From Spreadsheets to Capella: How a Student Team Built a Rover and a Drone in One Year

Authors:

Andreea Lita

Dr. Sophia Salas Cordero

Dr. Thibault Gateau

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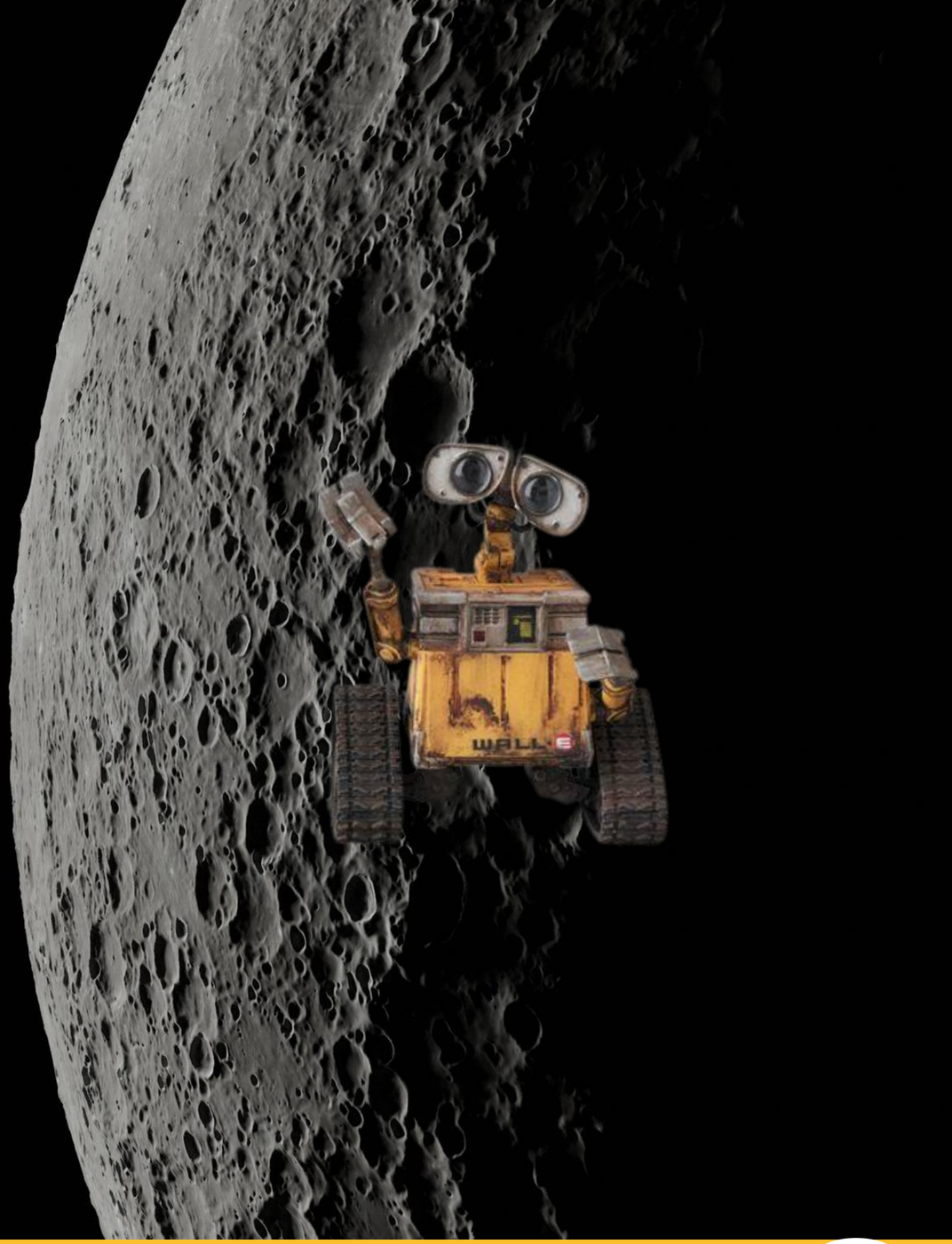
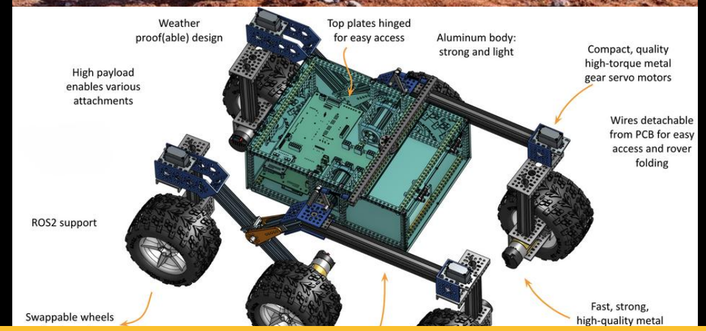


Projects description

ERC 2025

Science task
Navigation task
Maintenance task
Presentation task
Probing task

ERC Finalists earn a free **SpaceCert** that recognizes their contribution and skills much needed in the space industry.



Registration (Proposal)
February 2025

Preliminary report + Video
April 2025

Tasks execution plan

Final report
July 2025

Environmental Report

Science Planning Report

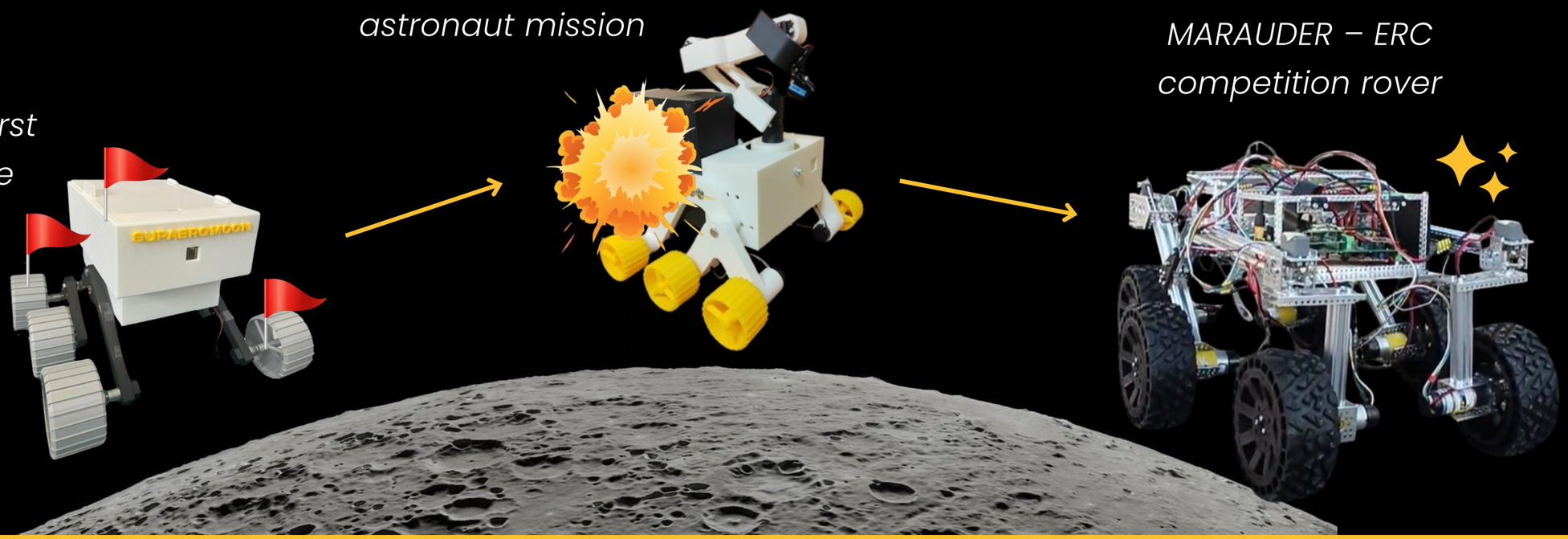
ERC 2025 Finals
September 2025

Enhancing Robotic System Reliability through Model-Based System Engineering

SELENE – First prototype

NEMO – MDRS analog astronaut mission

MARAUDER – ERC competition rover



Problem & Scope

Enhancing Robotic System Reliability through Model-Based System Engineering

Reliability

+

Traceability

Novice team

High stakes

Scattered information

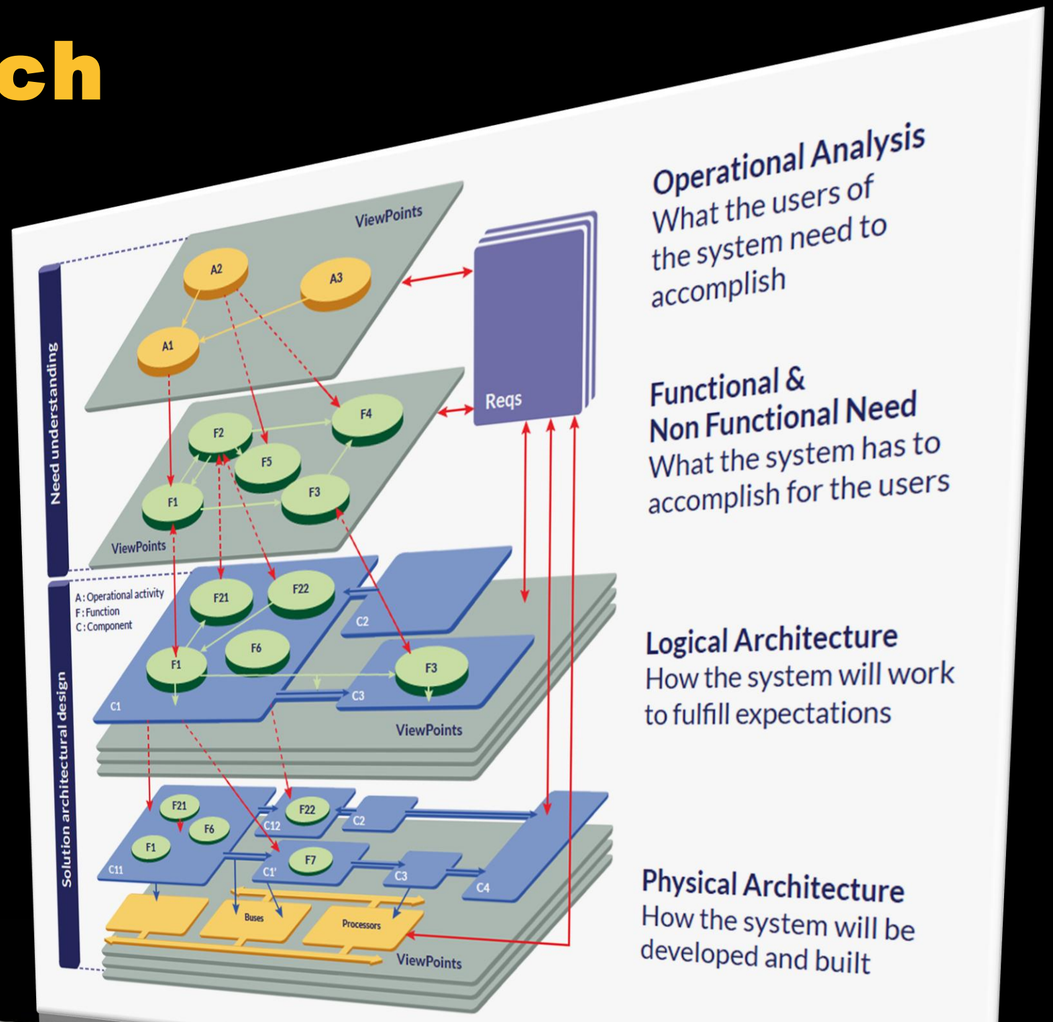
Our proposition

Big why

Small why

Documentation vs. Model-Based Approach

vs



Research Question

Can a lightweight MBSE workflow boost robotic-system reliability versus documents?

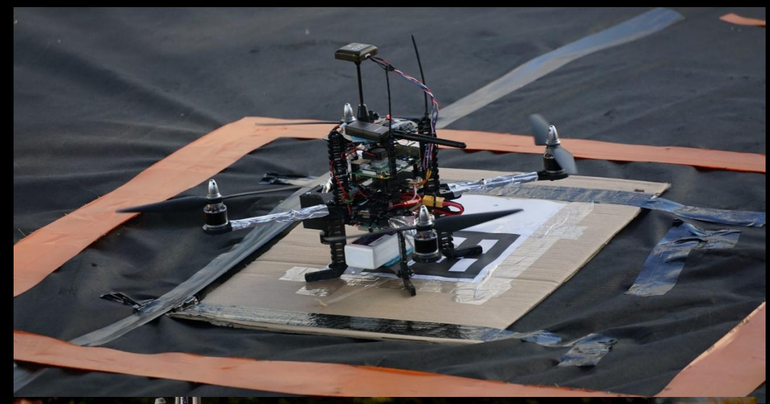
Approach

Why students need this

Pilot site

Deliverables

Mission & Stakeholders Overview

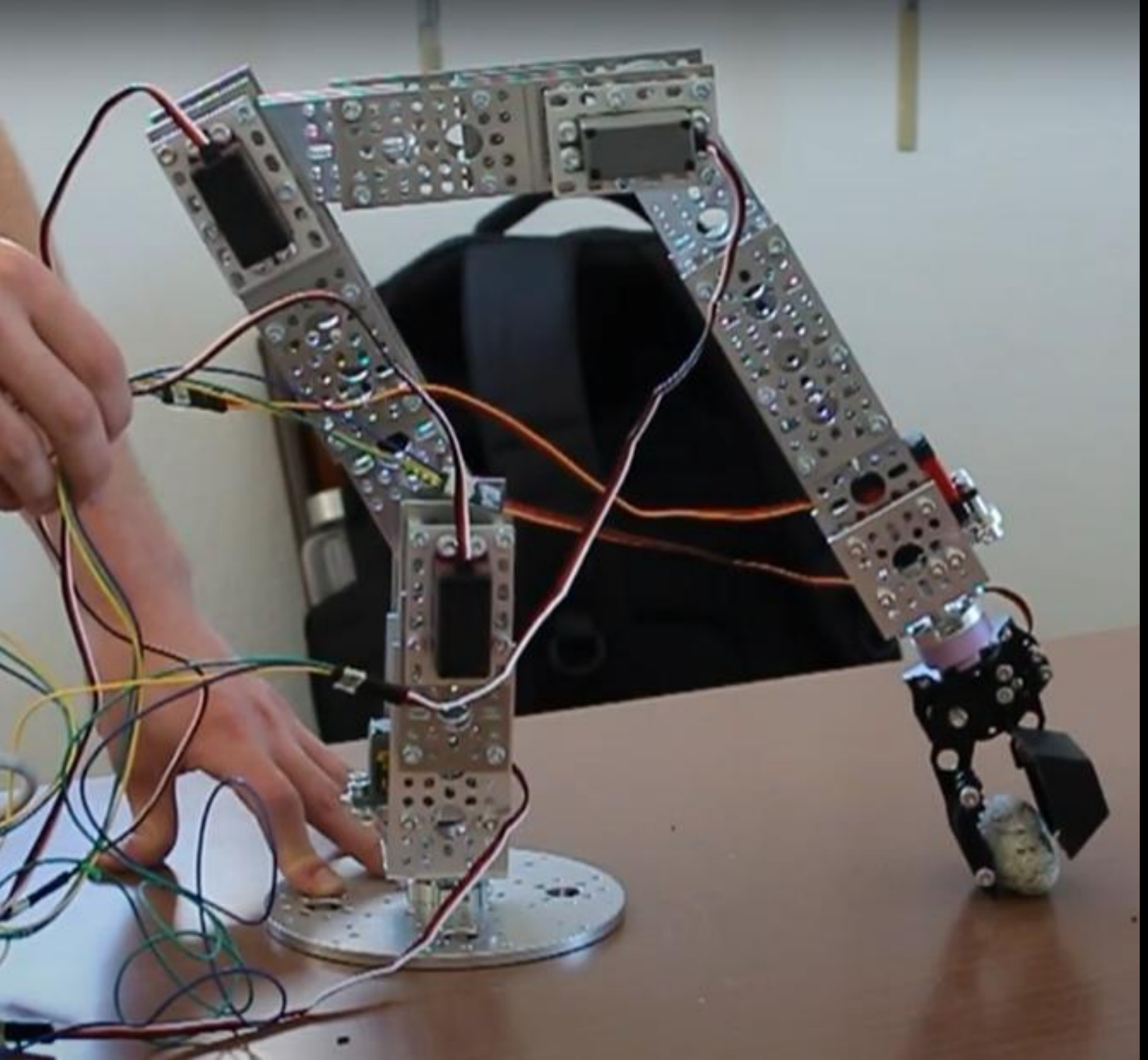


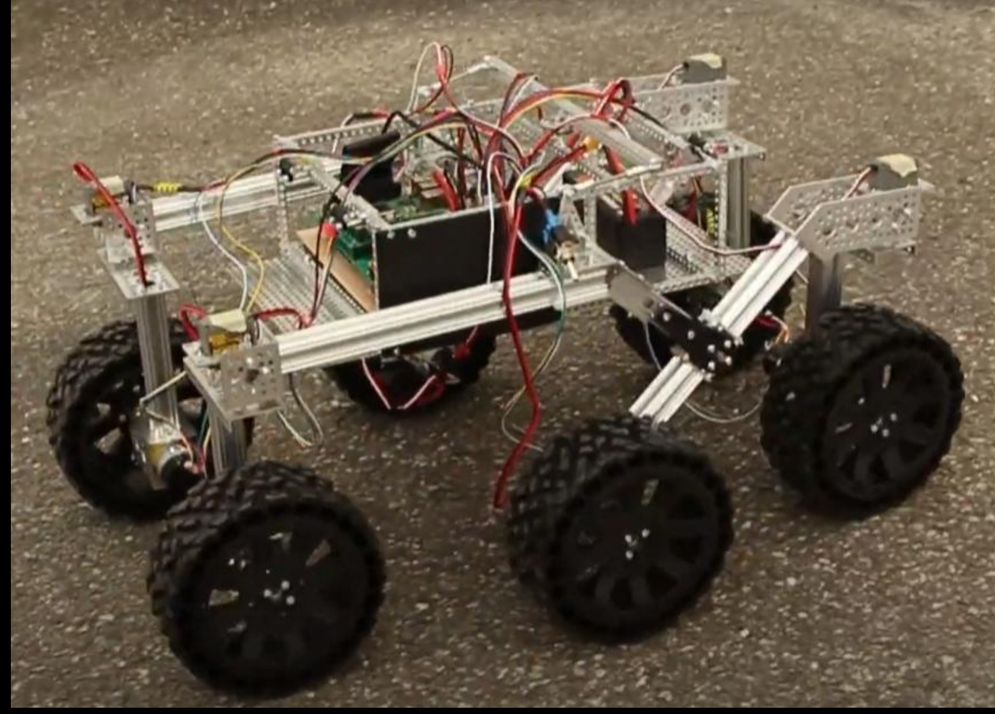
- Science & Sampling
- Autonomous Traverse
- Maintenance Ops
- Aerial Scouting

Ground rover + drone scout

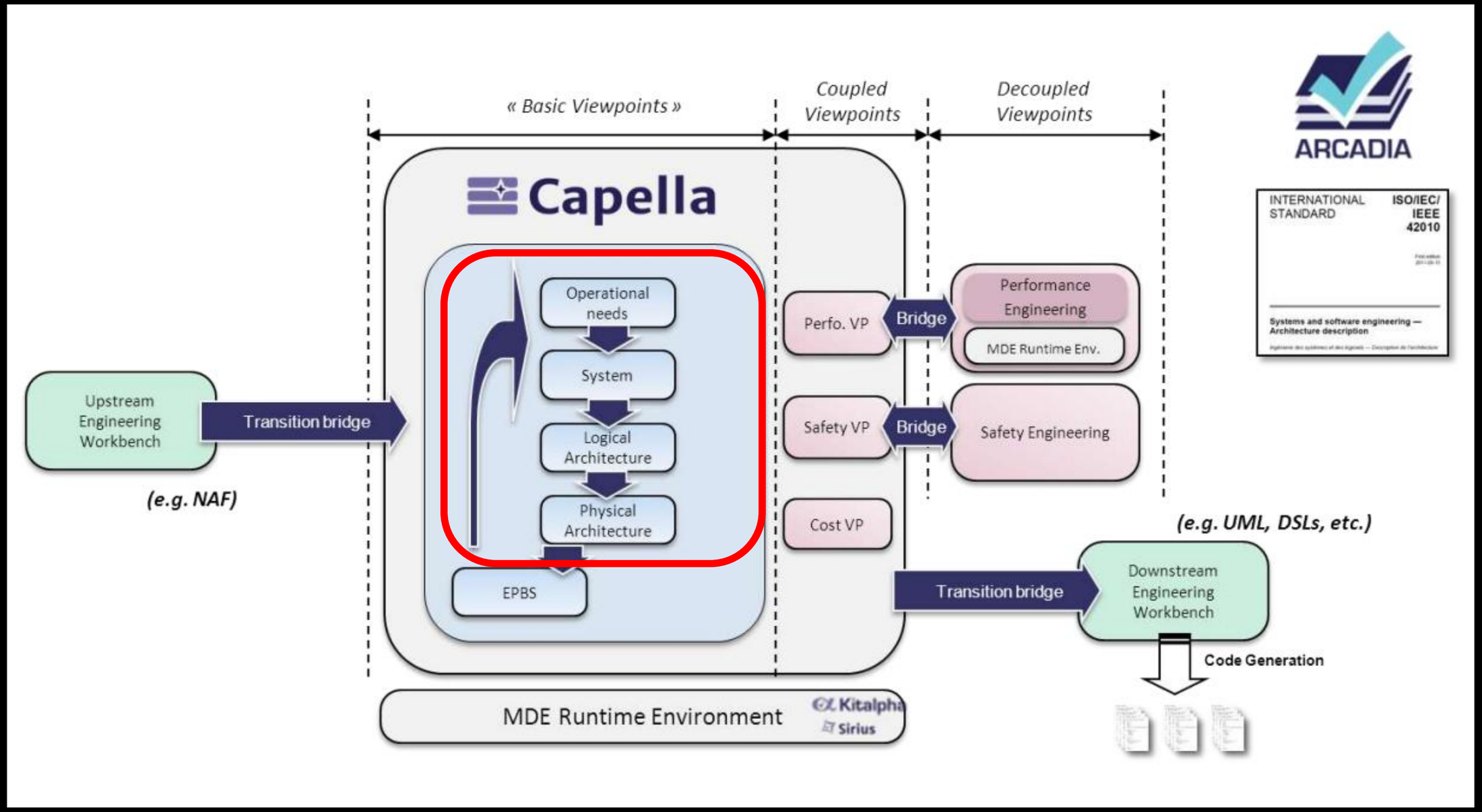
1 year to master the

European Rover Challenge

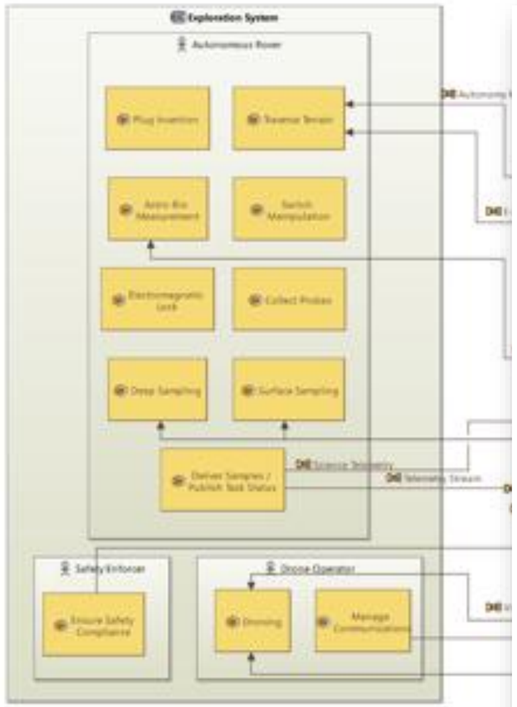


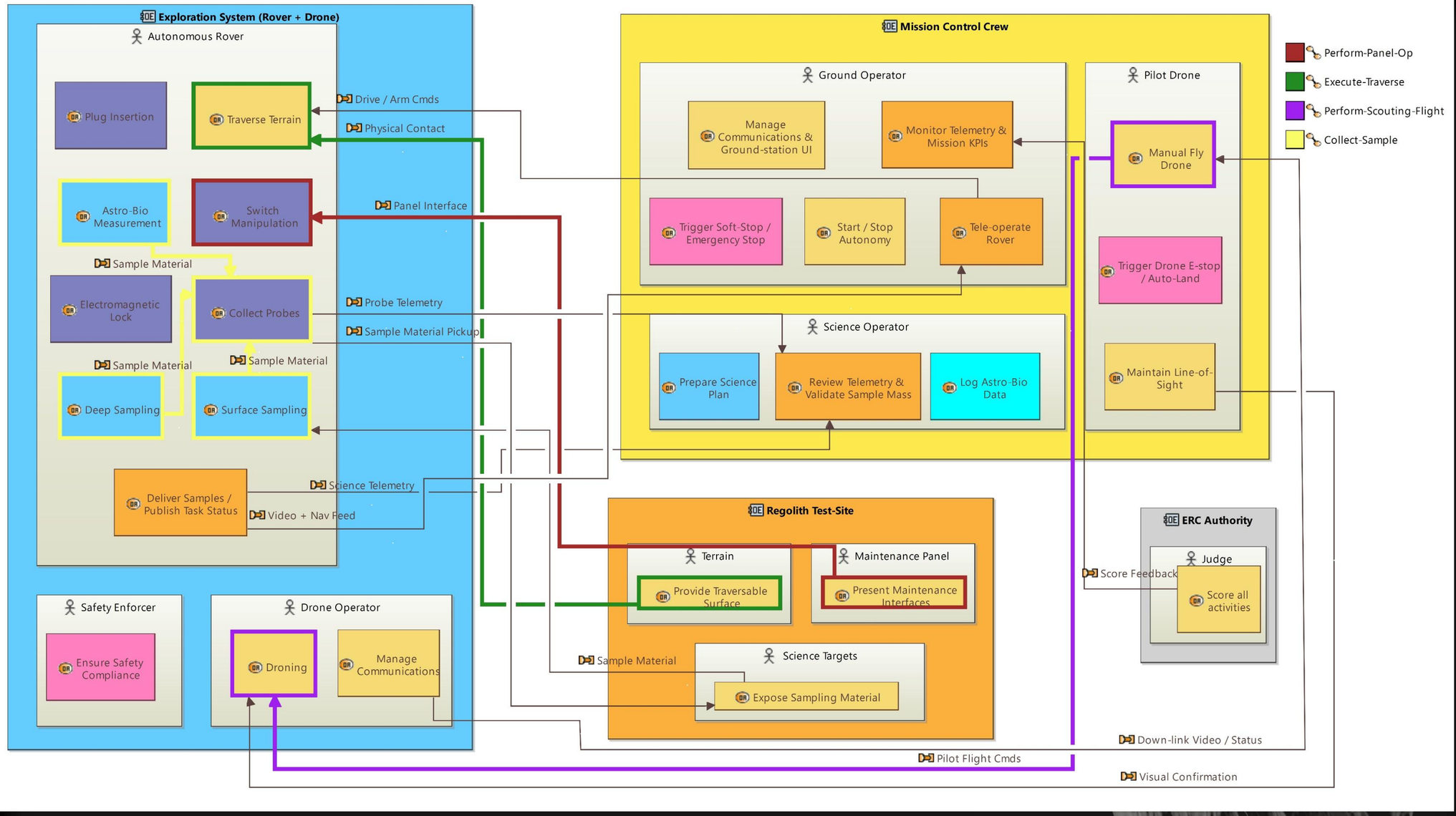


Why Arcadia & Capella

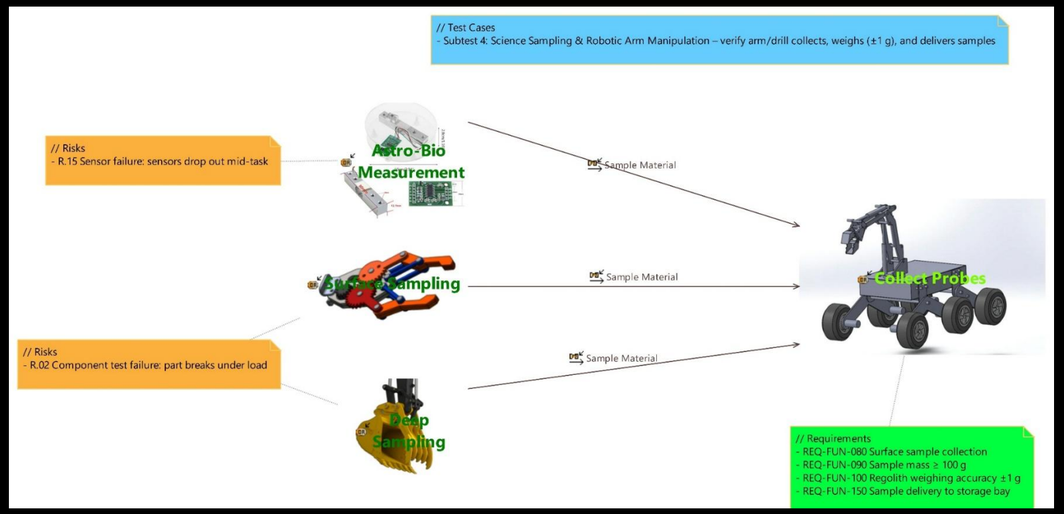


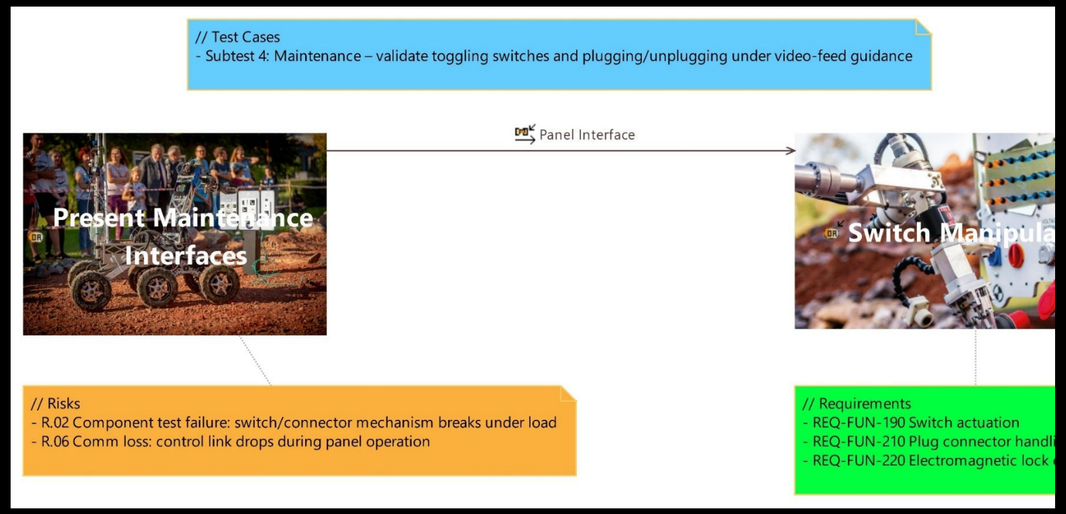
Operational Analysis

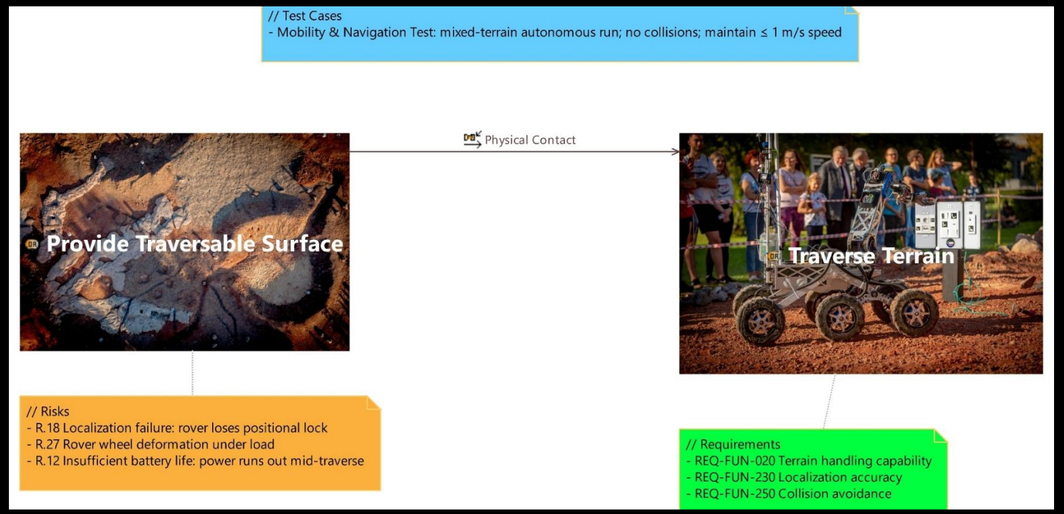


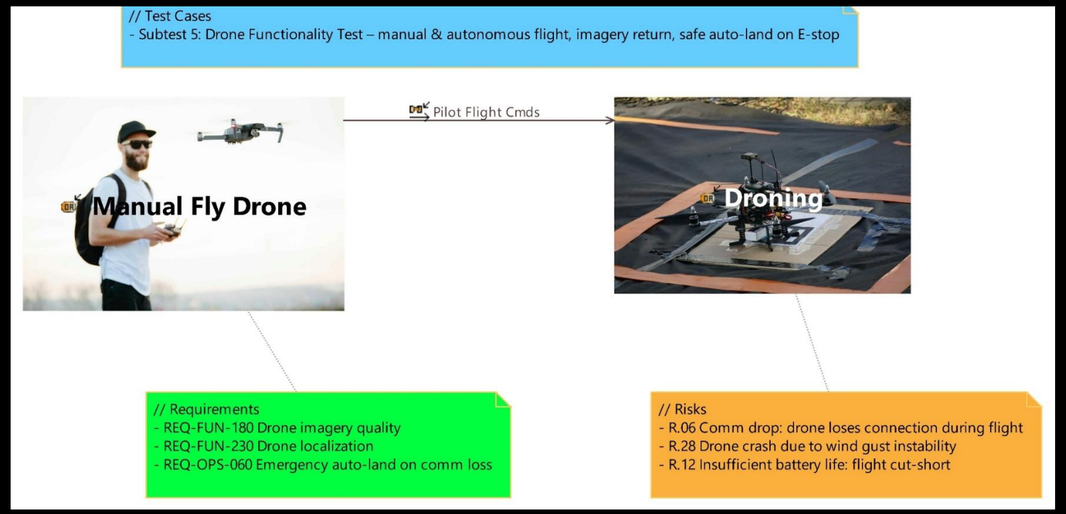


ERC operational processes

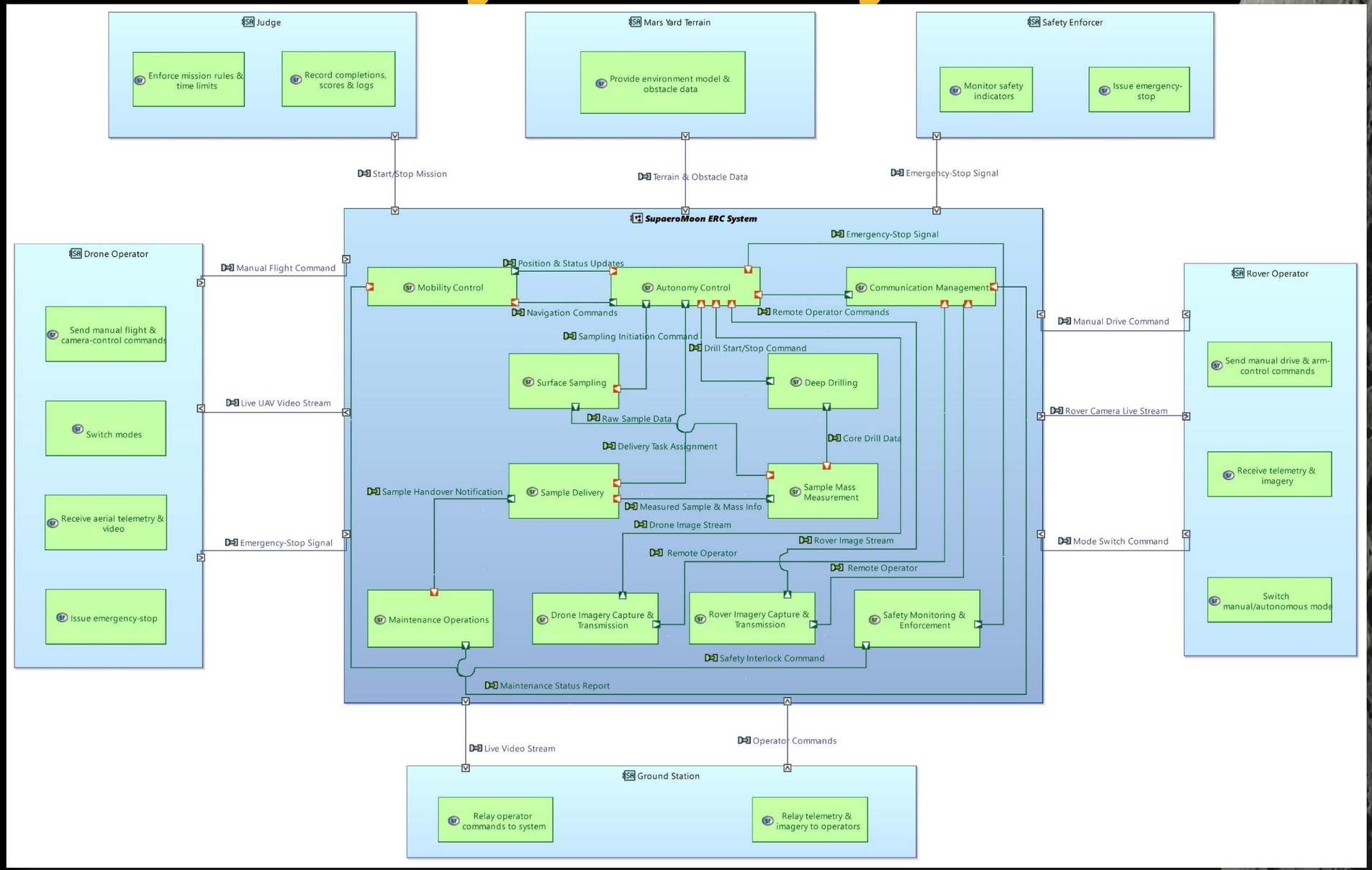




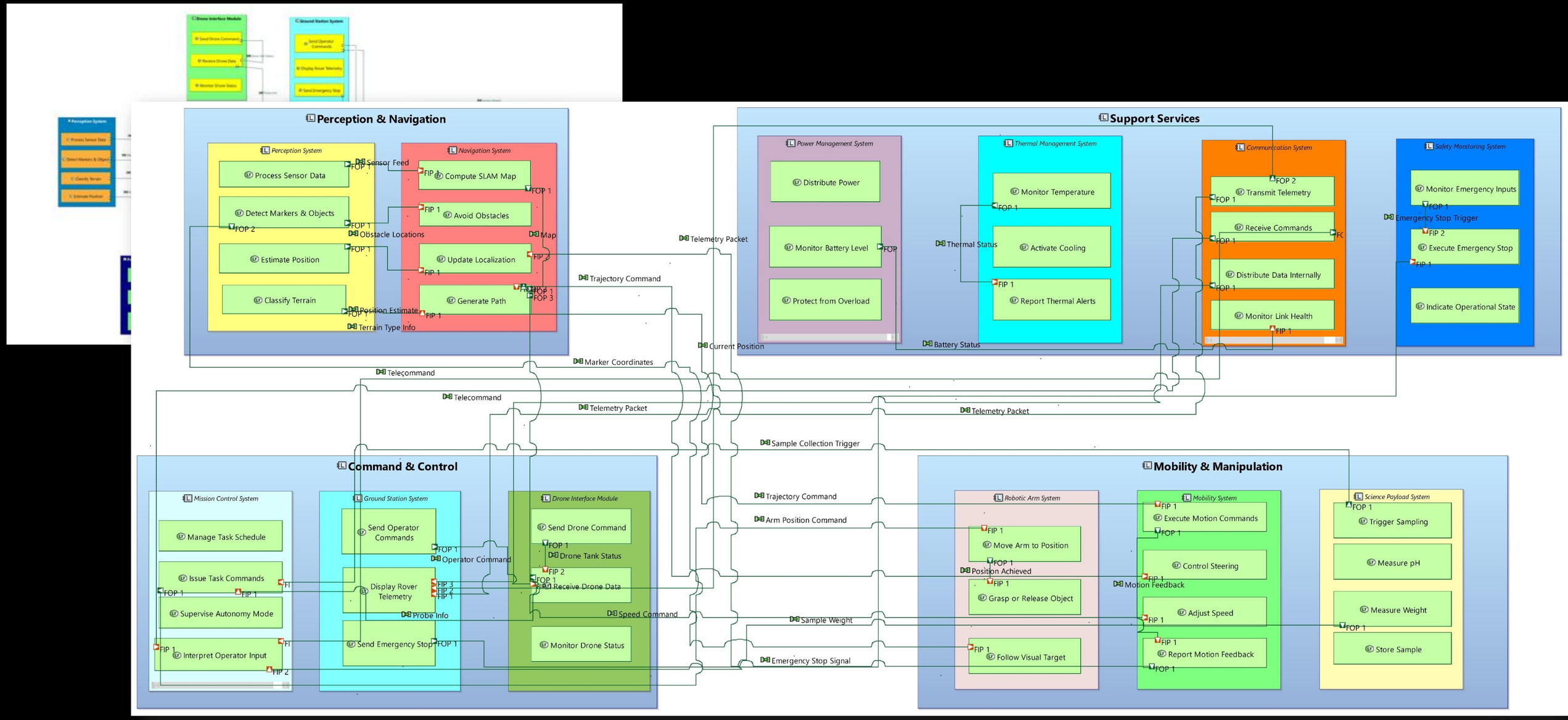




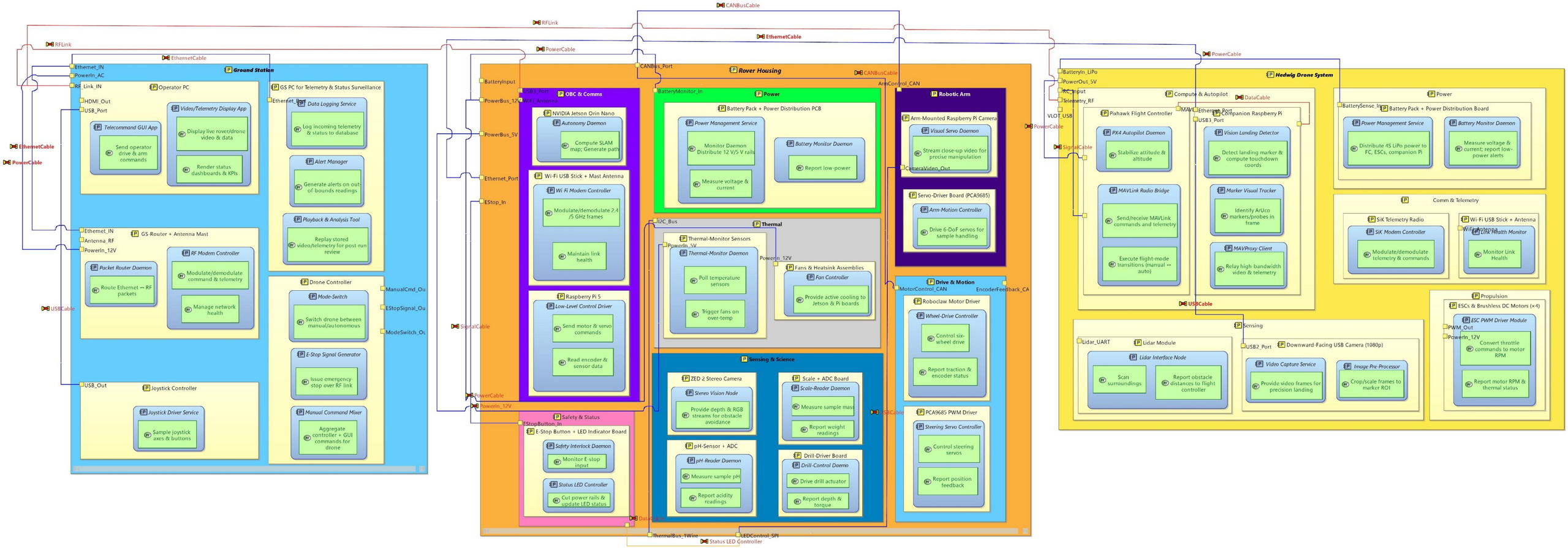
System Analysis



Logical Architecture



Physical Architecture



Time Savings & Lessons Learned

Time Savings

- Early Gap Detection
- Shorter Decision Cycles
- Fewer Interface Defects
- Unmatching Alerts
- Rapid Onboarding
- Minutes-not-Evenings

Lessons Learned

- Tight Schedules
- Curriculum Gap
- Tooling ≠ Adoption
- Repeatable Practice Needs

Conclusions & Contributions

Conclusions

- Lean Capella workflow boosts early risk + trace visibility
- One “living” reliability model replaces scattered spreadsheets
- Closed-loop tracing catches issues before hardware freeze
- Sustainable adoption needs curated installs, mentoring, incentives

Contributions

- Practical Capella recipe for small, time-pressed student teams
- Measured time savings + earlier defect detection
- Identified plug-in friction + MBSE curriculum gaps
- Reusable MBSE template for educators and project teams

Thank you for your time and attention!

Q&A time