



Joint Technology Exchange Group (JTEG) CBM+ Enablers

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Final

Presented to: JTEG

Presented by:

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AIR 6.7.1.6

RCM / CBM+ Branch Manager



R&M, RCM, CBM(+), MX Planning

Definitions, Products, and Interdependencies

R&M

Life cycle systems engineering process to evaluate the inherent performance degraders of a product and pinpoint potential areas for improvement. Material and / or Non- Material solutions to improve product readiness.

PRODUCTS – E.G. - FMECAs, FRACAS, Reliability Growth Modeling, Testability Analysis.

RCM

The analytical process used to determine appropriate failure management strategies, including PM requirements and other actions, to ensure safe operation and cost-wise readiness.

PRODUCTS – E.G. - MRC Decks, PMICs, Depot Spec, utilization of CBM Technology (sensors, strain gauges, etc.) Program Plan, Functional Block Diagrams and Breakdowns.

CBM

Integrates RCM & is an established approach to identify and schedule MX tasks. Employs CBM Technology (onboard/offboard systems and other technology, sensors, strain gauges, accelerometers, IVHM, BIT, other technology to assess the condition of an A/C system / component. The ability to perform MX 'based on evidence of need'.

PRODUCTS – E.G. - Data for trending, failure code identification, system performance degradation indicating MX is necessary, and the start Predictive MX opportunities.

CBM+

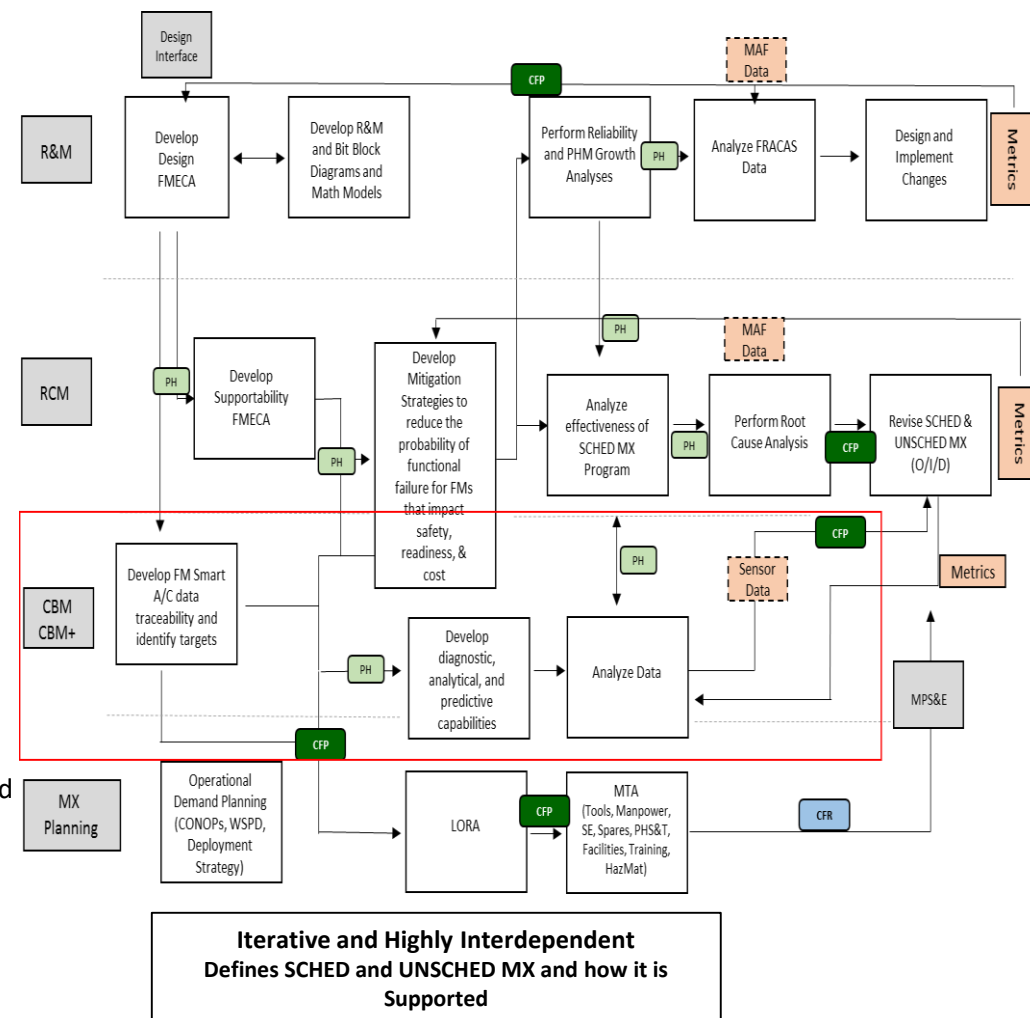
The 'plus' in CBM+ expands CBM to include MX technologies, processes, and **enablers** not necessarily included in current MX programs (leveraging enhanced analyses methods for MX applications, enhanced prognostics, enhanced BIT, other technologies and opportunities that reduce MMHs).

PRODUCTS- E.G. - Enterprise capabilities that drive CBM+ efficiencies

MX Planning

MX Planning establishes MX Concepts and requirements for the life of the system. It includes but is not limited to; level of repair, repair times, testability requirements, SE, Manpower, skills, facilities, etc. MX Planning has great impact on the planning, development and acquisition of other logistics support elements.

PRODUCTS- E.G. – LORAs, SE, Training, Facilities, etc.



FMs – Failure Modes
FMECA – Failure Modes Effects and Criticality Analysis
FRACAS – Failure Reporting Analysis and Correcting Action
LORA – Level of Repair Analysis
MPS&E – Maintenance Planning, Scheduling and Execution
MTA – Maintenance Task Analysis

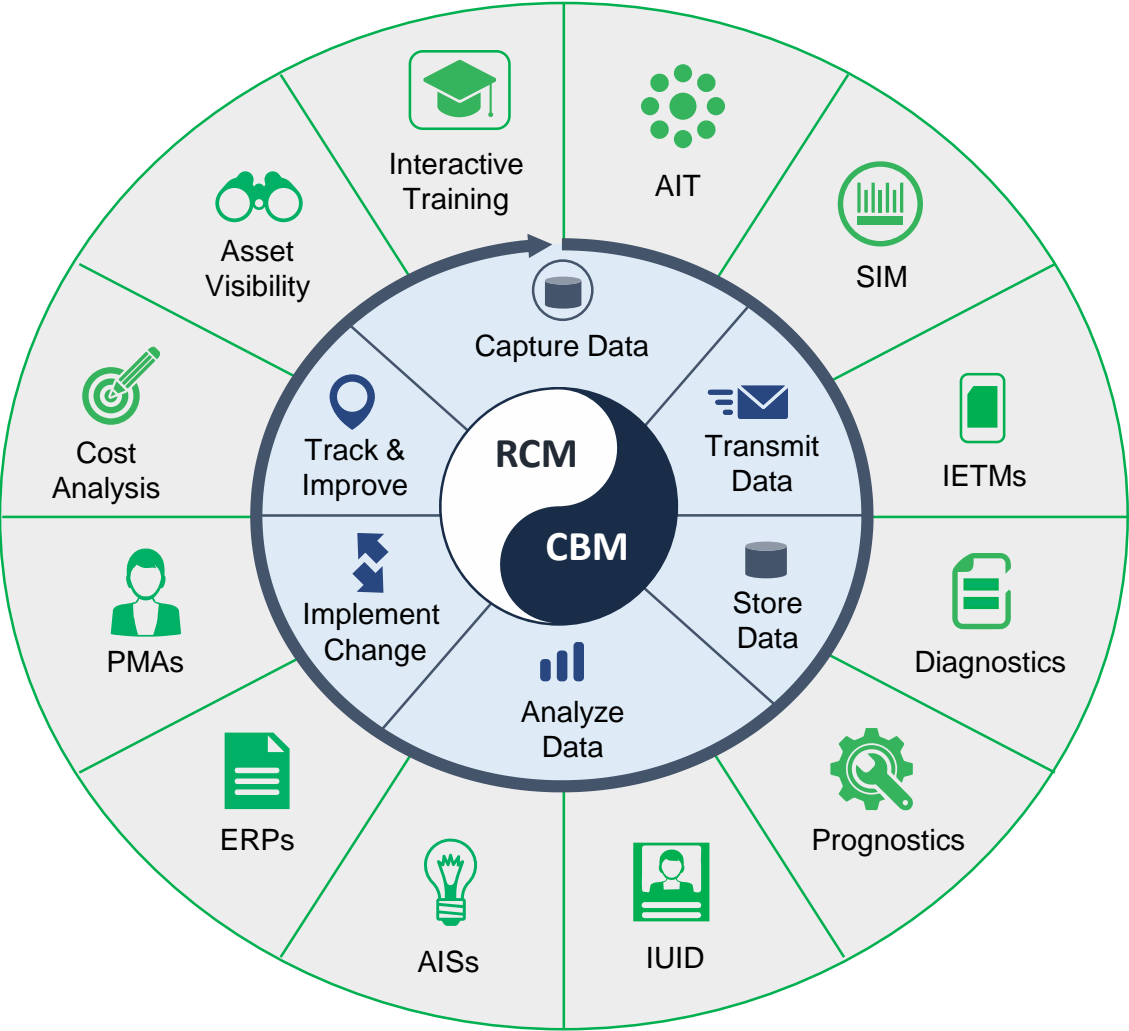
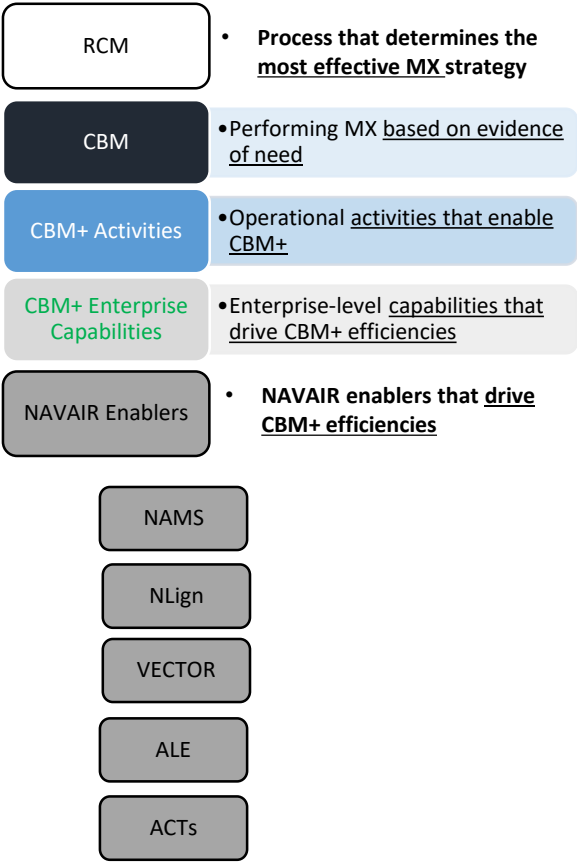
Primary Handoffs

Critical Fleet Products

Critical to Fleet Readiness



CBM+ Enablers





Naval Aviation Maintenance System (NAMS)

Background:

- Naval Aviation Maintenance System (NAMS)
- Replaces Optimized O-Level Maintenance Application (OOMA) in 2022
- OOMA is the current O / I level maintenance system of record used to document maintenance
- Fleet data, via OOMA, is provided to NAVAIR consumers primarily through DECKPLATE or VECTOR for various analyses tasks
- To improve the value to the data --- data cleansing is required

Status:

- Validate what RCM and CBM+ requirements have been included in the planned release for NAMS
- NAMS planned fleet release in 2021

Description/Additional Information:

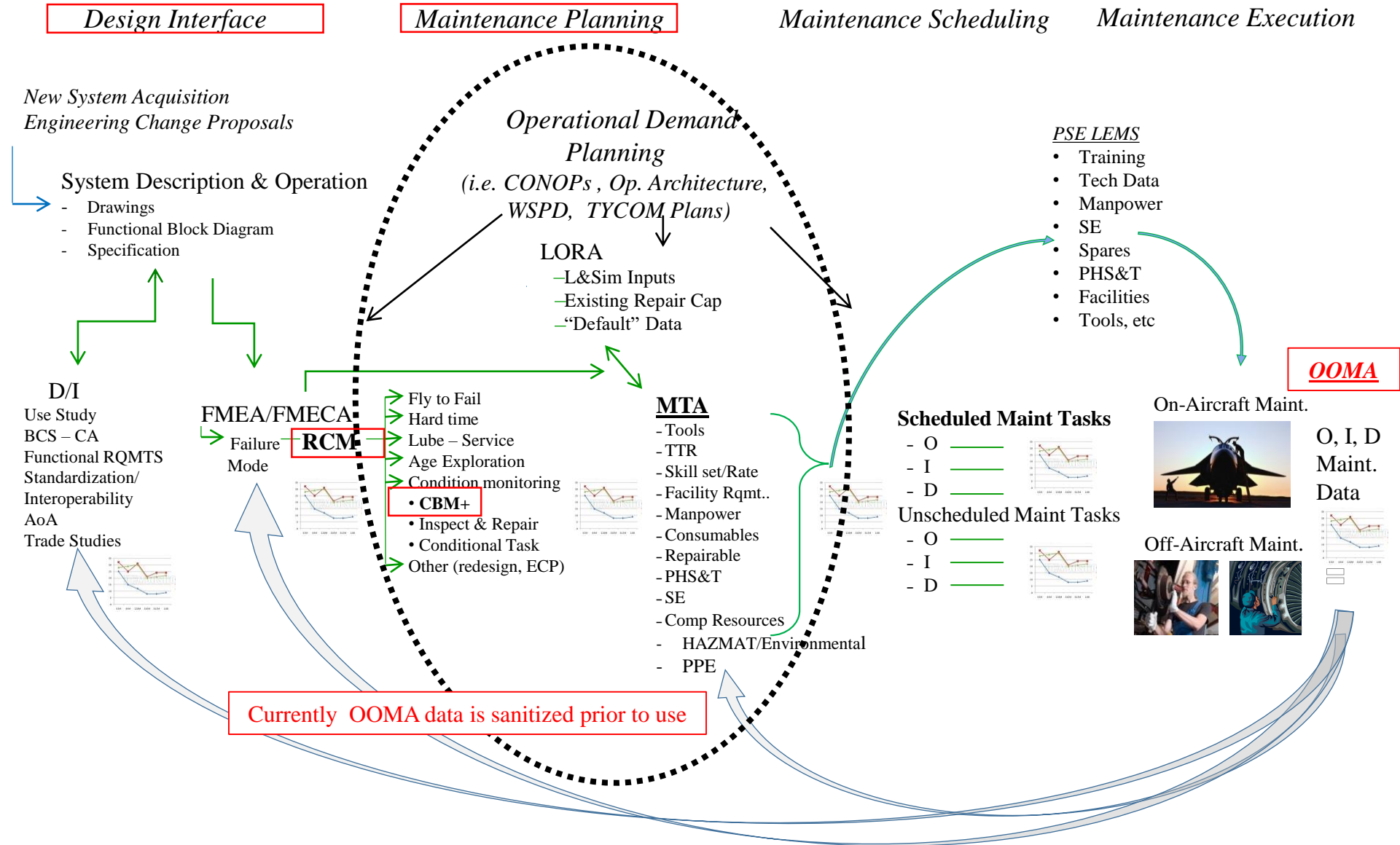
- OOMA provides maintenance records which is used in support of RCM and CBM+ analyses.
 - Remove/replace
 - Maintainer narratives
 - Squadron and BUNO ID information
 - Etc...
- Data is analyzed by itself or in conjunction with other data (onboard and off-board systems) to provide a more complete representation of fleet operations highlighted in demand signals
- RCM and CBM+ requirements will be added to the NAMS requirements based on lessons learned from OOMA and corporate knowledge for required data and insights

Way Forward/Challenges / Help Needed/Risks:

- Confirm all RCM / CBM+ requirements are in NAMS functional document and architectures
- Understand implementation and transition schedule and plan to assist in potential gaps in business processes
- With any new system, transition and support plan is critical to supporting and validating customer requirements



Life-Cycle Maintenance Planning, Scheduling & Execution





NLign

Background:

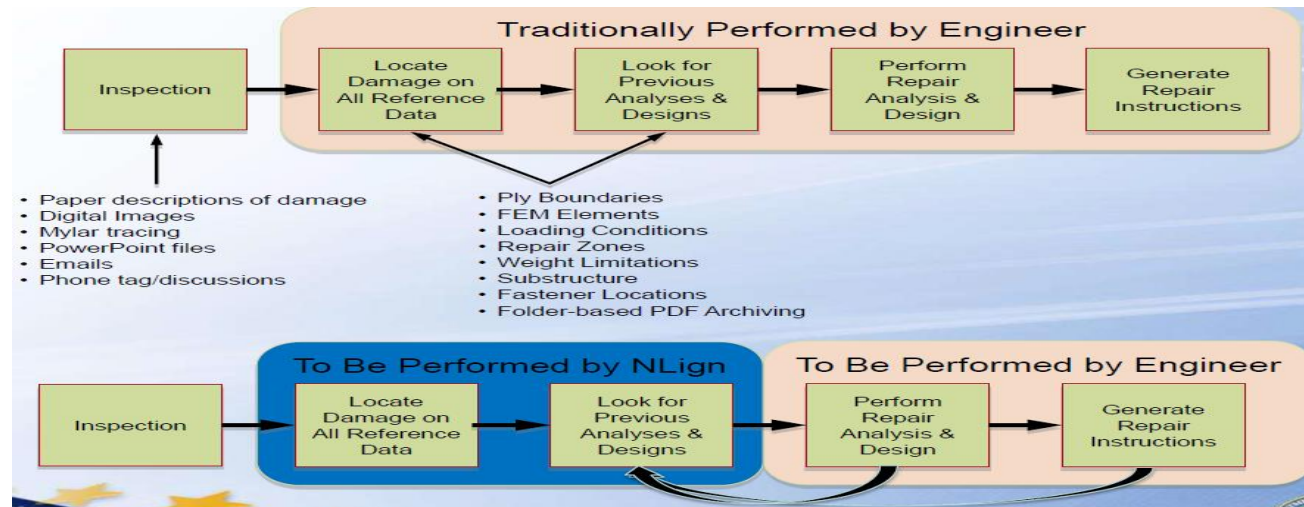
- When an A/C enters depot, traditional A/C damage reporting & mapping is done on standard hard copy forms
- These forms are either scanned into a database or the electronic form was completed
- Hard copy drawings are required when X-Y-Z coordinate mapping the repairs
- In each case, repairs on the same A/C or similar repairs across multiple BUNOs required significant investment of time for an engineer to pull the data and/or perform the NDI
- In addition, data may reside at multiple locations with various engineers reviewing, document, and approving repair dispositions
- NLign allows these analyses to be completed electronically (with CAD models) and stored for historical reference

Status:

- Pilot NLign in the NAVAIR closed-loop environment for enterprise integrated evaluation
- Rough Order of Magnitude received from Entegent for NLign – good until 15NOV18
- Coordinated with Entegent (company) in August 2018 to gather IT interface requirements

Description/Additional Information:

- NLign provides rapid analytical evaluation of repairs
- NLign provides trending of the damage/repair data for further insights
- Fielded for multiple platforms across USN and USAF



Way Forward/Challenges / Help Needed/Risks:

- Ensure funding is allocated for NLign from FRCFT
- Integrate NLign demo/pilot in IT framework for trial with other data sources and additional users
- ROM increase 50% if quote expires and CY19 estimates take effect



Data Analytics (Vector)

Background:

- Powerful readiness analysis toolset that consolidates the data from 19+ data sources and identifies readiness and cost degraders and trends at the system, sub-system and component level. System is evolving to include holistic engine readiness analysis, detailed planning with the RAMP module and further analysis enhancements.

Status:

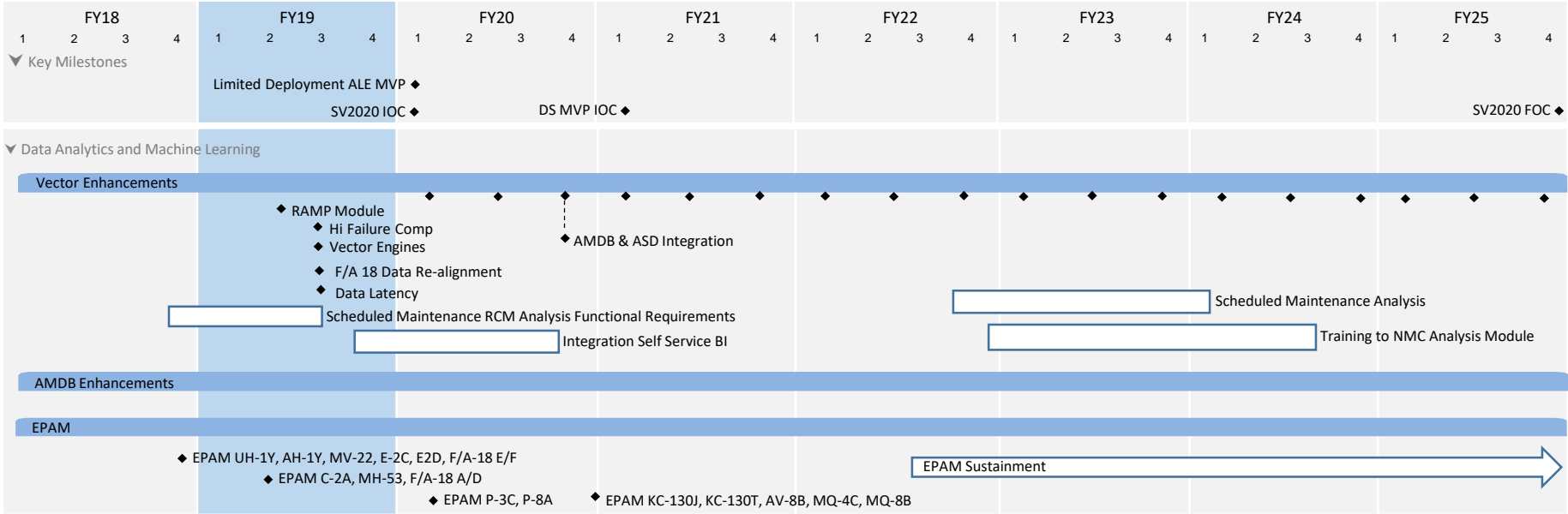
- Vector Engines (Ve) (ERG/MRG, Removals, MTSR, Repairs, Inventory) (Apr-19)
- RAMP Module (Mar-19)
- Data Latency (Mar-19)
- F/A18 Data Re-Alignment(Jun-19)

Description/Additional Information:

- Metrics
 - NMC aircraft analysis, engine availability, component performance, component delays
 - Flight line impact expected within one year of implementation; some impacts will be seen immediately after release (i.e. data latency and RAMP)

Way Forward/Challenges / Help Needed/Risks:

- Integration (AMDB + ASD + Vector (Va, Vc,Vw))
- Functional requirements aligned to TYCOM priorities (FRAG)
 - Fleet utilization of Vector
 - Gaps in our analysis (Maintenance & Training Plans)
- Next generation/Self-Service Business Intelligence
 - Vector enhancements will move faster





Aviation Logistics Environment (ALE)

Background:

- Aviation Logistics Environment (ALE) is Naval Aviation's Information Technology (IT) System of Systems solution and digital ecosystem delivering full lifecycle weapon system logistics and analytical capabilities via a shared services data environment for shore-based, afloat, and expeditionary operations.
- ALE is being developed as part of SV2020 and Digital Transformation efforts & replaces Automated Logistics Environment
- IT solution for a shared data environment with various maintenance and lifecycle data

Status:

- Some requirements for CBM+ have been included in the planned release for NAMS
- Minimum Viable Product (MVP) determination being defined (rollout in Q1FY20)

Description/Additional Information:

- Integrates many, but not all, data sources for CBM+
- Goal is to include a subset of fully verified, validated, and accredited business processes which CBM+ relies upon
- Will include Product Lifecycle Maintenance (PLM) interface

Way Forward/Challenges / Help Needed/Risks:

- Need meeting to confirm all CBM+ requirements are accounted for in ALE documents and architectures
 - Business Processes not fully captured
 - Ensure CBM+ end state is captured
 - Ensure breadth and details of interdependencies are captured
- Need implementation and transition schedule and plan to assist in potential gaps in business processes
- With any new system, transition and support plan is critical to supporting and satisfying customer needs
- ALE will provide a portion of, but not currently planned to address all CBM+ data or process needs



Aircraft Component Tracking System (ACTS)

Background:

- Aircraft Component Tracking System (ACTS) – SBIR
- Web-based data collection and centralized storage at the server provides access to users on demand, fleet wide, 24 hours a day - data entry to collect, store, and track movement and usage history of individual serialized components
- Per the Naval Aviation Maintenance Program (NAMP) COMNAVAIRFORINST 4790.2, each of these components is currently tracked using paper cards which are annotated by hand.

Status:

- Fully deployed to most H-60 squadrons
 - Afloat, T&E and SAR squadrons remain
- Converting from JAVA to .NET (ECD 2020)
- SBIR rights expire in 2022 where in the source code will be leveraged for the Enterprise

Description/Additional Information:

- From chapter 5 of the NAMP: “Since failure of a finite life item may have catastrophic consequences, it is mandatory that documented proof of its remaining service life be determined prior to installation.”
- Integral to individual component life tracking and safety of flight to ensure correct configuration control.
- ACTS preserves complete component installation and usage history, along with the implementation of advanced prognostics tools which can then also enable Performance Based Logistics (PBL) as in addition to Condition Based Maintenance (CBM+).
- Eliminates contractor support for manual re-creation of carded components and replaces CMIS

Way Forward/Challenges / Help Needed/Risks:

- Limited use outside of PMA-299 solely due to data rights
- Additional cost to “buy out” data rights before they expire
- Need to fully define requirements before determining if this is the component tracking solution for the Enterprise



Questions