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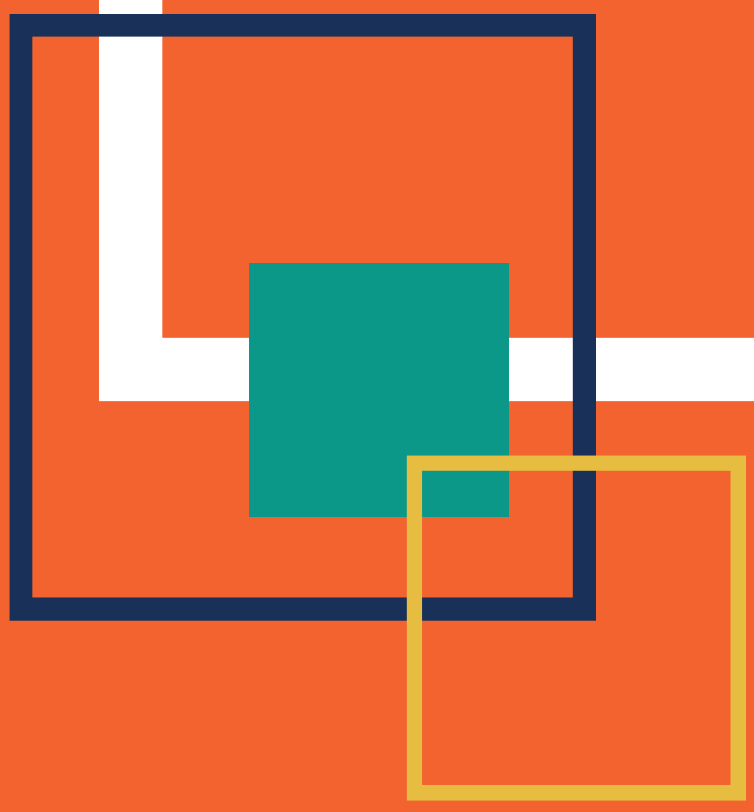
ConMon in Context

1. Failures and failure probability
2. Optimium maintenance mix
3. Continuous and periodic condition monitoring
4. Benefits of condition-based maintenance as a tactic
5. Selecting condition-based maintenance as a tactic



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1. Failures and failure probability

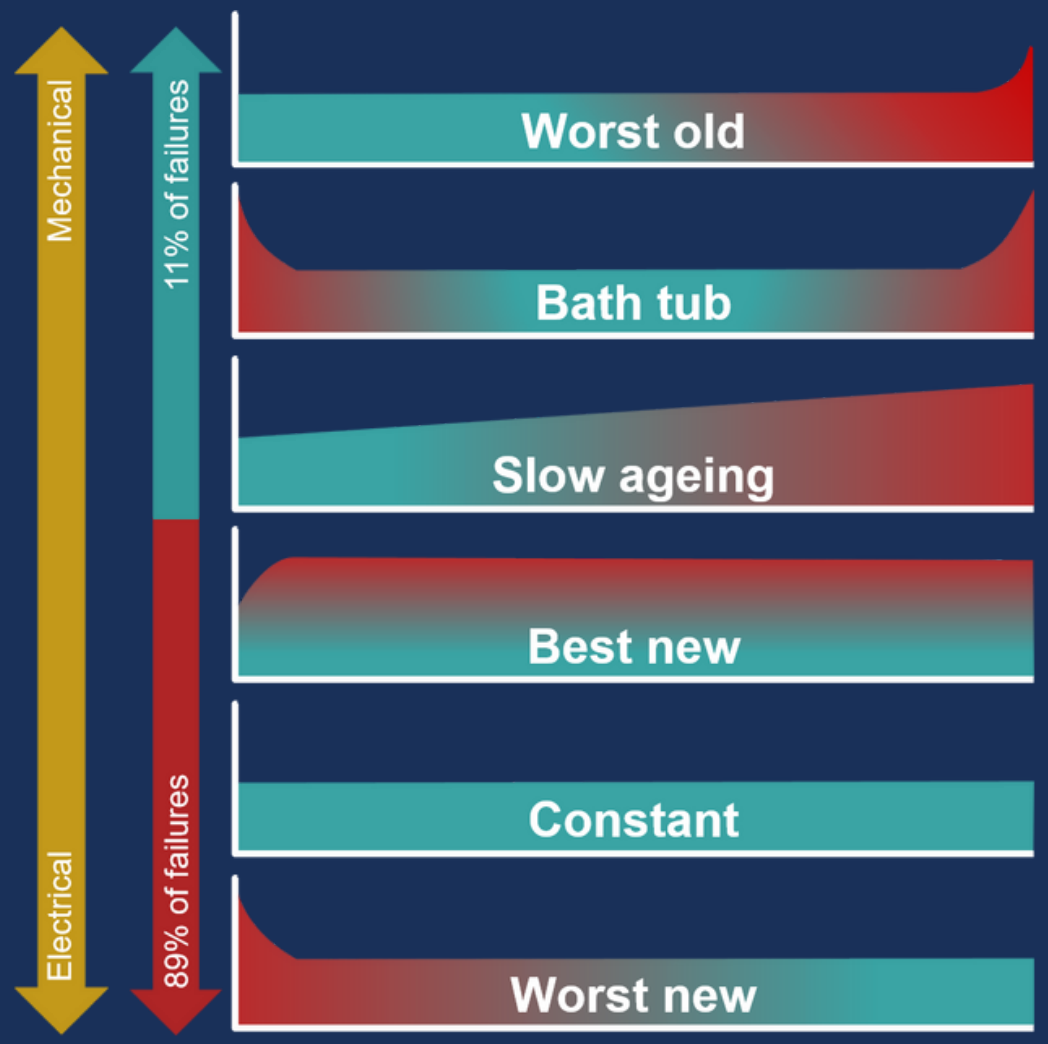
Treating all equipment and components as if the probability of failure is related to age or usage can be a costly mistake.

Failure isn't usually related directly to age or use – the first three mechanisms account for 11% of failures.

Failure is not easily predicted - restorative maintenance based on time, or use won't help to improve the failure odds.

Major overhauls can be a bad idea – and end up with a higher failure probability in the most dominant patterns. Age-related replacement is too costly for the same reason.

With systems/assets becoming more integrated and operated through complex control systems, the random and "worst new" failure probabilities are becoming more prominent.



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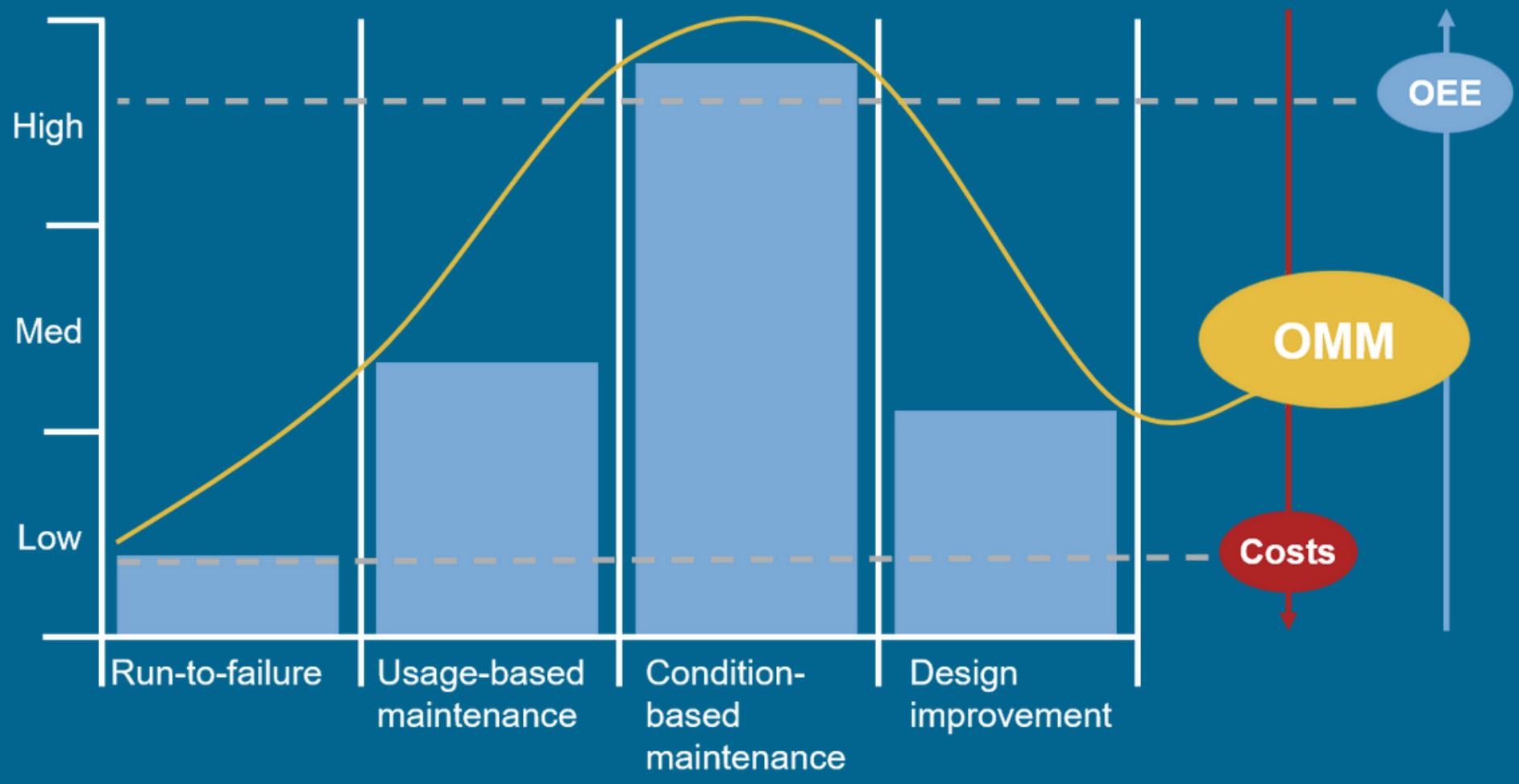
2. Optimum maintenance mix

The OMM methodology, based on reliability-centred maintenance aims to simplify the development process of asset care plans.



Seven steps for the development of the asset care plan:

1. Criticality analysis 2. Functional analysis 3. Failure analysis
4. Tactic selection 5. ACP detail development
6. ACP implementation 7. ACP execution

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3. Continuous and periodic condition monitoring

The asset's importance to the process, online availability, feasibility and cost-effectiveness will determine whether periodic or continuous monitoring is chosen.

Periodic condition monitoring is based on measurements taken at regular time intervals. The device is moved from one machine to another. It is typically applied to less critical machinery where advance warning of deteriorating conditions will show a positive return on investment.

Continuous condition monitoring examines measurements taken continuously. The device is fitted to and remains with one piece of equipment. Continuous monitoring is necessary on critical machines where problems can develop rapidly, have severe financial consequences, or may be dictated by safety considerations.

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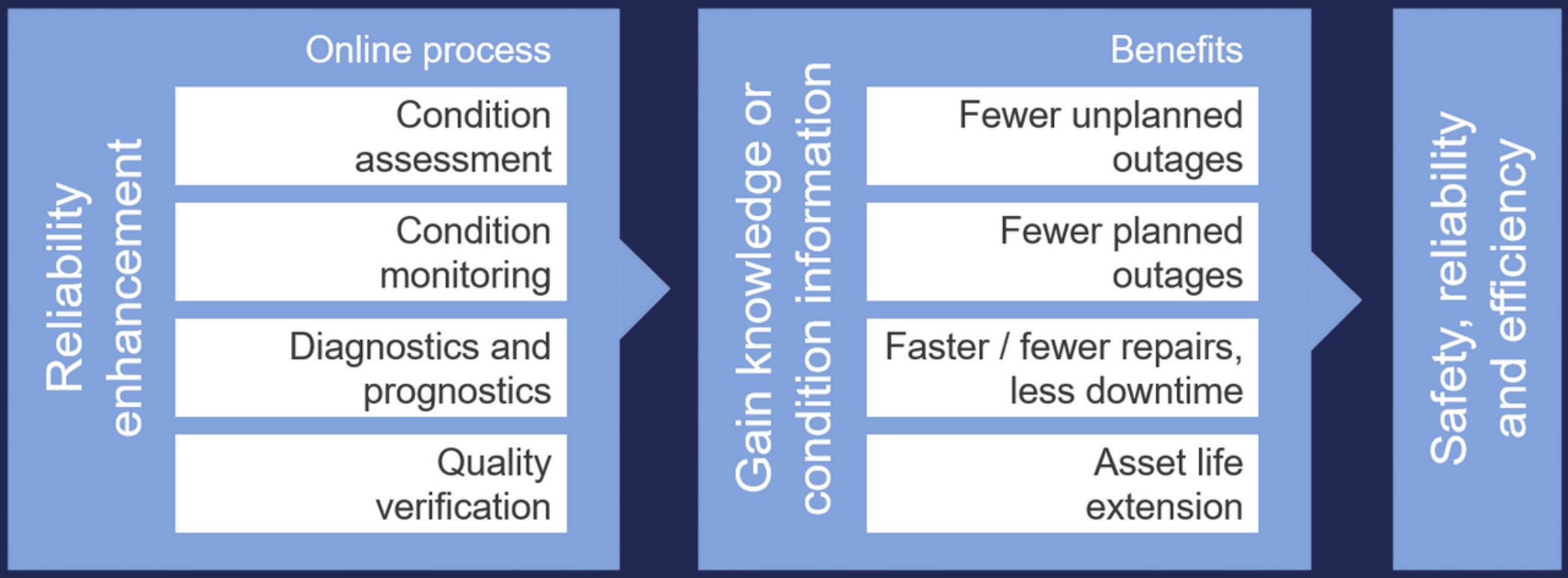
4. Benefits of CBM as a tactic

CBM as a tactic will minimise functional failure, downtime, and maintenance costs while maximising asset lifespan and ROI.



CBM is feasible as a tactic when ...

The potential failure mode can be clearly defined and detected.

The period from detection to failure (P-F) is relatively constant and predictable.

It is practical to monitor at intervals smaller than the P-F interval.

The warning level is detected long enough before failure to allow the intervention.

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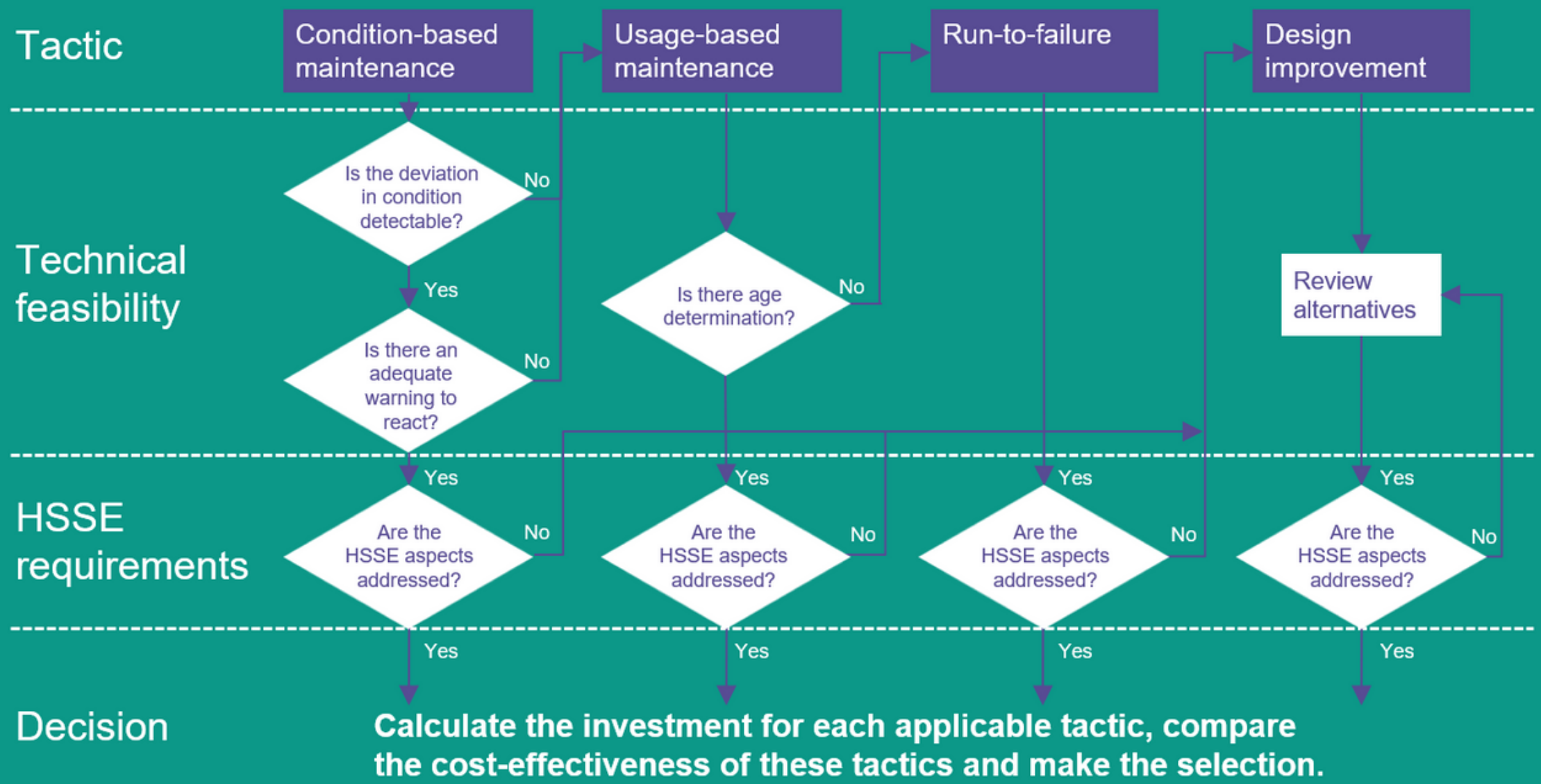
5. Selecting CBM as a tactic

When applying CBM to an asset, the most important success factor is correctly identifying the most useful parameter/s to monitor.

Maintenance tactic selection flowchart



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5. Selecting CBM as a tactic

When applying CBM to an asset, the most important success factor is correctly identifying the most useful parameter/s to monitor.

The failure history and results of root cause analysis primarily drive monitoring parameter identification.

OEM guidance or industry norms can also be applied. Note that these should be viewed in context, considering organisational or asset differences and new technologies - often with lower cost and improved ease of use.

Depending on the asset's complexity, criticality and mode of failure, monitoring more than one parameter may be beneficial.

By assessing multiple components with different technologies, condition-based maintenance provides for a holistic asset health analysis.

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