



R5: Pathfinding Lean Development and Accelerating Payloads to Orbit

2023 Small Satellite Conference

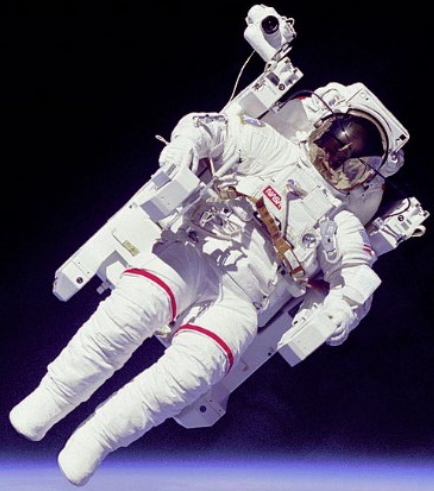
August 2023

Sam Pedrotty, R5 Project Manager

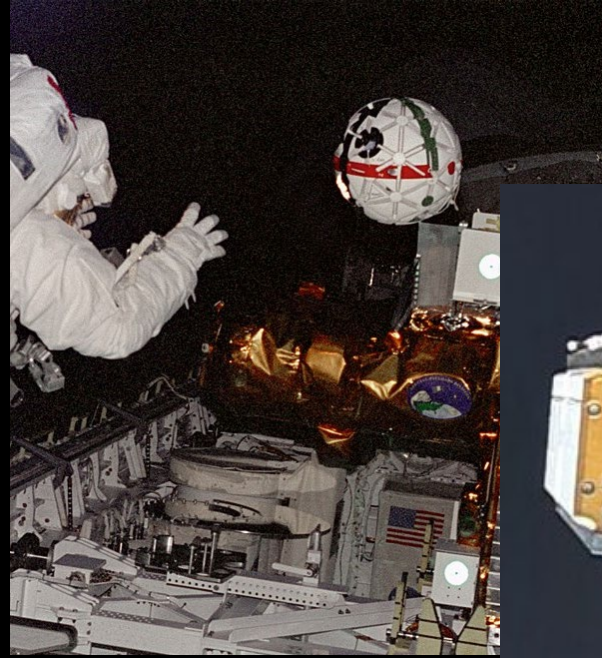


You May Remember Us From Such Spacecraft As...

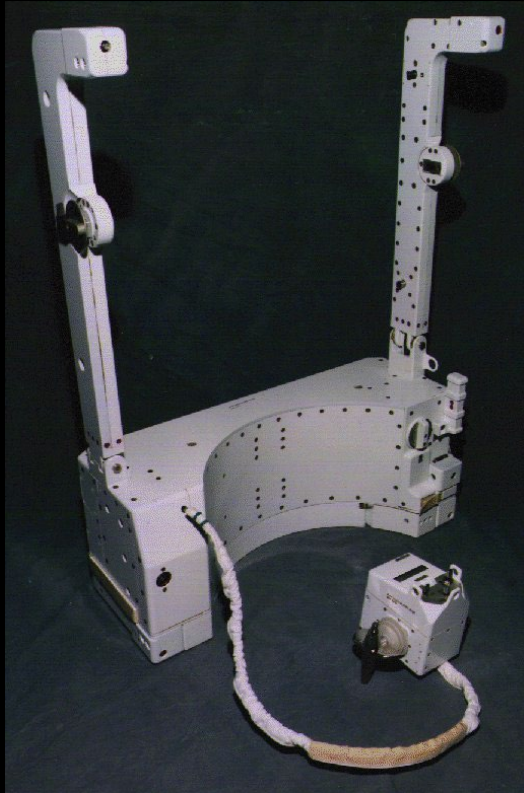
**Manned
Maneuvering Unit**



AERCam Sprint



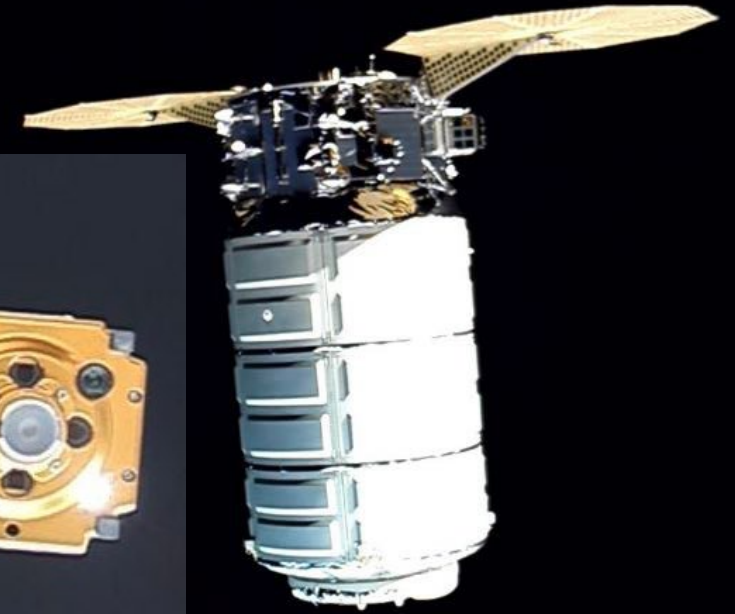
**Simplified Aid For
EVA Rescue**



Seeker



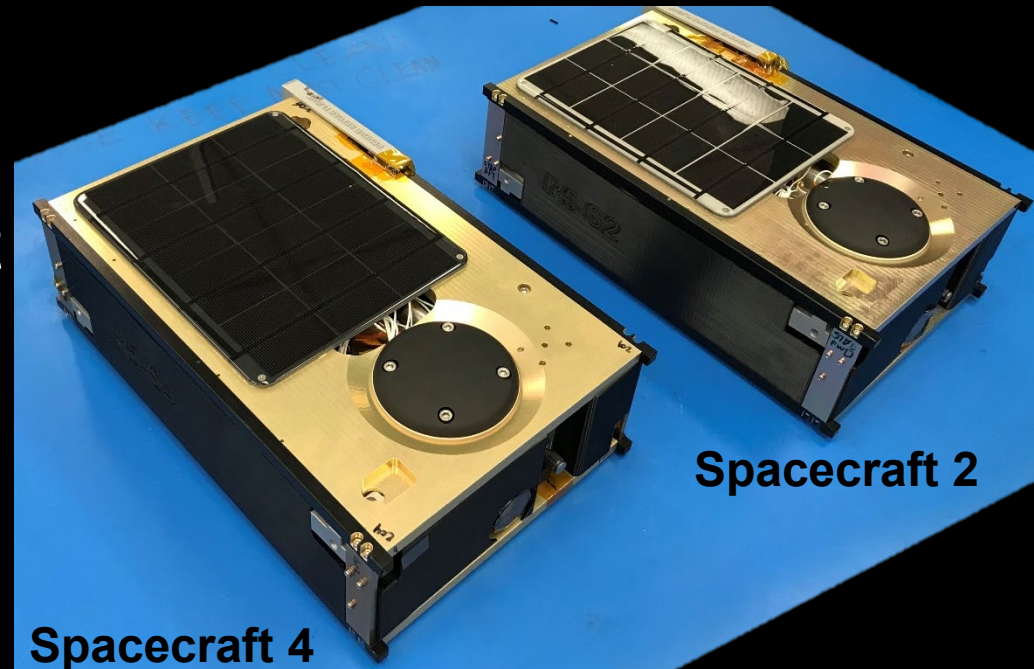
Mini AERCam





R5: Reassessing Cost and Speed

- STMD-funded, intended to provide **rapid, low-cost, high-risk method to get TRL 4 payloads to TRL 8**
 - Evaluating **ultra-lean, COTS-based approaches** to define new thresholds for cost and schedule
 - Hosting **payload/technology demonstrations** onboard each spacecraft
- (Once we get data) we intend to **broadly share experience and lessons learned** to accelerate/enable the small spacecraft community
- Status: 1 spacecraft launched, 2 set for delivery, 2 approaching fabrication, more in planning

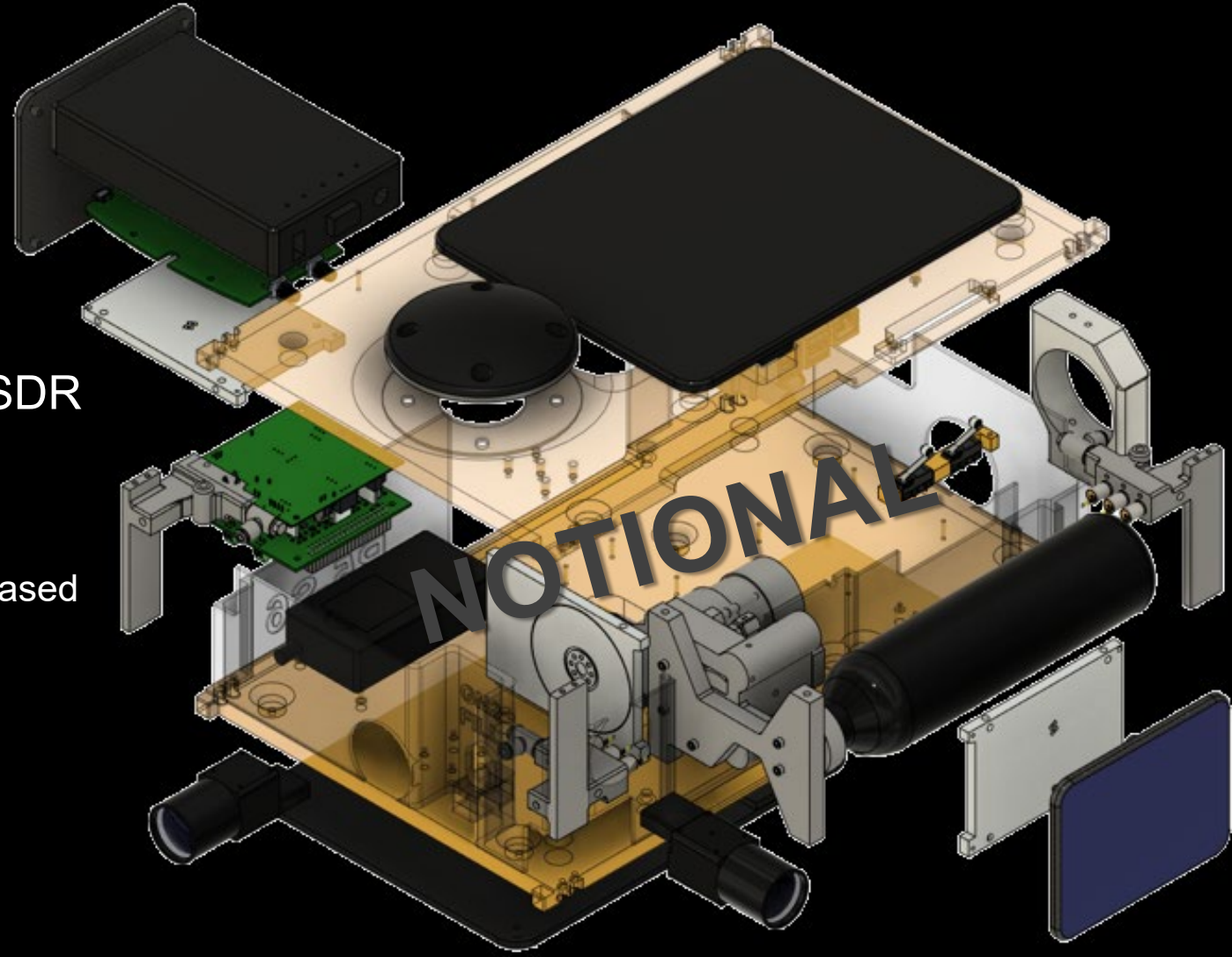




R5 Baseline

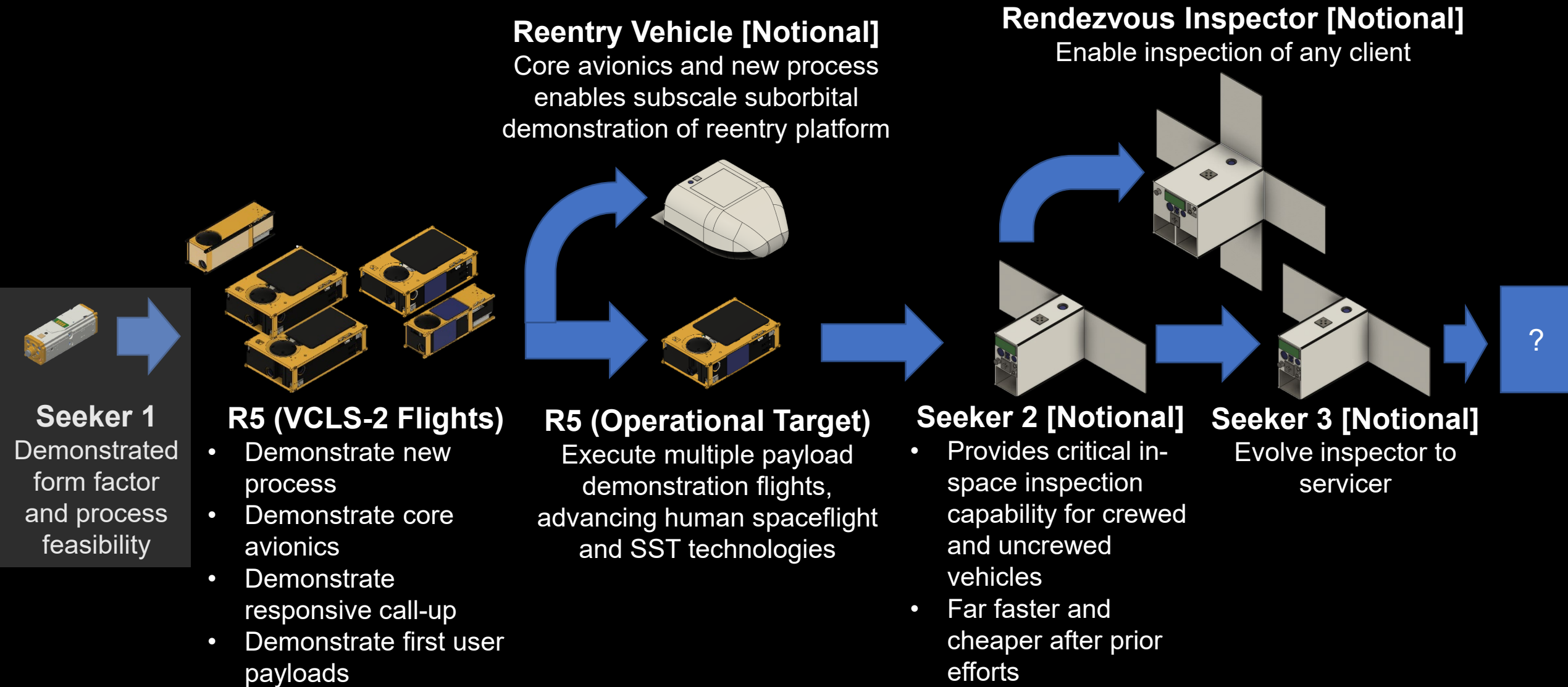


- Bus baseline:
 - Form factor: 6U (2x3U)
 - Energy: 70+ W*hr
 - Prop: 6DOF cold-gas
 - Comm: Iridium beacon, COTS-based SDR
 - Compute: “High performance” COTS
 - GNC: Full inertial, basic relative
 - Star tracker, IMU, reaction wheels, vision-based bearing
- Operations baseline
 - Ops autonomously executed onboard
 - Limited ground control possible
 - Resulting data autonomously and asynchronously downlinked





R5 [Notional] Evolutionary Path





Thanks!



- We hope to have data for you by Small Sat 2024
 - In the meantime, feel free to peruse Seeker:
 - <https://ntrs.nasa.gov/search?q=seeker&published=%7B%22gte%22:%222017-01-01%22%7D>
 - <https://software.nasa.gov/software/MSC-27108-1>
 - ... and our star tracker software suite: <https://github.com/nasa/COTS-Star-Tracker>
- We're interested in collaboration, especially with:
 - “Easy-to-license” RF comm
 - Optical comm
 - Proximity operations

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