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Air Combat Electronics

Avionics Users' Conference 2010

*Tutorial for  
Common Multi-Purpose Aircraft  
Information Recording System  
(CMPAIRS)  
for the  
PMA209  
Users' Conference*

**Ms. Karen Nelson-Gass, PMA209**

**IPTL, Common Aircraft Recorder Technology (CART) Team**

**Safety & Flight Operations**

**[Karen.Nelson-Gass@navy.mil](mailto:Karen.Nelson-Gass@navy.mil)**

**301-757-6721**

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# Bottom Line Up Front (BLUF)



- There are COTS “80% solutions” that support a single capability
  - The 20% of requirements (required) not addressed are the hard issues with significant Life Cycle Cost (LCC) impacts that are required
    - ◆ Security – Anti-Tampering/Encryption/Red-Black separation
    - ◆ Obsolescence – some COTS items still using obsolete parts
    - ◆ Multiple unique HW/SW interfaces to Joint Mission Planning System (JMPS), Optimized Organizational Maintenance Activity (OOMA)/Automated Maintenance Environment (AME), playback stations
  - PMA209 recommended development of a common modular Family of Systems (FOS)
    - ◆ Lower NRE by avoiding multiple one each solutions to security, obsolescence, and off-board integration
    - ◆ Lower recurring cost due to larger procurement quantities

***Evaluation of the 80% solution – Cheap Today Trouble Tomorrow...***



# Data is just data...or is it?



- Not all data is digital
  - Analog video and sensor data
  - Requires conversion and/or compression for compatibility
- Not all data is on a network or the same network
  - 1553, Ethernet, Fibre Channel
  - Video output, accelerometers and other discretes
    - ◆ Requires multiple/unique I/O connectors or multiplexer
- Not all data is standard
  - Software differences
    - ◆ Different and/or proprietary formats, transports and file systems
  - Hardware differences
    - ◆ Different Form Factors, power, wiring, connectors
- Not all data is meant to be seen
  - Red/Black separation
  - Encryption





# Current State of Data



## ■ Major categories of avionics storage devices

- Cockpit Data Loader (CDL) – AN/ASQ-215, AMU, DMD
  - ◆ Small form factor
  - ◆ Conduction cooled (low power requirement)
  - ◆ PCMCIA based loaders
- Video Recorder
  - ◆ Multiple analog I/O interfaces (RS170 etc.)
- Embedded Storage/Mass Memory
  - ◆ 1553 (slow) or unique high speed interface to CDL/Memory Loader Verifier Set (MLVS)
  - ◆ Legacy Mass Memory insufficient
  - ◆ Incapable of Digital Terrain Elevation Data (DTED) Level II
- Crash Survivable
  - ◆ Typically located aft and requires pinger
  - ◆ Unique I/O requirements and/or multiplexer
  - ◆ Very unique environmental requirements





# Current State of Recorders



## Multiple fielded solutions for similar capabilities



DRS DFIRS  
F/A-18C/D/E/F, EA-18G



GE Aviation 3246 CSMU  
V-22



Enertec VS-1500  
AH-1W



DRS EADS  
VH-71A



IVHMS-VHMU  
MH-60R/S



L-3 Sarasota FA 2100, FA  
1000  
P-8A, KC-130J, C-9B, C-12,  
C-20,  
C-26, C-35, C-37, C-40



GE Aviation 3253 VADR  
C-2A, C-130T, F/A-18C/D, VH-3D, VH-60N



L-3 Electroynamics SRVIVR  
F-35



# Current State of Data Loaders



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- F/A-18C/D
- F/A-18E/F
- AV-8B
- UH-1Y/AH-1Z

**TAMMAC  
Advanced Memory  
Unit (AMU)**



**Digital Memory  
Device (DMD)**

- F/A-18E/F lot 26 and up
- EA-18G



**Interface  
Receptacle Unit  
(IRU)**



**Data Transfer  
Module (DTM)**



**PCMCIA Data  
Transfer Module  
(PDTM)**

- AH-1W, UH-1N
- C-130T, KC-130F, KC-130J, KC-130R, KC-130T
- C-2\*, E-2C\*, E-2D
- CH-46E\*, CH-53\*, CH-53D\*, CH-53E\*, MH-53E
- EA-6B
- F/A-18A
- H-3 (UH-3H)
- HH-60H, SH-60F
- MV-22B
- P-3C\*, EP-3E\*, NP-3C, NP-3D
- S-3B
- T-45C

**ASQ-215/Digital Data Set (DDS)**





# Common Capability Vision



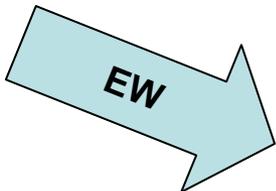
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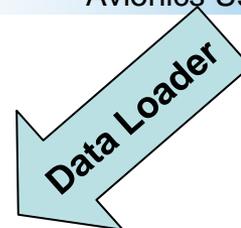
CFIT



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EW



Data Loader

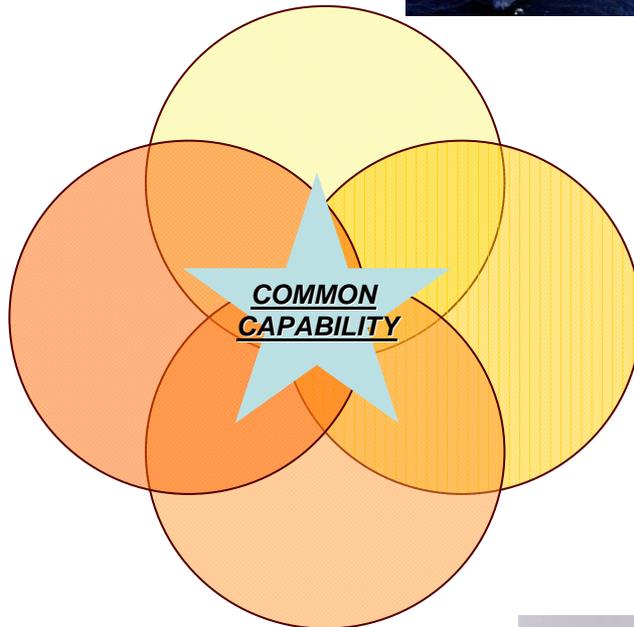


Encryption

MFOQA



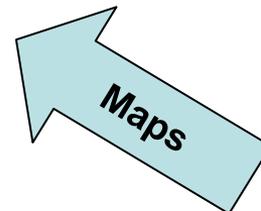
Mass Storage



CSR



Voice/Video



Maps

ACAS





# Common Recorder/Loader Concept



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- Exponential growth of digital data on aircraft and significant growth in use/re-use of recorded data and derived analysis results in the need for **higher volume, faster download, lower total ownership cost, and reduced logistics footprint**
- Extensible, functional requirements: mission recorder, crash survivability, data loader, digital video recorder, MFOQA support, maintenance diagnostics, and encryption of recorded data
- A common, Family of System (FOS) utilizing a Modular Open System Approach (MOSA) of high capacity recorders **combining independent capabilities** into a multifunctional solution for cost savings, ease of integration, decreased logistics footprint, and reduced life cycle costs
- Serve as a ready replacement for legacy recorders that go out of production, become obsolete/unsupportable, or require upgrade of operational capability
- Use of a mature, fielded, well-defined inter-service software standard to allow for non-proprietary use and development of third-party software packages

***Common does not mean Identical***

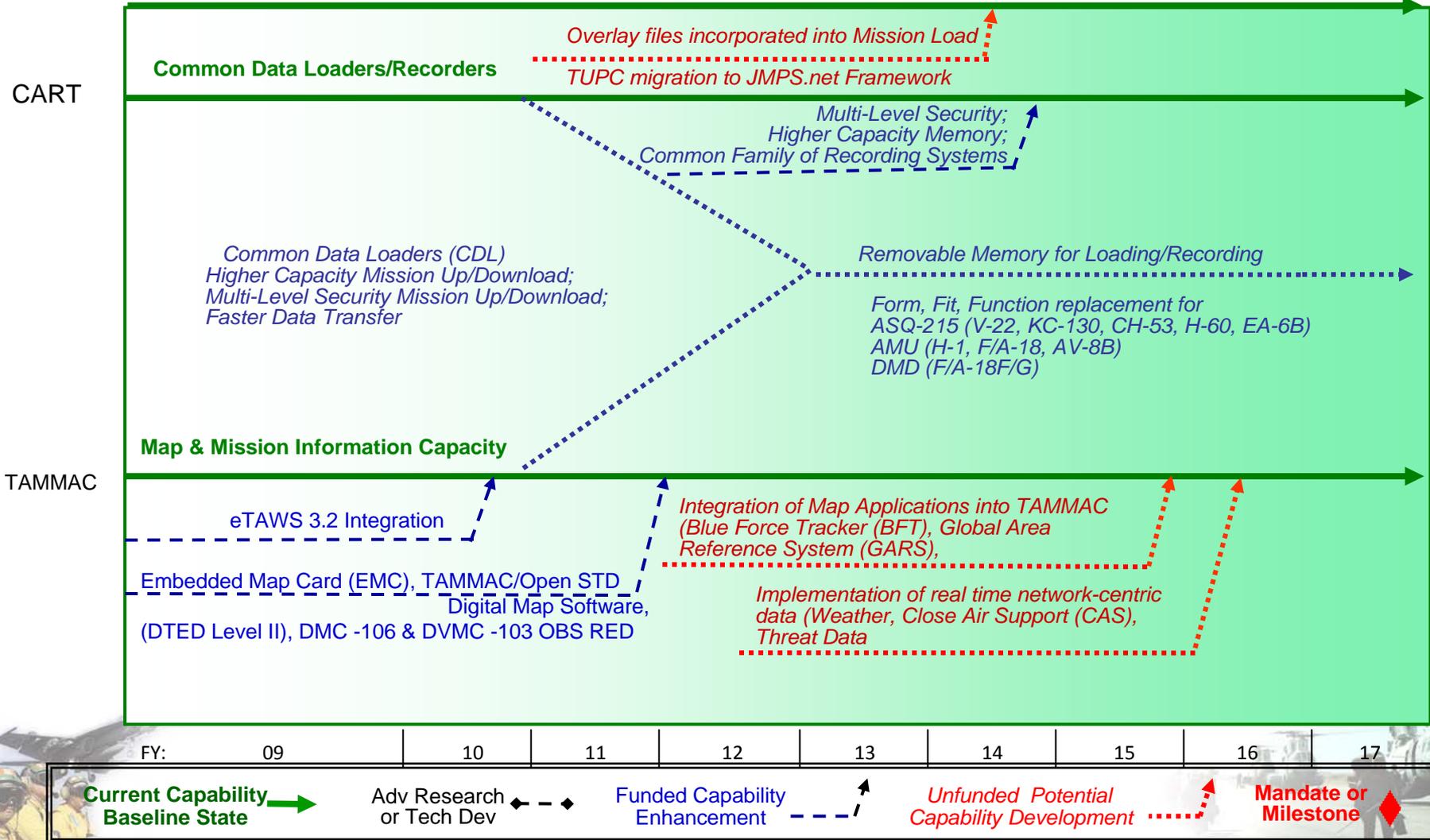


# Core Avionics Roadmap



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# Coordination / Planning Efforts



- December 08: Common Avionics Enabler Navy Aviation Requirement Group (NARG) in New Orleans initiated the requirement/need for recorders with multiple capabilities
- December 08: Initial release of OPNAVINST 13210.1A.
- Held discussions with NAVAIR Program Offices, Armed Services, and other DoD organizations to identify documented requirements and needs
  - February 09: Briefed NAVAIR Avionics Special Project Engineers (APSE); representing ten platforms; indicated interest in PMA209 pursuit to a Common Data Loader/Recorder FOS – Continued meeting with interested platforms collecting requirement through September 09
  - March 09: Met with Air Force, Navy, Coast Guard, and Army to discuss Flight Data Recorder and classified Data at Rest requirements
  - April 2009: Met with civilian and military representatives at the USAF 846/TSS Test Squadron to gain insight into Inter-Range Instrumentation Group (IRIG) 106 Chapter 10 standard



# Coordination / Planning Efforts (continued)



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- April 09: Submitted Request For Information (RFI) N00019-09-P7-ZD217
- February, May, October 09: Briefed Joint Service Review Committee (JSRC)
- September 09: Formal Release of OPNAVINST 13210.1A
- September 09: Assisted with establishment of JSRC common recorder working group
- October 09: Submitted POM12 Issue Sheet
- November 09: Common Recorder/Loader briefed at the Common Avionics Enabler NARG in New Orleans

***Planning efforts continue as we prepare our Program Plan***



# Summary



- A one size fits all solution is highly unlikely
  - Create a family of data devices with standard form factors and tailorable I/O to support multiple platforms with minimal impact
- Address common issues with a common solution set
  - Solve Declass/Encryption/Anti-Tamper (AT) once
  - Apply more efficient data CONOPS
    - ◆ Common and open data standards
      - Legacy 1553 support and non-proprietary Fibre Channel (FC) and Ethernet
      - Standard/Open interface to JMPS, OOMA/AME, playback
    - ◆ Provide flexibility in number of removable media and what is stored on each device to meet/improve CONOPS
  - Create “memory tolerant” designs
    - ◆ Network File Server (NFS)/Network Attached Storage (NAS) or similar
      - Isolate memory obsolescence to removable media
      - Allows for easier memory replacement
        - Easily expand memory capacity
        - Address frequent memory obsolescence





# POC Information



- Full Brief will be provided with a Notional Concept of CMPAIRS being held on Thursday, 11 March at 14:00 in S/L Grand Expo Hall A
- Available to meet/greet/discuss with any fleet representative this week on CMPAIRS.
  
- Bill Wescoe, CAP SFO – [William.Wescoe@Navy.Mil](mailto:William.Wescoe@Navy.Mil) – 301-757-6773
- Karen Nelson-Gass, CART IPTL – [Karen.Nelson-Gass@Navy.Mil](mailto:Karen.Nelson-Gass@Navy.Mil) – 301-757-6721
- Kelly Davis – TAMMAC DIPTL – [Kelly.A.Davis@Navy.Mil](mailto:Kelly.A.Davis@Navy.Mil) – 301-757-9443
- Jeanette Aley – CART DAPML – [Jeanette.Aley@Navy.Mil](mailto:Jeanette.Aley@Navy.Mil) – 301-342-3624

