



EASE-GROUND

THE MULTI-MISSION AND MULTI-SENSOR SOLUTION FOR GROUND SEGMENT

EASE-GROUND OVERVIEW

EASE-GROUND, is a complete User Ground Segment (UGS) solution at a glance. EASE is part of the Telespazio Ground-as-a-Service and can be either configured ***as-a-Service** with a fee-based model, deployable on Cloud or on Telespazio premises and made accessible to customer users, or ***as-a-System** for a private instance, deployable on customer premises or on Cloud according to the needs.

EASE-GROUND is a Cloud native solution by design supporting a full multi-mission, multi-sensor environment. It is designed to be open for federation with other infrastructure in order to exploit managed mission capabilities and synergies.

EASE-GROUND, thanks to these founding elements, turns out to be a solution **extremely flexible and deployment agnostic**.

EASE main capabilities are:

- Catalogue data exploitation;
- Satellite Tasking and Data Subscription management;
- Data Ingestion, Inventory and Archiving service;
- Distributed Data Processing;
- User Management and On-boarding;
- Monitoring & KPI Reporting services;
- News & Advertising contents management.

From the technological point of view, the new paradigm of UGS (User Ground Segment) is moving towards models of data exploitation in which four macro-elements converge:

- **Artificial Intelligence** (Machine Learning / Deep Learning), capable of generating Data Analytics and insights derived from the analysis of a large amount of satellite data;
- **Scalable and flexible ICT infrastructures (Cloud)** able to guarantee sufficient storage and calculation capacity to enable efficient data exploitation and to set-up geo-spatial services;
- **Satellite Big Data**, acquired systematically by Optical and SAR satellite missions, both commercial and non-commercial;
- Native integration with **Thematic Platforms** and **Vertical Thematic Applications** to support the provision of geo-information services.



NEAR DATA TO USERS

MICRO-SERVICE TECHNOLOGIES

Thanks to **Micro-service technologies**, EASE-GROUND architecture is modular and flexible and easily adapt to tailoring for specific customers. The **Kubernetes** layer makes EASE-GROUND to be **Cloud native** and **Deployment agnostic**, offering possibilities for **on premises or on cloud deployment**.

Moreover, the **Docker Container** packaging is useful to manage the workload of the specific functions. These ingredients facilitate the **DevOps environment**, with the known reduction of costs and deployment times. With this architecture, EASE-GROUND is ready to be offered both with As-A-System and **As-A-Service** configuration.

ARTIFICIAL INTELLIGENCE

New data exploitation approaches are provided, basing on **Artificial Intelligence techniques** to near the data to the users, implementing data research capabilities with extremely user-friendly approaches.

The **Natural Language Processing** allows data research using free text query.

The **Recommendation System** profiles the users according to their interests, starting from characteristics of their profile, e.g. preferences on mission, satellites, geographical areas, and then adds information by tracking its activities on the User Ground Segment. Using **machine/deep learning algorithms**, it is able to suggest data of potential interest for the users.

USER DASHBOARD

The User Dashboard is a section **tailored for the user**.

From this section, the user can access to his profile and to personalized access to data and in particular:

- **Suggestions** for archived products coming from the Recommendation System;
- **Top visited** product list;
- **Events** collected from institutional channels (e.g. INGV) and social networks (e.g. Twitter) filtered according to the user profile;
- **Forecast** for natural events.



DATA ACCESS

The Data Access pattern is **upset** respect to **traditional product navigators**, increasing the **User Experience** and ease the data research.

The user easily navigates the Data Access and is able to search for archived data, task new acquisitions to be scheduled acquisitions or subscribe to data driven mission data from a unique access point.

The **free text query** allows the user to submit queries with his desiderata using **natural language** in a **multi-mission environment** from a **unique HMI** on **archived product** and **future acquisition in the same time**.

Moreover, events are processed and graded according to social relevance and then filtered for the users according to their specific profile.

DATA INGESTION

Multi-mission and **multi-format** approach is implemented for data ingestion. After product parsing, the data can be archived on **multi-layered** and distributed archives.

DISTRIBUTED PROCESSING

EASE-GROUND provides **workflow and processing services** to perform automatic (**data driven and/or systematic**) or on-demand (**user driven**) processing activities for the ingested and stored data, on the basis of configurable workflows that may include automated and manual processing steps (activities). Supports a large number of third-party Instrument Processing Facilities (IPFs) (or also simple processors) realising processing steps (activities). Supports also PF interface.

EASE-GROUND is able to operate a **pool of processing nodes** on both **private, public and Hybrid Cloud solutions** so that it is to be able to **expand** its Cloud resources capabilities by integrating external Public Cloud infrastructures fully exploiting Cloud **elasticity**.

INVENTORY SERVICE

The Inventory Service provides cataloguing capabilities with a **mission agnostic approach**, allowing the ingestion with heterogeneous features.

Metadata can be accessed using **standard interface** for accessing data with **OGC Inspire compliant** protocol.

A **Big Data** and efficient partitioning is available offering sharding capabilities. **Sharding** approach, or horizontal partitioning, allows better performance with respect to vertical partitioning, as the data are distributed across different nodes, and therefore it is also possible to have an intelligent sharding, e.g. on time period or area of interest.

OPERATIONAL COST REDUCTION

The **DevSecOps** methodology reduces drastically the **integration costs** for both the As-A-Service and the As-A-System configurations bringing to a **zero shift model**. In fact, the **Blue/Green deployment model** ensures **zero-downtime** and **zero-deployment costs**. The **EASE-GROUND As-A-Service configuration** is the enabling factor for operational costs reduction. Customers are encouraged to embrace a **zero operation cost model** and to move towards a **pay-per-use approach**.

MISSION PERFORMANCE MONITORING & REPORTING
EASE-GROUND provides a **full transparent monitoring** and reporting system.
EASE allows to monitor **Key Performance Indicator** and control related **Service Level Agreement**. The EASE-GROUND MPMR is empowered by multi-dimensional database layers and **Data Analytics** techniques that provide insight on the Mission performance and is able to provide **predictive** outlook for anomalies and bottleneck on system and operations allowing to increase the **Mission success**.



~40M	~30	~550	~140	OPTICAL, RADAR	FROM 60 TO 660
PRODUCTS	MISSIONS	DATASETS	SENSOR MODE	SENSOR TYPE	OPTICAL RESOLUTIONS (CM)

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