



fly4EO

flight dynamics

Full orbit monitoring and maintenance capabilities



**Orbit
Determination**



**Orbit Prediction and
Manoeuvre Optimisation**



**Flight Dynamics
Database**



**Space Debris
Monitoring**

Working operationally in the Deimos-2 mission

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fly4EO is the **stand-alone product** in charge of the **Flight Dynamics System (FDS) function** within the **gs4EO** suite of ground segment products developed by Elecnor Deimos.

It is currently **working operationally in the Deimos-2 mission**.

Functionalities

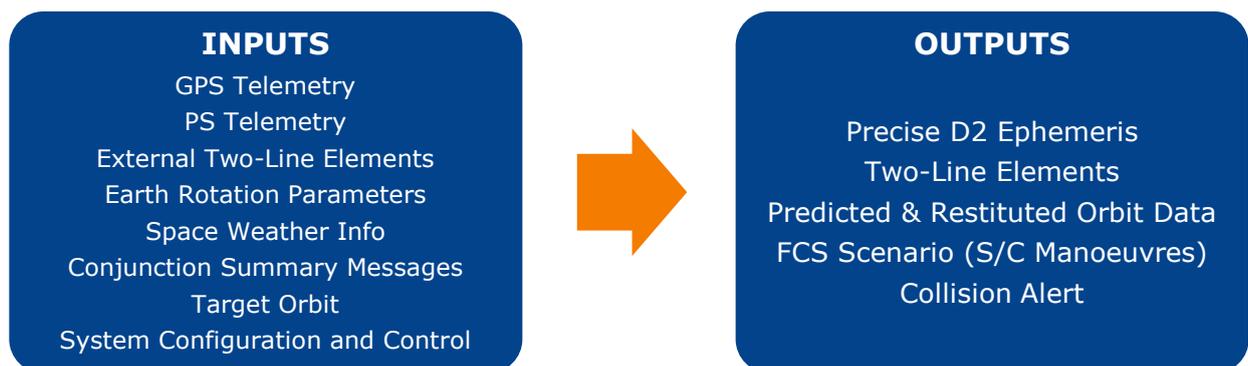
The Flight Dynamics System algorithms are decomposed in the **Orbit Determination and Control System (ODCS)** and the **Space Debris Monitoring (SDM)**, which share common data interfaces and functionalities despite performing different functions within the Ground Segment. Additionally, the **Human Machine Interface (HMI)** supports the configuration and control tasks of the system.

The ODCS is divided in:

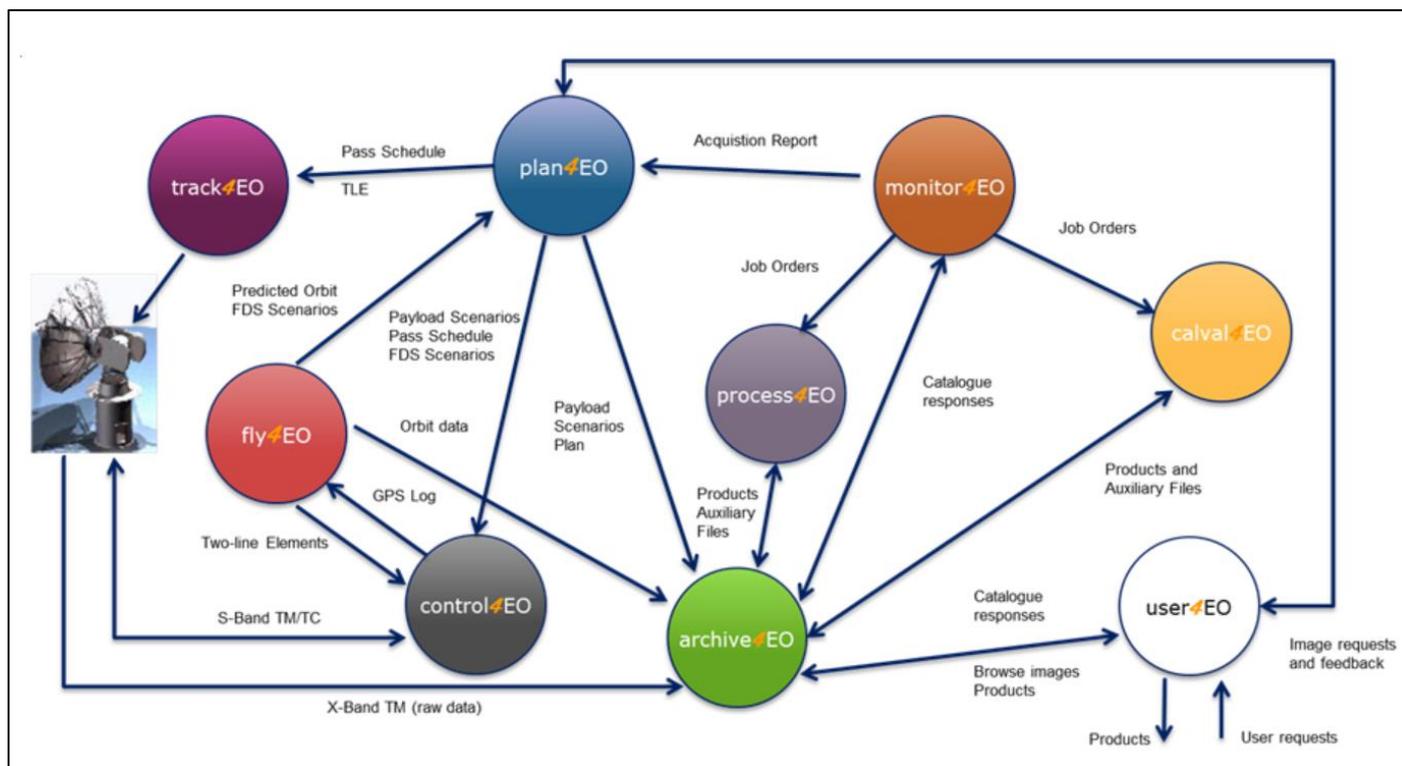
- **Orbit Determination Subsystem**, which estimates the parameters needed to describe the trajectory of the spacecraft, as well as other parameters related to the dynamics and observation models. A measure of the accuracy of the estimates is provided in the form of a covariance matrix of the estimated parameters.
- **Orbit Prediction and Maneuver Optimization**, which computes the orbit maneuvers required to reach given orbital targets while satisfying given mission constraints during the operational life of the satellite. The sub-system has also to compute and make available the future trajectory in XML and TLE format for use by other elements of the Ground Segment. This trajectory data is used, for instance, to compute attitude profiles, station coverage, antenna pointing elements and eclipses.
- **Flight Dynamics Database (FDDB)**, a file-based database in which all the relevant FD parameters are stored, together with the historical input/output and configuration data files. The transfer of operations to the backup system requires the transfer of the FDDB.

The main purpose of the SDM subsystem is to **warn FDS operators** whenever a **collision risk** between the spacecraft and another object is detected, providing decision-making support for the triggering of collision **avoidance manoeuvres**.

Interfaces



Deimos Space ground segment systems are built using a combination of **4EO products**. These products work in a coherent and synchronized way, although all of them can also be used as **independent applications**.



Thanks to its **modular design**, the **gs4EO** suite of ground segment products can be used to **customize the ground segment according to the customer's requirements**.

The various individual products can be assembled in different ways to implement different deployment configurations. These comprise from a **single product** supporting a specific mission need to a **complete Ground Segment**, or even a **Direct Receiving Station** that provides **fast, direct and safe access** to the mission data.

This modularity also provides extraordinary flexibility in order to accommodate **more than one Earth Observation mission within an individual** the ground segment.

These products are already being used in different
ESA and Spanish Governmental missions.

Together they form **gs4EO**,
the **Ground Segment of DEIMOS-2.**