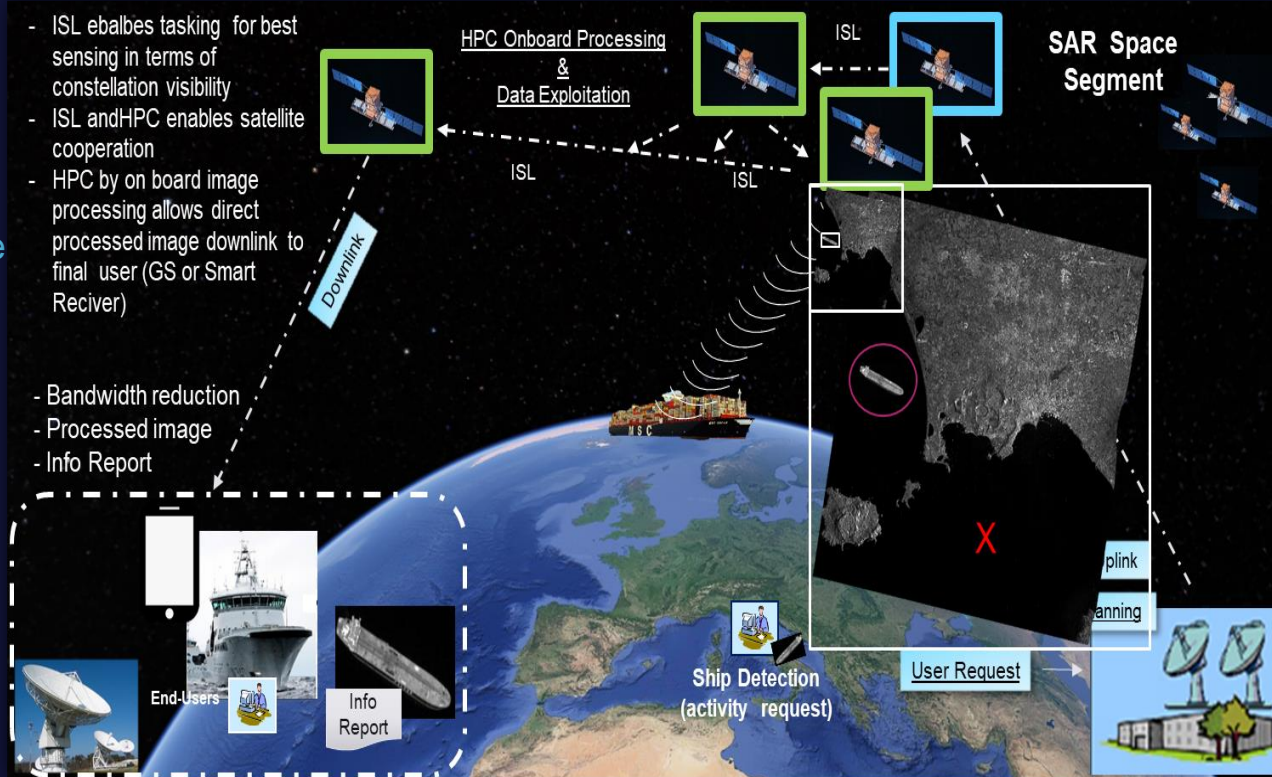


# OPERATIVITY IN CONSTELLATION

/// NIMBUS HPC/ISL tray provides the capability to operate Nimbus in Constellation configuration.

/// This new functionality enables the cooperation among satellites of the same constellation to minimize the E2E downlink time.

/// HPC allows to pre-process data on board and down-link only interesting features or directly smart info (e.g. report about presence of target).



- ISL enables tasking for best sensing in terms of constellation visibility
- ISL and HPC enables satellite cooperation
- HPC by on board image processing allows direct processed image downlink to final user (GS or Smart Receiver)

- Bandwidth reduction
- Processed image
- Info Report

# SPACE SMART FACTORY

The Smart Factory of Thales Alenia Space is designed to support high rate of production



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# SPACE SMART FACTORY

## SPACE BEYOND LIMITS

Smart Tools, connected objects: to improve production quality standard and way-of-working



Virtual Reality: provide an environment to upload 3D model and explore them collaboratively. Useful for training sessions for AIT operators



Augmented Reality: Assist the execution of integration procedure, Assist the quality inspection procedures.



Control Tower creates a digital representation of the manufacturing process and measure the KPI according to Lean principles.



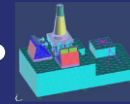
5 Metrology Measurements , Quality, Optical Inspection performed by robots



6 Industrial Simulator: simulates the industrial response including supply chain. Input from IoT sensors to feed the model (Digital Twin).



7 Virtual testing: To assess test feasibility even before test article availability before nominal test, improving test efficiency.



8 Automatic Mobile Robot: For Logistic dispatching of Hardware from the Warehouse area to the Production lines,

