

PROGRESS ON ESA PARALLEL CONTRACT ON LEO CARGO RETURN SERVICE (LCRS) PHASE 1

SPACE FOR INSPIRATION 2024 – COMMERCIAL STATIONS AND LOGISTICS:
ACCELERATING BUSINESS PLANS IN LEO

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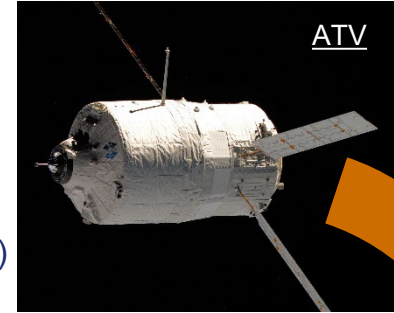
DOMAIN EXPLORATION AND SCIENCE



LCRS PROGRAM OVERVIEW

/// Program objectives

1. Development of a commercial service for cargo upload/return to/from human outposts in Low Earth Orbit (LEO) targeting operations with the International Space Station (ISS) as well as future Commercial LEO Destinations (CLDs) including:
 - the development of a vehicle with associated ground infrastructure and operations
 - the launcher; despite LCRS may be based on any launcher, however it shall be compatible as a minimum with Ariane 6 or another European launcher.
2. Execution of a demonstration mission to the ISS, targeting a launch date within 2028, with Industry being in charge of the end-to-end mission from the customer's handover of upload cargo to the Contractor, to the return of download cargo to the customer. *TASI objective is to implement the demo mission as close as feasible to ESA target*
3. The vehicle and its associated ground infrastructure and operations shall be compatible, without major modifications to their architecture, with the two following potential evolutions:
 - evolution to a crew transportation service to human outposts in LEO
 - evolution to a cargo return service from the Gateway in cis-lunar orbit



LCRS PROGRAM OVERVIEW

/// Thales Alenia Space positioning in the global market

/ Extensive knowledge of LEO needs and experience via

- Design and development of all typologies of habitable modules: Logistics (ATV, MPLM, Cygnus), Life support and resource management (Node 2 and Node 3), Cupola, On orbit Storage (PMM), Science Laboratory (Columbus), Commercial Airlock (Bishop)
- Cargo Integration for ATV and Mission Operations (COSMO and PA) and Sustaining Eng for all ISS station elements from 2008
- Available ground infrastructure and services experience achieved via ALTEC
- Return experience matured with IXV and with current Space Rider program

/ Extensive Collaboration with future LEO commercial stations and associated services via

- Provision of elements for Axiom station
- Collaboration with Northrop Grumman for ISS resupply and Logistics scenario evolution
- Dialogue with other CLD providers



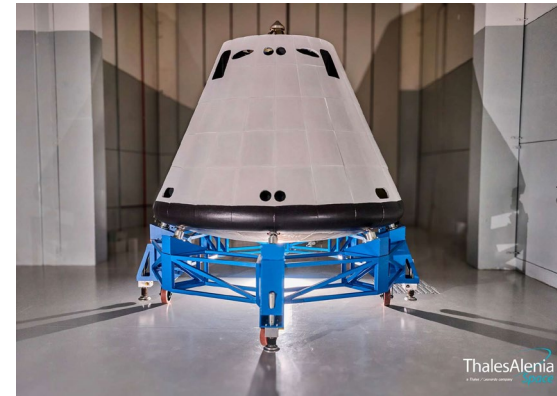
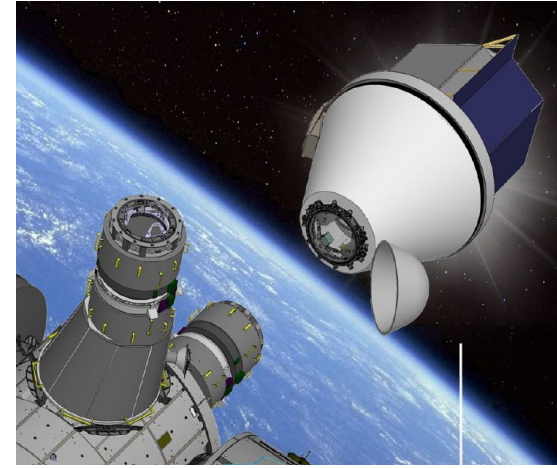
PROGRESS ON SERVICE DEVELOPMENT

/// Market survey and analyses to identify customers

- Service delivery to ISS (until it is decommissioned)
- Service delivery for logistics resupply of the future commercial space stations and exploitation of free-flying platforms

/// Identification, assessment and prioritization of users needs for service definition and definition of requirements for the cargo vehicle

/// Definition of the end to end service organizational structure and relevant governance



LCRS PROGRAM OVERVIEW (2/2)

/// Challenges

- Aggressive schedule to meet the target launch date which require innovative solutions
 - ISS expected de-orbit 2030-32 with risk to anticipate to 2029
 - Commercial station operations may start from 2028-29
- Technological challenges mainly for re-entry phase
- Upload/download capabilities (minimum 2 tons download)
- Extensive re-usability
- Maximize frequency of flights – Commercial station needs of frequent resupply
- Elaboration of a competitive and exhaustive end to end service scheme
- Service price competitiveness
- Regulatory frame for the service

! Full commitment to resolve all since contract signature



PROGRESS ON VEHICLE DEVELOPMENT

/// Definition of CONOPS

/// Consolidation of system requirements and preliminary system design

/// Developments activities needed to bring the technologies at TRL 6 by the end of Phase 1

- The demonstration mission will be based as much as possible on existing technologies (TRL>6) being its primary objective the validation of Rendezvous & Docking and re-entry, with transportation of powered cargo to the ISS
- New and delta-developments will be aiming to improve increase the vehicle performances and increase the level of re-usability of the flight hardware

/// Procurement of Long Lead Items

/// Consolidation of a design lifecycle approach and associated task anticipation to achieve the target launch date

/// Identification and implementation of alternate solutions to mitigate possible risks

