



# RCM: Establishing Preventive Maintenance Requirements

13 – Nov - 2012

*Presented to:*

**DoD Maintenance Symposium**

Grand Rapids, MI

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# Topics

- Reliability Centered Maintenance
  - Definition
  - Precepts and Steps
- RCM and CBM
- Integration with Supportability and CBM+



# Reliability Centered Maintenance

“RCM is used to determine what failure management strategies should be applied to ensure a system achieves the desired levels of safety, reliability, environmental soundness, and operational readiness in the most cost-effective manner. ”

-- DoDM 4151.22-M



# RCM

RCM develops logical decisions based on the following precepts:

- The objective of maintenance is to preserve an item's function(s).
- RCM seeks to manage the consequences of failure – not to prevent all failures.
- RCM is driven first by safety. When safety is not an issue, maintenance must be justified on the ability to complete the mission and finally, on economic grounds.
- RCM acknowledges that at best, maintenance can only sustain the system to its inherent level of reliability within the operating context.
- RCM uses design, operations, maintenance, logistics, and cost data, to improve operating capability, design and maintenance.
- RCM is a continuous process that requires sustainment throughout the life cycle.



# RCM

The RCM process includes identifying the following items in sequence.

## 1. Functions

The desired capability of the system, how well it performs, and under what circumstances

## 2. Functional Failures

The failed state of the system (e.g., the system falls outside the desired performance)

## 3. Failure Modes

The specific condition causing a functional failure

## 4. Failure Effects

Description of what happens when each failure mode occurs, detailed enough to correctly evaluate the consequences of each

## 5. Failure Consequences

The description of how the loss of function matters (e.g. safety, environmental, mission, or economics)

## 6. Maintenance Tasks and Intervals

The description of applicable and effective tasks, if any, performed to predict or prevent failures

## 7. Other Logical Actions

Including, but not limited to, run-to-failure, engineering redesigns, and changes/additions to operating procedures or technical manuals

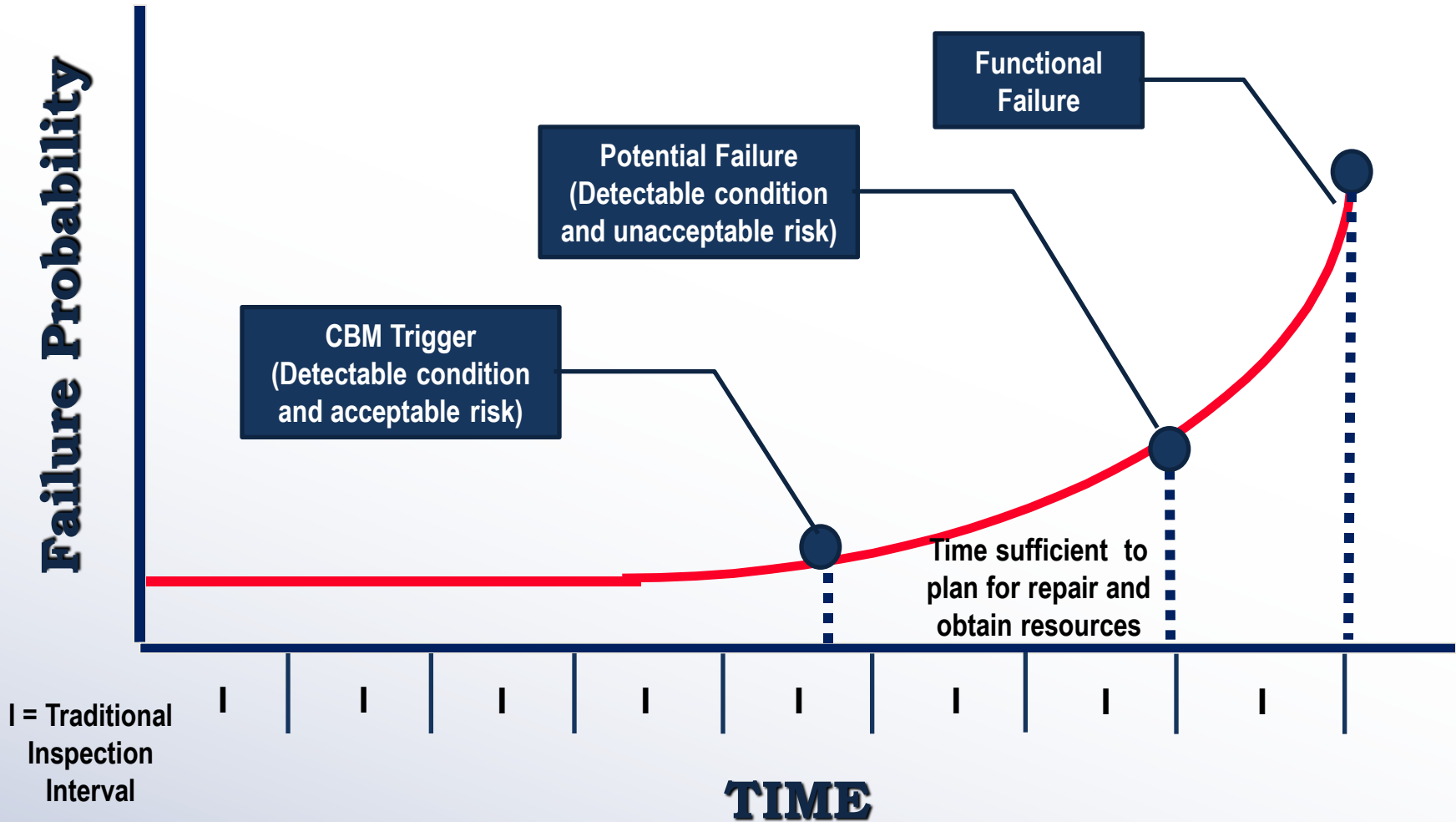


# RCM and CBM

- RCM and Condition Based Maintenance (CBM)
- Working Definition for CBM: A course of action, for a failure mode, developed through RCM that allows user to:
  - manage operation based on knowledge of condition
  - balance risk and consequences
  - monitor or track direct or indirect indicators of assets reliability and Remaining Useful Life (RUL) or Consumed Life
- Recommended practices in work (SAE G-11)
- Bottom Line: Allows item to remain in service longer, and with prognostics, to determine options for course of action.



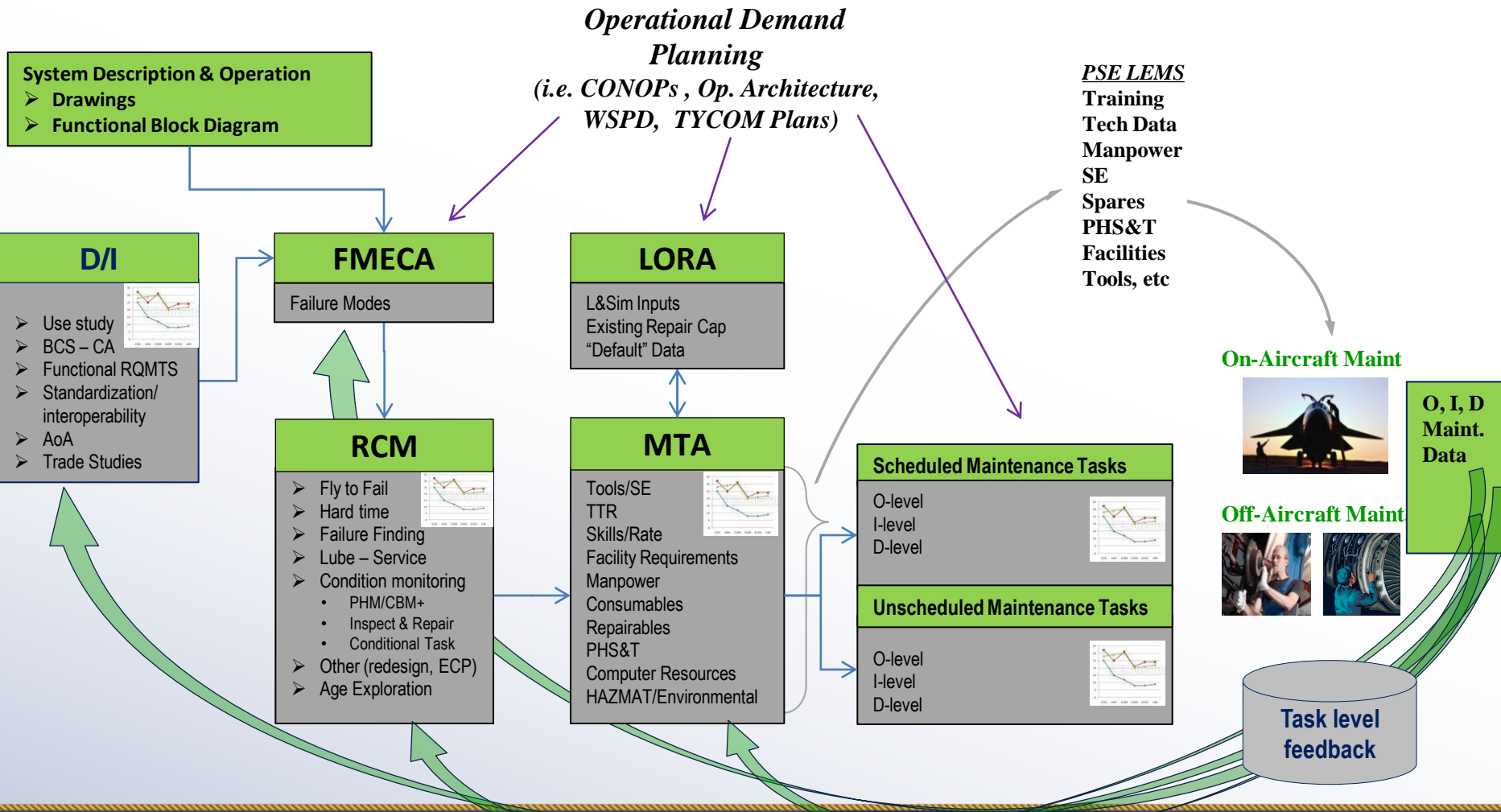
# RCM and CBM







# RCM Integration in Supportability







# RCM and CBM+

- “RCM provides the evidence of need for other CBM+ processes and technologies, such as health monitoring or prognostics. RCM provides an understanding of the applicability and effectiveness of proposed CBM+ technologies as well as an analysis of alternatives.”

-- DoDM 4151.22-M

- Tenets:
  - RCM outcomes, whether they be PM or “other logical action”, may be considered for CBM
  - Consider implementation cost
  - Consider reliability of CBM solution
  - Data feedback is critical to all supportability elements