

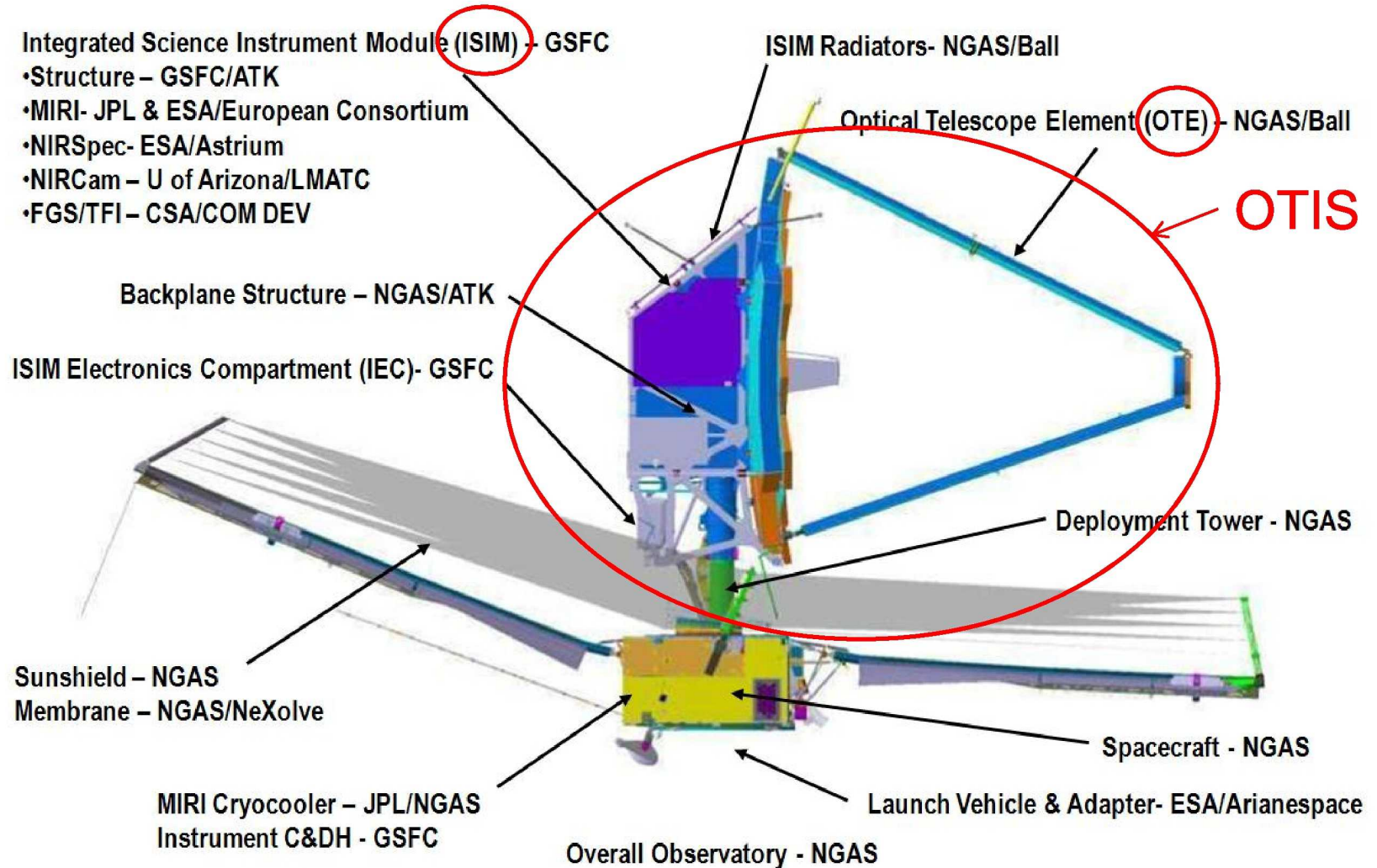
JAMES WEBB SPACE TELESCOPE (JWST) TEST ASSESSMENT TASK (TAT)

Briefing to the NASA Science Mission Directorate

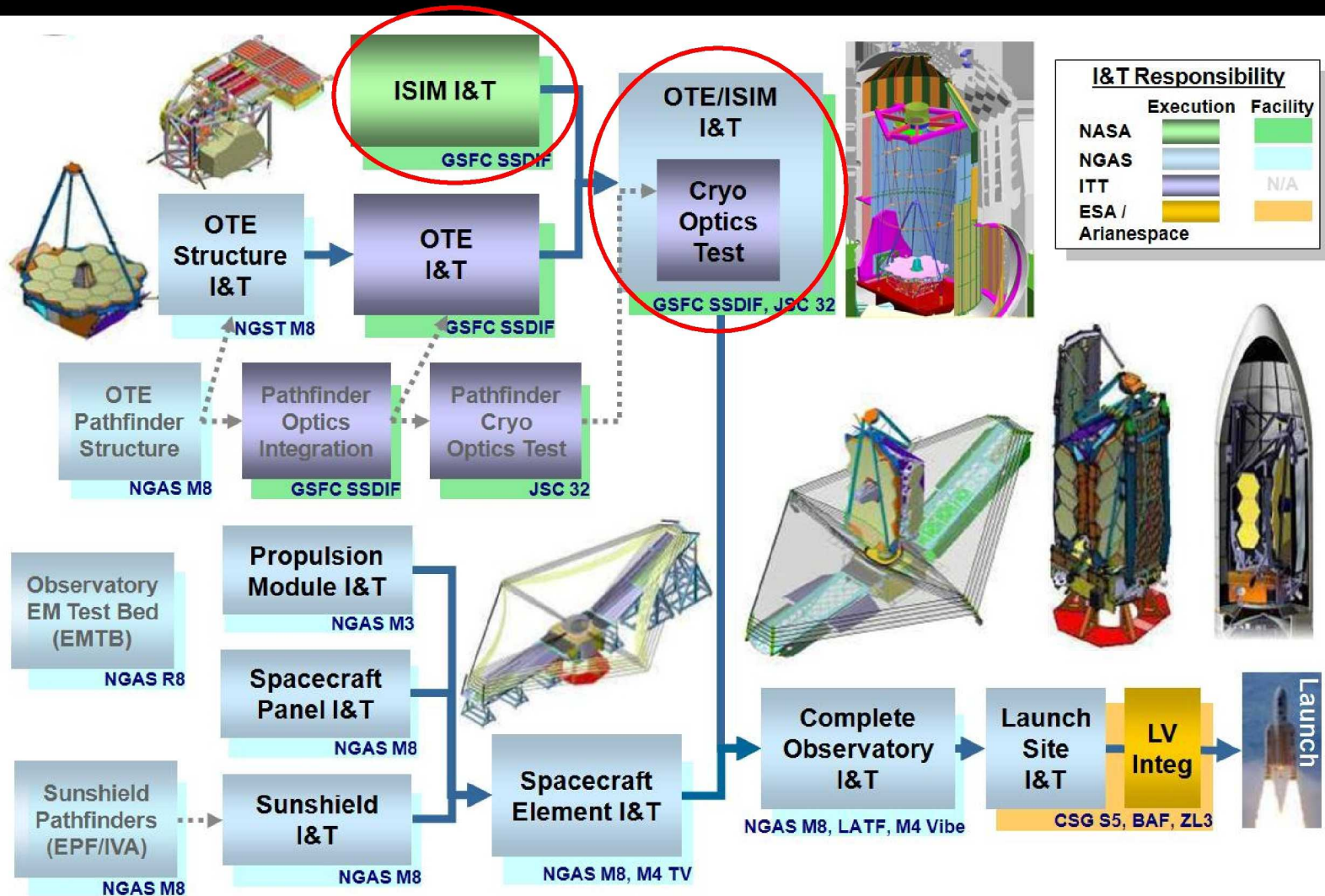
JWST Testing Assessment Task

NASA Headquarters
August 20, 2010

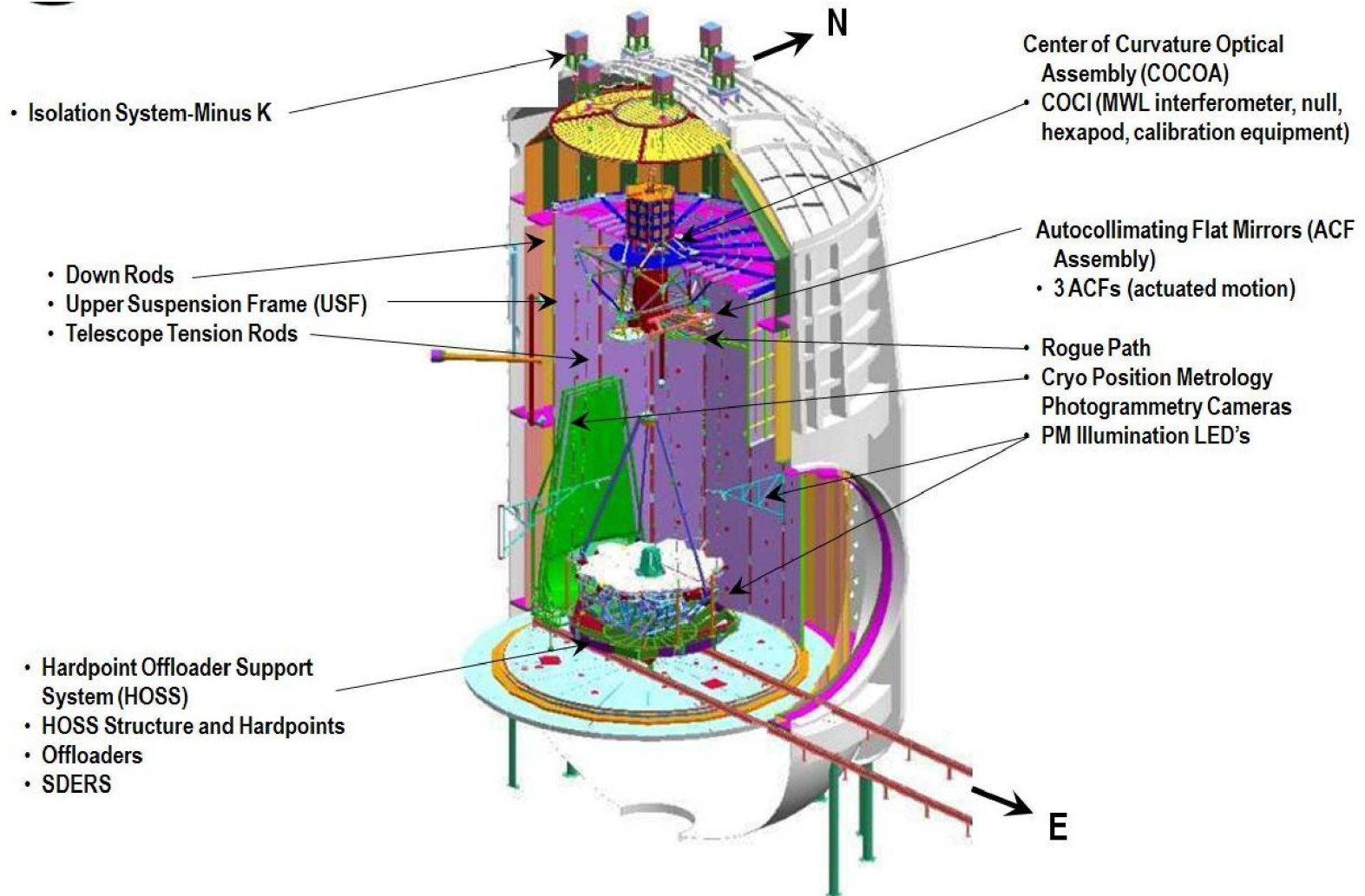
ISIM + OTE = OTIS



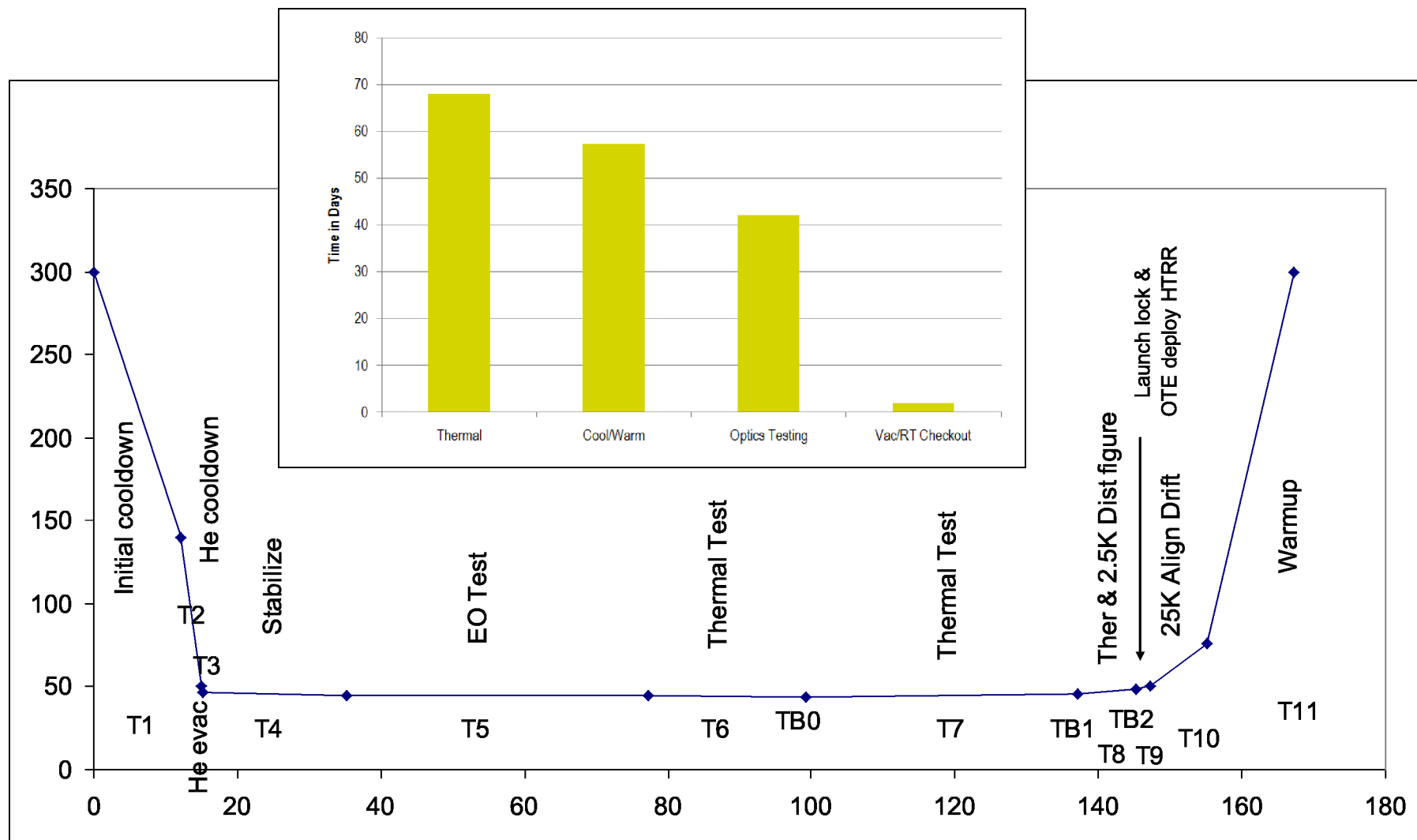
TAT Scope



Test Complexity at JSC



OTIS Cryo Test Timeline



Backup

Thermal Verification Overview

Orange (O)	Provides demonstration/risk reduction and supporting data for model validation
Yellow (Y)	Provides direct test data for partial model correlation and performance verification.
Green (G)	Provides direct measurement/model correlation in flight like thermal environment and as flown configuration.

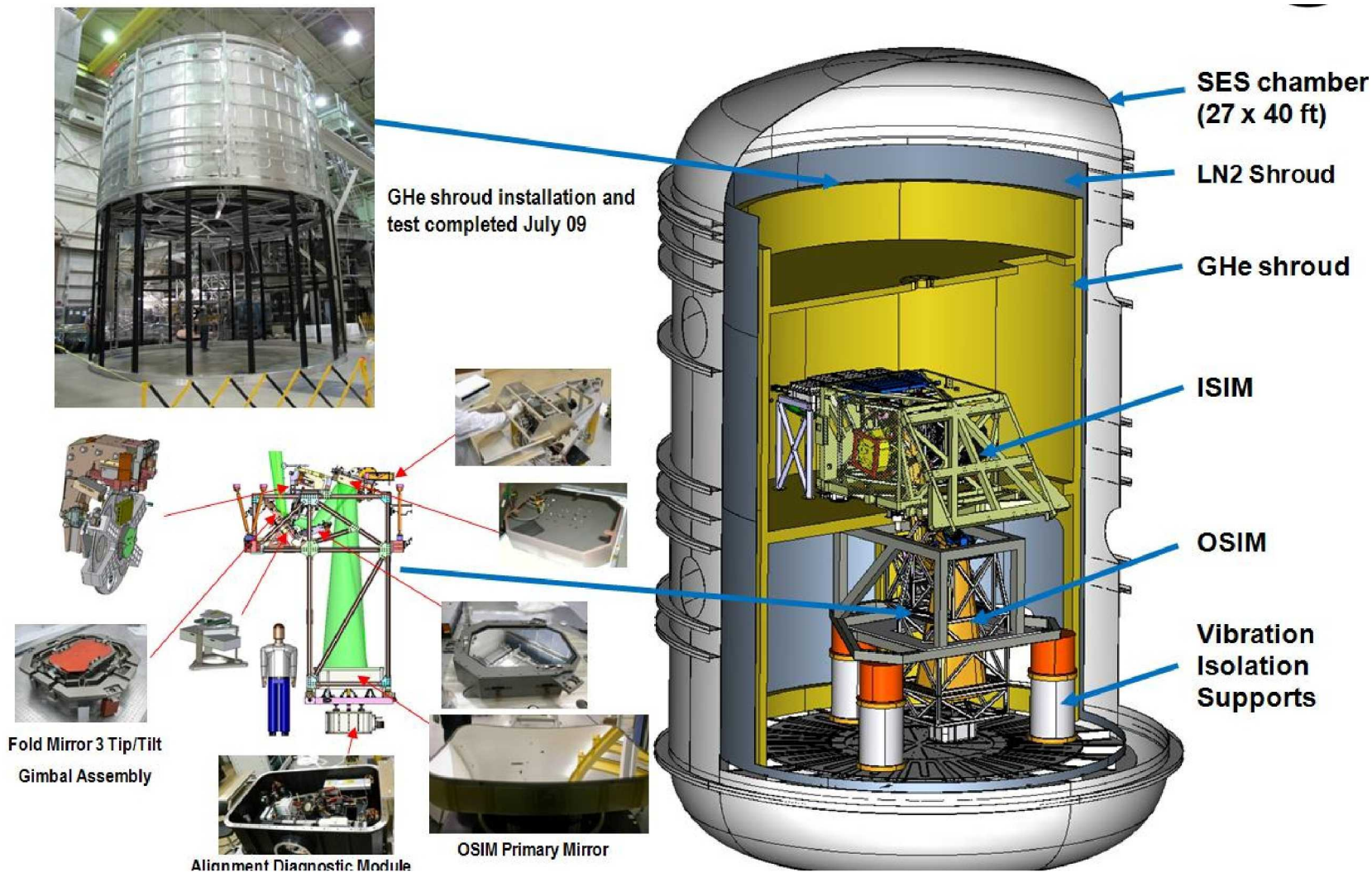
			2009 → 2013											2013			
Thermal Architecture Performance Parameters			A	B	C	D	E	G	H	I	J	K	L	M	Flight		
Description			Engineering Full Scale Core	Engineering 1/3 Scale SS	Engineering Layer 5 Lidar	Flight IEC Baffle	Flight SI TV/TB	Flight IEC	Flight Heat Straps	Flight ISIM Radiators	Flight ISIM SES	Flight OTIS JSC	Flight SS Core	Flight Bus	Final Verification T- Test A - Analysis	Notes	
1	OTE Temperature	function of several architecture thermal features	O	Y	Y	Y						G	Y		A	via analysis. OTE temperature is a function of several architecture	
2	Core Isolation Performance	critical to overall temperature of OTE and ISIM	O									G	G		T/A		
3	IEC Isolation Performance	critical to overall temperature of OTE and ISIM	O					Y				G			T/A		
4	IEC/Core SS Backscatter	critical to overall temperature of OTE and ISIM		O	Y	Y									A	via analysis. Only Lidar and baffle test provide	
5	Radiator Performance	dictacts total load capability of passive cooling system								G					T		
6	Heat Strap Performance	dictates total load capability of passive cooling system							G						T		
7	Radiator/Strap end to end	radiator to strap interface is										G			T		
8	Cooler - ISIM Loads	ISIM contributor to total load on cryocooler					Y					G			T/A		
9	Cooler - Line Loads	Observatory contributor to total load on cryocooler	O									G			T/A		
10	Harness Radiator Performance	major mitigator of IEC to ISIM harness loads										Y	Y		A	via analysis. Only lidar and baffle test provide	
Radiator Load Breakdown																	
QT	Total Load (253) mW, FGS Ex. Mounts - C (42)	Description													A	total load is verified via analysis. Strong function of OTE temperature	
Q1		radiator supports to OTE										G			T/A		
Q2	Ext Backload - R (88)			O	Y	Y									A	Final performance is via analysis. Only lidar and baffle test provide test data.	
Q3	Int Backload - R (0)											G			T/A		
Q4	Strap Load - C (123)	total load thru strap										Y	G		T/A	OTE generated heat loads are via analysis only	
Q4A	Supports - C (0)	strap supports to ISIM/OTE										Y	G		T/A		
Q4B	Radiation - R (0)	OTE ISIM cavity										Y	G		T/A		
Q4C	Instrument - C (123)	Load thru Instrument										Y	G		T/A		
Q4C1	Mounts - C (13)	Bench to Instrument Mounts					Y					Y	G		T/A		
Q4C2	Radiation - R (25)	OTE ISIM cavity					Y					Y	G		T/A		
Q4C3	Instrument Load (85)	Instrument Generated										G			T		
Q4C3A	Dissipation (55)						G								T		
Q4C3B	Harness (30)	Harness Total										G			T	assumes harness radiator performs as specified.	
Q4C3B1	IRSU(5)	IRSU to Instrument										G			T		
Q4C3B2	Instrument (25)	FPE/ICE to Instrument										G			T		

Optical Verification Overview

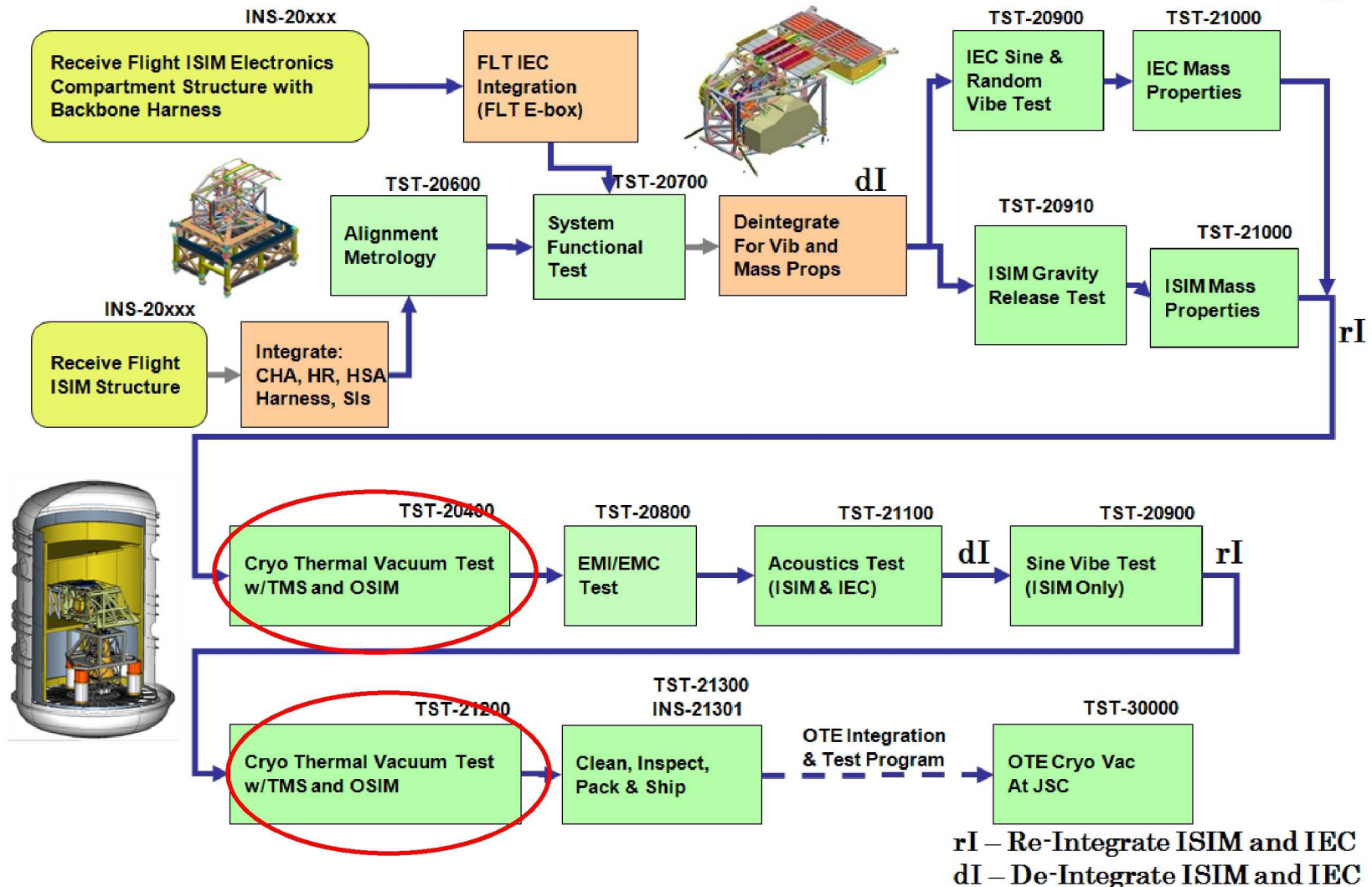
	OTE Subsystem Level	SI Level	ISIM	JSC	Notes		
WFE/Figure Performance							
PM Low Freq/PMSA-PMSA Alignment	Y	N/A	N/A	G (critical)	Backplane SES test at Subsystem Level; Integrated structure/PMSA alignment measured using acuator range for phasing at JSC		
PM Mid Freq	G	N/A	N/A	O		Orange	Risk redn/demo/blunder
PM High Freq	G	N/A	N/A	N/A		Yellow	Test data for partial model validation/performance verification
PMSA Astigmatism	G	N/A	N/A	Y		Green	Provides flight like test data
PM RoC	Y	N/A	N/A	G			
PM Conic	G	N/A	N/A	Y			
SM WFE	G	N/A	N/A	O			
SM RoC	G	N/A	N/A	O			
SM Conic	G	N/A	N/A	O			
TM WFE	G	N/A	N/A	O			
TM RoC	G	N/A	N/A	O			
TM Conic	G	N/A	N/A	O			
FSM Figure	G	N/A	N/A	O			
SI WFE	N/A	Y	G	O			
Alignments							
PM to AOS Alignment	Y	N/A	N/A	G (critical)	Backplane SES test at Subsystem Level		
SM to AOS Alignment / SM Actuator Range	Y	N/A	N/A	G (critical)	Backplane SES Test, SMSS ambient testing including deployment repeatability measured at Subsystem Level		
Internal AOS Alignment (TM, FSM, Mask, Aperture)	G	N/A	N/A	O			
ISIM to AOS Alignment	Y	N/A	Y	G (critical)	Backplane piece measured during Backplane testing in SES; ISIM piece including KM strut adjustments measured using OSIM		
SI to ISIM Pupil Shear	N/A	Y	G	O	Internal SI Shear measured at SI level		
SI to ISIM Focus	N/A	Y	G	O	Internal SI Focus measured at SI level		
Other							
Thermal Distortion - PM WFE & RoC Change	O	N/A	N/A	Y	BSTA testing		
Thermal Distortion - OTE Alignment Change	O	N/A	N/A	Y	Full Strut CTE test at Subsystem Level		
PM Collection Area	G	N/A	N/A	O			
Rogue Path	N/A	N/A	N/A	O	AOS mask alignment measured at Subsystem Level - captured under "Alignments" above		
PM to FSM Mask Alignment / Truant Path	O	N/A	N/A	O	Frill test at JSC		
Plate Scale	N/A	Y	Y	G	OTE alignments that impact plate scale are captured under "Alignments" above		
WFS&C Algorithms/Process	G	O	O	O	Full SW Verification w/ ITM at Subsystem Level; End-to-End WFSC Demo at JSC		
WFS&C Influence Functions	O	N/A	N/A	Y	TBT validation at Subsystem level		
WF Control Signal Path (PMSA, SMA motion control sign check test)	N/A	N/A	N/A	G	Mirrors see flight electronics for first time at JSC		
WF Control - Hexapod performance	G	N/A	N/A	O			
Fine Guidance Loop	Y	N/A	O	O	DITCE/ADU/FSM test at BATC; JSC uses ADU EDU		

NOTE: All Low frequency terms and PMSA astigmatism factor into actuator range

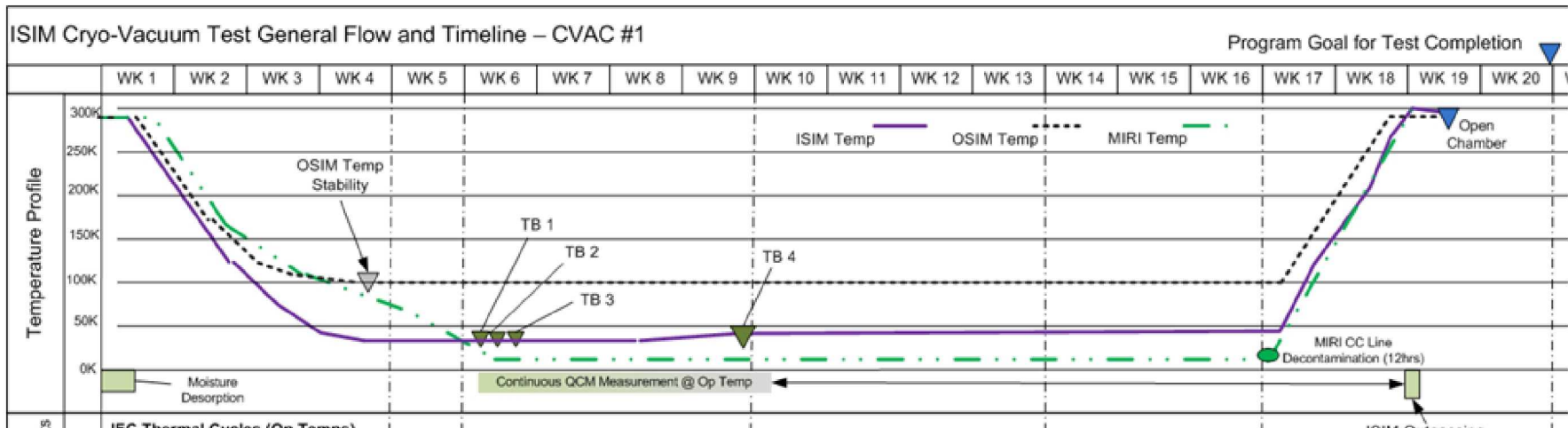
ISIM Cryo Test Configuration at GSFC



ISIM I&T Flow



ISIM Cryo Test Timeline



JSC Activities Flow

