Human Spaceflight Document List

Antonio Preden, Marco Carrano, Robert Furnell

Day 2

13:40-14:30

EUROPEAN SPACE AGENCY

Europe's Future in Human Spaceflight

- Europe currently depends on international partners for human access to space.
- **Europe needs greater autonomy**, freedom of action and the ability to cooperate from a position of strength.
- Europe must develop and retain **critical exploration capabilities**
- ESA's exploration vision for LEO to be presented at the Intermediate Ministerial Council includes :
  - European **crew vehicle and transportation capability** for routine access to LEO.
  - Use of European **launch services**, with Ariane 6 as the near-term solution.
  - Assessment of a **human-tended LEO outpost**, potentially European-led and developed with institutional and commercial partners.
  - A pathway towards Europe becoming a provider of human spaceflight services rather than a customer.

Integrated Human Spaceflight Documentation Framework – Why?

- Human spaceflight requirements and operational frameworks have historically been driven largely by ISS and NASA documentation.
- Future European-led capabilities require **ESA to define its own integrated human spaceflight framework**.
- Today, no single end-to-end ESA documentation hierarchy exists that connects strategy, requirements and operations --> **Industry needs a clear, stable and consistent set of expectations** for future human spaceflight programmes.
- The framework intends to establish traceability from Policies & Principles → Requirements → Operations Concepts & Plans, enabling coherent programme development across LEO, lunar and future exploration missions.

Integrated Human Spaceflight Documentation Framework – What?

- A complete Human Spaceflight documentation product tree is under development. A draft structure exists but is not yet mature for formal issue.
- Initial focus is on **establishing the policy and principles foundation** before progressing to detailed requirements, operational concepts and implementation-level documentation.
- Nine documents identified, development is split into two batches:
  - Batch-1: Policy-oriented documents
  - Batch-2: Principles and Framework documents
- All documents are currently undergoing ESA internal Review (HRE) and will soon undergo ESA Independent Review through October 2026.
- Following this review, the documents will be opened for **external review by industry** and national agencies.

Integrated Human Spaceflight Documentation Framework – How?

- Review approach:
  - Step 1 – ESA Independent Internal Review (DG-I). Definition of ESA Independent Review Team currently in work.
  - Step 2 – External review with industry and national agencies

- Timeline:
  - ESA review until end of October 2026.
  - Interaction with industry, via ESA-STAR, until end of Jan 2027.
- In the meantime, ESA will progress the next documentation layer, primarily focused on **requirements** and implementation guidance.
- Policies will go out to industry for generic "comments". Requirements will require specific review!

Human Spaceflight Documentation Framework

Batch-1	Book Captain
Human Spaceflight Safety Policy	Raul Alarcon
Human Spaceflight Health & Human Performance Policy	Sergi Vaquer
HRE Data Policy	Eric Istasse
Human Spaceflight Security Policy	Edi Yau
Human Spaceflight System and Payload Engineering & Integration Policy	Thomas Sheasby / Julia Weis

Batch-2	Book Captain
ESA Astronaut Crew Code of Conduct	Alexander Gerst
Human Spaceflight Science Framework	Angelique Van Ombergen
Human Spaceflight Safety Framework	Emmanuel Vicari
Human Spaceflight Missions Operation Framework	Alexander Nitsch / Marco Carrano

Part II – Application case: Crew Vehicle

Context

- ESA preparing activities for LEO Crew Transportation System
  - Fully European capability
  - Use European launch services operated from ESA/EU member States
  - Participate in LEO economy with partners

- Work on concepts and technology derisking started
  - ITT under preparation
  - Assessment of standards, policies and interface requirements ongoing

Applicable documentation – work ongoing

- Identify and assess candidate documentation applicable to the Crew Vehicle
  - covers requirements, policies, standards, interface specifications, legal obligations.
- Consolidate input from multiple sources
  - ESA Human Spaceflight documentation, ECSS standards, NASA CLD requirements, heritage programmes.
- Establish a coherent and accessible baseline for industry
  - prioritise European and non-European documentation that can be made freely available to all potential industrial bidders.
- Minimise reliance on documentation subject to US Export Control (ITAR/EAR)
- The objective is to establish a traceable, justified and tailored European Crew Vehicle document baseline, leveraging ESA, NASA and heritage experience while identifying new requirements.

Applicable document list for phase A

ESA/European Sources
- ECSS Standards
- ESA Human Spaceflight Policies
- ESA Programme Requirements
- National laws

NASA/CLD baseline
- CLDP requirements
- Human Rating standards
- Safety & Operations
- Interface Standards

Heritage & External
- Orion ESM
- ATV / ISS visiting
- Aladdin
- Non-US partners

Enterprise elements
- Launcher
- Launch base
- Flight Operations
- Recovery

Applicability assessment (ongoing). Identify what is applicable for Crew Vehicle:

- Applicable as is
- To be tailored
- Reference / good practice
- Not applicable

Crew Vehicle Baseline

NASA CLDP Requirements

The LEO Crew Transportation System needs to be compatible with Commercial LEO Destinations.

NASA developed CLDP requirements (and related Applicable Documents) and publishes them on Sam.gov, e.g.

Document Number	Document Title	Revision
CLDP-REQ-1130	Requirements and Standards for the Commercial Low-Earth Orbit Development Program	Revision B
CLDP-STD-1101	Commercial LEO Development Program Common Docking System Standard	Basic
CLDP-STD-1150	Commercial Low-Earth Orbit Development Program Operations Standard	Revision A
CLDP-STD-1170	Common Communications for Commercial Destinations in Low-Earth Orbit (C3DL) Radio Frequency (RF) Interface Standard	Baseline

Forward work for ESA and European Industry is to analyse those requirements and adapt them – as much as possible – to a European development, with focus on the use (and often development) of European standards that are valid alternate to what is mandated by NASA.

EUROPEAN SPACE AGENCY

THANK YOU!