The implementation of PLATO within the ESA Science programme

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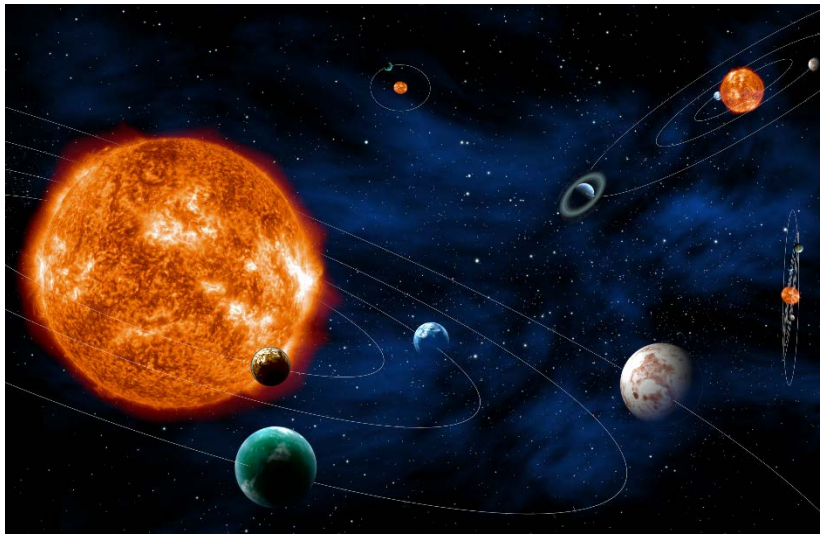
PLATO: M3 mission in ESA's Science programme

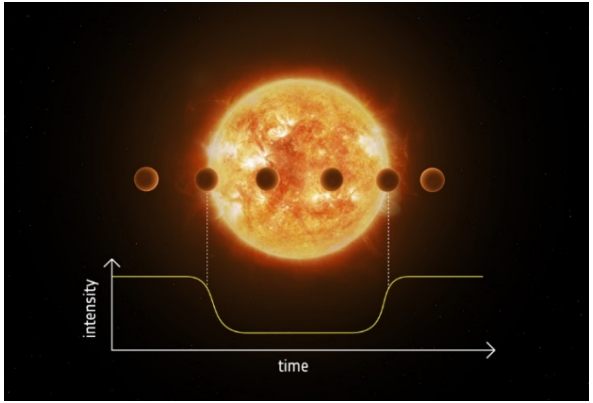
PLATO is a mission to detect and characterise exoplanets and study their host stars

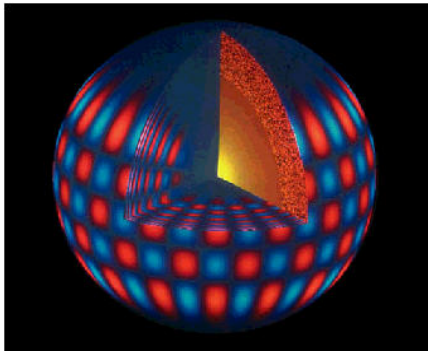
- Determination of bulk properties (mass, radius, mean density) of exoplanets, including terrestrial planets in the habitable zone of solar-like stars
- Planet evolution with age
- Internal structure of stars
- Architecture, formation and evolution of planetary systems
- Identification of good targets for spectroscopic follow-up of planet atmospheres

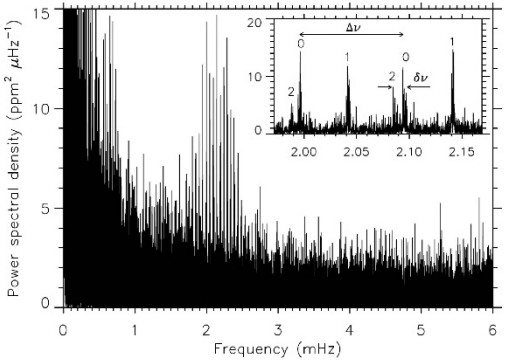


PLATO techniques

1. Transit method
   - Planet radius (~3% accuracy)
2. Asteroseismology analysis
   - Stellar radius, mass, and age
   - Planet age (~10% accuracy)
3. Radial velocity observations with ground-based telescopes
   - Planet mass (~10% accuracy)





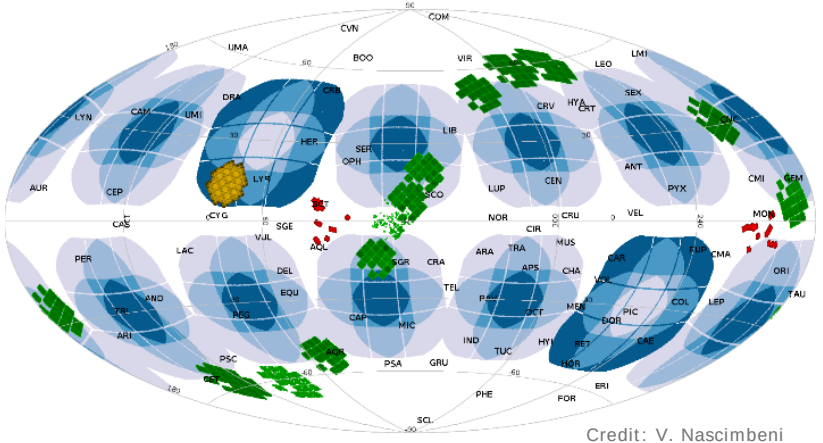


Accuracies required for an Earth like planet orbiting a G0V star of V=10

Observing strategy

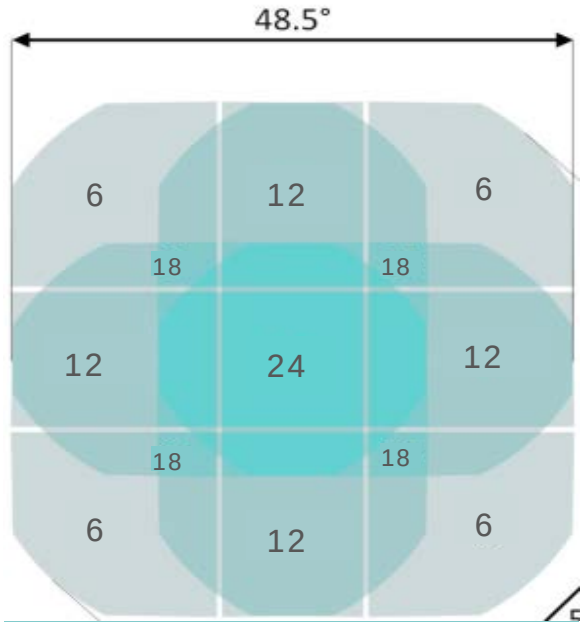
- Long uninterrupted photometric monitoring of bright stars in the visible band
  - Core sample: ~15,000 sun-like stars of $m_V < 11$
    to be complemented with radial velocity ground-based observations
  - Statistical sample: >245,000 stars of m_V <13(16)

- Mission nominal science operations: 4 years
  - ➢ Baseline strategy:
    2 long pointings, duration 2 years each
    (will be fixed two years before launch)
  - ➢ Satellite/instrument designed to last with full performance for 6.5 years
  - ➢ Consumables will last 8 years



Credit: V. Nascimbeni

PLATO satellite



Multi-telescope approach

- Large FOV (large number of bright stars)
- Large total collecting area (high sensitivity)
- Redundancy

Payload characteristics

- 24 «normal» cameras, cadence 25 sec
- 2 «fast» cameras, cadence 2.5 sec,
  2 colours
- Dynamical range: $4 \leq m_V \leq 11$ (16)
- Focal plane: 104 CCDs (4 CCDs per camera) with 4510 x 4510 18 µm pixels
- Instantaneous field of view ~ 2250 deg^2

Launch in 2026 into orbit around L2 Earth-Sun Lagrangian point

PLATO status

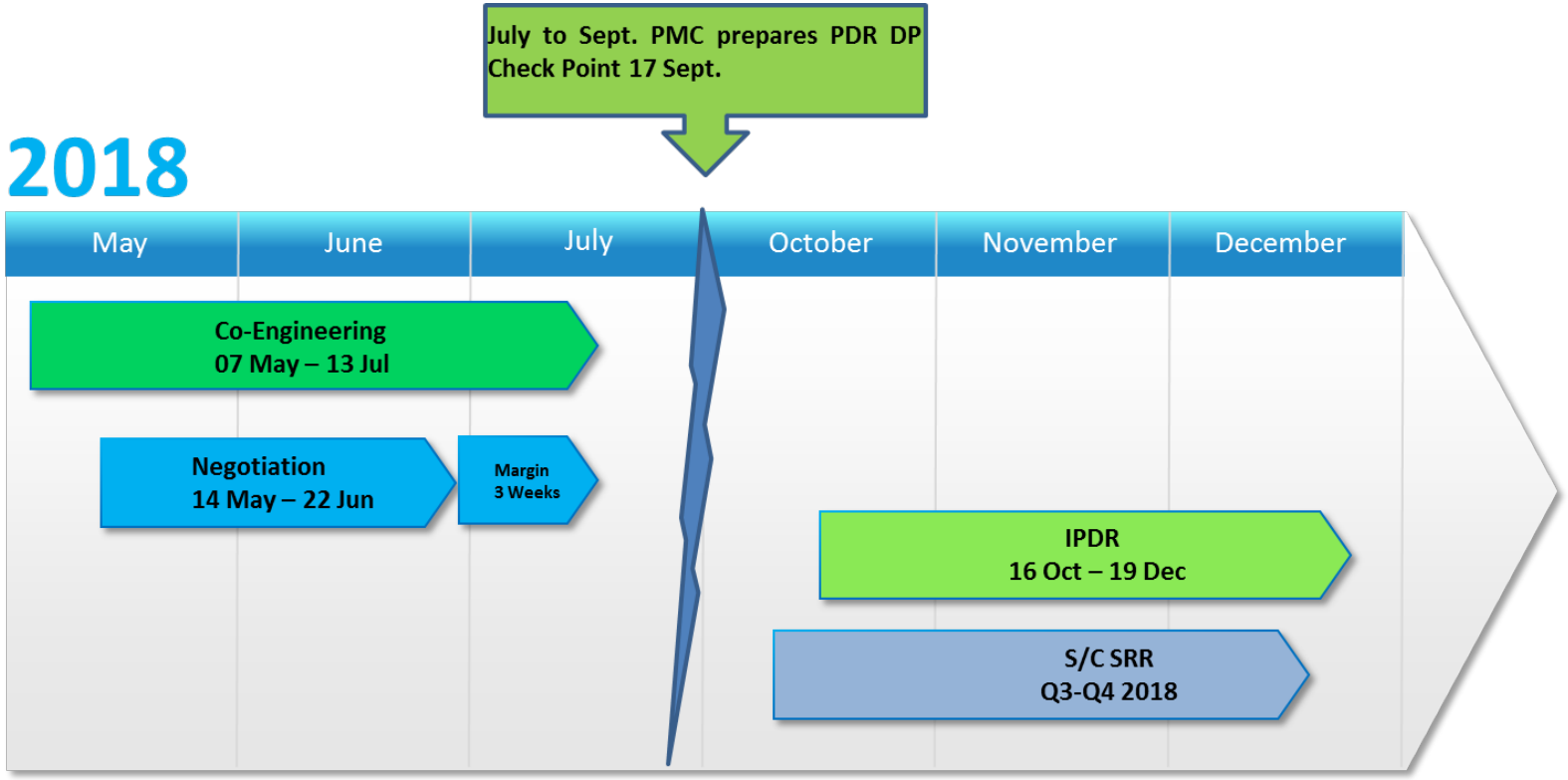
2017:

- Definition phase (B1) completed
- Update of Science Management Plan
- Mission adoption by SPC
- PLATO Mission Science Conference (U. Warwick)
- Invitation to Tender for the development of the PLATO satellite
- Two industrial proposals

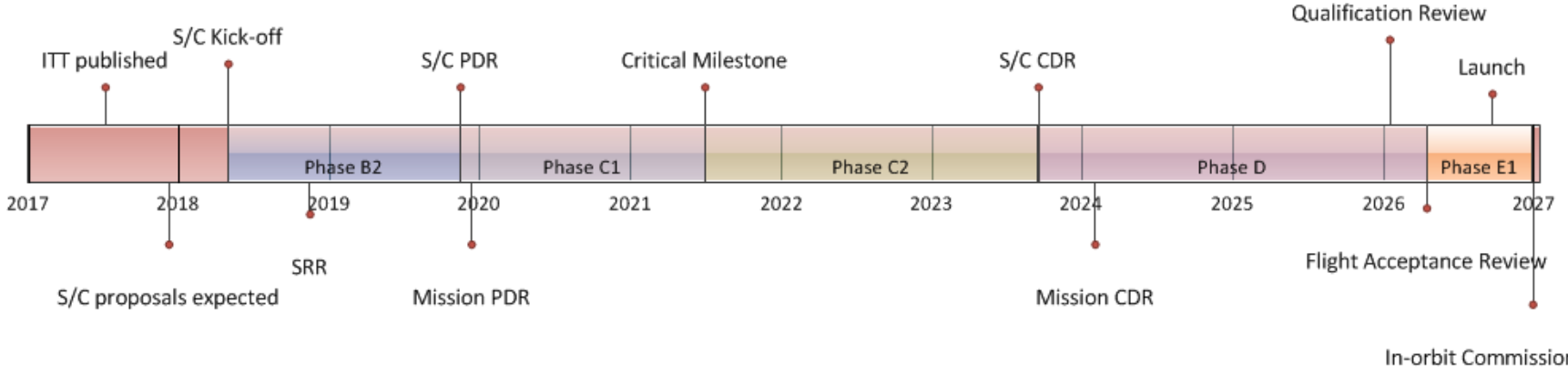
2018:

- ESA evaluation of industrial proposals
- Industrial Policy Committee approved recommendation to select OHB System AG for negotiation as industrial prime, with a core team comprising Thales Alenia Space (France and UK) and RUAG Space Switzerland.

Current and next main events



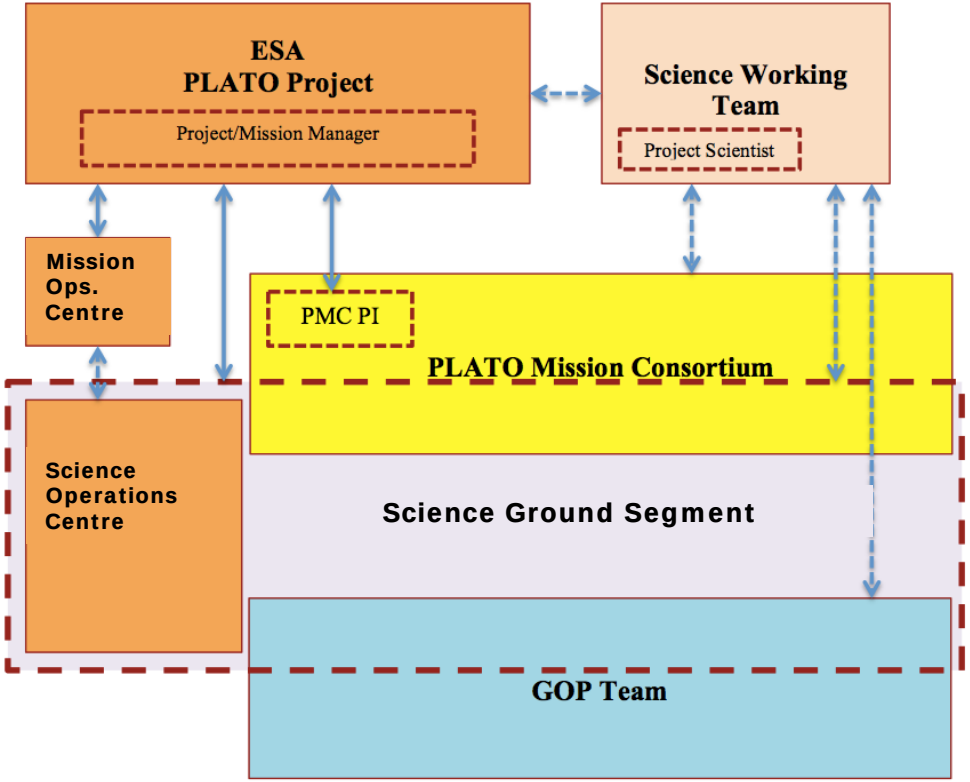
Long term plan



"Critical Milestone review" in Q2 2021 to confirm:

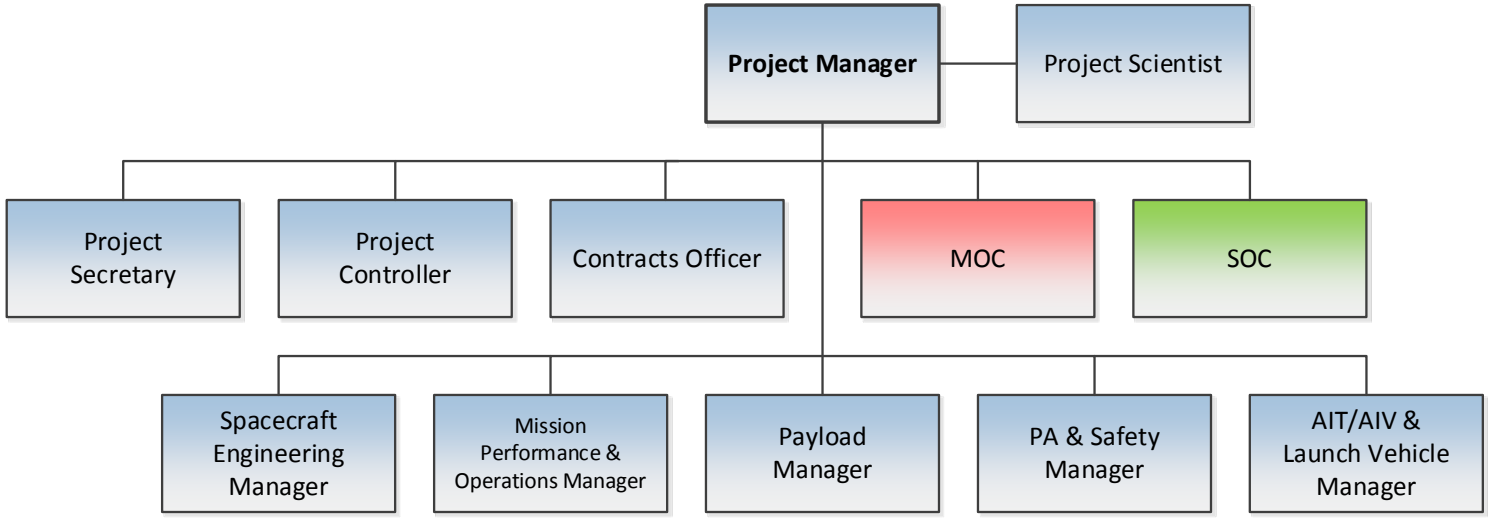
- Acceptable results from testing of flight-like camera and E-boxes
- Solid production schedule for all 26 FM cameras
- Interfaces between S/C and Payload final and agreed
- S/C development progress and schedule is robust

PLATO high-level organisation

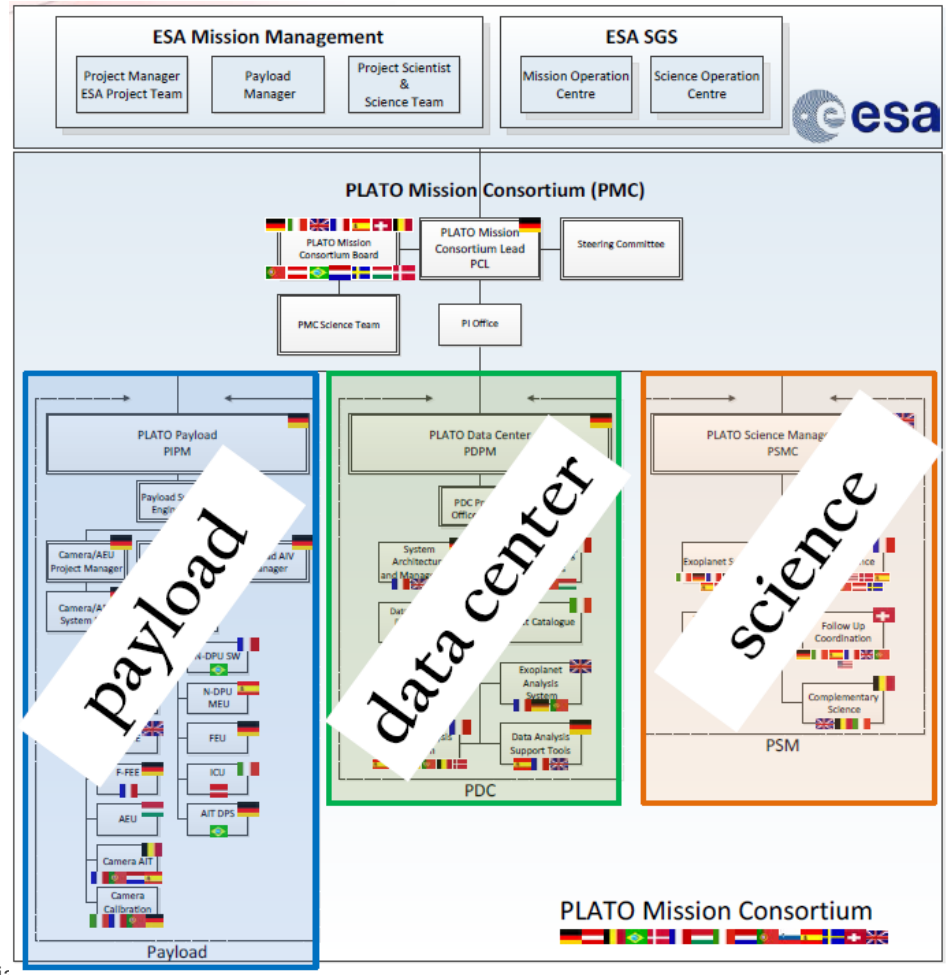


ESA Project Team

Project Manager: Filippo Marliani



Plus ~ 30 specialists from the support Directorate (at different % of involvement)



Credit: H. Rauer

Science Working Team

- The PLATO Science Working Team (SWT) was appointed just after adoption in summer 2017 – Chaired by the Project Scientist
- The SWT:
    - Advises ESA on all aspects of the mission potentially affecting its scientific performance
    - Assists the Project Scientist in maximising the overall scientific return of the mission within the established boundary conditions
    - Acts as a focus for the interests of the scientific community in PLATO
    - Reviews and endorse top-level requirements (in all areas of the project) that impact science return (e.g. Science Requirements Document)

SWT composition and meetings

- Composition:
  - The PMC PI and up to nine members from the PMC, covering main areas relevant for the scientific objectives of the mission
  - Two “Community scientists”: AO was issued in April with deadline in May
  - A “Ground-based observations Scientist”, selected through an ESA AO
  - Two experts associated with main facilities for ground-based observations
  - Up to two Ground-based Observations Programme Team representatives
- Normally three meetings in person per year, plus videoconferences when needed

SWT members

- The initial composition is the same as for the PLATO-SAT:

  Heike Rauer (DLR, DE)
  Conny Aerts (KUL, BE)
  Magali Deleuil (LAM, FR)
  Laurent Gizon (MPS, DE)
  Marie-Jo Goupil (Obs. Paris, FR)
  J. Miguel Mas-Hesse (CAB, ES)
  Giampaolo Piotto (U. Padova, IT)
  Don Pollacco (U. Warwick, UK)
  Roberto Ragazzoni (INAF, IT)
  Stéphane Udry (U. Genève, CH)

Ground Segment

- MOC, SOC and PMC met at ESAC on 12 March for the kick-off of the Ground Segment
- Consolidation of the high-level requirement documents on-going
- Three new members at the SOC (part time)
- PMC working towards the L2/L3 Requirement Review in Q3 2019

Steering Committee

- Representatives from the Funding Agencies and ESA
- Purpose is to oversee the obligations concerning the payload and operations contributions of all parties to the multi-lateral agreement
- German and Belgian representatives are, respectively, the chairman and vice-chairman

Artist's impression
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