

PHM

Prognostics Health Management

Naval Air Vehicle

Lessons Learned

NAS Patuxent River
AIR 4.4.2.2 Diagnostics

PHM Society Conference
Portland, Oregon
14 October 2010



Requirements Evolution

- HMX-1 H-60 mishap was the genesis for IMDS
 - Led the White House requirements memo September 1993
 - System must be proven on fleet rotary wing prior to deployment on VH aircraft
- Mission Needs Statement approved, June 1994
- VCNO memo identified PMA-261/H-53E IMDS as Lead-The-Fleet (LTF) platform, April 1995
- Operational Requirements Document signed, May 2000



Outfitted Aircraft

- UAV
 - MQ-8B (Fire scout)
 - MQ-4C (BAMS)
 - X-47B (UCAS)
- Rotary Wing
 - H-1Y/Z
 - CH-46E
 - C/MH-53E
 - CH-53K
 - MH-60R/S
- Fixed Wing / STOVL
 - E-2D
 - F-18E/F
 - F-35 (JSF)
 - MV-22
 - P-8

Virtually every aircraft in the Naval inventory has some form of a PHM system



Day In The Life

- Use Case Scenarios
- Operational Environment
- Requirements Interpretation

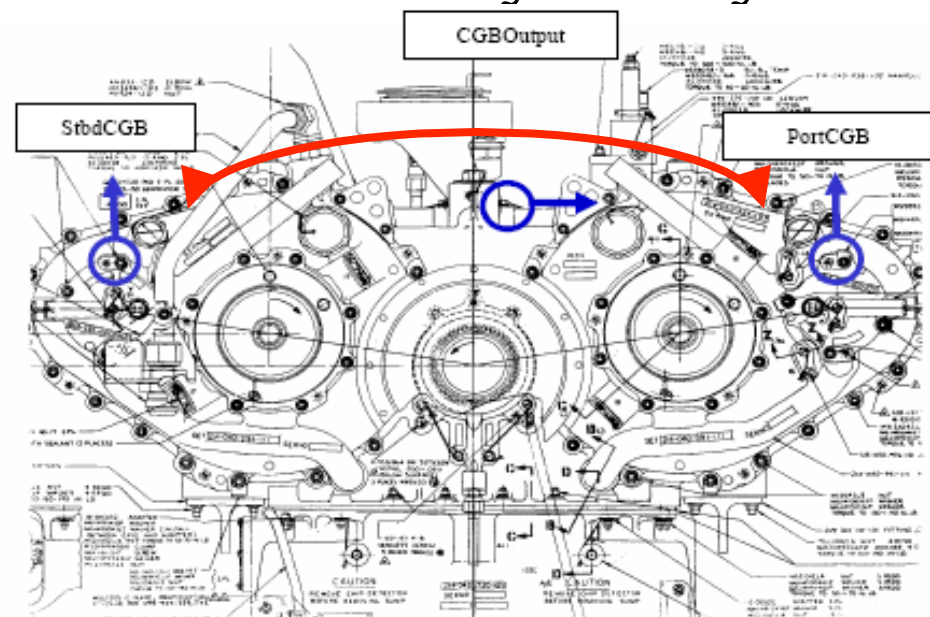


Validation / Verification

- RDT&E vs. O/S Dollars
- Limited Testing Opportunities
- Failure Modes and Effects Criticality Analysis

Example:

Wiring to the sensors was crossed. System level check was not sufficient to properly detect this scenario.

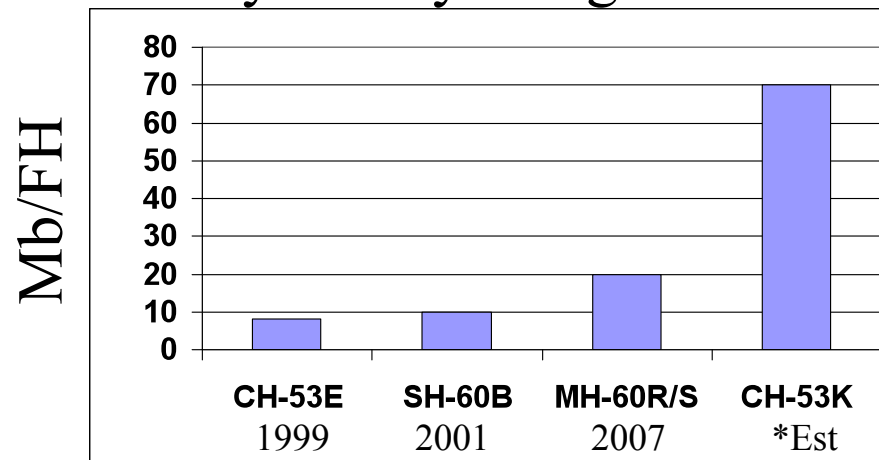


Data Storage and Retrieval

- Amount of Online Data
- Archival and Retrieval Procedures
- Data Lockout

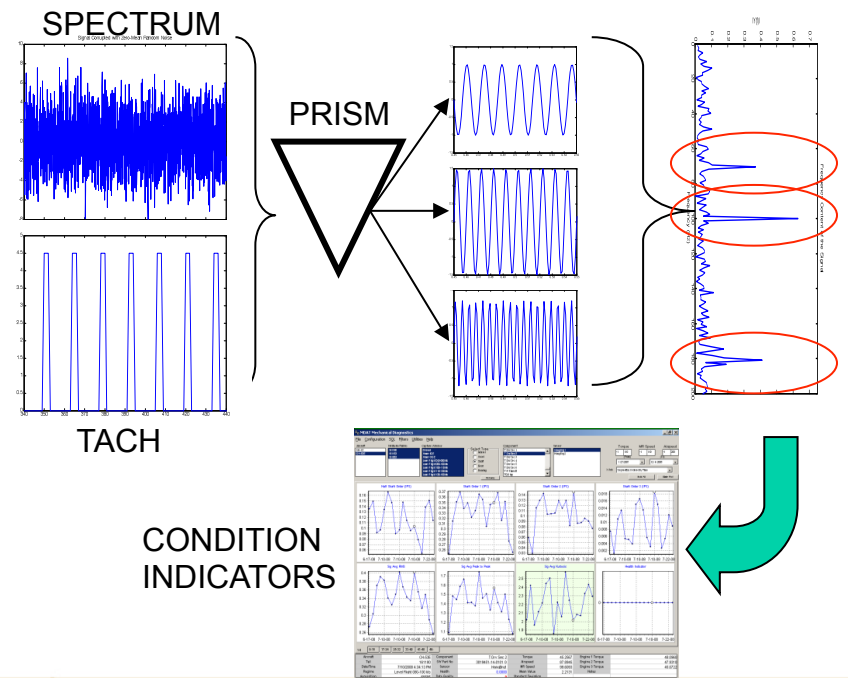
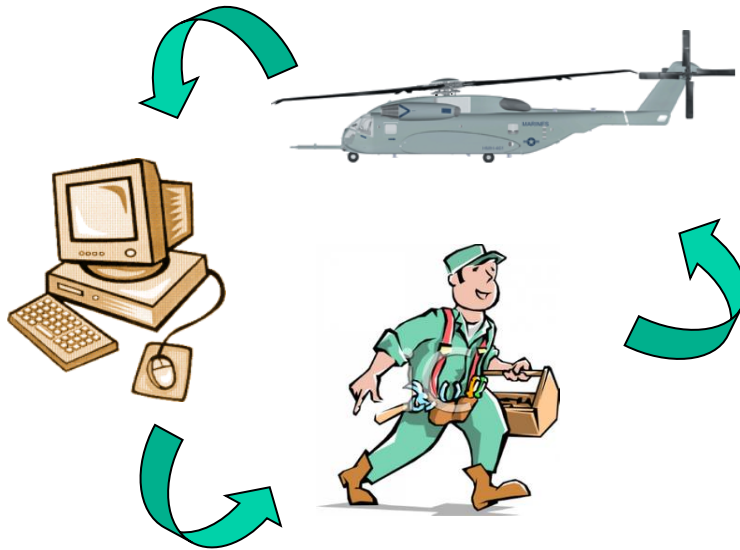


Data Rate of PHM Equipped
Navy Rotary Wing Aircraft



Transitioning to CBM

- Dynamic Thresholding
- Maintenance Credits
- Actionable Maintenance



Engine S&T Projects

- Prognostics Diagnostic Based Maintenance
- Fault Detection Hybrid Ceramic Bearings
- Advanced Sensor Applications
- Light Weight Bleed Flow Sensor



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