



# Reliability: Managing Emerging Challenges and Risks

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# Reliability Impact on the Department of Defense



- Operations and support costs represent 60% or more of **total** weapon life cycle costs
  - Reliability drives much of that cost (maintenance and spares)
- Reliability is a common contributor to the schedule delays for our biggest weapon system programs
- 10% improvement in reliability for a major defense program can equate to billions of dollars in savings over the life cycle
- Failure puts soldiers in harms way



# Designing something that won't break when used is easy....Right?





# Five Areas Essential for Successfully Managing Challenges and Risk



- Designing reliability in up-front
- Developing contracts that promote emphasis on Reliability and Maintainability (RAM) design practices
- Leveraging data and information to the maximum extent possible
- Establishing solid reliability growth (improvement) strategies
- Linking maintenance data to product support strategies



# Designing Reliability in Up-front



- Mitigate potential sources of failure
- Quickly develop solutions for failures
- Positively impact design

Full-system Dynamics Modeling provides tremendous insights that reduce testing and eliminate failures

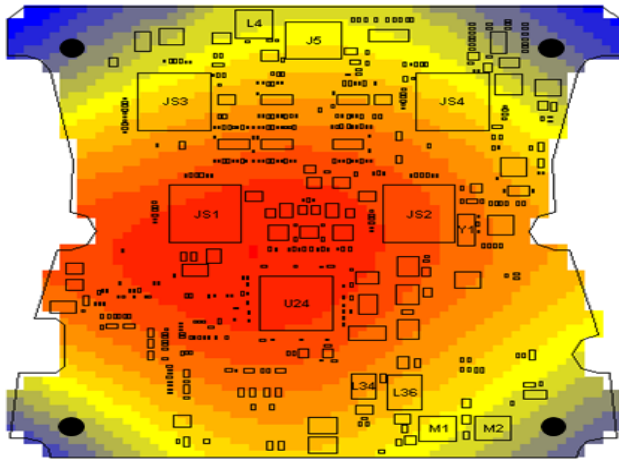


# Designing Reliability in Up-front



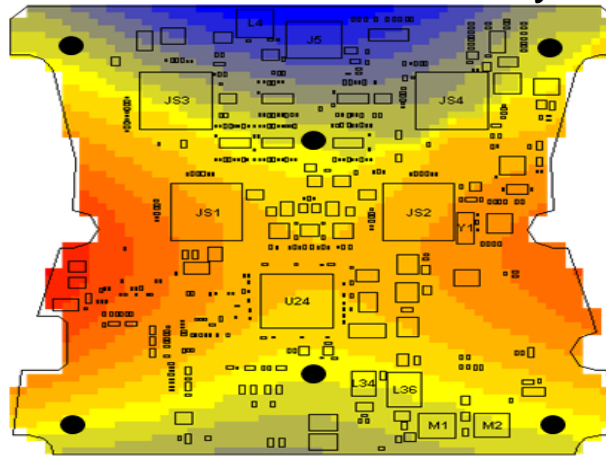
## Electronics in an Army Hand Held Device

Initial Design



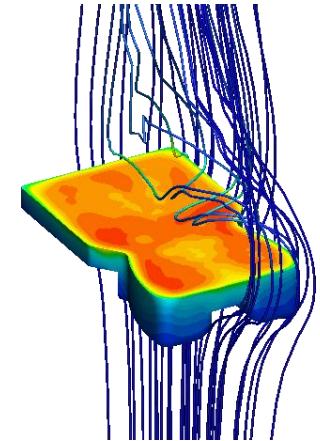
This Circuit Board Fails Due to Vibration

Design after Physics-of-Failure Vibrations Analysis



This Circuit Board Does Not (just by adding two screws)

Thermal Analysis Provided Additional Insights



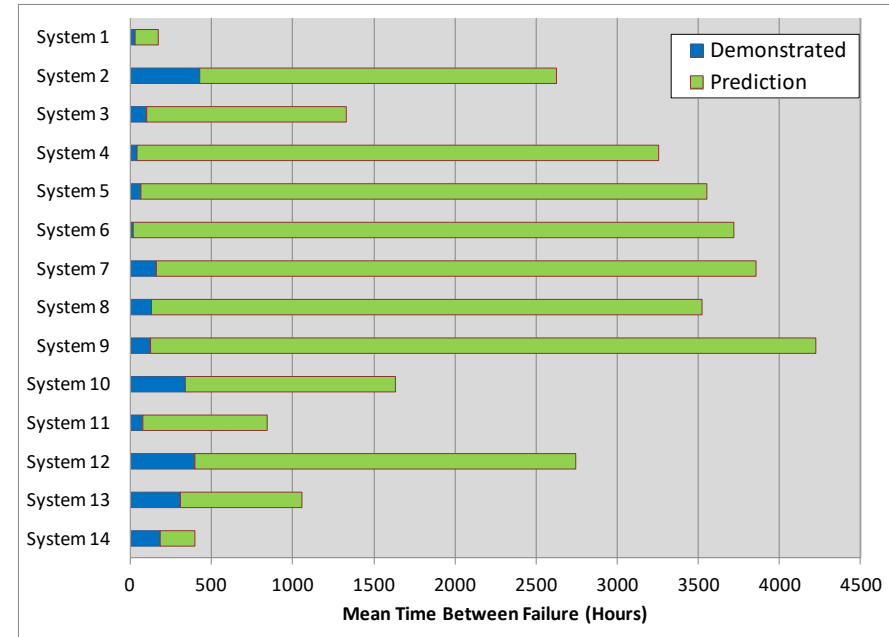
Design modification costing almost nothing changes product from being unreliable to reliable



# Developing Contracts that Promote Emphasis on RAM Design Practices



- ❑ In some cases, we contract for little more than a specification target and ask for a reliability prediction... and maybe a FMEA
- ❑ Need to incorporate language that provides focus on reliability engineering activities
  - Thermal/Vibrations/Shock analyses
  - HALT
  - Solid FRACAS linked to design changes
- ❑ Contract is the most important document for ensuring that developers have the proper incentives for applying their best reliability and design engineering teams

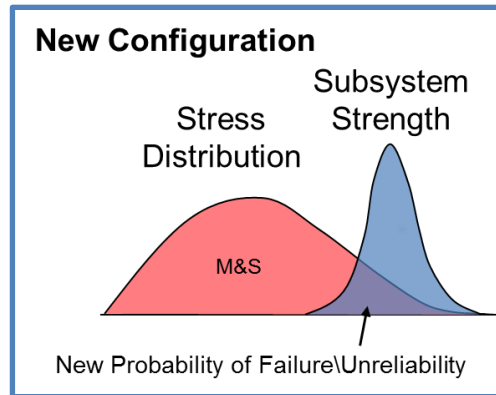
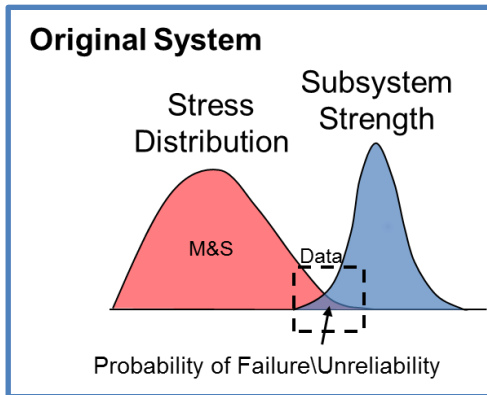
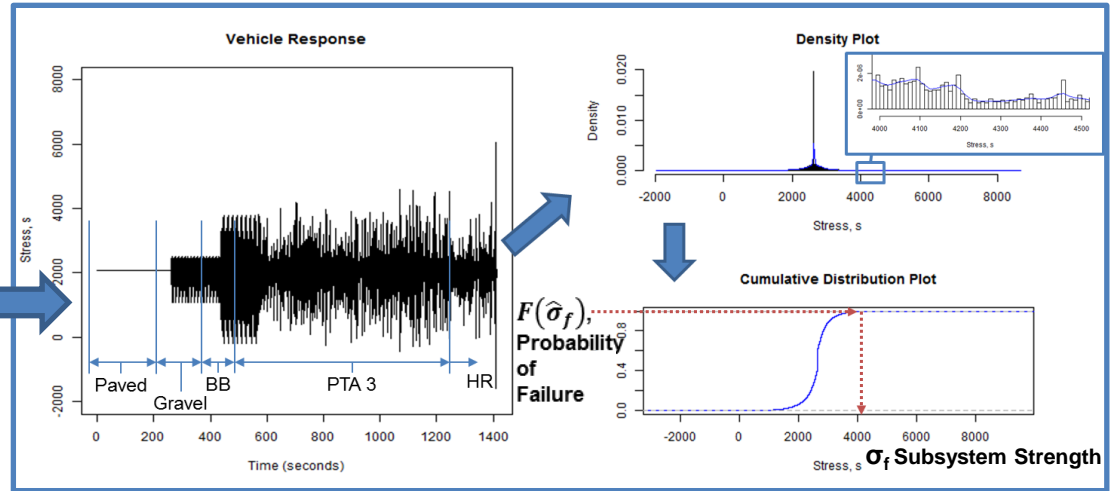
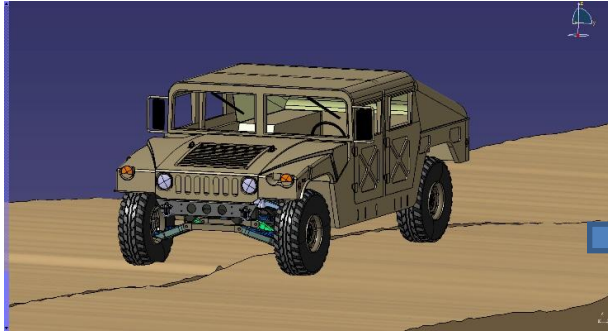


- Reliability contract language developed by AMSAA, OSD, and others
- Scorecards also available to evaluate reliability risk





# Leveraging Data and Information to the Maximum Extent Possible

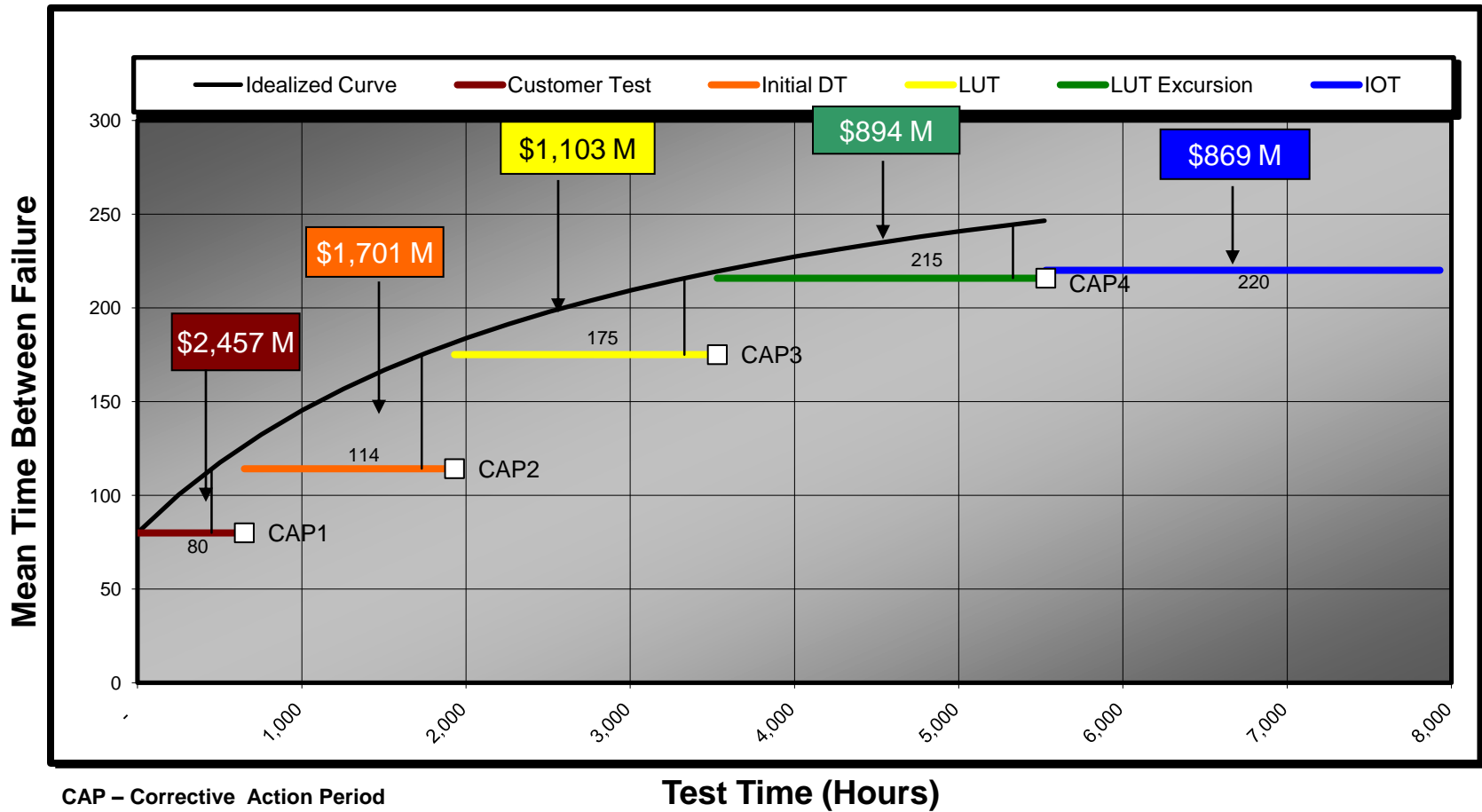


Using Physics-Based-Reliability methodology to determine impacts of weight or mission changes for ground systems

➔ Field data from existing systems combined with engineering modeling



# Reliability Growth and its Impact On Support Costs



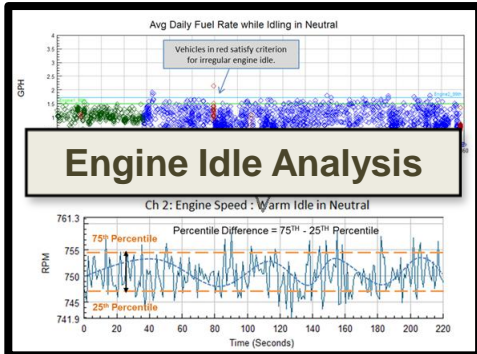
CAP – Corrective Action Period



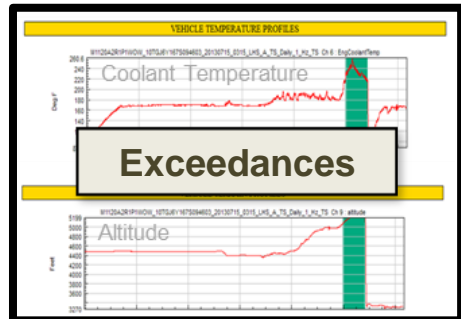
# Linking Maintenance Data to Product Support Strategies



Soldier Level Analysis	Fleet Level Analysis
Identify corrective actions	Identify systemic issues
Improve vehicle readiness & availability	Reduce scheduled services
Determine cause of incidents	Influence RAM and vehicle RESET
Inform mission planning	Improve vehicle design



**Vehicle Health Alerts**



**Health Usage Parts Reliability Availability**

**FLEET INSIGHT TOOLKIT**

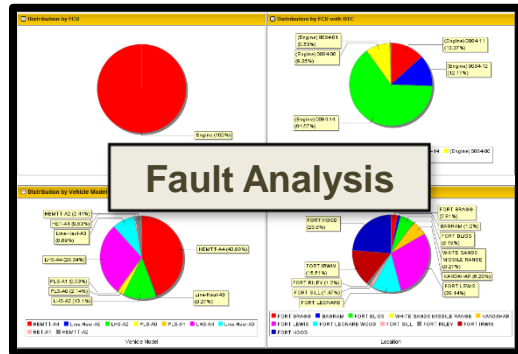
Search for a UIC, Location, Family, Bumper, or Serial Number

Active Fault Slots

**Oil Life Analysis**

TACOM CDM Pilot Program

Conclusive Change since Last Oil Change



Developing business intelligence analytics to inform reliability and readiness decisions