AIX

BiDS | BIG DATA FROM SPACE 2025
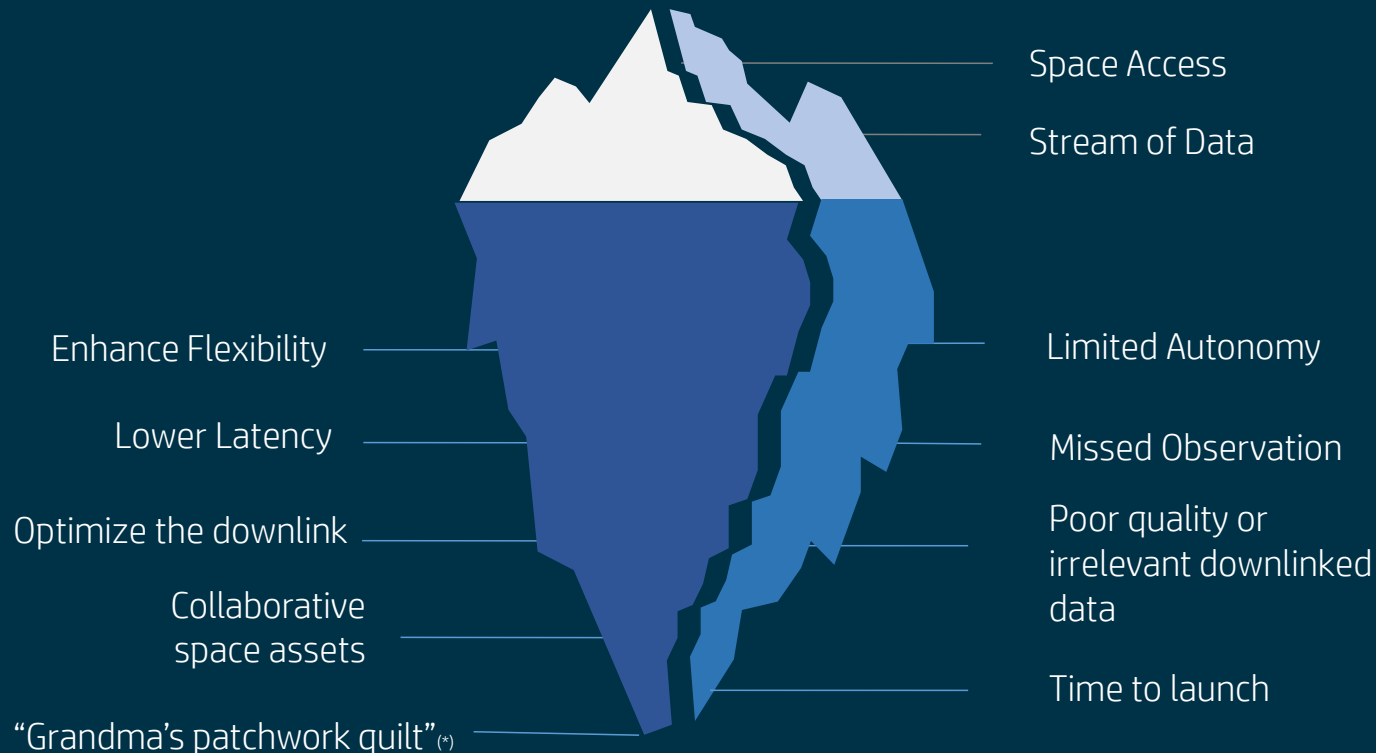
October 3rd, 2025, Riga, Latvia
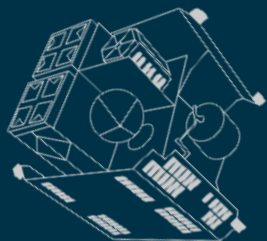
Vito Fortunato, Planetek Italia

RESHAPING THE EARTH-OBSERVATION VALUE CHAIN THROUGH AI-EXPRESS POWERED LOW LATENCY SERVICES FOR SECURITY AND CRISIS RESPONSE

PLANETEK ITALIA | AIKO | D-ORBIT

aix

ESA INCUBED

planetek italia

D-ORBIT
NEW SPACE SOLUTIONS

AIKO

The challenges of the current EO value chain

Space Access

Stream of Data

Enhance Flexibility

Lower Latency

Optimize the downlink

Collaborative space assets

"Grandma's patchwork quilt"(*)

Limited Autonomy

Missed Observation

Poor quality or irrelevant downlinked data

Time to launch

AIKO

planetek italia

D-ORBIT

(*)credits:ESA

A user-centered processing facility
in Space

A technological framework composed of hardware, software and services. These provide a set of basic and advanced building blocks that AI applications can be built upon. In other words, a testbed for AI (and not only)

provide access to information acquired directly from assets in orbit exploiting and privileging a service-based approach
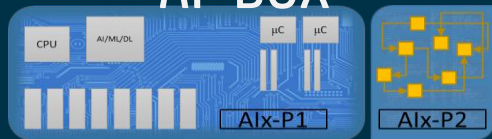
improving the implementation and validation of space services, with effects on time-to-market, operational and commercial efficiency

devising and testing new mission concepts directly in orbit
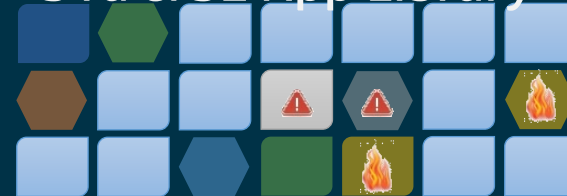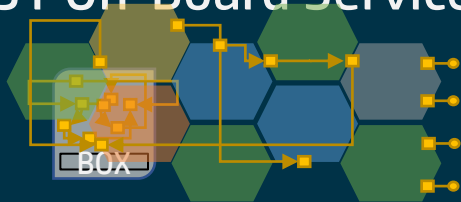
AIX products/services

AI^X BOX

Includes the AI^X-BOX and a software framework enabling the **on-board services** intended to the other sub-systems and payloads. It includes also the SW development kit, with a set of ready-made applications, and the tools allowing the development of new ones

S1 On-Board Services

The AIX-BOX is embedded in a satellite Carrier (e.g. D-Orbit's ION) and provides its services to payloads hosted onboard. In this way several payloads can pay-per-use the access to the AIX capabilities, services and environment
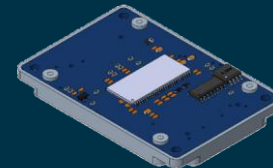
S1a & S2 App Library

A set of services à la carte based on AI^X On-Board framework with a public catalogue and an "app store" approach. Services will include EO data acquisition, processing (actionable info extraction) and downlink. They can be combined together to build custom applications. Ready-made applications (e.g. fire detection and warning service) are available on the app-store.

AI^X Dev kit

A development kit (SW only) intended to the implementation of applications that are based on the AISF framework and that can be run on any AIX On-Board Service. This will enable the "app-store" selling model.

AIKO

planetek italia

A web-based low-code/no-code appstore

Operational services flow

APP STORE

Off-the-Shelf
App Catalogue

FIRE MONITORING

SERVICE CONFIGURATION BACK-END

USER

Choose APP

- EO acquisition (lat, lon, Km² ...)
- APP performances
  - accuracy
  - responsiveness
  - latency

Get Alert

SPACE SEGMENT

AI & processing resources at the edge

EO payloads SW configured

- Configure on-board services
- Activate APP
- Acquire EO data
- Infer information
- Send actionables

PROCESSING BACK-END

Cloud processing resources

Transfer App & Configuration

GROUND STATION

APP configuration (transparent to user)
- Sensor MWIR/ SWIR...
- bands' id
- bands' width & SNR

User configuration
- AoI (lat, lon, Km2...)
- accuracy %
- responsiveness
- latency

6

An evolutionary path

AIX-1p

14 January 2025:

- F9 - Transporter-12
- SSO +/- 0,1 deg
- 500-600km +/- 20km
- LTDN 10:30 + 60min
- COTS RGB camera (15m GSD)

AIX-1

23 June 2025:

- F9 - Transporter - 14
- LTDN 13:00 + 2h / - 0h
- SSO +/- 0,1 deg
- 500-600km +/- 20km
- COTS RGB camera (15m GSD)
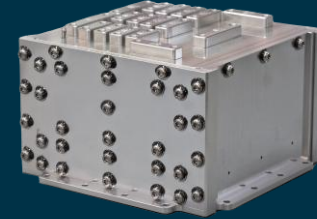- Dedicated Low-Latency channel #1

AIX-1+

NET November 2025:

- F9 - Transporter - 15
- 561 km +/- 15 km
- LTDN 10:00 + 60min
- SSO +/-0.1 deg
- MUL-dual camera system (15m/150m GSD)
- Dedicated Low-Latency channel #2

AIKO

planetek italia

D-ORBIT

Flight(s) processing configurations

Platform	AIX-1p / AIX-1 (iX5-106)	AIX-1+ (iX10-101)
CPU	AMD Steppe Eagle Quad-core x86-64	AMD Ryzen Embedded V1000 series
GPU	Integrated AMD Radeon	8× AMD Radeon GPU cores
VPU	Intel Movidius Myriad X	Intel Movidius Myriad X
RAM	2 GB DDR3 ECC	24 GB DDR4 ECC
Storage	1× 120 GB SATA SSD	2× 4 TB NVMe + 1× 128 GB SATA SSD
Power	~10–30 W	< 40W
Traits	Compact, power-efficient	High-throughput, rich I/O

AIKO planetek italia D-ORBIT

Reference sensing configuration

Snapshot mosaic camera

Macro-pixel

Multi-spectral Sensor
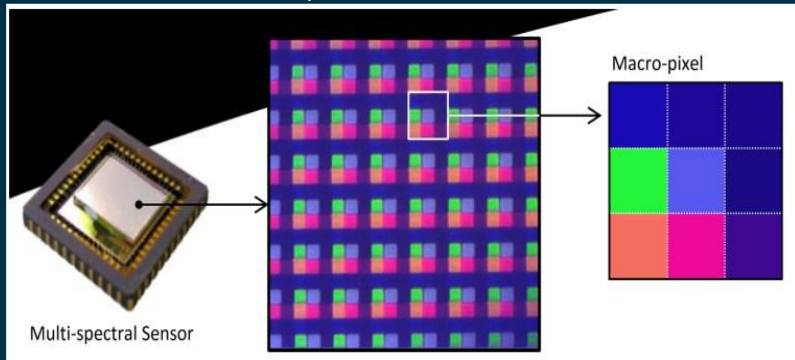
Credits: TSD\Silios

	Sentinel-2 (sensore di riferimento)			AIX (+ 1 panchromatic)		
	Spatial Res [m]	Central WaveLen [nm]	Bandwidth [nm]	Spatial Res [m]	Central WaveLen [nm]	Bandwidth [nm]
B2	10	492,4	66		492	43
B3	10	559,8	36		560	40
B4	10	664,6	31	NFOV 8.5-15 && WFOV 135-150	665	37
B5	20	704,1	15		705	37
B6	20	740,5	15		739	37
B7	20	782,8	20		782	34
B8	10	832,8	106		833	32
B8a	20	864,7	21		865	31

AIKO

planetek italia

D-ORBIT

The full picture

Low-latency edge processing with sensor in the loop: *actionable info direct to users in minutes down to seconds*(*)

Camera system by TSD space

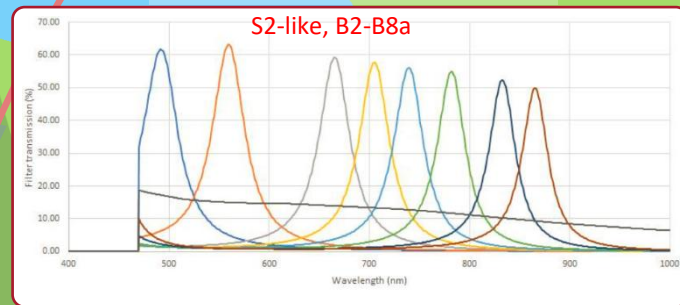Wide FOV Forward looking Low-res (150m) sensor

Narrow FOV Nadir looking 8,5m GSD Optical Multi-Spectral sensor

Low latency downlink of actionable info through LEO/GEO

Radio system by NSL/Addvalue

Possibility of AIX operations triggering through iridium/inmarsat

8 spectral bands

S2-like, B2-B8a

Filter transmission (%)

Wavelength (nm)

(*) under characterization in multiple scenario of operations

PLANETEK ITALIA | AIKO | D-ORBIT

aix

ESA INCUBED

Application examples

Market segments	Applications		
Agriculture	Yield Mapping	Nutrient Management	Irrigation Management
Forestry	Forest Health Management	Forest Fire Monitoring	Forest Land Mapping
Urban Monitoring	Cadastre & Land Mapping	Monitoring Urban heat	Critical Infrastructure Monitoring
Natural Disasters	Risk Forecasts for Hazards	Support early Warning and Response	Support to Insurance
Security/Defence	Border Surveillance Migrants-Refugees	Non-Collaborative Vessel Detection	Accidents Search & Rescue
Defence	Theatre Real Time Threats Detection	SIGINT/IMINT Situation Awareness	Anomaly Detection
Maritime & Coastal	Fishing Zone Surveillance	Oil Spill	Marine Litter
Oil&Gas	Onshore & Offshore Oil Field Monitoring	Pipeline Monitoring	Gas Station Positioning

Alerting
Latency is the driver

Rapid Tasking
Speed is the driver

Continuous monitoring
is the driver

Confidentiality
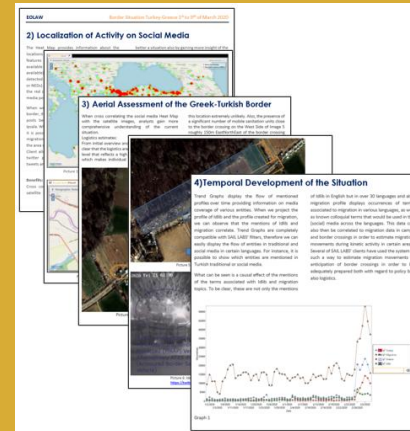is a result
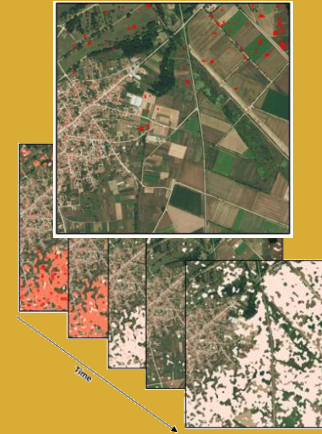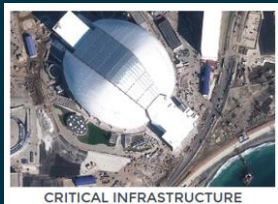
AIKO

planetek italia

D-ORBIT

Enablers:
ship detection

Ship detection (with/without AI) from space has already been identified as a potentially interesting use case by several players in the European and US ecosystem and is envisaged as one of AI^X applications.

HUMANITARIAN AID

MILITARY CAPABILITIES

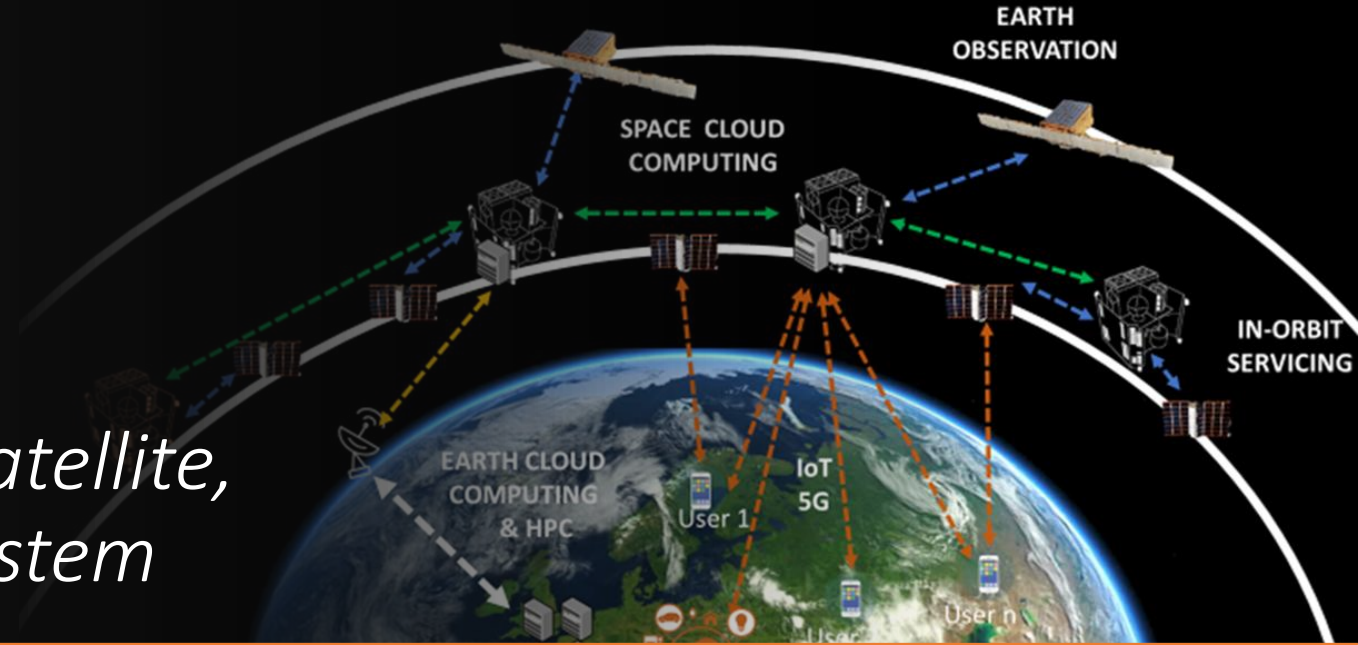GENERAL CRIME AND SECURITY SURVEILLANCE

Enablers:
OSINT derived direct tasking

- Exploiting the OSINT to task in a machine 2 machine way the tasking of the satellite

- Time between detection and tasking less than one minute

CRITICAL INFRASTRUCTURE

HUMANITARIAN AID

GENERAL CRIME AND SECURITY SURVEILLANCE

planetek
italia

D-ORBIT

Evolutions:
*AIX is not an EO satellite,
it's a digital ecosystem*

EARTH OBSERVATION

SPACE CLOUD COMPUTING

IN-ORBIT SERVICING

EARTH CLOUD COMPUTING & HPC

IoT 5G

User 1

User n

PLANETEK ITALIA | AIKO | D-ORBIT
aix
ESA INCUBED

Ceci n'est pas une pipe.

"The famous pipe
reproached me fo
you stuff my pipe
representation, is
written on my pict
pipe", I'd have bee

René Magritte

Questions?

fortunato@planetek.it

AIKO

planetek
italia

D-ORBIT