



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



Authors:

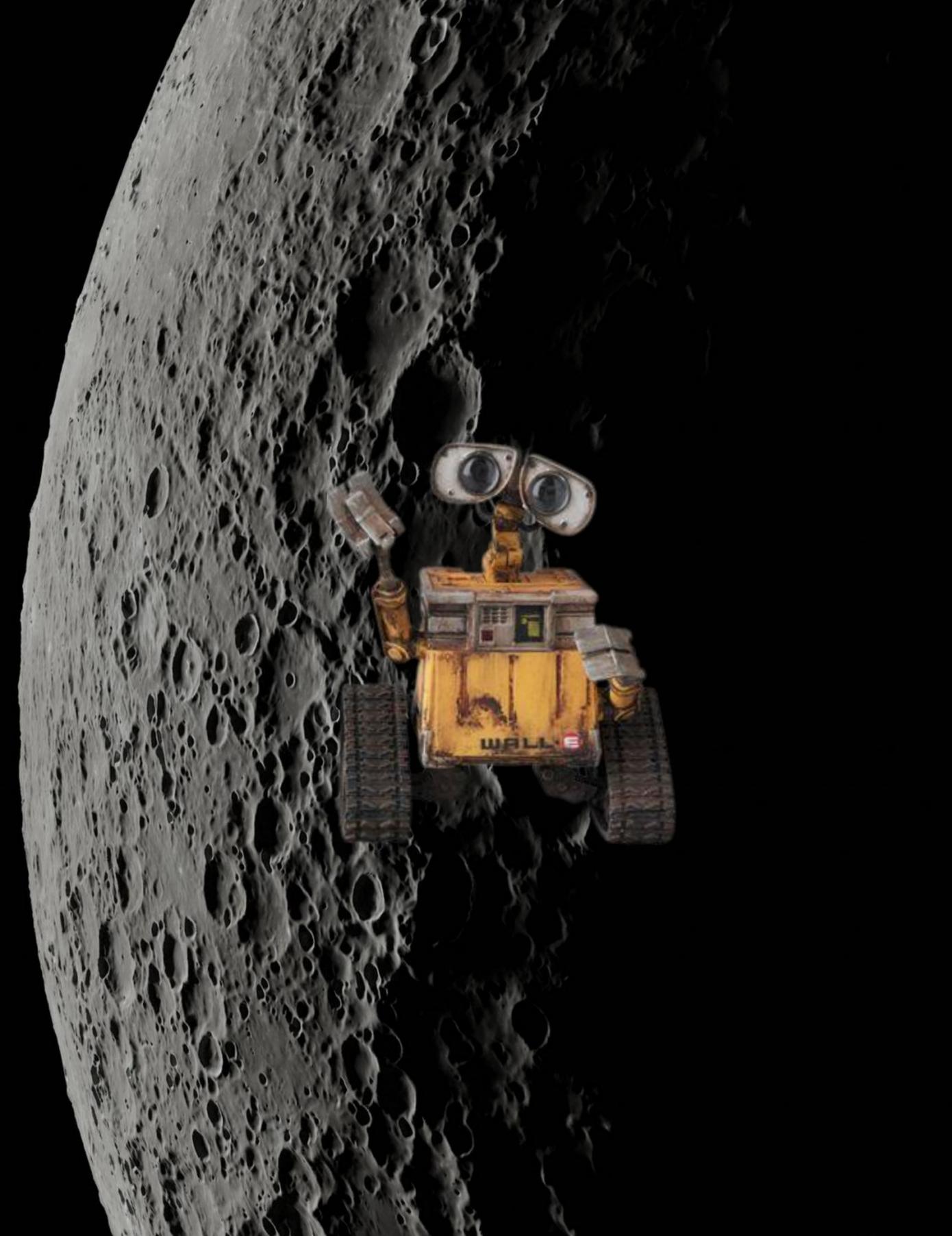
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February 24th, 2026

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4. From Documents to MBSE Model ■
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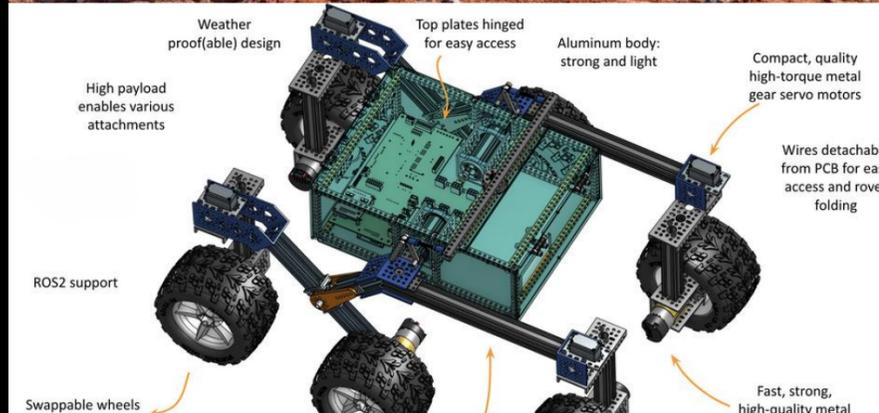
Projects
description

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

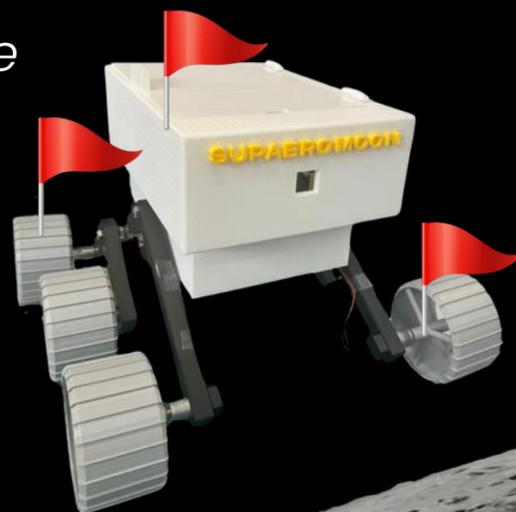
Environmental Report

Science Planning Report

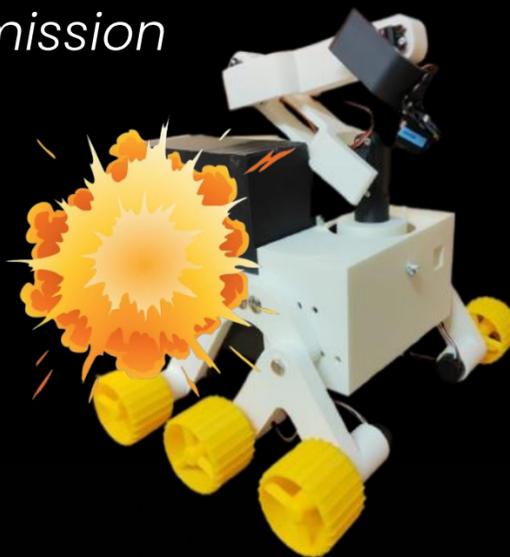
ERC 2025 Finals
September 2025

Enhancing Robotic System **Reliability** through Model-Based System Engineering

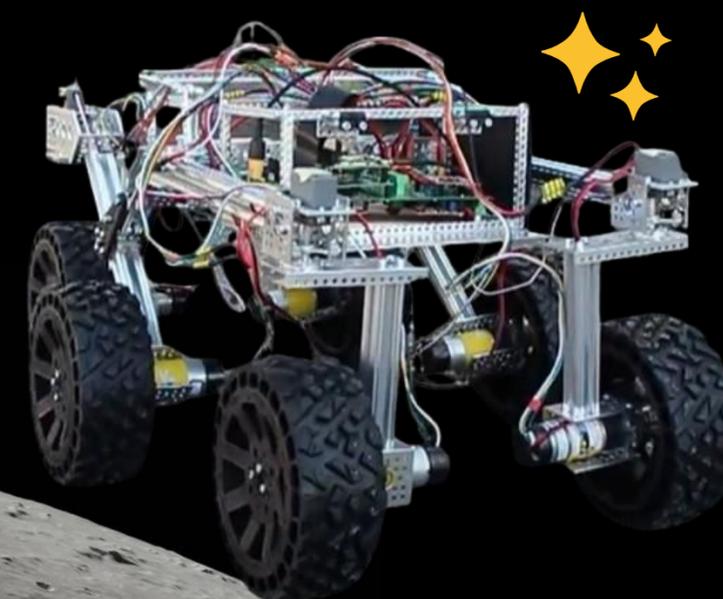
*SELENE – First
prototype*



*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

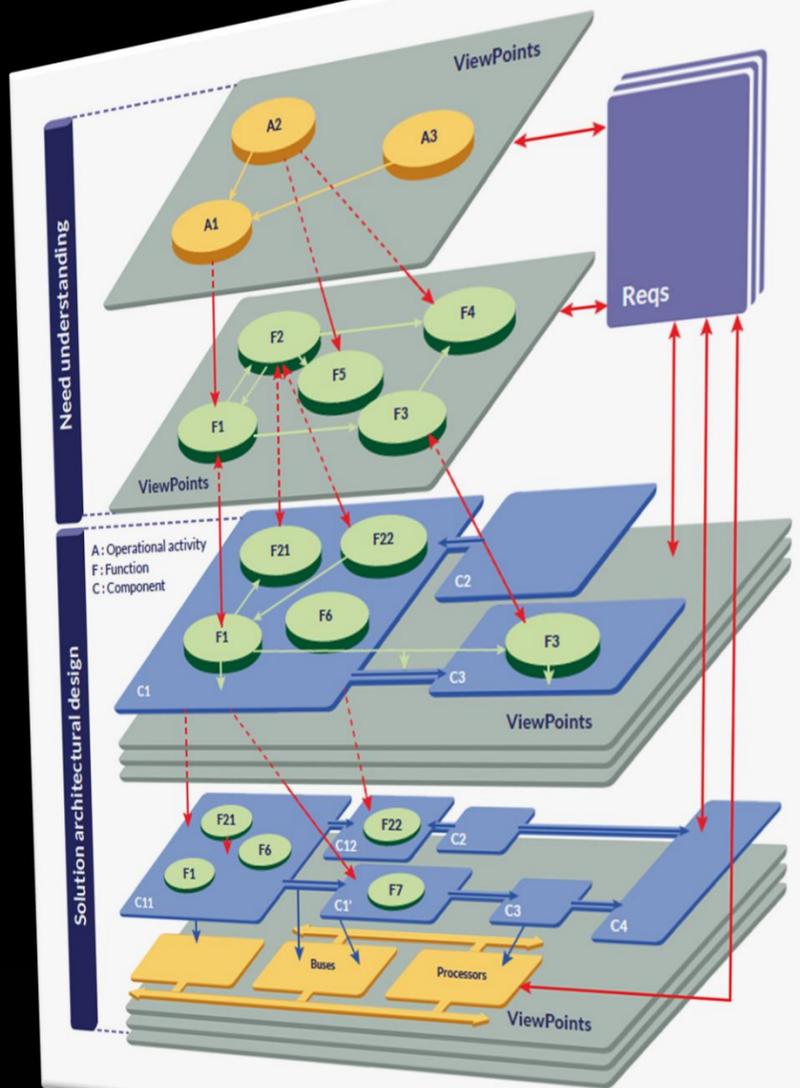
Documentation vs. Model-Based Approach

ERC 2025 Preliminary Design Report

Team name: SUPAEROMOON
Rover name: MARAUDER
Affiliation: ISAE-SUPAERO
Contact: supaeromoon@gmail.com

Req ID	Req Description	Owner	Likelihood	Severity	Index	Response
R.01	Redundancy	Systems & Testing team	3	2	6	Risk - Avoid
R.02	Rigidity of wheels	Systems & Testing team	2	3	6	Risk - Mitigate
R.03	Operational Temps	Systems & Testing team	1	5	5	Risk - Avoid
R.04	Communication range	Systems & Testing team	3	3	9	Risk - Mitigate

VS



Operational Analysis
What the users of the system need to accomplish

Functional & Non Functional Need
What the system has to accomplish for the users

Logical Architecture
How the system will work to fulfill expectations

Physical Architecture
How the system will be developed and built



Research Question

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

Approach

Why students need this

Pilot site

Deliverables

Mission & Stakeholders

Overview

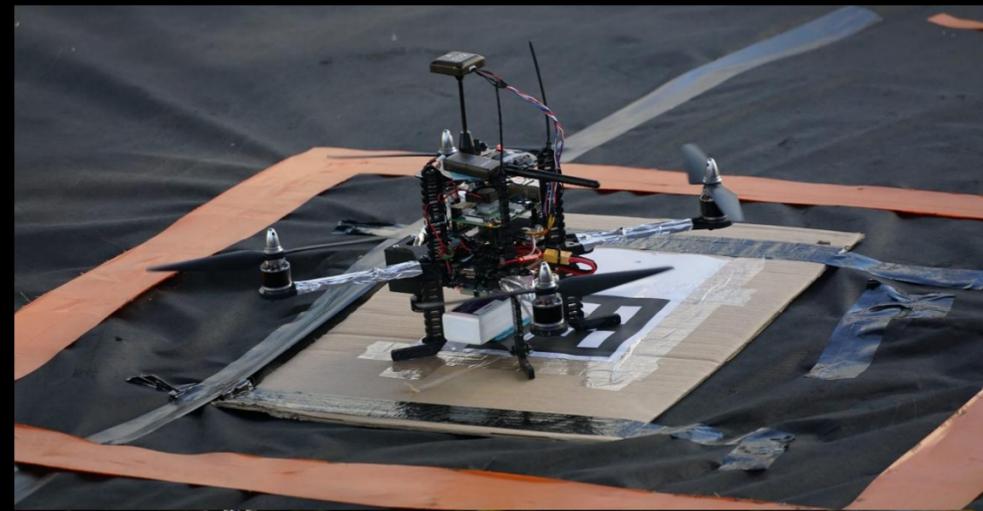


 Science & Sampling

 Autonomous Traverse

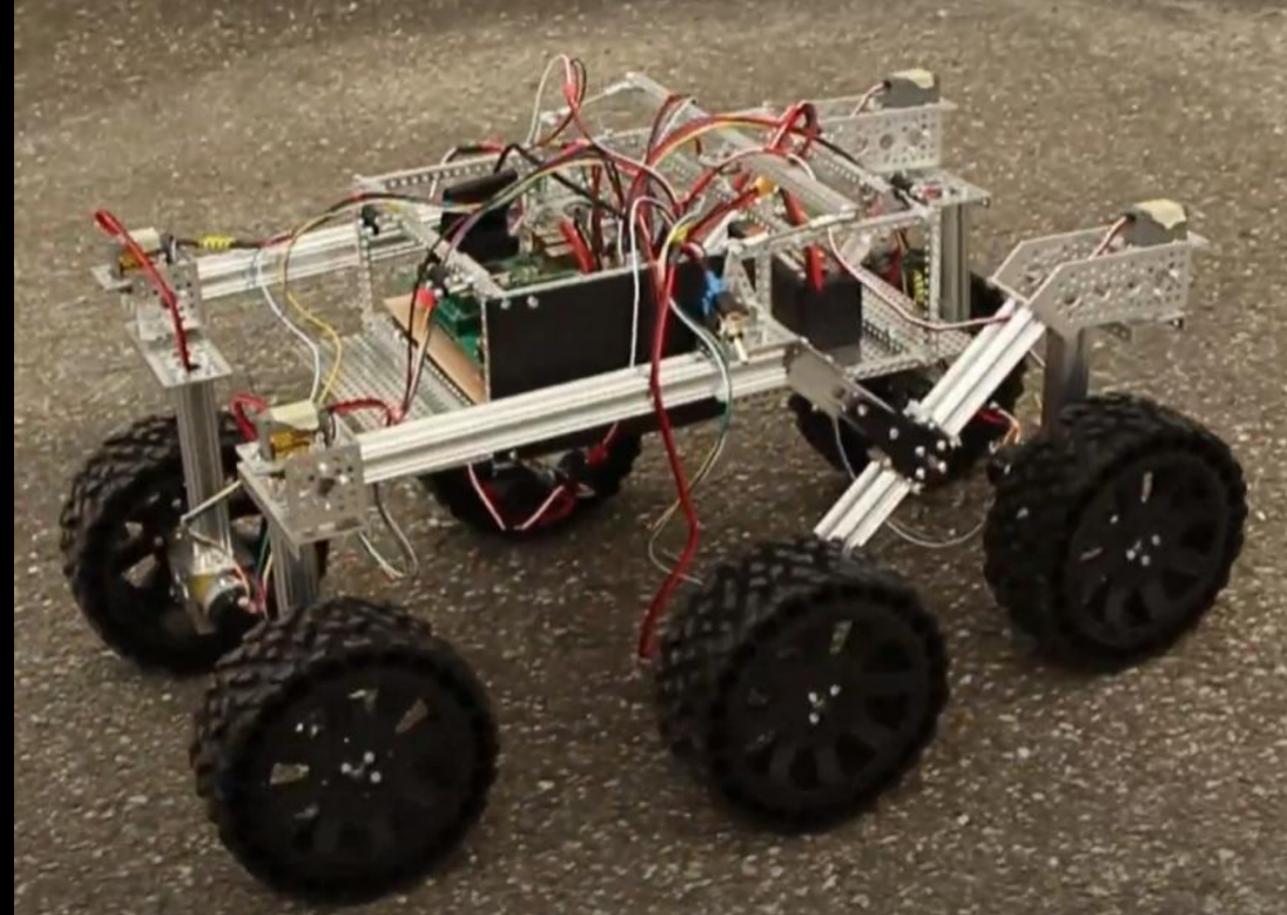
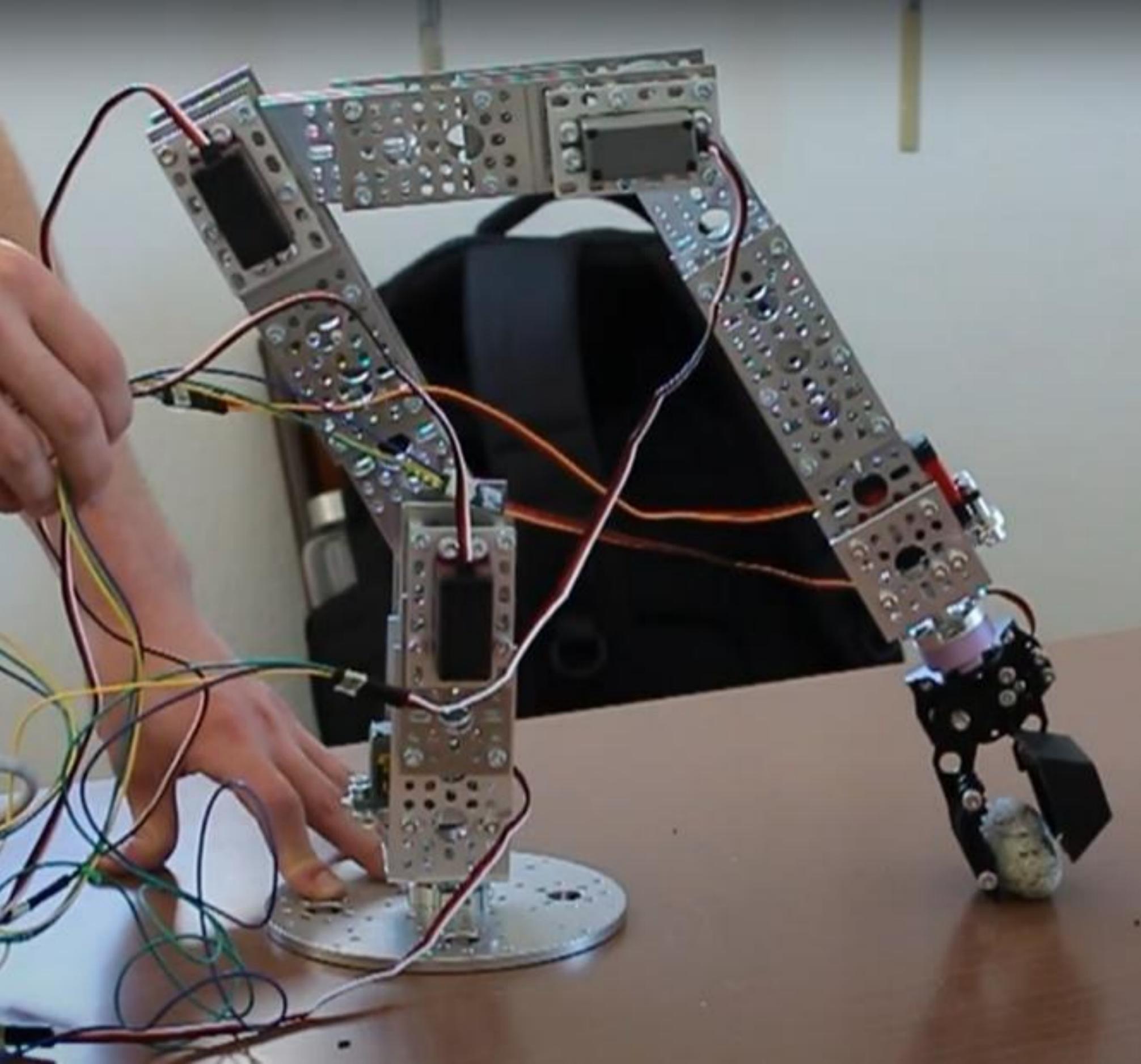
 Maintenance Ops

 Aerial Scouting

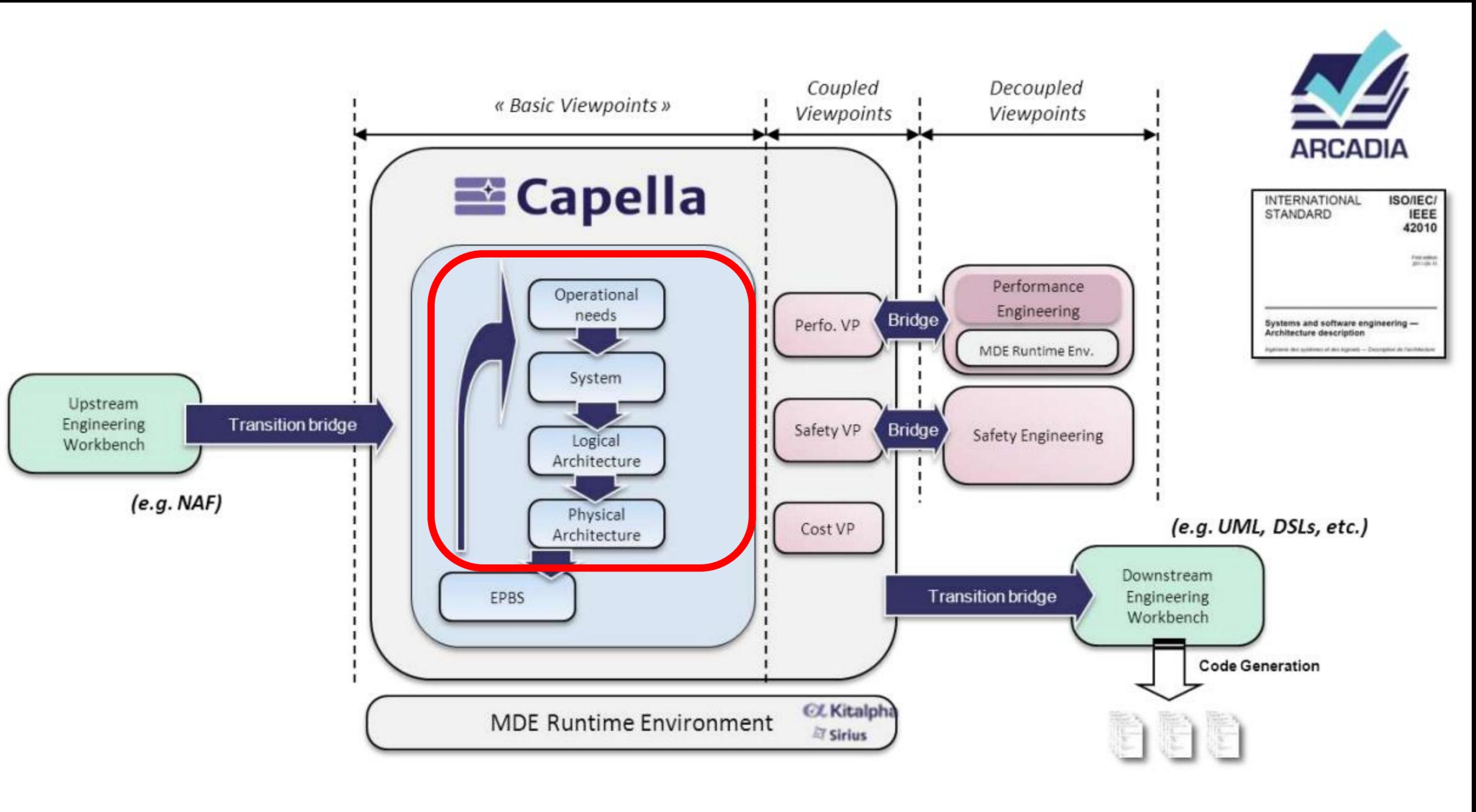


*Ground rover + drone scout
1 year to master the
European Rover Challenge*

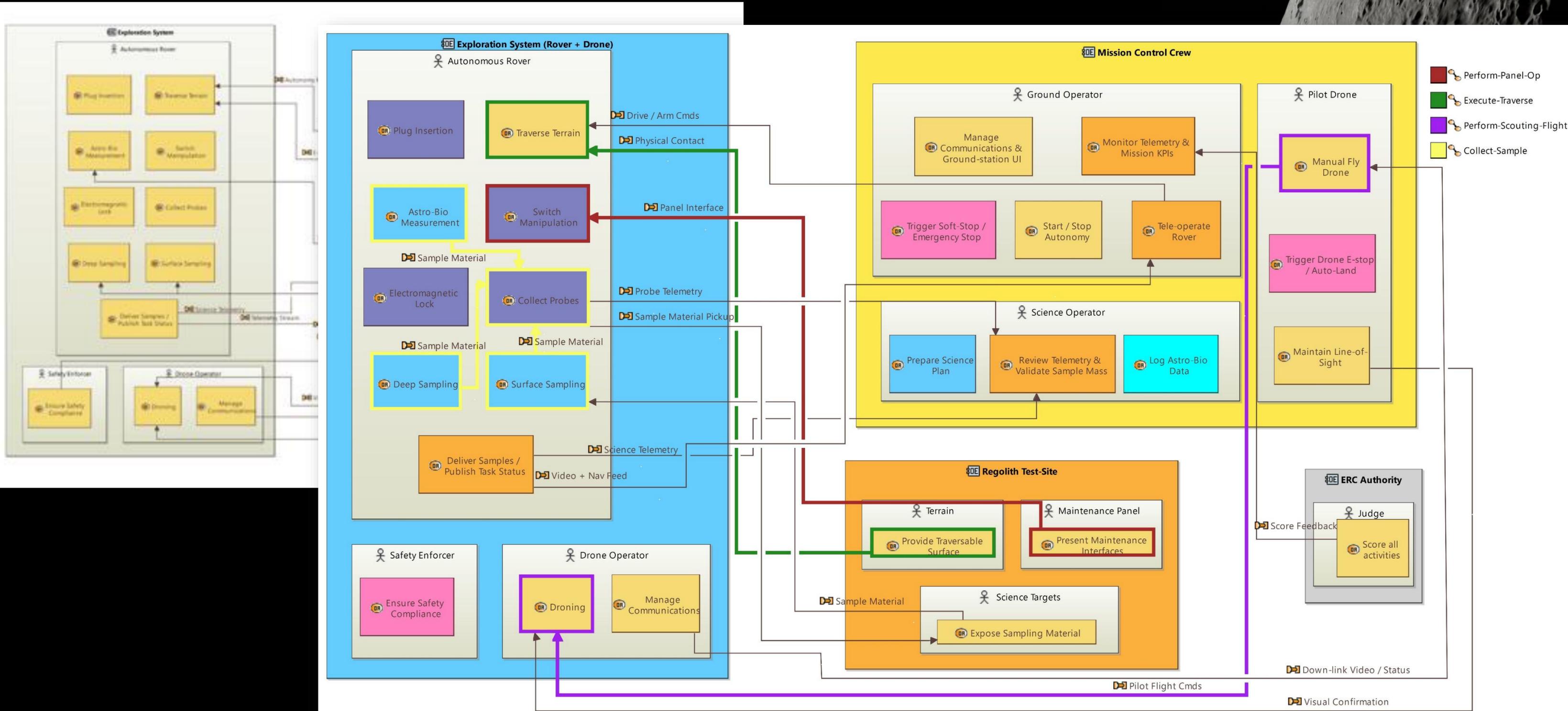




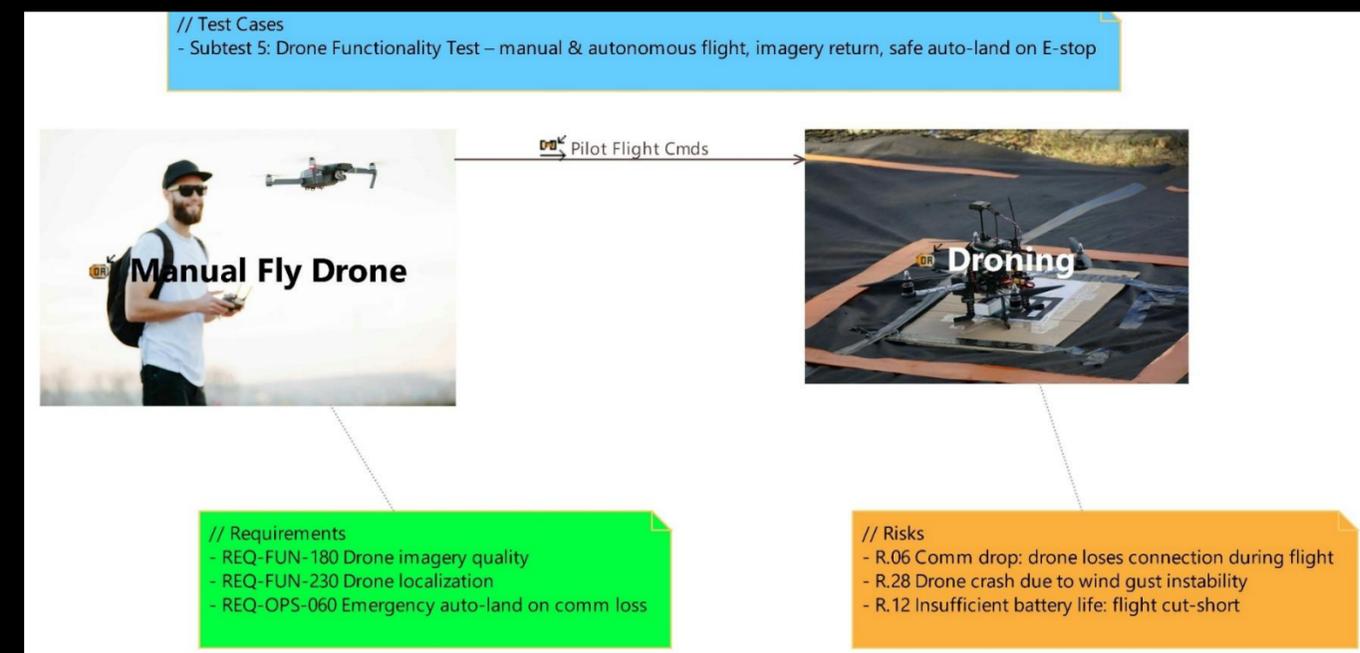
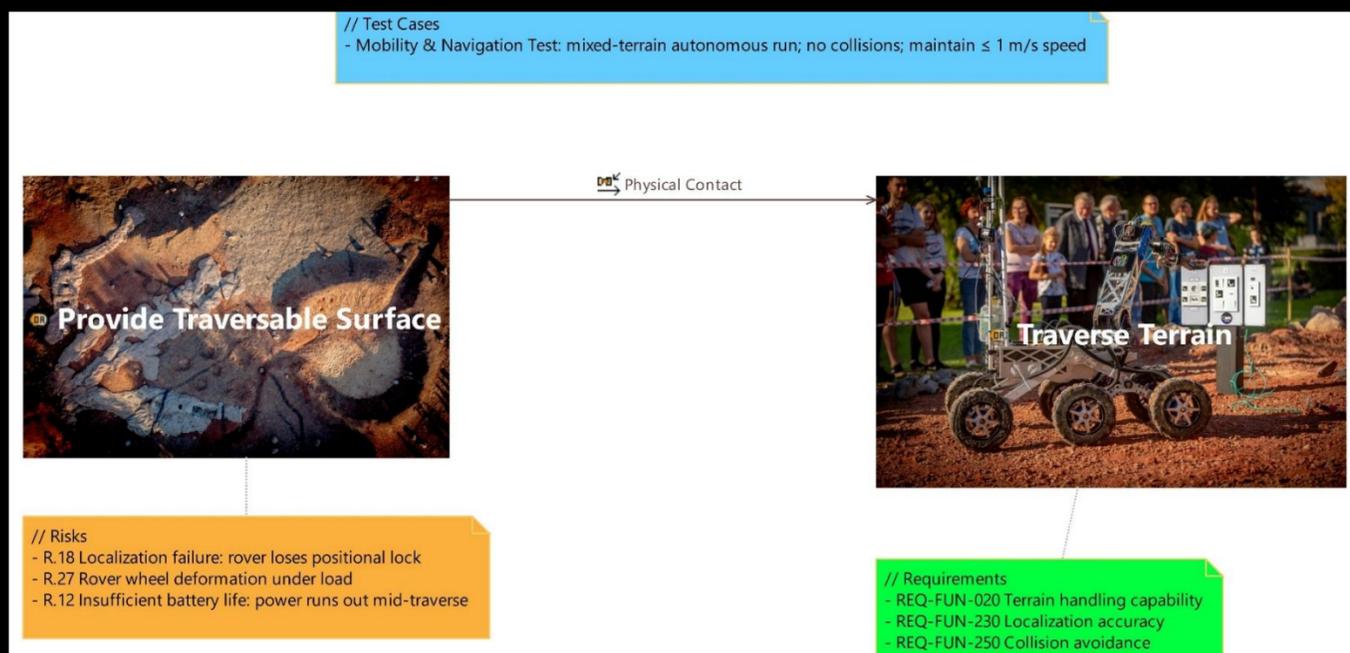
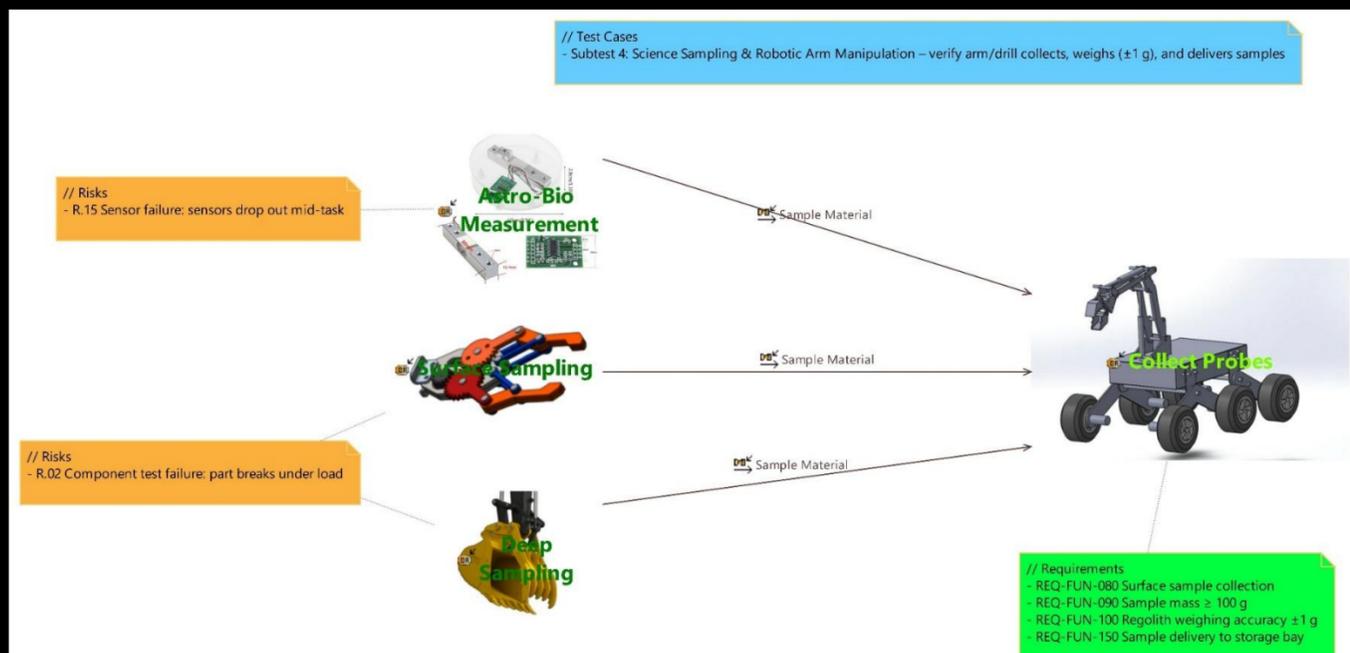
Why Arcadia & Capella



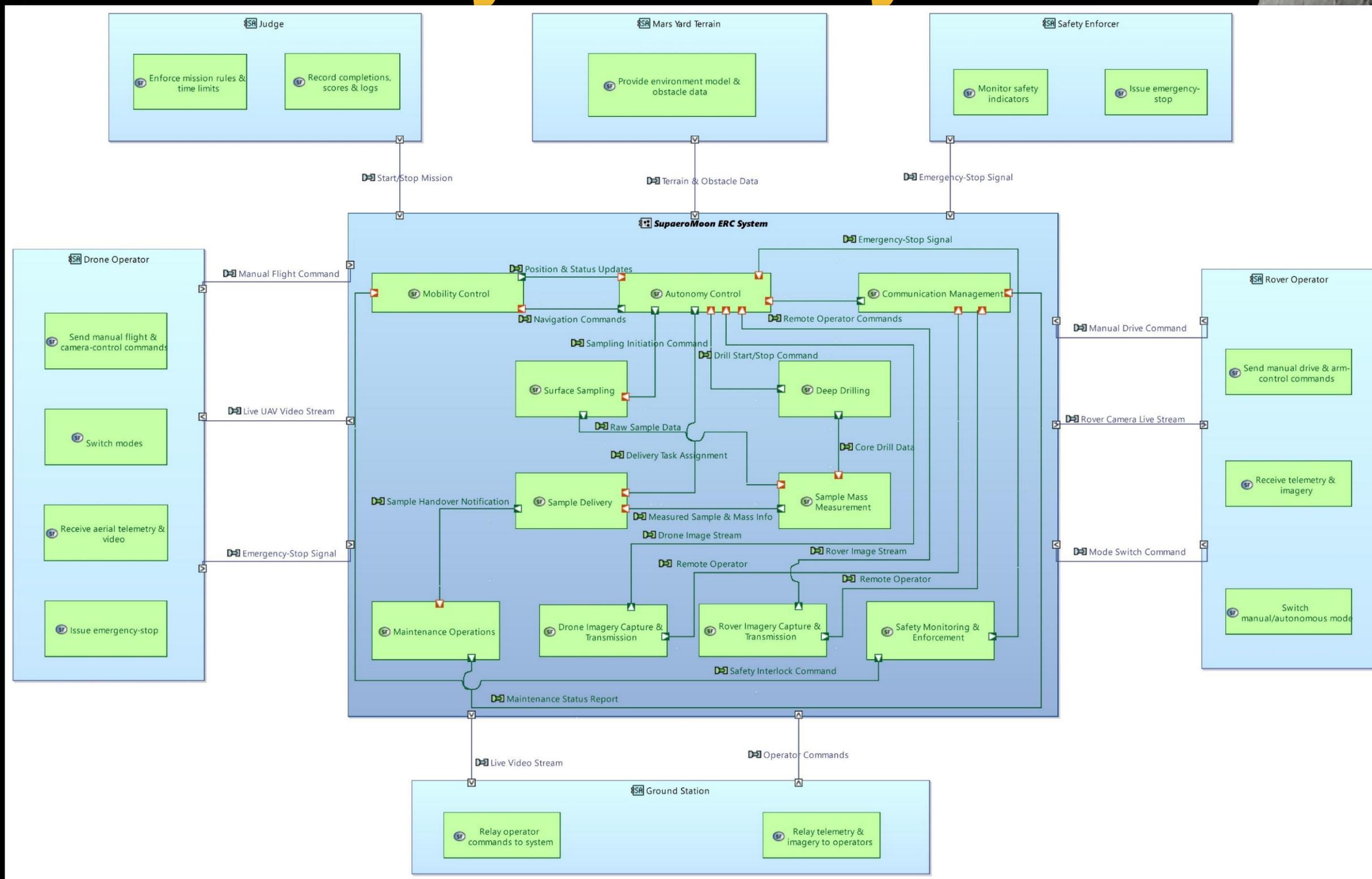
Operational Analysis



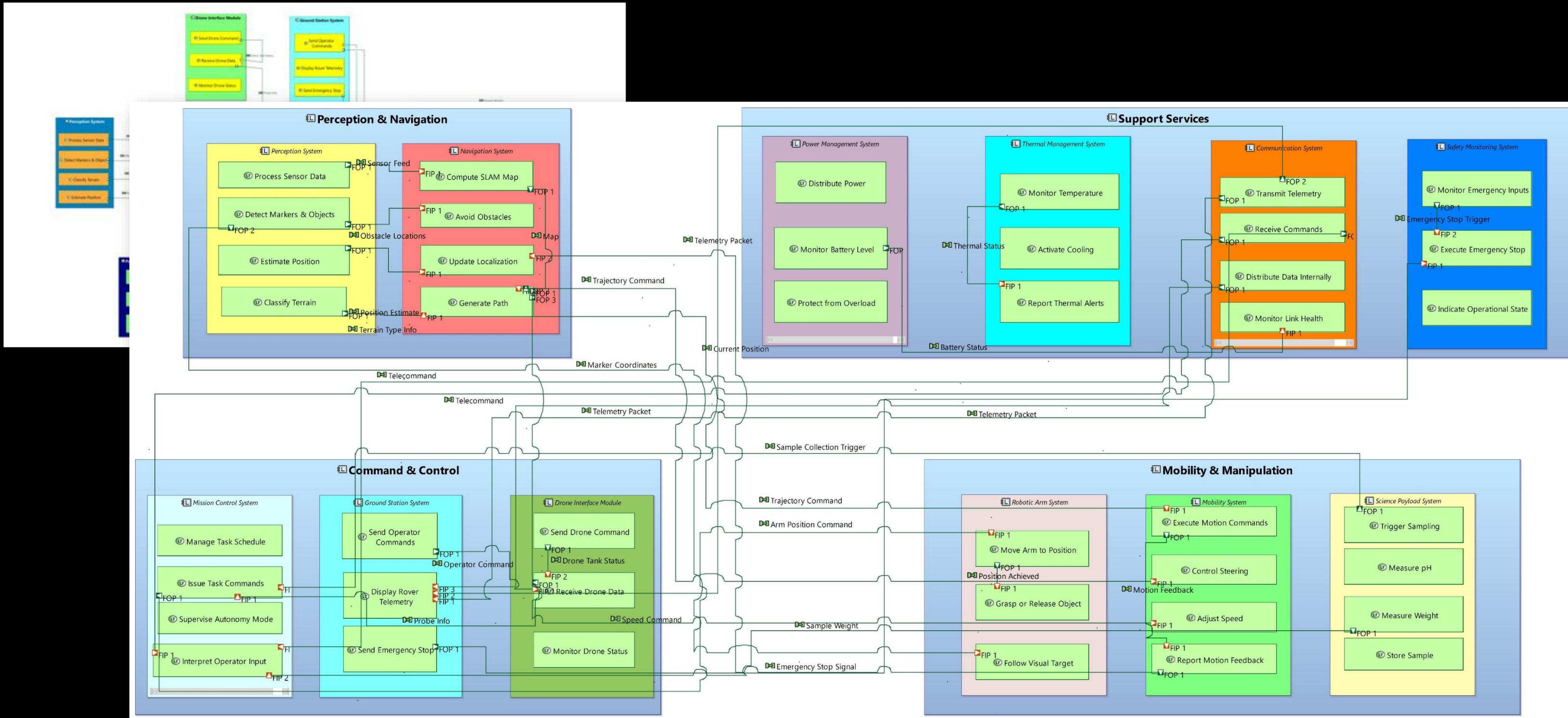
ERC operational processes



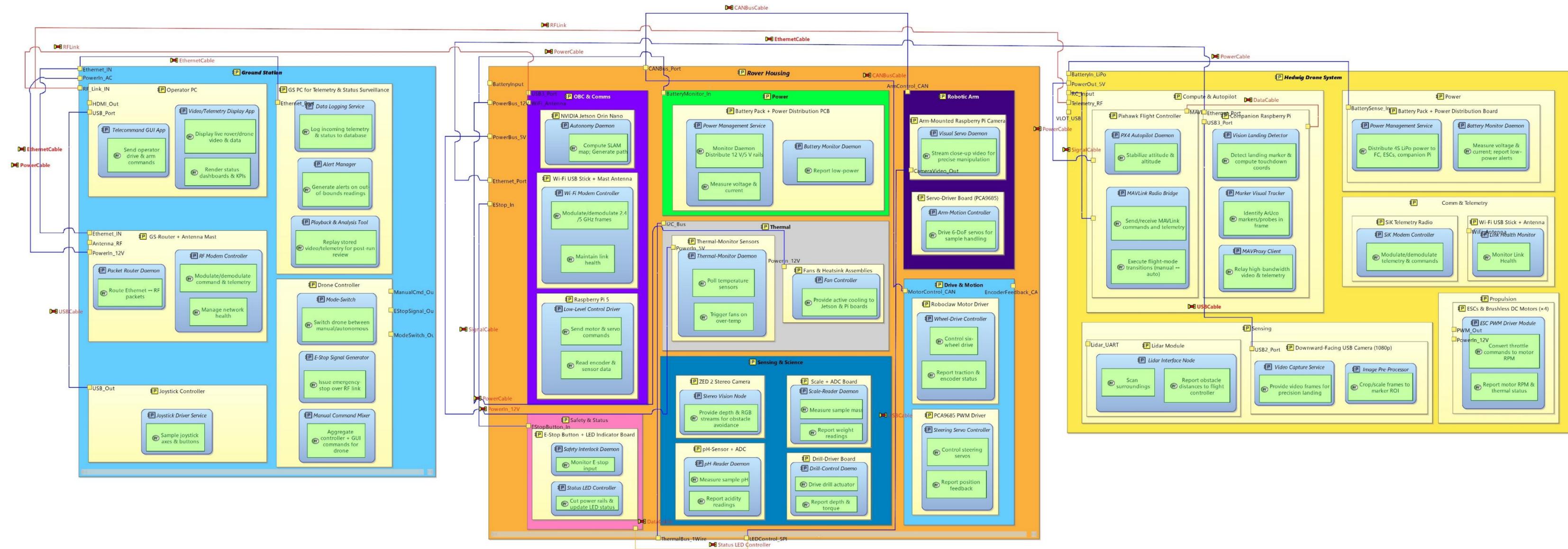
System Analysis



Logical Architecture



Physical Architecture



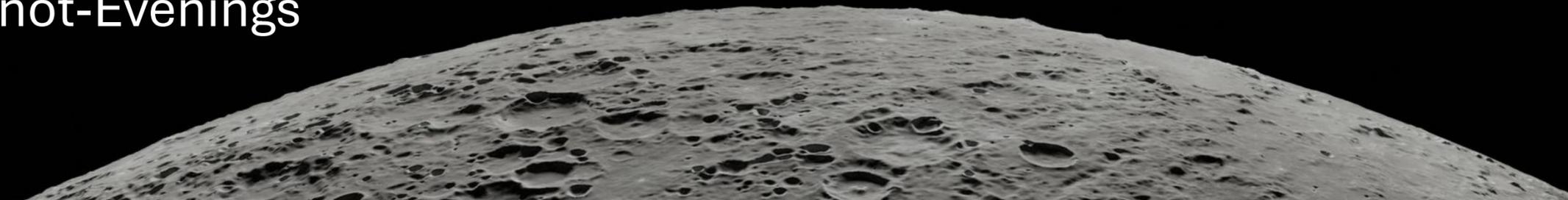
Time Savings & Lessons Learned

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 \neq 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

