From PIC to SOC to POC to MOC

The fate of PIC up to the spacecraft

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(on behalf of the SOC Team)
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Fate of the Plato Input Catalogue (PIC)

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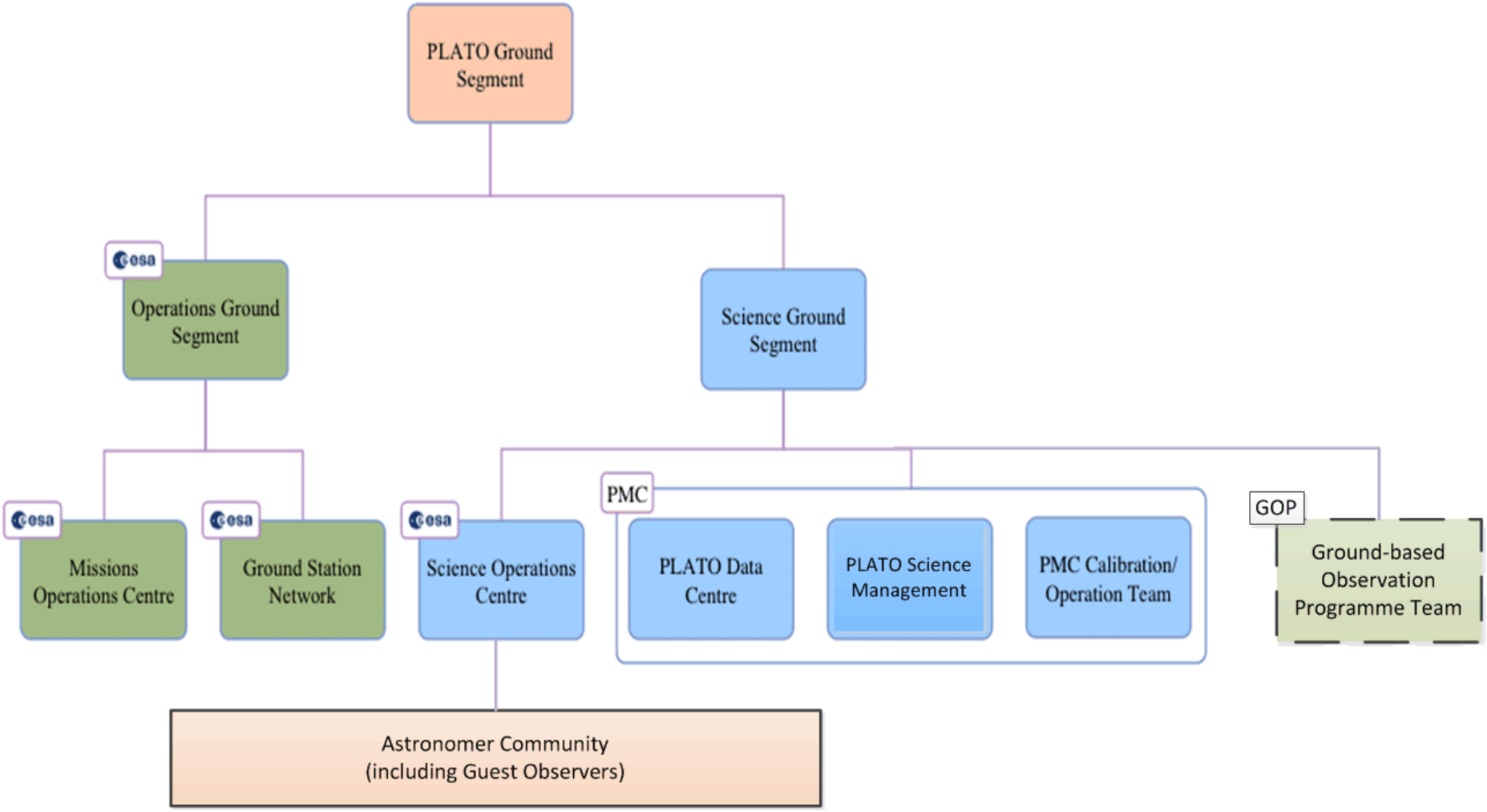
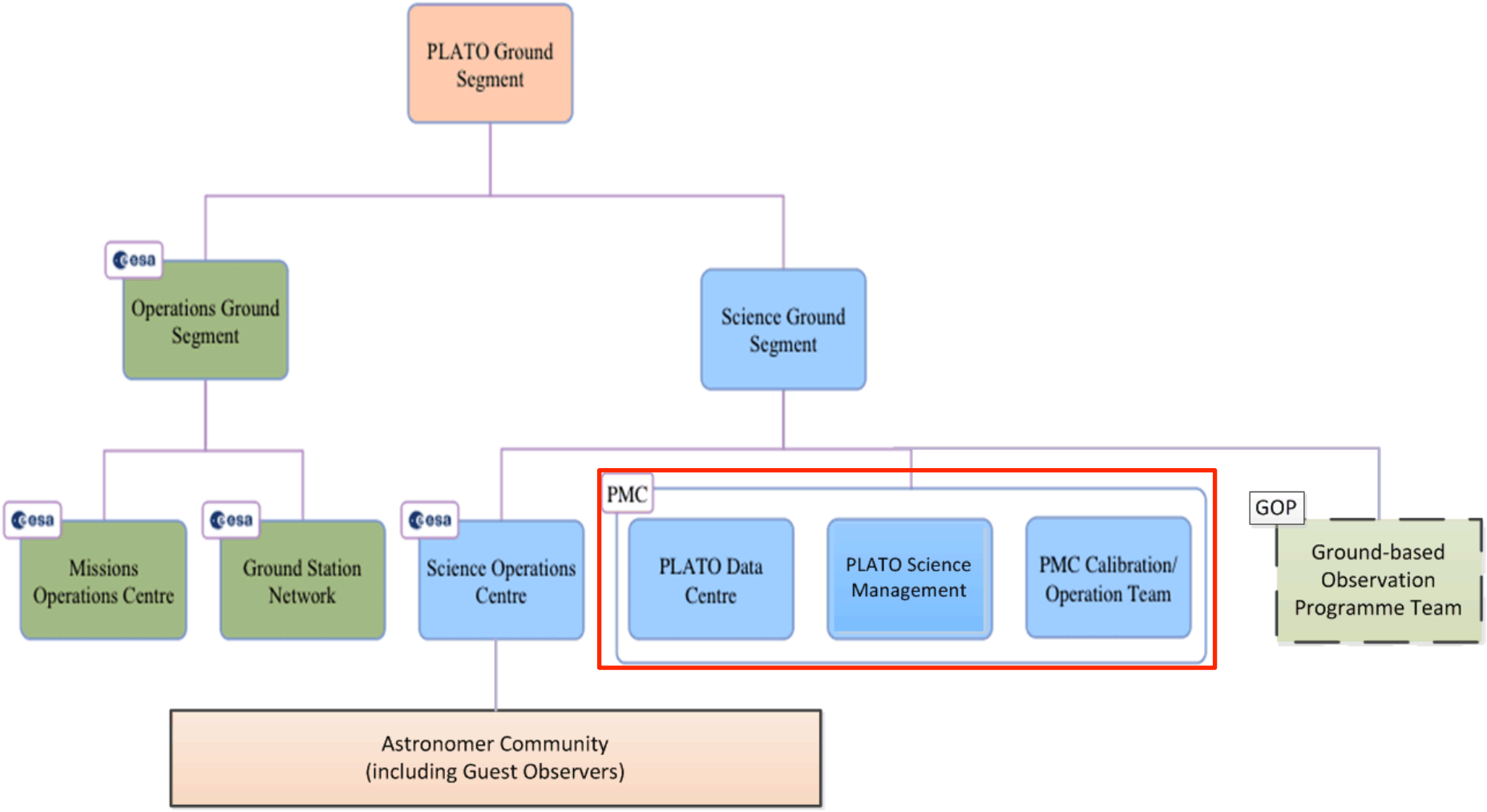
1 – Responsibilities

PLATO Ground Segment



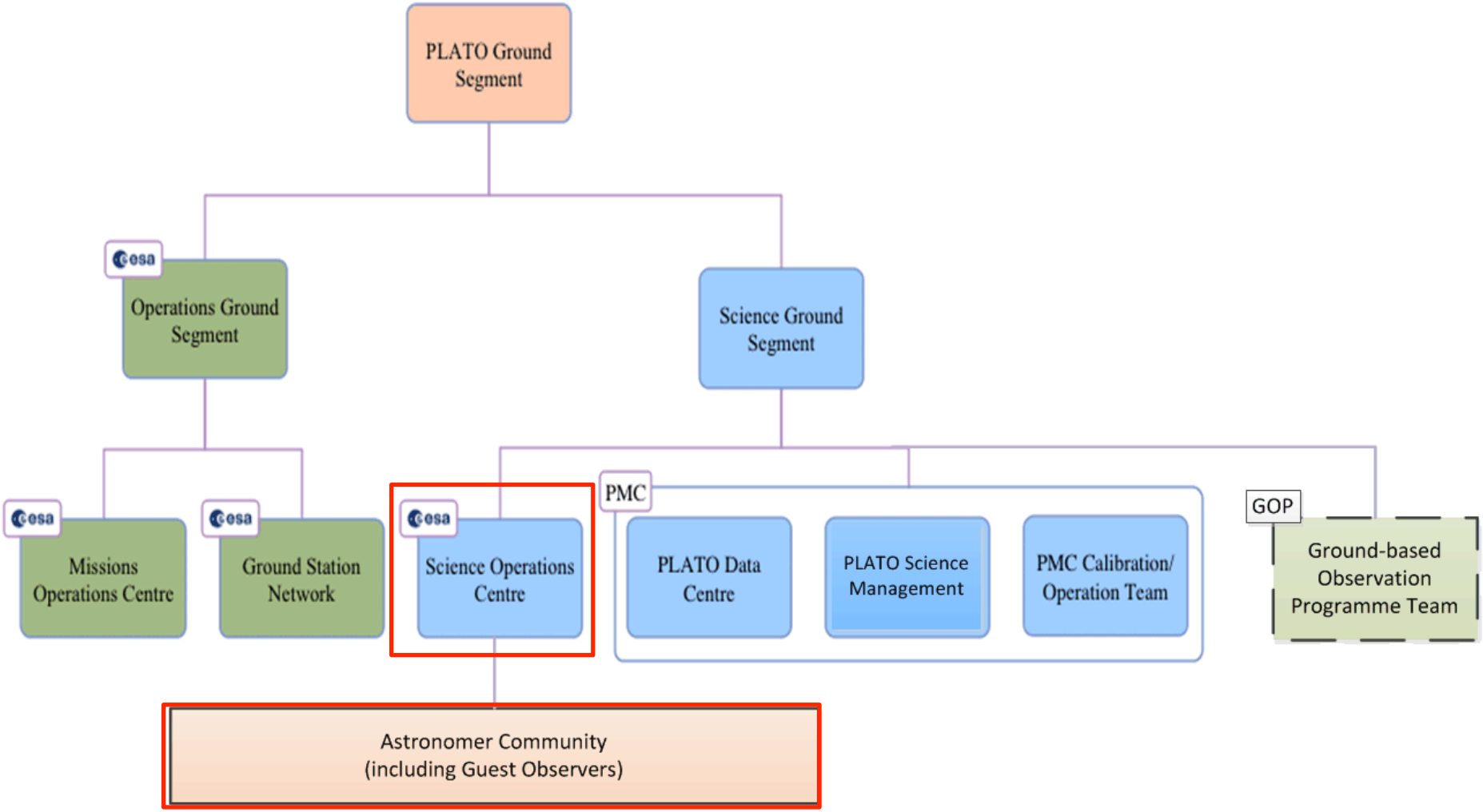
PLATO Ground Segment - PMC



PLATO PMC – responsibilities

- Plato Mission Consortium: PMC
  - Provision and maintenance of inputs for the PIC (target identification and selection) following guidelines provided by the Plato SWT.
  - ➢ PMC Data Center: PDC
    - Generation of a validated PIC and transference to the SOC for the scientific mission planning
  - ➢ PMC Science Management: PSM
    - Review and scientific validation of the PIC, checking and confirming that the target selection follows the PSWT criteria
  - ➢ PMC Calibration / Operation Team: PCOT
    - Provision of calibration updates to the PIC

PLATO Ground Segment - SOC



PLATO SOC – responsibilities

- Science Operations Centre: SOC
  - Proposal Handling
  - Science Planning
  - Interfaces to PDC & MOC
  - Development of Level 0 Data Processing Pipelines
  - Integration of Level 1 & 2 Data Processing Pipelines
  - Execution of Data Processing Pipelines
  - Quick Look and Quality Control Pipeline Execution

PLATO SOC – key activities - 1

- **Support Call for Proposals -** Co-ordinate a call for proposals 9 months before launch for Guest Observers (incl. support from PMC) with further calls after launch as defined by the SWT. The major software tools needed for the call + support for the call to be provided by PMC. Note: The selected targets (including ToOs) shall be added to the PIC by the SOC.

(1) Proposal Handling

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(1) Proposal Handling

- **Integration & execution of Science Planning System** at SOC. The input from the PDC shall be a validated PIC to be run by the SPS, which will export a PLATO On-Board Catalogue (POC) in a format compatible with what is expected by the MOC.

(2) Science planning

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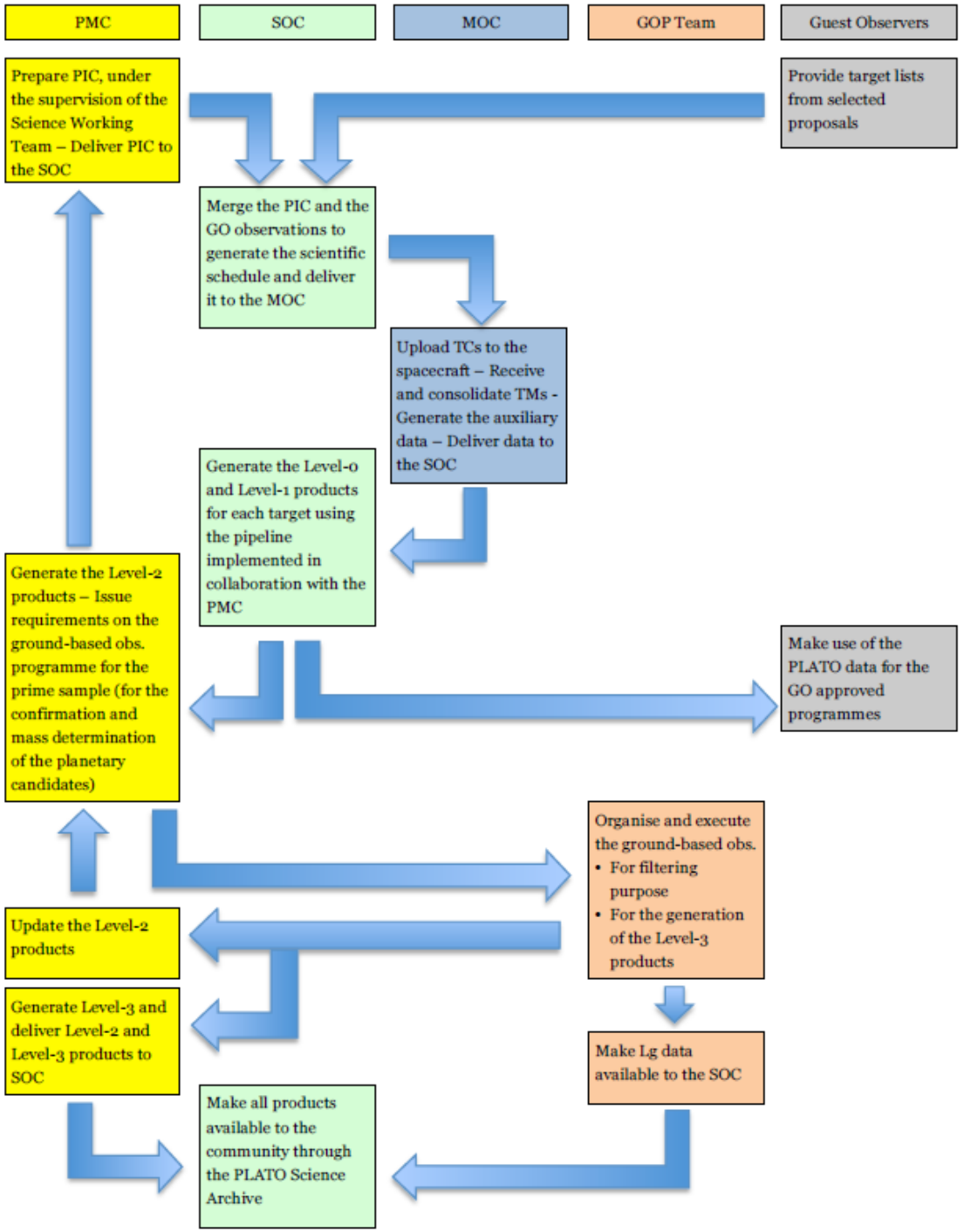
(2) Science planning

- **PDC-SOC-MOC Interface & community interface** - The SOC shall be the prime interface between the MOC & the PDC : This includes acquisition and distribution of S/C TM from MOC as well as acting as interface between the PDC and the MOC for payload operations and for all files and procedures required for optimizing the quality of the data and safeguarding of the payload.

(3) Interfaces to PDC & MOC

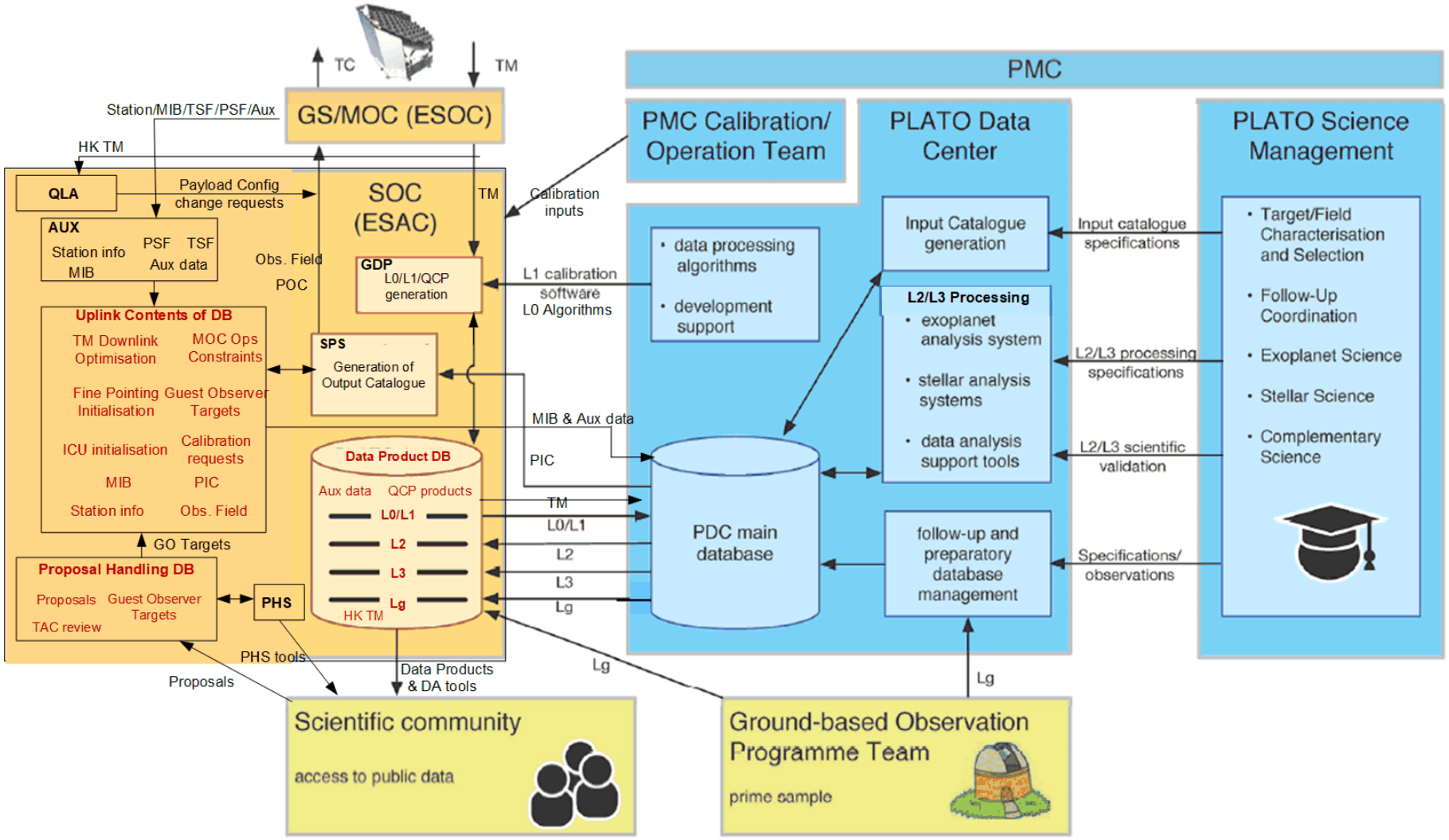
2 – Operations Concept

Flow diagram of PLATO operations, ground-based observations and data generation



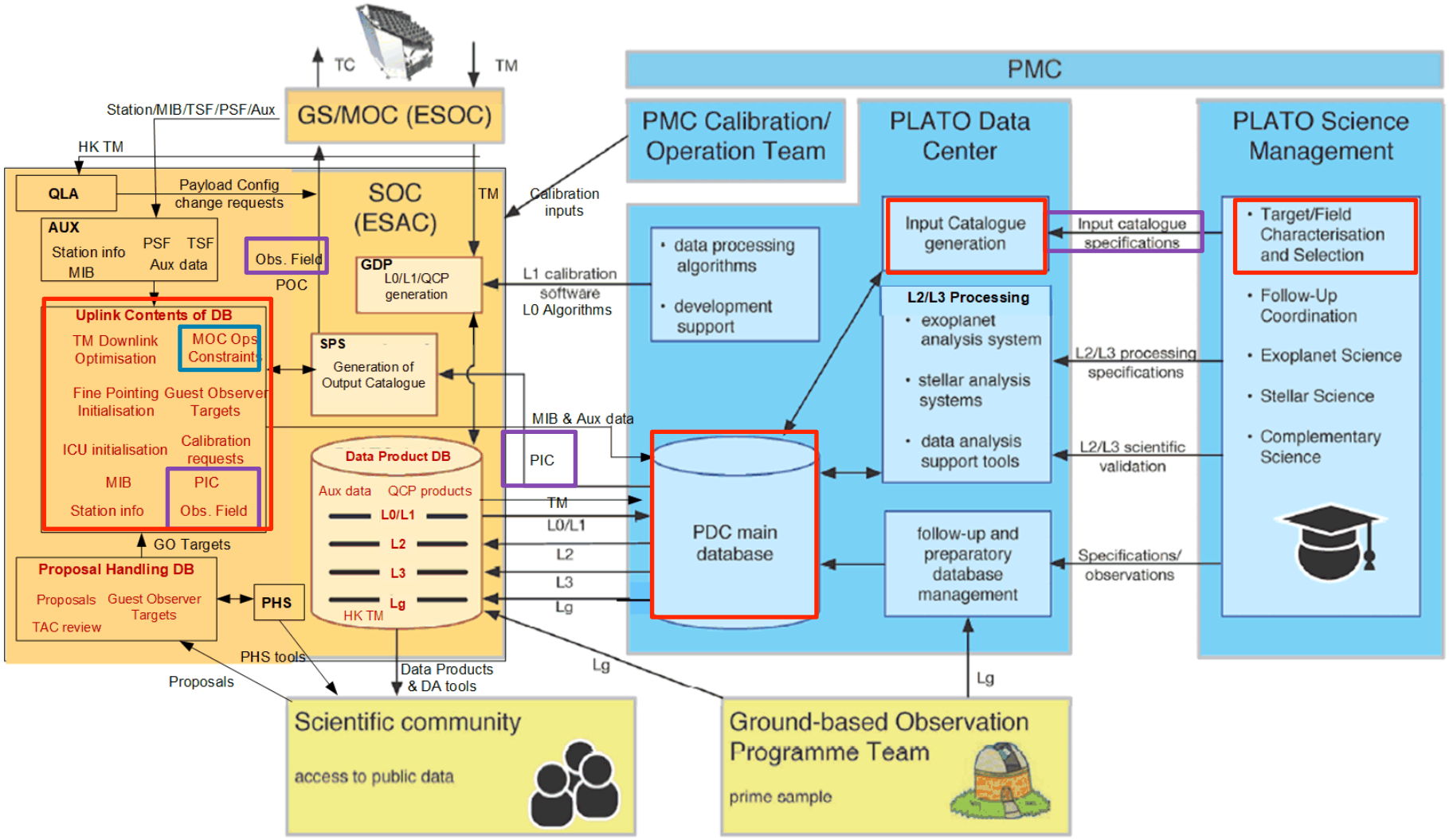
3 – Uplink Interactions (including PIC)

PLATO SGS Operations Concept
Uplink/Downlink Interactions - High level overview

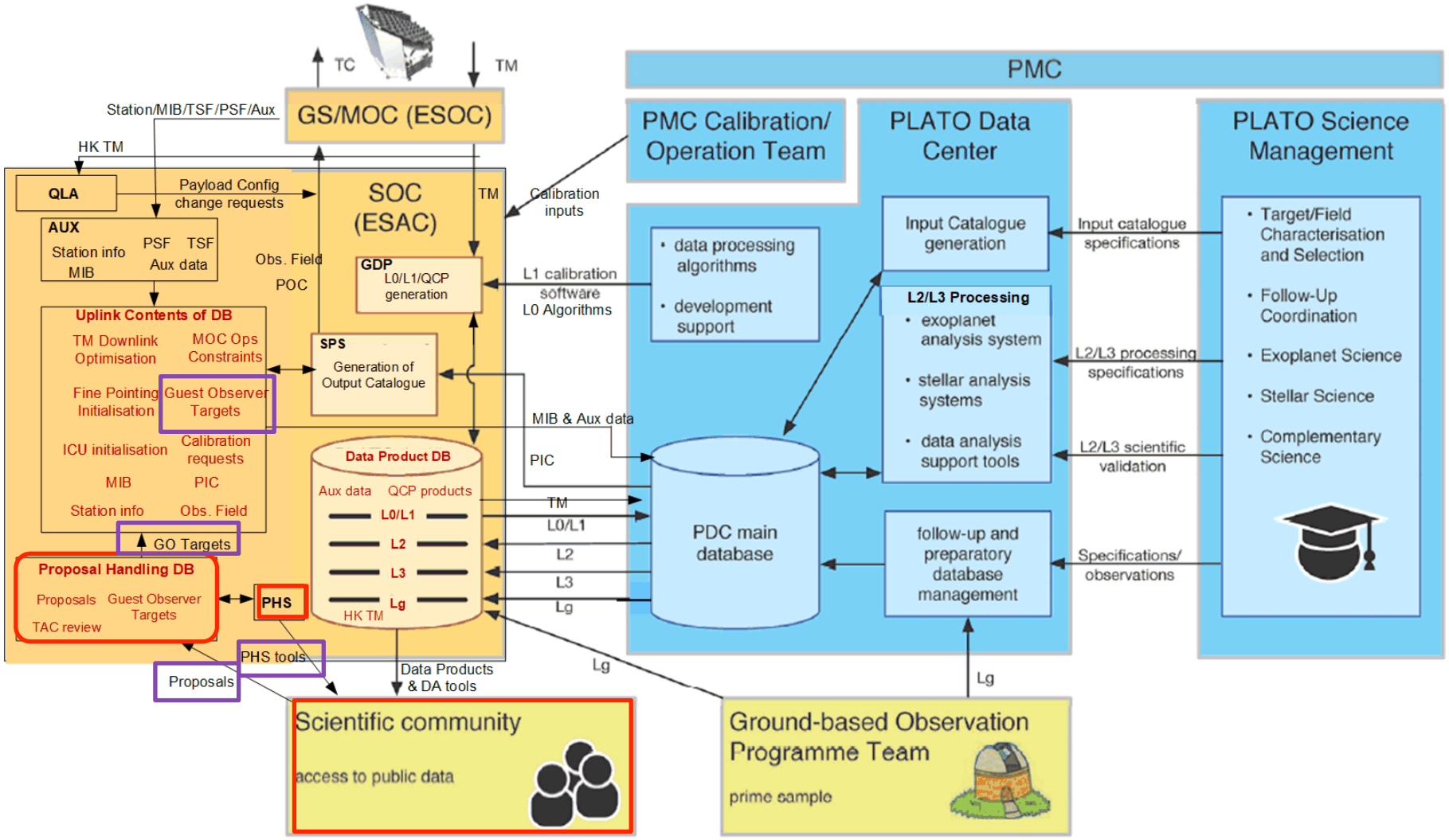


PLATO SGS Uplink interactions

PIC & Obs field & ops constraints inputs (2018 to L-1 year)

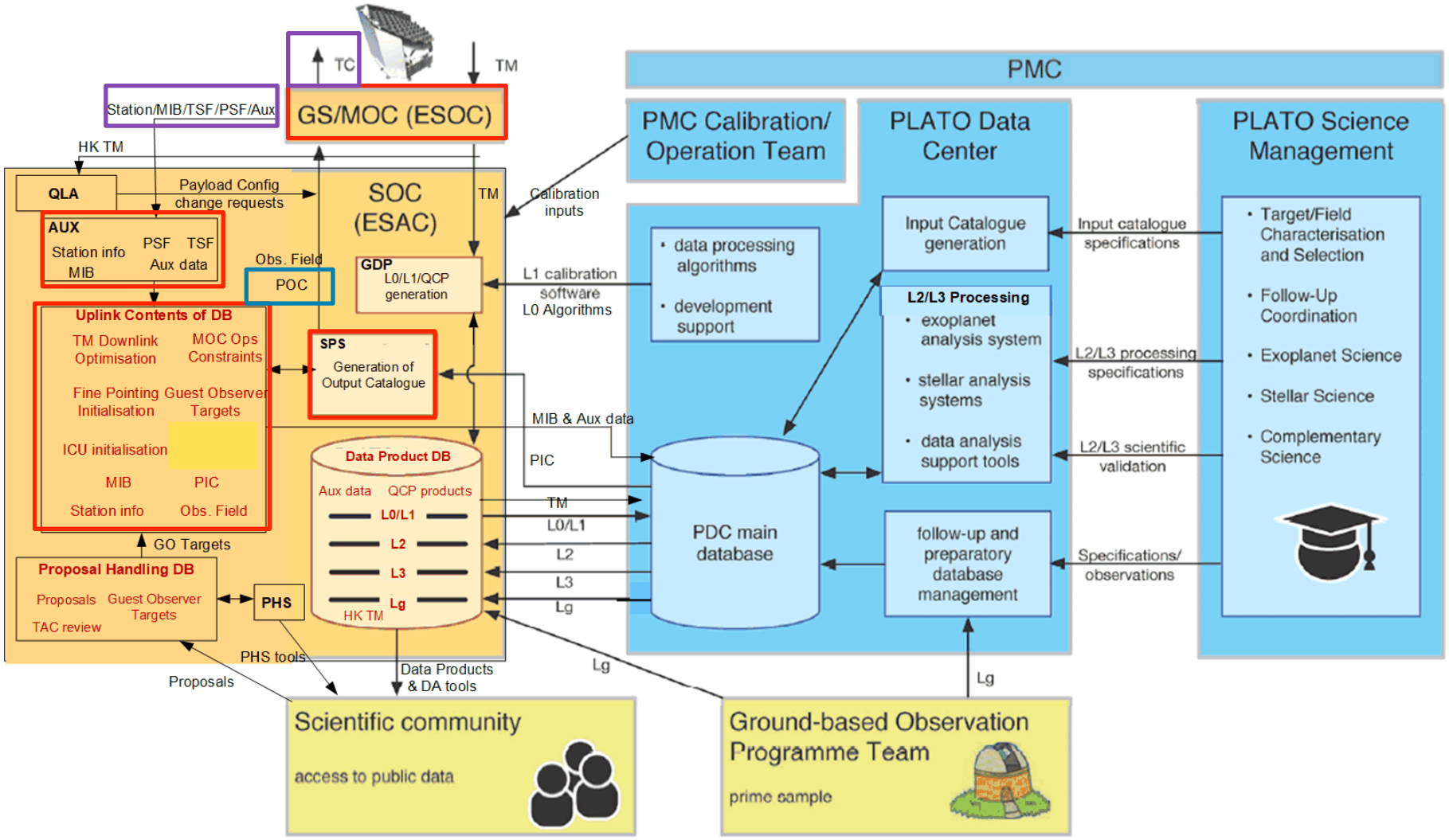


PLATO SGS Uplink interactions
Call for proposals – L – 9 months



PLATO SGS Uplink interactions

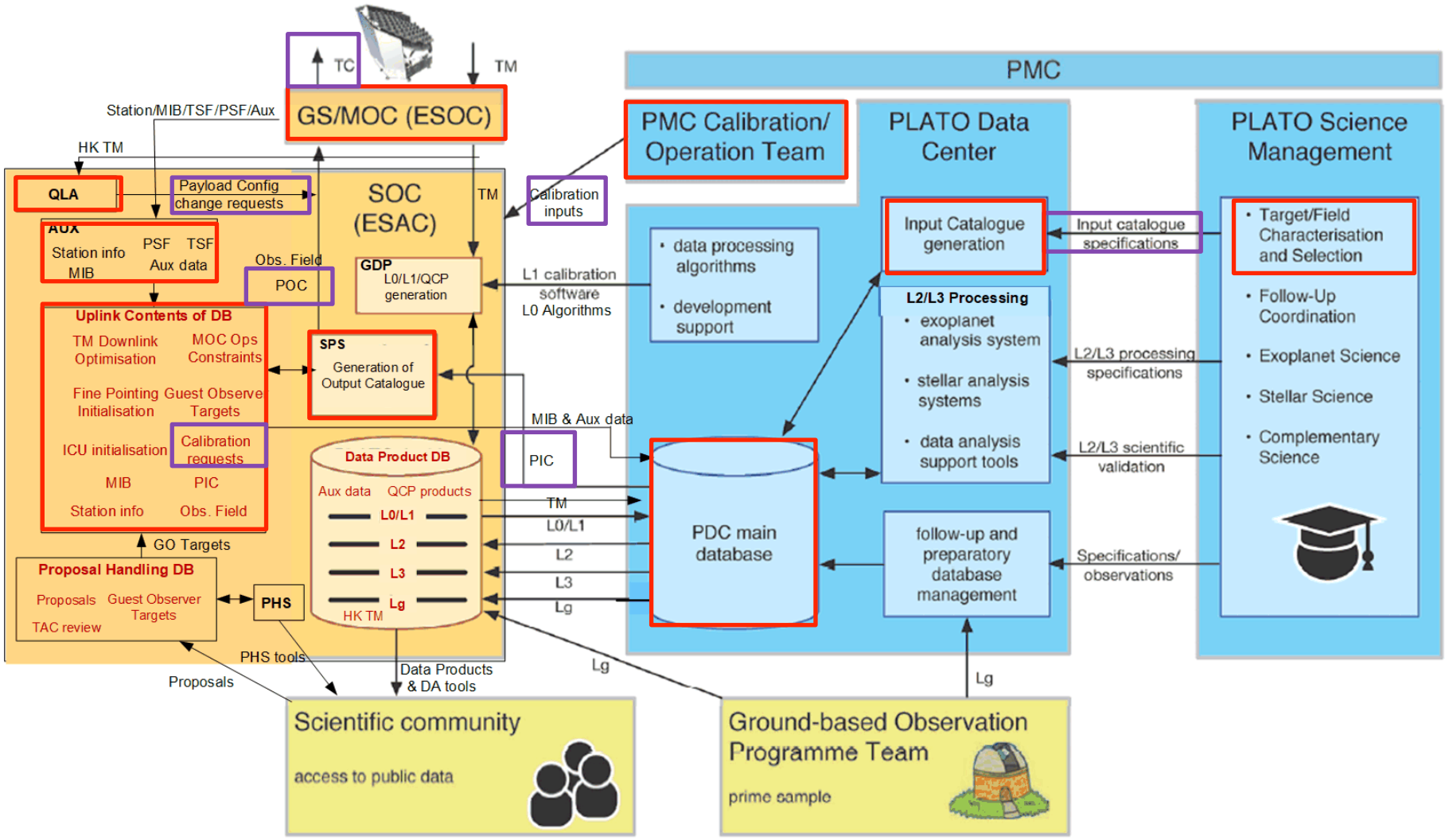
Operations data flow - Mission Planning basic inputs/outputs



Nominal Mission planning cycle: The MOC will run mission planning once per week during the 1st year, and once per month thereafter, without iterative loops.

PLATO SGS Uplink interactions

Operations data flow - Mission Planning – Calibration & PIC & QLA



For the first two weeks after an attitude repointing, the MOC will run a weekly cycle that will include the necessary re-calibrations and feedback. A faster turn-around for special operations has been agreed.

4 – PIC Updates

Proposed Update	What is being updated	Turn-around time on ground (time in advance of uplink) PMC => SOC => MOC	Comments
Update of the full catalogue	Imagette positions and sizes, light curve mask positions and sizes, light curve mask parameters, outliers detection algorithm configuration parameters, background window positions and sizes	2 months	Update of full onboard parameters after every new pointing and after every 90º rotation of the S/C. PMC => SOC – 2 months in advance of uplink SOC=> MOC – 1 month in advance of uplink consistent with their monthly planning cycle.
Calibration after full update			

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Additional and Replacement targets	Additional targets being added to list to be monitored on board or indeed replacing those existing on the list.	Linked to the planning cycle	Assume delivery to the SOC 5 working days in advance of delivery to the MOC.
Additional Imagette data download	Update of imagette data to be downloaded		

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On-board parameter corrections	CCD characterisation correction, outlier rejection	Linked to the planning cycle	Feed into the uplink due to problems identified from QLA & RTA. May need a faster turnaround but dependent on next delivery to MOC defined in the planning schedule. It is assumed jitter correction is done on-ground and removed in the L1 pipeline.

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Calibration Updates	Monitor continuously the focus, the throughput, the overall gain, the line-of-sight, the image geometry, and the distortions. Updates to be made: imagette, light curve parameters, and background windows	Linked to the planning cycle	It is assumed that calibration updates can be planned well in advance but updates at a shorter timescale might be identified. The calibration updates should be focussed on feeding into the weekly planning cycle to be made in the two weeks following an attitude repointing.

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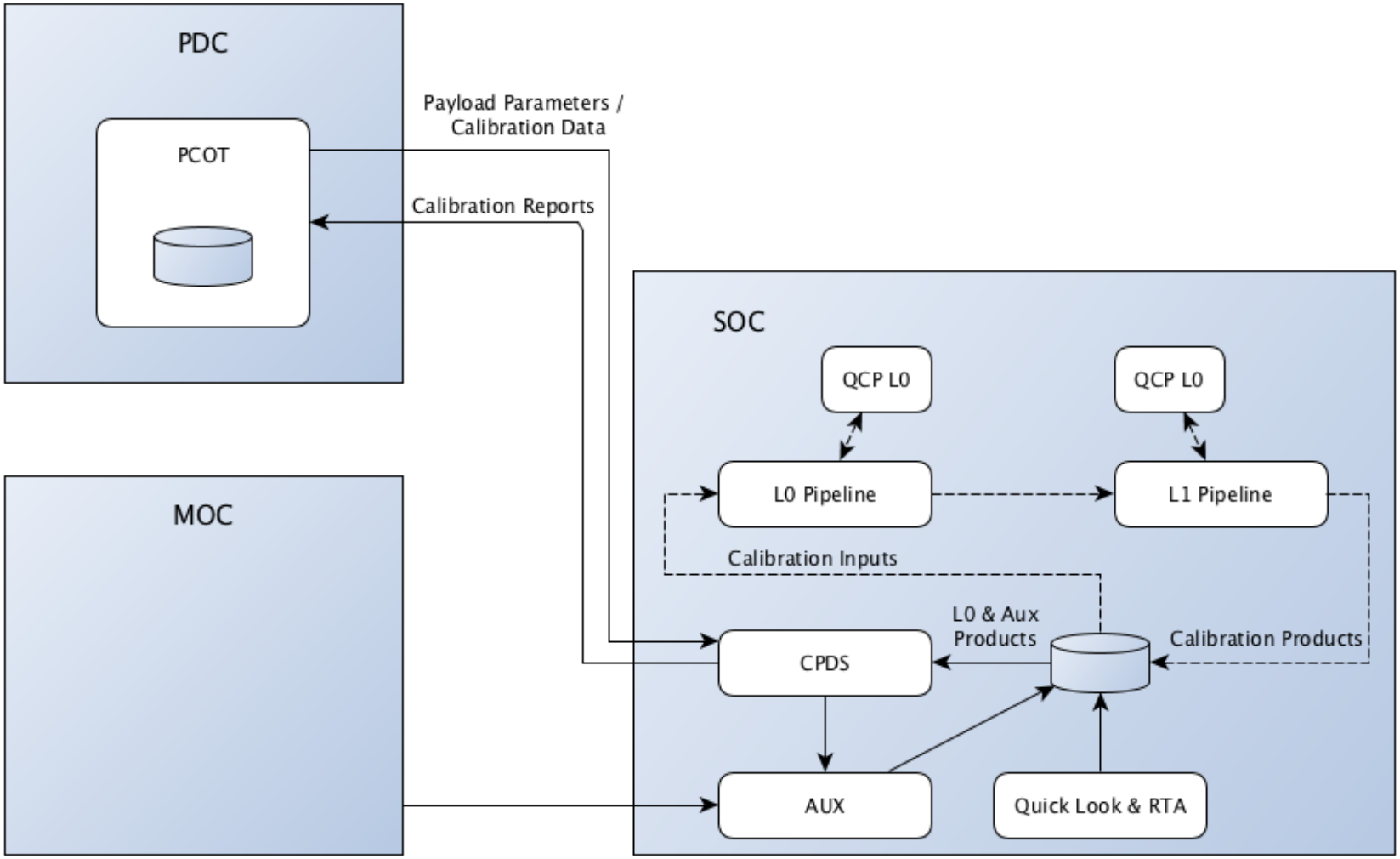
Targets of Opportunity	Update to look at certain targets informed on from other observatories e.g. supernovae.	Best effort basis linked to on-going planning cycle	Expected to occur a maximum of 10 times per year. Not considered to require on-call capabilities as the time involved is sufficient to support normal working hours.

5 – Calibration Interactions

SOC Downlink Infrastructure



Calibration Operation Types & CPDS usage

- **Automatic CPDS standard pipeline:** CPDS is the Calibration Parameter Derivation System. Every time the L0/L1 pipelines are run the CPDS runs in parallel to feed in the "standard calibration configuration" to be used on a daily basis for these pipelines. This would include the payload parameters & nominal science calibration updates that are delivered by PCOT on a TBD basis.
- **Monitoring Triggered on-demand CPDS:** the Quality Control Pipeline and/or Quick Look Analysis/Real Time analysis flags certain problems in the data which cannot be treated using the standard calibration configuration. These would result in the PCOT team requesting a special kick-off of the CPDS i.e. on-demand, for processing this specific data.
- **Calibration Operations CPDS:** this involves running the CPDS to process the calibration data delivered by the MOC based upon (a) specific calibration activities running onboard the spacecraft e.g. commissioning, and (b) after each spacecraft rotation.

Interactions between PCOT & SOC to run CPDS

CPDS Pipeline Activity	Is the PCOT involved?	Implications
Automatic CPDS standard Calibration pipeline	No	Only involved where new payload parameters & calibration pipeline updates (algorithm changes, etc.) are to be fed into the standard calibration pipeline. Update of the models on a new s/c pointing (approx. every month)
Monitoring Triggered CPDS Pipeline	Yes / No	SOC gets in touch with PCOT due to anomaly observed. Result is a specific run of the CPDS to deal with this problem. Can also be automatic if the problem occurs on a regular basis and it is triggered automatically.
Calibration Operations driven CPDS pipeline	Yes	Calibration operations in commissioning & in spacecraft rotation

Thank you