

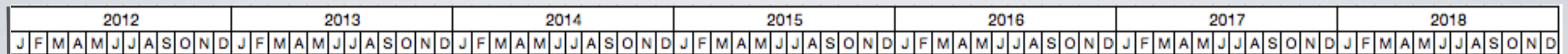
March 4, 2013

Eric P. Smith

JWST Program Office



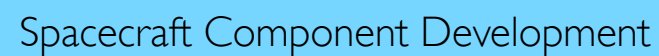
# SIMPLIFIED SCHEDULE



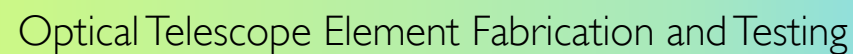
OTIS = Optical Telescope + ISIM

OTIS = Optical Telescope + ISIM

k months of project funded critical path (mission pacing) schedule reserve



# Science Instruments

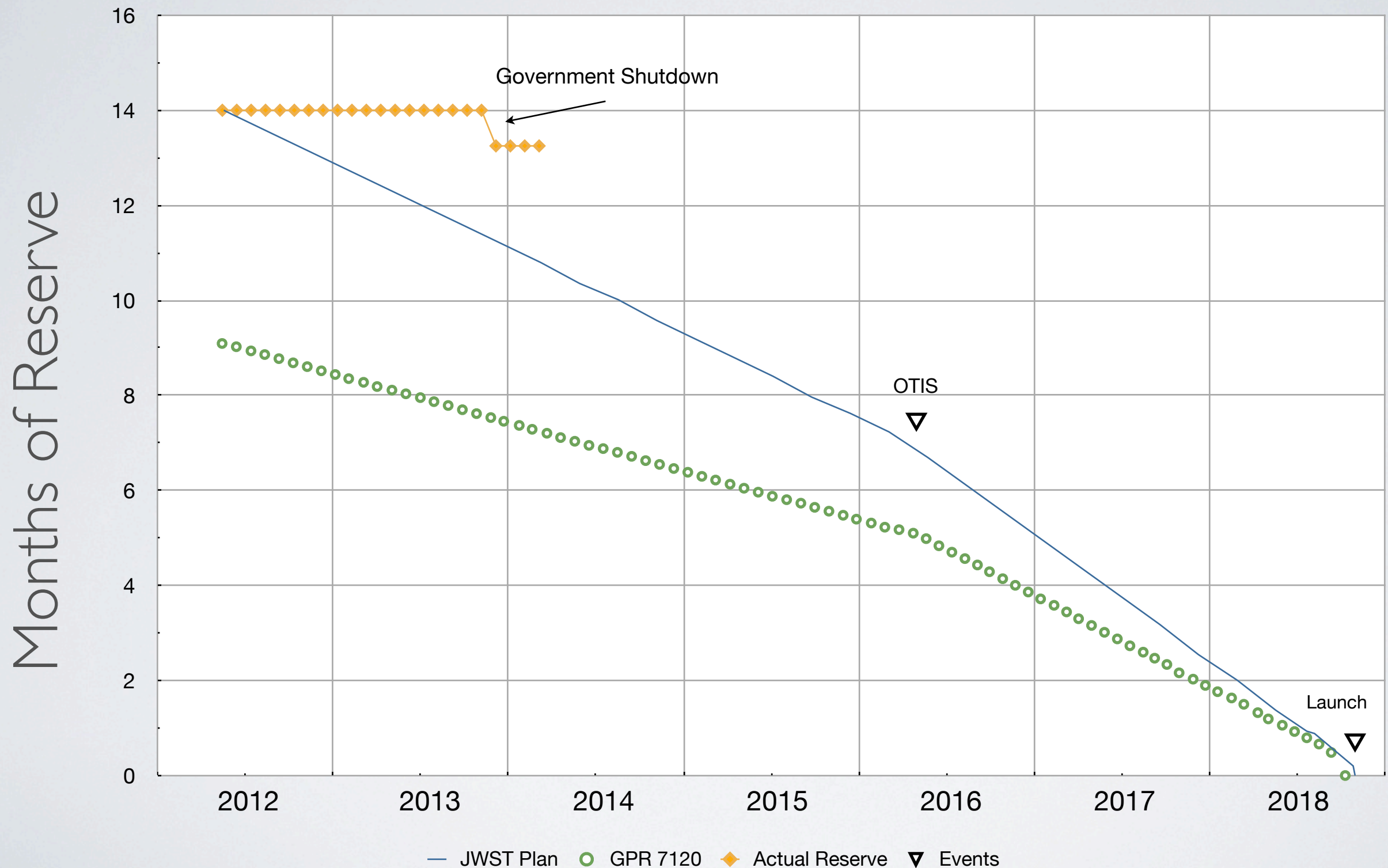


# Telescope

- Northrop-Grumman
- Goddard Space Flight Center
- Ball Aerospace
- ATK
- Johnson Space Center
- Guiana Space Center

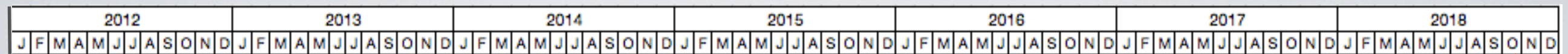
Faded areas are completed

# FUNDED SCHEDULE RESERVE



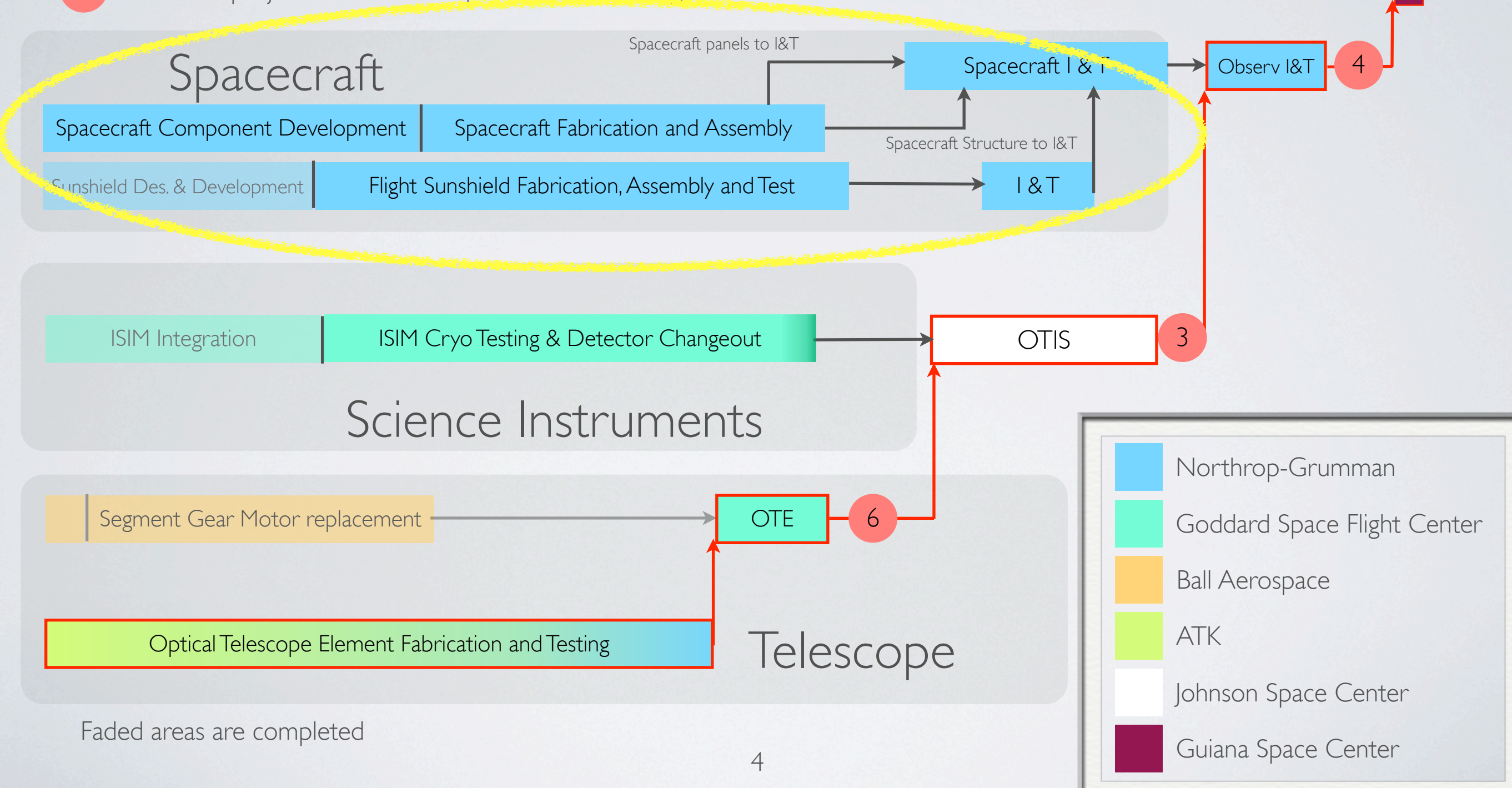


# SIMPLIFIED SCHEDULE



OTIS = Optical Telescope + ISIM

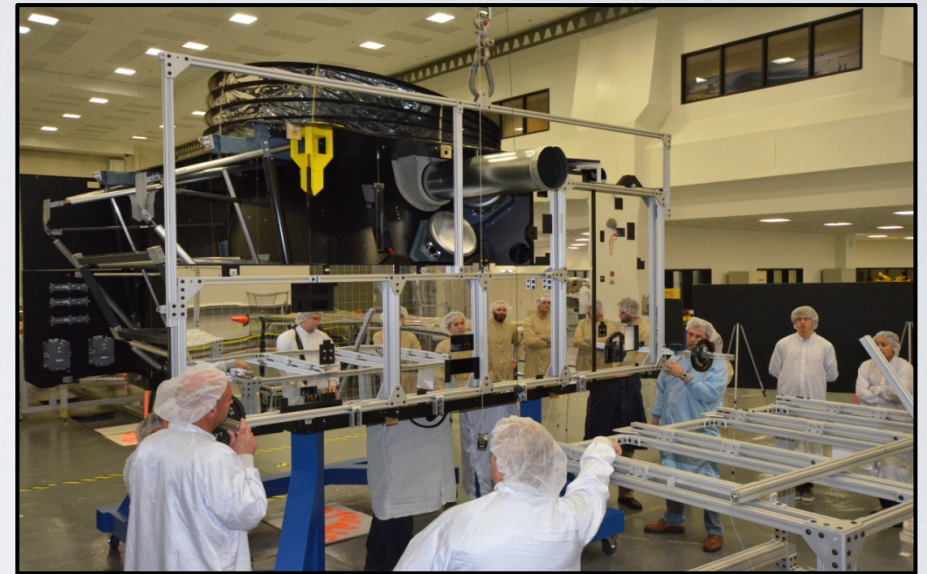
k months of project funded critical path (mission pacing) schedule reserve





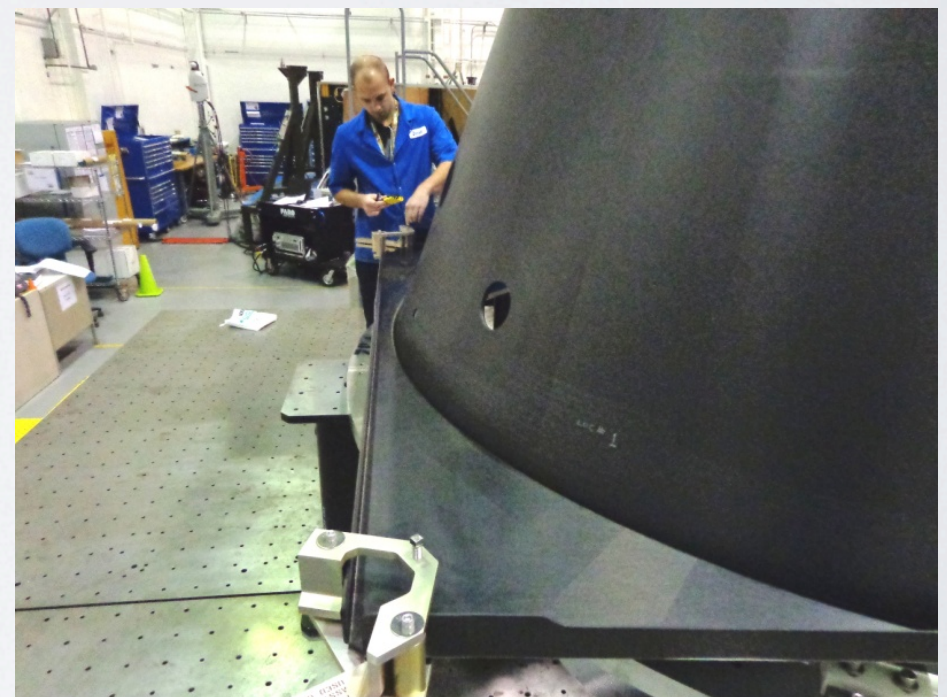
# SPACECRAFT

- Spacecraft CDR passed in January (final major design review, only 15 RFAs, most requests for information)
- >97% of Observatory, by mass, now built, in fabrication, or ready for fabrication



Panel integration demonstration on spacecraft mock-up

## Flight Hardware



Panel Fit Check on Cone

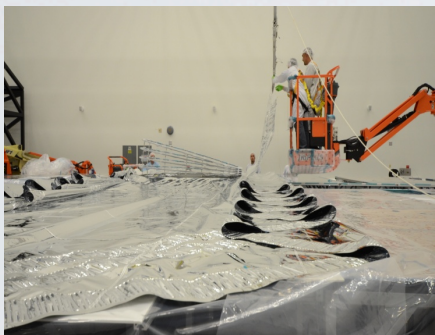


# SPACECRAFT: SUNSHIELD

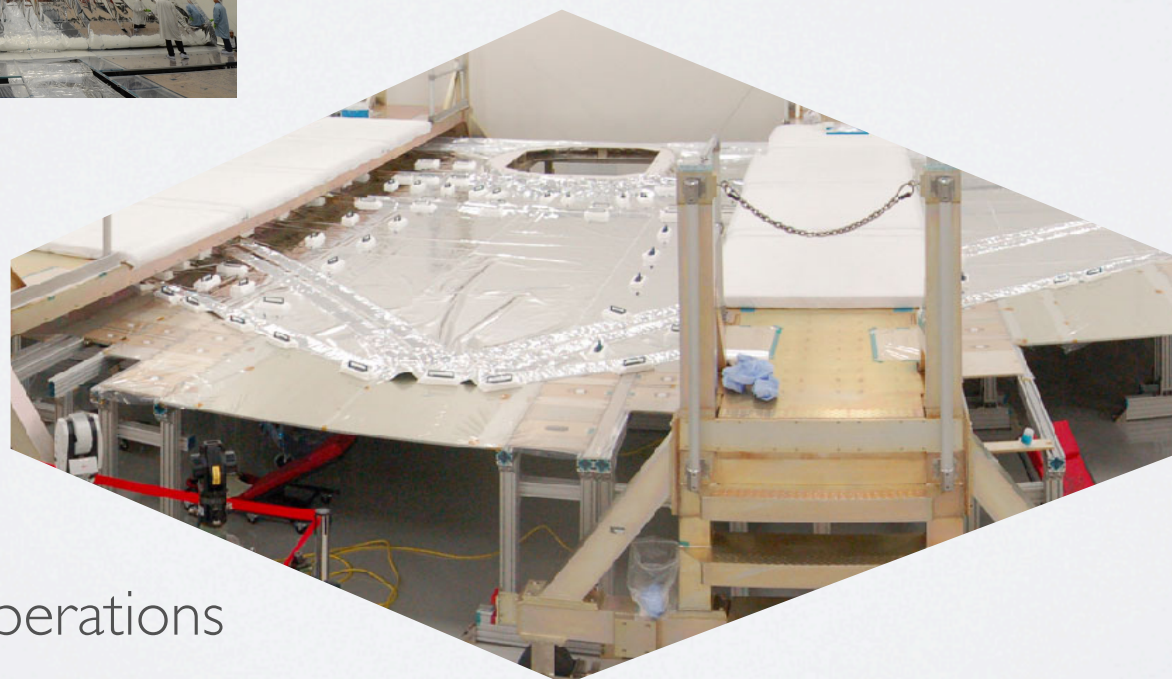
All full-scale engineering layers complete, folding,  
deployment testing happening now

Flight Sunshield manufacturing underway

Stringing Operations



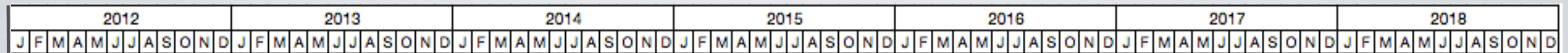
Folding: Engineering  
layers 1-5



Hole tool operations



# SIMPLIFIED SCHEDULE



OTE = Optical Telescope Element

OTIS = Optical Telescope + ISIM

k months of project funded critical path (mission pacing) schedule reserve

## Spacecraft

Spacecraft Component Development

Spacecraft Fabrication and Assembly

Sunshield Des. & Development

Flight Sunshield Fabrication, Assembly and Test

Spacecraft panels to I&T

Spacecraft I & T

Observ I&T

4

Spacecraft Structure to I&T

I & T

ISIM Integration

ISIM Cryo Testing & Detector Changeout

OTIS

3

## Science Instruments

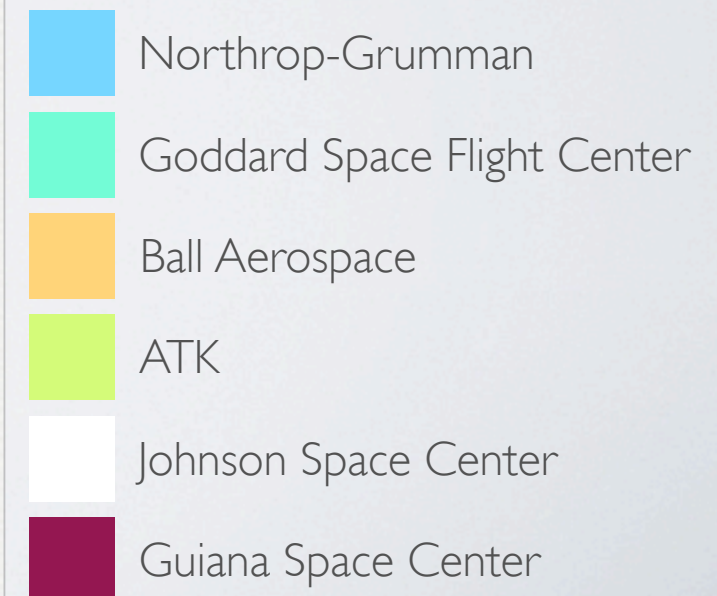
Segment Gear Motor replacement

OTE

6

Optical Telescope Element Fabrication and Testing

## Telescope



Faded areas are completed



# REPLACEMENT DETECTORS

DETECTOR LOCATIONS:  
P1 - 16991  
P2 - 17005  
P3 - 17011  
P4 - 17047

All NIRCam new focal plane arrays (FPA) installed  
(9 months ahead of schedule)

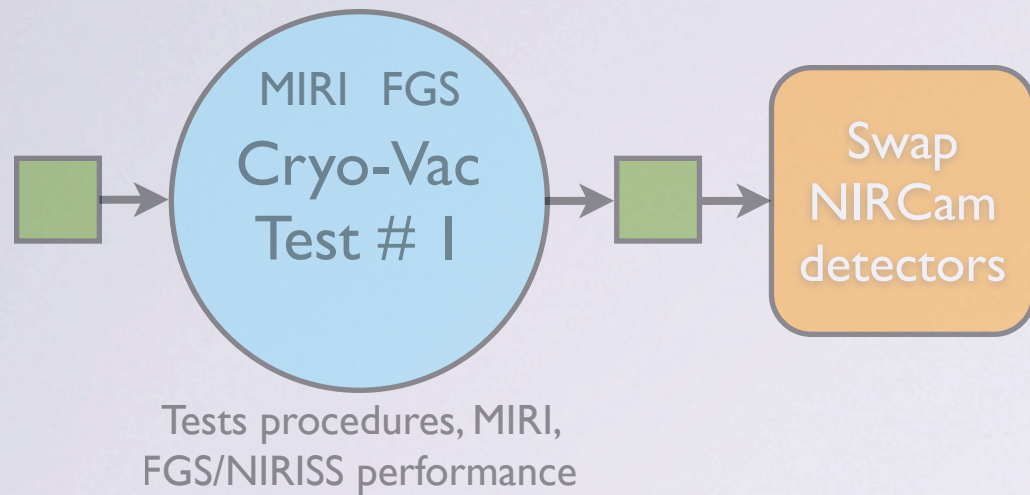
All NIRSpec new FPAs selected, 2 of 4 selected for  
FGS/NIRISS

All new detectors meet or exceed their requirements

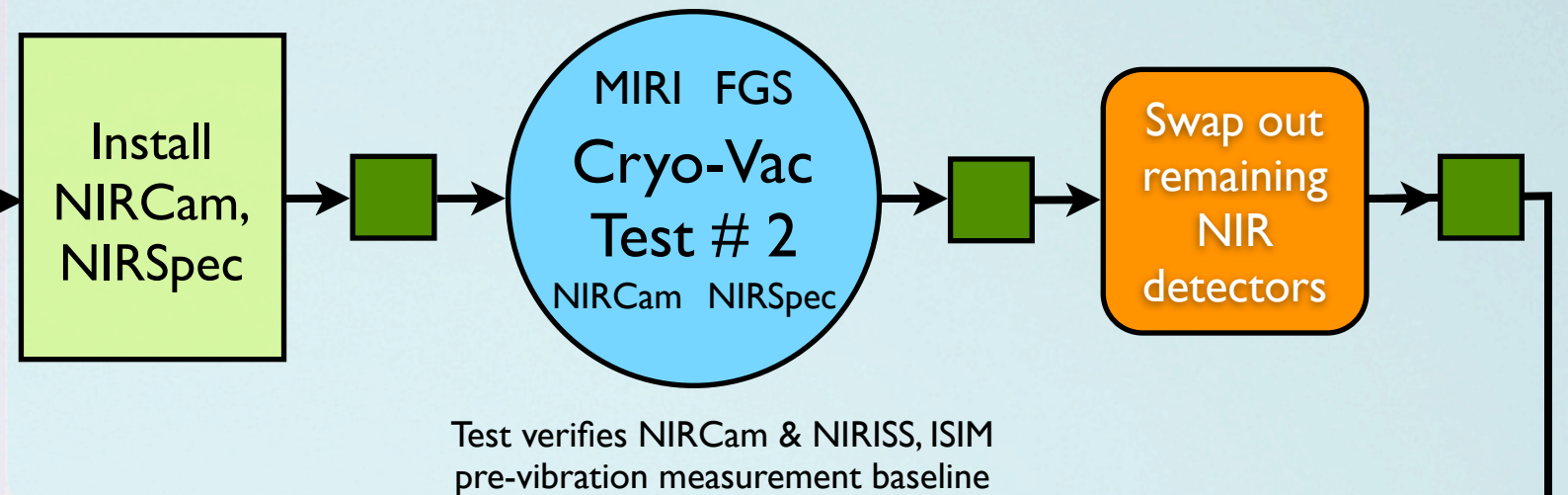


# ISIM TESTING

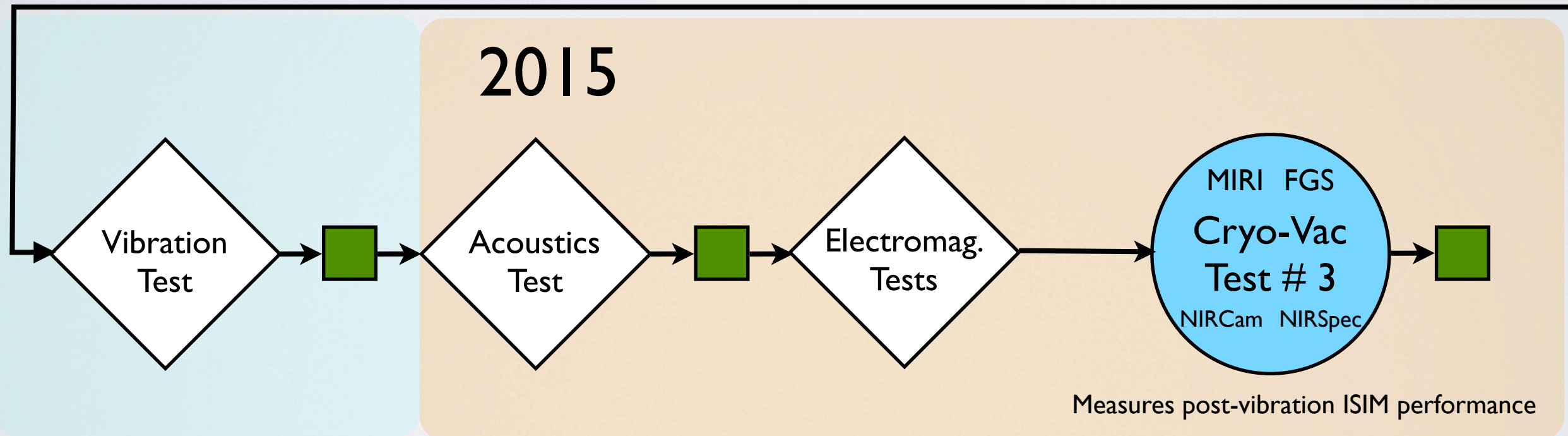
2013



2014



2015



=

Ambient Temperature Metrology



# SIMPLIFIED SCHEDULE

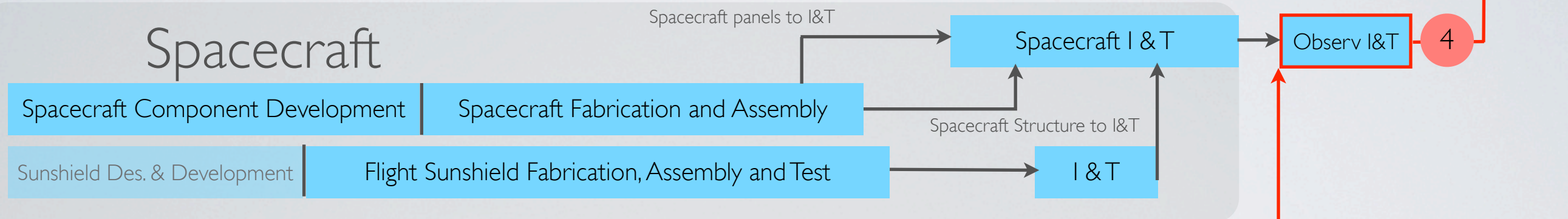
| 2012 |   |   |   |   |   |   |   |   |   |   |   | 2013 |   |   |   |   |   |   |   |   |   |   |   | 2014 |   |   |   |   |   |   |   |   |   |   |   | 2015 |   |   |   |   |   |   |   |   |   |   |   | 2016 |   |   |   |   |   |   |   |   |   |   |   | 2017 |   |   |   |   |   |   |   |   |   |   |   | 2018 |   |   |   |   |   |   |   |   |   |   |   |
|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|---|---|---|---|
| J    | F | M | A | M | J | J | A | S | O | N | D | J    | F | M | A | M | J | J | A | S | O | N | D | J    | F | M | A | M | J | J | A | S | O | N | D | J    | F | M | A | M | J | J | A | S | O | N | D | J    | F | M | A | M | J | J | A | S | O | N | D | J    | F | M | A | M | J | J | A | S | O | N | D | J    | F | M | A | M | J | J | A | S | O | N | D |

OTE = Optical Telescope Element

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## Spacecraft



ISIM Integration

ISIM Cryo Testing & Detector Changeout

OTIS

3

## Science Instruments

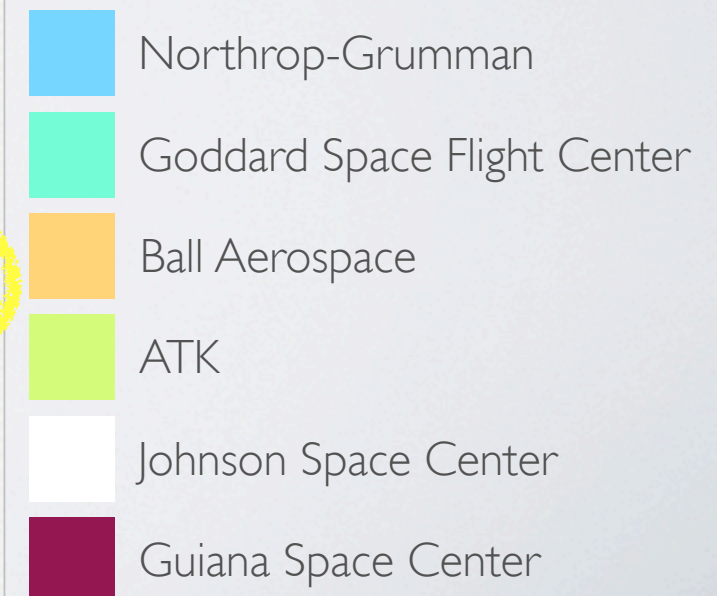
Segment Gear Motor replacement

OTE

6

Optical Telescope Element Fabrication and Testing

## Telescope



Faded areas are completed



# TELESCOPE: OPTICS



18 segments, secondary  
and spares at GSFC



# TELESCOPE: BACKPLANE

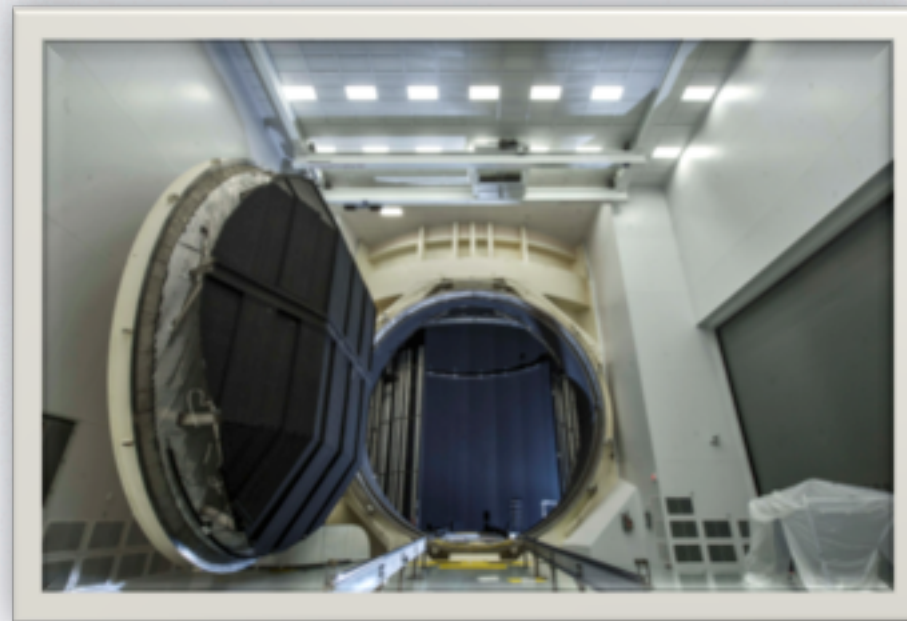
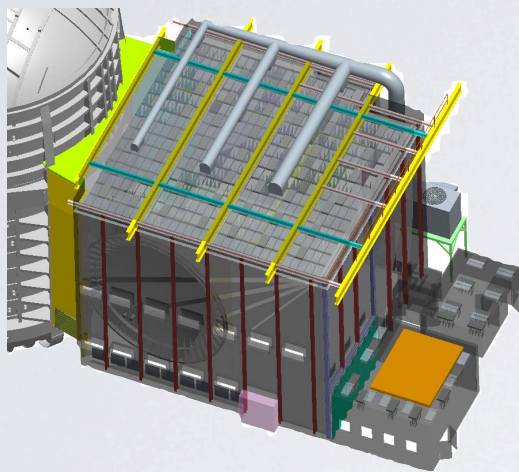


Backplane Center Section & Backplane Support Fixture at NGAS for Static Loads Testing  
Completed Wing backplanes being tested at ATK, Secondary Mirror Mount delivered to NGAS



# OTIS TESTING

- Chamber A modifications complete, cleanroom complete, testing hardware arriving at JSC



Rails into Chamber A from clean room



Load Testing of Rod Assy. At Exelis



Painted USF and ready for chamber install



Painted HOSS and ready for chamber install



NASA visit to ACU during final fabrication effort



# MILESTONE PERFORMANCE

|        | <b>Total<br/>Milestones</b> | <b>Total<br/>Milestones<br/>Completed</b> | <b>Number<br/>Completed<br/>Early</b> | <b>Number<br/>Completed<br/>Late</b> | <b>Deferred to<br/>Next Year</b> |
|--------|-----------------------------|---|---------------------------------------|--------------------------------------|----------------------------------|
| FY2011 | 21                          | 21  | 6                                     | 3                                    | 0                                |
| FY2012 | 37                          | 34  | 16                                    | 2                                    | 3                                |
| FY2013 | 41                          | 38  | 20                                    | 5                                    | 3                                |
| FY2014 | 36                          | 12  | 5                                     | 14*                                  | 4                                |

\*Late milestones have been completed one or more months late or are forecast to complete one or more months late within the fiscal year. Six Government shutdown-related delayed milestones are included in this tally.



# NEAR TERM FOCUS AREAS

Update on items from last CAA presentation

| Issue                                  | Trend | Comment   |
|--|-------|---|
| • Cryocooler Cost, Schedule, Technical | ↔     | Cryo-valve issue resurfaced, compressor schedule not improving          |
| • ISIM Test Flow                       | ↔     | Delay of cryocooler puts added activity into period between CV2 and CV3 |
| • NIRSspec Micro-shutter Fabrication   | ↑     | 3 of 4 quadrants selected for flight, 4 unit in testing                 |
| • Observatory Stray Light              | ↔     | Previous issues resolved, new one (sunshield gaps) found                |



# PROGRAM WATCH LIST

- Low FY14 unencumbered Unallocated Future Expenses (UFE)
- MIRI Cryocooler (schedule, technical, cost)
- 3/4" Non Explosive Actuator, Star Tracker Assembly and Spacecraft Radiator. All issues known prior to spacecraft CDR that will require work this year.
- Mid-infrared stray light
- Resolution of FGS-ISIM communications issue from CV#1



# SUMMARY

- Project continuing Integration and Test activities
- Technical progress continues to be significant
  - Instruments delivered, completed flight mirrors at GSFC, sunshield flight build started, spacecraft component manufacturing begun
- Project is performing within the budget, to schedule, with same amount of schedule reserve held since 2011.
- FY14 is the peak funding year with many critical activities





# 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