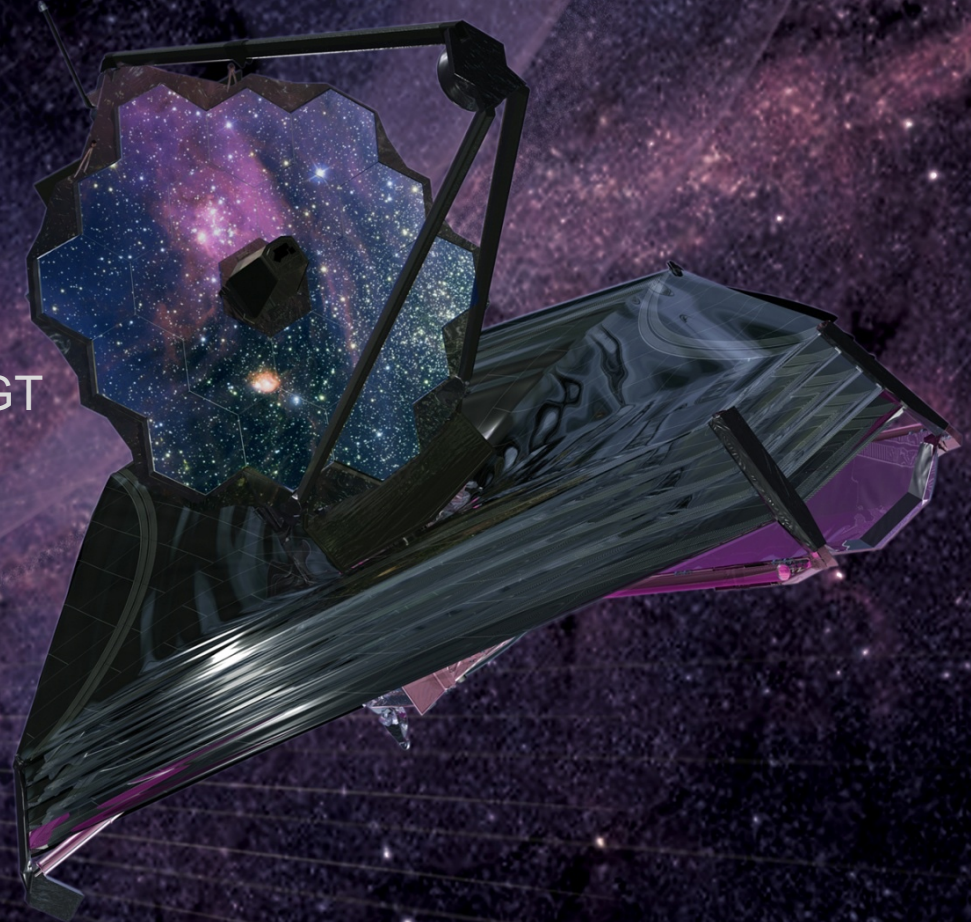


JWST: Testing and Integration Status

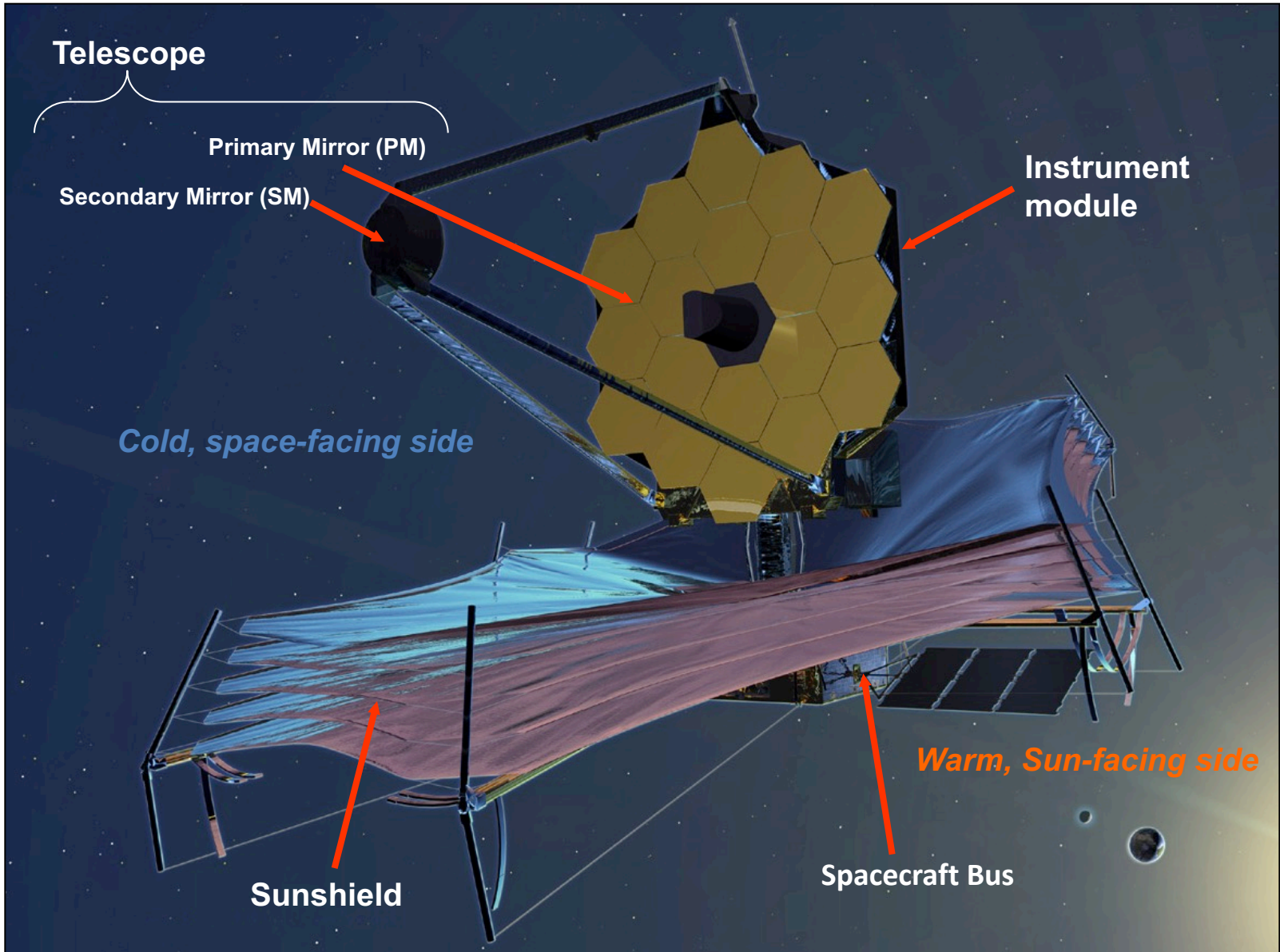
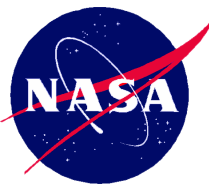
Begoña Vila, PhD
NASA Goddard Space Flight Center/SGT
March 12, 2018



JWST IAC Workshop – March 12th - 13th 2018



James Webb Space Telescope (JWST)



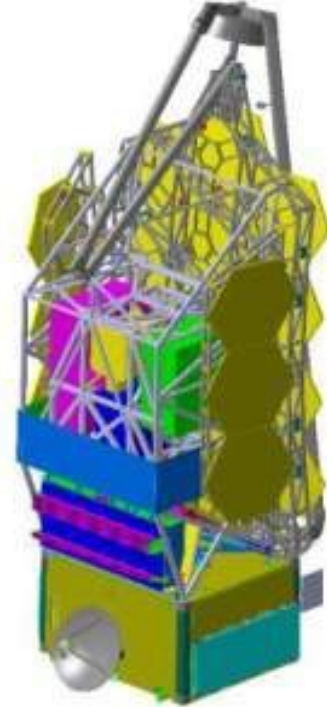
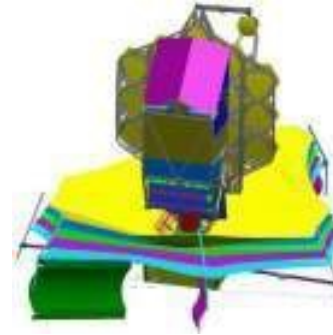
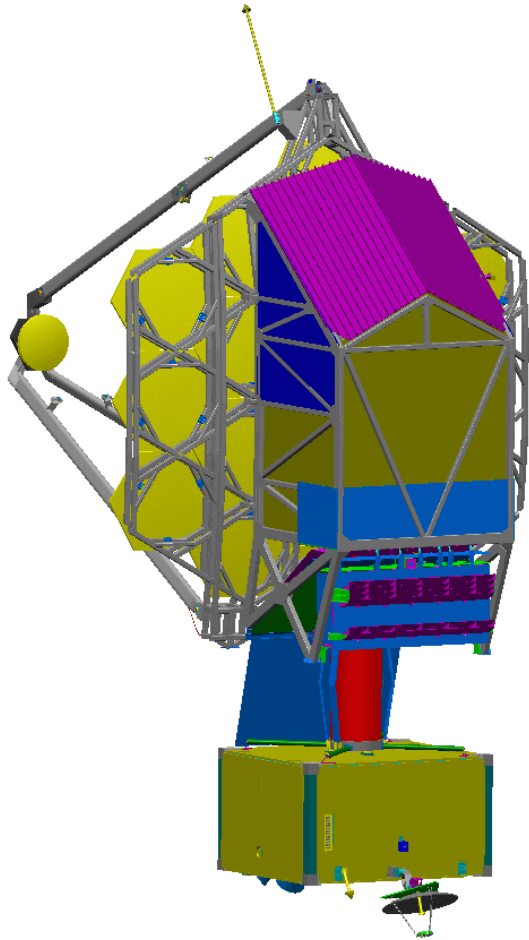


ISIM Overview



ISIM is:

- The JWST Science Instruments
- Associated Infrastructure: Structure, Thermal Subsystem, C&DH, & FSW



Region 1:

Science Instrument Optics Assemblies

Near Infrared Camera (NIRCam)

Near Infrared Spectrograph (NIRSpec)

Mid Infrared Instrument (MIRI)

Fine Guidance Sensor/NIRISS (FGS/NIRISS)

Optical Bench Structure

Radiators and support structure (NGST-supplied)

Region 2:

ISIM Electronics Compartment

Focal Plane Electronics (FPE)

Instrument Control Electronics (ICE, MCE)

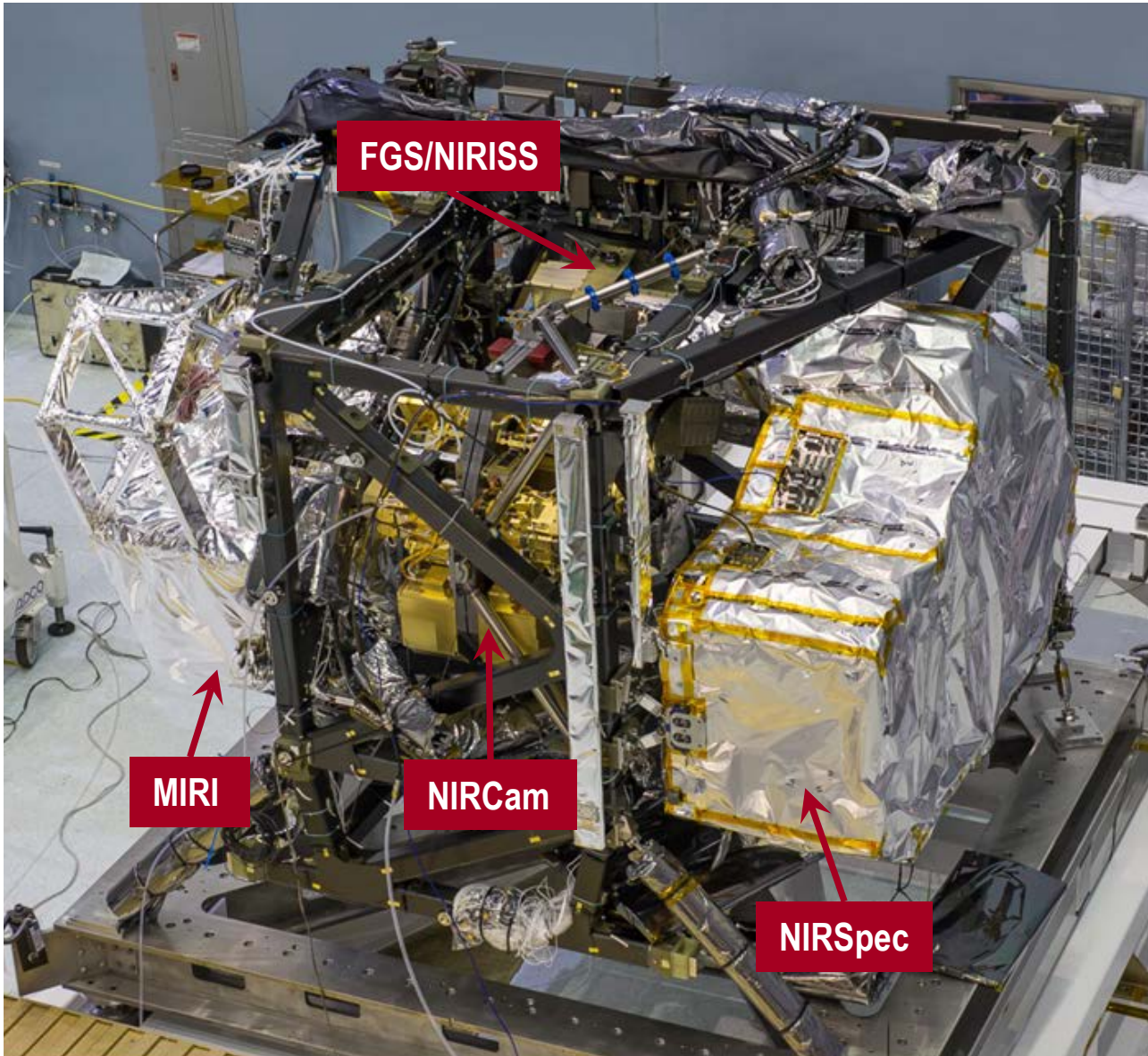
ISIM Remote Services Unit (IRSU)

Region 3

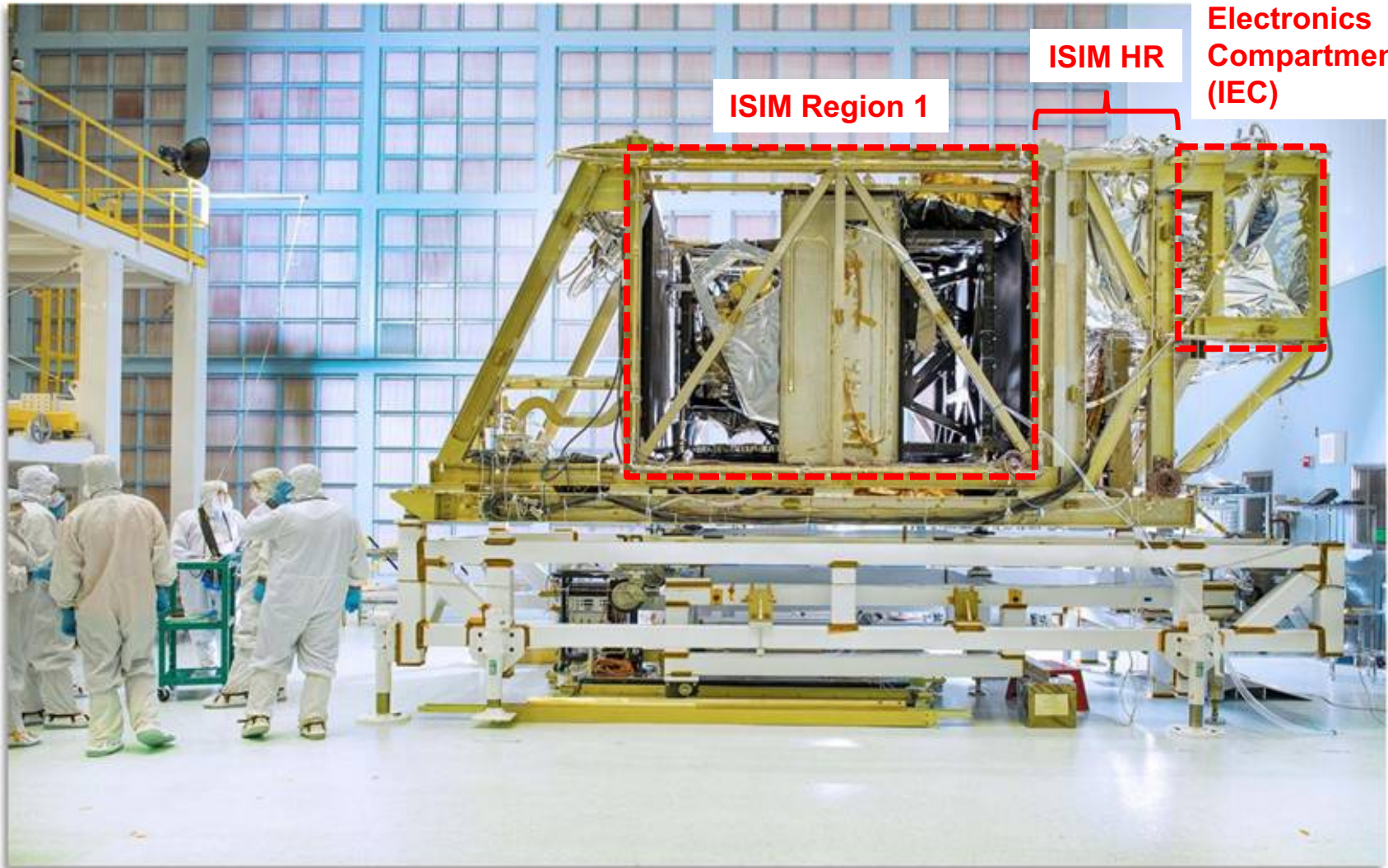
ISIM Command & Data Handling (C&DH) Electronics

ISIM (Integrated Science Instrument Module)

Flight Hardware

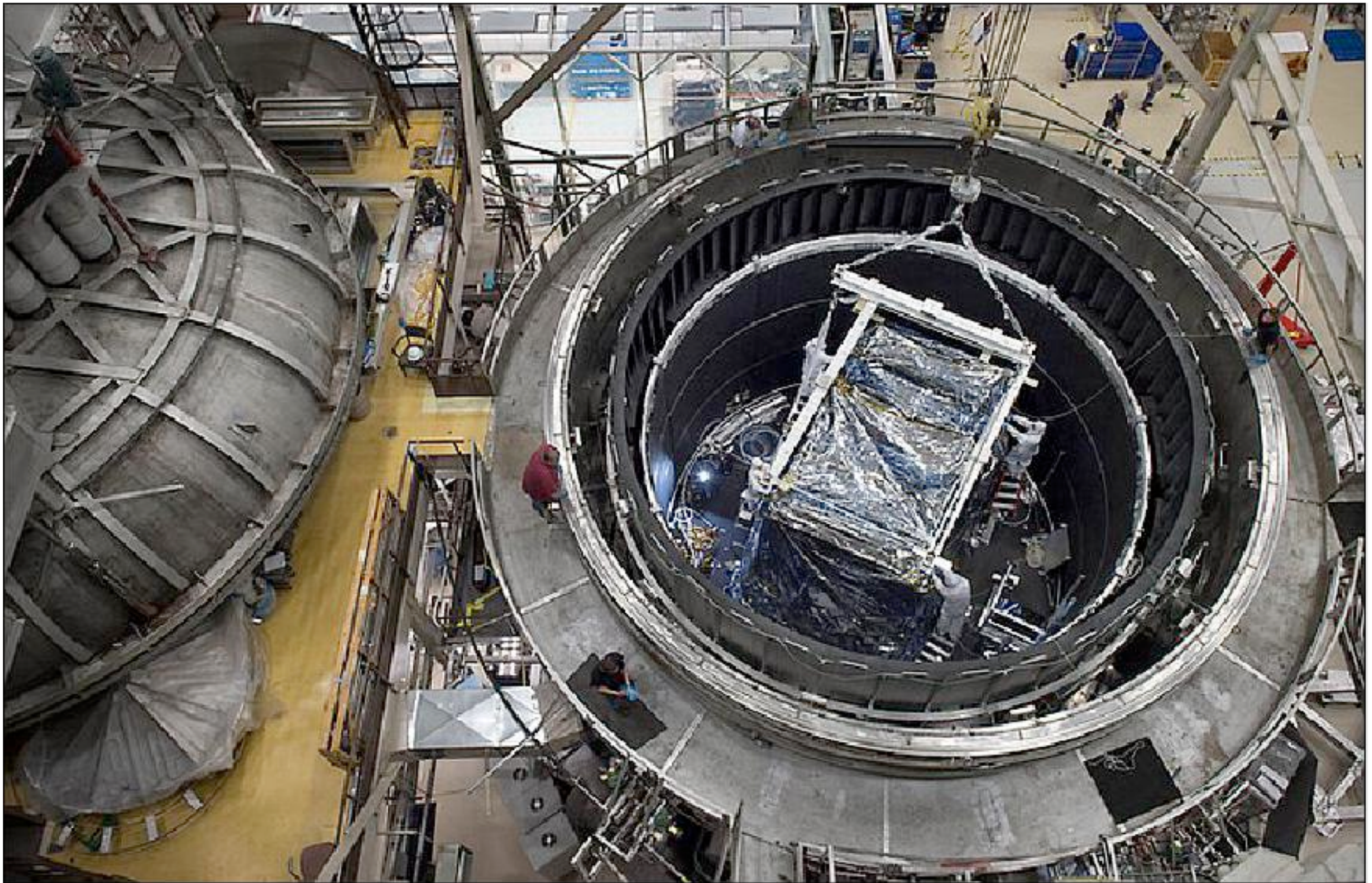
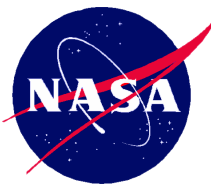


ISIM with Support Structure in the GSFC Clean Room

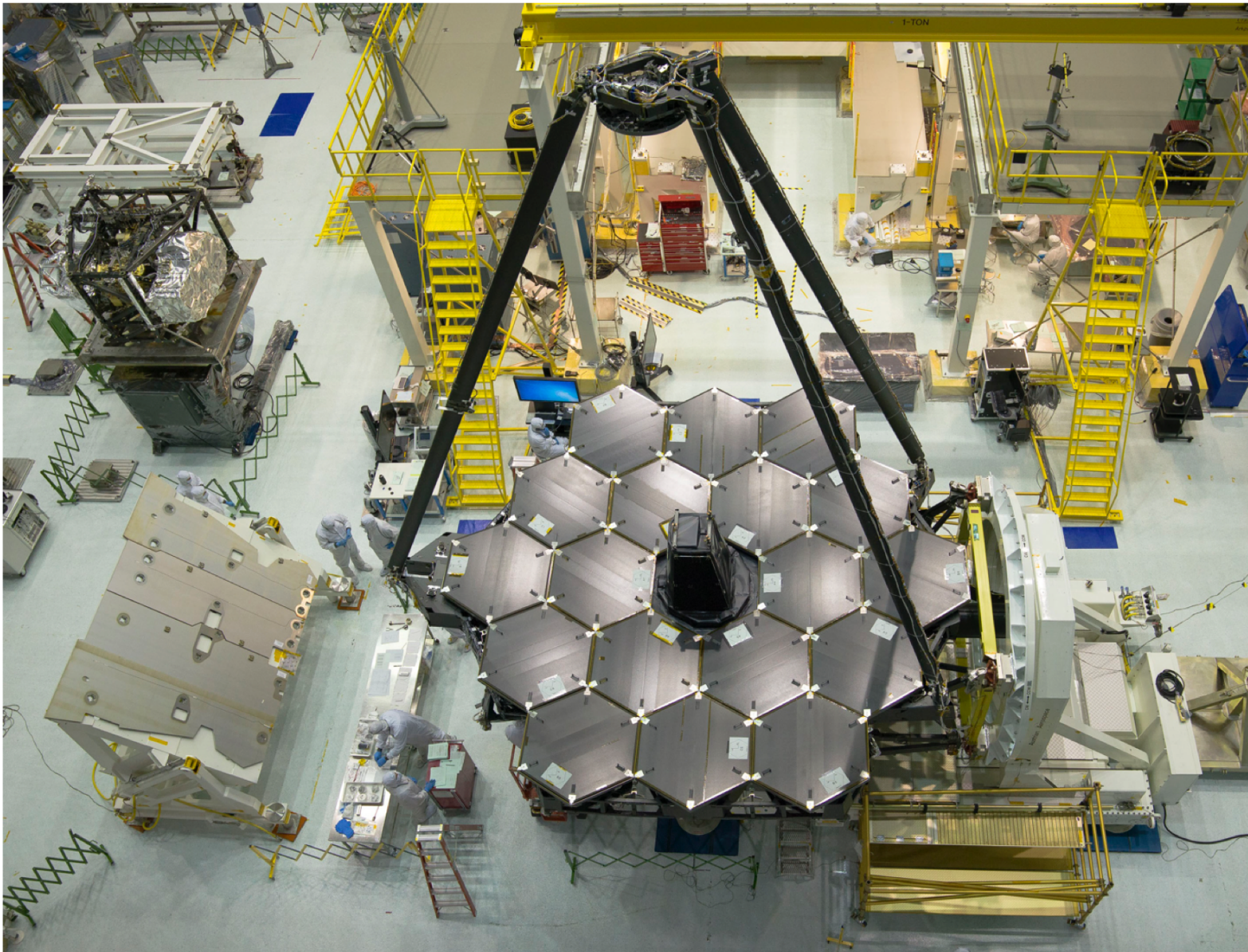




ISIM and IEC cryo test – Feb 2016

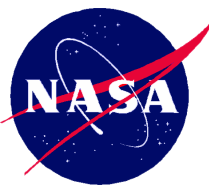


Mirrors mounted – Feb 2016





JWST in the Goddard Space Flight Center Clean Room: Optical Telescope and Instrument Module



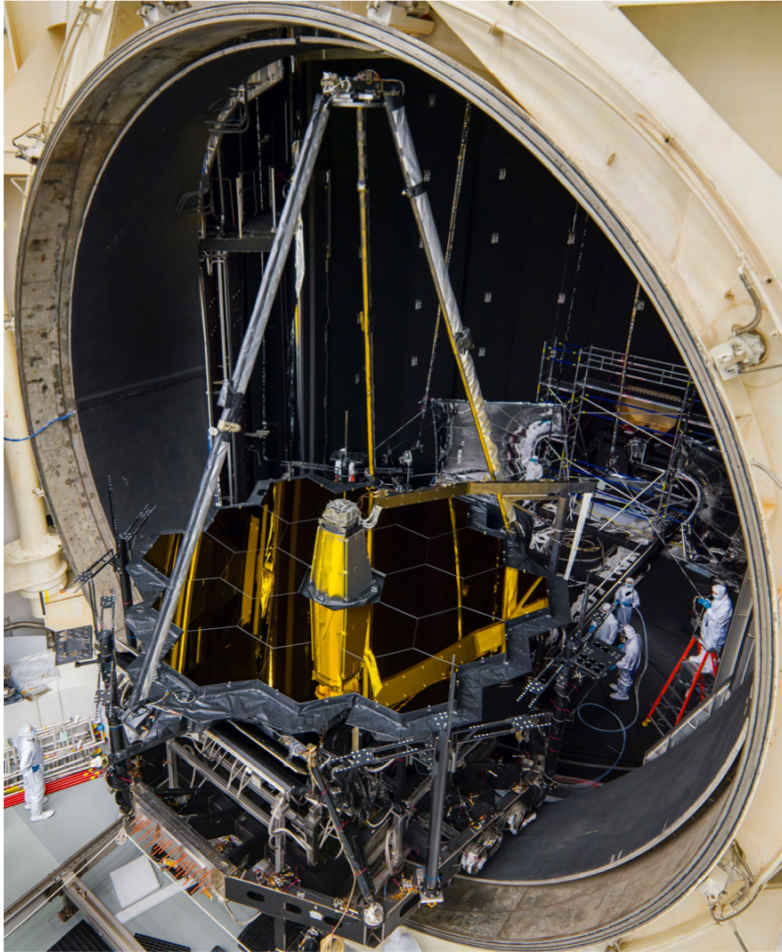


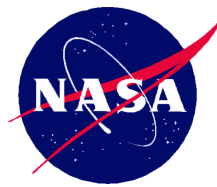
Clean Tent covering hardware before Vibration and Acoustic Testing at GSFC





OTIS Cryo Test at JSC - 2017





OTIS activities post-cryo

- JSC Cryogenic Test completed October 2017
- Pre-post ambient functionals for ISIM and OTE completed successfully
- Post-cryo inspections and removal from chamber through early December
- Final Mirror Stows, Primary Mirror Segment Assemblies (PMSA) and Secondary Mirror Assembly (SMA) Inspections and Cleaning through Jan 2018
- Shipped OTIS to NGAS and moved into cleanroom – completed March 8th
- Once Spacecraft Element (SCE) leaves cleanroom – post shipment ambient functionals for OTIS – ISIM and OTE
 - Including particle damper installation
 - Aft Deployable ISIM Radiator (ADIR) deployment
 - Risk mitigation ambient testing with latest FSW versions



OTIS Shipment to NGAS - LA

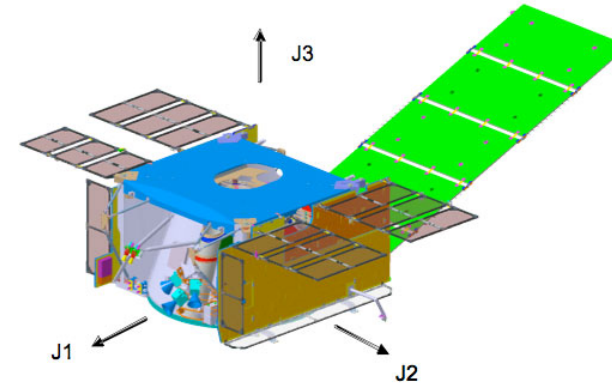




Spacecraft Element (SCE) + Sunshield activities

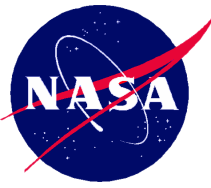


Spacecraft and Sunshield have completed their individual integration and test phases and are assembled together.

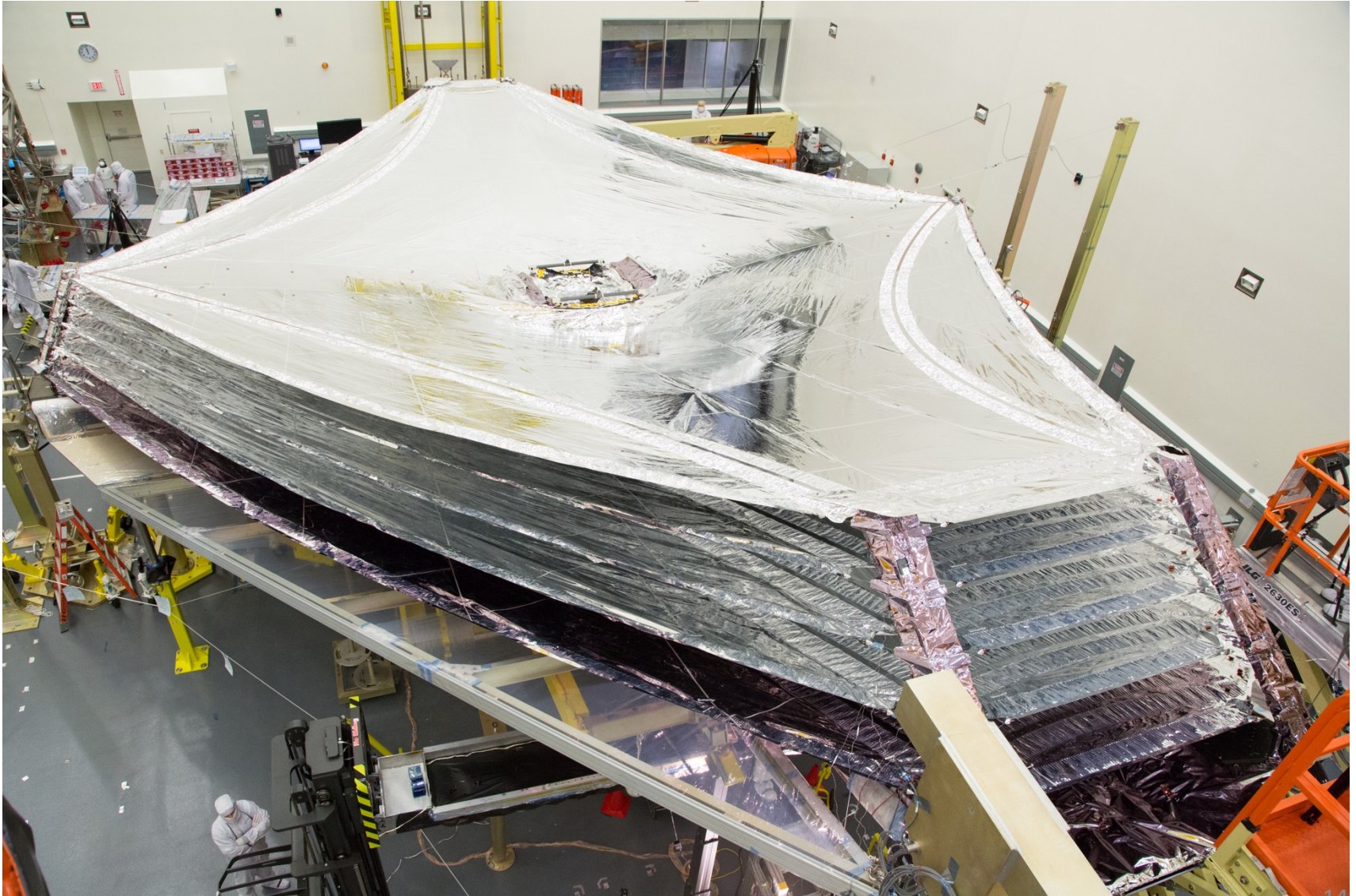


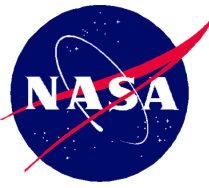
- Completed Sunshield deployment – Oct 2017.
- Shock, Acoustic, Vibe, Thermal Vacuum campaign using OTE simulator (Comprehensive System Test CST#2 and CST#3) through July 2018.
- Post-environmental deployments.
- Returning to cleanroom and ready for installation with OTIS Aug/Sep. (TBC)





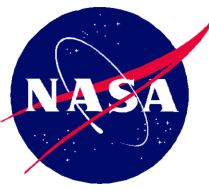
Flight Sunshield



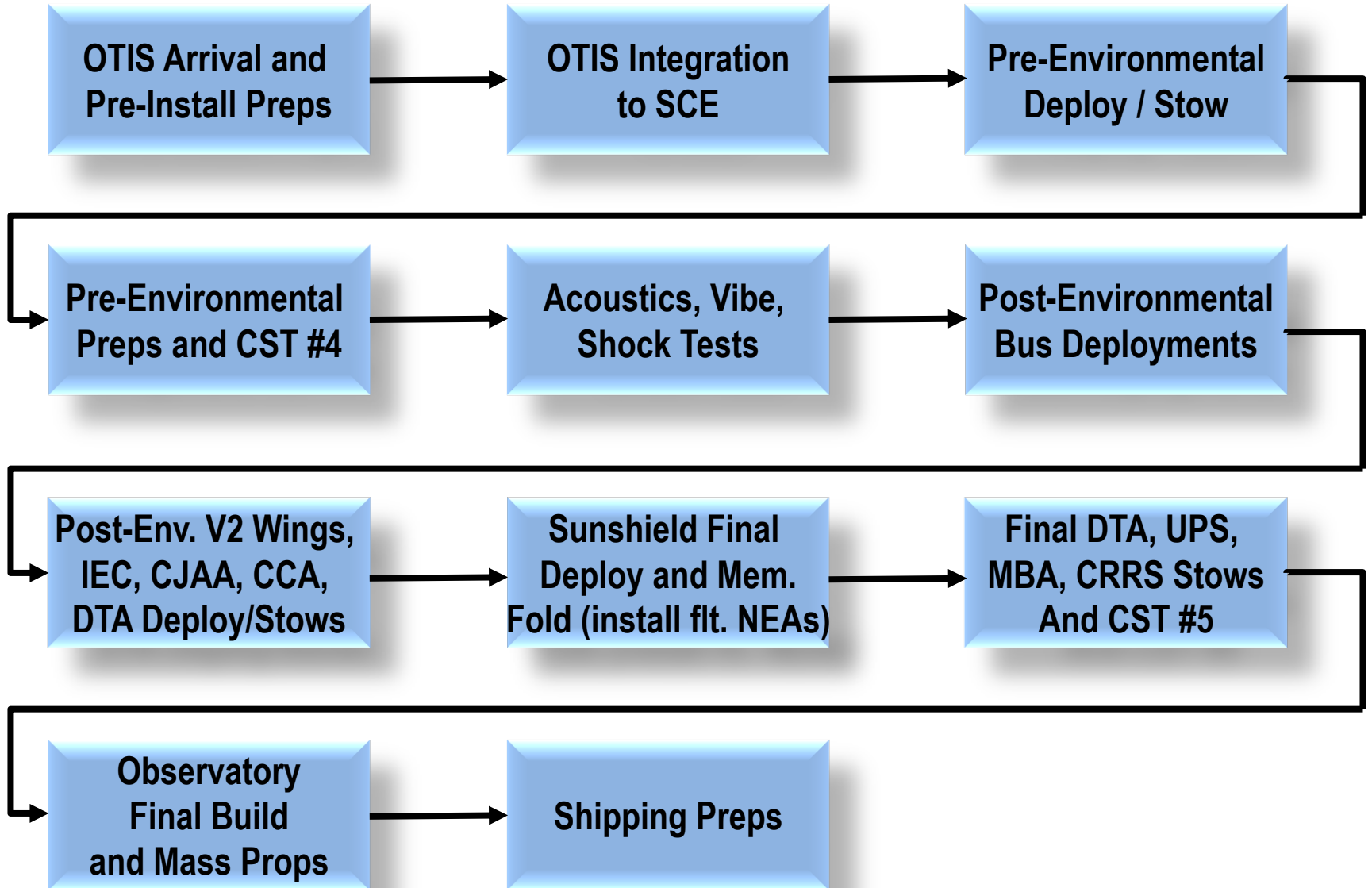


Observatory activities

- Deploy OTE wings
- Secondary Mirror Support Structure (SMSS) Deployment, Install blankets
- Ambient functional (CST4); Observatory Day in the Life; Obs to Ground segment end to end (GSEG3) – through Nov 18
- Acoustics test; Vibration; Shock – through Jan 19
- Solar array release; Gimbal Antenna Assembly (GAA) release; Deployable Radiator Shade Assemblies (DRSA) release;
- Sunshield deployment; deploy wings; Deployable Tower Assembly (DTA) and SS deployment;
- Ground segment end to end test #4; Observatory Day in the Life
- Install flight NEAs, Solar Array
- Shipping to Launch Site
- Post-ship ambient functional at Launch Site; installation into Ariane; final ambient check

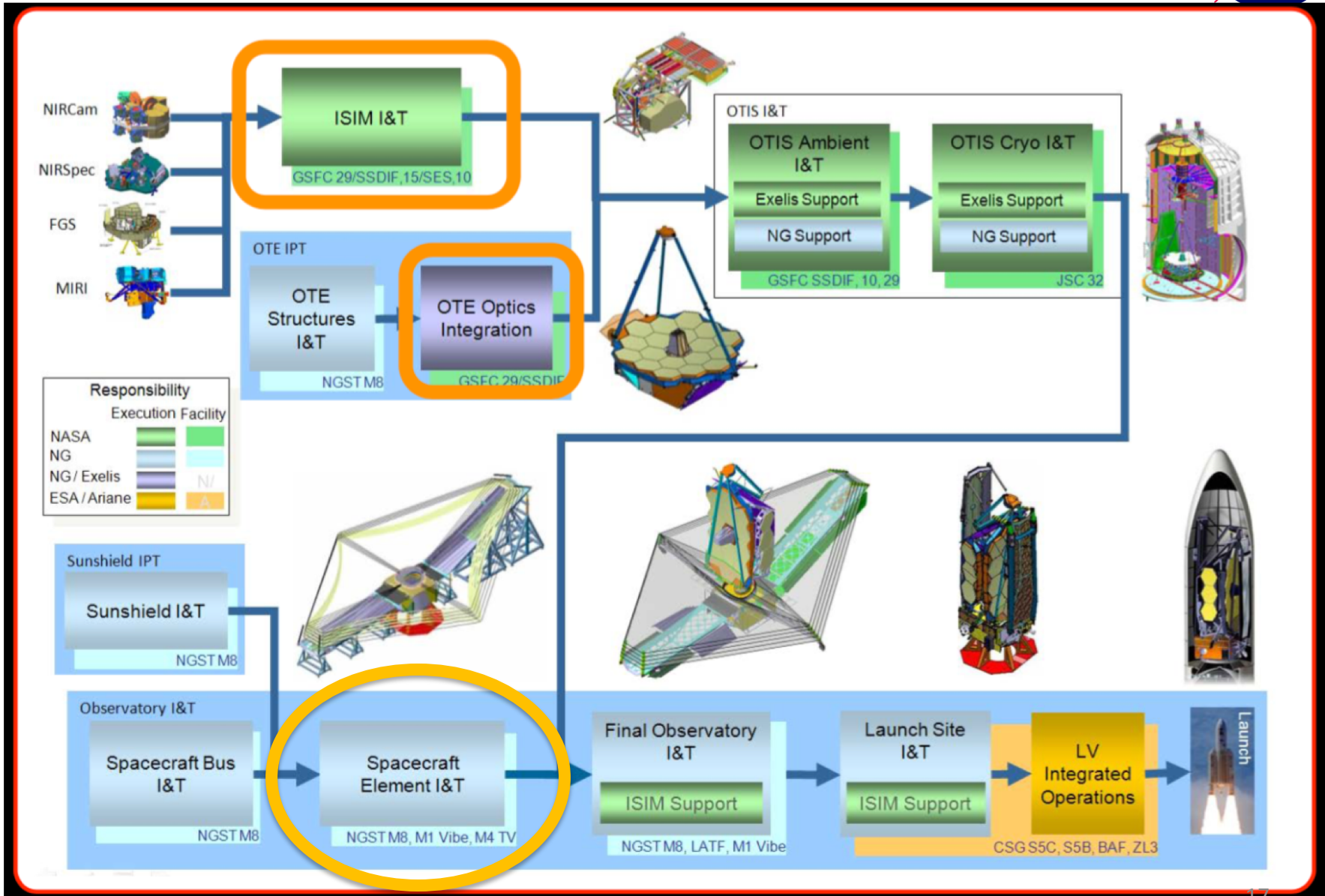
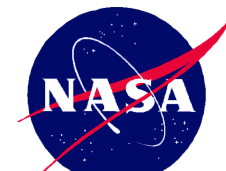


Observatory I&T Flow

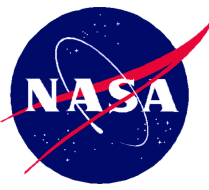




JWST Path to Launch

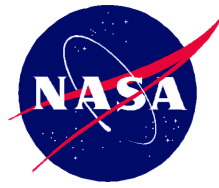


We are here

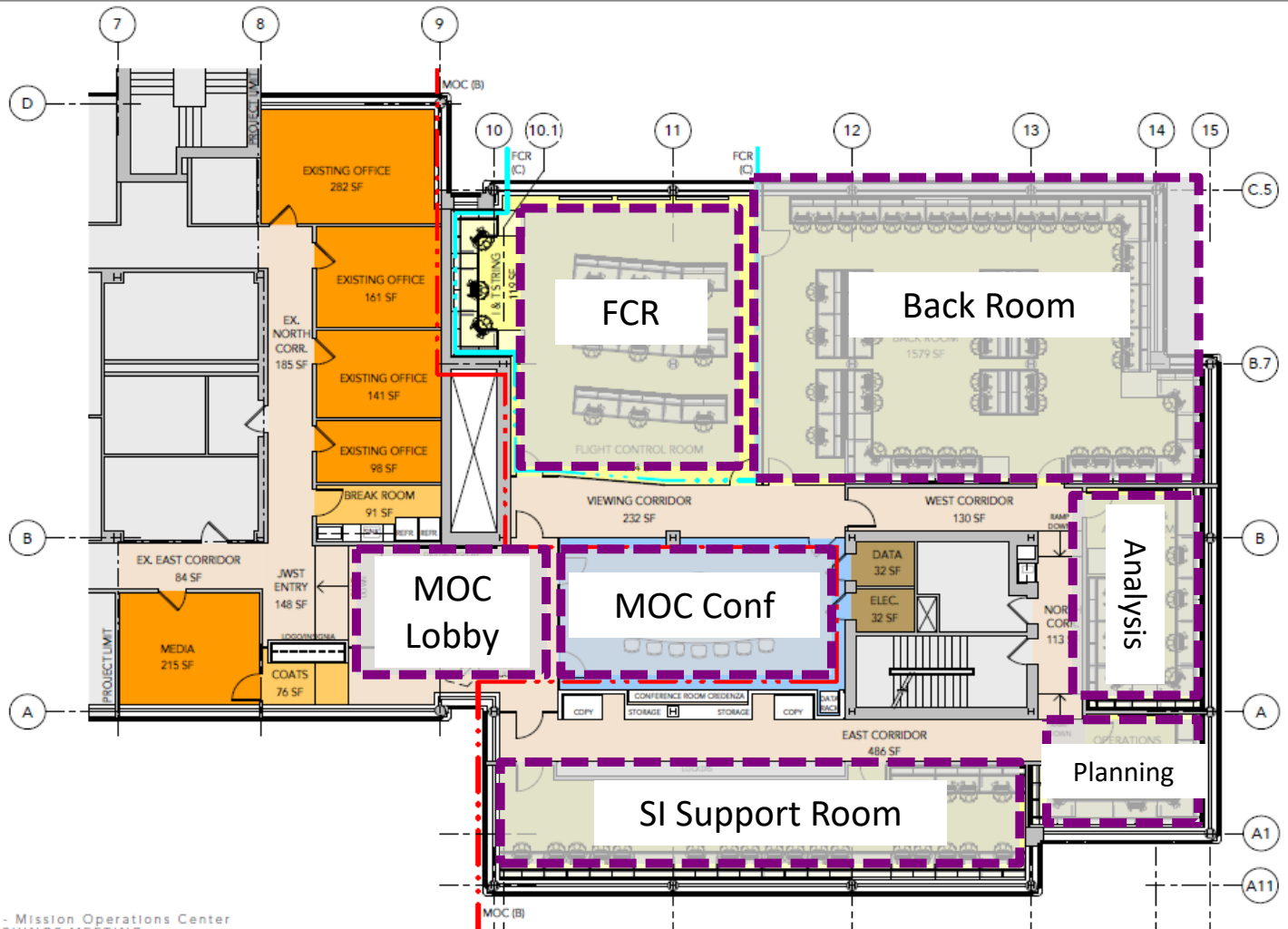


Rehearsals in preparation for Commissioning

- ORE: Operation Readiness Exercises – all complete – flight operations team
- LRE: Launch Rehearsal Exercise: 5 or 6
 - LRE1 – L-9 months, NIRSpec; LRE2 – L-7 months, NIRSpec, MIRI; Cryocooler
 - LRE3 – L-5 months; LRE4 + LRE5 – L-3 months – all SIs on
- ICE: Integrated Crew Exercise:
 - ICE1 before LRE1; ICE2 before LRE3; ICE3 before LRE5
- MDR: Mission Dress Rehearsal; occurs 4 days before launch
- GSEG: Ground Segment End-to-End Test: the 3rd and 4th need SI participation
- WFSC: Wavefront Sensing and Control Rehearsals #1 and #2
- SI Rehearsals
- Early Commissioning Exercise (ECE) covering Mid-Course-Correction (MCC) activities
- DIL – Day in the Life and Science Operations Rehearsals (SORs)



MOC Layout

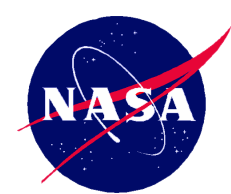


3rd FLOOR PLAN

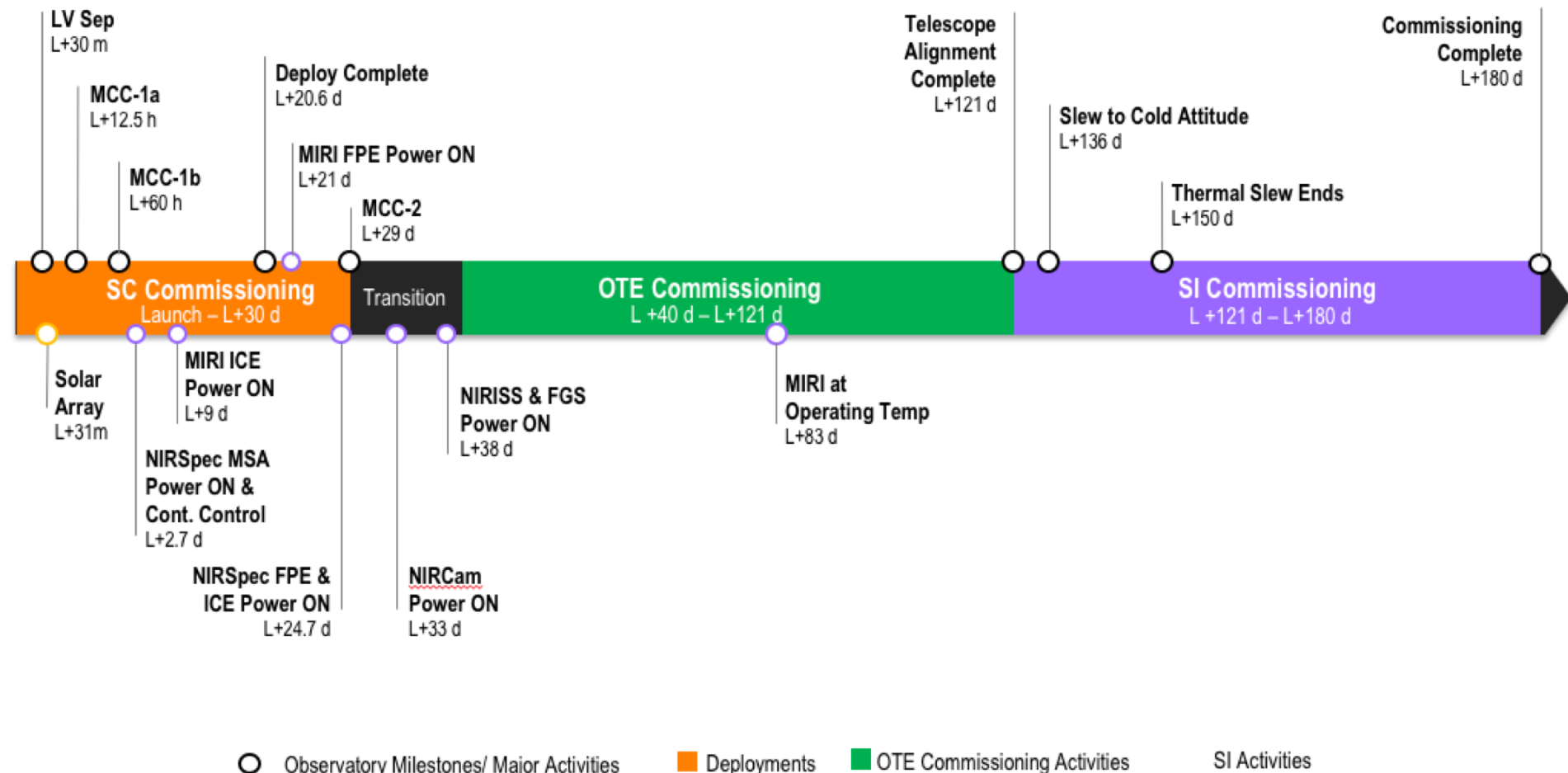
James Webb Space Telescope - Mission Operations Center
DESIGN DEVELOPMENT FURNISHINGS MEETING
01.07.2015



Read & Company Architects Inc.



Graphical Timeline



July 2017

The JWST will be transported by ship through the Panama Canal to French Guiana for launch



Roll on roll off transport ship built in the Netherlands by Merwede Shipyards
Length 116m
Displacement about 4200 metric tons
Garage deck length 95m (plenty of room for STTARS)
Speed: 15 knots



6900 Nautical Miles
Approximately 20 days

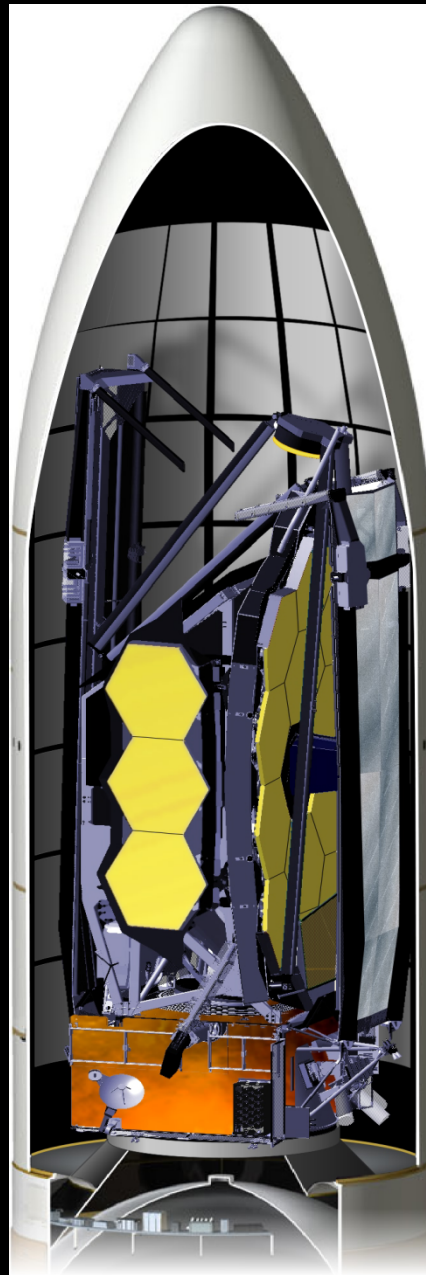


Space Telescope Transporter for Air Road and Sea (STTARS)

The telescope requires a segmented deployable mirror



Ariane 5 ECA



- JWST is designed to integrate with an Ariane V launch vehicle and 5 m diameter fairing
- Launch from Kourou Launch Center (French Guiana) with direct transfer to L2 point.
- Payload launched at ambient temperature with on orbit cooling to 50 K via passive thermal radiators
- JWST payload: 6530 kg

