



SERVING OUR ARMY AT WAR

Lessons Learned from Army Interoperability Certification Testing

CTSF

RELEVANT AND RESPONSIVE

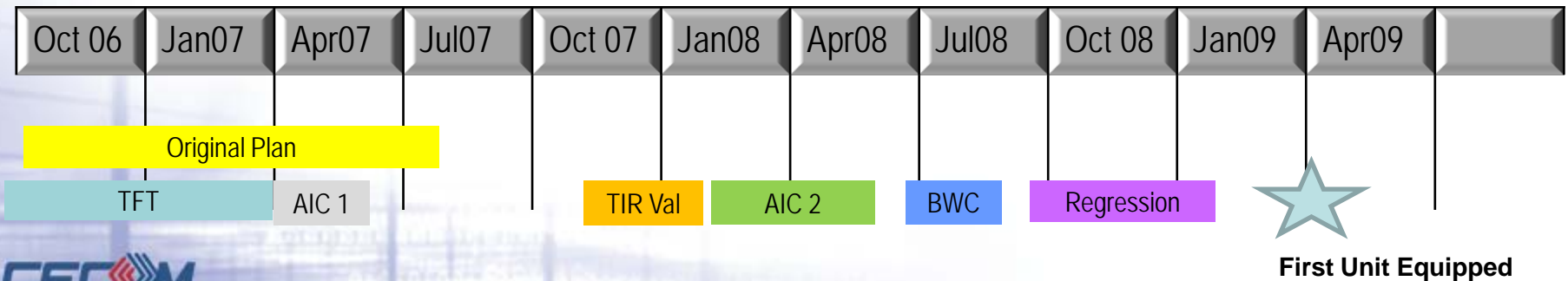


Analysis of Software Block 2 (SWB 2) Test Incident Reports (TIRs)



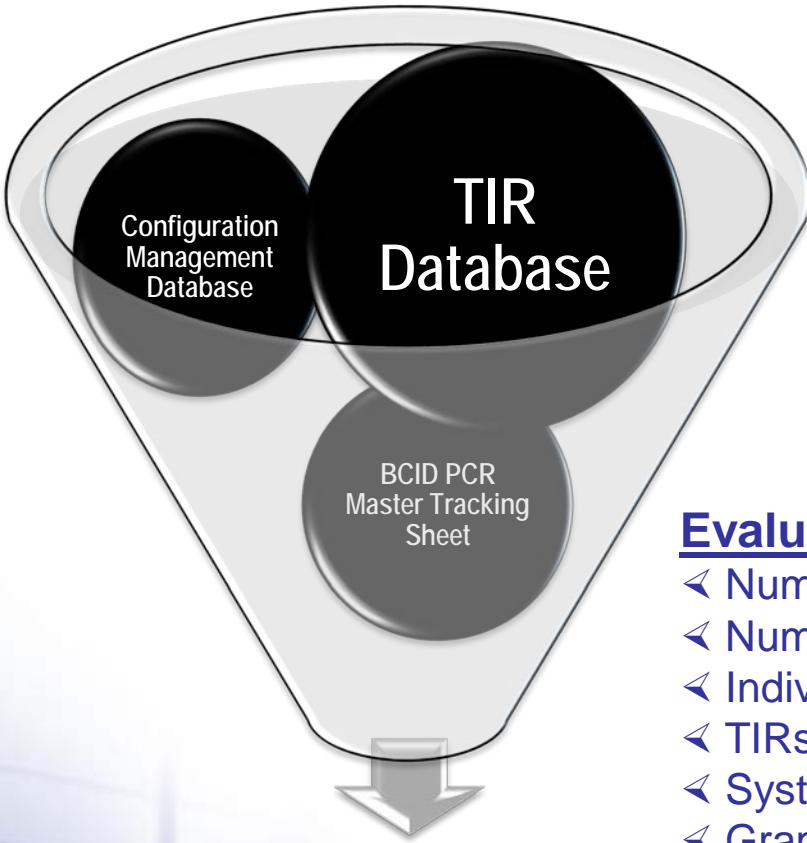
Background:

- The CTSF is the Army Interoperability Certification (AIC) agent for LandWarNet/Battle Command systems
- The Army incorporates a blocking process of multiple systems to introduce new capability set into the Army
- Software Block 2 had 50+ systems
- SWB 2 was initially scheduled for 9 months of Test-Fix-Test, AIC and Backward Compatibility (BWC) testing – however it took over 2 years before the CIO G6 certified the block and fielding began.





Methodology



Results

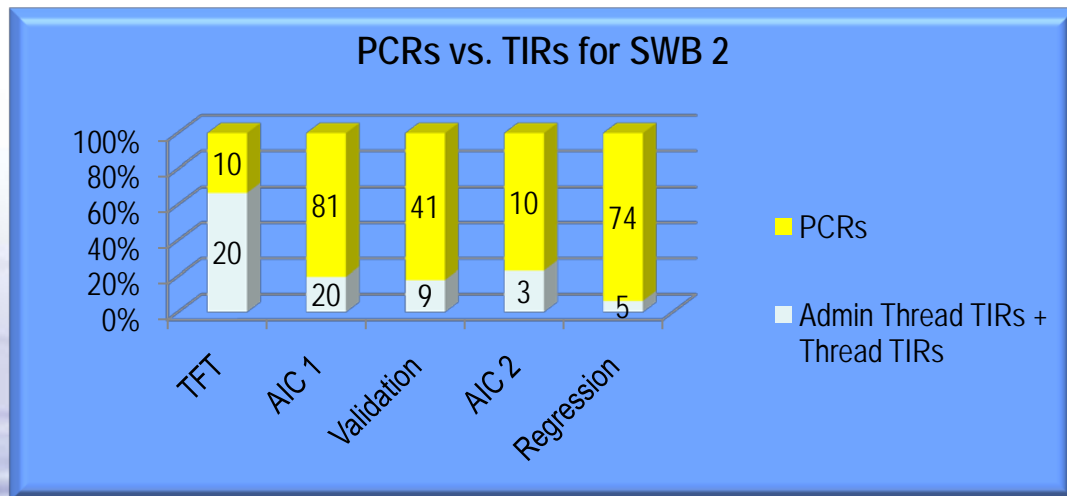
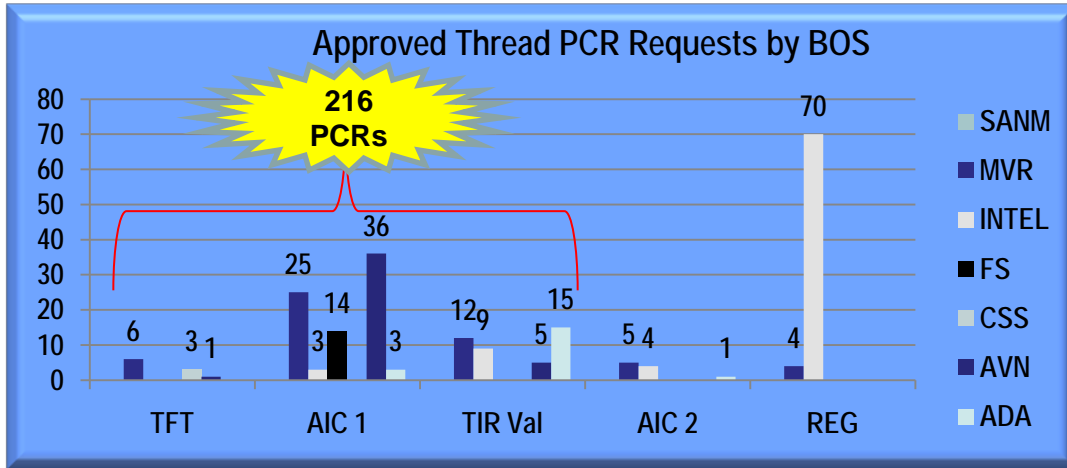
- ◀ Focused on Level 1-3 TIRs
- ◀ Date range is 10/06 thru 12/15/08
- ◀ Did not evaluate BWC issues
- ◀ Segregated the TIRs into 5 Test Windows: Test-Fix-Test; AIC 1; TIR Evaluation; AIC 2; Regression 1 & 2

Evaluated the following type of data:

- ◀ Number of TIRs over time for entire 2-year period
- ◀ Number of TIRs over time for each Test Window
- ◀ Individual system TIRs and sub-category by severity level
- ◀ TIRs by Issue Category
- ◀ System of System (SoS) vs. System TIRs
- ◀ Graphic TIRs
- ◀ CTSF Configuration Management database of software deliveries: date and purpose of deliveries
- ◀ Battle Command Integration Directorate (BCID) SWB 2 Product Change Request (PCR) Master Log:



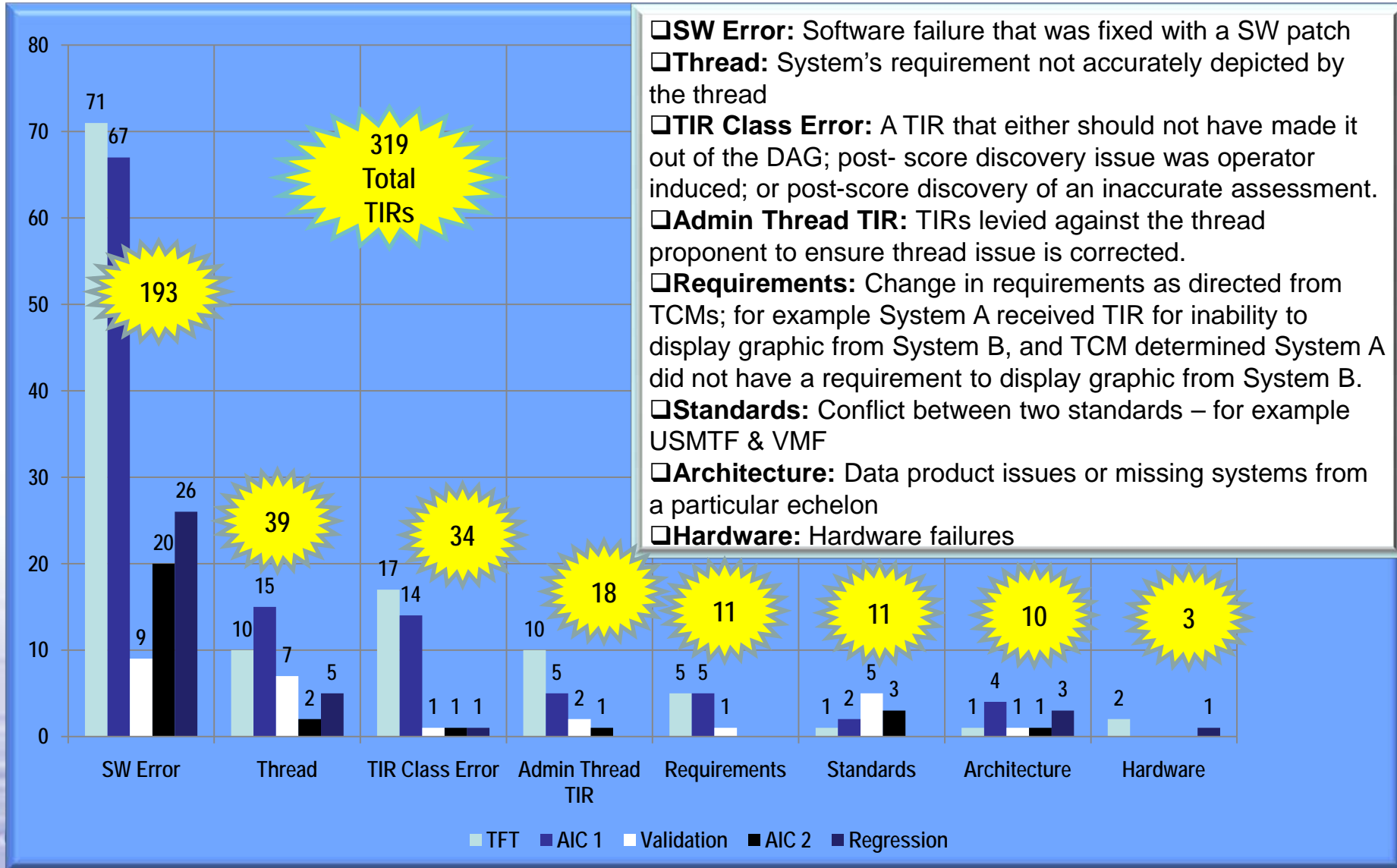
Requirements Changed



- Suspense date for TCM & PM certification of threads was 18 Sept 06.
- Start of TFT to Dec 08, 216 approved PCR changes (count after removing PCR duplicates, archived Threads, and denied PCRs)
- 38% of PCRs occurred during AIC 1
- Maneuver and Aviation PM/TCMs requested the majority of PCRs during AIC 1
- Majority of PCRs during Validation and AIC 2 were in response to Thread and SW TIRs
- High number of INTEL PCR changes during Regression due to DCGS-A replacing ASAS



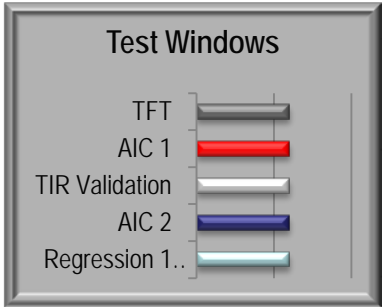
SWB 2 TIRS by Categories



- SW Error:** Software failure that was fixed with a SW patch
- Thread:** System's requirement not accurately depicted by the thread
- TIR Class Error:** A TIR that either should not have made it out of the DAG; post- score discovery issue was operator induced; or post-score discovery of an inaccurate assessment.
- Admin Thread TIR:** TIRs levied against the thread proponent to ensure thread issue is corrected.
- Requirements:** Change in requirements as directed from TCMs; for example System A received TIR for inability to display graphic from System B, and TCM determined System A did not have a requirement to display graphic from System B.
- Standards:** Conflict between two standards – for example USMTF & VMF
- Architecture:** Data product issues or missing systems from a particular echelon
- Hardware:** Hardware failures

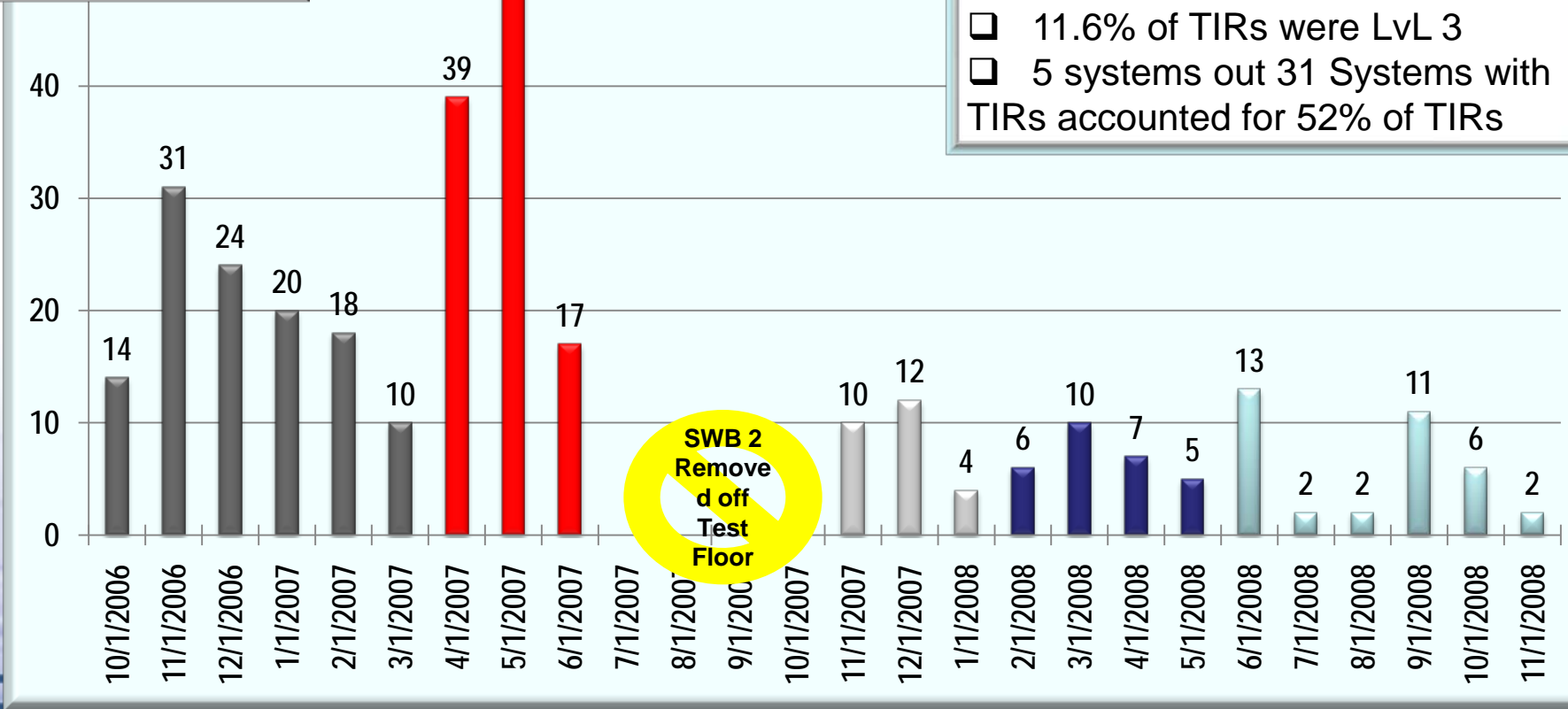


Total Level 1-3 TIRs for SWB 2



SWB 2 TIRs by Test Windows

- Total of **319** LvL 1-3 TIRs
- 6.9% of TIRs were LvL 1
- 81.5% of TIRs were LvL 2
- 11.6% of TIRs were LvL 3
- 5 systems out of 31 Systems with TIRs accounted for 52% of TIRs



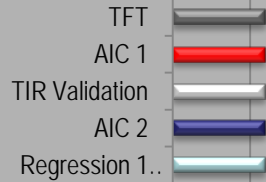
SWB 2
Removed off
Test
Floor



Unexpected Results of AIC & Regression Testing



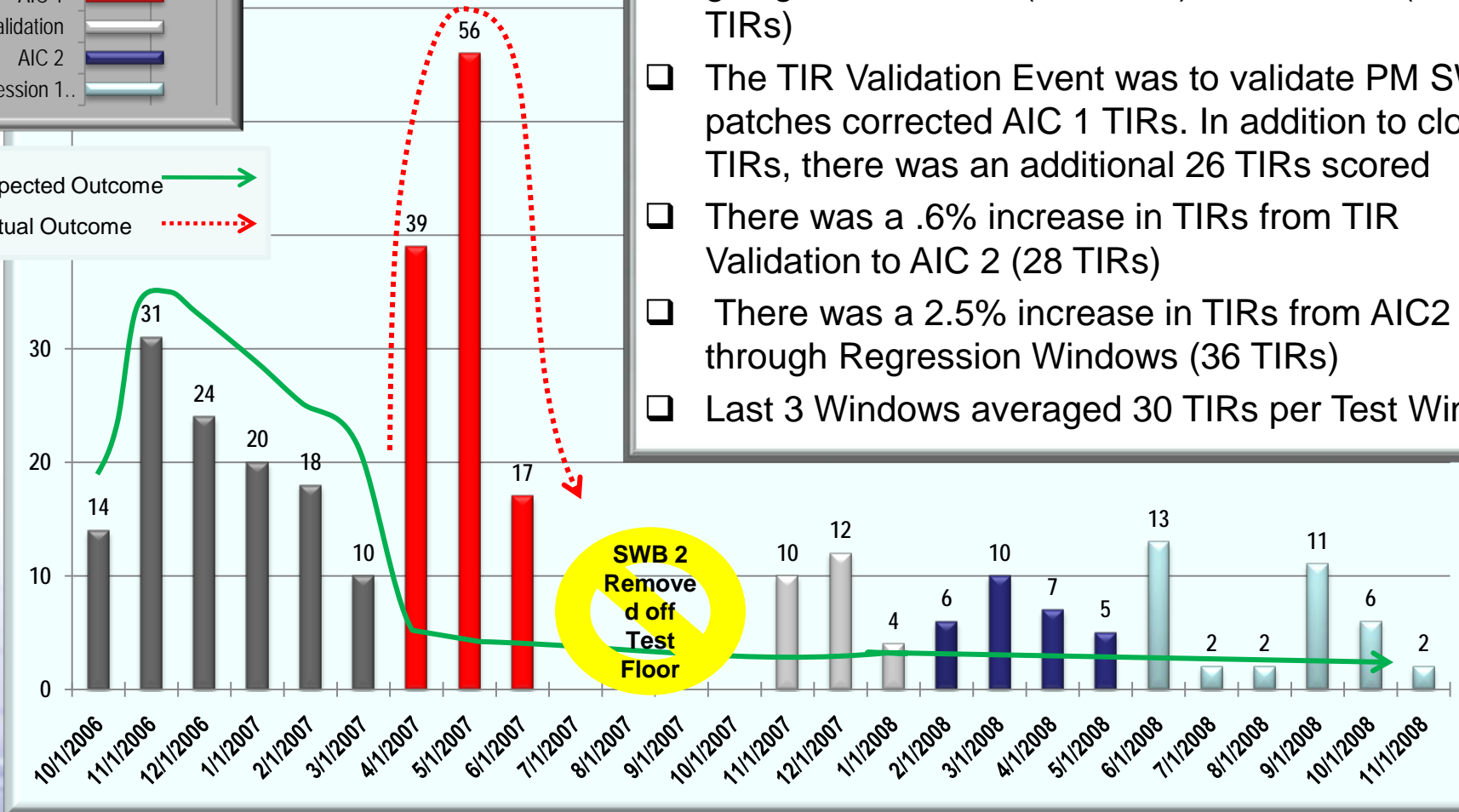
Test Windows



Expected Outcome

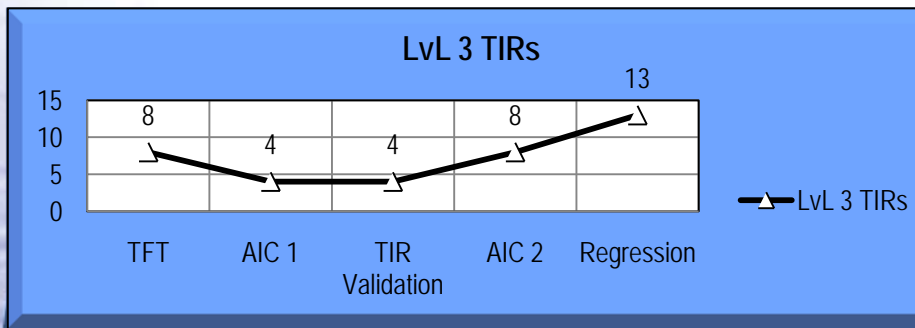
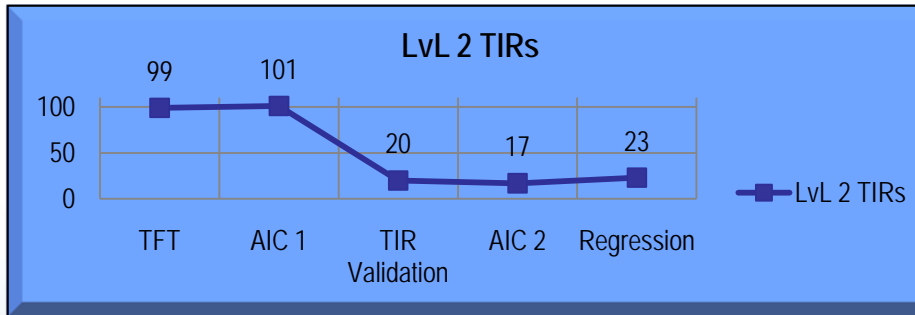
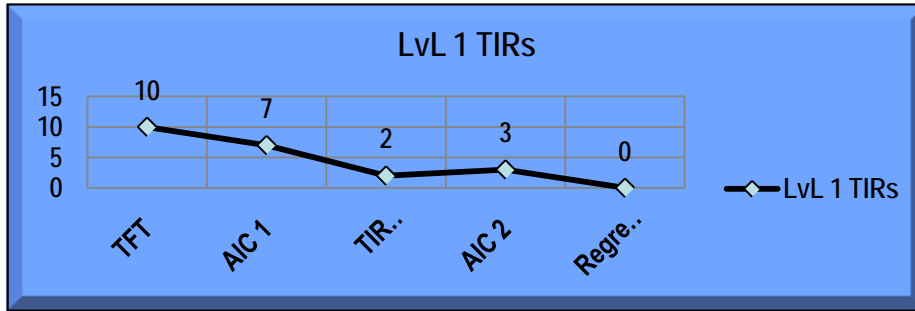
Actual Outcome

- There was a only a 1.6% decrease in LvL 1-3 TIRs going from the TFT (117 TIRs) to the AIC 1 (112 TIRs)
- The TIR Validation Event was to validate PM SW patches corrected AIC 1 TIRs. In addition to closing TIRs, there was an additional 26 TIRs scored
- There was a .6% increase in TIRs from TIR Validation to AIC 2 (28 TIRs)
- There was a 2.5% increase in TIRs from AIC2 through Regression Windows (36 TIRs)
- Last 3 Windows averaged 30 TIRs per Test Window





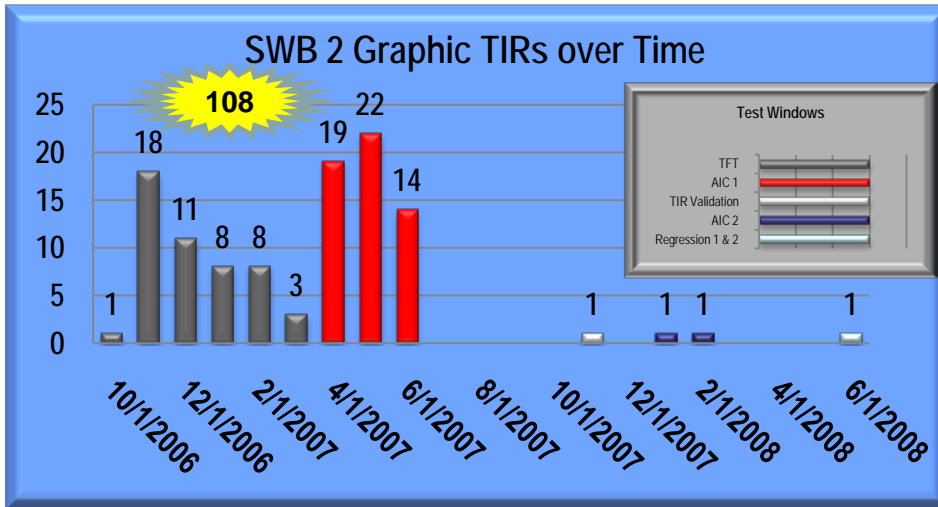
SWB 2 TIRs by Severity Level



- ❑ **10 LvL 1** TIRs during TFT were within expectations because it was first time systems evaluated within a robust integrated architecture
- ❑ **7 LvL 1** TIRs for AIC 1 not expected and resulted in inability to fully test systems' capability
- ❑ AIC 1 accounted for **39%** of all LvL 2 TIRs
- ❑ The TIR Validation window had **20** new LvL 2 TIRs
- ❑ The **17** LvL 2 TIRs from AIC 2 were corrected during Regression, but an additional **16** TIRs were scored (NOTE: 4 OOC systems first test against SWB 2 accounted for an additional 7 LvL 2 TIRs)
- ❑ LvL 3 TIRs actually increased during AIC 2 and Regression (**NOTE:** A LvL 3 TIR is a LvL 1 or 2 TIR that has been reduced to a LvL 3 with a valid Technical Bulletin.)



Graphics



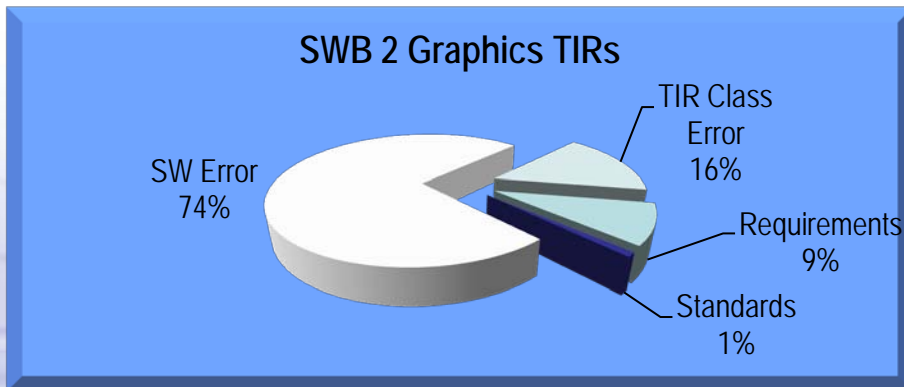
❑ **SWB2** had **108** Graphic related TIRs out of **319** TIRs

❑ Graphic Software Error TIRs accounted for **41% (80 out of 193)** of all **Software Error TIRs** for SWB 2

❑ **74%** of Graphic TIRs were **software errors (80 out of 108)** – Systems delivered software that fixed issue

❑ TIR Class Errors result of operators building incorrectly and systems configured incorrectly

❑ Graphic TIRs became a non-factor after AIC 1 window



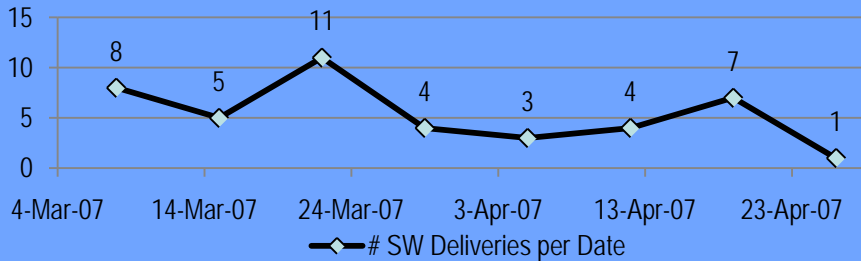
Not a new issue – SWB 1 had two Graphic Summits to work graphics



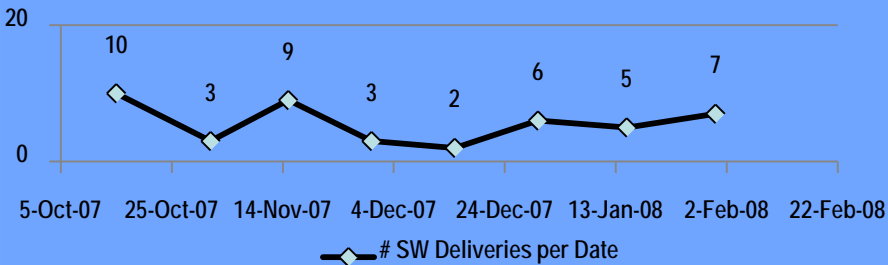
Software Deliveries



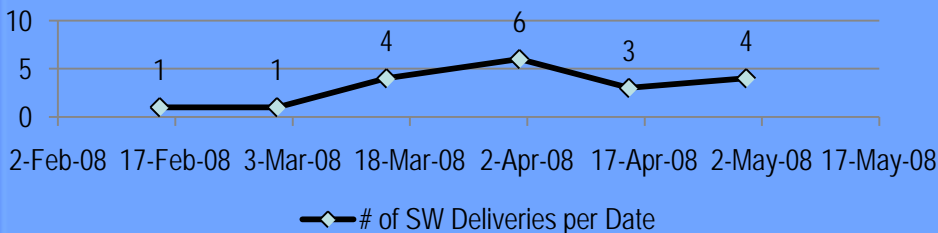
PM SW Deliveries pre-AIC 1



SW Deliveries During TIR Validation



of SW Deliveries During AIC 2



- ❑ **43 Systems** turned in software or software patches after the TFT Window through the first week of AIC 1 Window.
- ❑ **16** of those systems contributed **88 Lvl 1-3 TIRs** scored during AIC 1 Window
- ❑ Fire Support systems and Aviation systems did not participate in the TFT event. **10 Lvl 1-2 TIRs** are attributed to Aviation assets and issues with FBCB2 Operation Center (OPS CNTR) and Fire support.
- ❑ **45 software deliveries** to CTSF CM for inclusion in TIR Validation from Nov 07 thru 01 Feb 08. 12 of the SW deliveries were multiple drops from 6 systems. **7 of the systems** accounted for **23** out of the 26 TIRs
- ❑ **16 systems** delivered software during AIC 2. **6 of the systems** accounted for **17 Lvl 1-3 TIRs**

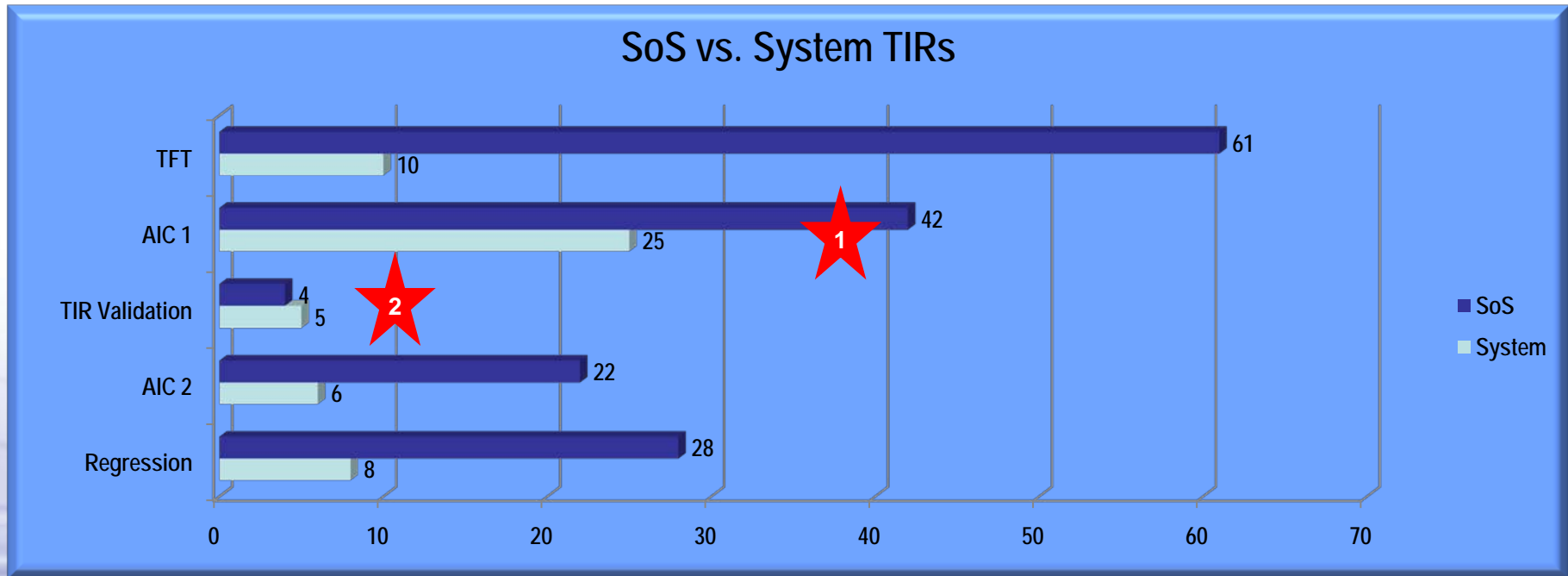
SoS Maturation is required after systems deliver software



SoS vs. System TIRs



- ❑ 74% of Lvl 1-3 Software TIRs were SoS TIRs
- ❑ 37% of Lvl 1-3 Software TIRs found in AIC 1 were System TIRs **1**
- ❑ 9 of the systems, with AIC 1 TIRs delivered SW for the TIR Validation Test and received additional TIRs. 5 out of the 9 systems had TIRs that were System TIRs **2**



SoS Events find both SoS and system errors



Summary

SoS Interoperability development is a process that is dependent upon:

- Stable Requirements
- Software Maturity
- SoS Integration Capability

Goal is a disciplined and repeatable process