



# GWFF

GEOSPATIAL WORLD FORUM

[\*\*CLICK TO KNOW MORE\*\*](#)



**“Earth Observation and Geo Spatial domain:  
disruptive technology and business innovations over  
the value chain”**

**Massimo C Comparini**

**Thales Alenia Space**

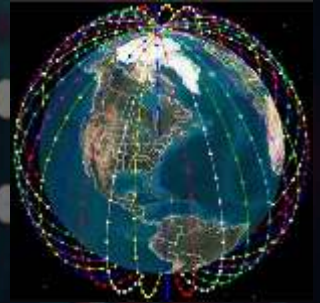
**Deputy CEO, SEVP Observation Exploration and Navigation**

**GWF 2024**

**Rotterdam, May 13<sup>th</sup> 2024**

# The new space race, space democratization

- The Space sector has contributed to open new technological frontiers due to the extreme and demanding nature of operating in deep space environment as well as to address specific missions and new requirements
- In the last decade an incredible richness of new sensors in space in all the domains allow to globally communicate, to observe the earth from space with unprecedented resolution and revisit time, to know exactly where we are on earth through navigation satellite
- We enter in a new era of space missions and technologies, an era where our everyday life activities relies on space infrastructures, data and services. Space technologies are today essential in the race for a sustainability planet and for a digital knowledge society. A true space economy definitively emerges.



# The new space race – global geospatial

- The Fourth Industrial Revolution ushers in the era of Big Data, artificial intelligence, machine learning and Internet of Things.
- Geospatial is becoming pervasive, from smartphones to self-driving cars to machines that think, the sheer level of ubiquity is subsuming geospatial systems into common everyday processes.
- Earth Observation is not just imaging from space and geospatial is not just about location. It is more about how the information revolution will affect human kind and the surrounding environment



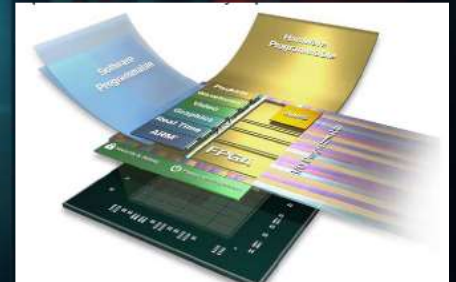
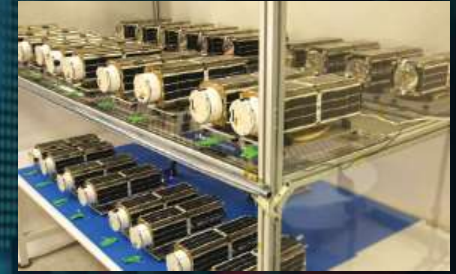
# The new space race – global geospatial

- The increasing number of satellites, the variety of EO sensors and the raising of new analytics techniques drive the growth of the satellite-based EO analytics industry to enhance decision-making and operational processes in a wide number of sectors
- At the same time the Geo Spatial market is rapidly growing with rise in both supply of information through evolution of flagship EO programs like Copernicus and raising high revisit constellations as well as in demand
- It results in a global growing interest from institutional and commercial players in buying EO satellites and a democratization of the use of satellite data leading to an increase in demand from end-user



## the space segment - drivers

- The state of technology within the satellite industry is evolving rapidly. Improvements in launch systems, sensors and enabling technologies drive innovations such as smallsat, constellations driving down costs.
- more sensors and a greater diversity of sensor types mean greater spatial resolution, higher temporal cadence, and richer spectral coverage.
- Software-defined satellite, which can be updated with new capabilities and techniques for speedier development, further slashes the cost and time required to provide new space-based services
- The increasing intelligence of satellites, on board AI algorithms and ISL across the nodes allow EO systems to operate more and more autonomous optimizing space resources to operate in the most efficient way



# Optical Radar Constellations – Ultra High End

Worldwide reference for EO ultra high resolution Optical Radar Integrated constellations





# ALL IN ONE CONSTELLATION

/// 7

Date:

Ref:

Template: 83230347-DOC-TAS-EN-010

PROPRIETARY INFORMATION

© 2022 Thales Alenia Space All rights reserved

THALES ALENIA SPACE LIMITED DISTRIBUTION

**ThalesAlenia**  
Space  
a Thales / Leonardo Company



# ALL IN ONE SOLUTION

The world is rapidly changing,  
threats monitoring needs near  
real-time surveillance

Until now, space solutions  
have been limited in  
reactivity and control

Powered by optical and radar  
microsatellites, the ALL-IN-ONE  
constellation combines frequency  
and control for a night and day,  
all-weather capability



# ALL-IN-ONE CAPABILITIES



## Timely alert, tracking & response

Prevent the impact of adverse events with the continuous monitoring capability



## Real-time situational awareness

Get a comprehensive and up-to-date understanding of the situation



## Trends analysis

Identify gradual changes, cyclical patterns or emerging trends

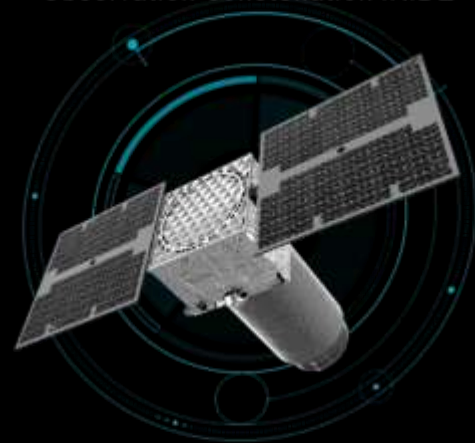


## Data driven decision making

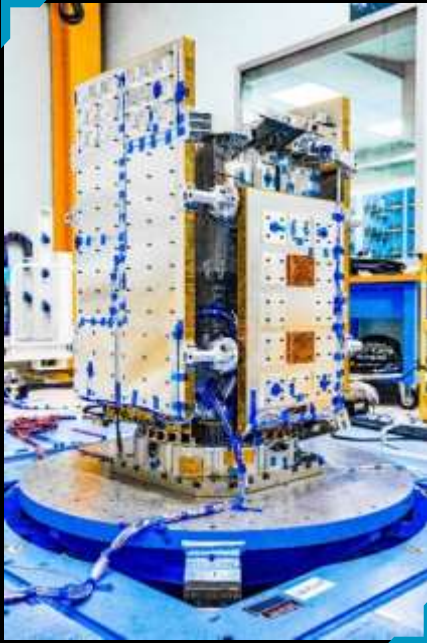
Analyze, interpret and integrate data with other datasets for evidence-based decision



**Under development** for the Italian Earth  
Observation constellation IRIDE



# SATELLITE PLATFORM: NIMBUS



a reconfigurable concept for multi missions application, compatible with a wide range of payloads and launchers

Empowering design flexibility:  
Ability to design optical and radar satellites through ToT and/or localization with a unique platform



# GROUND SEGMENT

A ground segment designed for **optimized constellation operations**



Optimized for multi mission evolvable systems



Automated operations



Optimal mission planning

A **single interface**



Program new acquisitions and activate optical and/or SAR satellites



Seamlessly operate both optical and SAR satellites



Visualize, discover and deliver both optical and/or SAR products



Manage user authentication and authorization

# GROUND SEGMENT

Agile and adaptative  
**multi mission planning** for  
the best reactiveness



## Automatic mission planning

Automatic prioritization of the acquisitions according to operator configurable conditions

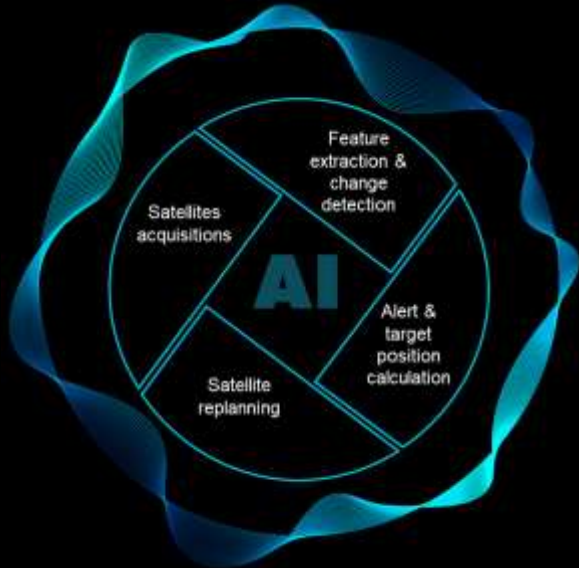


## Multiple acquisition modes

A multi-mission planning allowing combined optical and SAR acquisitions, “as soon as possible” acquisitions & multiple clustered acquisitions

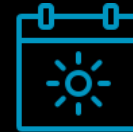
# POWER OF AI IN SPACE SYSTEMS

The power of AI  
in **satellite**  
**mission planning**



## Resource allocation

AI can determine the most efficient satellite based on its position and capabilities to collect the data



AI can incorporate weather forecasts into mission planning to optimize data collection schedules



## Data downlink prioritization

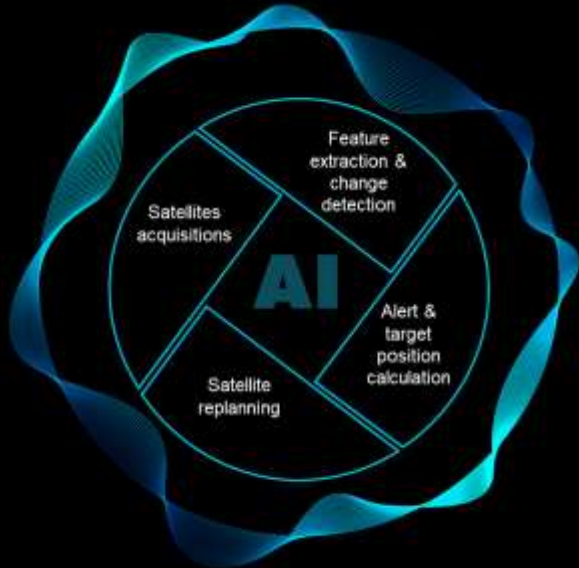
AI can prioritize the downlink of data based on its importance and relevance to the mission



In dynamic environment, AI can rapidly adapt and replan missions

# POWER OF AI IN SPACE SYSTEMS

The power of AI  
in **image**  
**processing**



## Real-time image analysis

AI can automatically process images in real-time for near instant access to information



## Change detection

AI algorithms can compare images taken at different time to identify changes



## Object detection

AI-based object detection models can identify specific objects of interest in images



## Super resolution

AI can enhance the resolution of satellite images, improving the level of details and clarity



ThalesAlenia  
*a Thales / Leonardo company* Space