

From Recommendation to Reality

Decadal → GOMAP → CSIT → Mission Architecture

HWO Technology Maturation Project Office
(TMPO)

Breann Sitarski, Deputy Principal Architect

SCIENCE, TECHNOLOGY, AND ARCHITECTURE REVIEW TEAM (START) AND TECHNICAL ASSESSMENT GROUP (TAG) WORKING GROUPS

Scien

Galaxy Growth
Ravindranath & Postman

Evolution of the Elements
Lee & Scowen

Ground-Based Astronomy in the 2030s/2040s
Lopez-Morales & Miyazaki

Space-Based Astronomy in the 2030s/2040s
Kataria & Petre

Living Worlds
Arney & Parenteau

Solar System in Context
Robinson & Shkolnik

Communications
Schirner & Straughn

Artificial Intelligence & Machine Learning
Ansdell & Dean

Joint &

Mentorship
Beaton & Scannapieco

GOMAP
Synergies for Future Missions
Gaskin & Oschmann

Science Case Simulation
Batalha & Osten

Science Data Simulation
Greene & Tumlinson

Science-Engineering Interface
Morrissey & Sitarski

Past Studies Comparison
Gaudi

Techni

Systems
Menzel & Shaklan

Integrated Modeling
Levine & Liu

Technology
Bolcar & Zhao

Servicing
Van Campen & Grunsfeld

THE TECHNOLOGY MATURATION PROJECT OFFICE (TMPO) BUILT ON THE WORKING GROUPS OF THE START AND TAG

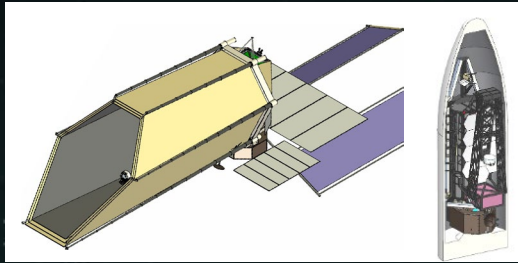
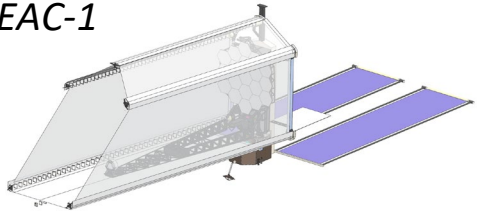


HWO25 Conference in Washington, DC

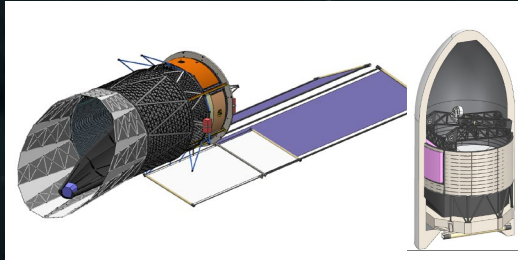
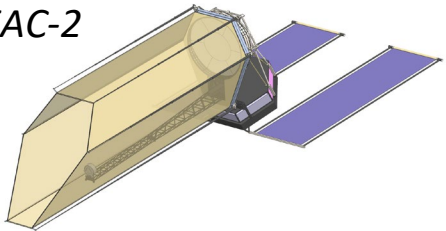
EXPLORATORY ANALYTIC CASES (EACs)

Explore → Design → Analyze → Repeat

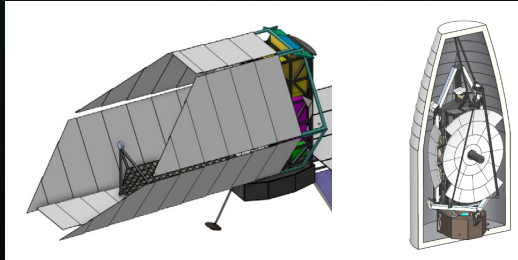
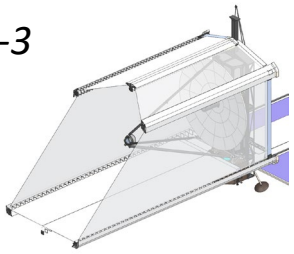
EAC-1



EAC-2



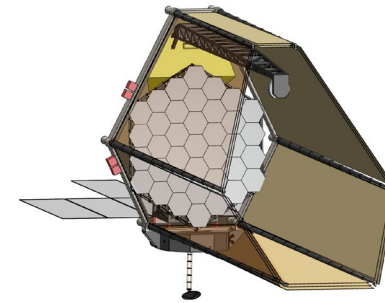
EAC-3



EAC-4



EAC-5



Starting Point (1/2026)



EAC-6

Single
Baseline
for MCR

Starting Point (2/2024)

End Point (3/2025)

EACs 1 – 3 WERE RECONNAISSANCE: THEY HELPED FIND PAIN POINTS

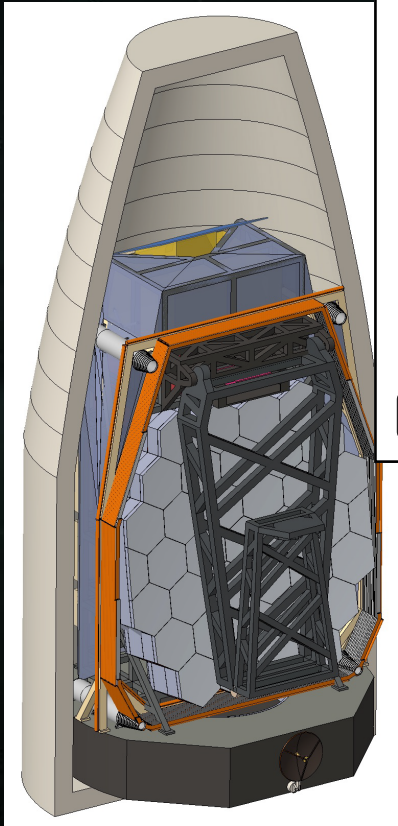
Some trades:

- Segmentation
- Deployments
- Primary mirror diameter
- Barrel configuration
- Instrument location
- On-/off-axis



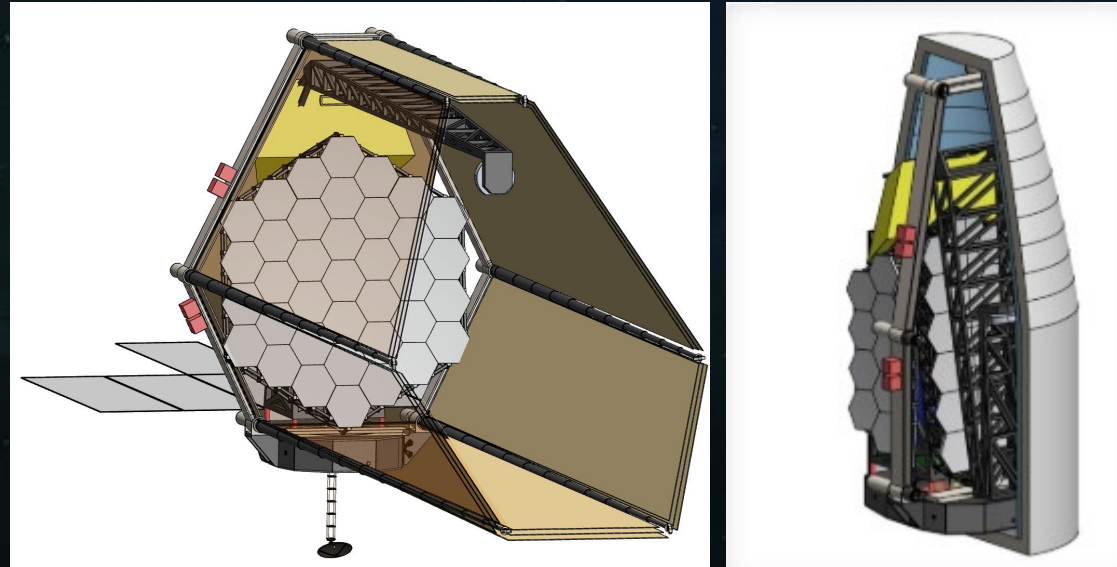
EACs 4 + 5 BUILD ON EACs 1 – 3 + TECHNOLOGY MATURATION

EAC4



- Off axis, >6.5 m
- Volume dual rocket compatible
- 5 instruments, including a UV IFU
- 2 channel coronagraph

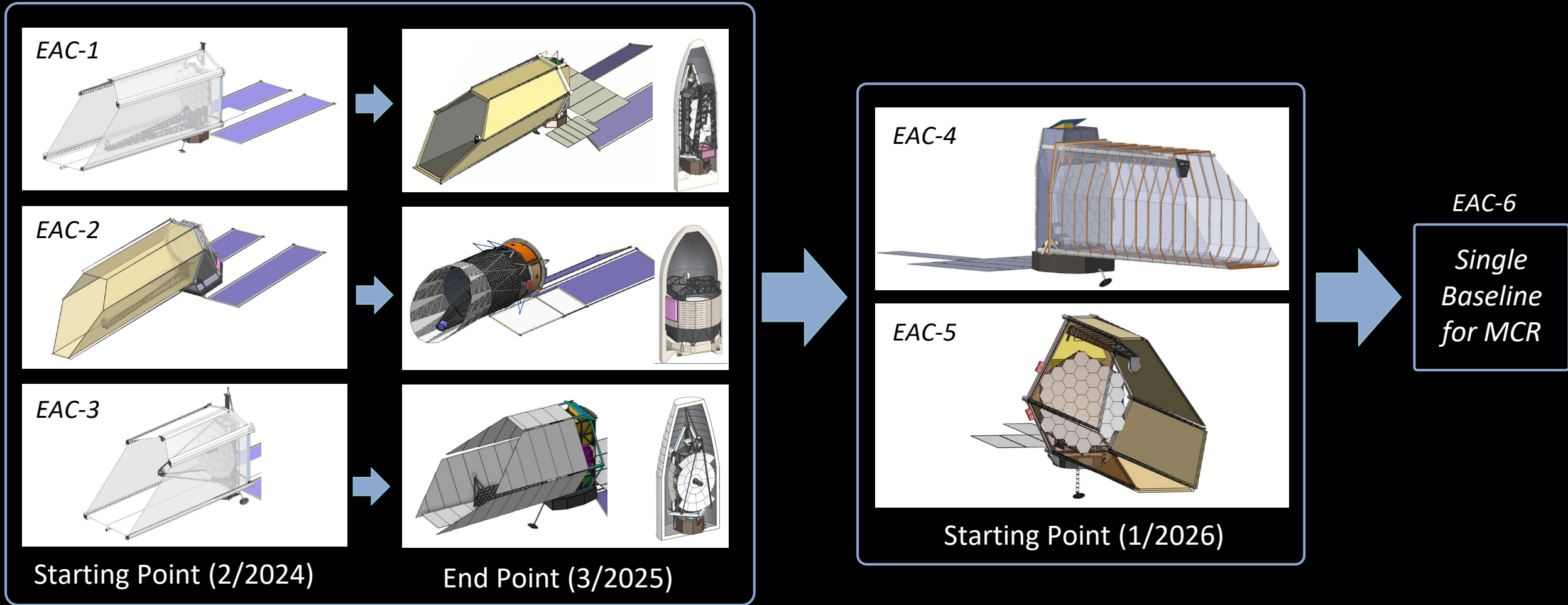
EAC5



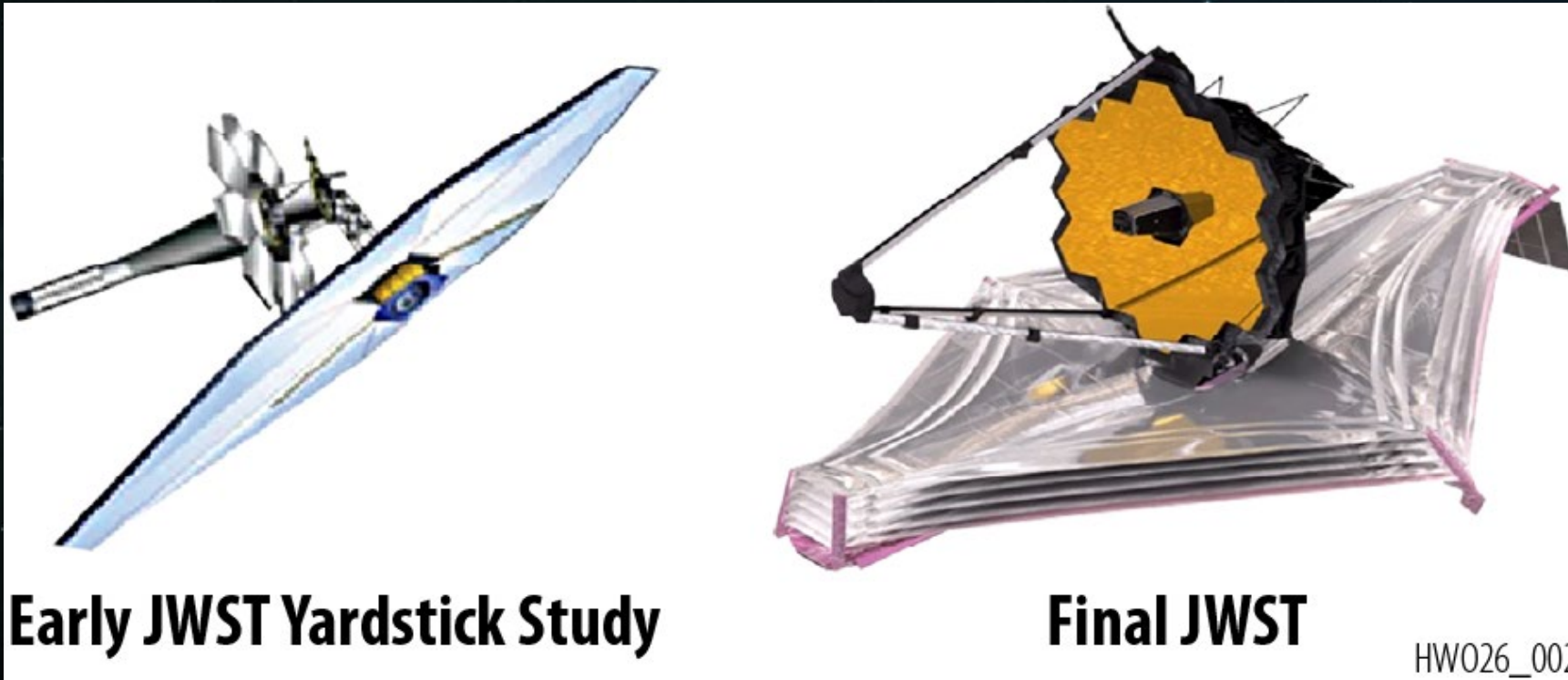
- Off axis, >8 m
- Volume dual rocket compatible
- 5 instruments, including a UV IFU
- 3 channel coronagraph

EXPLORATORY ANALYTIC CASES (EACs)

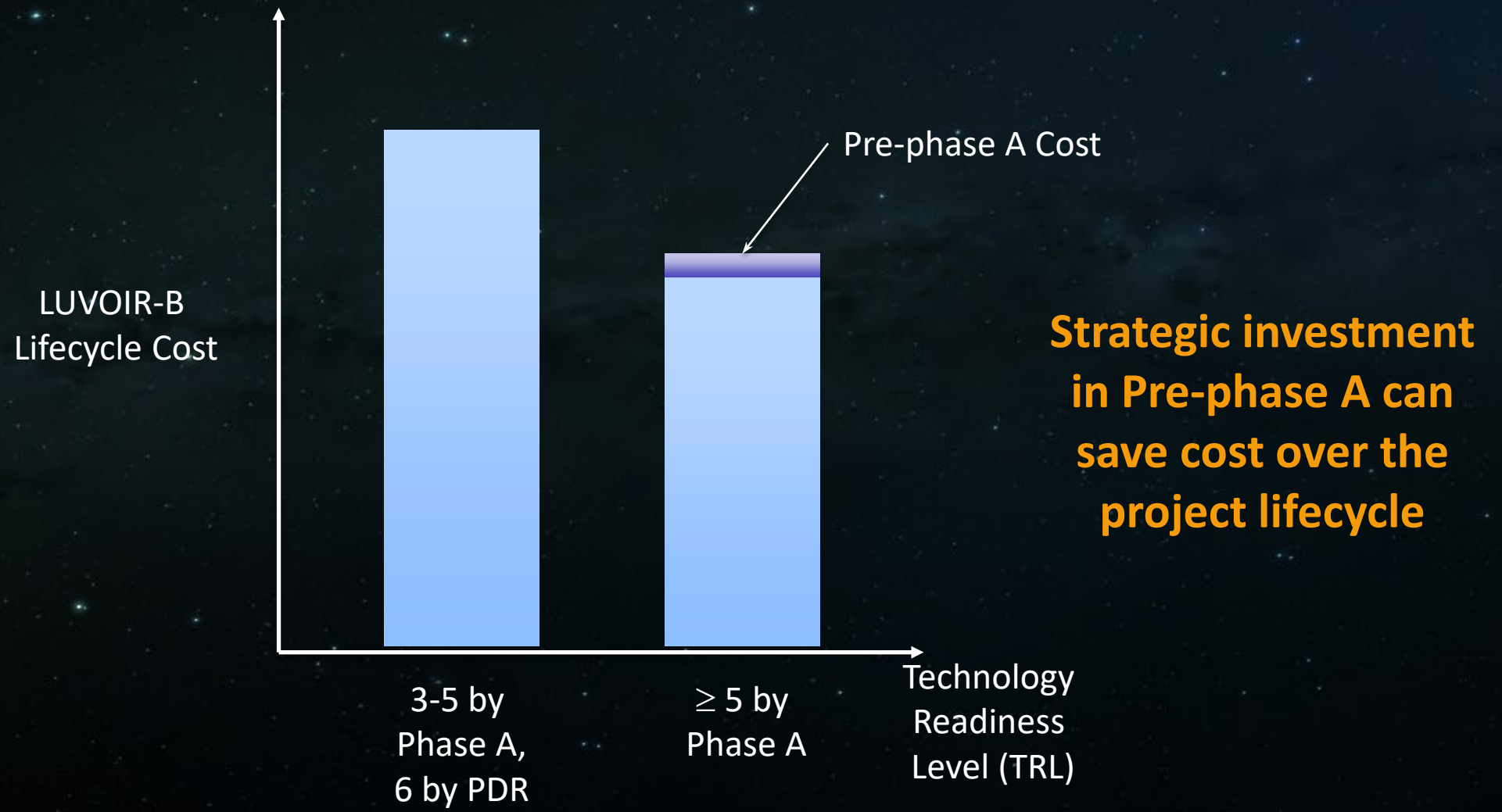
Explore → Design → Analyze → Repeat



EAC6 IS NOT INTENDED TO NECESSARILY BE THE FINAL DESIGN OF THE OBSERVATORY, BUT WILL BE INFORMED BY YEARS OF TECHNOLOGY DEVELOPMENT



EARLY TECHNOLOGY DEVELOPMENT SAVES MONEY

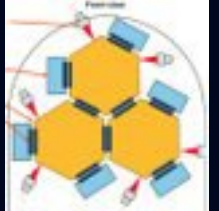




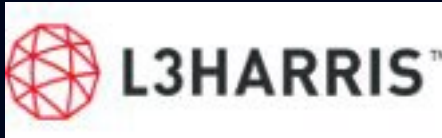
Service architecture studies to optimize science return and operational lifetime



Picometer-level rigid body telescope sensing and control and laser metrology to TRL5



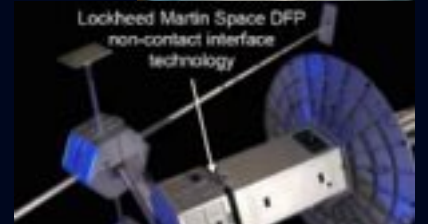
Micro-thruster Propulsion System Module to TRL5



Thermal Picometer-level (pm) stable mirrors to TRL5



Non-contact Vibration Isolation and Precision Pointing System to TRL5



Ultra-stable, Stiff Telescope Structures (TRL5), Latches, Structural Microlurching and Creep and Micrometeoroid Shield Protection



Large-scale, Far-Ultraviolet, Broadband Mirror Coating to TRL5



By Mission Concept Review, we need to show acceptable risk with respect to:

- Holding a *segmented mirror* to the required stability
 - Achieving end-to-end *system-level alignment & stability*
 - Reaching and maintaining the necessary *contrast and contrast stability*
 - Detecting and characterizing an exoEarth with *photon-counting detector systems*
 - A feasible *deployment scheme* that achieves the necessary aperture, micrometeoroid, stray light, and thermal constraints
 - Uniform, repeatable *far-ultraviolet mirror coatings*
- Investments with industry partners that built Hubble, Webb, and Roman
- Build on infrastructure and expertise of the Roman CGI team
- Competitive development across academic, industry, and gov't labs
- Collaborative industry & gov't studies, tests, and Pathfinders
- Leverage developments from small CubeSat and sounding rocket science missions

Technology Development Roadmap

Now

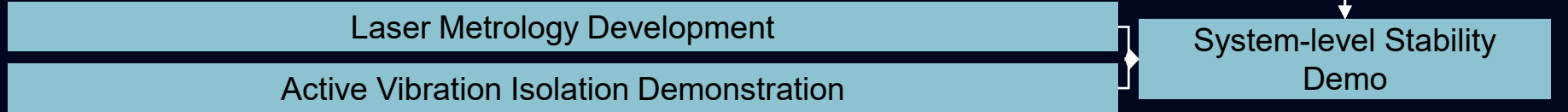
MCR



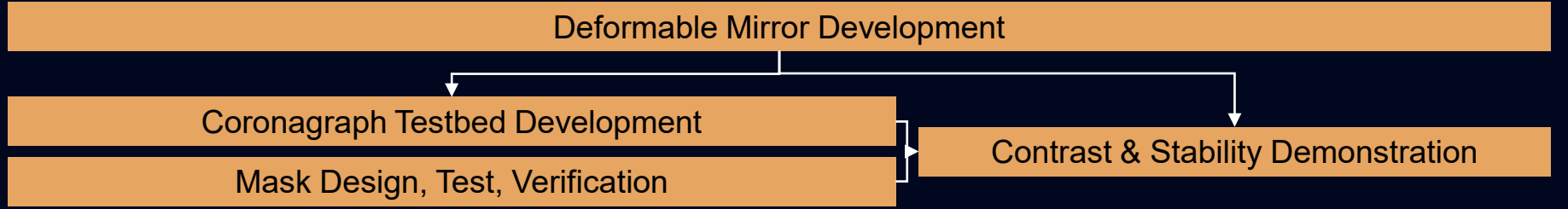
Segmented Mirror
Stability



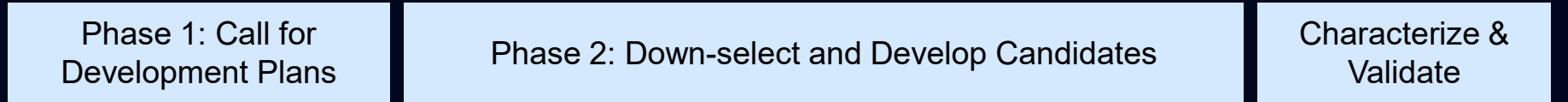
System-Level
Alignment Stability



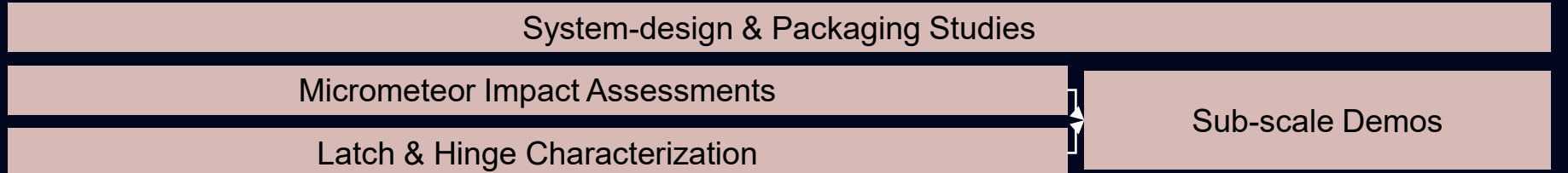
Coronagraph Contrast
& Contrast Stability



Photon-counting
Detectors



Feasible Deployment
Scheme



Far-UV Mirror Coatings

