



*Presented to:*

**RAM VIII Training Summit**

*Effective Highly  
Accelerated Life Test:  
HALTPlus*



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***TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.***

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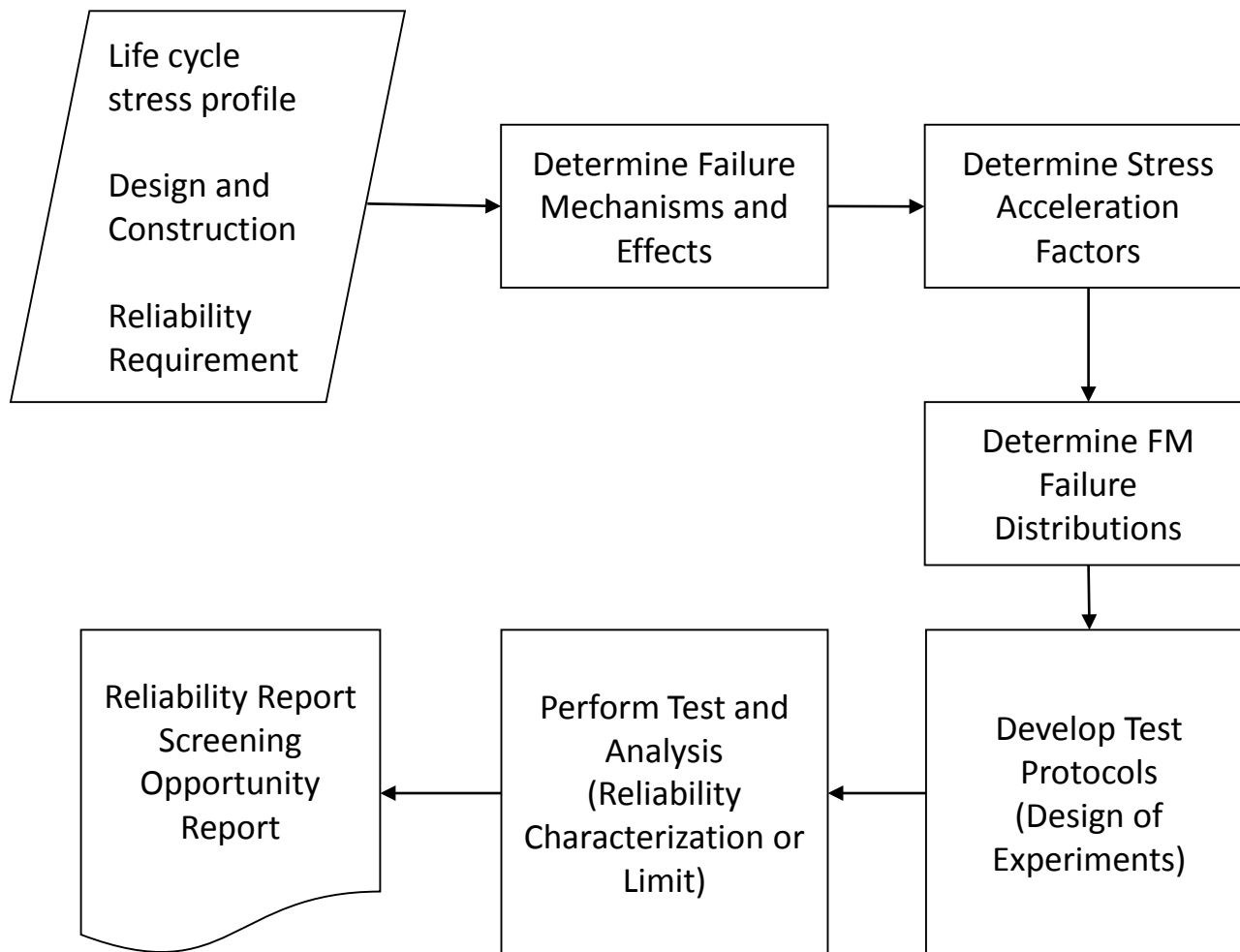
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- **Accelerated testing needed to assess and verify subsystem reliability**
  - System level testing does not provide sufficient confidence (limited samples, test conditions and test times) for required equipment life cycle
- **Typical HALT process not related to system Life**
  - Stress levels usually exceed application and specified limits
  - Irrelevant failures to application may occur
  - Test profile cannot readily be correlated to system application lifetime
  - Does not provide accurate, quantifiable, reliability assessment
- **Physics of Failure application to Life testing**
  - Understanding failure mechanisms for a particular subsystem can allow development of accelerated tests relevant to the application

**Improved HALT methodology required**

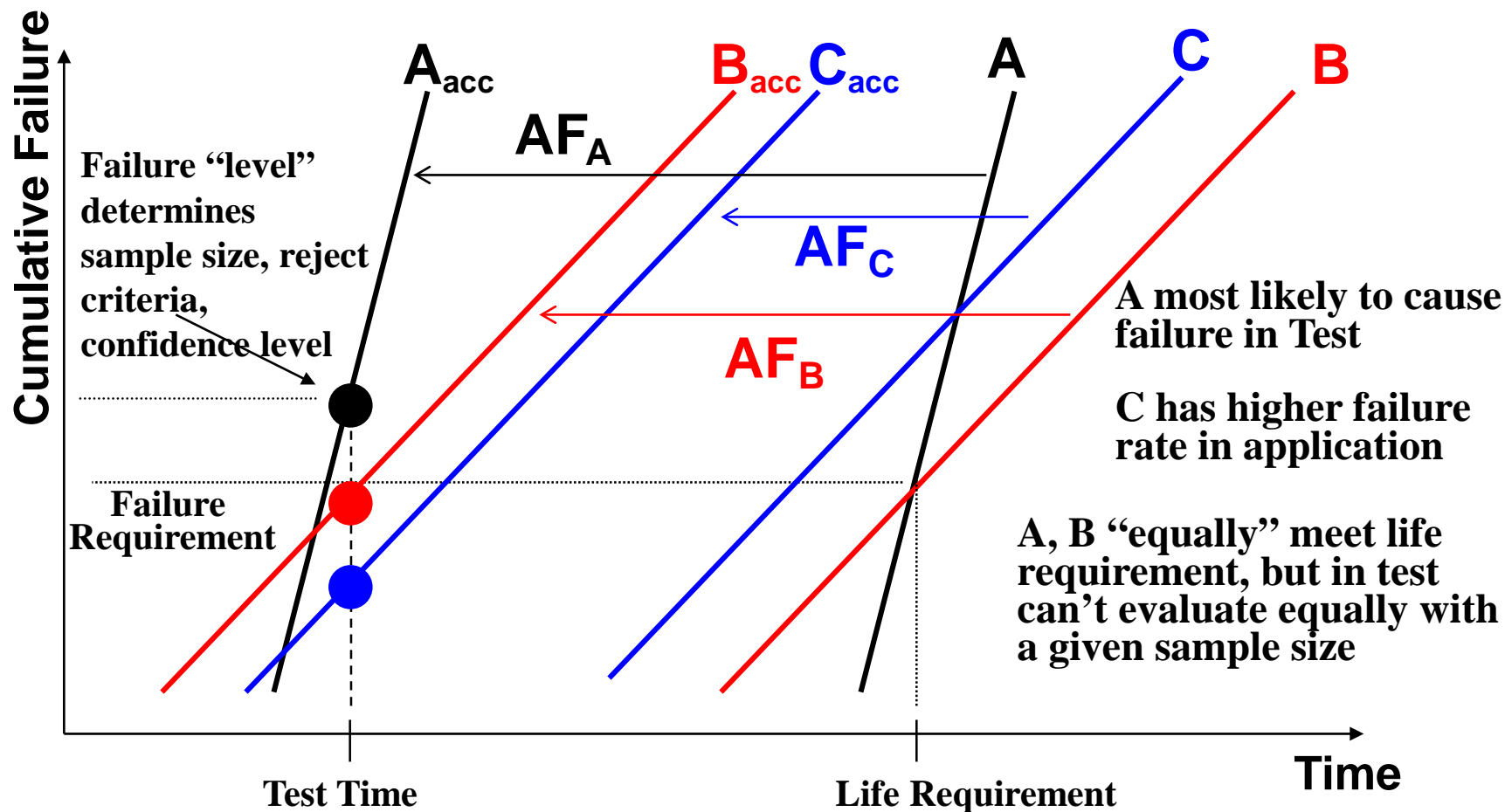


# HALT Plus Process





- **Basic approach used on Circuit Card Assemblies for >15 years**
  - **Address Plastic Encapsulated Microcircuit and Solder Joint reliability**
  - **Can apply to other assemblies**
- **Identifies the need for sequential/simultaneous environments**
  - **Synergistic effects among environments**
  - **Simultaneous environments difficult to apply and model, but often preferred to address life cycle stresses**
    - **Temperature/humidity and temperature/vibration common simultaneous stress**
  - **Power cycles important effect to include**
- **Accelerated testing difficult to apply at high assembly levels due to competing failure mechanisms with different acceleration factors**





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