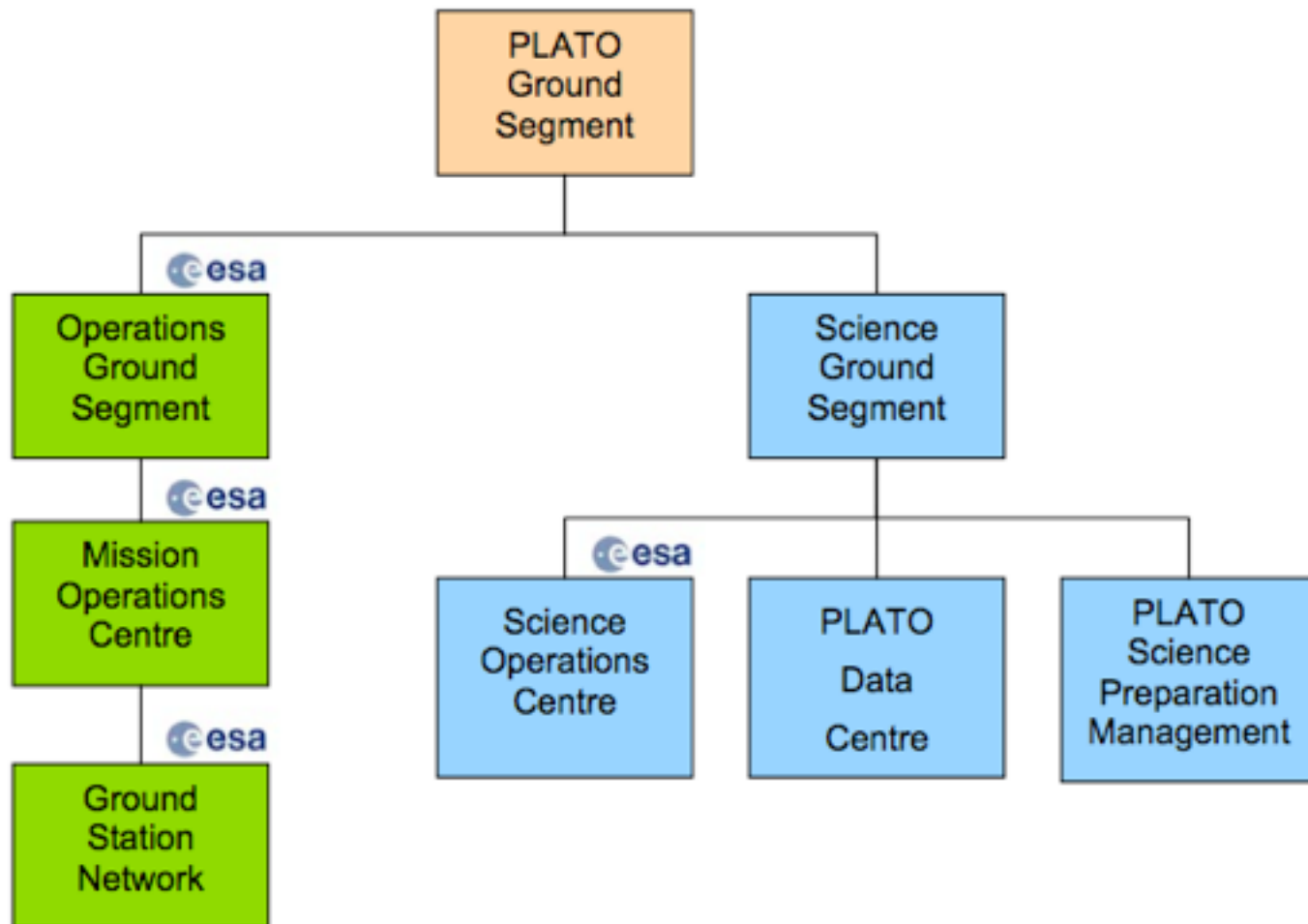# The PLATO Science Ground Segment

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PLATO Ground Segment

PLATO Data Products

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

Science Operations Center

- SOC generates validated light and centroid curves (Level 1)

PLATO Data Center (PDC)

- PDC delivers algorithms to the SOC, which are needed in order to produce and validate Level 1 data, as well as to validate and optimize the onboard software.

- PDC receives scientific specifications from the PSPM.

- PDC then produces the Level 2 science data products and delivers them to the SOC for both archiving and distribution to the user community.
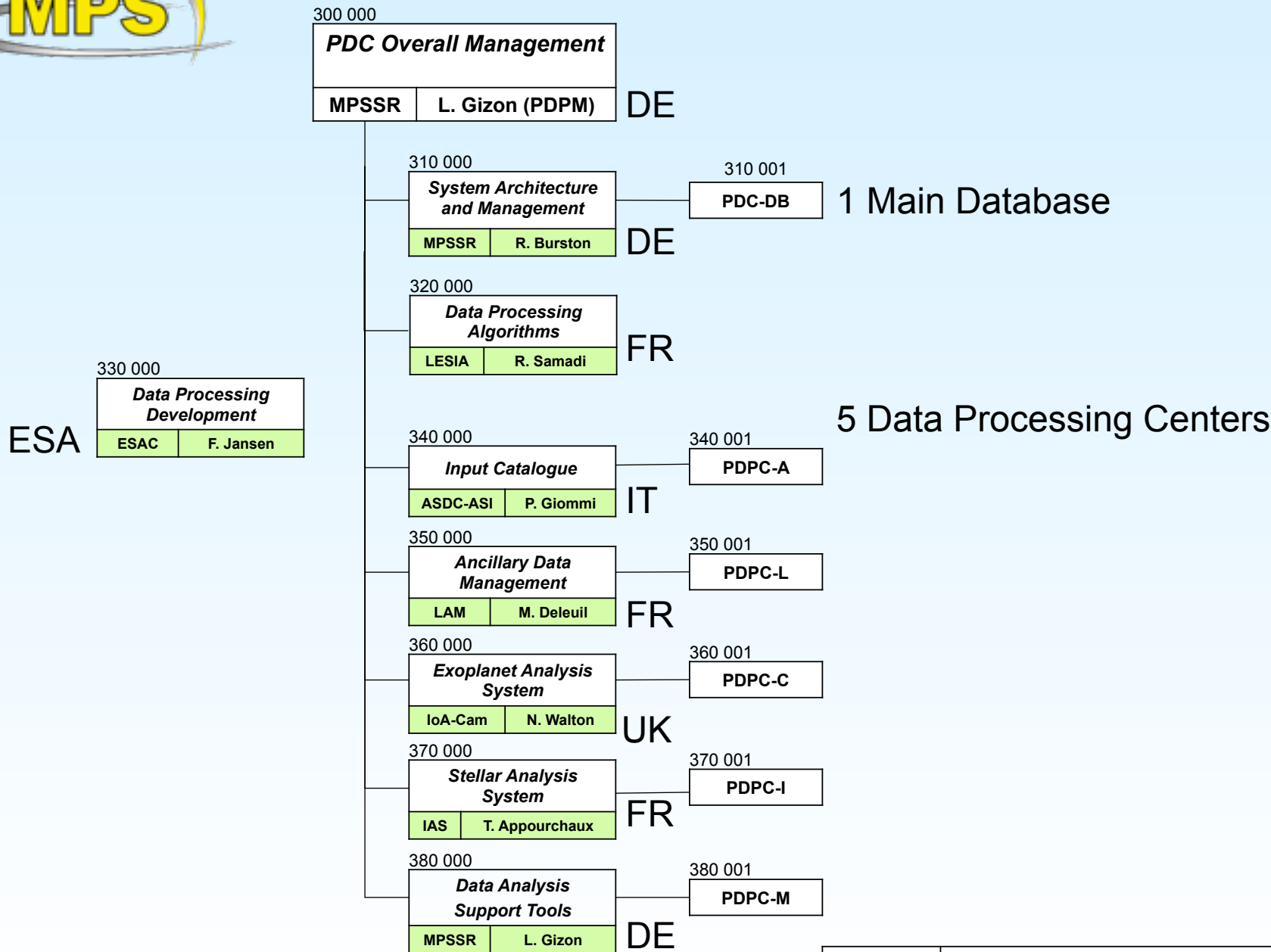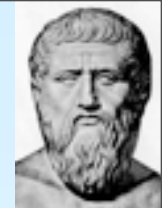
WP31 System architecture and Management (R Burston)

- System architecture, archives, central data base (PDC-DB), system management

- Data flow design and management, export system, network

- Simulation of data stream

WP32 Data processing algorithms (R Samadi)

- Validate onboard software:

  - Check onboard processing using ground copy of onboard software and the onboard software and the imagettes of ~1600 stars

  - Fine tuning of onboard software algorithm. For example choose number of parameters needed to describe PSF. Especially during configuration mode

- The ~1600 stars for which imagettes are available receive a more sophisticated treatment.

- Instrumental corrections to manufacture L1

WP32 Data processing algorithms (R Samadi)

- Correction for jitter for each telescope; PSF, stellar catalog, and distortion matrix.

- Integration time correction, sampling time correction

- Statistical analysis over the 40 telescopes to identify cosmic ray hits, hot pixels, and possibly deficient cosmic ray hits, hot pixels, and possibly deficient telescopes

- Average (weighted) light & centroid curves over all telescopes.

- Compute error based on scatter

- The ~1600 stars for which imagettes are available receive a more sophisticated treatment. PSF fits to improve photometry (contamination from neighboring sources taken into account). Imagettes are downloaded for all stars for which a serious planetary candidate has been identified.

WP33 Data Processing Development (F Jansen)

- Main activities: Write and implement core-processing software that will run at the SOC

- Requires a good understanding of system interfaces with SOC and operational procedures

WP34 Input Catalog (P Giommi)

- Main activities: Implementation of the PLATO input catalogue, under Italian responsibility

- This activity is related to the Target/Field Characterization WP in the PSPM segment of the PMC

- WP34 delivers the validated PIC to the PDC-DB

WP35 Ancillary Data Management (M Deleuil)

- Essential information for the success of the mission: input catalogue, follow-up observations, etc.

- Support for on-board processing, on-ground calibration, and scientific data analysis

Observations include:

- Stellar properties: effective temperature, absolute luminosity, radius [Gaia], chemical abundances, v sin i, activity, properties specific to multiple stars.

- Follow-up observations to confirm planets (at several wavelengths when possible)

- Other relevant complementary observations: hires spectra, astrometry, imaging, spectro-polarimetry, etc..

- The ancillary data are in support of the processing activities and are accessed by the PDC via the main data base (PDC-DB).

WP36 Exoplanet Analysis System (N Walton)

- **Transit candidates and their parameters (DP2)**

  - List of transit candidates

  - List includes candidates from centroid curves (astrometry)

  - Ranking of candidates according to planetary likelihood

  - Basic characteristics of the transits (depth, duration, period, and ephemerids).

- **Planetary systems and their characteristics (DP6)**

  - The most important PLATO deliverable

  - Ranked list of confirmed planets, using follow-up observations

  - Potentially several hundreds of planetary systems for which the seismology of the central stars is possible.

  - Determination of the planet parameters: orbital parameters, planet size, mass, density (average composition), age (from central stars)

  - Any additional characterization of planet properties from follow-up observations and light curves analysis, e.g. planetary atmospheres etc.

WP37 Stellar Analysis System (T Appourchaux)

- **Asteroseismic mode parameters (DP3)**

  - For most stars

  - Frequencies, amplitudes, lifetimes of modes of oscillation.

  - From fits to spectra of stellar oscillations.

- **Stellar rotation and stellar activity (DP4)**

  - Rotation periods from activity-induced periodicities.

  - Whenever possible, characterization of stellar activity: activity level from low-frequency power spectrum, star spot models.

- **Stellar masses and ages (DP5)**

  - For cool stars with magnitude less than 11.

  - Stellar parameters are obtained from stellar model fits to the frequencies of oscillation.

WP38 Data Analysis Support Tools (L Gizon)

- PDC documentation management

- Tools to support the analysis of individual light curves and to provide feedback to L2 processing pipelines (exoplanet and stellar)

- PDPC-M is the place where consortium scientists inspect light curves, assess DP validity and update ranking of planet candidates

- Search tools and VO activities

- Internal PDC web site. In particular: PDC web site makes FU info accessible to FU observers

Thank you!