CO2M – LCA OF A SPACE MISSION DURING PHASE B2 AND C/D

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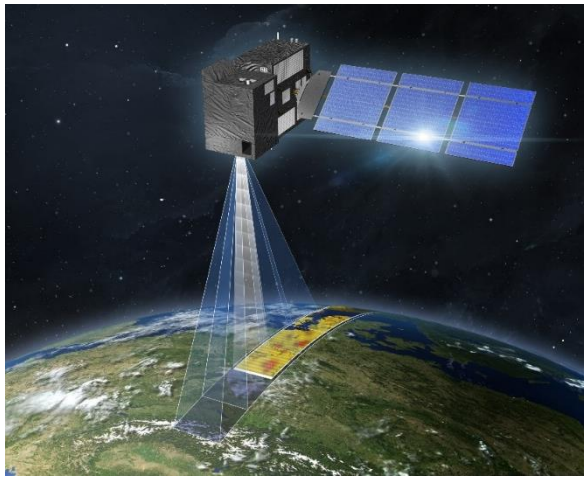
PROJECT: LCA OF CO2M MISSION

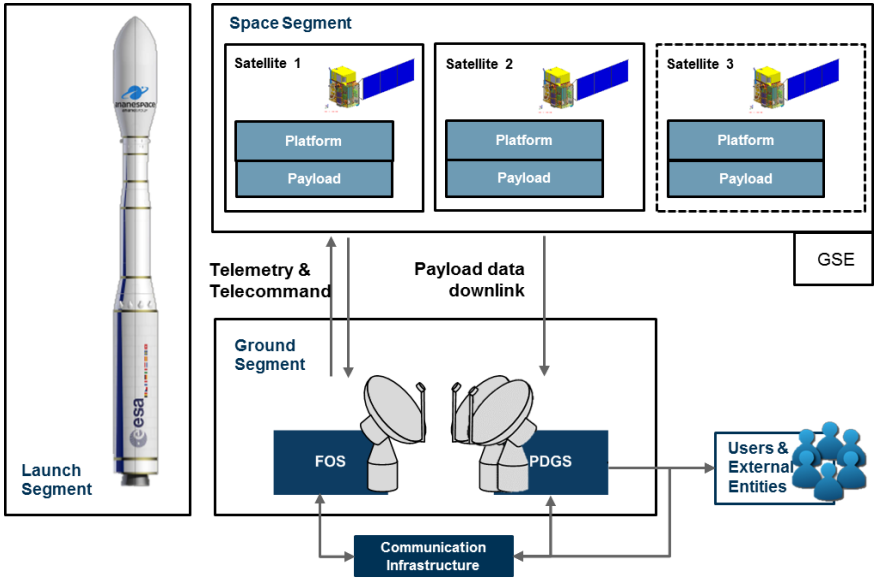
- How it started:
  - Iterative LCA of standard **platform** for Copernicus missions during phase A/B1
  - Identification of environmental hotspots and mitigation actions

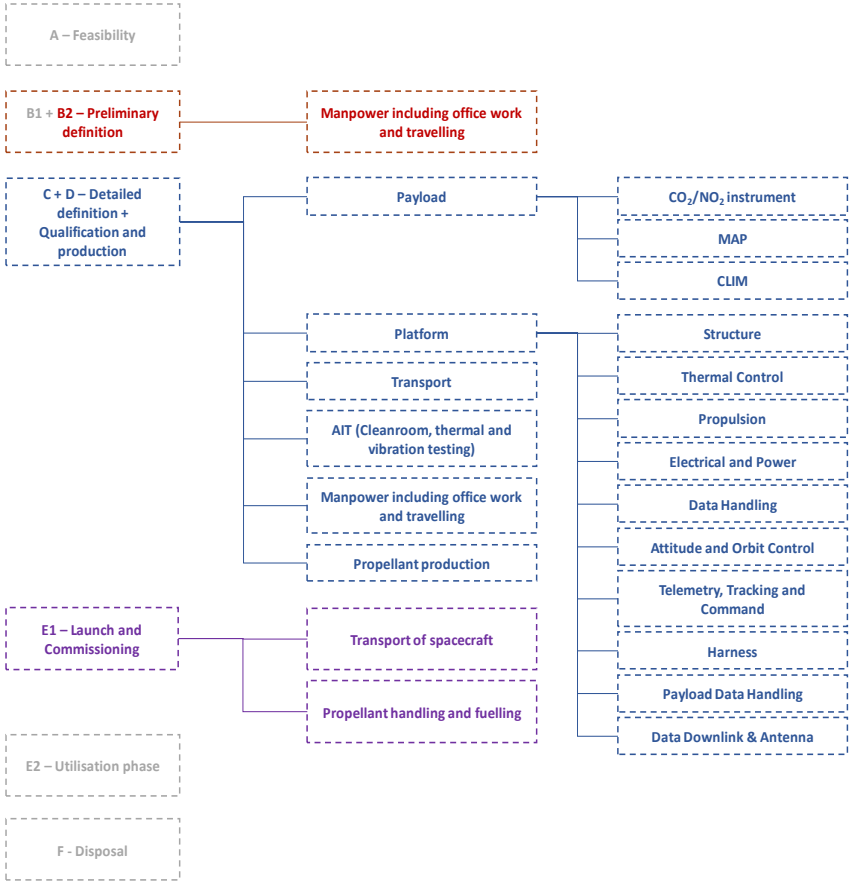
- What is currently ongoing:
  - Iterative LCA of CO2M **mission (platform + payload)** during phase B2 resp. C/D
  - Identification of environmental hotspots and understanding impacts/sources

- CO2M Mission objective is to measure and identify hotspots of anthropogenic CO2 emissions.



LCA OF CO2M: GOAL AND SCOPE





Functional unit: "Definition, production, testing and spacecraft-related launch activities of the space segment of the CO_2M mission"

LCA OF CO2M: DATA COLLECTION (LCI) AND LCIA

- Data collection follows **iterative approach** and study phases
  - Specific data from OHB and TAS
    - Mass balance, BoM on equipment level, hardware matrix, GSE, AIT
    - Powerpoint to guide suppliers in data collection
  - More specific data become available during satellite development
  - Background data and proxies come from ESA database, Ecoinvent database and literature
  - Data Quality Rating is performed in each iteration (finally DQR ≤ 3)

- **Allocation**:
  - Mass criterion to allocate impacts in the foreground system
  - Economic allocation for background system (Ecoinvent)
  - Only person hours directly dedicated to CO2M mission
  - Common infrastructure based on duration of use
  - Recycled content approach

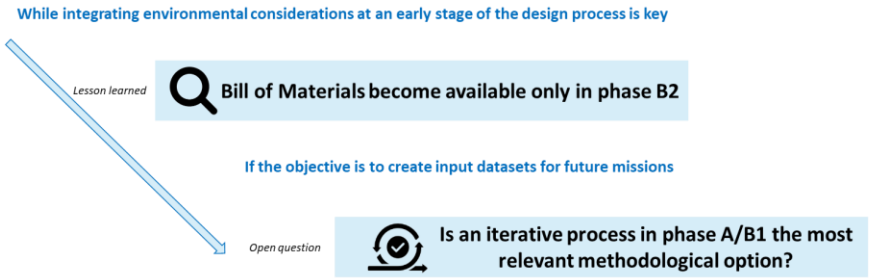
- **LCIA method**: combination of different methods

LCA FOR SPACE MISSIONS – LESSONS LEARNED AND CHALLENGES

From the **perspective of an LCA expert**

- ESA facilitates and enhances uptake of environmental considerations in space
- Supported by guidance documents, database, … → Need to continuously update

- Suggestion to **tailor/distinguish** guidelines in ESA Handbook specific for G&S and LCI to
  - Development phase (A, B1, B2, C/D, E)
  - Objective of the LCA (ecodesign, elaboration of database, …)



- Clear **guidance** from ESA on aspects such as:
  - DQR assessment: on which level (S/C, subsystems, equipment, …)?
  - Margin philosophy
  - Testing: what to include, how to include impact of testing
  - How to deal with missing data → proxies?
  - Data collection: how to set focus and priorities, how and when to involve suppliers?

- Good **balance** between required efforts (for data collection) and added value:
  - Focus where it matters

LCA FOR SPACE MISSIONS – LESSONS LEARNED AND CHALLENGES

From the **perspective of the prime**

- Performing a LCA is a valuable assessment to understand the environmental hotspots of the satellite development and manufacturing.

- In early phases (A/B), material and manufacturing processes information is scarce:
  - Limited information is currently available in the ESA database
  - Proxies are providing a high level estimates

- Clear guidelines from ESA would be beneficial on:
  - How to handle missing information.
  - Which part of the data collection is driving and should be the focus of the effort.

- Harmonize data collection approach towards the suppliers.

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