GLAST Large Area Telescope:

Mechanical Systems

Marc Campell
SLAC
Subsystem Manager

marcc@slac.stanford.edu
(650) 926-4658

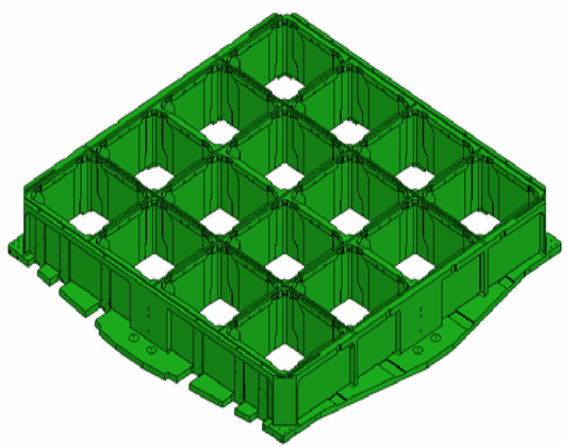
Overview – MECH SYS Deliverables

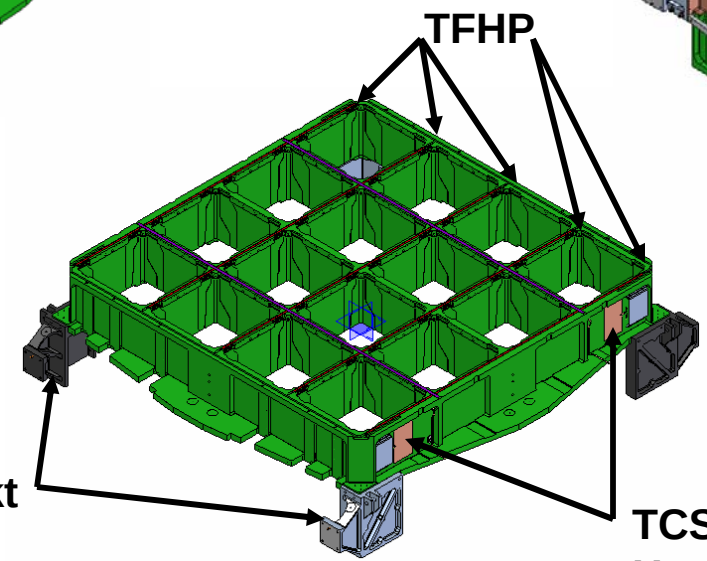
- Grid Box Base Assembly (GBBA)
  - Grid + Radiator Mount Brackets + Top Flange HP's + Thermal Control hardware
  - Configuration delivered to I & T for LAT integration
- Grid Box Assembly (#2 only)
  - GBBA + EMI Skirt + Dummy CAL Baseplates
  - Mechanical Systems Top Assembly test configuration
  - Static Load test
- Radiators
  - Fabricated and tested by LM
- X-LAT Plates
  - Fabricated and tested by LM

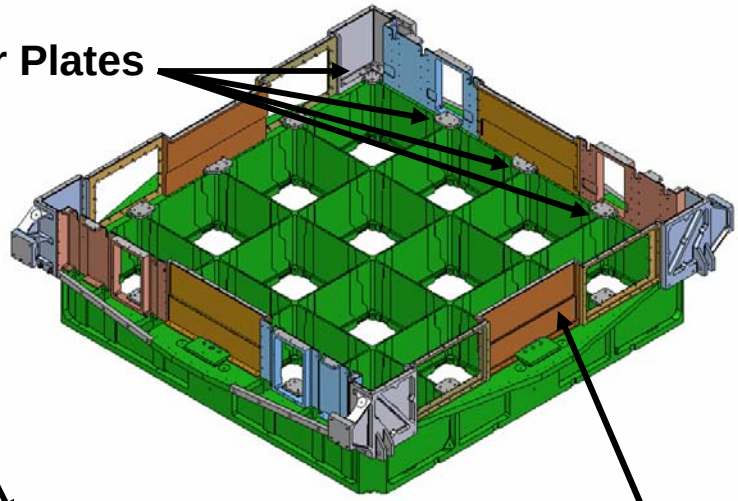
Mechanical Subsystems Overview

4 x 4 Grid >> Grid Box Base Assy >> Grid Box Assy

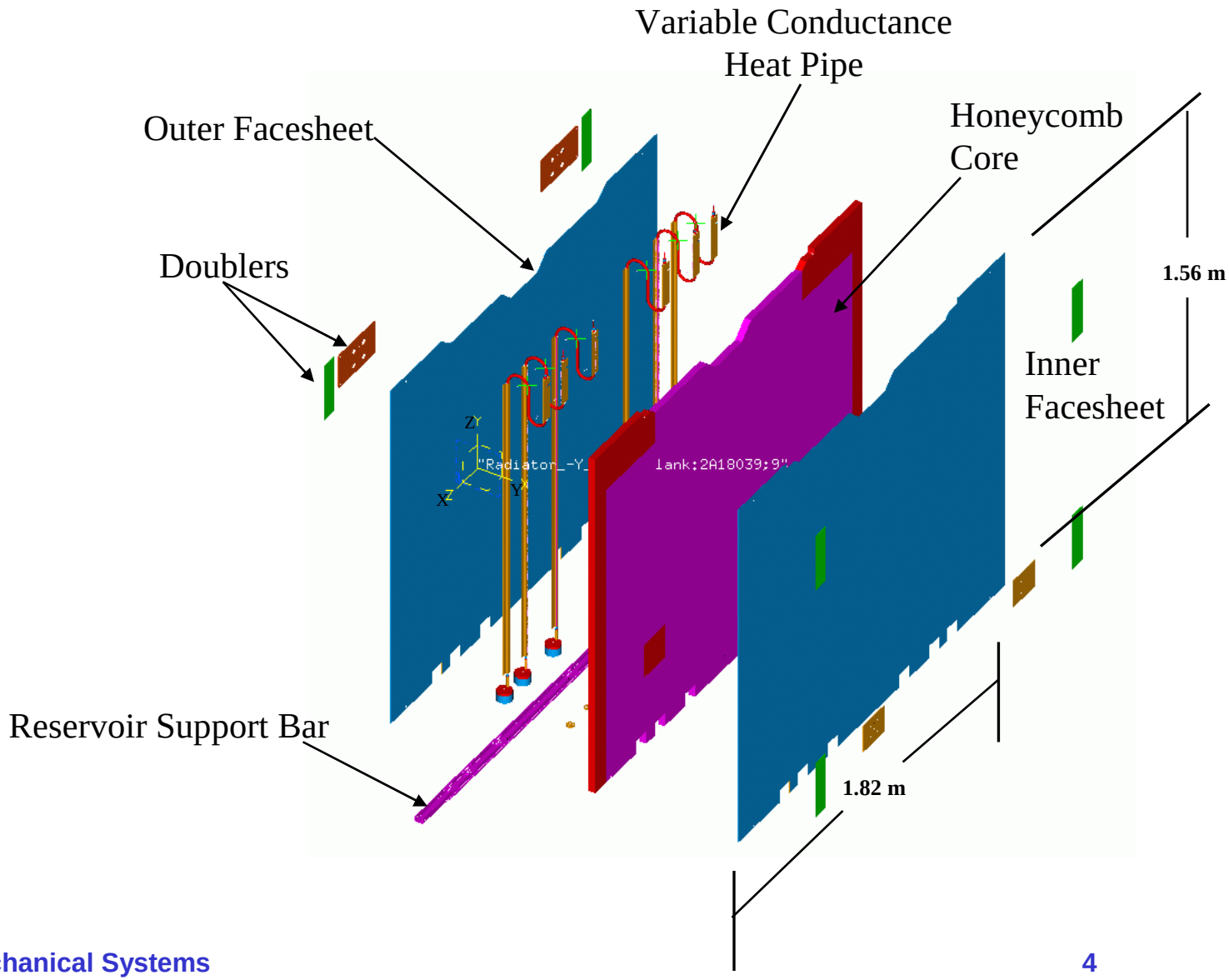
(Test Configuration CAL Baseplates not shown)



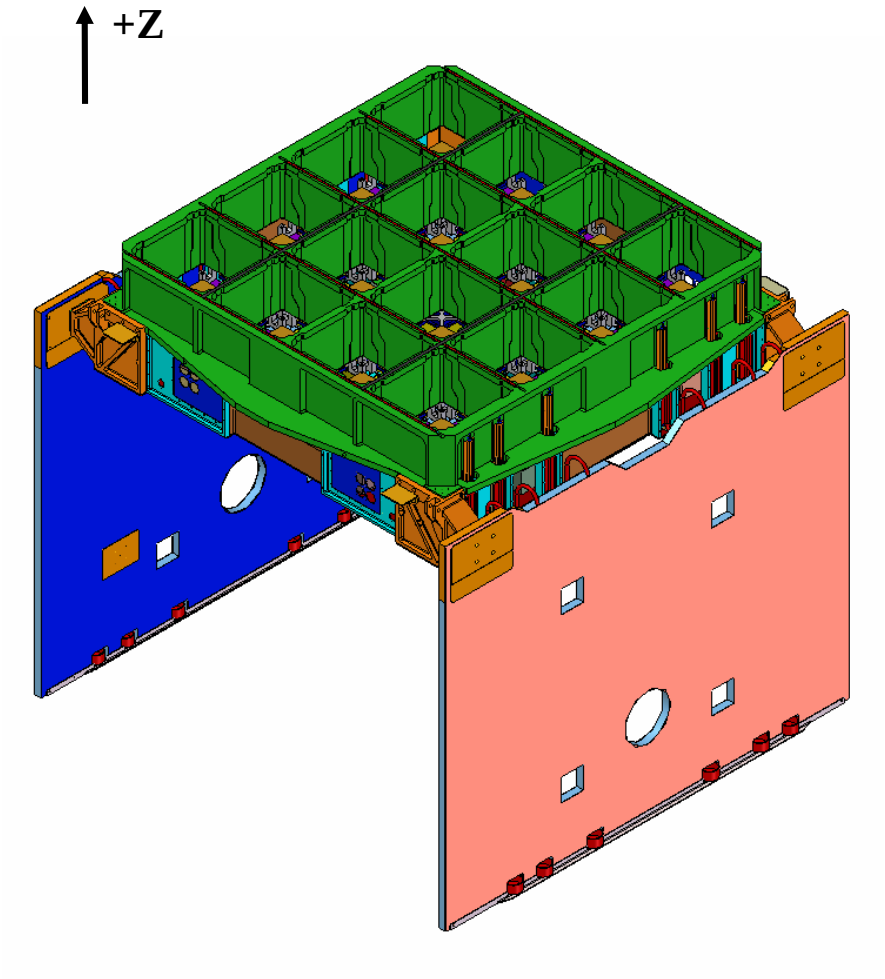


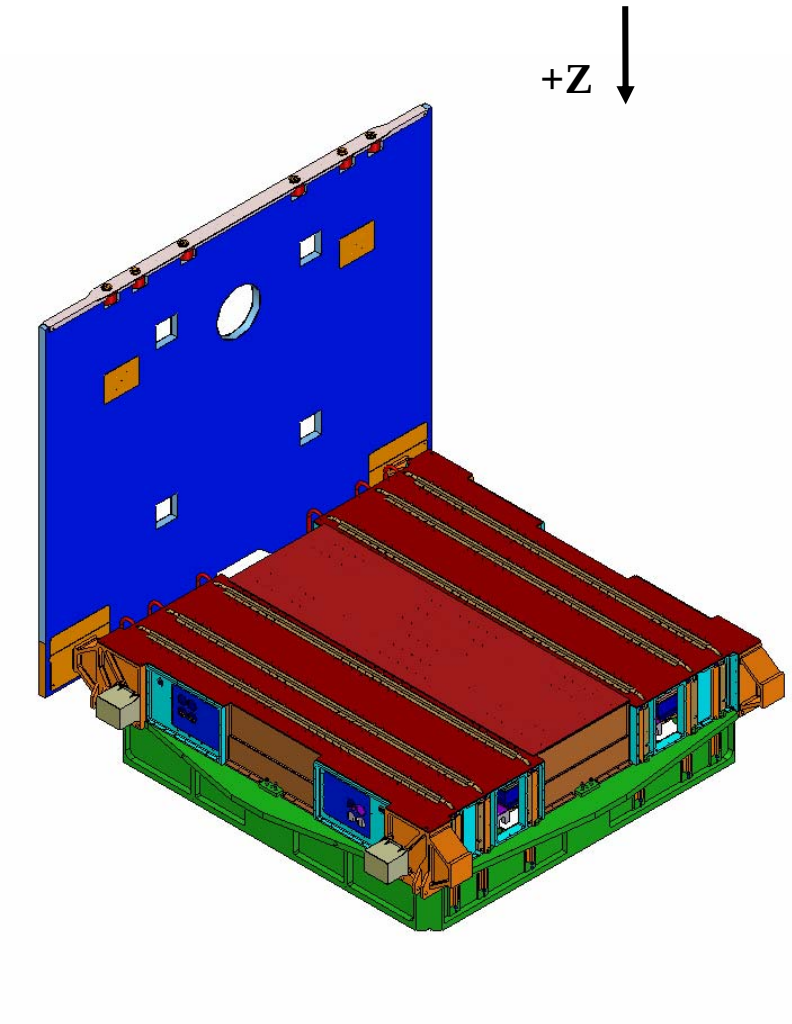


Radiator Panel Exploded View



Radiator & X-LAT Placement





Recent Accomplishments

Grid Box

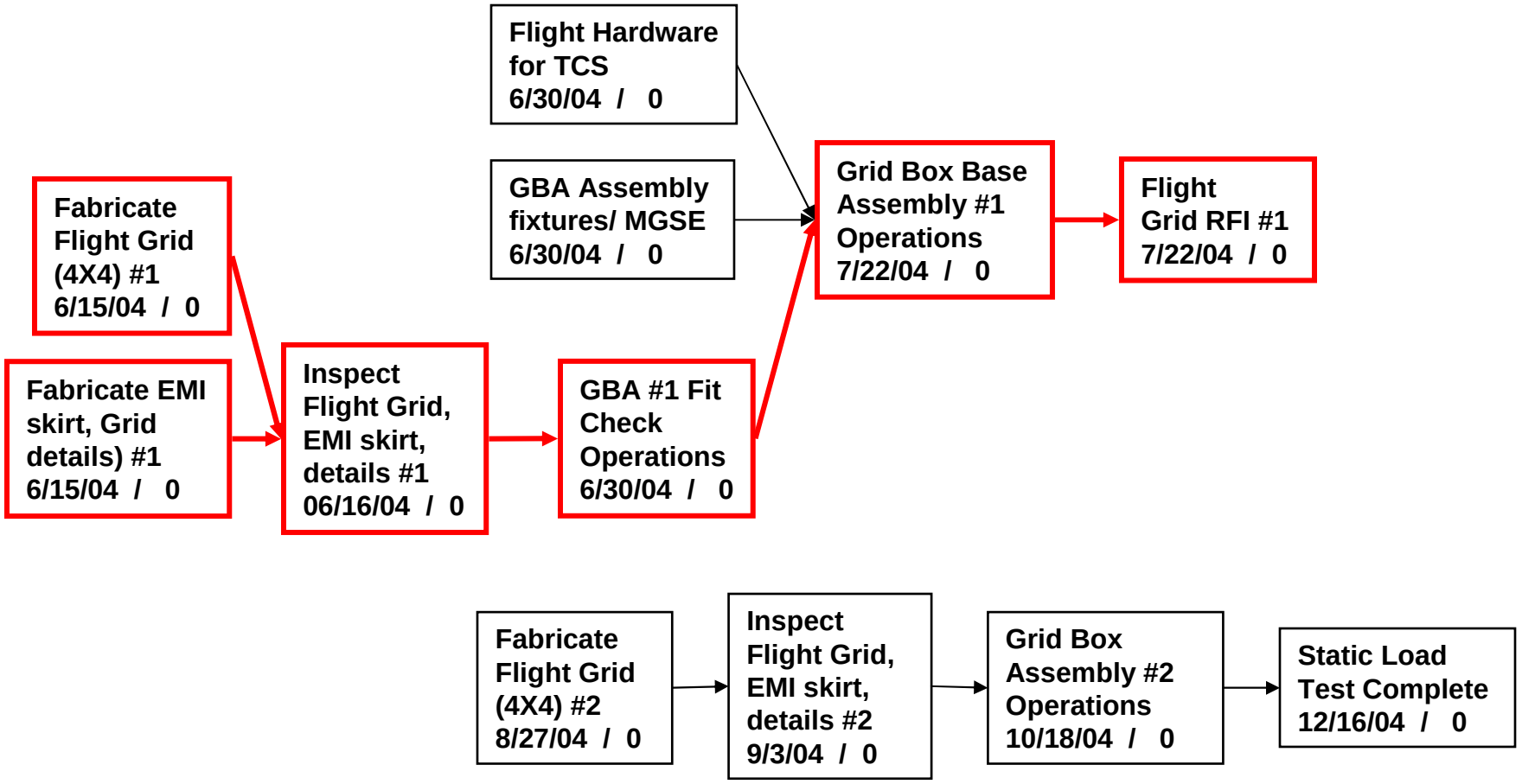
- Grid #1 rough machining complete
- Grid #1 finish machining 50% complete (shown below)
- Grid #2 rough machining & heat treat complete

Recent Accomplishments (cont)

Lockheed Martin

- **Downspout Heat Pipes complete (shown below)**
- **Top Flange Heat pipes complete**
- **Radiator detail parts fabrication xx% complete**
- **X-LAT Plate interface design finalized**

Mechanical Systems Critical Path



Completion Dates/Variance to Baseline

Radiator Critical Path

- VCHP Fabrication
- Radiator details fabrication
- Radiator assembly complete
- Protoqual test
  - Low level sine vibe
  - Acoustic
  - Low level sine vibe
  - Thermal Vacuum cycling
  - TCS / Thermal Balance test
- Deliver to SLAC
  - I&T fit check

X-LAT Path to First Flight Article

- X-LAT Heat Pipe Fabrication
- X-LAT plate detail fabrication
- X-LAT Plate assembly complete
- Protoqual test
  - Thermal Vacuum cycling
- Deliver to SLAC
  - I&T installation

Open Issues

- **Radiator VCHP Helium leak rate may impact ACD Photomultiplier Tubes (PMT's)**
  - **LM can substitute another inert gas, but it impacts ground (not on-orbit) performance.**
  - **LM given the "OK to Fab" the VCHP's up to the charging operation (need date).**
  - **Dispersion analysis is underway to evaluate impacts to PMT's. ECD: xx**
- **Coordination of TCS validation, LM Radiator Thermal Vacuum & Balance test plans**
  - **TCS risk assessment and Qual test plan requested by GSFC. ECD: xx**
- **TCS – location of Grid heaters, thermostats, RTD's and associated wiring needs to be finalized (top assembly drawing)**
  - **Thermal memo from LM is due xxx**
- **Radiator integration sequence**
  - **Grid has been modified to allow integration via pure translation of the Radiators.**
  - **Demonstration and detailed procedure are in work. ECD: May 04**

Risk List

Problem	Impact	Mitigation	Status
Failure of Radiator VCHP to Down-spout & X-LAT HP thermal joint during LAT TH/Vac testing	Day for day LAT schedule slip during anomaly resolution	Installation process control and prototype verification of 3 way joint	Verification tests planned for May '04
Failure of Grid thermal control components during LAT TH/Vac testing	Day for day LAT schedule slip during anomaly resolution	Perform ambient continuity & isolation test of heaters	
Availability of Grid & ACD'S BFA for match drilling	Schedule slip for either subsystem	Multiple windows have been established	Currently planned for 5/3 – 5/19/04

Key Schedule Issues

- **Problem: Late changes to Grid interface requirements**
- **Impact: Grid #1 delivery from Tapemation (vendor)**
  - **Is: 6/15/04; Re-Baseline: 3/30/04**
- **Mitigation steps taken or planned to get back on schedule:**
  - **Freeze Grid design and build it**
  - **Reduced Grid plating time 4 weeks by changing thermal requirement from 3 to 2 plating types (Alodine and Nickel plating – black anodize deleted)**
  - **Working with Tapemation to incorporate producibility improvements to design**

Key Schedule Issues (cont)

- **Problem: Late Grid delivery to SLAC drives delivery to I&T**
- **Impact: Grid to I & T delivery date**
  - **Is: 7/22/04; Re-Baseline: 6/15/04**
- **Mitigation steps taken or planned to get back on schedule:**
  - **Minimized Mechanical Systems assembly operations**
  - **Deleted Grid Box Assembly operations (fit check only)**
  - **Deleted Thermal Cycle testing of Grid Box assembly**
  - **Postponed some operations until after delivery to I&T**

Key Schedule Issues (cont)

- **Radiator delivery to I&T**

- **X-LAT Plate delivery to I&T**

Approved Cost Changes Since Rebaseline

	(k$)
4.1.8 Baseline, November 03	**$13,384**
Changes:	
• Align Schedule w/ Grid Deliv	$ (22)
• Grid Assy & TCS Replan	$ 53
• Stanford Benefits Rate Increase	$ 63
Total Change	$ 94
4.1.8 Baseline, February 04	**$13,478**

Variances

Cost variances:

- **LM = +$158K. Will be used in upcoming months**
- **SLAC = -$57K. Most of it is in M&S in 2600116 contractor support.**

Schedule variances:

- **LM = zero**
- **SLAC = -$189K. Missed (REC) Procure flight h/w for control system (-$184K)**

Looking Ahead 6 Months

- Grid #1 delivered to I&T
  - Supporting I&T integration operations
- Grid #2 delivered to SLAC
  - Static Load Test preparations underway
- X-LAT Plate fabrication complete and ready for test
- Radiator fabrication 75% complete

Summary

- Designs are released (except X-LAT plate)
- Fabrication of Grids is underway
- Fabrication of Radiators is underway
  - LM effort has ramped up significantly
- No major issues with hardware fabrication
- Focus now on resolving test issues