Under the patronage of **H.E. Dr. Abdullah Belhaif Al Nuaimi -** Minister of Infrastructure Development

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Under the Theme:
Enhancing Maintenance Through Big Data Management

DEFENDING YOUR BUDGET

Defending Your Preventive Maintenance Budget - An Approach to Information System Specification.

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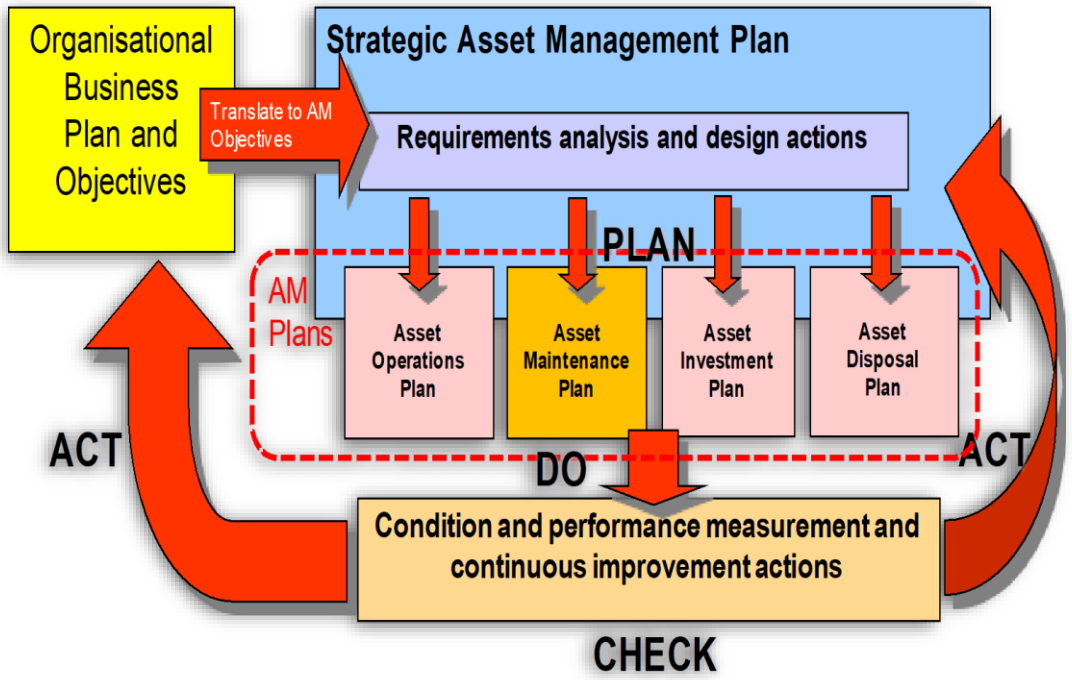
Budget cuts can occur for many reasons!

- A desire for short term profit;
- A focus on operational availability;
- A belief that the budget is wasted because everything is OK;
- Technical ignorance of relationship between asset degradation and operational failure;
- Financial ignorance of cost difference between planned and unplanned tasks (1/6 cost);
- A personal view of being "lucky" and that failures happen to someone else.

***WE must DEFEND** our **MAINTENANCE BUDGET** from the **BEHAVIOURS of OTHERS**!*

How do we build our Asset management budget?



Plan comprises:

- Operating Plan
- ***Maintenance Plan***
- Investment Plan
- Disposals Plan

Why defend our maintenance budget?

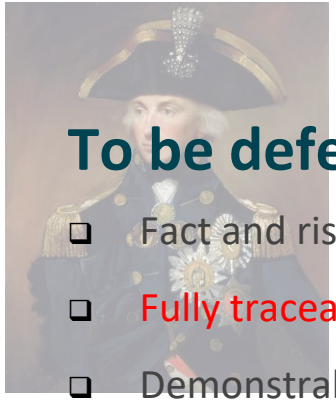
Maintenance objectives *(Nowlan and Heap - Aerospace)*

- To ensure **realisation of inherent safety and reliability** – Preventive maintenance;
- To **restore safety and reliability** when it degrades – Corrective maintenance;
- To **obtain information** necessary to improvement;
- To accomplish those goals at **lowest total cost**.

Please note:

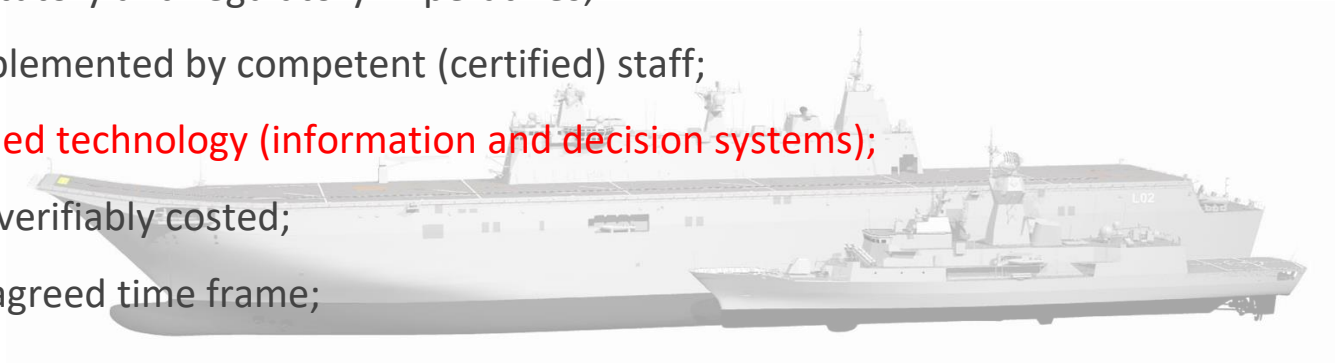
- ***If the preventive maintenance program is broken – everything else is broken!***
- Protecting that program's budget is a **most important role** of the Asset Management function.
- **If there is NO traceability** from "task" to "business objective" – **NO budget protection!**

Admiral - we need a “Defensible Budget”!

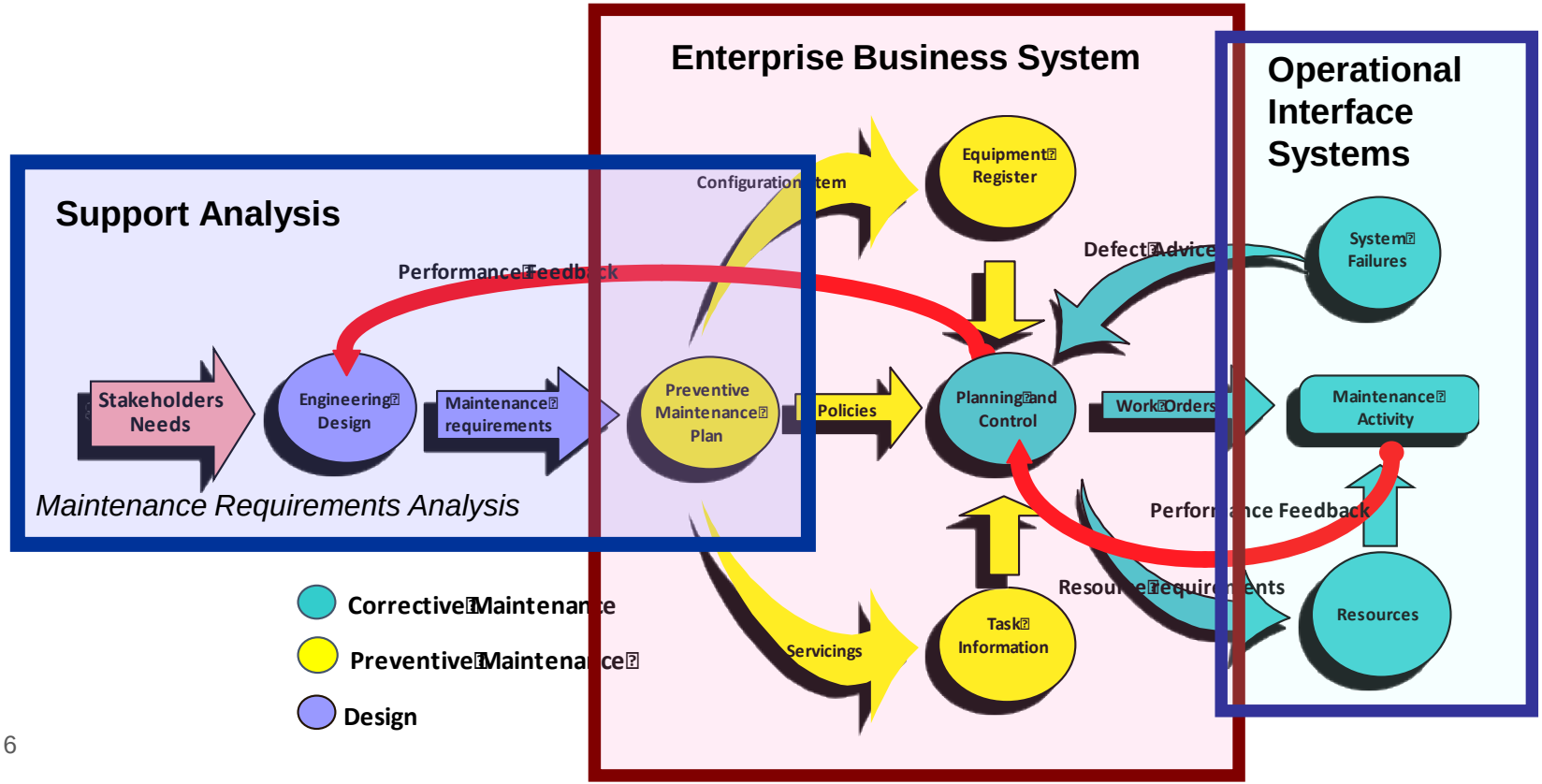


To be defensible, our asset management plans must be:

- Fact and risk based;
- Fully traceable to asset output requirements;
- Demonstrably good practice (apply international and national standards);
- Compliant with statutory and regulatory imperatives;
- Developed and implemented by competent (certified) staff;
- Supported by verified technology (information and decision systems);
- Transparently and verifiably costed;
- Deliverable in the agreed time frame;

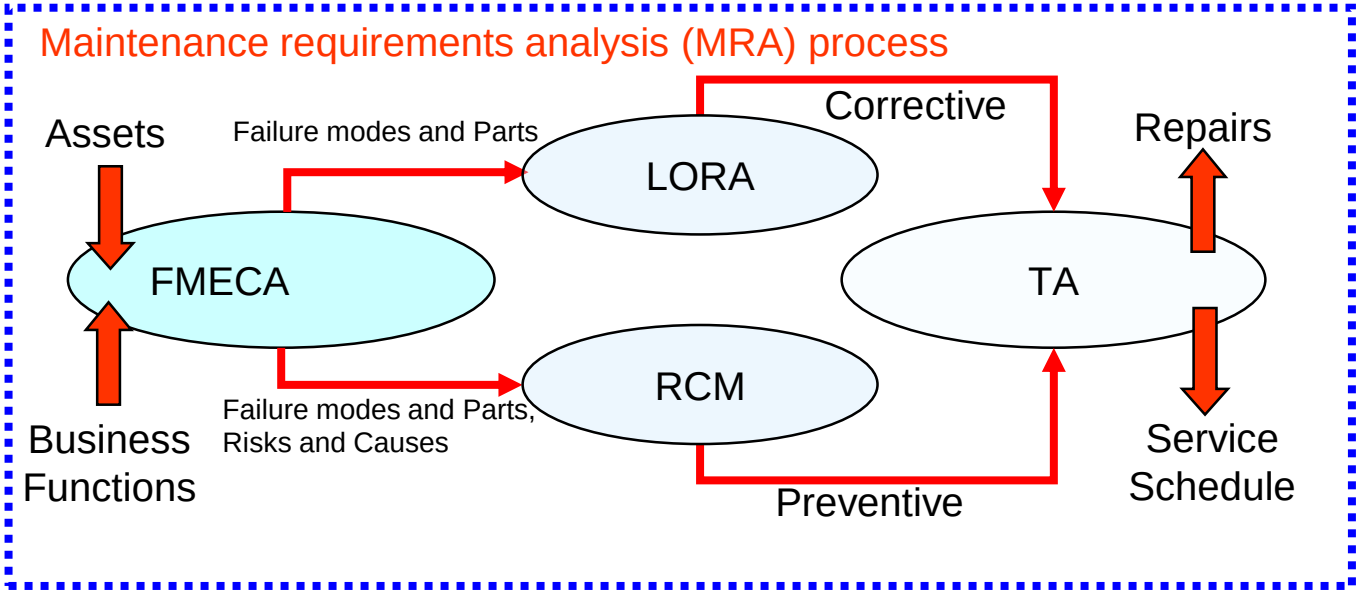


How do we build the required traceability?



What decision system creates traceability?

Failure Mode Effects and Criticality Analysis – **FMECA**
Reliability Centered Maintenance – **RCM**
Level of Repair Analysis - **LORA**
Task Analysis - **TA**

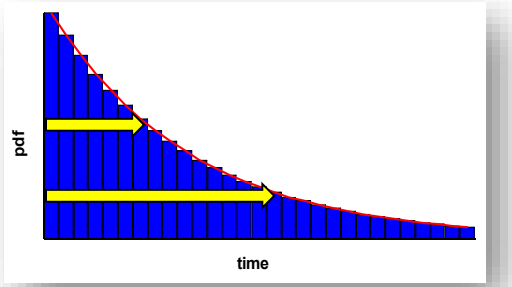


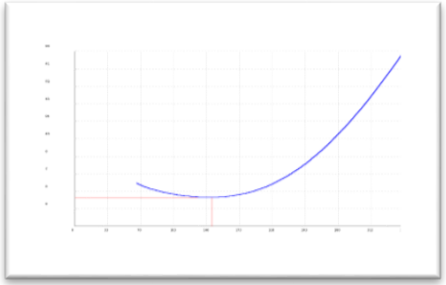
What RCM tasks and frequency result?

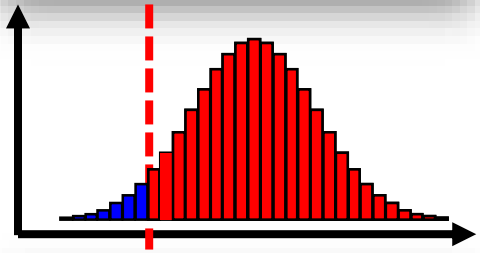
Examine condition to detect potential failures (Condition Monitor)

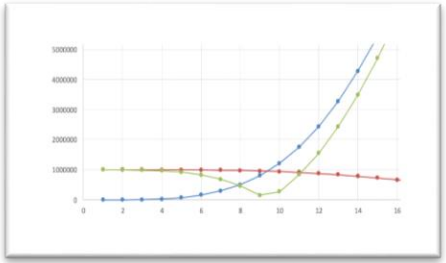
Restore or discard before a maximum age (Hard Time)

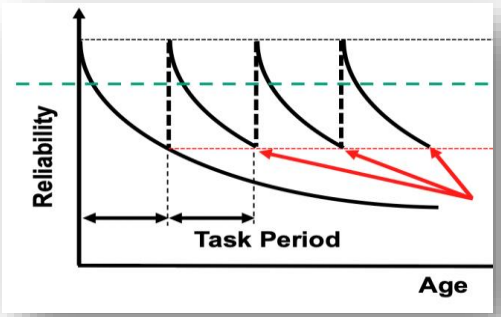
Check to find failures that are not evident (Failure Finding)

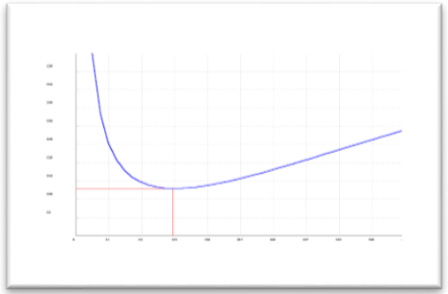




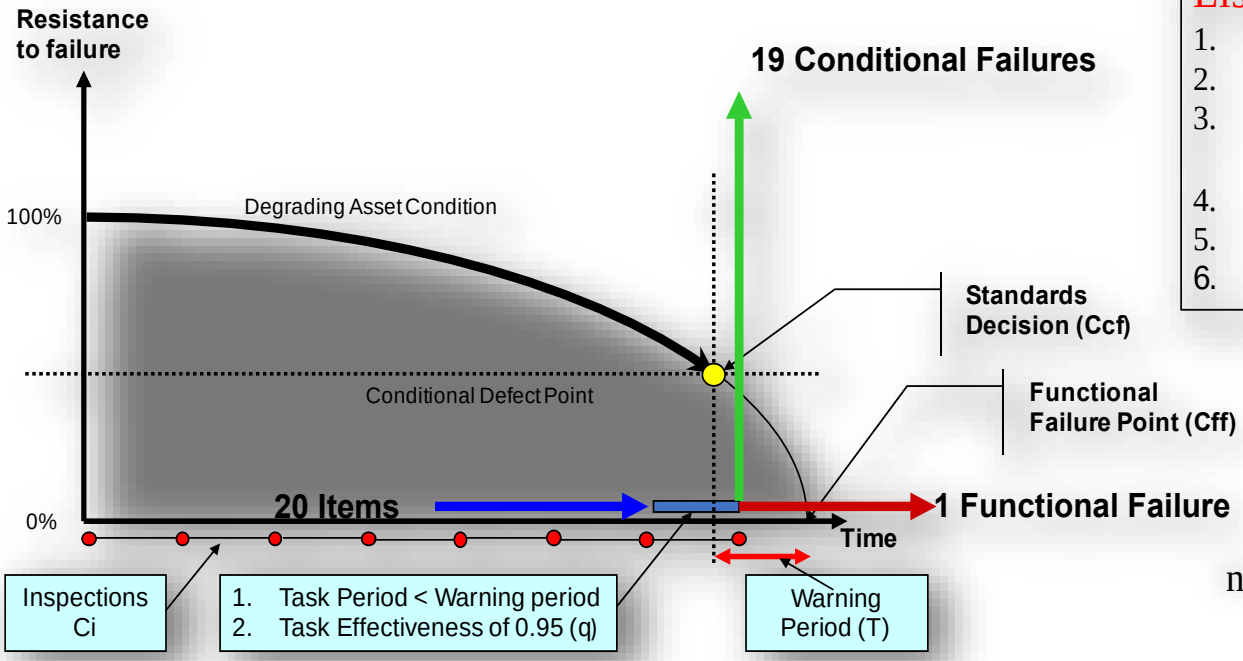








What information do I need for this decision?

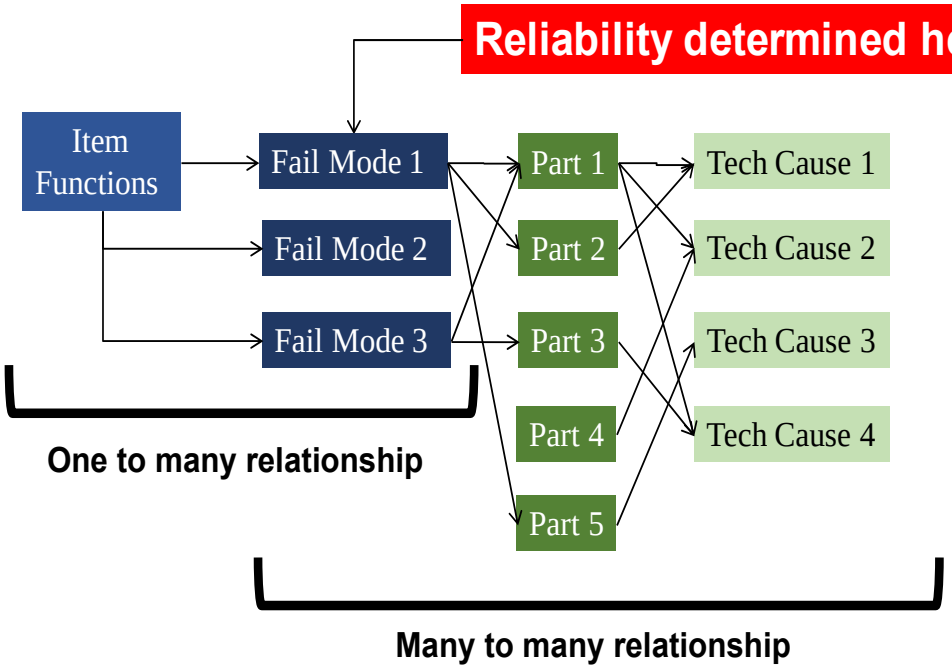


List of variables

1. Ci – Inspection $
2. Ccf – Condition Fail $
3. Cff – Function Fail $
4. MTBF – CF plus FF
5. T – Warning Period
6. q - Task Effectiveness

$$n = \frac{\ln\left[\frac{\frac{-MTBF}{T} * C_i}{(Cff - Cpf)*\ln(1-q)}\right]}{\ln(1-q)}$$

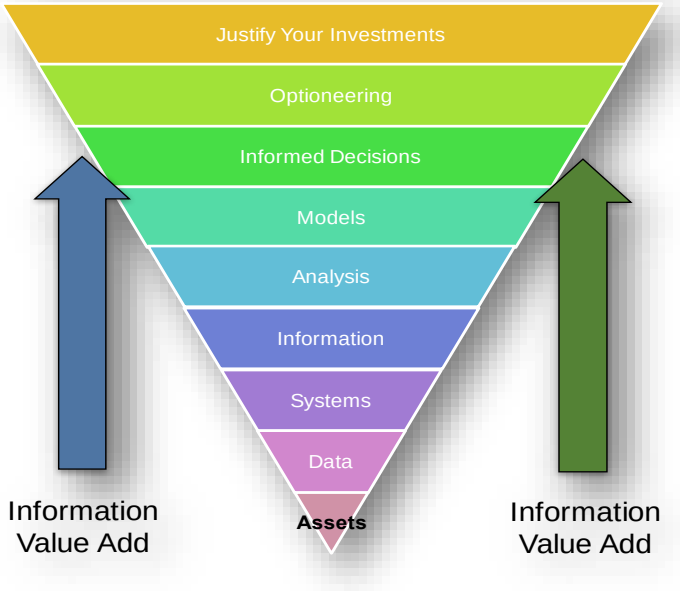
What information should we collect?



Capture of failure data at source by maintenance staff that includes the following:

a. What asset? (*water supply system)*
b. What item? (*gearbox*)
c. Item function (*transmit torque*)
d. Failure mode (*seized*)
e. Involved part (*gear teeth*)
f. Failure cause (*wear*)

How do I go from “data” to “defensible budget”?



1. Use FMECA/RCM to build initial defensible plan;
2. Collect data to show compliance to plan;
3. Collect failure and cost data to verify initial plan.

Case study – Electrical distribution network

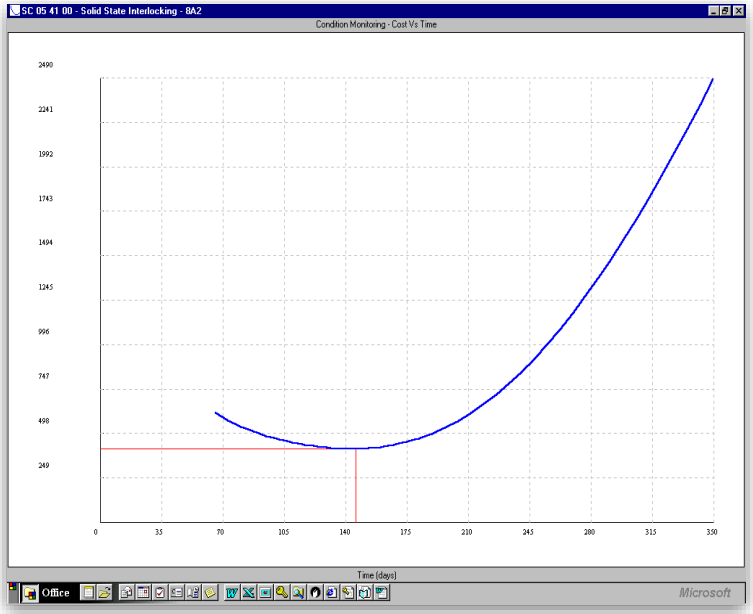
10 years after the initial application of estimates in FMECA/RCM

2,710 CM Task Periods changed overnight - $2 million USD/year saved

40% - Task eliminated
16% - Task Period extended
7% - New Tasks added

33% - Task Period unchanged
4% - Task Period reduced

Conclusion



Defensible budget and data

The Defensible Budget requires data collection and management information systems that support agreed decision making models.

Preventive maintenance in accordance with those models turns high cost operational failures into low cost discovered and managed failures.

The inherent failures in systems cannot be stopped but their potential consequences can be managed by preventive maintenance programs that are funded by Defensible budgets.

Thanks for your attention!