Contributions IRAP au segment sol SVOM

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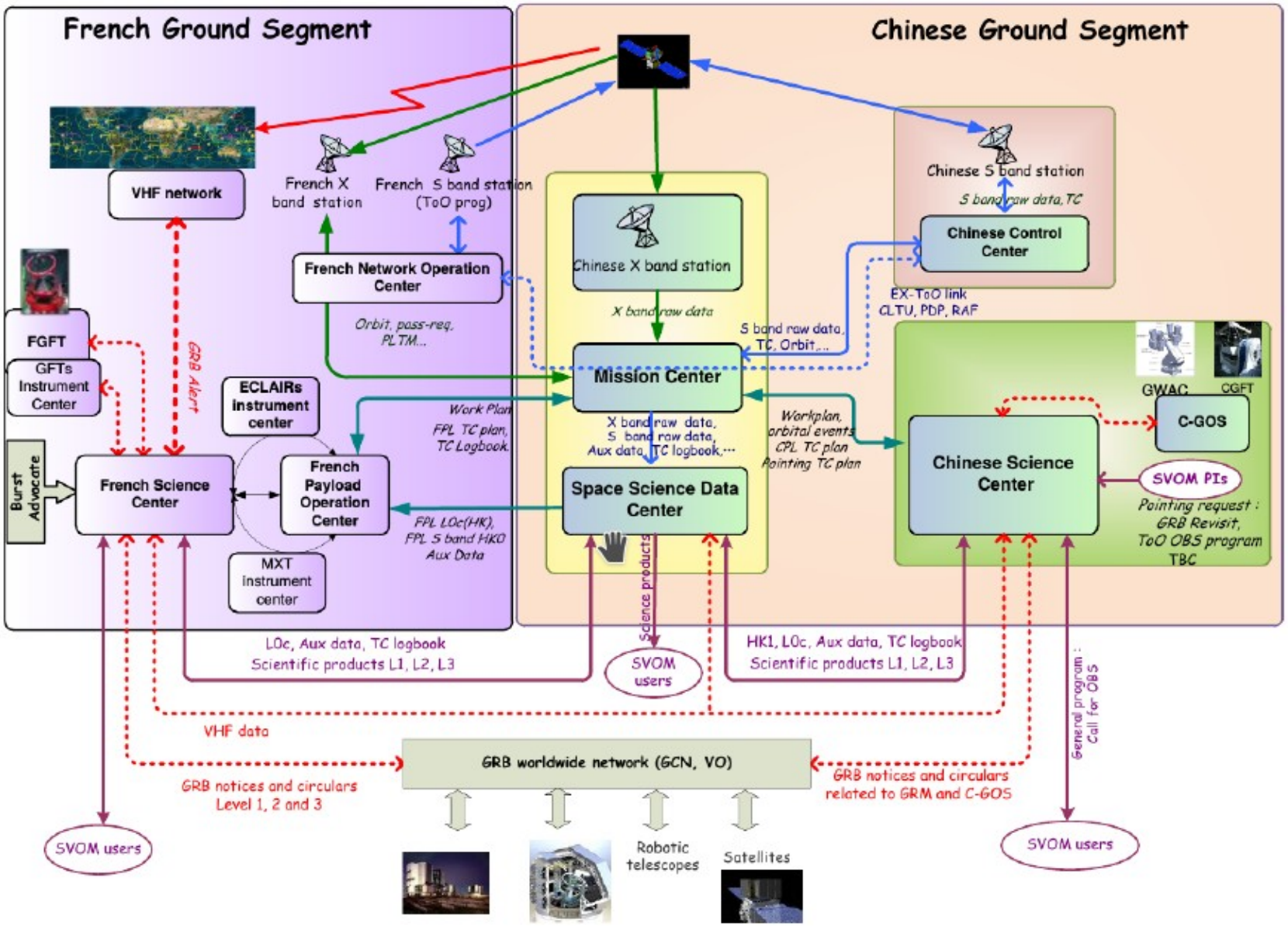
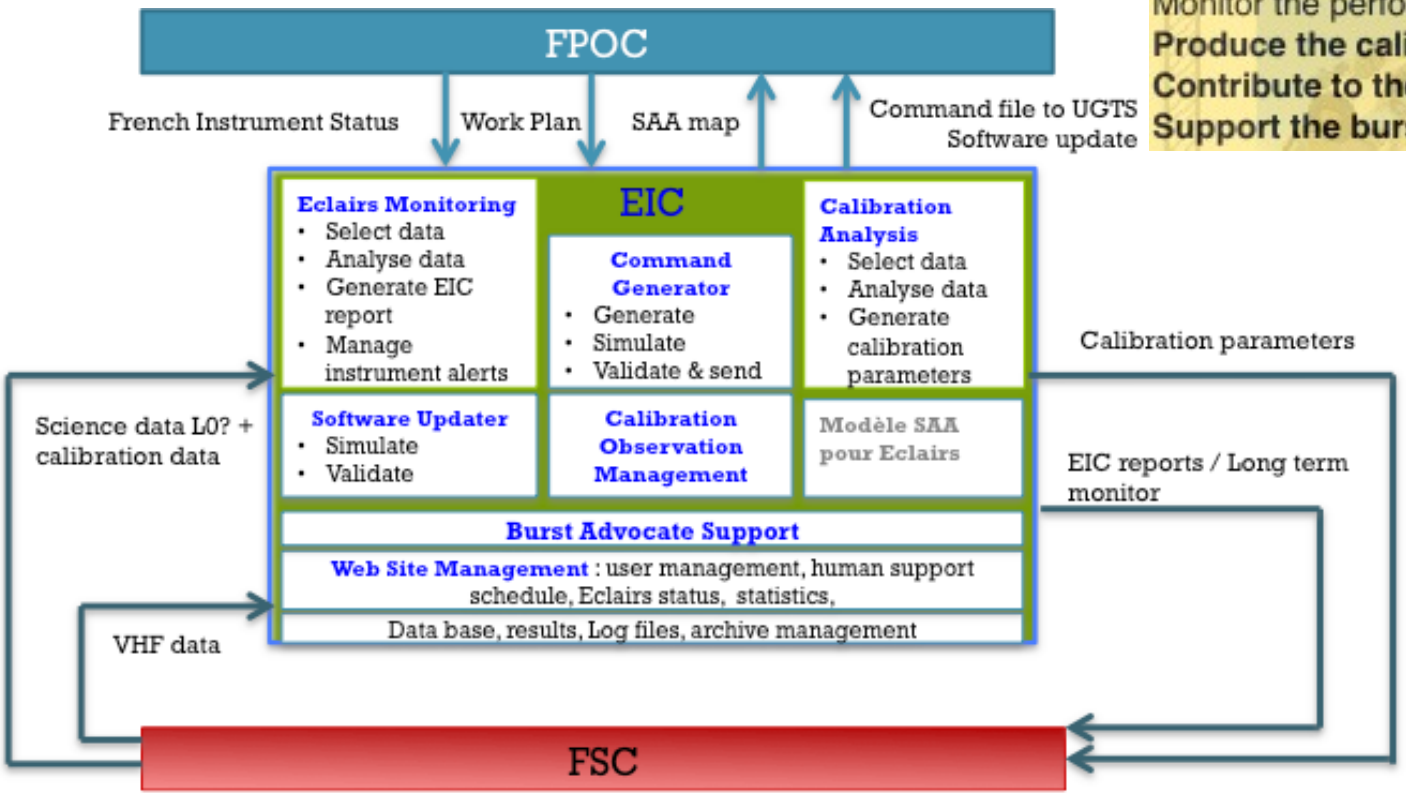
GROUND SEGMENT



ECLAIRs Instrument Center

- EIC = ECLAIRs Instrument Center under IRAP responsability
- EIC deals with all the in-flight activities around ECLAIRs.
- EIC will have multiple interfaces with FPOC & FSC.

Prepare the instrument commands
Monitor the instrument (long term)
Monitor the performances and sensitivity
Produce the calibration files
Contribute to the scientific pipeline at FSC
Support the burst advocates



Products

- Most EIC activities will generate products of 3 types:
  - Reports/documentation ➡ **all SVOM team** (except alarm reports)
    - Release note for each product / Mid-/long-term instrument status / **…**
      - Format : pdf
  - Auxiliary files ➡ **FSC**
    - Response files (RMF & ARF) / Gain table / ASIC threshold table / Imaging correction files (vignetting + biases) / dead pixel table / pixel flat-fielding table /…
      - Armelle Bajat (Ph-D) develops a code to compute the spectral response of the detection plane + calibration using data collected on the prototype
      - Format : fits OGIP
  - Onboard configuration files/UGTS software ➡ **FPOC**
    - Gain file / ASIC threshold / dead pixel table / SAA contour map / …
    - Instrument configurations for Workplan
    - Onboard source catalog (provided by APC)
    - Trigger monitoring (CEA responsability) ⇒ update the trigger param. / upgrade of the trigger S/W
    - DPIX management software (CNES responsability)
- EIC will update these products with different frequencies as function of the needs.
  - Most onboard parameters (apart trigger parameters) to be updated over a week timescale
  - Response files, SAA map to be updated every few months at most
  - Each new release of a product will be made available asap with the appropriate documentation

Update and upgrade strategy

- X-band (HK+photon), VHF data to be used to generate EIC products

- Prior to the launch, use of on-ground calibration data
  - Some pipelines to generate the products based on analysis tools to be developped during the different on-ground calibration phases (proto-DPIX → ECLAIRs)
  - Participating coding effort within the ECLAIRs calibration team – improvements by incremental versions / rules of coding to be put in place to ensure consistency
  - Once the codes are sufficiently robust & efficient, they will be integrated into the chain of EIC tools/pipelines.

Update and upgrade strategy (2)

- After launch, follow the calibration plan (to be updated throughout the mission when needed)
  - Performance verification phase → update of products using a series of dedicated observations (both calibration source & background data)
  - Exploitation phase → check the overall instrument response with a frequency of TBD months using a set of calibration sources and update the onboard configuration files with a typical frequency of a week
  - Preparation of the input data using FSC tools → **need to have access to a development pipeline** to modify parameters/to test new auxiliary files
  - Validation of some changes **using the DPIX/UGTS GSE**
    ⇒ DPIX spare (1/8 of the DPIX) with all the experimental setup to operate it
  - Software upgrades:
    - Elaborate patch(es) to be installed with the implementation strategy
    - FPOC produces the time-tagged TC sequence to be uploaded onboard
    - EIC checks the TC sequence on a UGTS GSE before transmission to the MC

ACTORS

- EIC supervisor (OG) – main point of contact for FSC & FPOC / manages all the EIC activities / responsible for all products generated by the EIC

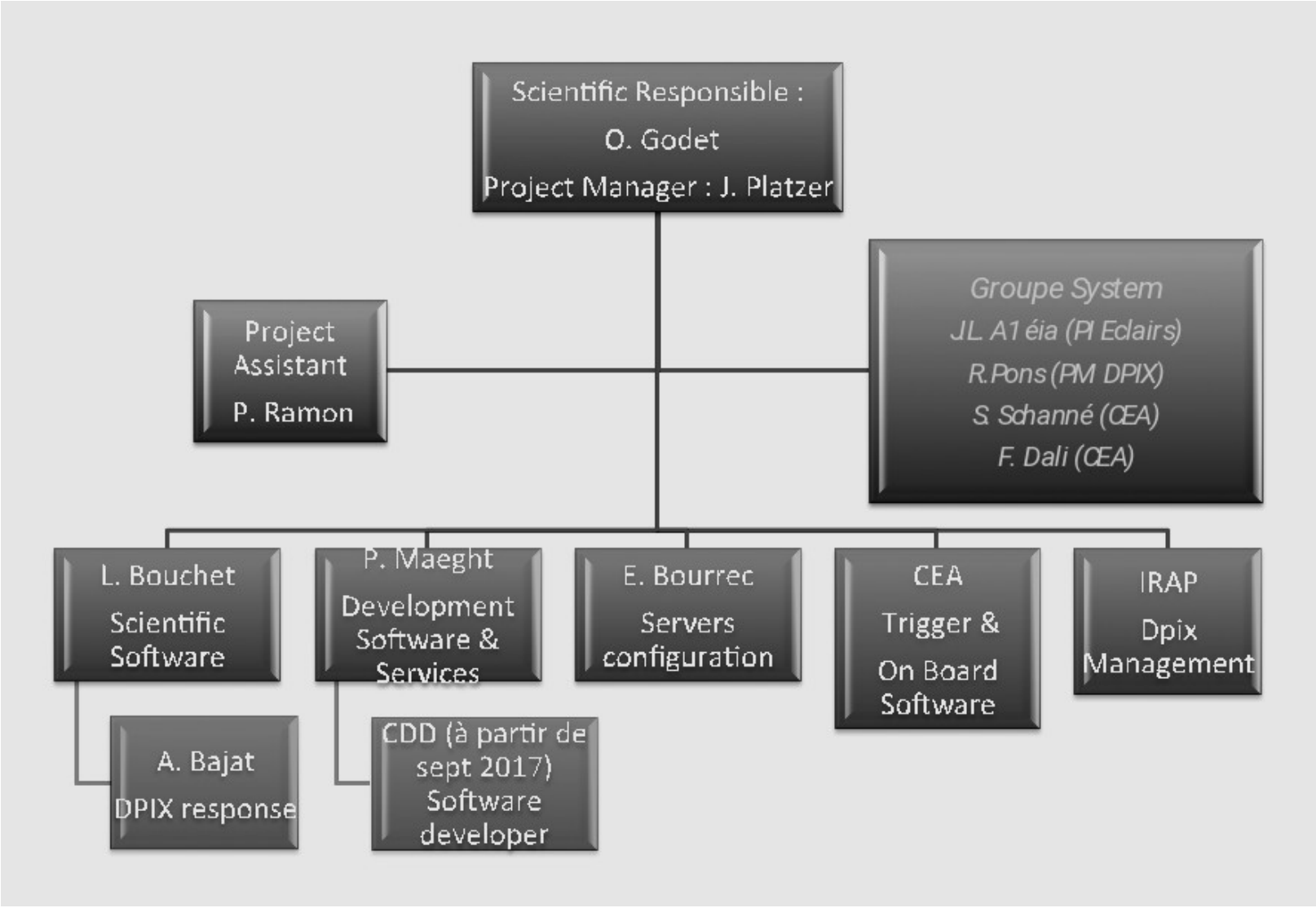
- Instrument scientist (I-PI = JLA) – management of the calibration plan with the help of EIC supervisor

- Instrument Scientists (ISs from the labs involved in the ECLAIRs project) responsible for:
  - the monitoring of the mid- and long-term instrument health;
  - the monitoring of the trigger efficiency (under CEA responsability);
  - the verification of the overall ECLAIRs performances and updates of the EIC products, upgrades of the trigger software if needed;
  - supporting the BA with the analysis of the ECLAIRs science data relative to an ECLAIRs trigger / advising the BA about the instrument calibration issues (**EIC-SC-7**).

- 1-2 IRAP computing engineers to ensure the maintenance of the system computing infrastructure, EIC database, …

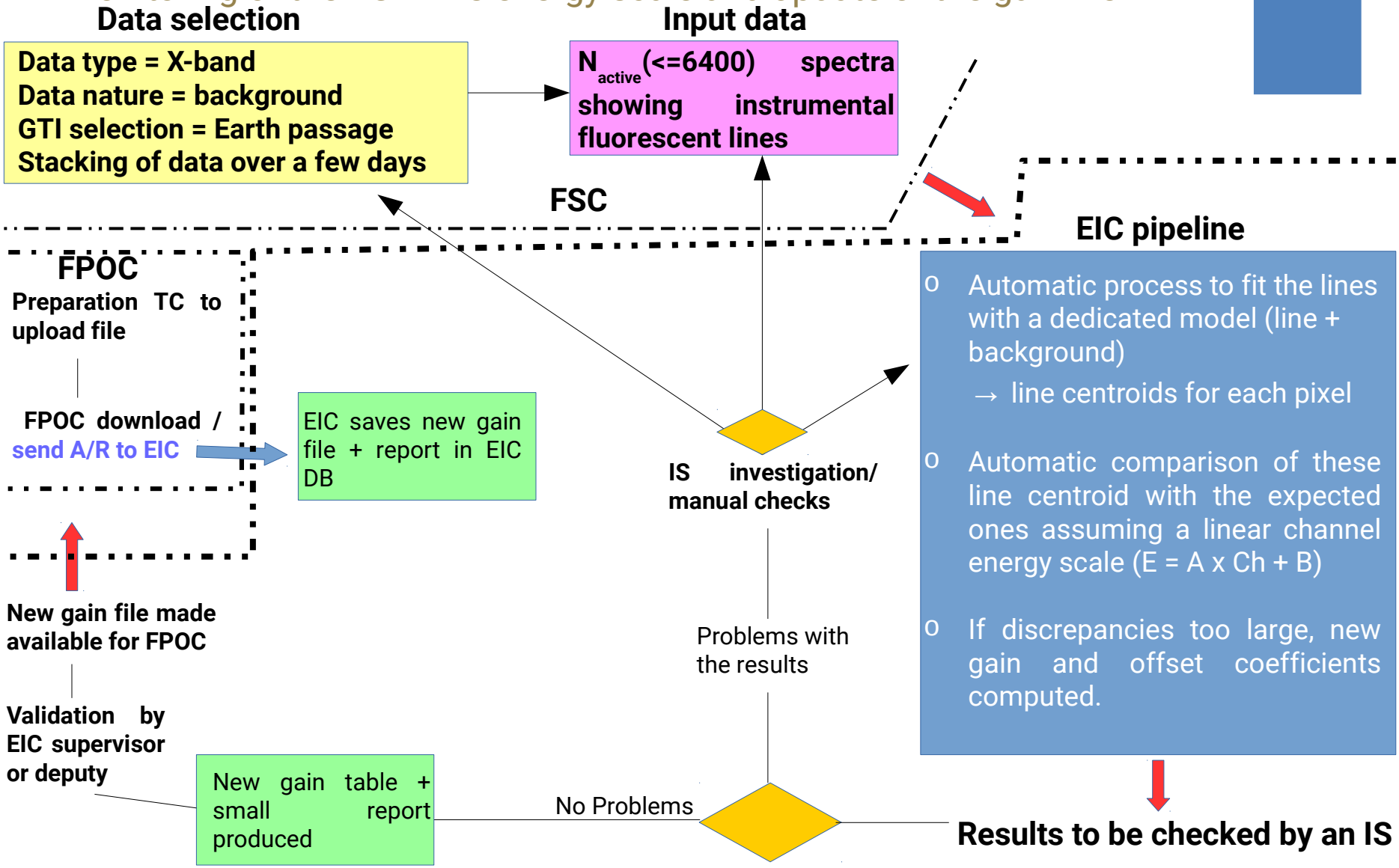
- Instrument experts (IEs : at least one project engineer per speciality and sub-system) – participation to the activities during the commissioning phase / to be called to understand/solve a serious technical issue with the instrument.

Project Organization

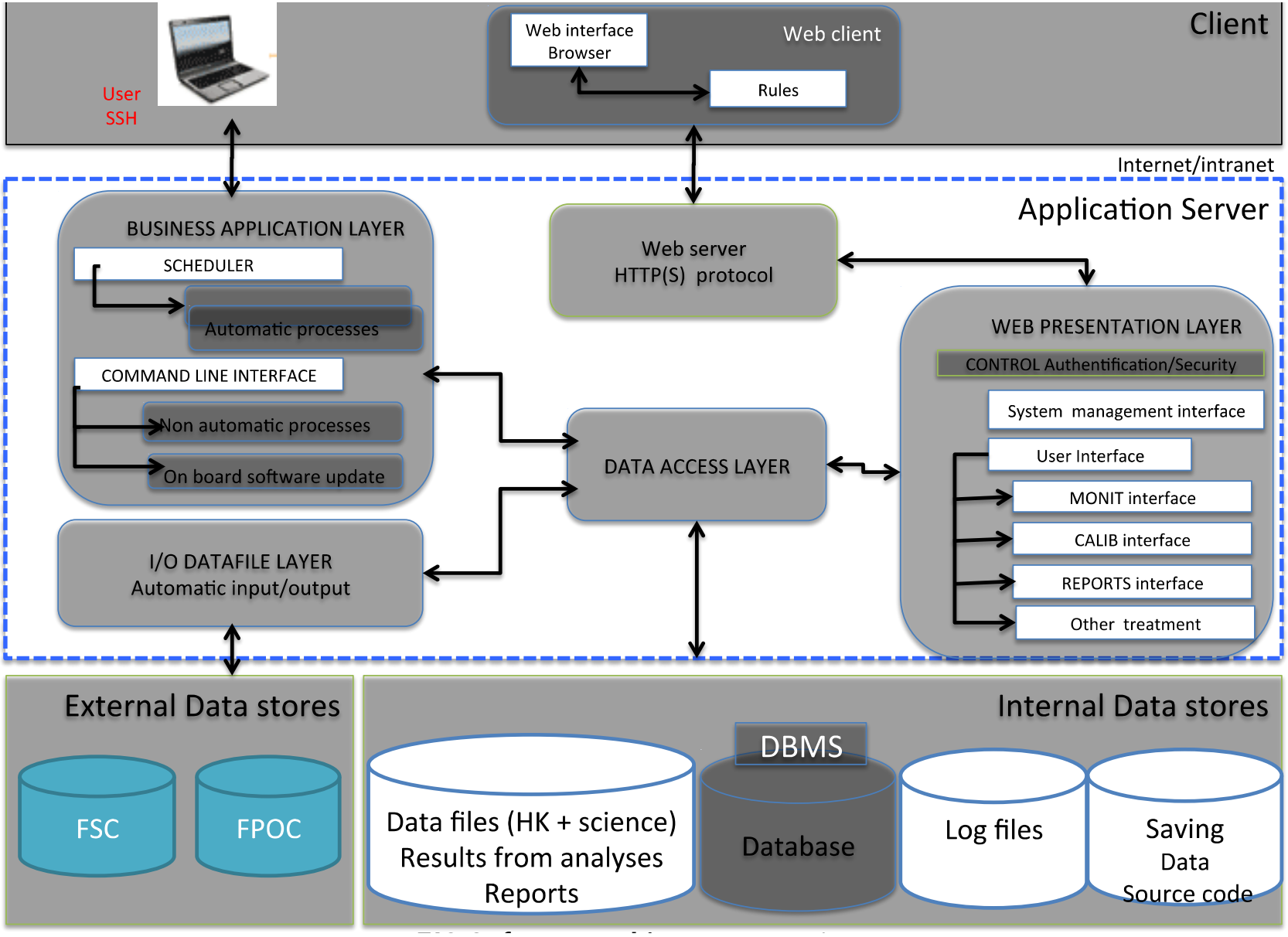


USE CASE

- Monitoring of the ECLAIRs energy scale and update of the gain file



SOFTWARE ARCHITECTURE



Environment software

Data base : Postgres SQL

Language : Python, C, C++, Javascript + heritage from existing codes

Code source : GIT

Scheduling : use Rest API

Format de fichier : Json, XML, FITS

Contributions FSC

- Roles of FSC:
  - Real time analysis and distribution of alerts for onboard triggers (VOEvents)
  - Management of the scientific products (L1, L2, L3) of the core/GP/ToO programs
  - Data and software management
  - GRB products released asap to the community / All science products made public after TBD years
  - Contribution from 10 labs
- Contributions of IRAP mainly on the core program
  - Off-line trigger software (resp. L. Bouchet)
  - Analysis of the X-band data when available in order to:
    - → Monitor the onboard trigger performances (clone of the onboard code)
    - → Search for undetected transients onboard (e.g. ultra-long GRBs) on medium timescales (few dozen of hours to 1 day)
    - → Make some fine-tuning of the trigger parameters → update of the onboard trigger
  - GRB science products (resp. J-P Dezalay)
    - → Classification of GRB types asap based on various parameters computed using VHF data
    - → Information to be made available for the community via VoEvent messages