

Escape Velocity: Mission Architect

Design it. Launch it. Learn why it worked.

Team Escape Velocity · Saadan Khokhar (Team Lead)

Challenge: Space Mission Design Game · NASA Space Apps Challenge 2026

THE PROBLEM

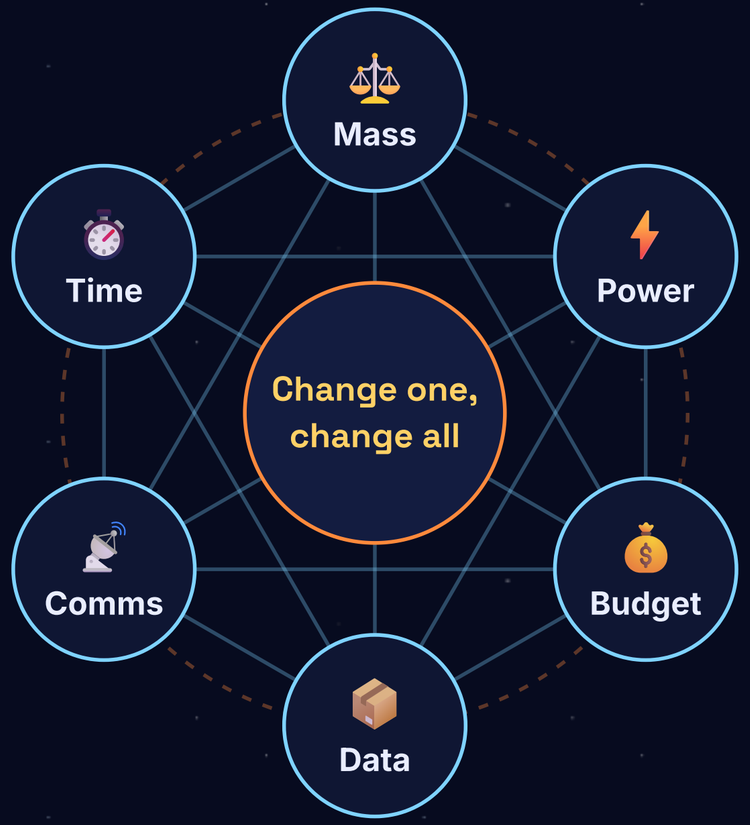
Real missions are a web of trade-offs.

Students rarely get to try one.

A better instrument means **more mass, power, cost and data**.

Existing tools teach **one piece** (orbits OR rockets OR spacecraft), not the whole system.

Students learn the theory but **never make integrated decisions**.



OUR SOLUTION

Design, launch and fly a complete space mission.

A free browser game: one file, nothing to install.



5 scenarios

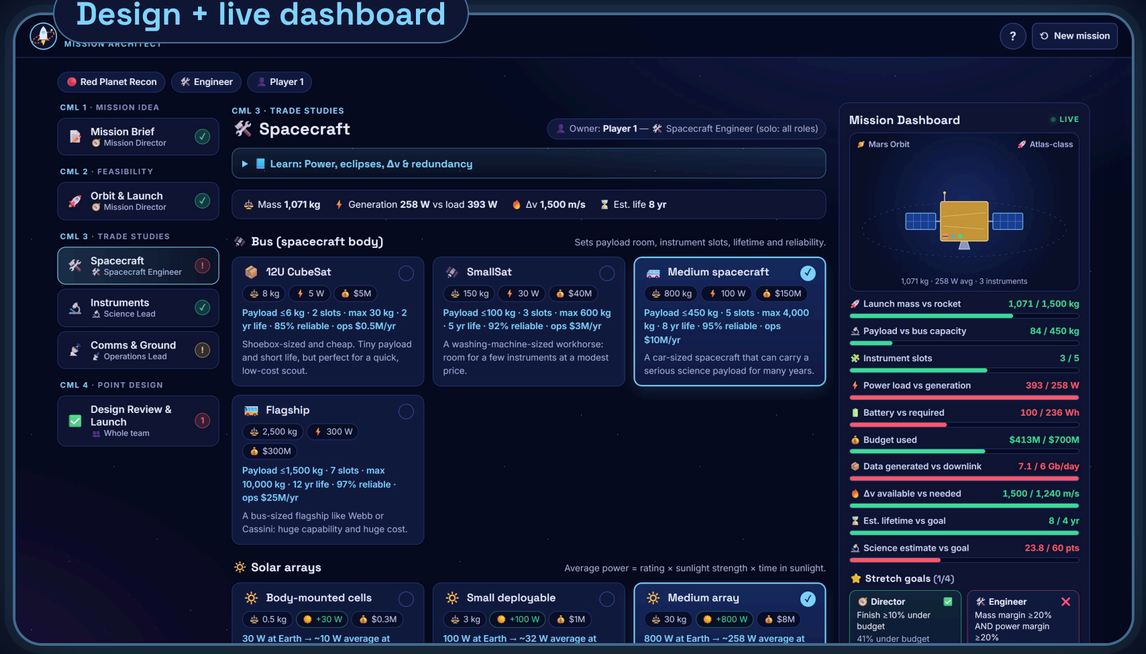
- 🌍 Earth Watch
- 🔴 Red Planet Recon
- 🔭 Deep Sky Eye
- 🌙 Lunar Pathfinder
- 🧪 Sandbox

- 🎚️ 3 levels: Cadet · Engineer · Flight Director
- 📱 Any device, no install

From idea to launch, step by step.

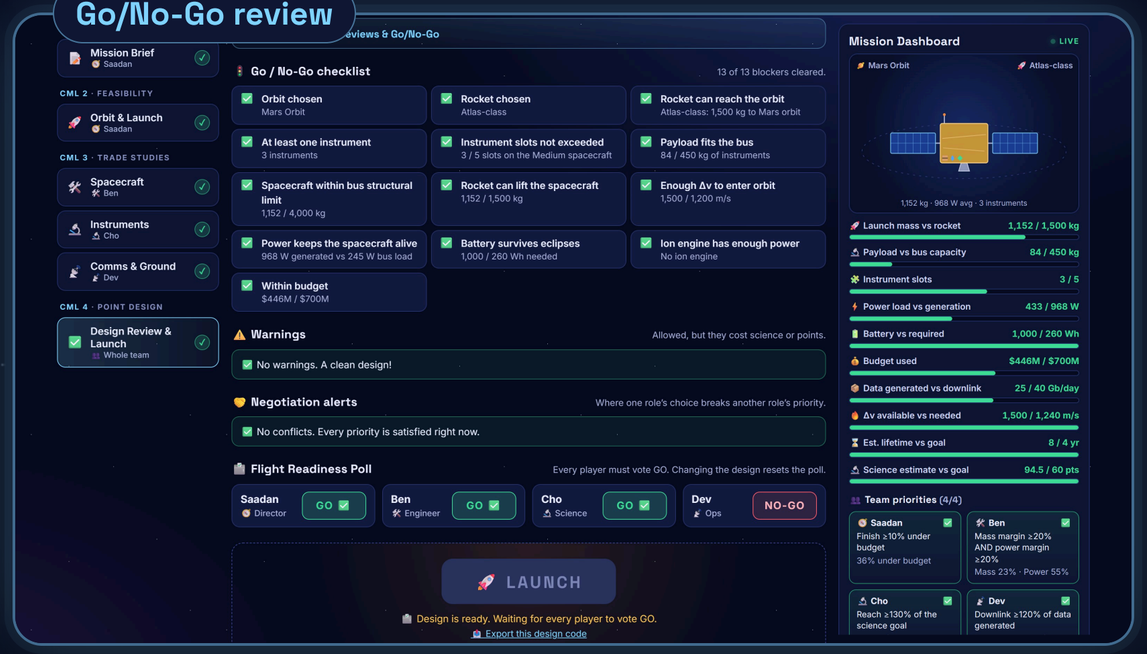
CML 1 Mission Idea → **CML 2** Orbit & Launch → **CML 3** Spacecraft · Instruments · Comms → **CML 4** Go/No-Go Review → **Launch**

Design + live dashboard



Every choice updates live **mass, power, budget, data, Δv and lifetime**.

Go/No-Go review

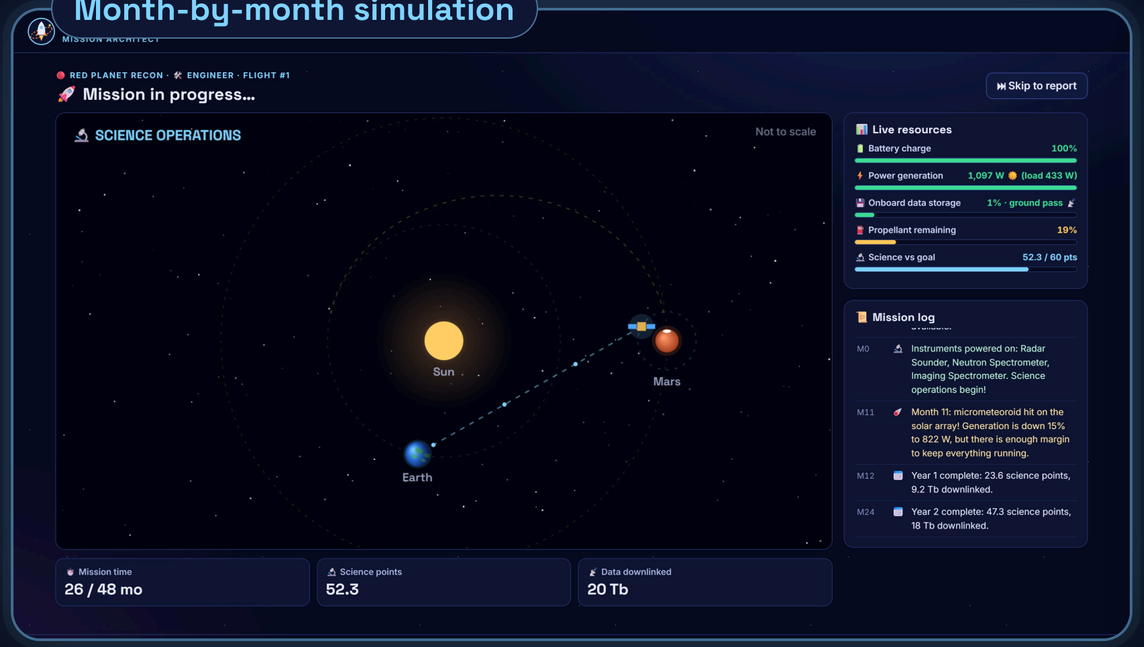


The rocket must lift it, the batteries must survive eclipses, **the budget must hold**.

FLY · LEARN · COMPETE

Watch it fly. Find out why.

Month-by-month simulation



Mission report



Real NASA mission like yours: Landsat 9 (2021) & NISAR (2025)

- Landsat 9 launched in 2021 into a ~705 km sun-synchronous orbit, the same kind of orbit you can choose here.
- It pairs a multispectral imager (OLI-2) with a thermal infrared sensor (TIRS-2): imaging + thermal, a classic wildfire and crop combo.
- NISAR, a NASA–ISRO mission, uses synthetic aperture radar to map floods and ground motion through clouds, day or night.

Lesson: Real Earth-observation missions mix imagers with thermal or radar sensors so they keep working at night and through smoke.

Learn more ↗ · More ↗

Fly it

Month-by-month flight with random events: solar storms, wheel failures, discoveries.

Learn why

A score out of 1000 and a report that explains why, compared with a real mission: Landsat 9, MRO, JWST, CAPSTONE...

Play as a team

Up to 4 roles: Director, Engineer, Science Lead, Ops Lead. Clashing priorities: negotiate, then vote GO.

BUILT ON REAL NASA PRACTICE

Powered by NASA resources

JPL Concept Maturity Levels

→ The game's design stages, CML 1 to CML 4

NASA Mission Design Lab

→ Trade studies and subsystems: power, propulsion, comms, attitude control, cost, risk

Design & Develop Science Missions

→ Launch, Space, Ground and User segments

CubeSat 101

→ The CubeSat option and the Lunar Pathfinder scenario

NASA telescope learning game

→ Linking objectives to instruments; comparing with real missions

GMAT & Mission Viz

→ Orbit choices and the mission animation

Real missions: Landsat 9 · MRO · JWST · CAPSTONE · NISAR (NASA–ISRO) · + CSA games collection

Simplified educational model, with numbers inspired by real missions.

IMPACT

Any student, anywhere, can think like a NASA mission team, in minutes.

What's next

- More scenarios: asteroid sample return, outer planets
- Online multiplayer
- GMAT-based trajectories
- Classroom mode
- Urdu and other translations

Play now →

Scan the code or open the link. Free, no install, any device.

saakho.github.io/escape-velocity-mission-architect

Repo: github.com/SaaKho/escape-velocity-mission-architect

Saadan Khokhar · Team Escape Velocity