DORY

Discovering Ory

esa academy

POLITECNICO MILANO 1863 | DIPARTIMENTO DI SCIENZE E TECNOLOGIE AEROSPAZIALI

DORY - Mission Overview

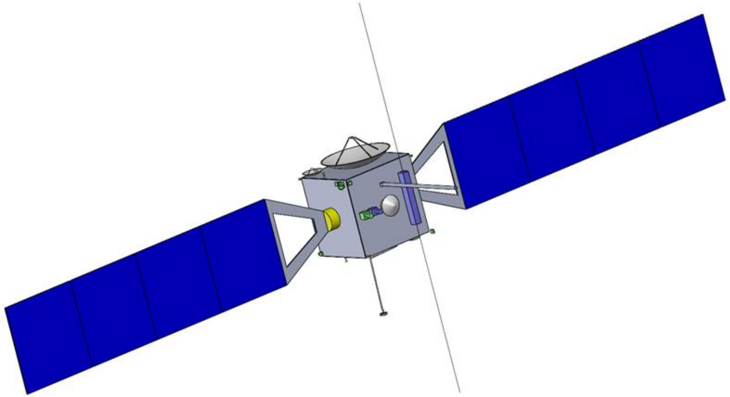
Presented by
TEAM POLITECNICO DI MILANO

ESA/ESEC (CONCURRENT ENGINEERING CHALLENGE 2025)

Mission Overview

GOAL

- Study comet shape and mass distribution
- Map the surface of a comet
- Investigate the in-depth composition
- To mesure the on-site magnetic disturbances
- Return at least 10g of samples on Earth



Target Comet: 304P/ORY

Mass	3643.81 kg
Margined ΔV	2581.32 m/s
Dimensions	3.82 x 3.05 x 2.92 m

Architecture selection

MONOLITHIC SATELLITE
- Simpler
- Lighter
- Touch and Go strategy
- Cheaper
- Less critical events

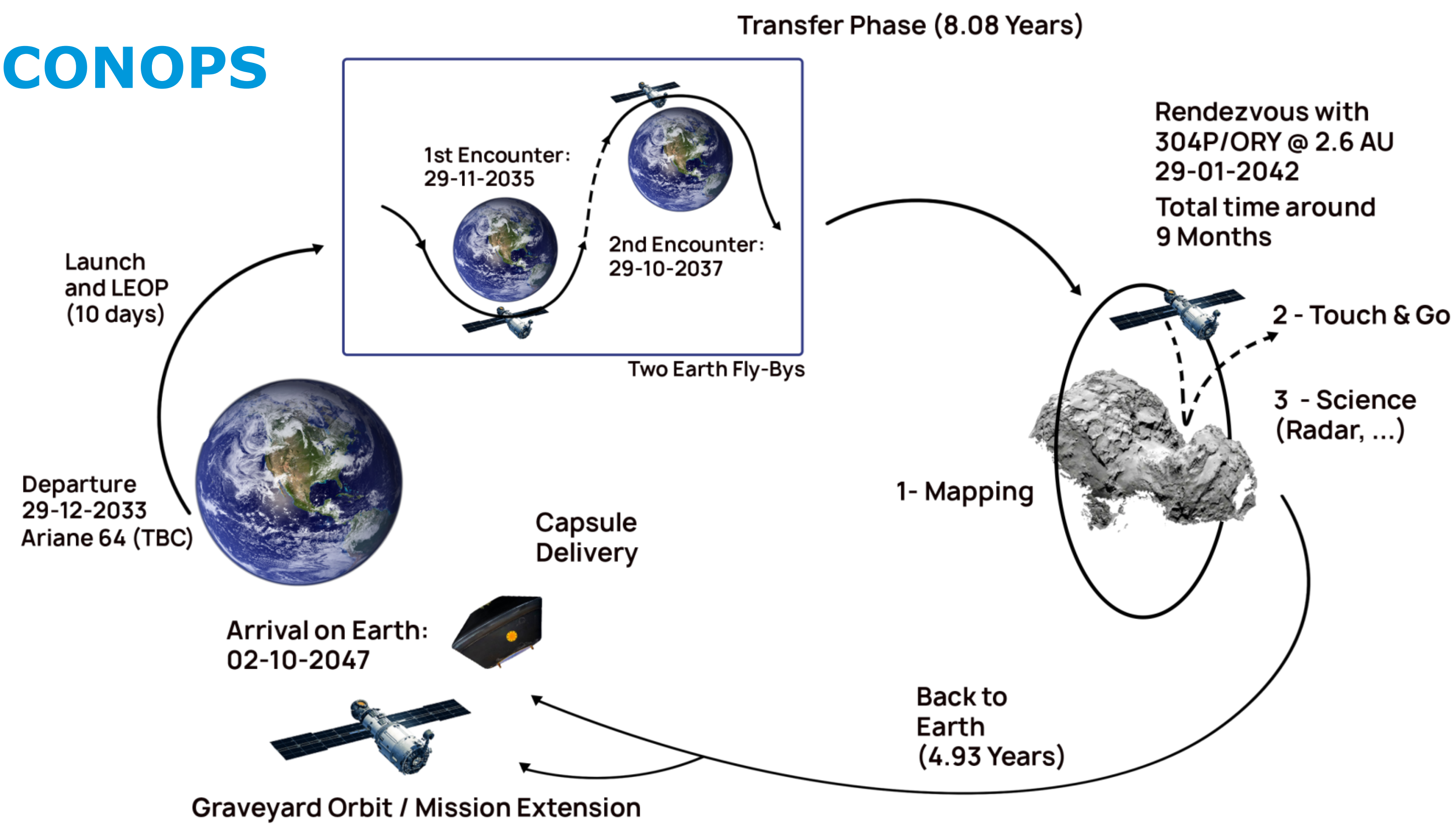
SATELLITE + LANDER
- More complex
- Heavier
- Landing strategy
- More expensive
- Lower TRL for in-situ PL

Criterion	Monolithic satellite	Satellite + Lander
Mass	5	4
Science Output Depth of sampling	4	5
Science Output Mass of sample	5	4
Cost	5	3
Reliability	3	2

Trade-Off analysis (5 is best)

→ **MONOLITHIC SATELLITE**

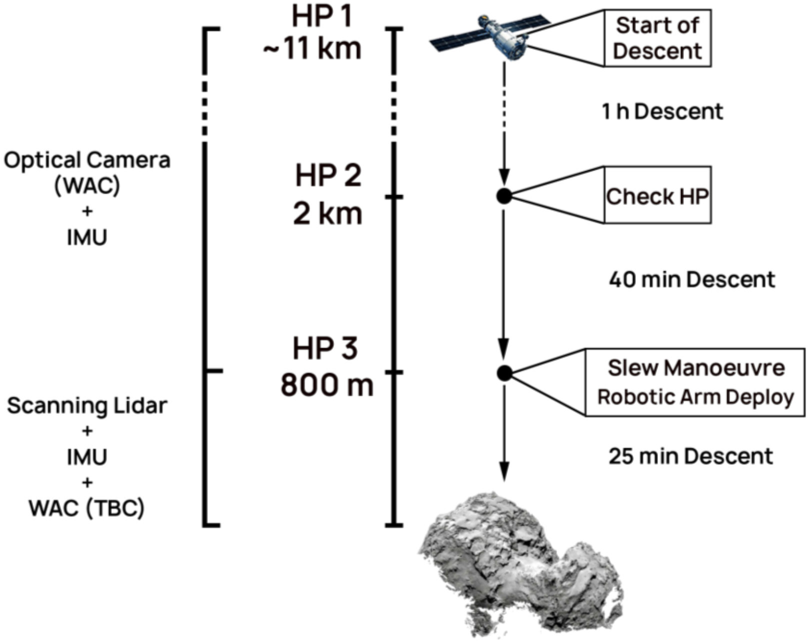
CONOPS


Transfer Phase (8.08 Years)
1st Encounter:
29-11-2035
2nd Encounter:
29-10-2037
Two Earth Fly-Bys
Rendezvous with
304P/ORY @ 2.6 AU
29-01-2042
Total time around
9 Months
2 - Touch & Go
3 - Science
(Radar, ...)
1- Mapping
Launch
and LEOP
(10 days)
Departure
29-12-2033
Ariane 64 (TBC)
Capsule
Delivery
Arrival on Earth:
02-10-2047
Back to
Earth
(4.93 Years)
Graveyard Orbit / Mission Extension

CONOPS

1- Mapping (min. 4 Months)

2 - Touch & Go



3 - Science (Radar,..) (min. 1 Months)

HP: Hold Point

Modes

Modes	Definitions
Science - Remote	Mapping of the comet
Science - TAG	Touch and Go
Science – Rad-Mag	Comet study with radar and magnetomer
Maneuver - DSM	Deep space maneuver
Maneuver - OCM	Orbital correction maneuver
Telecom - LP	Low power telemetry communication
Telecom - HP	Science data downlink
Transfer	Interplanetary transfer
Safe	Power saving mode
Detumbling	Reduce s/c angular rate
Approach	Approach to the comet
Desaturation	Desaturation of the reaction wheels
Commissioning	Testing of all the subsystems

Payload

Paolo Fedele Di Giglio

Gabriele Farina

Matteo Fulgheri

Moein Peyghambarzadeh

Requirements and Assumptions – Payload

REQ ID	STATEMENT
MR-03	The mission shall return at least 10g of samples to Earth.
MR-04	The mission shall investigate the elemental composition of a comet to at least a depth of 30cm (requirement), and should investigate a depth of up to 1m (goal).
MR-08	The mission shall investigate the elemental composition of 100% of the surface of a comet with a resolution of 2m.
SR-05	The system shall allow for the identification of at least one landing site.
SR-10	The system shall be able to monitor and provide data of magnetic disturbances in 3 axes.

Input from MA

The semi-major axis during surface mapping is 10 km.

Analysis and Trade-offs – Payload

Sample Collection

- Landing vs Touch&Go approach
- Projectile vs Gas
- Sample Conservation Analysis
- Comet Enviroment Analysis

Depth Investigation

- Drill sampling vs Remote observation
- SAR vs Radar Sounder
- Mass, power and data budgets
- Vertical resolution
- Time of Observation

Surface Mapping

- Camera properties (FOV, spatial resolution)
- Mass & Power Budgets
- Time of Observation
- Altitude analysis

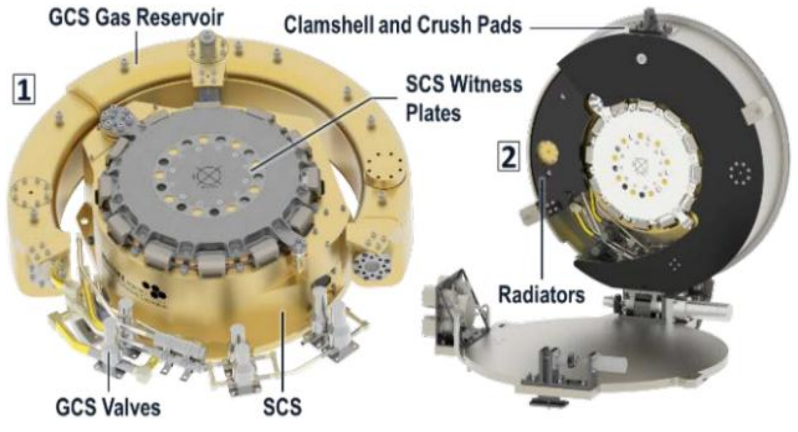
Final Baseline Design – Payload

- **Camera resolution**: 93.7 μrad
- **Camera FOV**: 5.5 x 5.5 deg
- **Camera wavelengths**: 400-1050 nm
- **RADAR frequency**: 20 Mhz
- **MAG resolution**: 0.047 nT

Instrument	Req ID	Mass + DMM [kg]	Power [W]	Data Rate	Data Volume
Framing Camera (DAWN)	MR-08 SR-05	5.775	17	20.5 Kbps	10.3 GB
Radar (SHARAD MRO)	MR-04	17.955	28	20 Mbps	10 GB
Magnetometer (MESSENGER)	SR-10	1.50 (boom 2.8)	4.2	0.414 Kbps	267 MB

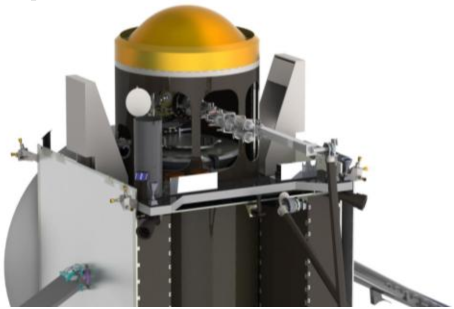
Final Baseline Design – Payload

GCS & SCS concept from CAESAR mission



Sample Return Capsule Closure

Sample container stow in SRC



	Temp. [°C]	Pressure [Pa]
***GCS**	<- 80	<500
****SCS**	<- 60	Vented

*GCS = gas containment system
**SCS = solid containment system

- **Decoupling volatile/solid**
- **Temperature/pressure conditioning**

Mission Analysis

Davide Bellini
Alessandra Centrella
Francesco Persenico
Davide Provenzi

Requirements and Assumptions – MA

CRITICALITIES

STATEMENT
Multi Gravity Assist trajectory needed to rendezvous with the comet.
Constraints to perform science at distances from the Sun lower than 3AU.

ASSUMPTIONS

STATEMENT	COMMENTS
No drag is considered during the close proximity Phase	Low activity of the comet when this phase occurs
Impulsive manoeuvres	
5.5 km/s v_∞ given by launcher	May exceed Ariane 64 capabilites

Analysis and Trade-offs – MA

Comet identification:

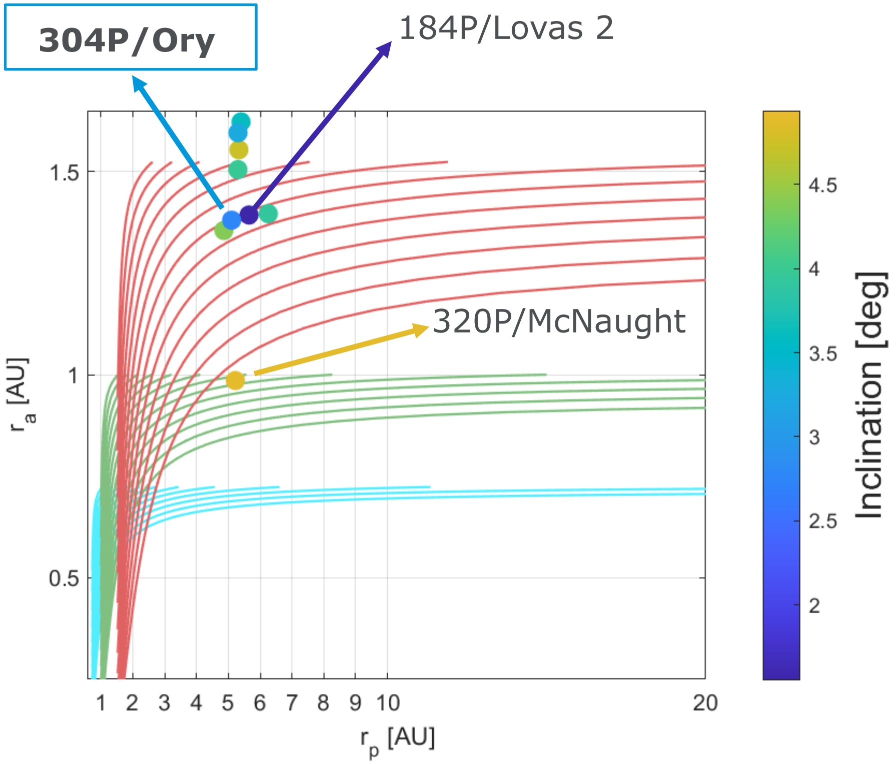
- Jupiter family comets
- Condition code = 0 (Uncertainty knowledge)
- i < 10°
- Perihelion radius (rp): 1.08 < rp < 1.7 [AU]

Flyby sequence analysis:

- Tisserand graph e flyby selection

Close Proximity:

- Safe approach to the comet
- Imaging condition



Transfer strategy – MA

Approach:

- *PyKep* and *Pygmo* libraries
- Multiple runs of the heuristic +*slsqp* solver

Solution:

Transfer to Ory

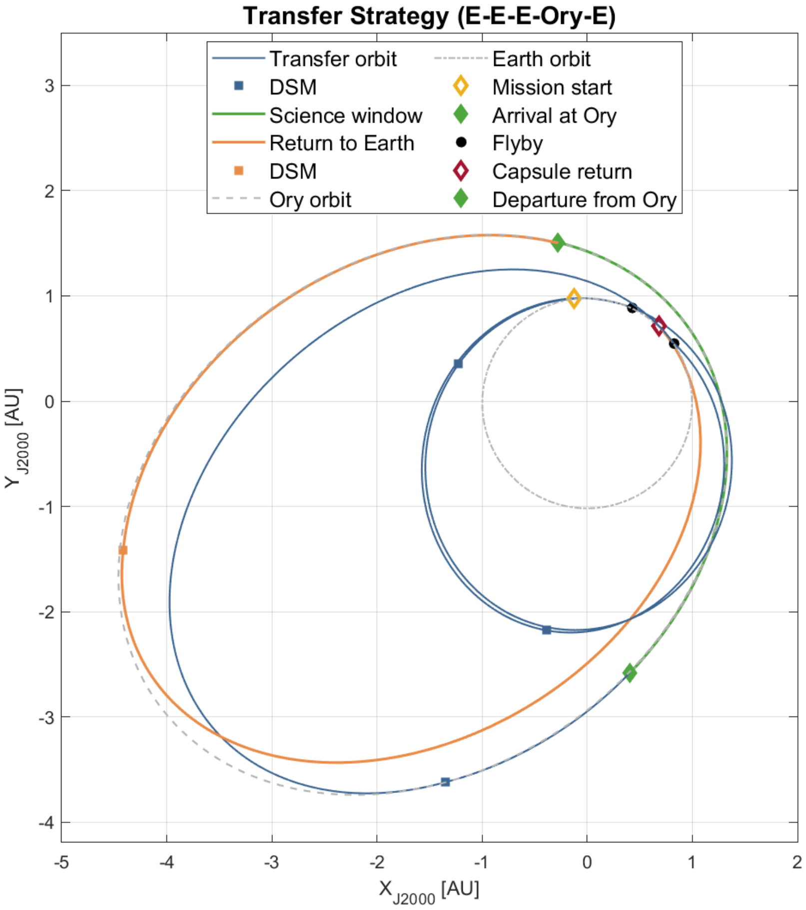
→ Departure from Earth: **2033-Dec-29**
→ 3 DSMs and 2 Earth gravity assists
→ Rendevouz with Ory: **2042-Jan-29**

ΔV = 1.430 km/s

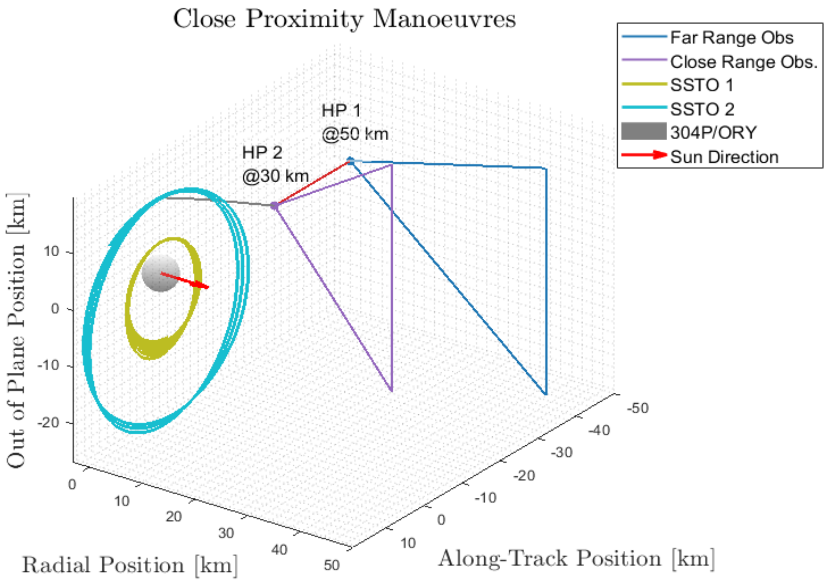
Return to Earth

→ Departure from Ory: **2042-Dec-04**
→ DSM near the orbit apocenter
→ Capsule release and Earth divert

ΔV = 0.785 km/s



Close Proximity - MA



Initial Target Characterization

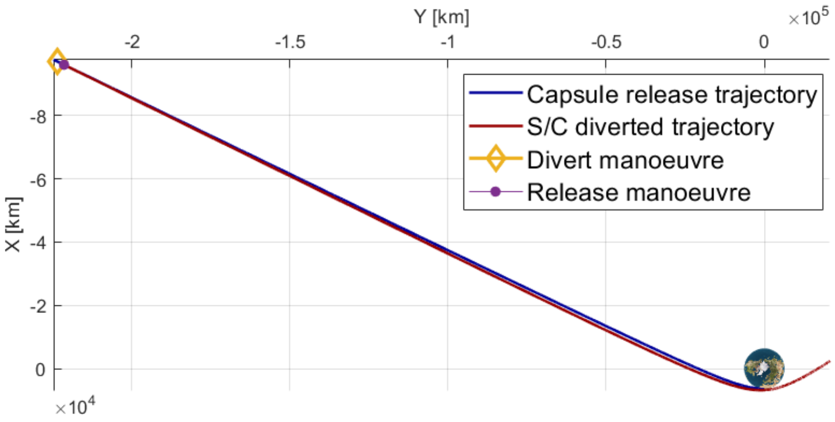
- Approach along track for safety reason (quasi stable HP)
- Sun phase angle span (40° - 90°) for optimal imaging condition

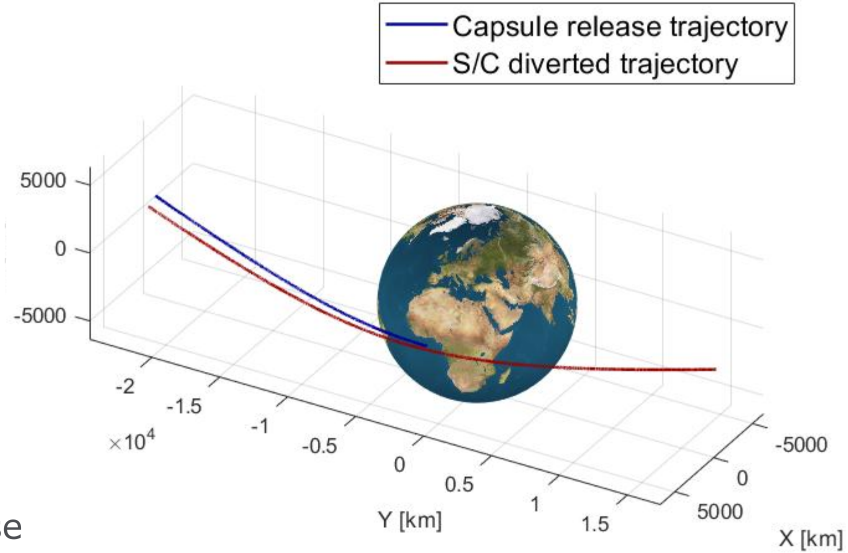
Target Mapping

- 2 Sun Stabilized Terminal Orbits (SSTO) for mapping
- 2 Altitude levels for safety reasons
- Backup: equatorial orbit if spin axis is unfavourable

Total Δv < 100 m/s
SSTO 1, a = 10 km
SSTO 2, a = 20 km

Capsule release and divert manoeuvre - MA





Terminal guidance

Capsule release:
- 12h before re-entry
- Hyperbolic pericentre on Earth surface

Divert manoeuvre:
- Right after capsule release
- Pericentre raising to 400 km
- Earth escape

End of Life (TBD):
- Heliocentric graveyard orbit
- Mission extension

DV Budget – MA

MANOEUVRE	ΔV [m/s]	Margin	Margined ΔV [m/s]
LAUNCH-COR	30	0	30
DSM 1	0.01	10 m/s	10.01
TCM-FB 1	35	0	35
DSM 2	474.43	5%	498.16
TCM-FB 2	35	0	35
DSM 3	788.61	5%	828.04
TCM-REND	10	0	10
COMET-REND	167	5%	175.35
PROX-OPS	50	100%	100
COMET-DEP	42	5%	44.1
TCM - EARTH	35	0	35
DSM - 4	709	5%	744.96
EARTH-DIVERT	34	5%	35.70
TOT	**2410.54**	**-**	**2581.32**

LAUNCH-COR: Launch correction manoeuvre
DSM: Deep Space Manoeuvre
TCM: Trajectory Correction Manoeuvre
FB: Fly-By
COMET-REND: Comet rendezvous

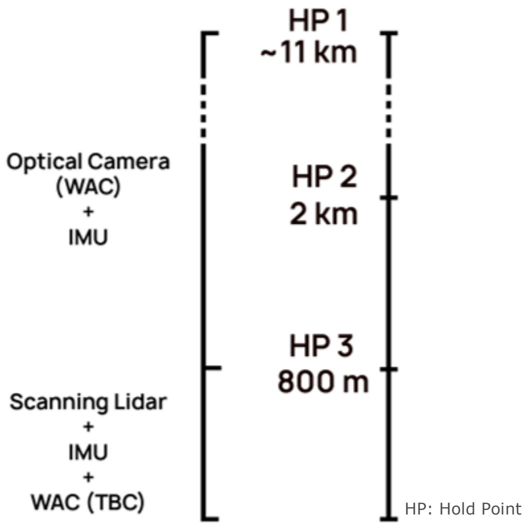
AOCS/GNC

Francesco Cataffo
Marco Cocomazzi
Daniele Paternoster

Requirements and Assumptions – GNC

→ CRITICALITIES

- Sensors sensibility to dust → operations.
- Not all hazard are detectable from nominal orbit (SSTO at 10km) → HPs at lower altitude.
- Autonomous from HP3 to touchdown → too high TC delays for real time ops.
- Minimize the T&G time (from EPS) → full thruster usage.



→ ASSUMPTIONS

STATEMENT	COMMENTS
Absolute navigation: DDOR ang. accuracy 10nrad	From literature
No drag is considered during the Approach to Landing Phase	Low activity of the comet when this phase occurs
Impulsive manoeuvres	

Navigation – GNC

Analysis and trade offs:

- **Interplanetary navigation** – ground based:
  - Range measurement: very accurate (≈10m).
  - DDOR: angular measurement (≈10nrad accuracy).
  - Range rate measurement: very accurate (≈10mm/s).
- **Relative navigation**:
  - Optical Camera → navigation around the comet and for navigation for landing up to HP3, support mapping imaging.
  - Scanning lidar → navigation for final landing phase (T&G) with **dust.**
  - IMU → robustness.

Baseline design:

- Scanning lidar
- Wide Angle Camera (60° FOV) → full comet in FOV @h=10km
- IMU
- DDOR + Range Rate measurement + Range (TBC)

Relative

Interplanetary

Touch & Go strategy – GNC

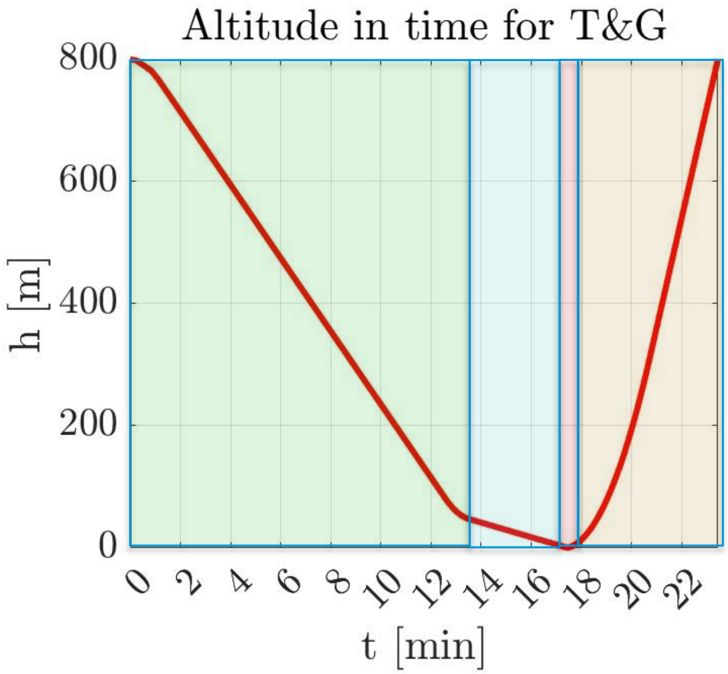
Constraints:

- V_{touch} = 0.2 m/s
- $h_{approaching}$ = 800 m

$\}$ V_{coast}=1 m/s

- Minimize T&G time
- F_{THmax} = 12 N

$\}$ Full thruster usage



Approach:13.5min	Coasting: 3.9min
Impact:5.8s	Escape: 5.9min

Requirements and Assumptions – ADCS

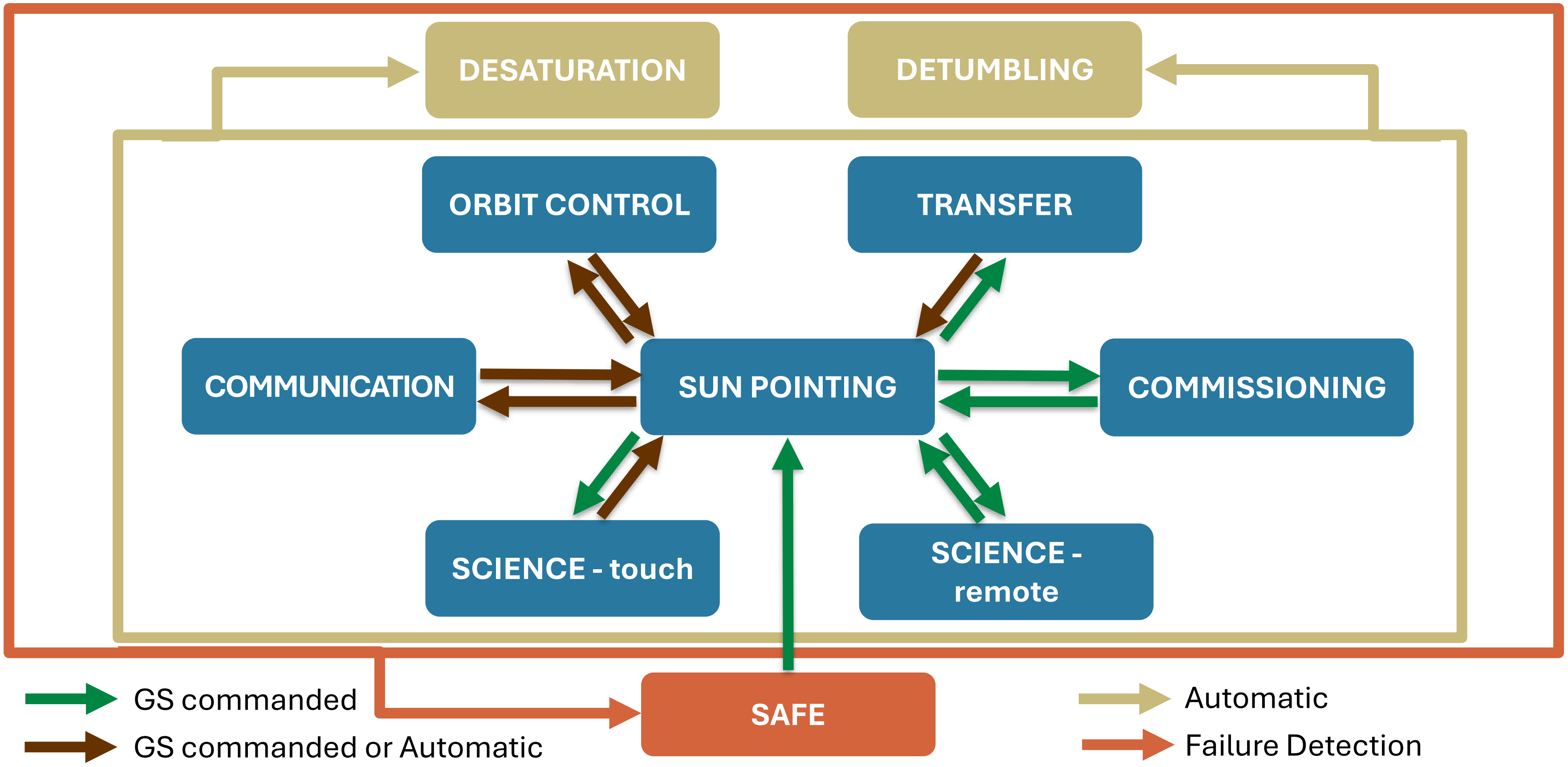
MAIN REQUIREMENTS

REQ ID	STATEMENT	COMMENTS
ADCS-010	The spacecraft shall not exceed a maximum angular acceleration of 0.17 $°/s^2$	From structural and payload request
ADCS-020	The subsystem shall be designed to ensure single-failure tolerance	System requirement [SR-01]
ADCS-030	During remote science mode, the APE shall not exceed 0.1°	From PL requirement, resulting in worst APE for the whole mission
ADCS-040	During safe mode, the APE shall not exceed 5°	From TTMTC to ensure the proper use of LGA

MAIN ASSUMPTIONS

STATEMENT	COMMENTS
No drag is considered during the Approach Phase	Low activity of the comet when this phase occurs
SRP was considered referring to 1 AU	Closest distance to Sun during whole mission
AKE is assumed to be 1/3 of the APE at each mode	Common best practice in mission design
Slew sizing based on a 180° rotation in 20 minutes	From worst case of angle and time across operations

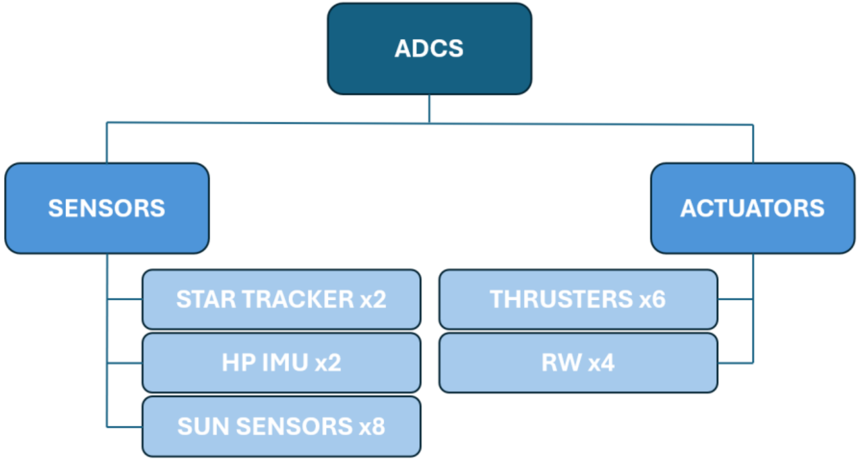
State Machine and modes – ADCS



Trade-offs and baseline architecture– ADCS

→ TRADE-OFFs

- **RWs** are more efficient than **CMGs**
- **Common thrusters** with PS
- **Star Tracker integrity**: positioning as far away as possible from landing surface



→ BASELINE

- 2 Star Sensors → Cold redundancy
- 2 IMUs → Retrieve attitude in worst case scenario (no star trackers available)
- 8 Sun Sensors → To have almost full coverage
- 4 RWs → Pyramidal configuration
- 6 Thrusters → Avoid residual torques, most control authority along non vertical axis while landing

Propulsion

Riccardo Coppola
Gabriele Nuccio
Angelica Perniciaro

Requirements and Assumptions – PS

REQ ID	STATEMENT	COMMENTS
PS-01	The system shall ensure the total ΔV of the mission.	To comply with Mission Analysis.

CRITICALITIES

- Provide a compact system compatible with mission analysis.
- Design a system requiring an affordable power budget.

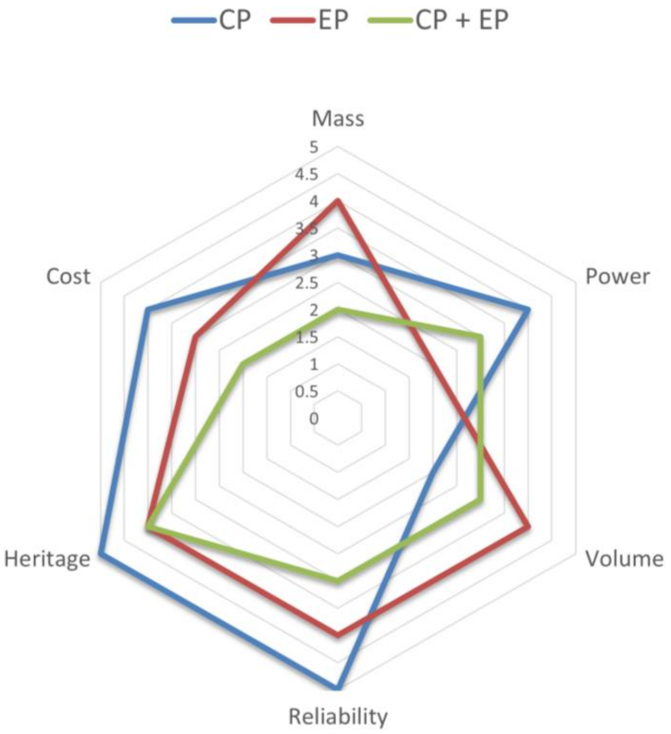
ASSUMPTIONS

STATEMENT
Statistics used for Pressure Falls from the Tanks to the combustion chambers.
Thrusters were taken from COTS.
Final Helium pressure equal to tanks pressure.

Analysis and Trade-offs – PS

3 Alternatives for the **main propulsion** system:

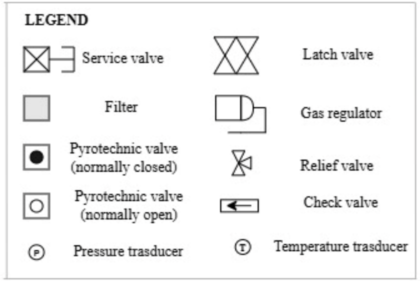
- **CP**: Bipropellant/Monopropellant
- **EP**: Xe Ion thrusters
- **CP + EP**

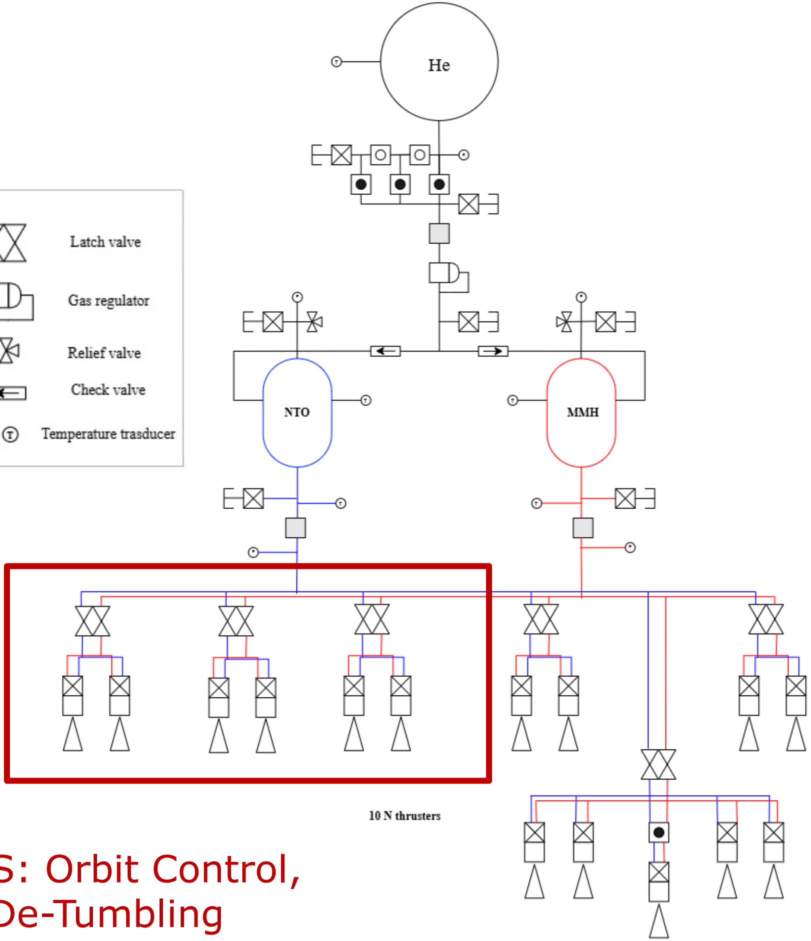


Final Baseline Design – PS

BIPROPELLANT MMH + NTO

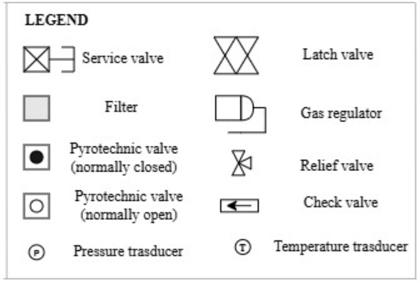
- 15 Ariane Group Bi-propellant thrusters with Dual seat valve
- **Pressure-fed** with **Helium**
- Tanks **Material**: Ti6Al4V
- Tanks **Shape**: Cylinder + Hemispherical Caps
- **Pressurant** Tank **Shape**: Spherical





6 thrusters ADCS: Orbit Control, SK, T&G, Slew, De-Tumbling

Final Baseline Design – PS



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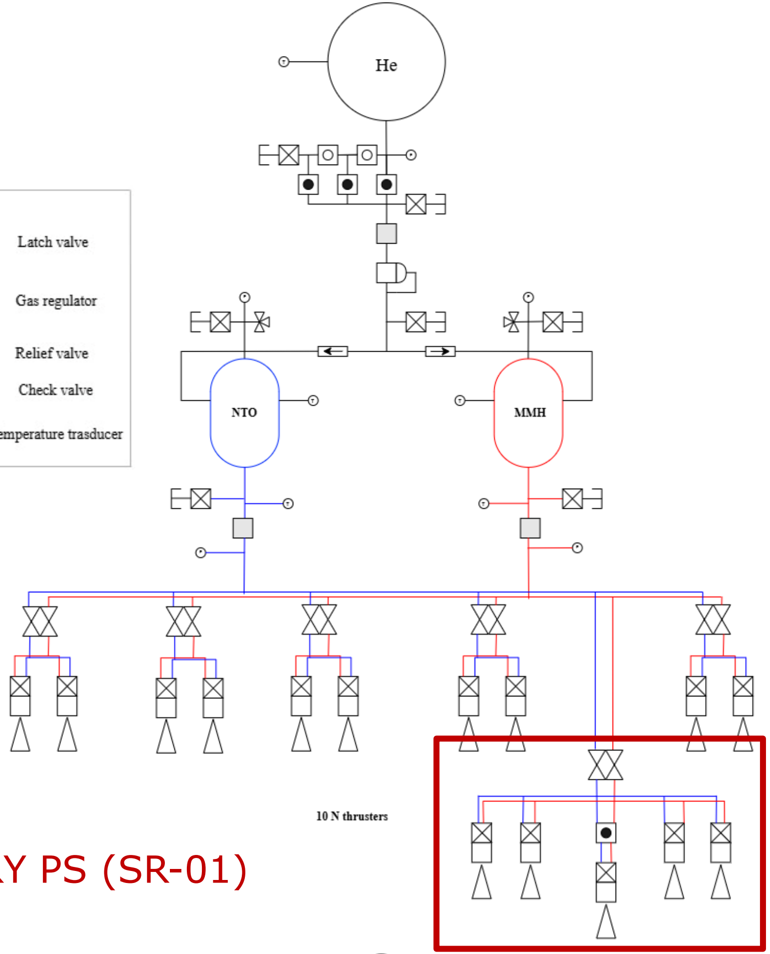

5 thrusters PRIMARY PS (SR-01)

Final Baseline Design – PS

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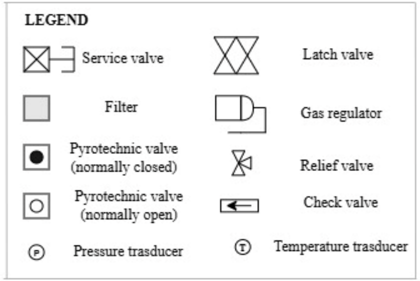
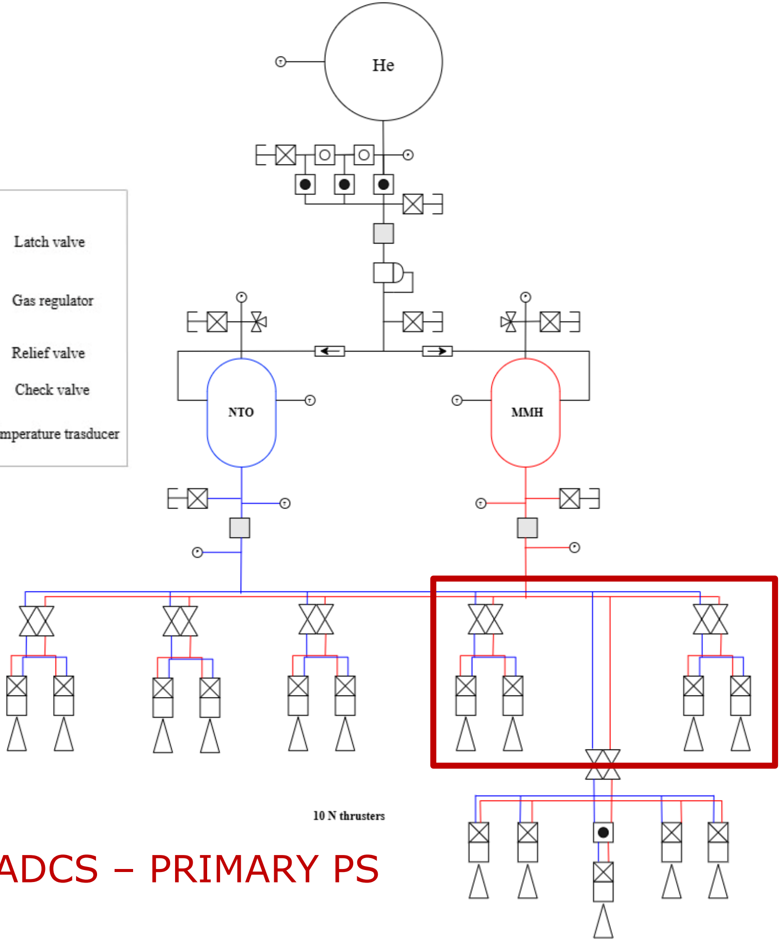




4 thrusters shared ADCS – PRIMARY PS

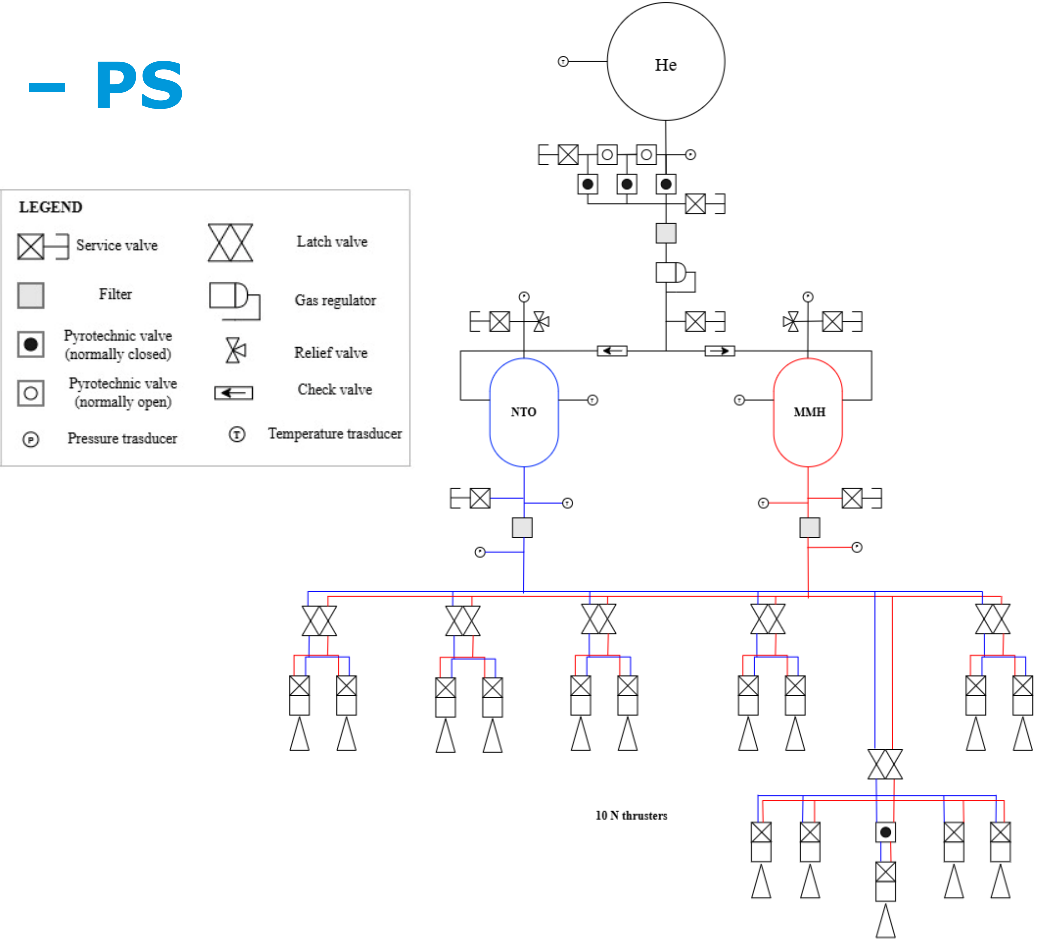
Final Baseline Design – PS

BIPROPELLANT MMH + NTO

- 15 Ariane Group Bi-propellant thrusters with Dual seat valve
- **Pressure-fed** with **Helium**
- Tanks **Material**: Ti6Al4V
- Tanks **Shape**: Cylinder + Hemispherical Caps
- **Pressurant** Tank **Shape**: Spherical

Inputs:
- ΔV [m/s] = 2581

Choice:
- Pc [bar] = 9
- Isp [s] = 292
- O/F = 1.67



Results – PS

Outputs:

- Overall compact system
- Single failure tolerant
- Low power budget

Feature	Value
Propellant Mass [kg]	2065.90
Pressurant Mass [kg]	9.03
Fuel Tank Volume [m^3]	0.973
Oxidizer Tank Volume [m^3]	0.973
Pressurant Tank Volume [m^3]	0.278
Inert Mass of the PS [kg]	98.45

Communication & On Board Data Handling

Lorenzo Cesarini
Gaetano Vitello

Communication Strategy – COMMS

LEOP/COMMISSIONING	TRANSFER	COMET APPROACH	SCI-REMOT
Frequent comms with ground, both Uplink and Downlink	Downlink of TM **once a week** with a **3.5h visibility window.** Comms before/after a **critical manoeuvre**	Communication at **Holding Point**	**15 days** of Downlink of DAWN images

T&G	RETURN
Comms before and after T&G **No comms** during T&G	Downlink the RADAR and Magnetometer data **during return** Downlink of TM **once a week** with a **3.5h visibility window.** Comms before/after a **critical manoeuvre**

Analysis and Trade-offs – COMMS

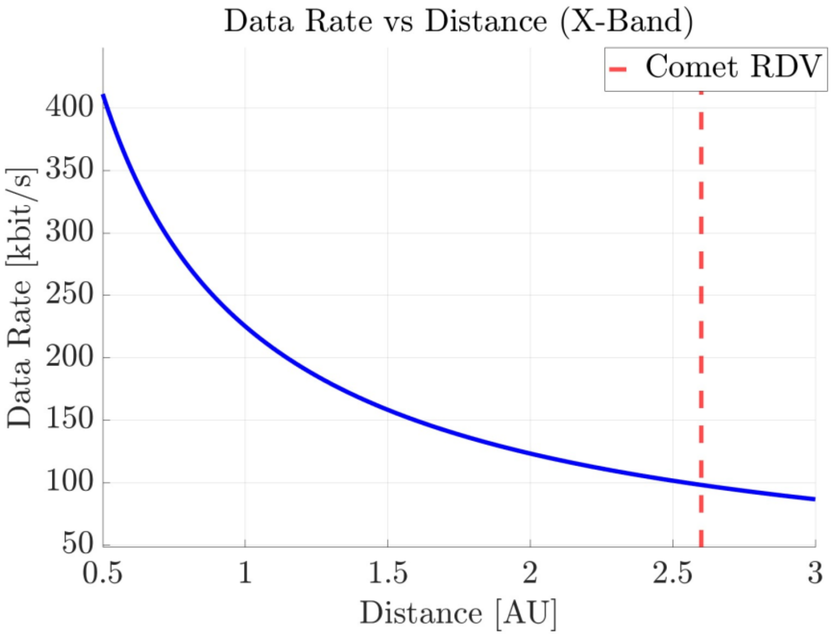
Ground network:

- ESA Core Network
  - LEOP/Commissioning
  - Close-to-Earth OPS
- NASA DSN

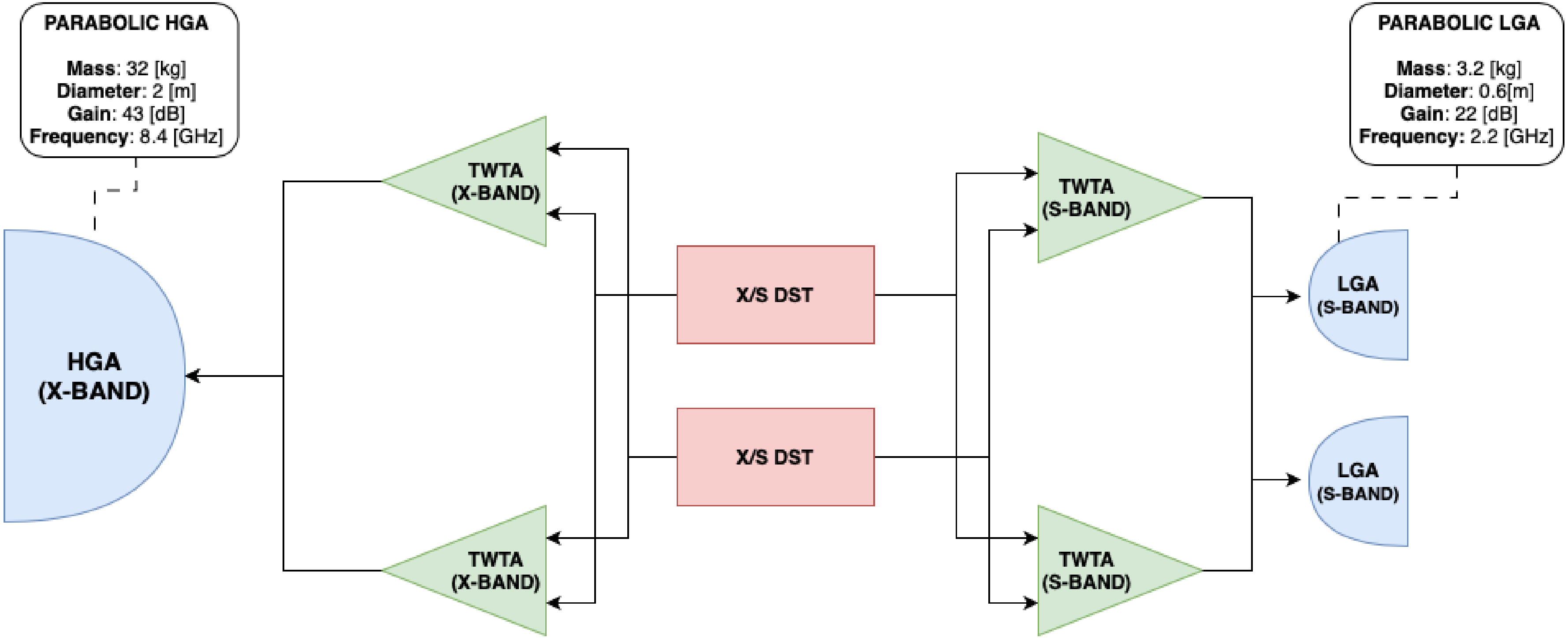
Data Rate vs Distance (HGA):

Phase: Transfer
Distance: 4 [AU]
Data Rate: 10 [kbit/s]

Phase: Science
Distance: 2.6 [AU]
Data Rate: 100 [kbit/s]



Final Baseline Design – COMMS



Requirements and Assumptions – OBDH

Assumptions

- Main OBC shall be sized to store all Payload data (20 GB)
- OBDH shall be sized to withstand total radiation dose absorbed during mission
- Main OBC shall be sized for image processing

ID	
SR-01	The system shall be single-failure-tolerant
MR-08	The total mission lifetime shall be at least 8 years

Main OBC Sizing Results

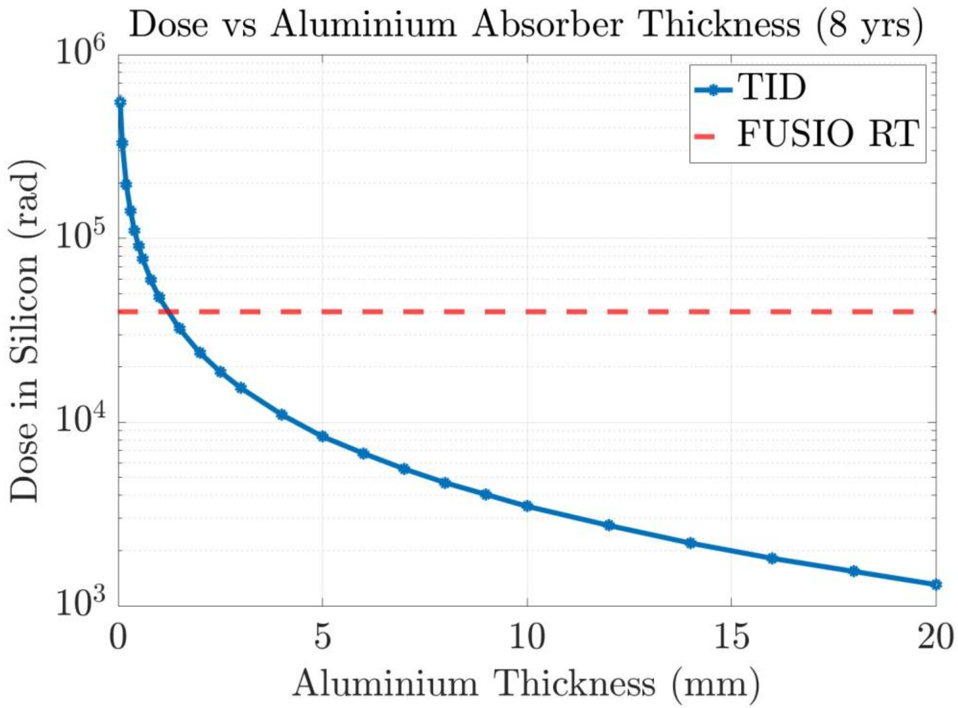
RAM [Mb]	ROM[Mb]	Mass Memory [GB]
2.33	4.34	20

Analysis and Trade-offs – OBDH

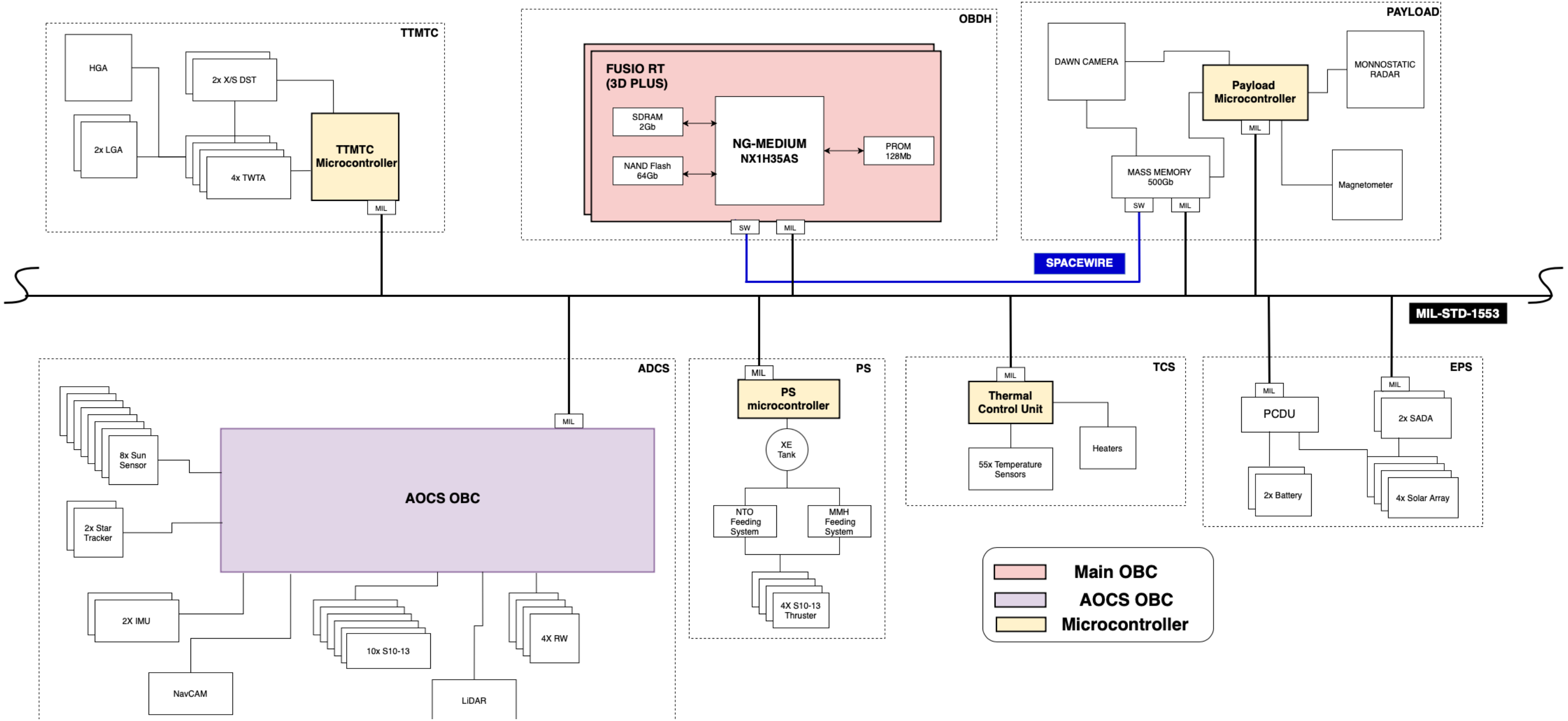
- **TID Analysis** performed using Spenvis
- **10^6 rad absorbed** over a 8yr mission at a distance of 1AU
- FUSIO RT (Main OBC) tested for **50krad**

↓

2mm Al schielding around OBC



Final Baseline Design – OBDH



Electrical Power System

Cecilia Calegari
Giuseppe Brentino

Requirements and Assumptions – EPS

ID	Requirements
SR-01	The system shall be single-failure-tolerant
MR-05	The mission shall be compatible with a European launch vehicle

Assumptions:

- The launcher will provide all the electrical power until separation
- The solar array will always point toward the sun with an accuracy of 20 degrees.
- Negligible eclipse time

Analysis and Trade-offs – EPS

- **Power generation**:
  - Solar array: TJ GaAs by Azurspace, good compromise between cost and efficiency
  - RTG: 50% mass savings with respect to PV + batteries, but it is not compatible with Ariane 6
- **Batteries**:
  - Li-Ion cells to reduce the mass
  - The touch and go maneuver will be performed on battery power, in order to reduce structural loads on the solar arrays
- **Power distribution**:
  - Peak Power Tracking with an unregulated bus at 28V in accordance with the literature

Final Baseline Design – EPS

Solar arrays	
Area [m^2]	53.4
Mass [kg]	267
Nseries	13
Nparallel	1226

Batteries	
Capacity [W-hr]	8100
Mass [kg]	70
Nseries	8
Nparallel	30

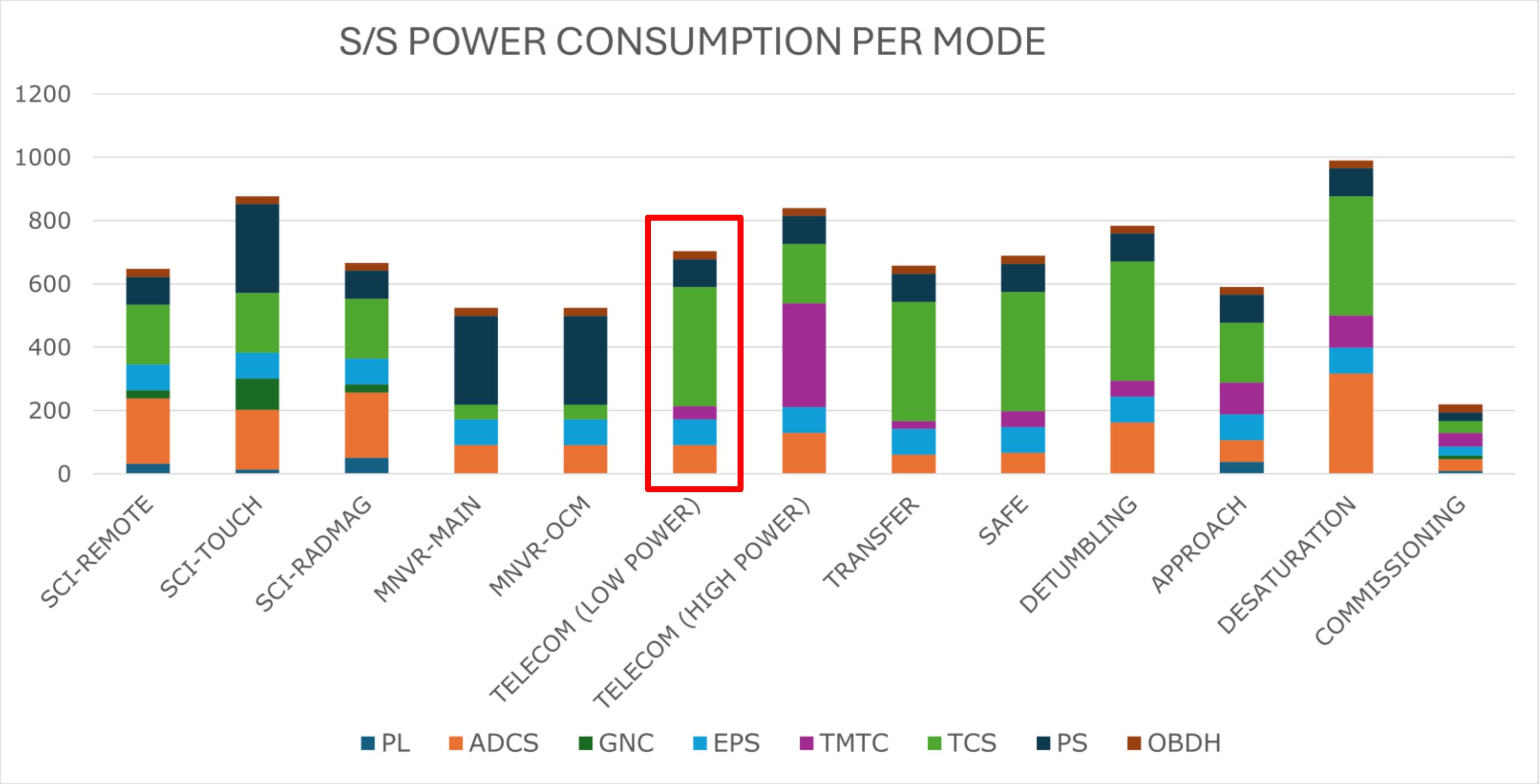
Sizing case:

- Phase: Telecom (low power)
- Power required: 626 W
- Max Sun distance: 4.6 AU
- Specific power available: 13 W/m^2

Sizing case:

- Survival in Safe mode for 12 hours @4.6 AU

Power budget



Thermal Control

Luca Frassinella
Edoardo Mensi Weingrill
Filippo Resta

Requirements and Assumptions – TCS

- **System Requirement**: SR-03

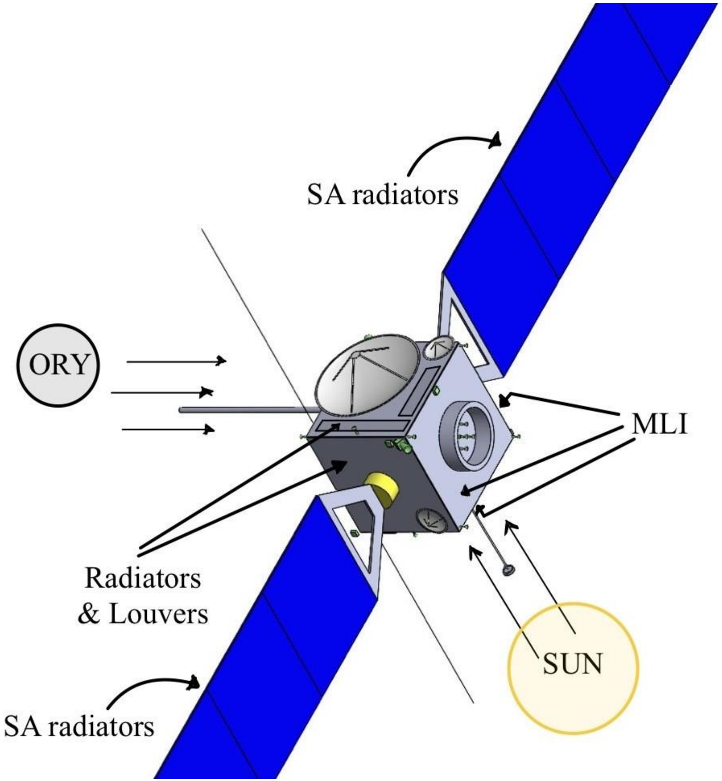
- **Hot Case:** Earth Flyby
  - $q_{Sun} = 1367 \frac{W}{m^2}$; $q_{Albedo} = 423.74 \frac{W}{m^2}$; $q_{IR} = 181.12 \frac{W}{m^2}$
- **Cold Case:** Max distance from Sun with ME off (~4.9 AU)
  - $q_{Sun} = 202.29 \frac{W}{m^2}$

- **Margins Philosophy Adopted**
  - Temperature Range = $[T_{Min} + 15°C\ ,\ T_{Max} - 15°C]$
  - $Q_{Heaters}$ / 0.7

Analysis and Trade-offs – TCS

Subsystem architecture:

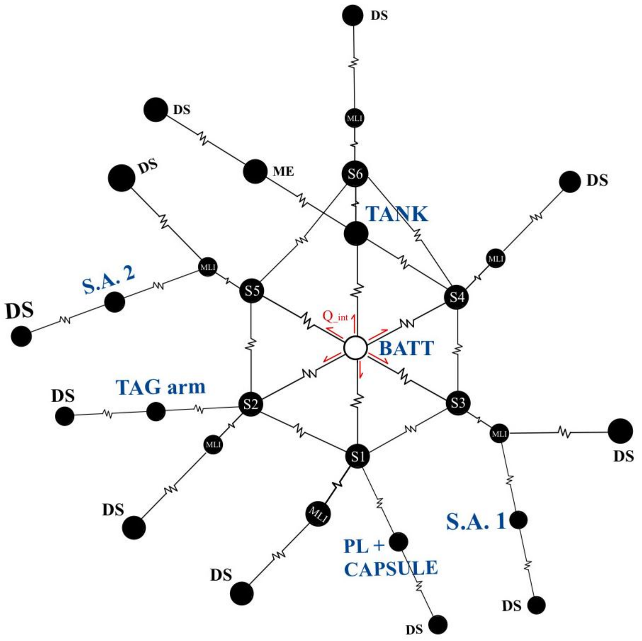
- **Radiators** with thermal louvers:
  - Surface 3, 5, 6
  - Solar arrays
- **MLI** on all external surfaces where free
- **Heaters** on the critical components, mainly on batteries, tanks and P/L
- **Coatings:**
  - Black paint for internal surfaces
  - White paint for HGA



Analysis and Trade-offs – TCS

Approach:

- Multi-Node Analysis
  - 20 Nodes
    - External surfaces
    - External MLI layers
    - P/L, TAG arm, batteries, tank, SAs, main engine, radiators
  - Assumptions:
    - No radiative heat transfer between the panels
    - Unique node containing all the tanks, considering the most stringent temperature range
    - No transient analysis



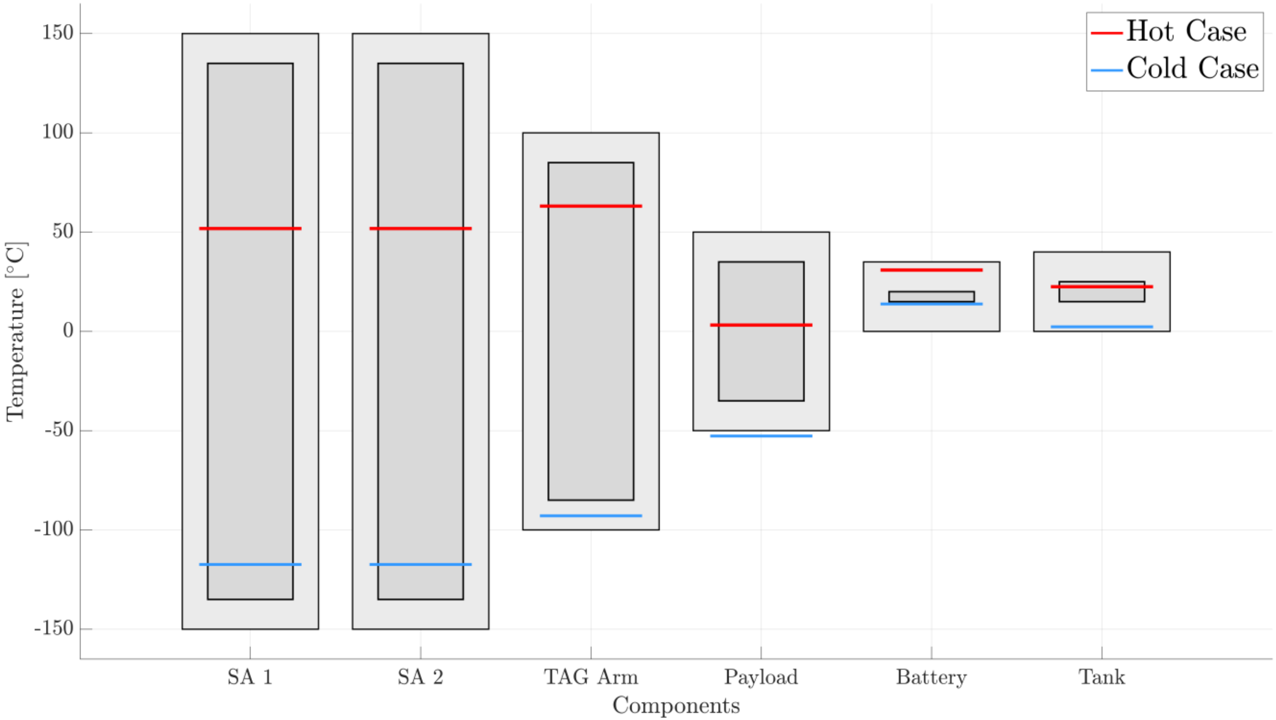
Final Baseline Design – TCS

TEMPERATURE [°C]							
	HOT CASE	COLD CASE	Temperature Ranges [°C]				
	Fly-By at Earth	Comet Approach	T_{min}	$T_{min.MM}$*	T_{max}	$T_{max.MM}$*
SA1	51.8	-117.4	-150	-135	150	135
SA2	51.8	-117.4	-150	-135	150	135
TAG	63.1	-92.9	-125	-85	100	85
PL	3.2	-52.7	-50	-35	50	35
BATT	30.9	13.8	0	15	35	20
TANK	22.5	2.3	0	15	40	25

* Margined according to the margin philosophy

Final Architecture	
Radiators Surface with Louvers (Arrays excluded) [m^2]	11.9
N.of Heaters	20

Final Baseline Design – TCS



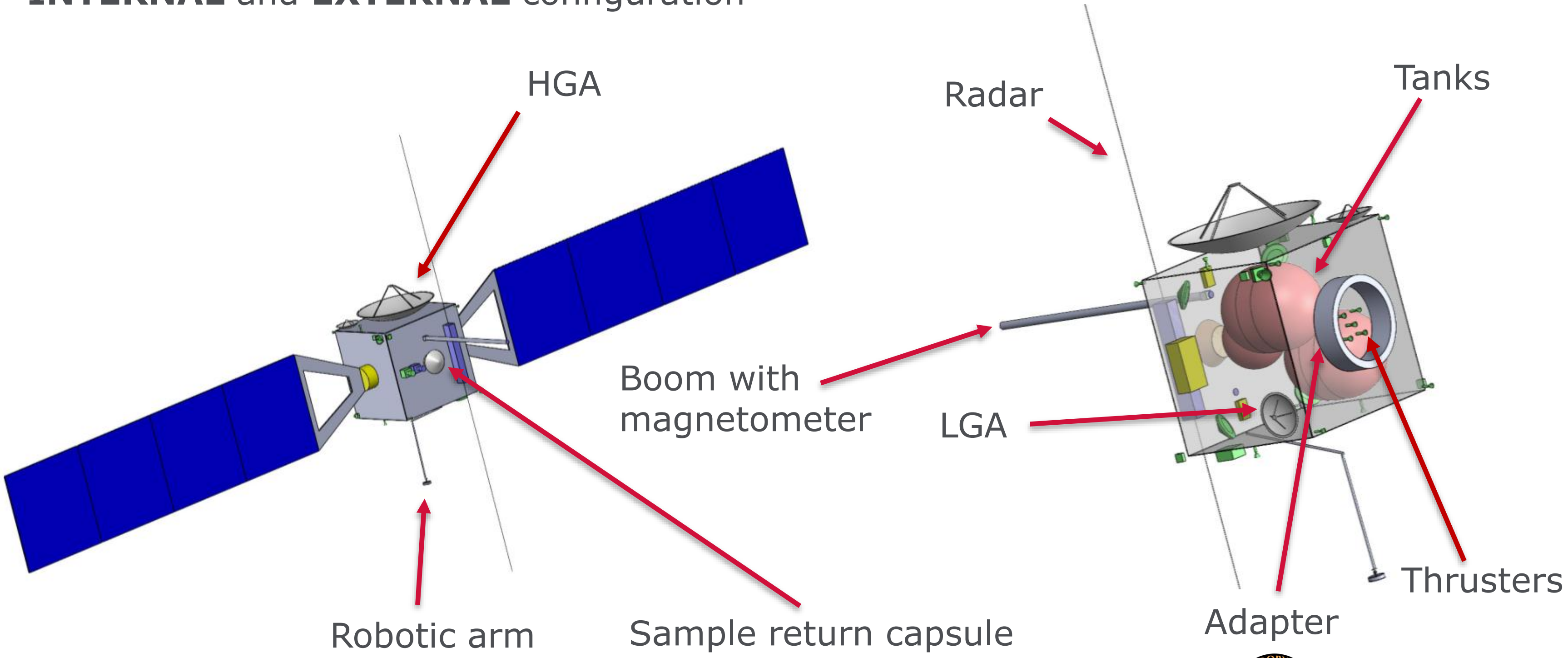
Configuration

Giacomo Burlando
Tommaso Cesarini

Configuration

Body	2.3 x 2.3 x 2.1 m
Single solar array	9.45 x 2.55 m

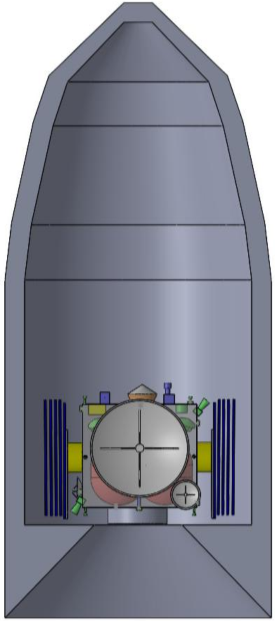
INTERNAL and **EXTERNAL** configuration

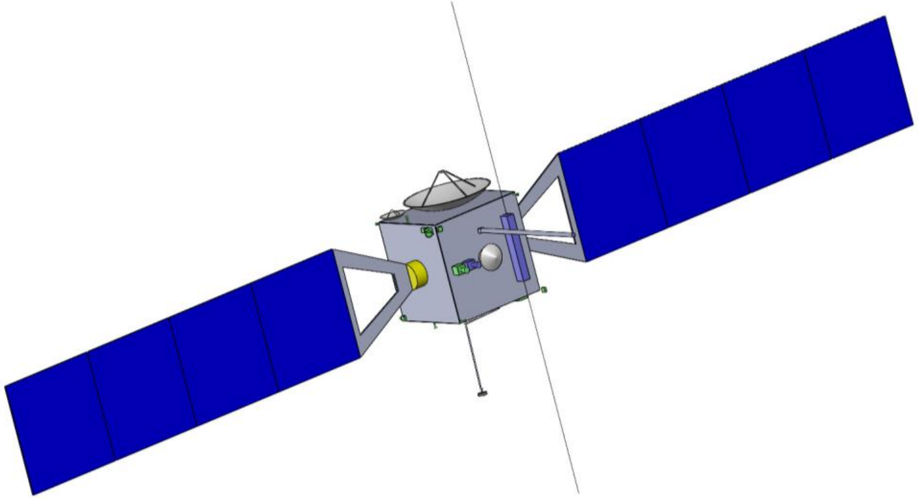


Configuration

Stowed conf.	3.82 x 3.05 x 2.92 m
Fairing (Ø, H)	5.4 x 20 m

Fairing envelope **Ariane 64** with **DORY**



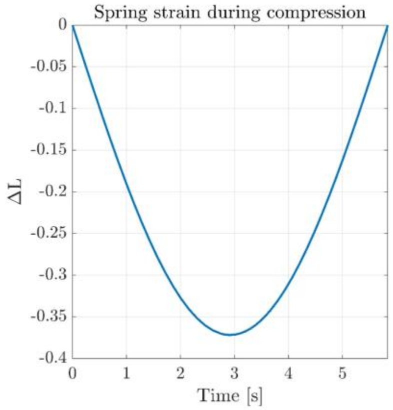


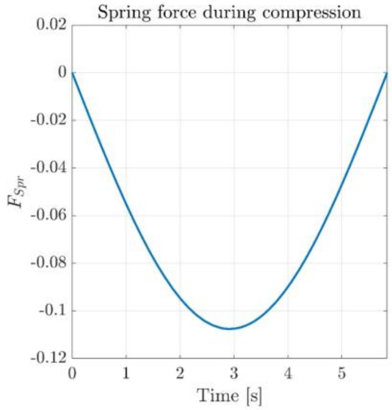
Structure

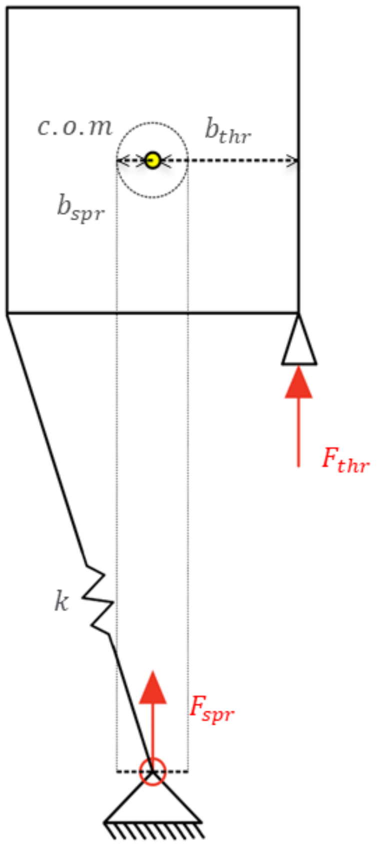
Riccardo Galvani
Mattia Sala
Riccardo Caliri

Structure - R.A.D.

Costraints		Output
Sampling time	$t_{sampling} > 5s$	$t_{sampling}$
Maximum acceleration	$a_{TAG} \leq a_{critic} = 0.04\ m/s^2$	$a_{spr\ max}$
Momentum balance	$F_{thr} \cdot b_{thr} = F_{spr} \cdot b_{spr}$	k_{spr}
Maximum displacement	$\Delta L_{spr\ max} = 0.5\ m$	ΔL_{spr}





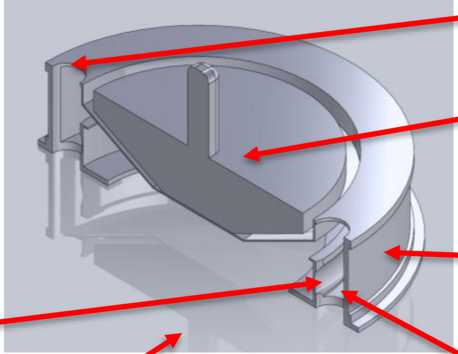


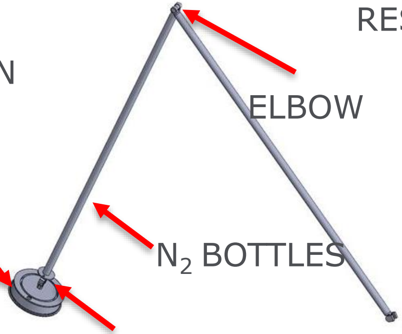
Structure: TAGSAM & Robotic Arm

Description	Data
Base diameter	0.23 m ✓
Height	0.053 m ✓
Material selected	Al 7075
Dry mass to store in return capsule	0.91 kg ✓
Allowable sample volume	0.374 L ✓
Arm full extention	3.4 m
Arm diameter	0.006 m (TBC)

- ☺ Extensive IRAD-supported LM testing
- ☺ Test results fulfil collection requirements
- ☹ Shoulder and Elbow EMs to size
- ☹ Wrist U-joint to adapt to the ground

(Heritage: OSIRIS-REx)

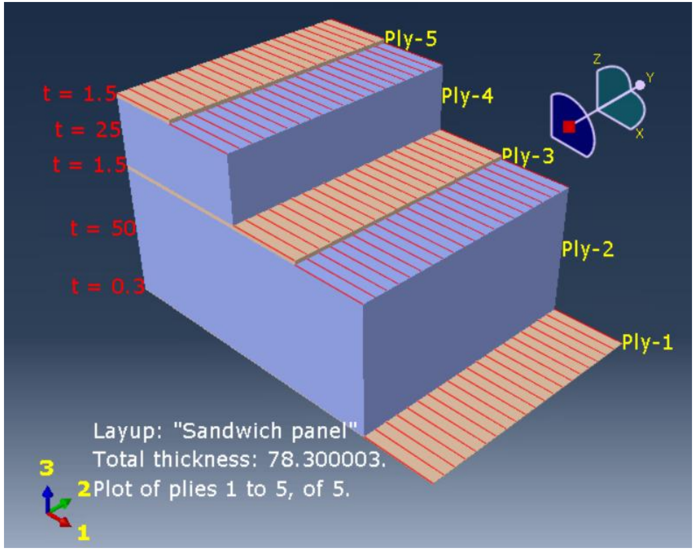




Structure: Modal Analysis

Launcher compliance	Value
Min. axial natural frequency	20 Hz
Min. lateral natural frequency	6 Hz
Min. ax. obtained	29 Hz ✓
Min. lat. obtaned	13 Hz ✓

Zone	Selected materials
Skin e core	Aluminum and honeycomb composite layup.



Mass budget

- Design Maturity Margins
for subsystems are applied in compliance with ECSS standards.
- Mass currently not compliant with Ariane 64 C3 capabilities, but addressable in further iterations.

Subsystem	Mass with DMMs[kg]
P/L	43.03
ADCS	50.72
GNC	33.47
EPS	413.88
TTMTC	68.88
TCS	11.34
PS	98.45
OBDH	1.20
CAPSULE	27.3
STRUCTURES	420
Dry Mass (+20%)	1497.91
Wet Mass	3563.81
Launch Mass	3643.81

Cost

Gaetano Vitello

Final Baseline Design – COST

System activities cost:

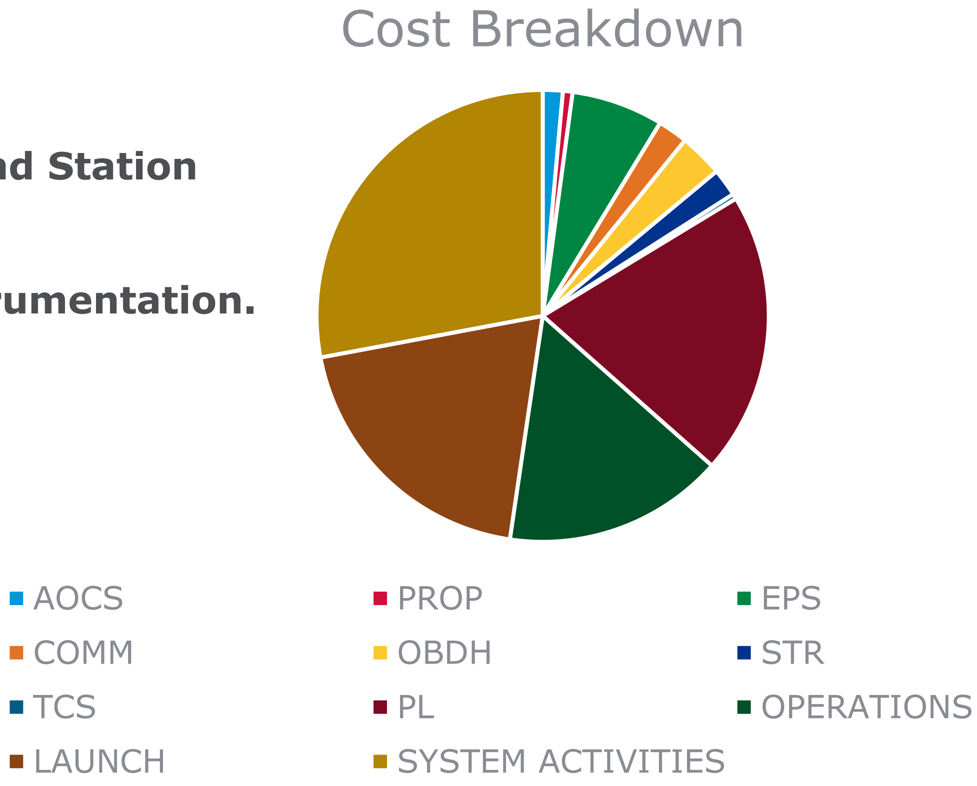
- Management
- Engineering
- Product assurance
- AIVT
- **Planetary Protection**
- Facility

Operation:

- **DSN Ground Station**
- MOC, SOC

Payload Instrumentation.

Total no margin:	**636.93 M€**
Total + 31% risk margin:	**834.43 M€**



Mission Requirements Overview

ID	
MR-01	The mission shall launch by 2036.
~~MR-02~~	~~The mission shall be compatible with a parking orbit lasting at least 6 years.~~
MR-03	The mission shall return at least 10g TBC of samples to Earth
MR-04	The mission shall investigate the elemental composition of a comet to at least a depth of 30cm (requirement), and should investigate a depth of up to 1m (goal).
MR-05	The mission shall be compatible with a European launch vehicle.
MR-06	The mission shall cost no more than 800M€ (2025).
~~MR-07~~	~~The total mission lifetime shall be at least 8 years.~~
MR-08	The mission shall investigate the elemental composition of 100% of the surface of a comet with a resolution of 2m (TBC).
MR-09	The mission shall comply with the planetary protection policy.

System Requirements Overview

ID	
SR-01	The system shall be single-failure-tolerant. (NOTE: no redundancy is expected for propellant tanks or heavy critical mechanisms, though non-mission-failure is of course always preferred)
SR-02	The system shall be capable of rendezvous with 1 comet.
SR-03	The system shall maintain the acquired samples within a temperature range of TBD to TBD °C until the sample is retrieved on ground.
SR-04	The system shall maintain the acquired samples at a pressure of no more than TBD Pa until the sample is retrieved on ground.
SR-05	The system shall allow for the identification of at least one landing site.
SR-06	The system shall land / touch down on the selected landing site with an accuracy of TBD m.
SR-07	The system shall be able to survive the effect of dust accumulation during contact with the comet.
~~SR-08~~	~~The system shall be capable of remaining in a parking orbit (while waiting for a suitable target of opportunity) for at least to 6 years.~~
~~SR-09~~	~~The system shall be able to reach comets with a propulsive cost of at least 700 m/s TBC (when assuming impulsive manoeuvres).~~
SR-10	The system shall be able to monitor and provide data of magnetic disturbances in 3 axes.

Conclusions

- The mission is **deemed feasible**, and can go through further studies to address open points and criticalities

Open points

- Ariane 64 currently insufficient
- Further design iteration needed on all subsystems
- If an European launcher is not selected, RTGs can be evaluated as power source alternative
- Re-iterate mission design with Electric Propulsion
- Samples management (Pressure, Temperature)

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