e-ASTROGAM
MISSION CONFIGURATION MANAGEMENT & PLANNING

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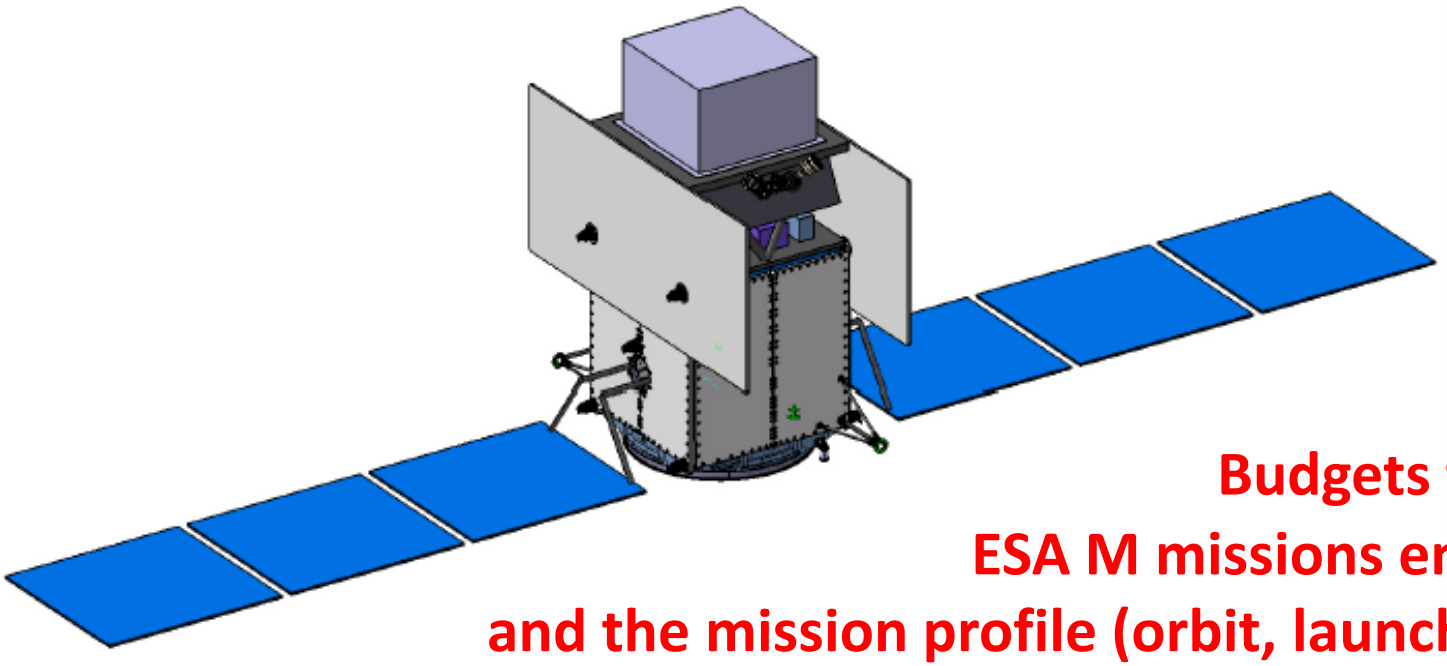
OUTLINE

- Mission configuration
- Mass production
- Model philosophy
- Work Breakdown Structure
- Mission planning
- Conclusions

SYSTEM BUDGETS

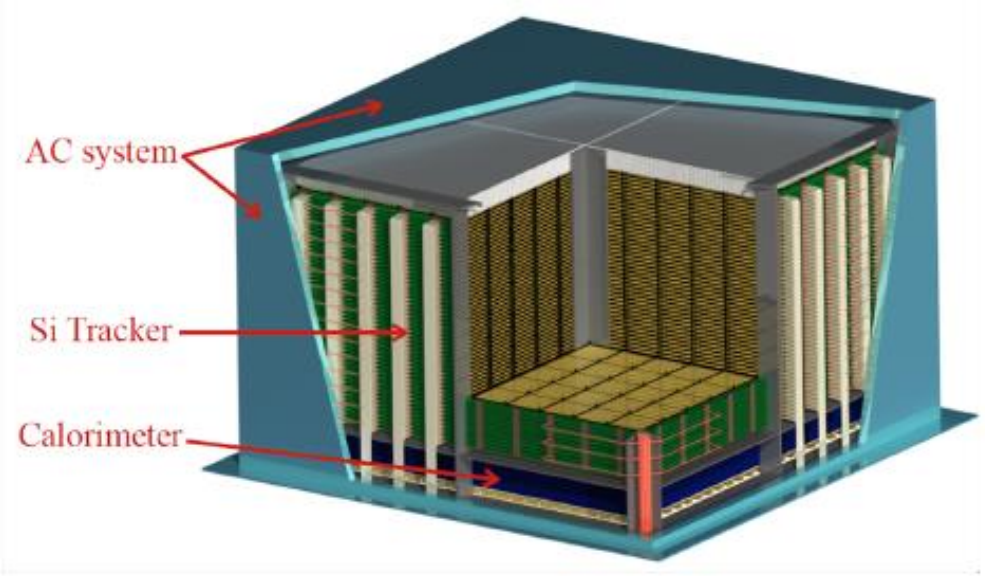
- Payload mass 1.2t
- Satellite dry mass 2.4t
- Satellite power consumption 2kW
- Data generation 1GB/orbit



Budgets fit the
ESA M missions envelope
and the mission profile (orbit, launcher, GS)

INSTRUMENT OVERVIEW

- 4 ST towers (50m^2 of Silicon detectors)
- 529 Calorimeter modules (33k crystal bars)
- Large area upper-AC (total active area of 5.2 m^2) + ToF
- 1M readout channels
- High modularity
- Background event rate under control
- On-board processing flexible for different trigger levels



Numbers and complexity not negligible but within "our" state-of-the-art

TECHNOLOGICAL READINESS LEVEL

Almost all the technologies involved in the Payload project have TRL higher than 6.

Only a few items (Si ladder bonding; SDD and Readout ASIC for the CAL FEE; SiPM for the AC) have a lower TRL (4-5) with no critical issues.

The groups involved in the Instrument development have relevant heritage on the manufacturing of detectors for space high energy applications

The proposed spacecraft platform is based on the Thalesaleniaspace PROTEUS 800 platform, under development in the frame of the SWOT CNES/NASA programme.

All the technologies involved in the platform project have a TRL higher than 6.

MASS PRODUCTION

The e-ASTROGAM P/L requires the production of large amounts of elementary components:

- **224 Tracker trays**
  (5600 silicon tiles, 27k readout ASICs)

- **529 Calorimeter modules**
  (34k CsI bars+SDDs, 17k readout ASICs)

The proposed risk mitigation is based on a proper model philosophy, an optimized allocation of the development activities and an appropriate planning.

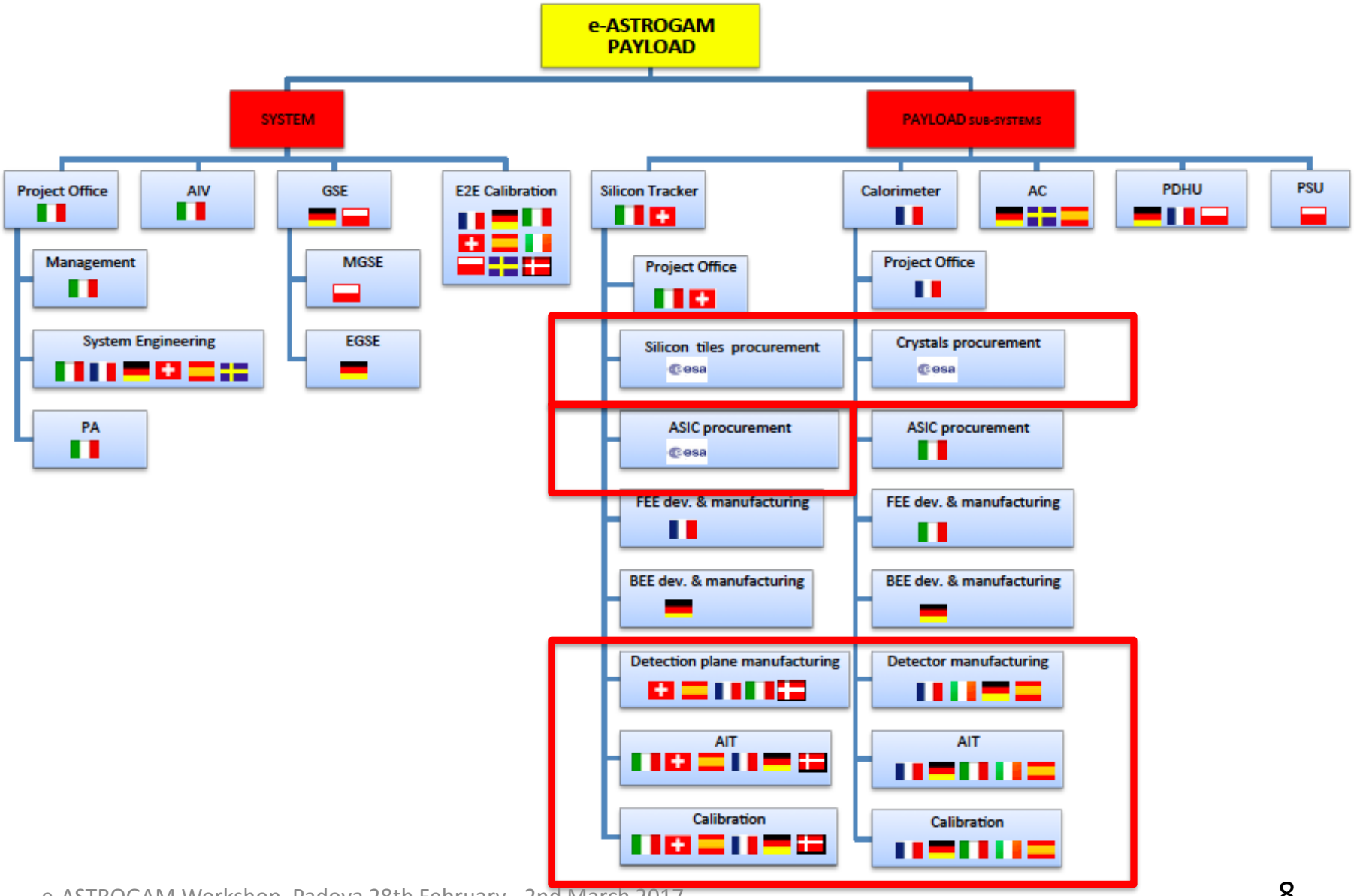
MODEL PHILOSOPHY

The e-ASTROGAM Payload models (PFM approach):

(i) Demonstration Model (DM);
(ii) Proto-QMs aimed at consolidating the design of the P/L sub-systems very early in the project (to be reused as EM);
(iii) Structural & Thermal Model (STM);
(iv) Engineering Model (EM);
(v) Functional Model of the Data Handling;
(vi) Proto-Flight Model (PFM).

For the service module (SVM), we propose a standard PFM development approach.

WBS


e-ASTROGAM PAYLOAD
SYSTEM
PAYLOAD SUB-SYSTEMS
Project Office
AIV
GSE
E2E Calibration
Silicon Tracker
Calorimeter
AC
PDHU
PSU
Management
System Engineering
PA
MGSE
EGSE
Project Office
Silicon tiles procurement
ASIC procurement
FEE dev. & manufacturing
BEE dev. & manufacturing
Detection plane manufacturing
AIT
Calibration
Project Office
Crystals procurement
ASIC procurement
FEE dev. & manufacturing
BEE dev. & manufacturing
Detector manufacturing
AIT
Calibration

PLANNING

Definition phase (phases 0, A & B1; 4 years):

- development of tecnologies with lower TRL
- development of the DM in order to validate the instrument concept
- LLIs authorized at the end of phase B1

Phase B2 (2 years):

- LLIs procurement
- development of the proto-QMs
- Qualification of the proto-QMs

Phase C (2 years):

- starting of the Instrument PFMs manufacturing
- development of STMs and EMs
- consolidation of the system design

Phase D (3 years):

- Completion of the Instrument PFMs MAIT (3.5 years)
- Payload AIV
- Satellite AIV

Phase E1: 6 months of contingency, launch campaign and launch on late 2028

CONCLUSIONS

System budgets are under control and fit the ESA boundary conditions

Instrument characterized by mass production, high modularity and high TRL

Mass production main driver of the management & planning

WBS, model philosophy and planning defined in order to mitigate the mission risk