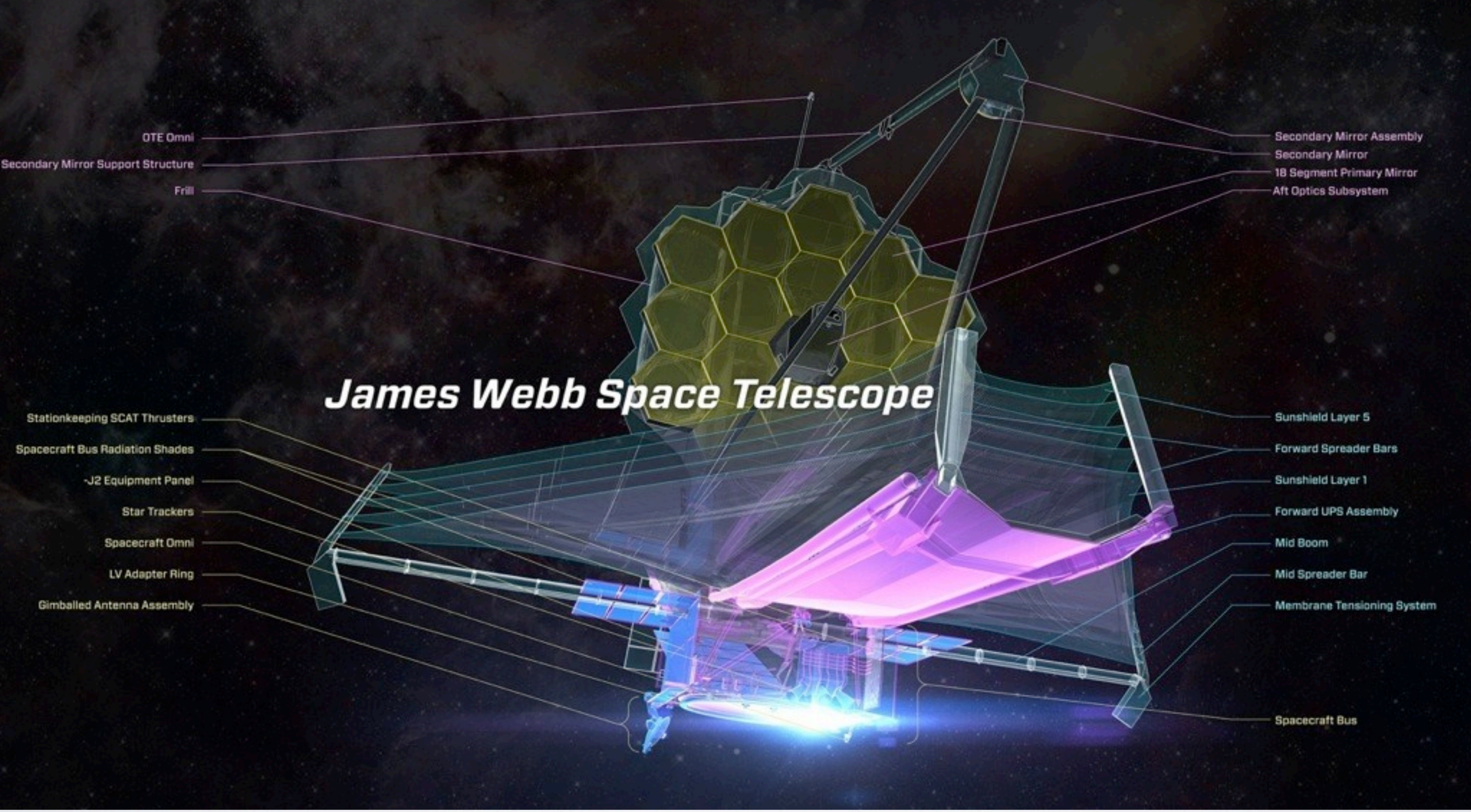


April 8, 2015

Eric P. Smith
JWST Program Director

NASA Advisory Council Science Committee Presentation

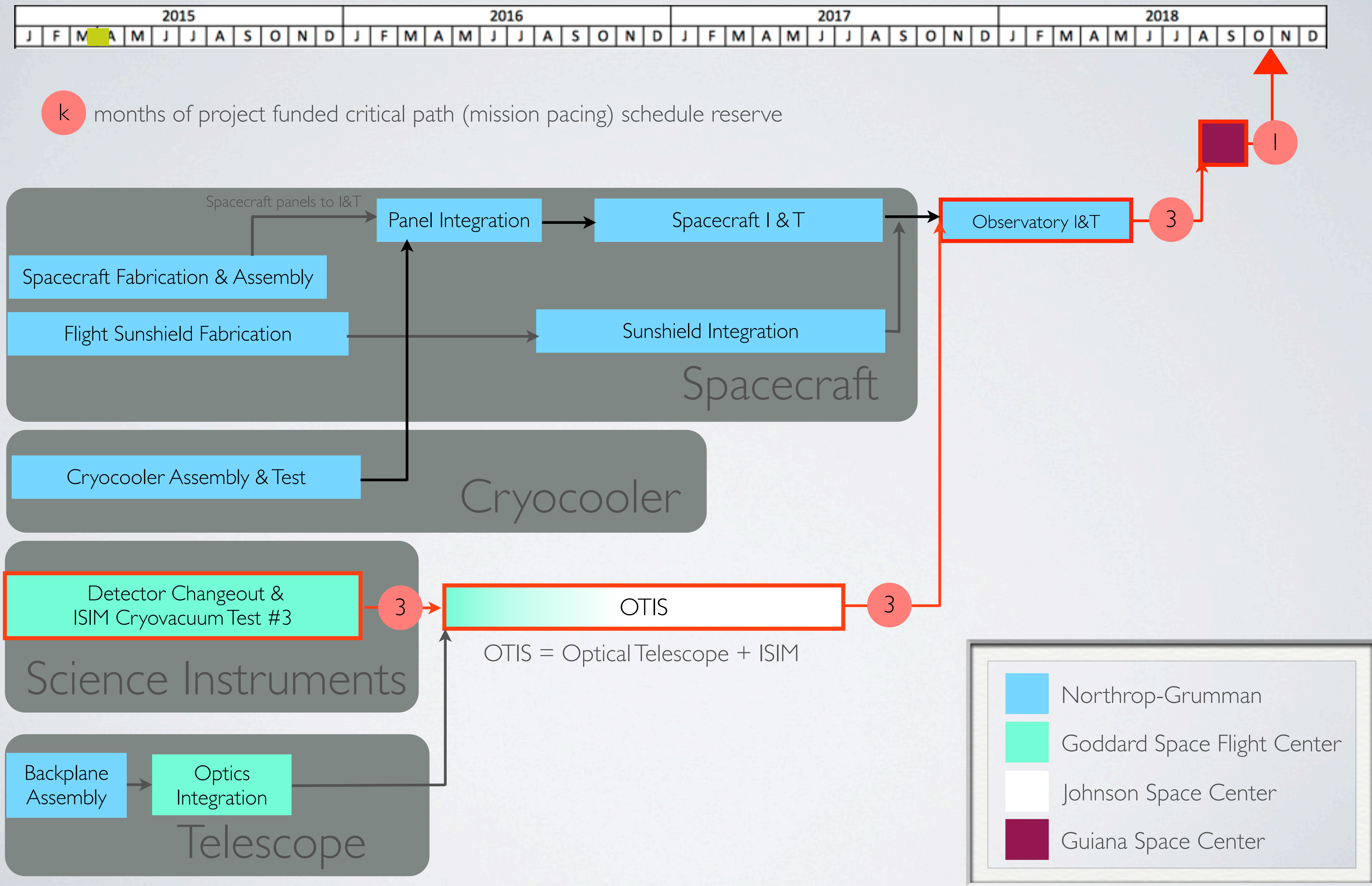
SINCE LAST SC MEETING...

- Acted on FY2014 GAO recommendations (cost-risk study, performance evaluation plan change).
- Completed GAO entrance conference for FY2015 activity
- Successful House Science Committee hearing on JWST Progress (3/24)
- FGS/NIRISS rework completed and instrument reinstalled into ISIM
- NIRSpec rework completed, instrument ready for reinstallation into ISIM
- NIRCam rework completed, instrument ready for reinstallation into ISIM
- ISIM is now the critical path because of NIRCam Sensor Chip Assembly issues and NIRSpec microshutter control electronics boards needing replacement
- Flight Backplane center section, wings and secondary tower assembled at NGAS
- Pathfinder backplane now at JSC in preparation for testing
- Flight sunshield membrane manufacturing in full swing, 4 layers in process, one (layer 3) complete.
- ¾" NEA issue heading toward successful resolution by May
- STScI will be hosting first annual user training session for JWST.
- Aft Sunshield Unitized Pallet Structure (UPS) completed and Forward UPS being manufactured
- Spacecraft bus and many components being built and/or delivered
- MIRI Cryocooler flight Cold Head Assembly installed onto ISIM
- Cryocooler Compressor Assembly at higher level of assembly and incremental performance tests look good. Schedule is still the issue here.

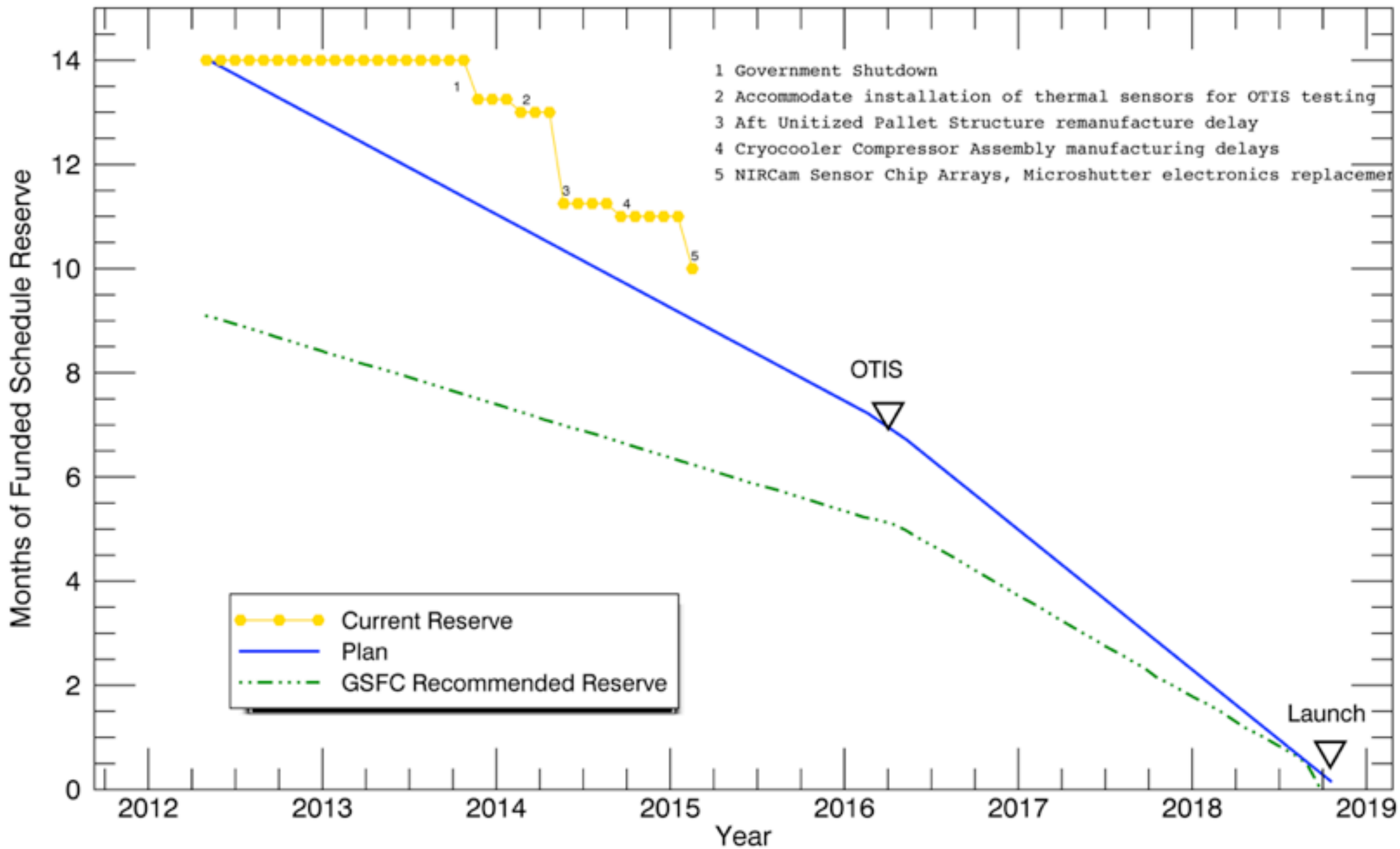
YEARLY THEMES

- 2013: Instrument Integration: The Science instruments will be finished and begin their testing as an integrated science payload
- 2014: Manufacturing the Spacecraft: Construction will commence on the spacecraft that will carry the science instruments and the telescope
- 2015: Assembling the Mirror: The mirror segments, secondary mirror and aft optics will all be assembled into the telescope
- 2016: Observatory Assembly: The three main components of the observatory will be completed (instruments, telescope, spacecraft)
- 2017: Observatory Testing: The three main components of the observatory will be tested and readied for assembly (instruments, telescope, spacecraft) into a single unit
- 2018: Kourou Countdown: All parts of the observatory will be brought together, tested and readied for launch in Kourou, French Guiana

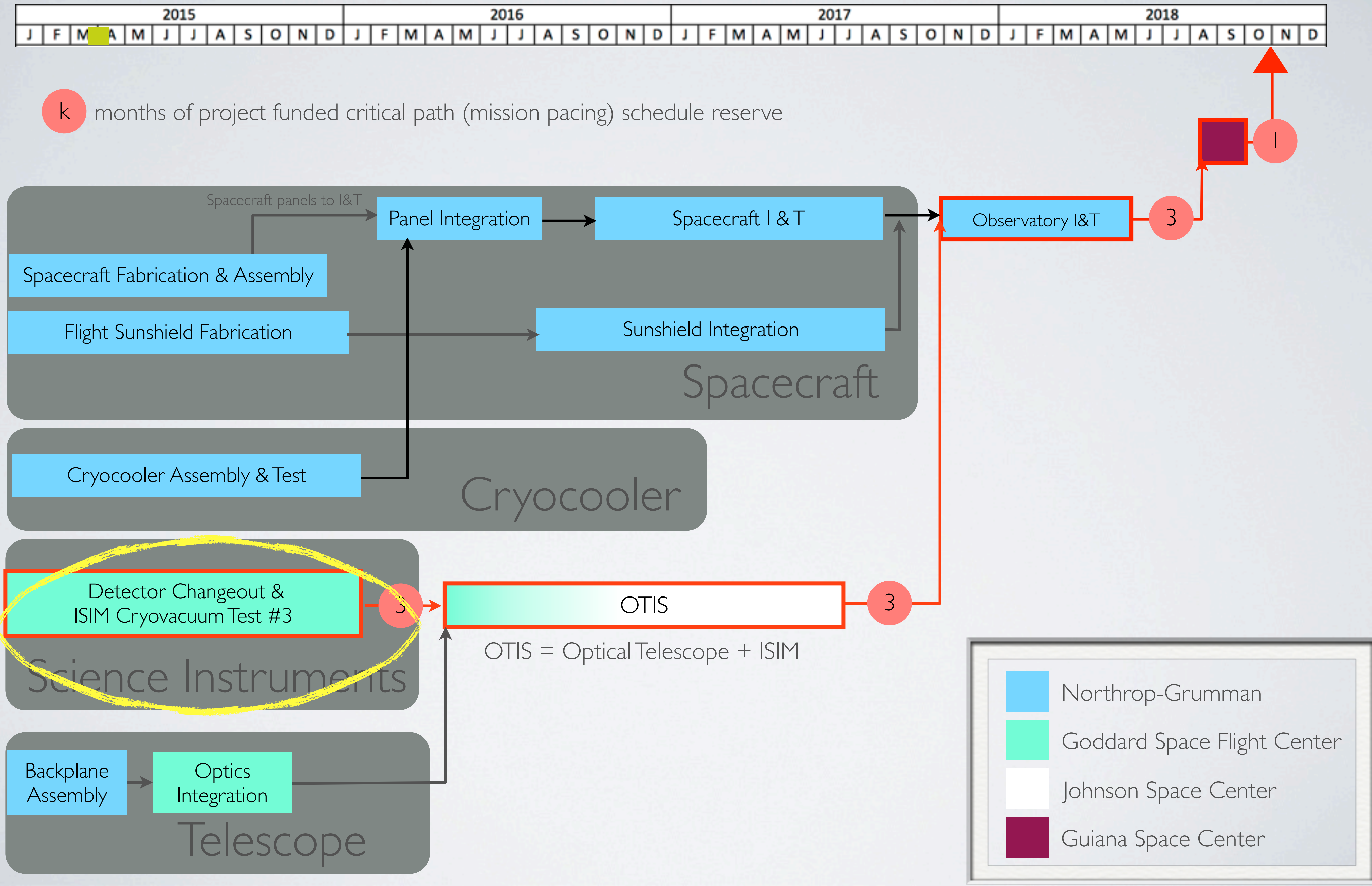
SIMPLIFIED SCHEDULE



FUNDED SCHEDULE RESERVE



SIMPLIFIED SCHEDULE



“HALF TIME” ACTIVITY

All FGS/NIRISS rework successfully completed, instrument back in ISIM

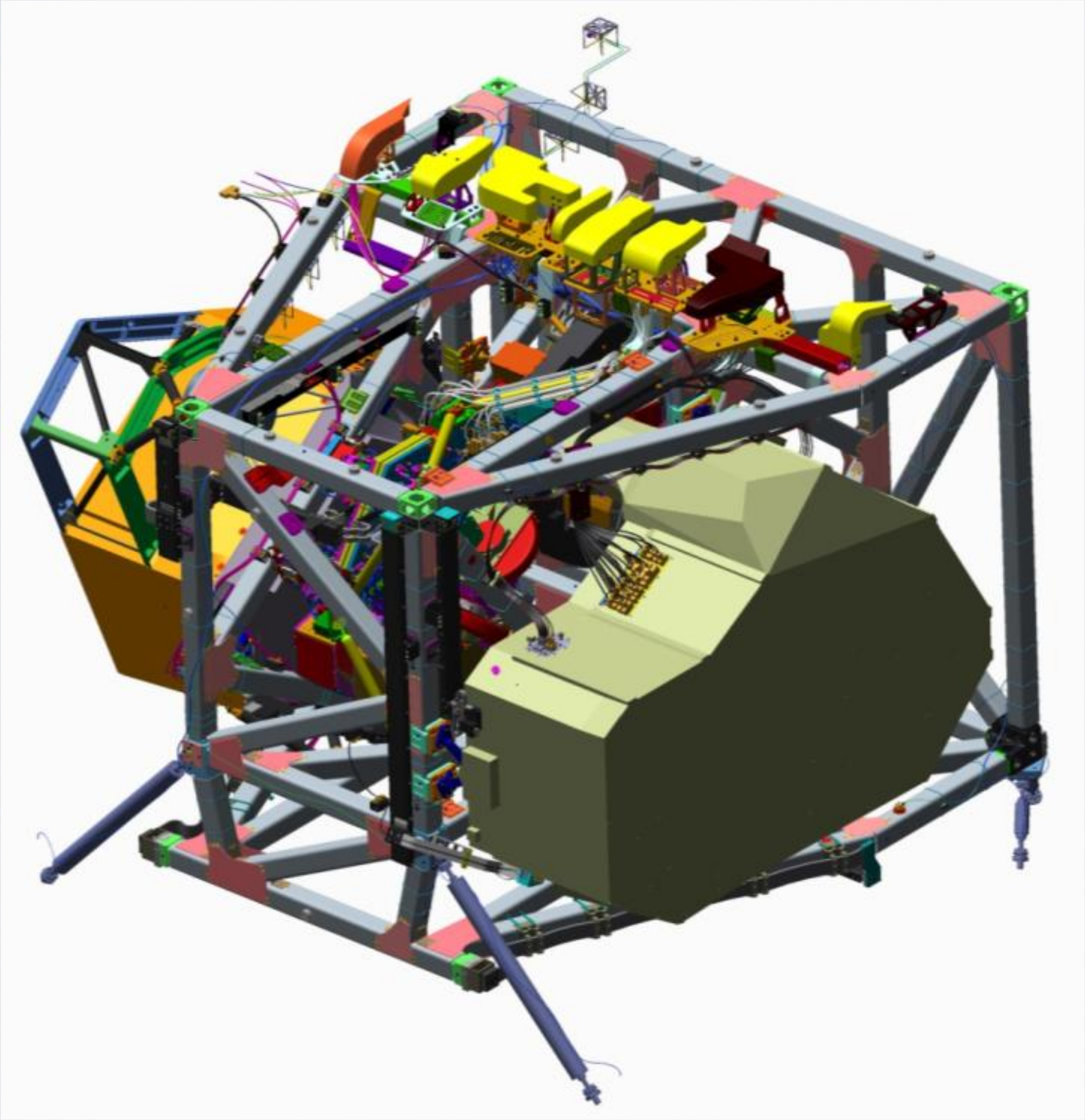
All NIRSpec rework successfully completed, awaiting reinstallation

NIRSpec microshutter control electronics board damaged necessitating build of new boards, work in progress and not pacing further ISIM testing

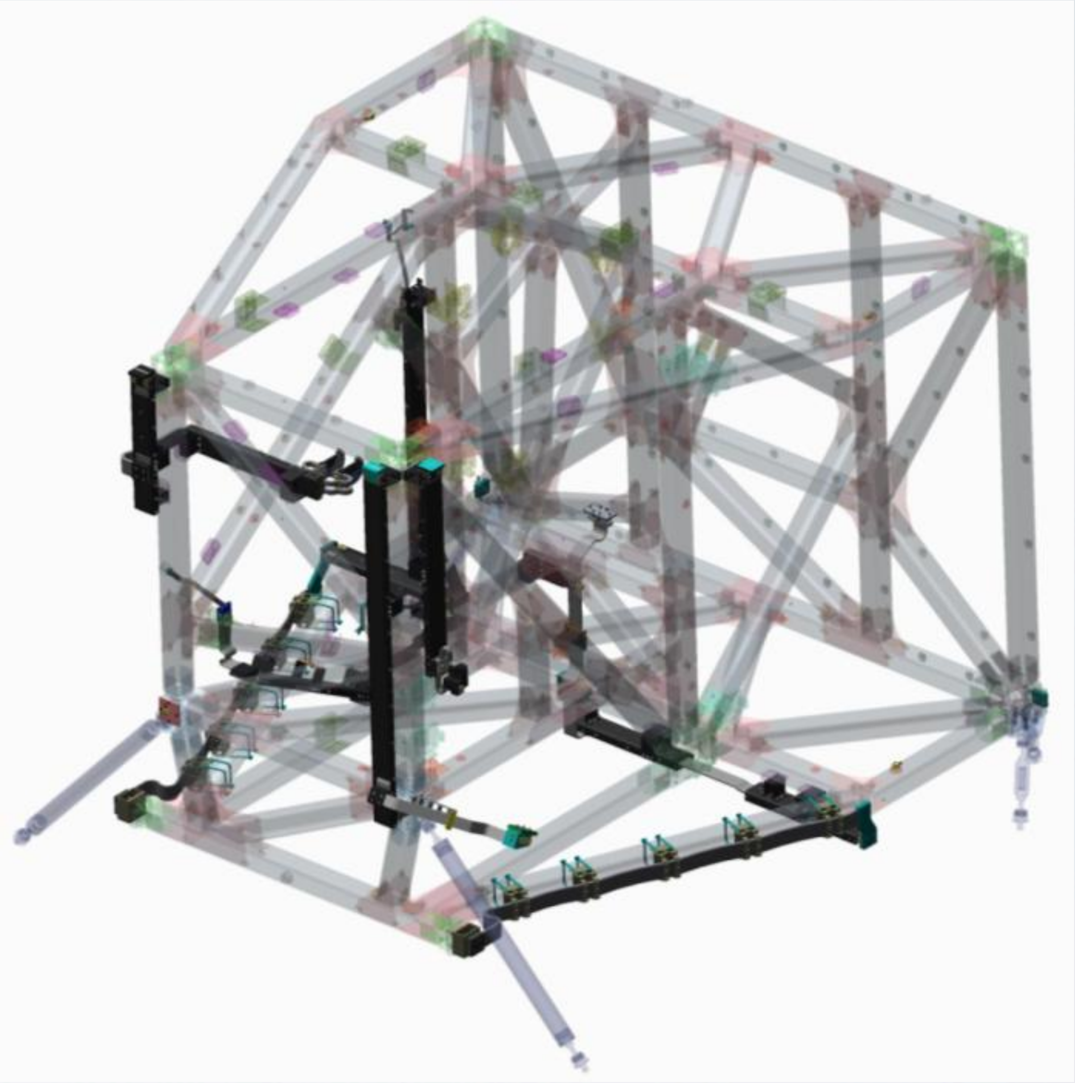
Short in NIRCam Sensor Chip Assembly (grounding and procedural issue) and SCA, light-mask interaction reworked, NIRCam ready for installation

Heat Straps: During CV2, thermal performance of MIRI, FGS, and NIRSpec was as expected. NIRCam thermal performance was different than expected, still within spec., but out of family with the other measured thermal performance. This NIRCam performance prompted ISIM I&T to check torques on NIRCam thermal strap joints. Loose bolts found. At the time, human error was believed to be root cause. However, a subsequent check of all heat straps determined that many had loose bolts. Attachment fixtures are being redesigned. This is the pacing activity for ISIM.

ISIM HEAT STRAPS

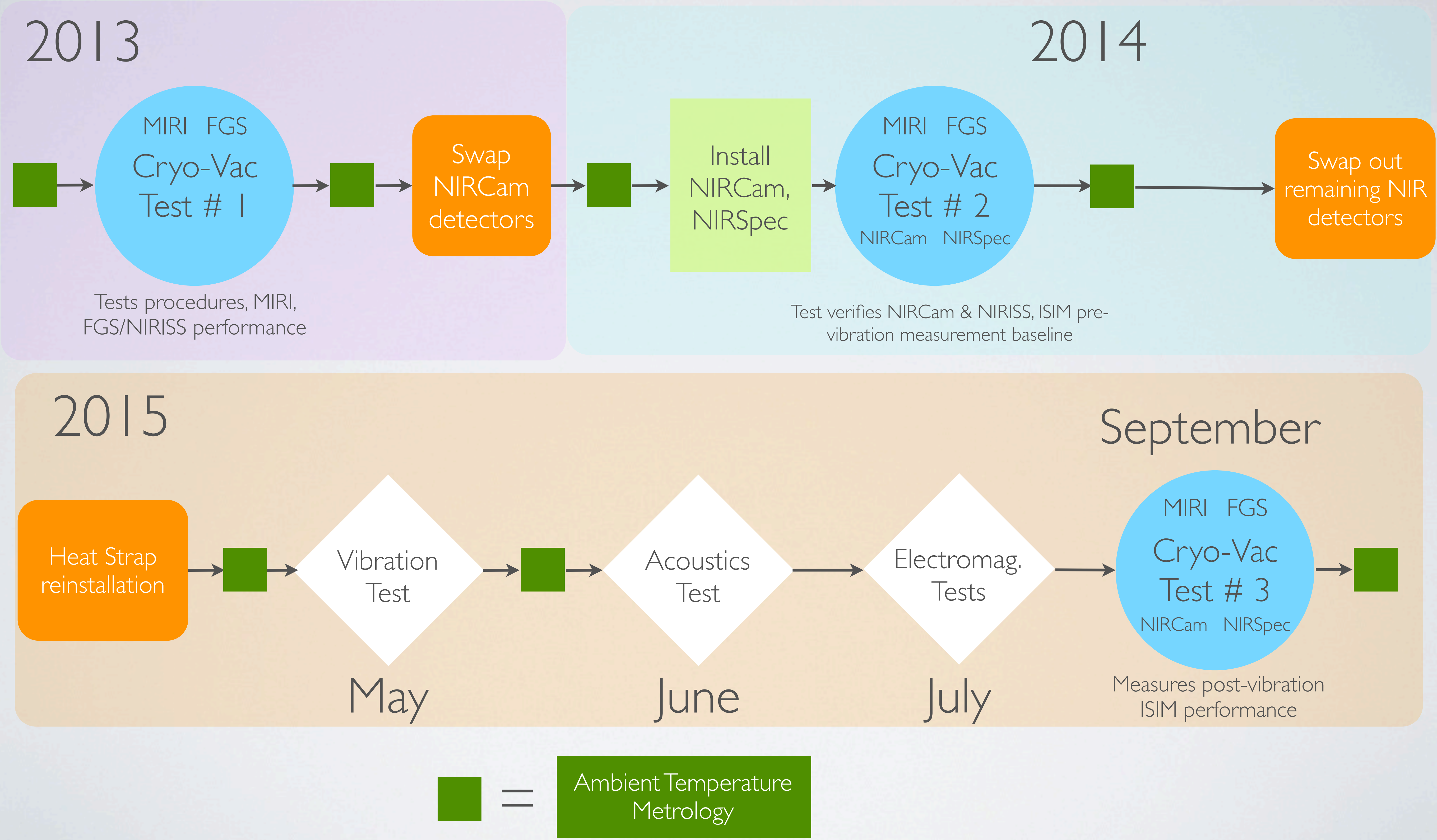


ISIM Prime Configuration

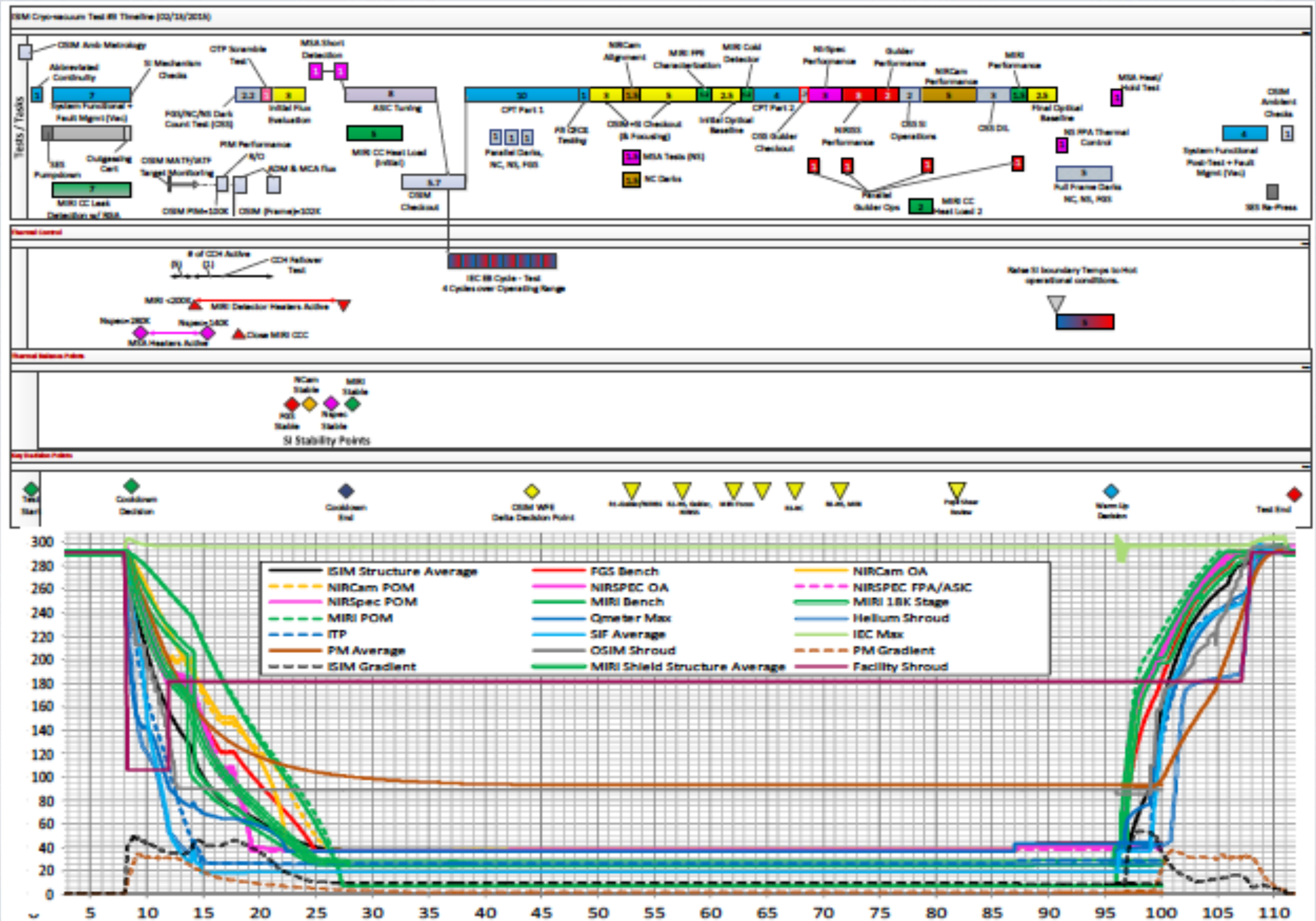


Heat Strap Locations

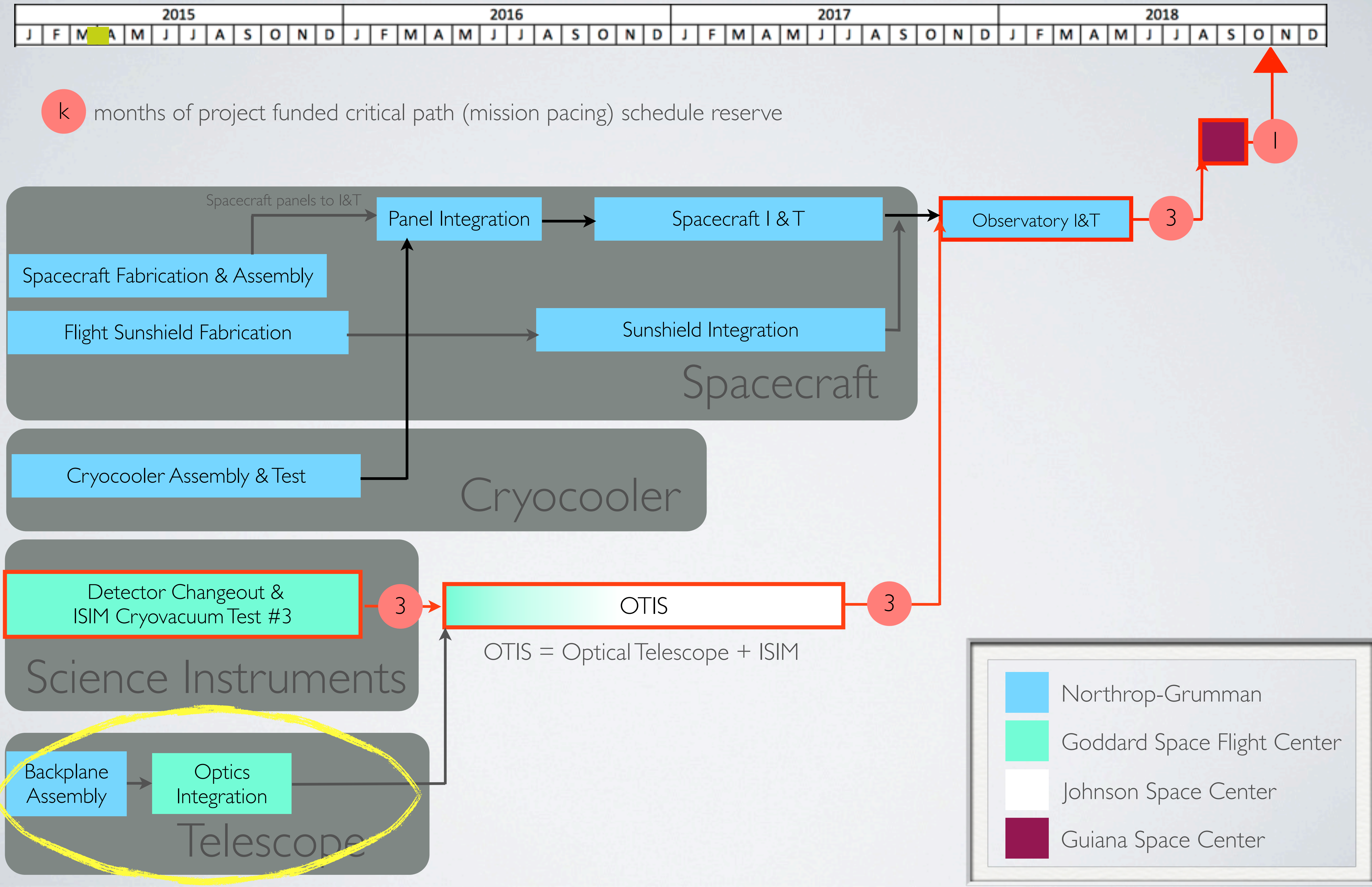
ISIM INTEGRATION AND TEST



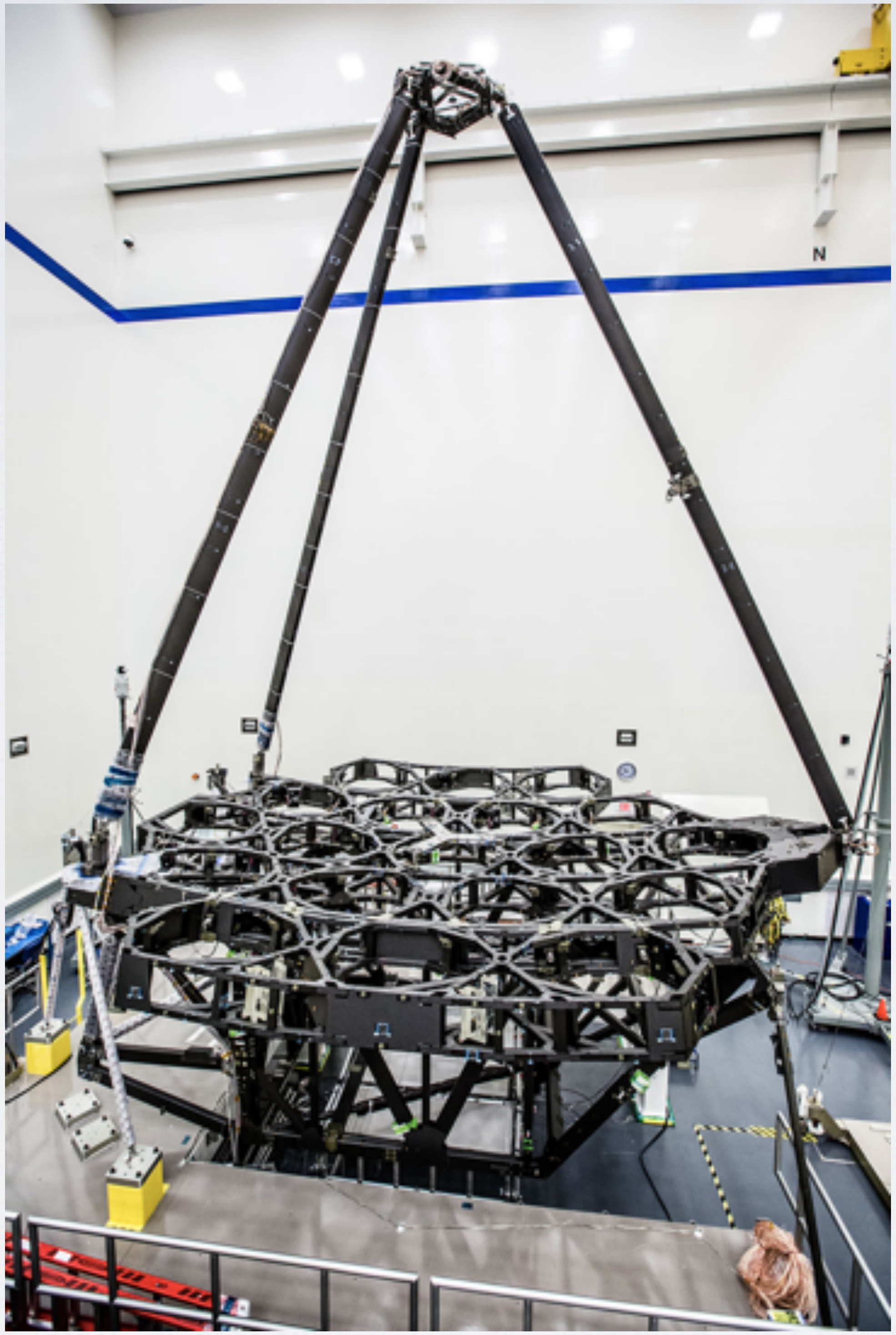
ISIM CRYOVAC #3



SIMPLIFIED SCHEDULE



TELESCOPE: BACKPLANE



Backplane Center Section, Wings and secondary tower assembled at NGAS

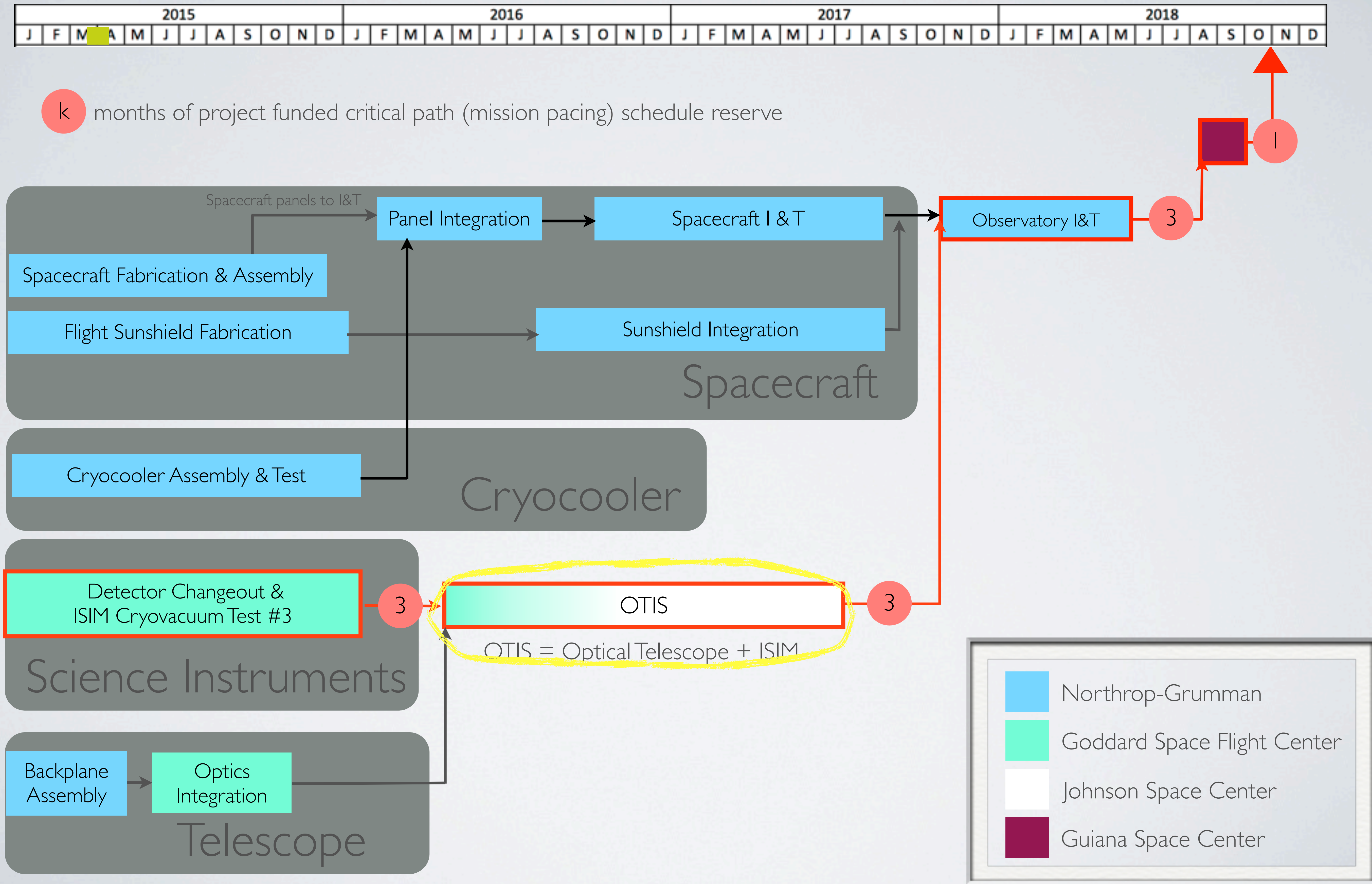
TELESCOPE ISSUES

- Working issue with Telescope wire harnesses showing nicks or cuts near their connectors.

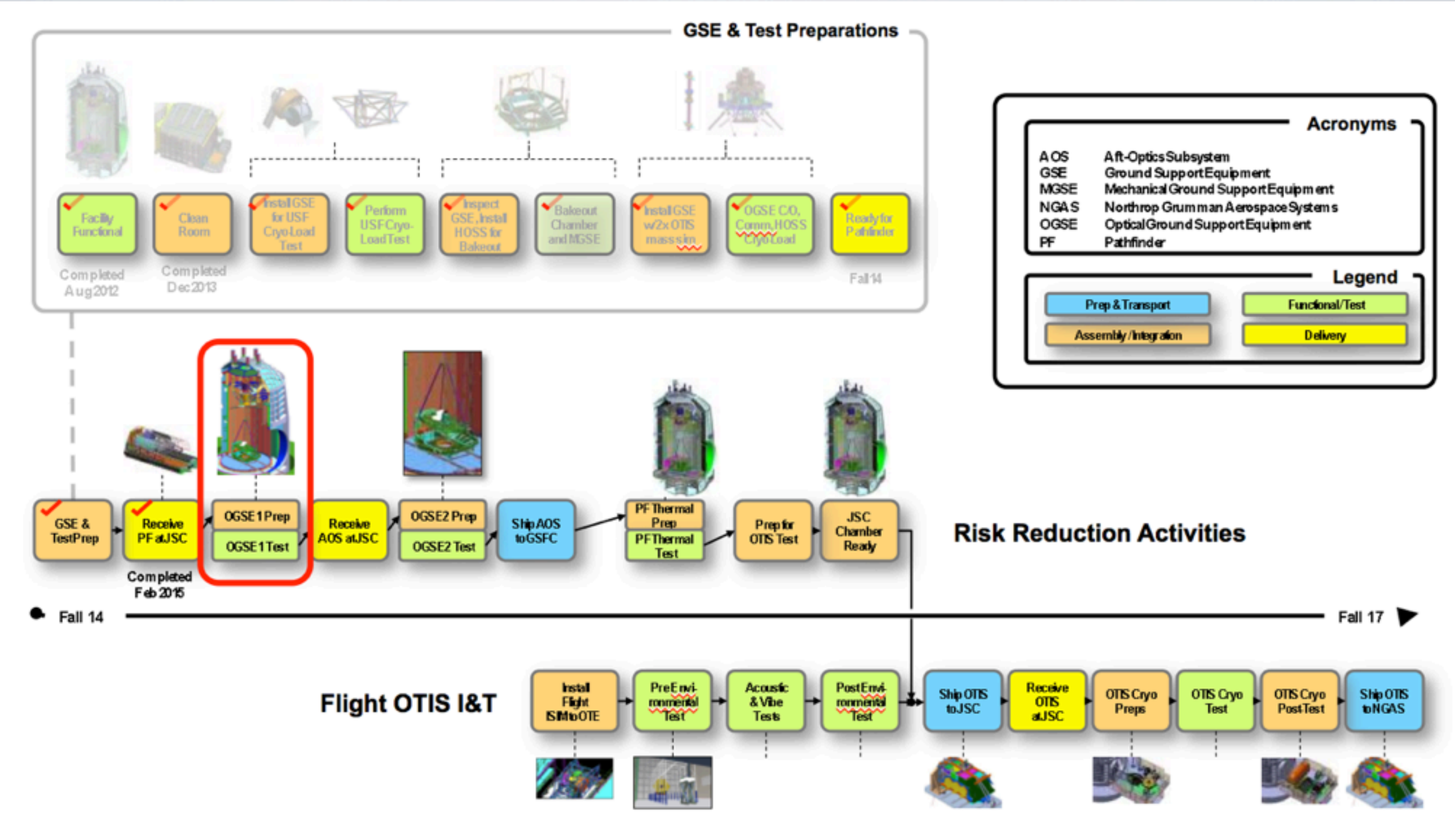
- Fix to wire stripping and handling procedures put in place at the manufacturer. Project working remanufacturing schedule with vendor and Northrop-Grumman.

- Project evaluating the optimum sequence now for installing harnesses with the rest of the telescope build-up

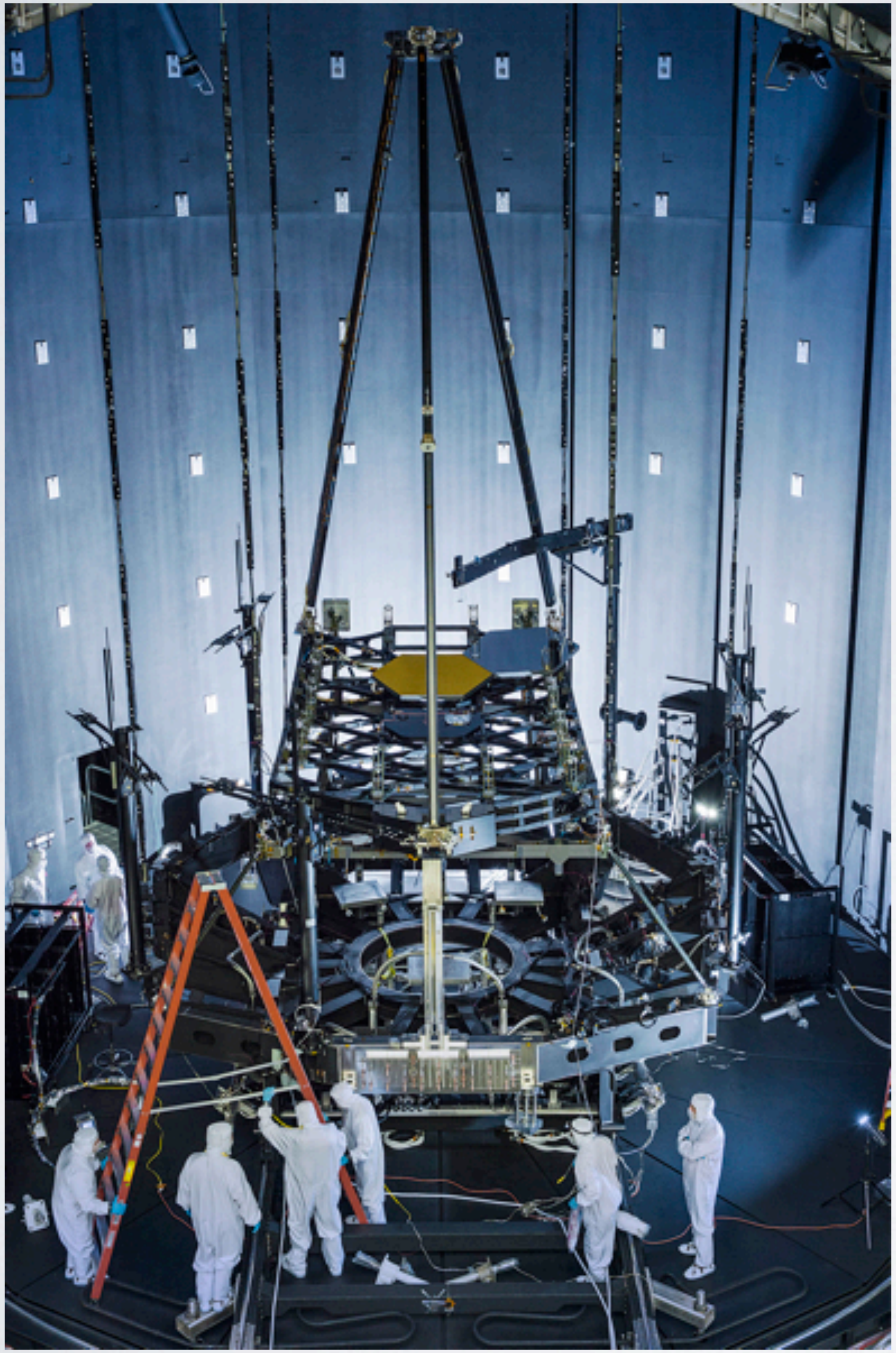
SIMPLIFIED SCHEDULE



OTIS TEST FLOW

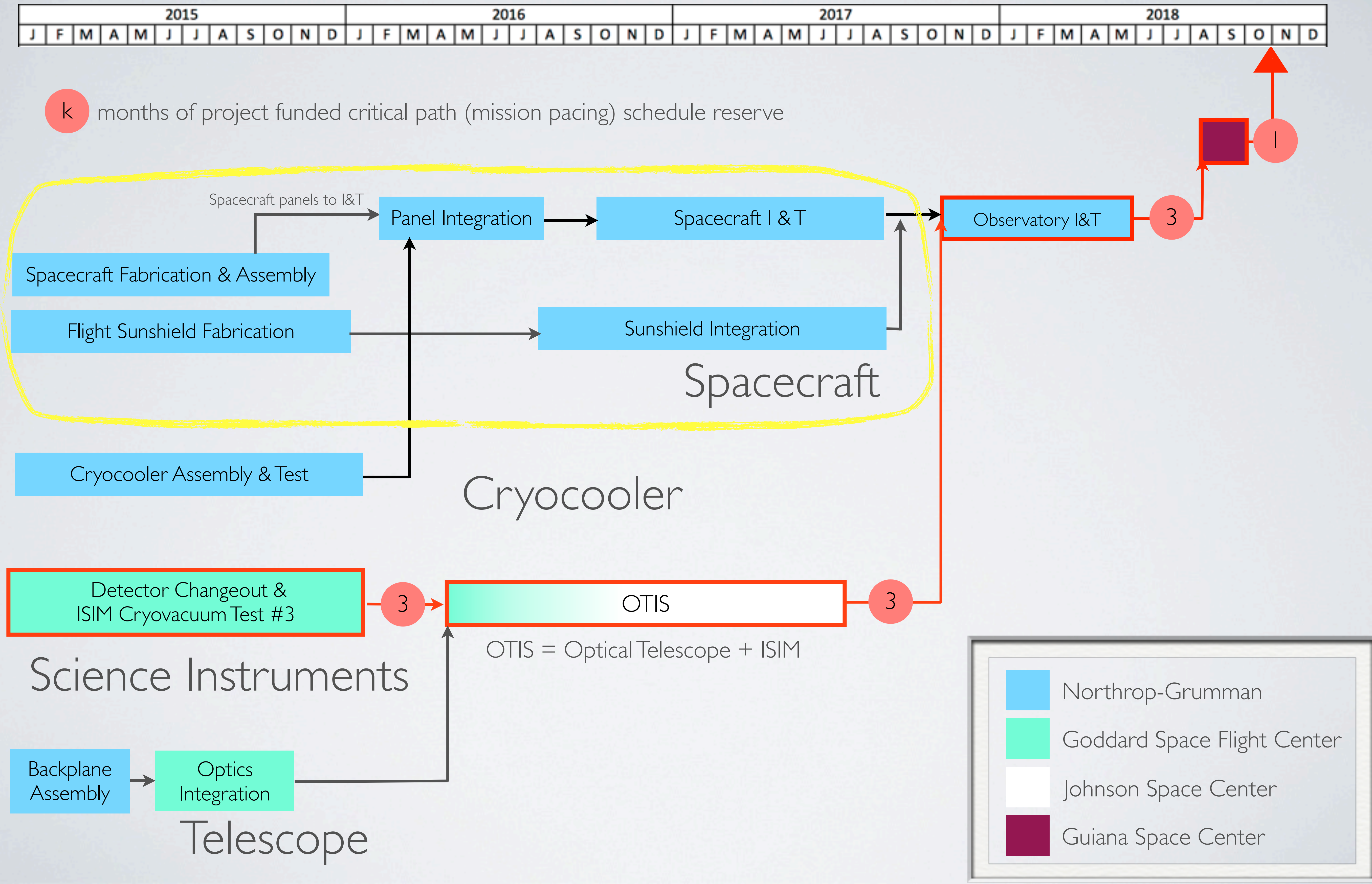


TELESCOPE: PATHFINDER



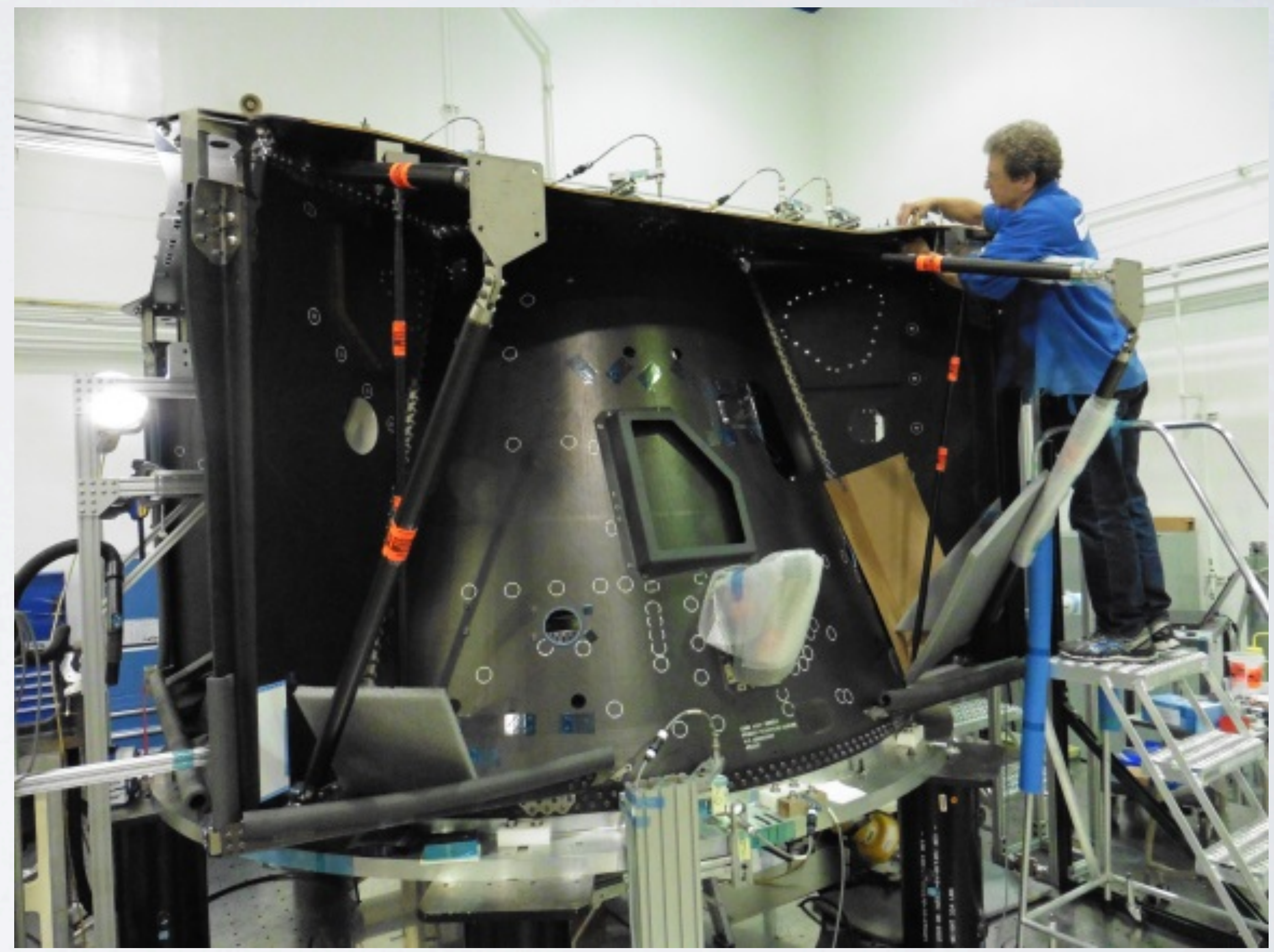
Pathfinder with Two Flight Spare Mirror Segments and spare Secondary Mirror heading in the JSC Chamber A

SIMPLIFIED SCHEDULE



SPACECRAFT

- Spacecraft build proceeding well
- >99% of Observatory, by mass, now built, in fabrication, or ready for fabrication, >60% of Observatory mass is measured mass



Spacecraft Bus

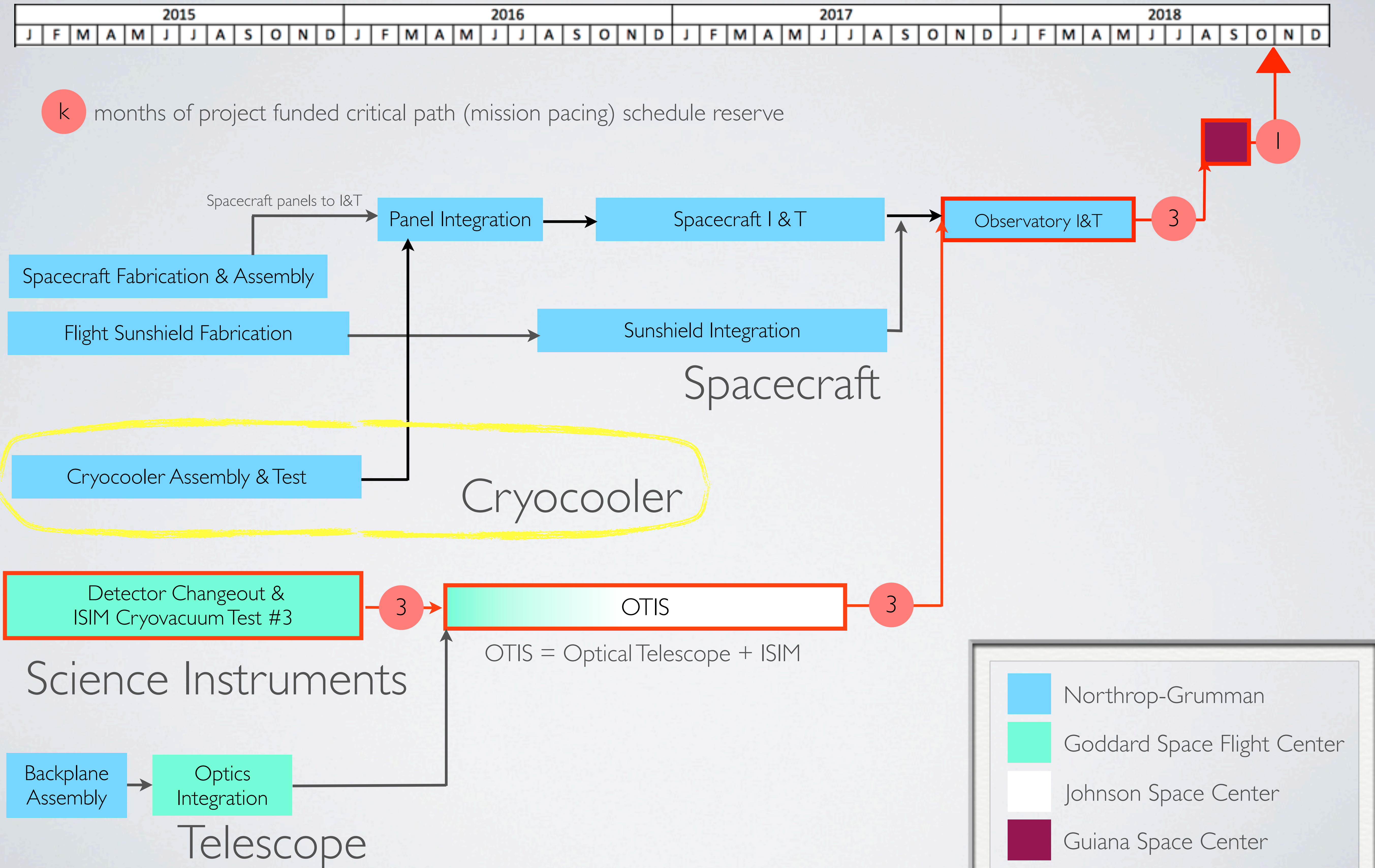
SPACECRAFT: SUNSHIELD

All full-scale engineering deployment testing successful

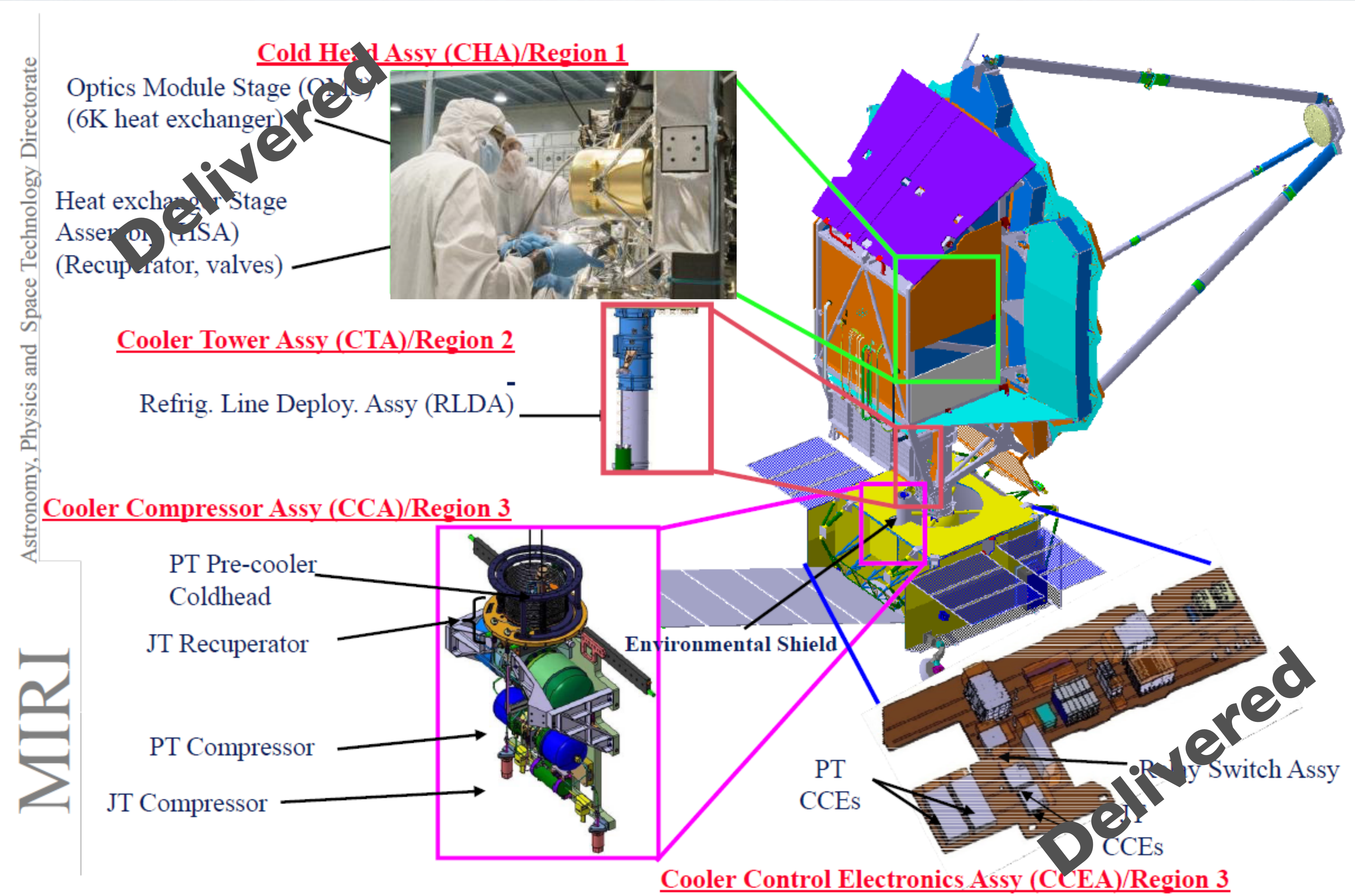
Flight Sunshield manufacturing underway: Layer 3 complete, Layer 4 halfway through hole-punching, Layer 5 seamed, Layer 2 gores cuts

Completed Aft Unitized Pallet Structure

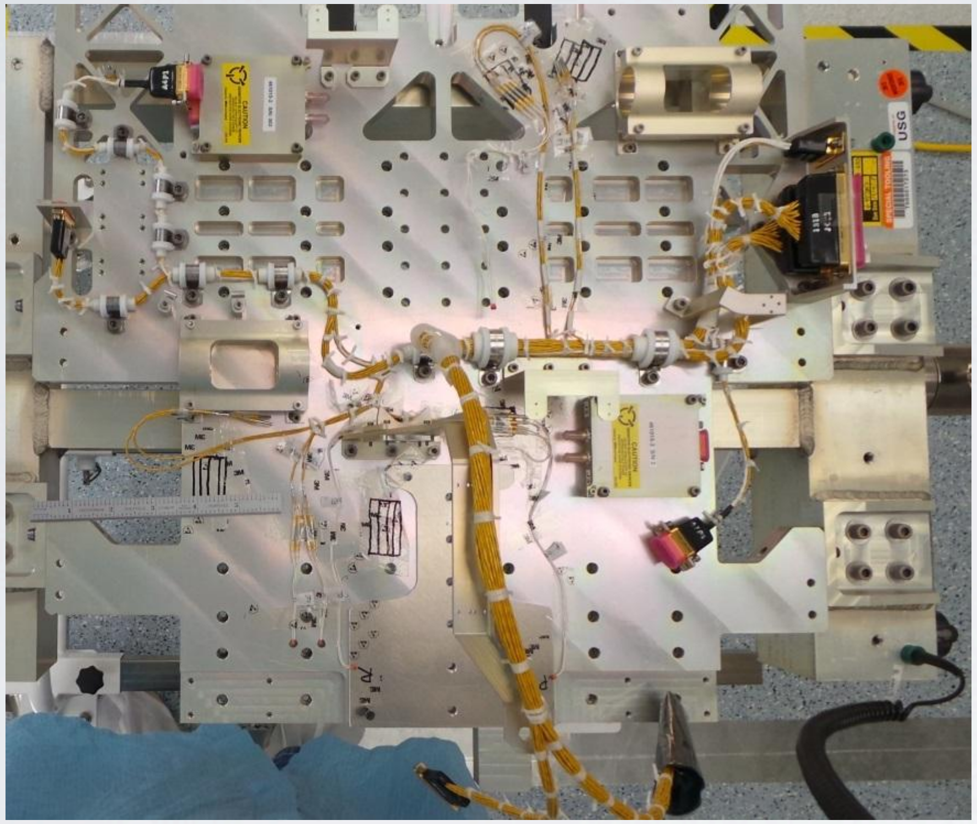
SIMPLIFIED SCHEDULE



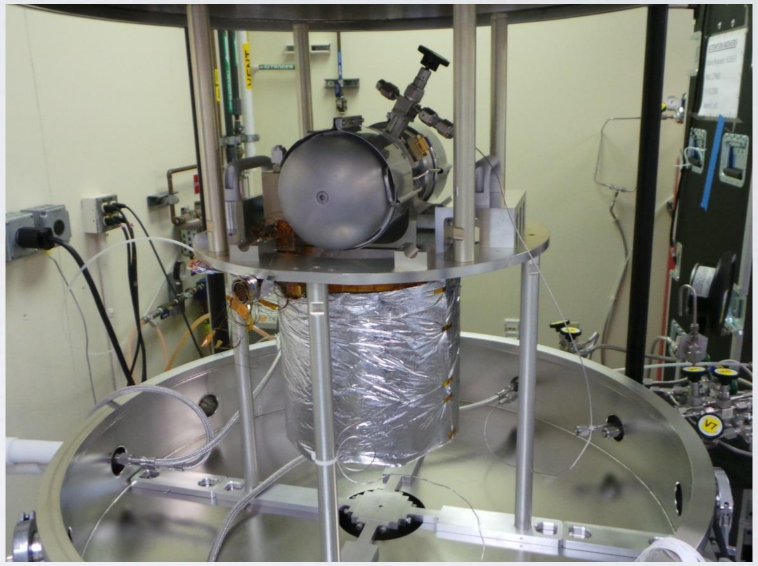
CRYOCOOLER HARDWARE



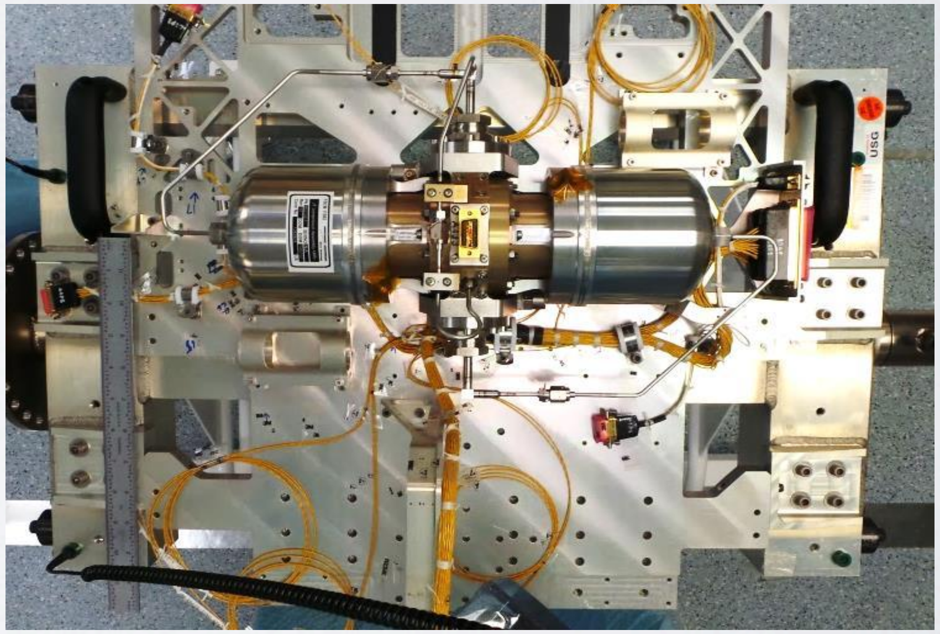
CCA COMPONENTS



Harness Installation with Splices



CCA Thermal Performance Test



Joule-Thompson Compressor Fit-Check

TECHNICAL PERFORMANCE METRICS

Performance / Resource Parameters	Capability / Requirement	Estimate or Predict 3-15	Comments
Sensitivity Parameters			
NIRCam SI Sensitivity @ 2 microns (nJy) **Level 1**	11.4	10..2	Prediction at EOL from 6-19-13 SI TPM Report
MIRI SI Sensitivity @ 10 microns (nJy)	700	679	Prediction at EOL from 6-19-13 SI TPM Report
Straylight (MJy/ster @ NIR 2 microns)	0.091	0.089	Prediction from 4-7-14 Integrated Modeling Review
Straylight (MJy/ster @ NIR 3 microns)	0.07	0.066	Prediction from 4-7-14 Integrated Modeling Review
Straylight (MJy/ster @ MIR 10 microns)	3.9	0.74	Predict from 3-9-15 AWG including LTO
Straylight (MJy/ster @ MIR 20 microns)	200	174	Predict from 3-9-15 AWG including LTO
OTE Transimission* Ap m^2	22	22.219	2013 03 20 Transmission X Budget - RevE.xlsx predictions at 2 microns min margin wavelength
Image Quality Parameters			
Strehl (NIR 2 microns)	0.80	0.836	Strehl at λ = 2.0 μm From SLR
Strehl (MIR 5.6 microns)	0.80	0.936	Strehl at λ = 5.6 μm from SLR
NIRCam ChannelWavefront Error (nm)	150	125	Rev W (v2.1 (2) WFE Budget
NIRSpec Channel Wavefont Error (nm)	238	218	Rev W (v2.1 (2) WFE Budget
NIRISS Channel Wavefront Error (nm)	180	135	Rev W (v2.1 (2) WFE Budget
MIRI Channel Wavefront Error (nm)	421	224	Rev W (v2.1 (2) WFE Budget
EE Stability at 2 microns Over 24 hours	2.30%	0.81%	From SLR
EE Stability at 2 microns Over 14 days	3.00%	1.95%	From SLR
Image Motion rms for 15 sec Slidinging Window for NIRCam (mas)	6.6	5.3	From SLR
Operations Parameters			
Observing Efficiency	70%	77.0%	From "Observation Efficiency Allocations Report JWST-RPT-004166, Revision F"
Slew Time for 90 Degree Slew with 5 RWAs (min)	60.0	57.3	Prediction as cited in Pointing Budget D36177 RevH Para 5.1
Momentum Accumulation LV1 (Nms/d)	22	18.10	Updated on 8-1-2013 (13-JWST-207D) from Torque Tables for SC Bus IM Cycle (Nom+rss)*MUF
Momentum Accumulation LV4 (Nms/d)	23	18.50	Updated on 8-1-2013 (13-JWST-207D) from Torque Tables for SC Bus IM Cycle (Nom+rss)*MUF
Thermal Parameters			
Cryo Parastic Margin (NIRCam)	60%	78.3%	Predicts with Liens and Accepted Opportunities per 2015.03.04_Obs_v5.3m_LTO-P2_v65.xlsx
Cryo ParasiticMargin (NIRSpec FPA)	60%	69.8%	Predicts with Liens and Accepted Opportunities per 2015.03.04_Obs_v5.3m_LTO-P2_v65.xlsx
Cryo Parasitic Margin (FGS/NIRISS)	60%	65.8%	Predicts with Liens and Accepted Opportunities per 2015.03.04_Obs_v5.3m_LTO-P2_v65.xlsx
ISIM Cavtity Temperature (K)	41K (TBR)	41.5	Predicts with Liens and Accepted Opportunities per 2015.03.04_Obs_v5.3m_LTO-P2_v65.xlsx
Cryo-Cooler Line Load Margin (Pinch Point / Steady State)	83%	113%/146%	Cryo-Cooler Predicts from K. Banks and S. Thomson Mar 2015 Predict + Liens)
Cryo-Cooler OM Load Margin (Pinch Point / Steady State)	83%	114%/55%	Cryo-Cooler Predicts from K. Banks and S. Thomson Mar 2015 Predict + Liens)
Data and Link Parameters			
S-Band Uplink Margin (dB)	3.00	5.80	Adverse Margin From 2013.11.01 S-Band Link (SC CDR) .pdf (SC Omni at 2000 bps)
S-Band Downlink Margin (dB)	3.00	3.90	Adverse Margin From 2013.11.01 S-Band Link (SC CDR) .pdf (Both Omni's at L2 at 200 bps)
Ka-Band Downlink Margin (dB)	3.00	4.44	Adverse Margin From 2013.10.31 Ka-band Link (SC CDR).pdf (28 Mbps)
Observatory Resources			
Observatory Wet Mass (kg)	6620	6050	Estimate with Pendings From 3-12-15 Mass Report
Observatory CG Offset (mm)	Area in DCI	19.8	CG uncertainty ellipse to 5 mm margin Ariane Static Unbalance Domain with Pendings (3-12-15)
Observatory Power Load (W)	1808	1509	Estimate + Pendings, 3-19-15 Power Report vs SA at 6 years
Observatory Power Generation (W)		2055	Power Generation at 6 Years, 12-11-14 Power Report
I&T Parameters			
JSC Timeline (Days)	120	88	Partners Workshop Presentation 2-11

WATCH LIST UPDATE

items from last CAA presentation

Issue	Trend	Comment
• Cryocooler Cost, Schedule	↔	Cryocooler compressor cost and schedule performance remain at historical levels
• Low FY2015 UFE	↔	Project managing reserves well so far in FY2015
• ¾" NEA, Spacecraft Radiator	↔	Spacecraft Radiator work progressing on schedule. ¾" NEA redesigned, working to show sufficient margin.
• Observatory Mid-IR Stray Light	↑	Observatory predicted to meet Mid-IR stray light requirement.
• Resolution of FGS-ISIM comm issue	↑ Resolved	New FPGA developed at to correct problem. One mounted on flight board, second in progress, third awaiting software update for validation prior to installation.

PROGRAM WATCH LIST

- FY15 project reserves tight, began year at approximately the same percentage as last year.
- Critical path funded schedule reserve decreased from 11 to 10 months due to Sensor Chip Assembly and microshutter electronics work on ISIM. ISIM is now the critical path (still above plan however).
- Cryocooler (schedule, technical, cost).
- Potential OTE schedule impact from harness rework and remanufacture
- 3/4" Non Explosive Actuator, shock spectrum, design change, qualification
- NIRSpec microshutter control electronics repair progressing well

MILESTONE PERFORMANCE

Since the September 2011 replan JWST reports high-level milestones monthly to numerous stakeholders

	Total Milestones	Total Milestones Completed	Number Completed Early	Number Completed Late	Deferred to Next Year
FY2011	21	21	6	3	0
FY2012	37	34	16	2	3
FY2013	41	38	20	5	3
FY2014	36	23	10	8	11
FY2015	48	25	16	5*	0

7 of 11 deferred FY2014 milestones on cryocooler components

*Late milestones have been or are forecast to complete within the year. Deferred milestones are not included in the number-completed-late tally

JWST EXCLUSIVE USE PERIOD

BACKGROUND

- NASA seeks to maximize the scientific return from all of its science missions
- The more people who have access to NASA data the more science studies will be performed using those data
  - Archival science products are more numerous now than general observer products (e.g., HST, Chandra)
  - Access to data fosters better informed proposals which increases science productivity
- JWST is a life limited mission
  - 5 year prime mission
  - 10 year consumables limit

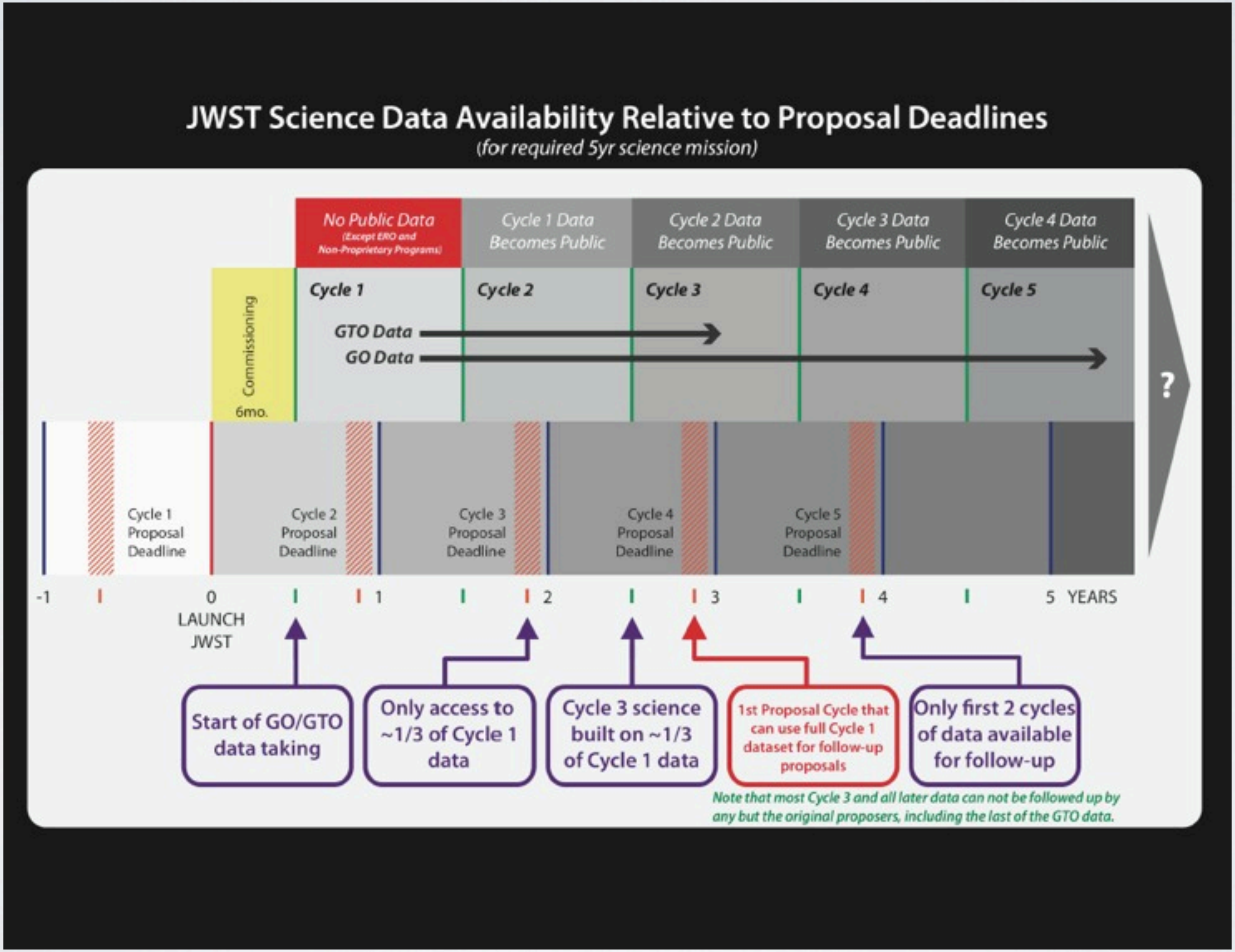
JWST GENERAL OBSERVERS

- Like HST, JWST will select a pool of General Observers (GOs) yearly
- Current science policy states GOs will have a 12 month exclusive use rights to their data (can be waived), and STScI Director can recommend different lengths for this period
- In July of 2014, the STScI Director recommended the GO exclusive user period be set at 6 months based upon advice from the JWST Space Telescope Advisory Committee (JSTAC)

JSTAC

- STScI employs the JSTAC to provide the Director with advice on technical readiness, policies and other matters (see http://www.stsci.edu/jwst/advisory-committee)
- This committee performed a study that showed how changing to a 6 months exclusive use period would dramatically affect the amount of public data for Cycles 2 and 3 of the JWST proposal timeline

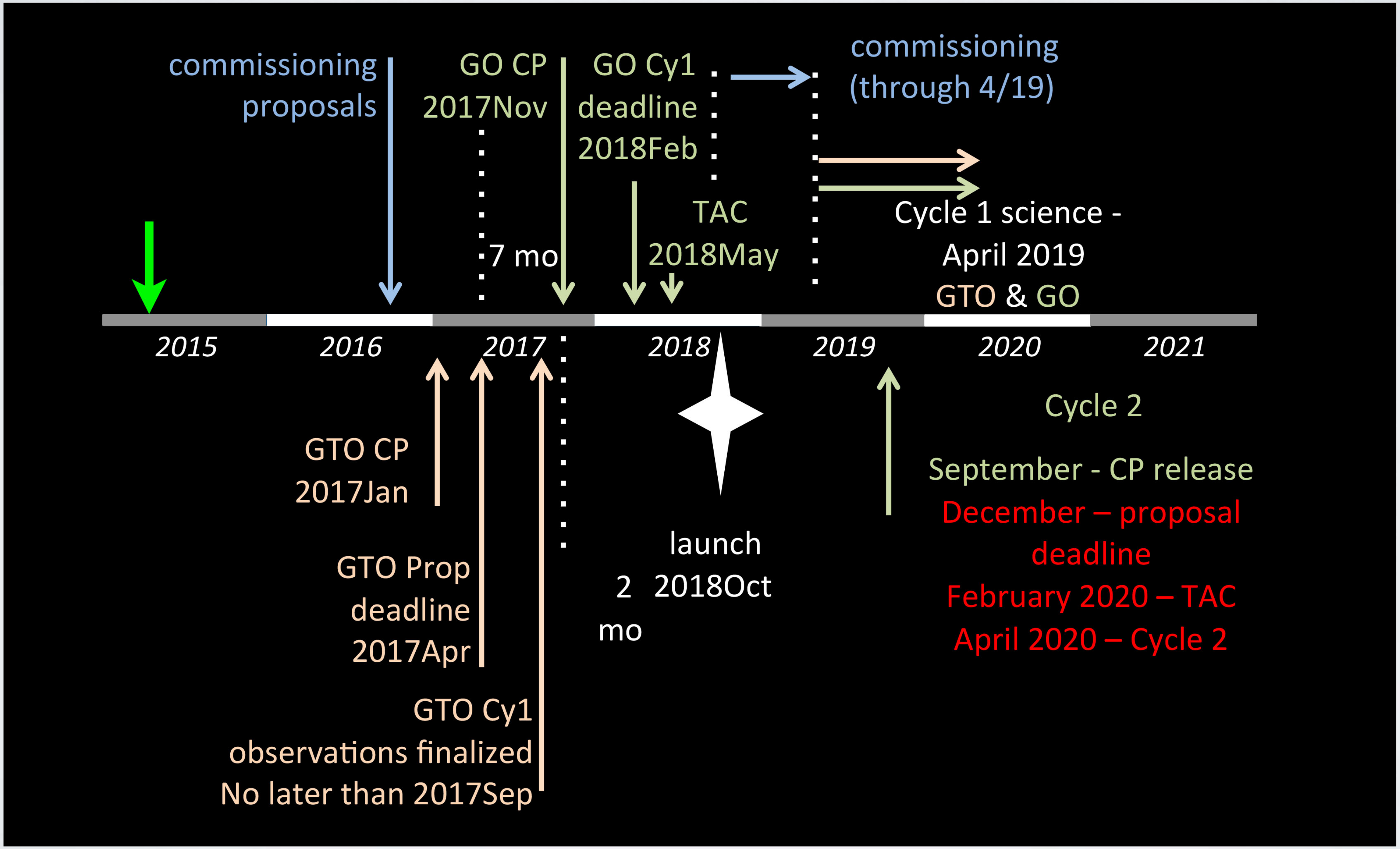
12 MONTH EXCLUSIVE USE



SUMMARY

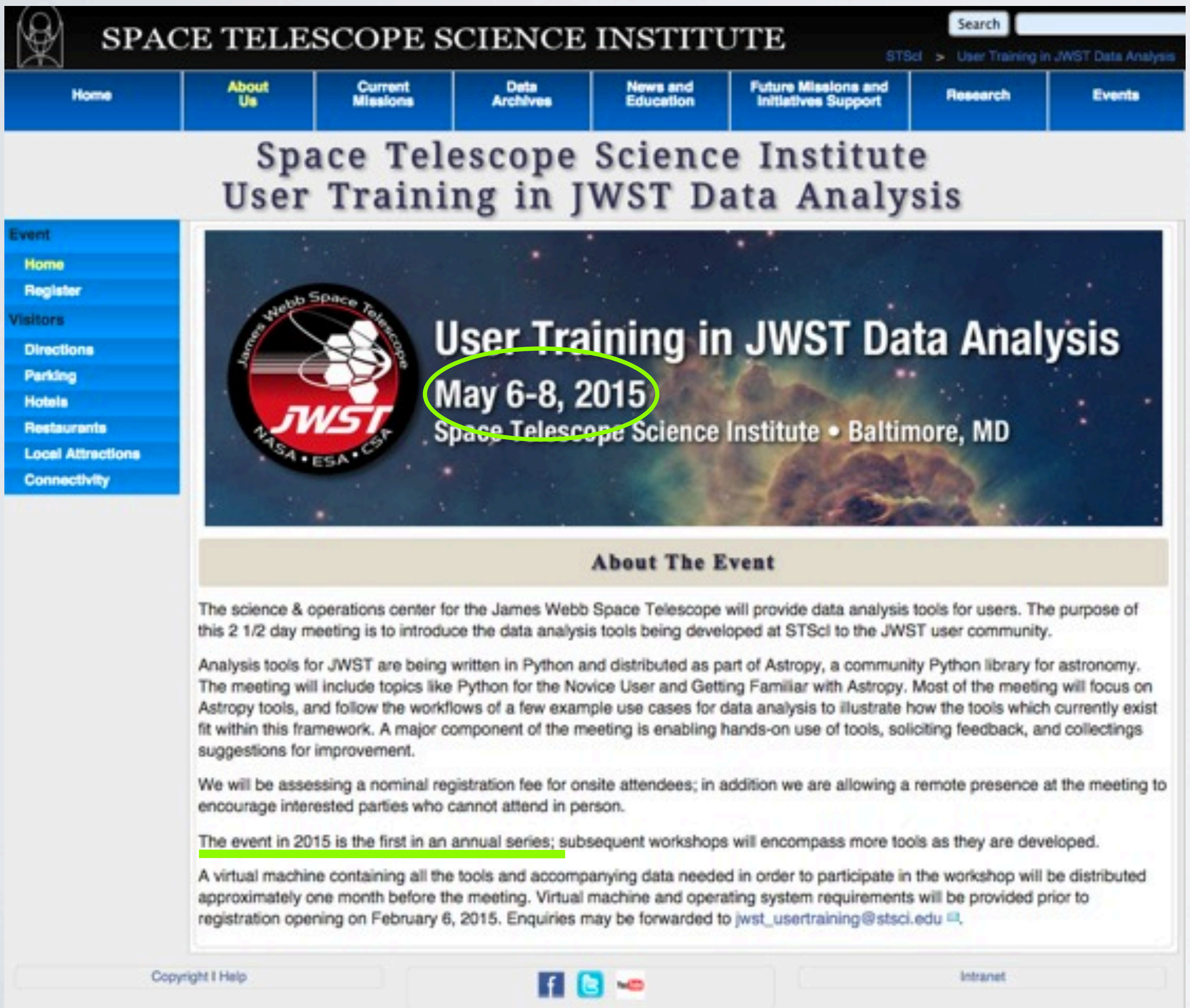
- Changing the default exclusive use period for JWST general observers from 12 to 6 months can benefit the science community and NASA by making more data available to proposers earlier in the limited lifetime of JWST
- The STScI Director recommended, the JWST SWG and NASA Astrophysics Subcommittee endorse this proposal
- NASA is working with ESA and CSA and their advisory processes to ensure all agencies concur with such a change.

SCIENCE PLANNING TIMELINE



courtesy I.N. Reid, STScI

SCIENCE PREPARATIONS


SPACE TELESCOPE SCIENCE INSTITUTE

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STScI > User Training in JWST Data Analysis

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Space Telescope Science Institute User Training in JWST Data Analysis

Event
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- Local Attractions
- Connectivity

About The Event

The science & operations center for the James Webb Space Telescope will provide data analysis tools for users. The purpose of this 2 1/2 day meeting is to introduce the data analysis tools being developed at STScI to the JWST user community.

Analysis tools for JWST are being written in Python and distributed as part of Astropy, a community Python library for astronomy. The meeting will include topics like Python for the Novice User and Getting Familiar with Astropy. Most of the meeting will focus on Astropy tools, and follow the workflows of a few example use cases for data analysis to illustrate how the tools which currently exist fit within this framework. A major component of the meeting is enabling hands-on use of tools, soliciting feedback, and collectings suggestions for improvement.

We will be assessing a nominal registration fee for onsite attendees; in addition we are allowing a remote presence at the meeting to encourage interested parties who cannot attend in person.

The event in 2015 is the first in an annual series; subsequent workshops will encompass more tools as they are developed.

A virtual machine containing all the tools and accompanying data needed in order to participate in the workshop will be distributed approximately one month before the meeting. Virtual machine and operating system requirements will be provided prior to registration opening on February 6, 2015. Enquiries may be forwarded to jwst_usertraining@stsci.edu.

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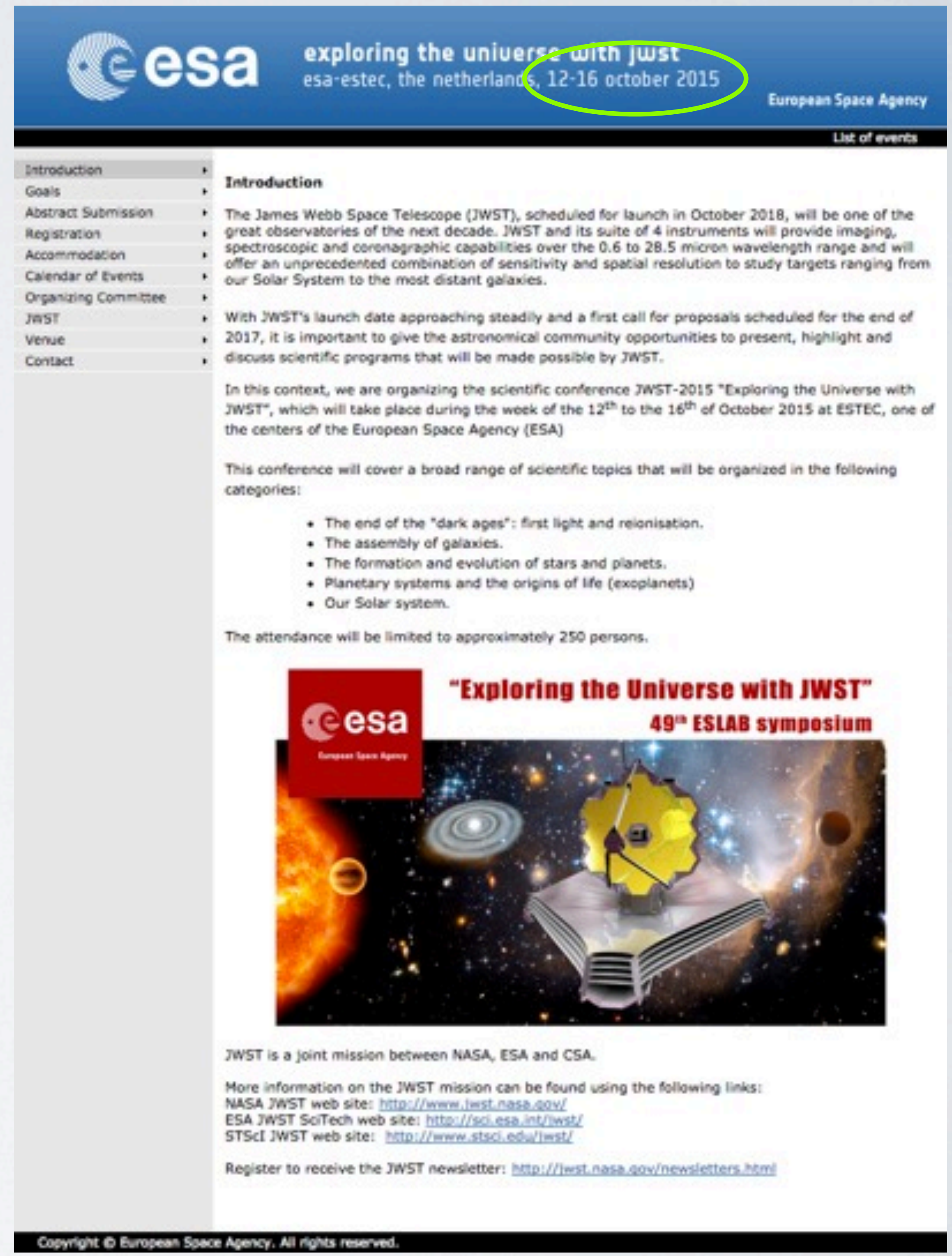
esa

exploring the universe with jwst
esa-estec, the netherlands, 12-16 october 2015

European Space Agency

List of events

- Introduction
- Goals
- Abstract Submission
- Registration
- Accommodation
- Calendar of Events
- Organizing Committee
- JWST
- Venue
- Contact

Introduction

The James Webb Space Telescope (JWST), scheduled for launch in October 2018, will be one of the great observatories of the next decade. JWST and its suite of 4 instruments will provide imaging, spectroscopic and coronagraphic capabilities over the 0.6 to 28.5 micron wavelength range and will offer an unprecedented combination of sensitivity and spatial resolution to study targets ranging from our Solar System to the most distant galaxies.

With JWST's launch date approaching steadily and a first call for proposals scheduled for the end of 2017, it is important to give the astronomical community opportunities to present, highlight and discuss scientific programs that will be made possible by JWST.

In this context, we are organizing the scientific conference JWST-2015 "Exploring the Universe with JWST", which will take place during the week of the 12th to the 16th of October 2015 at ESTEC, one of the centers of the European Space Agency (ESA)

This conference will cover a broad range of scientific topics that will be organized in the following categories:

- The end of the "dark ages": first light and reionisation.
- The assembly of galaxies.
- The formation and evolution of stars and planets.
- Planetary systems and the origins of life (exoplanets)
- Our Solar system.

The attendance will be limited to approximately 250 persons.

JWST is a joint mission between NASA, ESA and CSA.

More information on the JWST mission can be found using the following links:
NASA JWST web site: http://www.jwst.nasa.gov/
ESA JWST SciTech web site: http://sci.esa.int/jwst/
STScI JWST web site: http://www.stsci.edu/jwst/

Register to receive the JWST newsletter: http://jwst.nasa.gov/newsletters.html

SUMMARY

Challenges arising in critical manufacturing and I&T phases.

- UFE tight in FY15 will require prudent fiscal control.
- MIRI Cryocooler Compressor continues to be a schedule challenge
- ISIM team preparing for cryovacuum test #3 and working heat pipe connector issue before vibration testing.

Technical Performance Metrics look excellent for the mission

JWST team continues to execute to our Launch Readiness Date commitments within budget.