The PLATO Data Centre

L. Gizon, H. Moradi, and the PDC Definition Phase Study Team

MPS

Max-Planck-Institut für Sonnensystemforschung

The PLATO Science Ground Segment

The PLATO Ground Segment, shown in Figure 1 on the right, covers the in-flight operations of the satellite, such that the mission objectives can be met. The PLATO Operations Ground Segment consists of the Ground Station Facilities and the Mission Operations Centre (MOC), which operates the spacecraft and creates the telemetry and flight dynamics products. The PLATO Science Ground Segment (SGS) is responsible for the end-to-end handling of the PLATO data and production of the PLATO scientific data products (DPs). The major systems within the SGS are: the ESA provided PLATO Science Operations Centre (SOC), and the PLATO Mission Consortium (PMC) provided SGS components, which are the PLATO Data Centre (PDC) and PLATO Science Preparation Management (PSPM).
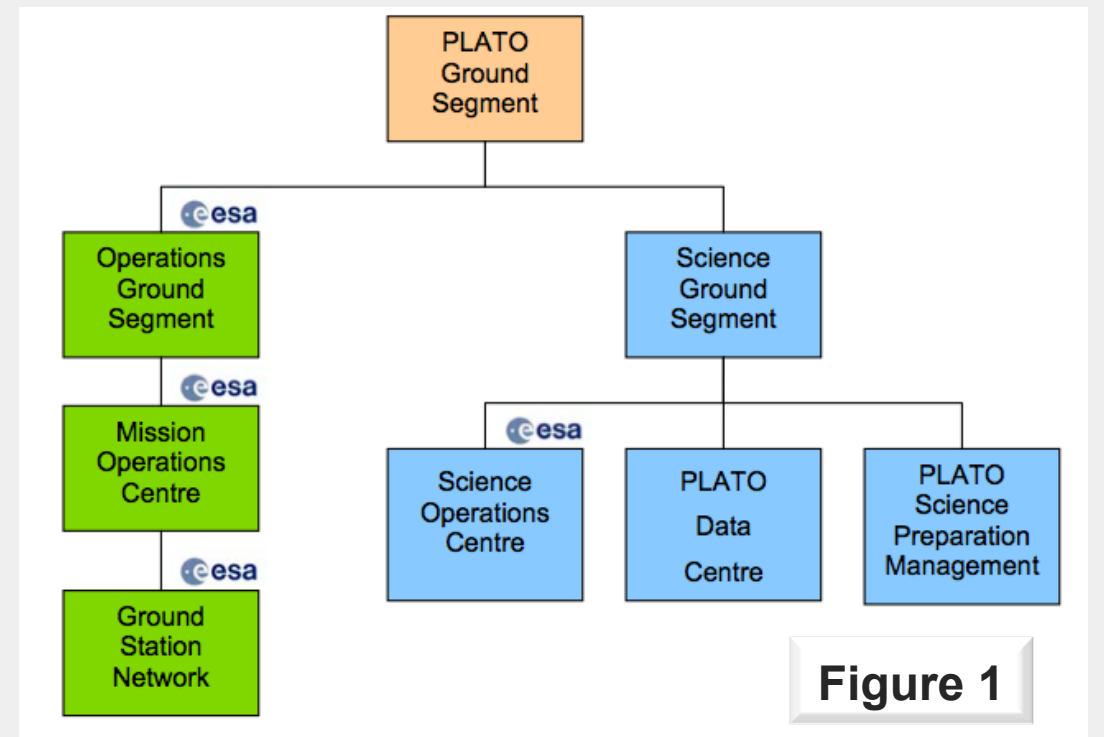

Figure 1

Organization of the Science Ground Segment

The definition phase objectives of the SGS are to establish the technical (PDC) and scientific (PSPM) requirements baseline for the SGS and to develop the operations concept, architecture and interfaces. The definition phase activities of the PDC and PSPM are organized according to the following guidelines:

- PSPM provides the scientific specifications of the software
- PDC translates the scientific specifications into technical specifications
- PDC implements technical specifications
- PSPM checks that the PDC software is consistent with the initial scientific specifications. This validation by PSPM occurs within the PDC – a normal part of the development QA process.

The PLATO Scientific Data Products

The scientific outputs of the PLATO mission are the key science data products DP1 through DP6, shown in the table below. These will be generated as outputs from various 'levels' of the processing chain.

Calibrated light curves and centroid curves	DP1	L1
Planetary transits and their parameters	DP2	L2
Asteroseismic mode parameters	DP3	L2
Stellar rotation and activity	DP4	L2
Stellar masses and ages	DP5	L2
Confirmed planetary systems and their characteristics	DP6	L2

PDC Documentation and Timeline

More information regarding the Definition Phase activities of the PDC can be found online:

http://www.mps.mpg.de/projects/seismo/PLATO/index.html

The PDC timeline for Definition Phase A is shown in the figure below:
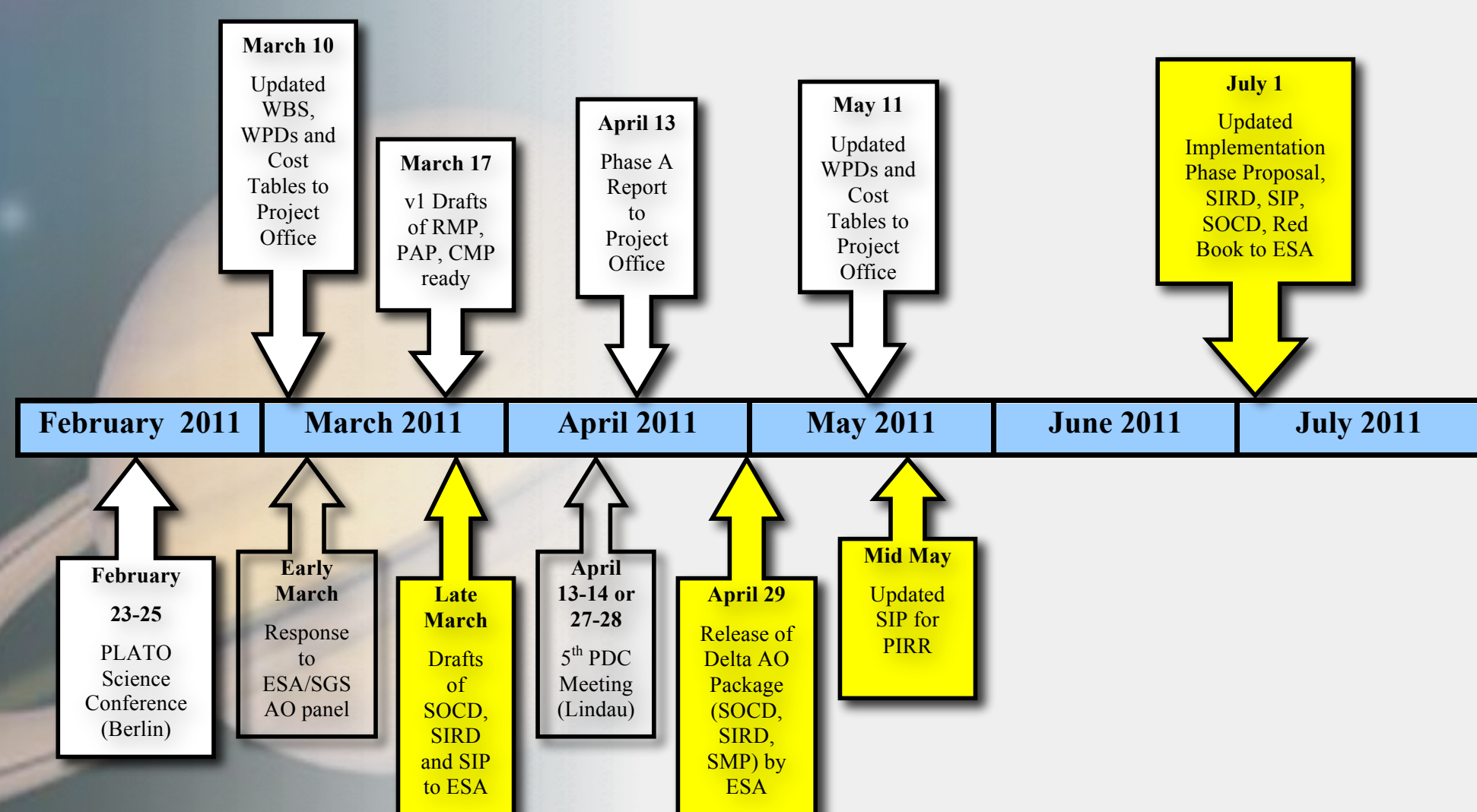
PLATO Data Centre Phase A Timeline

Figure 4

PLATO Data Centre – Structure & Objectives

As seen in the figure below, the PDC structure is divided into 8 top-level components/WPs, under the overall coordination of the PLATO Data Processing Manager (PDPM).
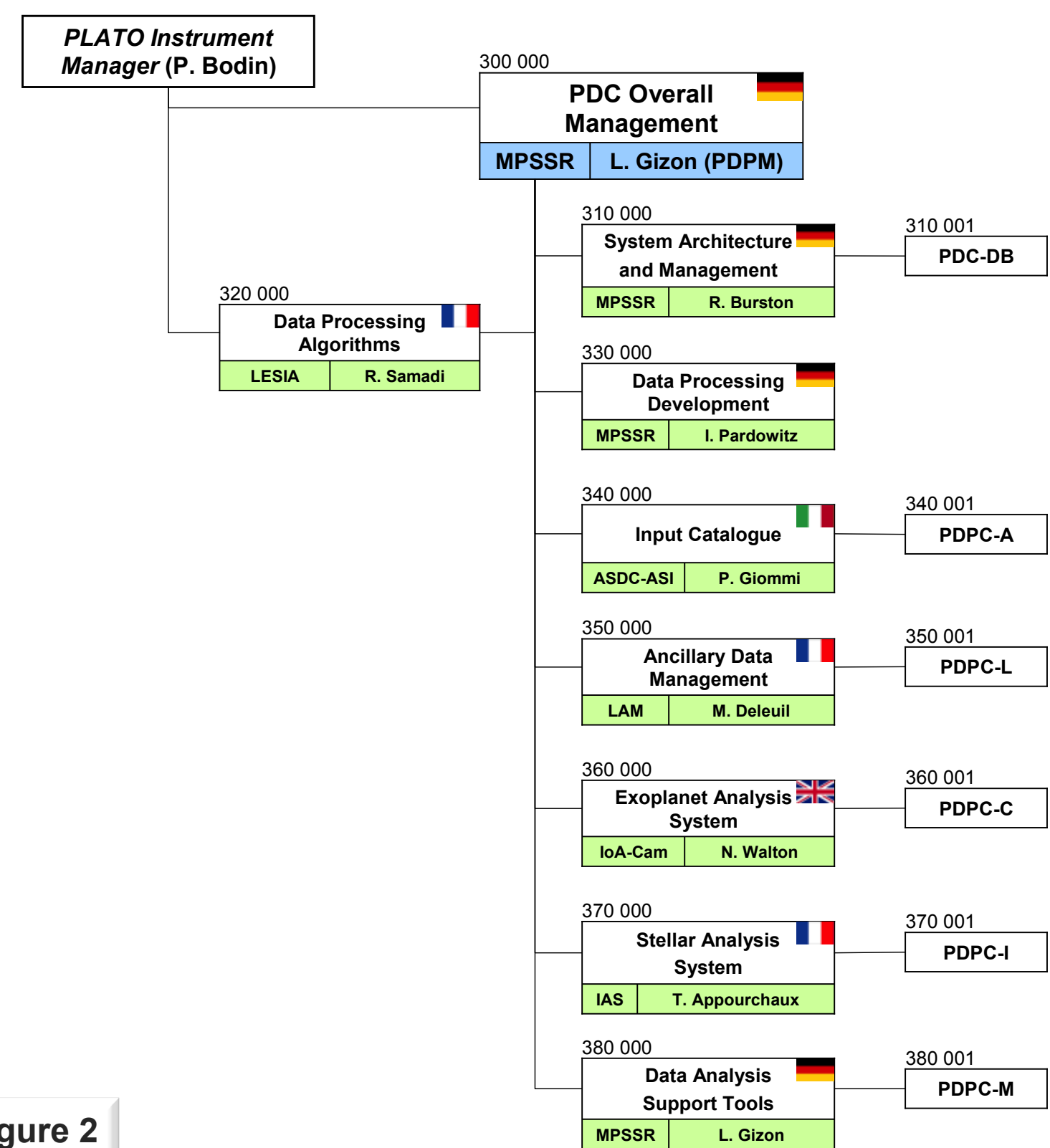

Figure 2

The PDC will be responsible for defining and developing all the software tools to be run at the SOC for the production of the L1 data products, as well as for the preparation of the monitoring runs. The PDC will also deliver to the SOC the necessary tools for the validation and optimization of the onboard processing.

As illustrated in the SGS data flow diagram below, the PDC will be responsible for the technical specifications and the implementation of the software tools to process the scientific L2 data products. The PDC will include a main data base (PDC-DB at MPSSR) that will comprise the PLATO data products, the input catalogue, and all the ancillary data on the PLATO targets that are required for the processing of the L2 data products, in particular, specifically acquired ground-based follow-up observations.
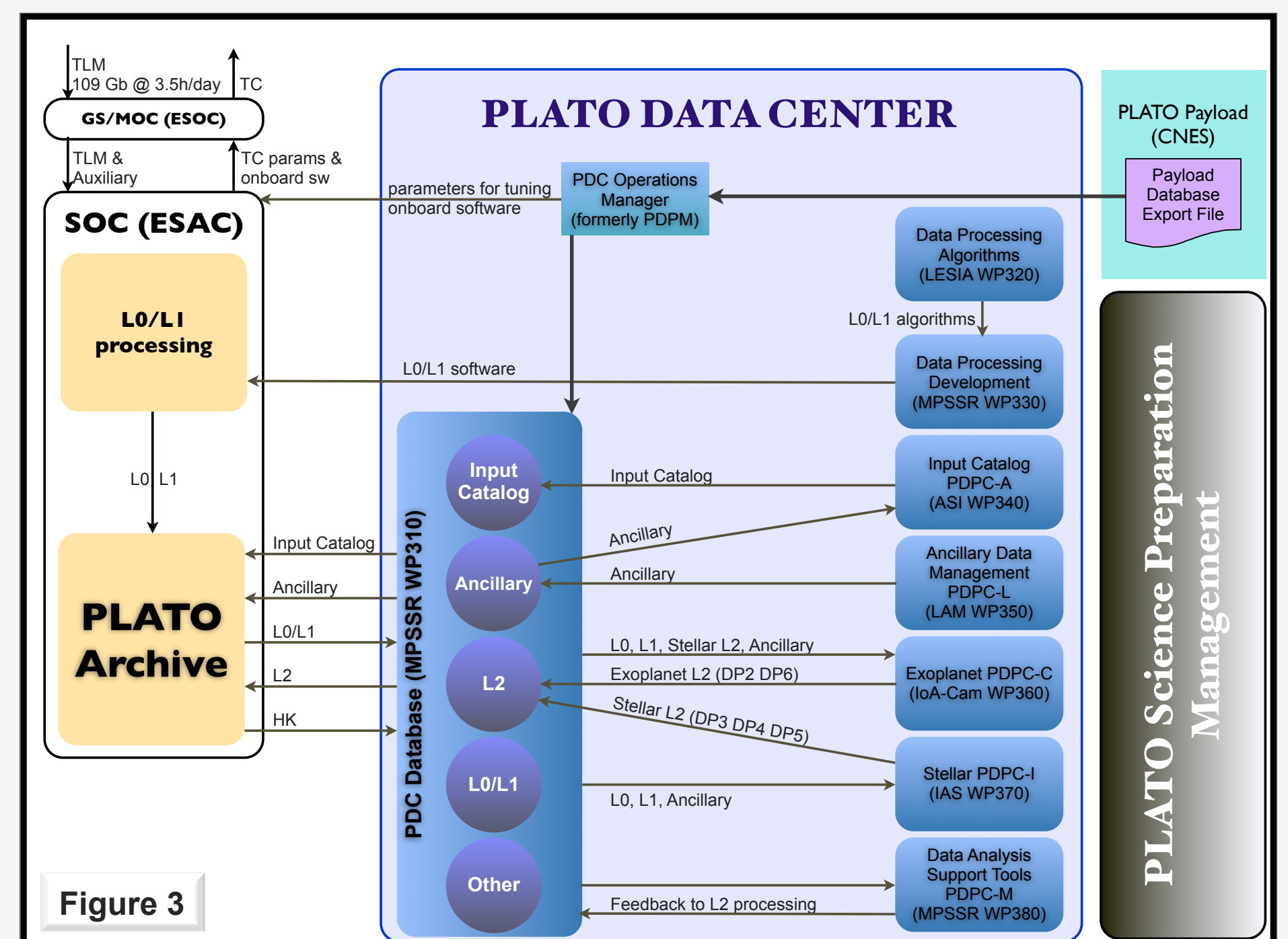

Figure 3

The PDC will also generate the validated PLATO input catalogue and manage the ancillary data. Computing resources will be distributed among five Data Processing Centers: PDPC-C at IoA-Cambridge for the exoplanet analysis system, PDPC-I at IAS for the stellar analysis system, PDPC-A at ASI for the Input Catalog, PDPC-L for the ancillary data management, PDPC-M at MPSSR for running of the data analysis support tools.