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Clearing the Hurdles to a Successful CBM programme

Presentation for
SKF Marindagen 2009 Conference, Gothenburg

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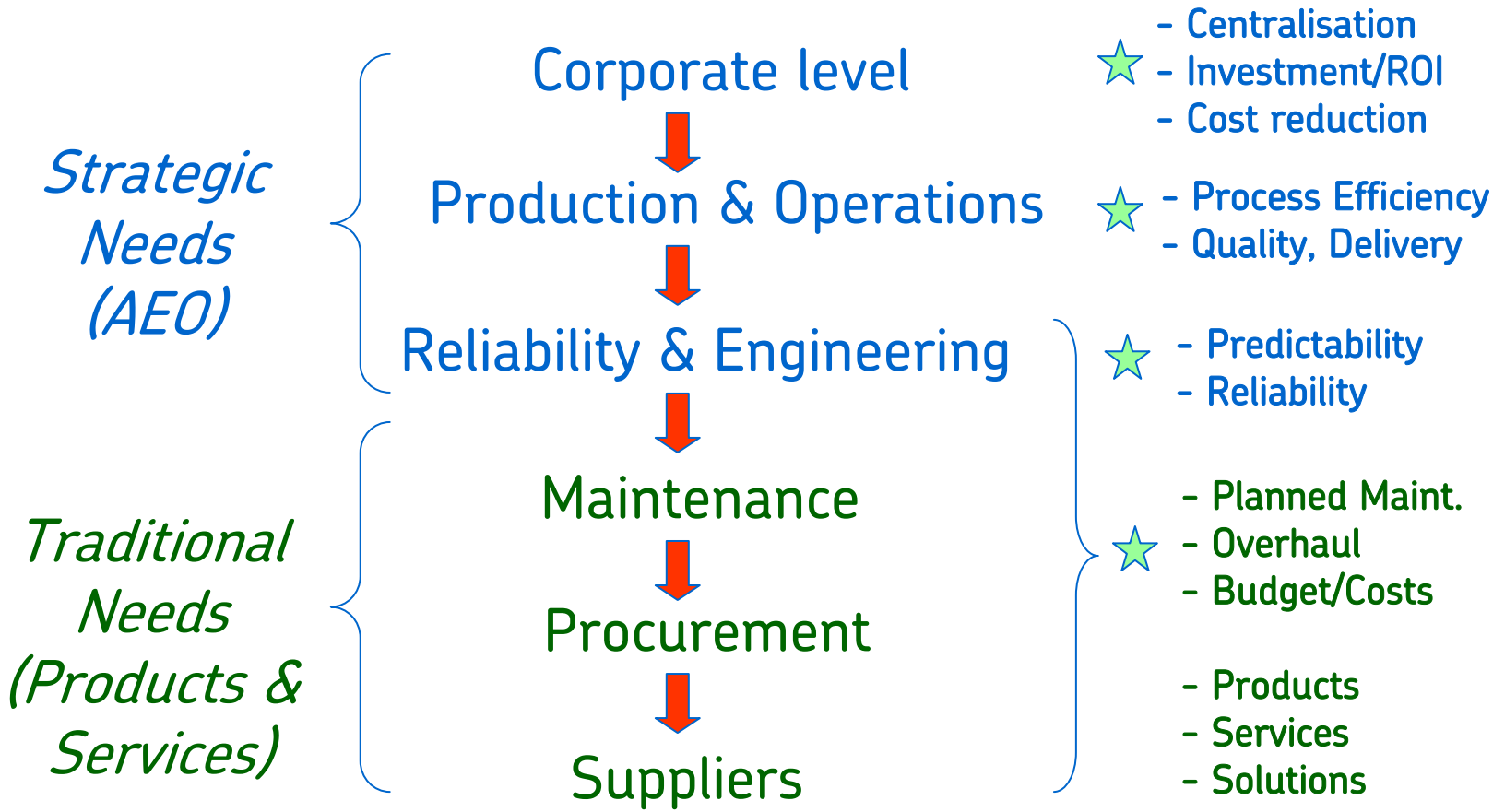
2009-03-19

1

Introduction to Asset Efficiency Optimisation

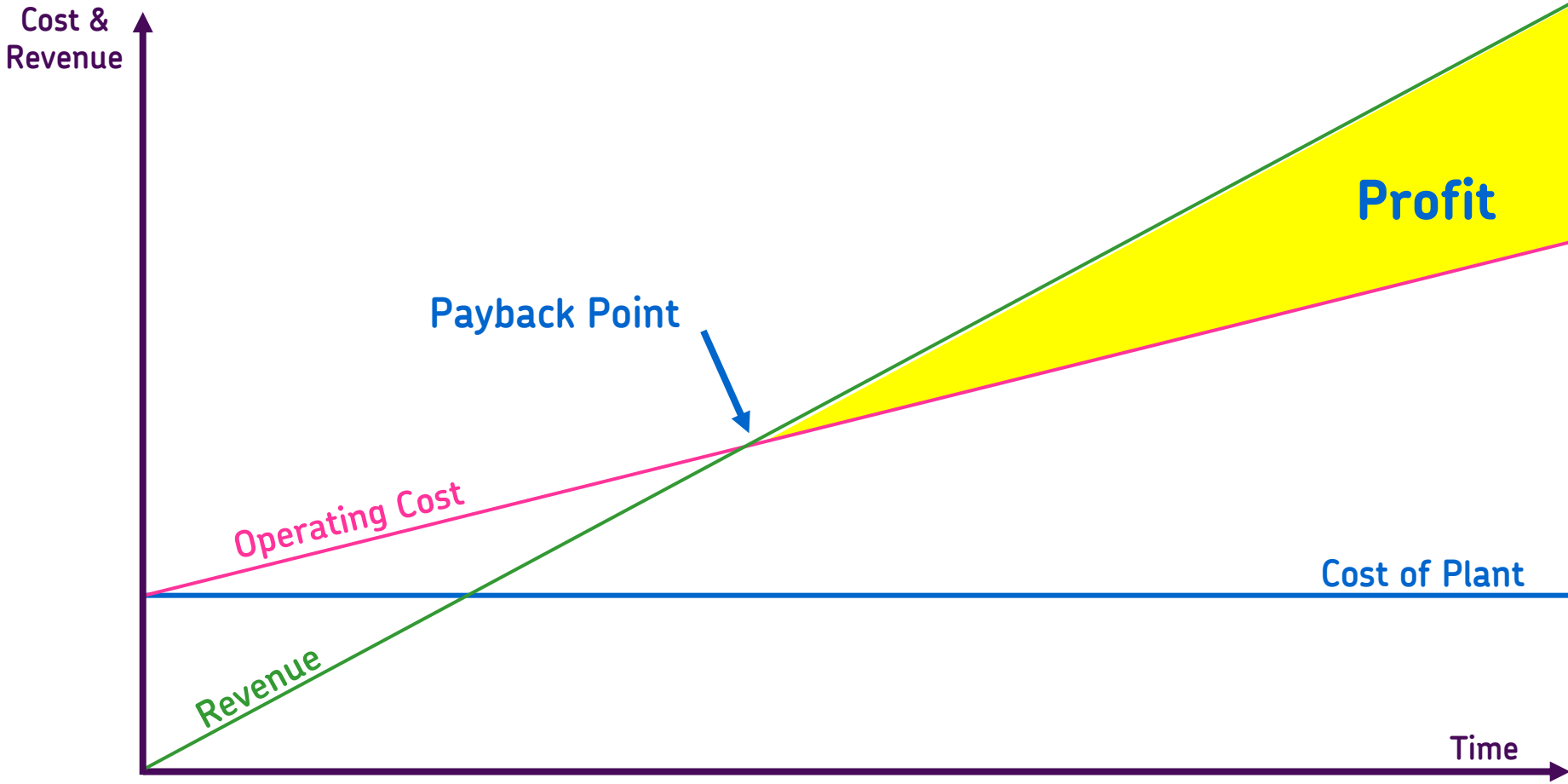
Understanding our customer perspective



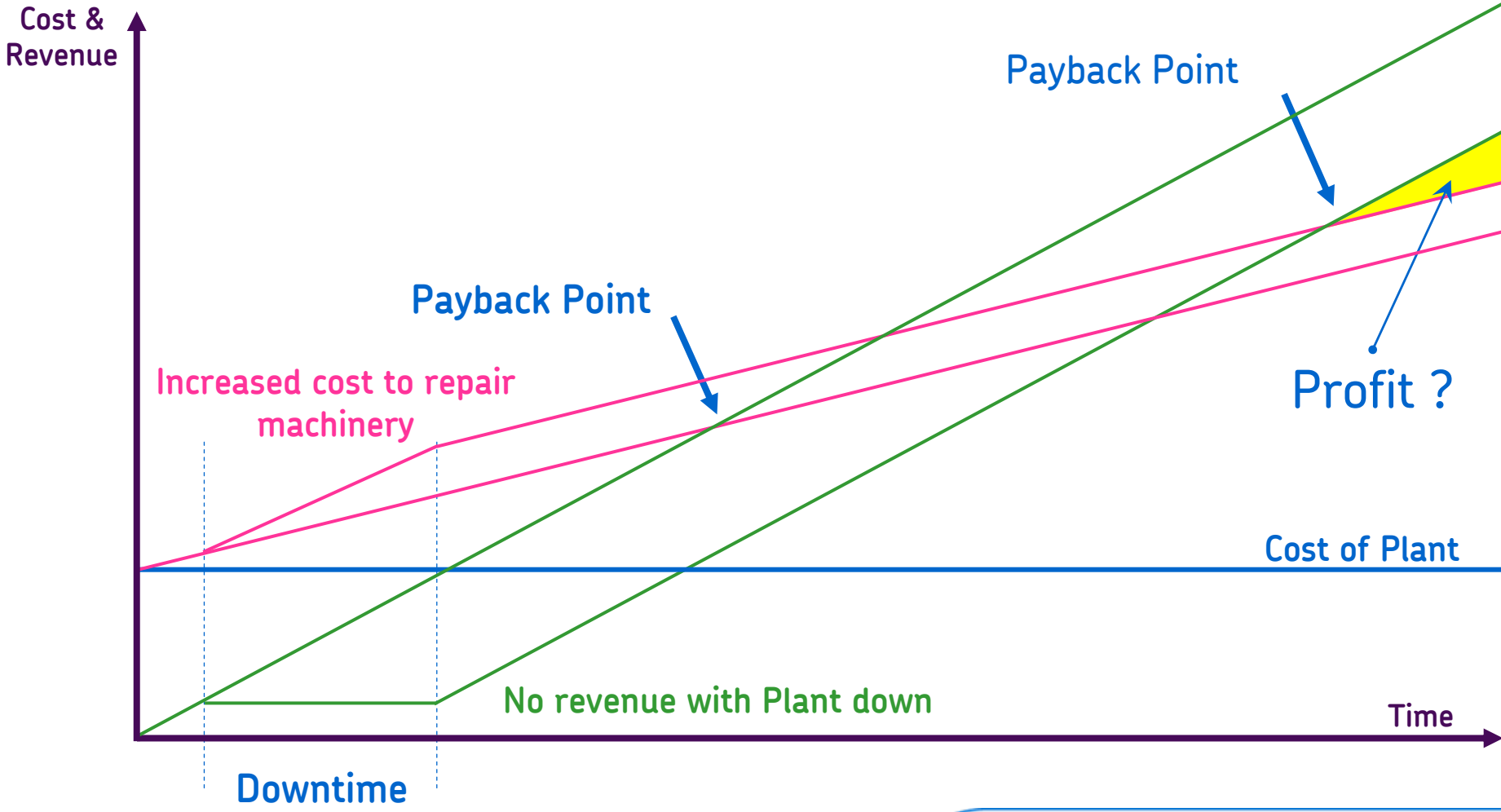
Key drivers

- ☆ Increased Productivity (improved Uptime)
- ☆ Reduced Total Costs (Life Cycle Cost)
- ☆ ROI (more profit & less avoidable costs)
- ☆ Integration (Technology, Process and People)

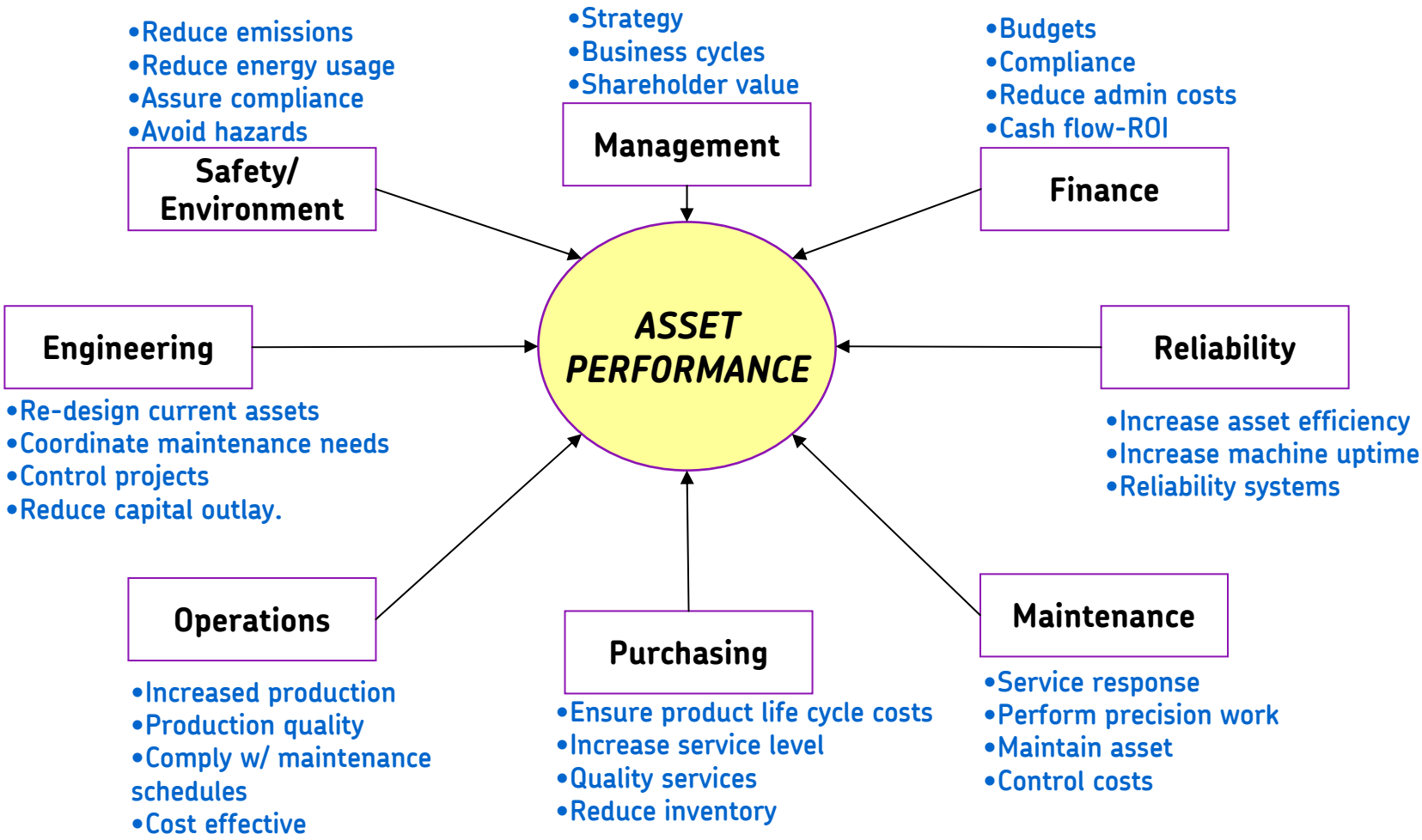
Why do we conduct Maintenance ?



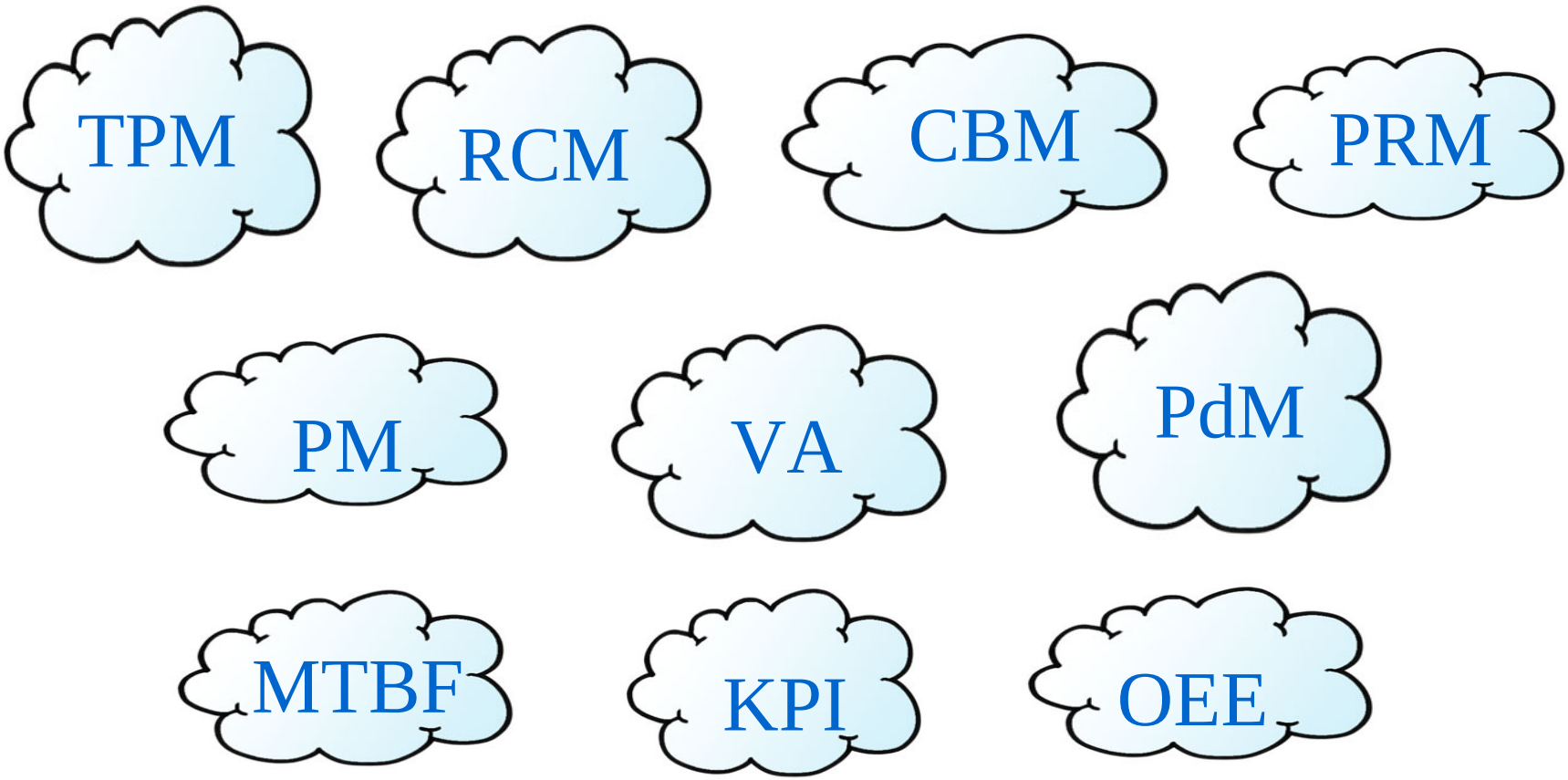
Why do we conduct Maintenance ?



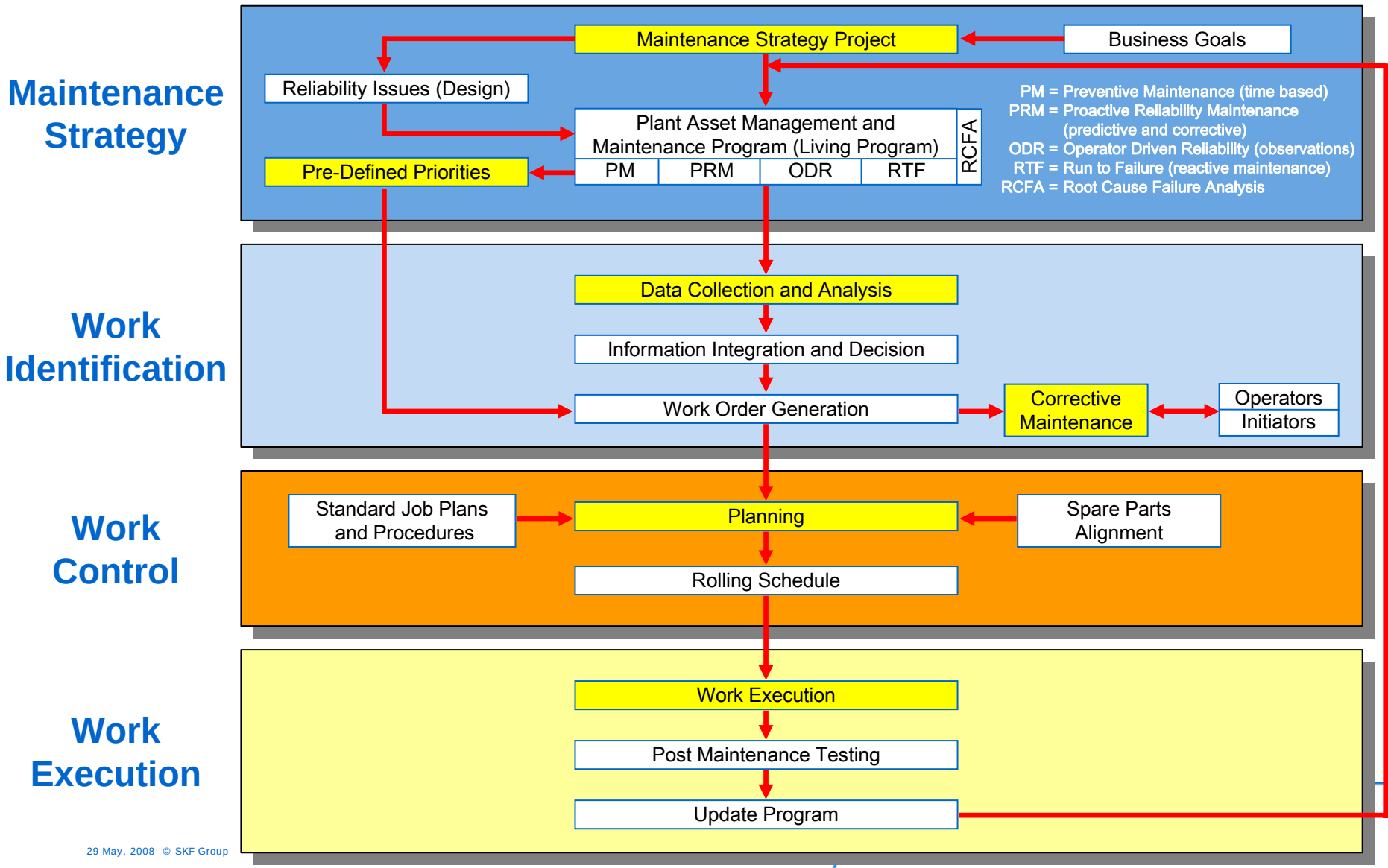
What are your priorities?



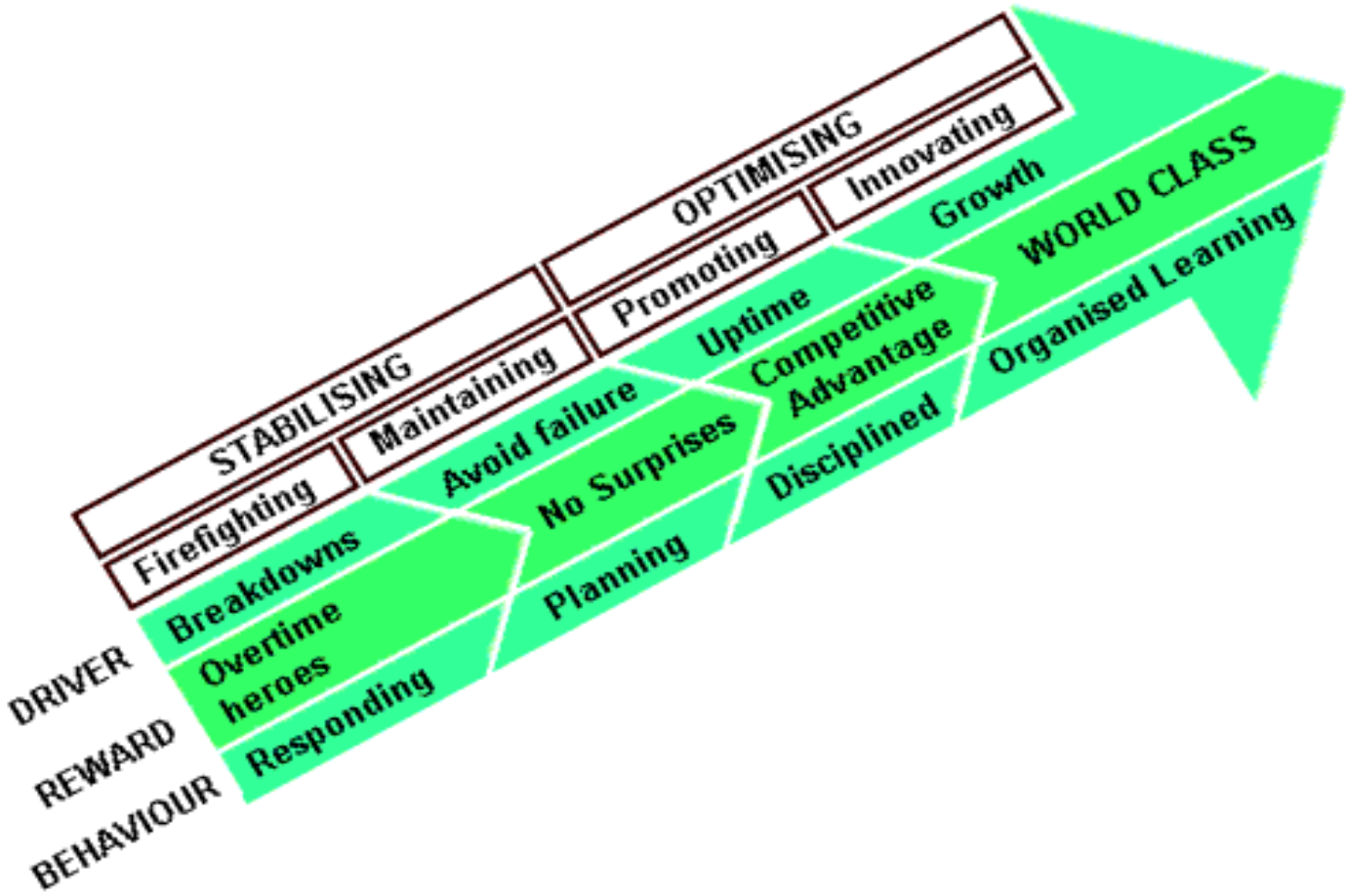
The language of Maintenance today



SKF AEO workflow process



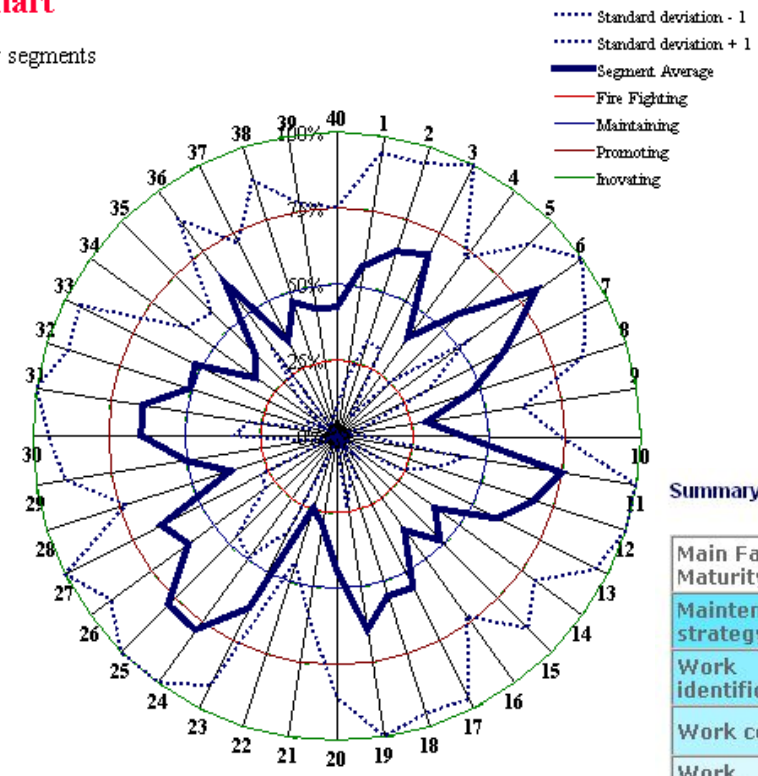
Maintenance maturity



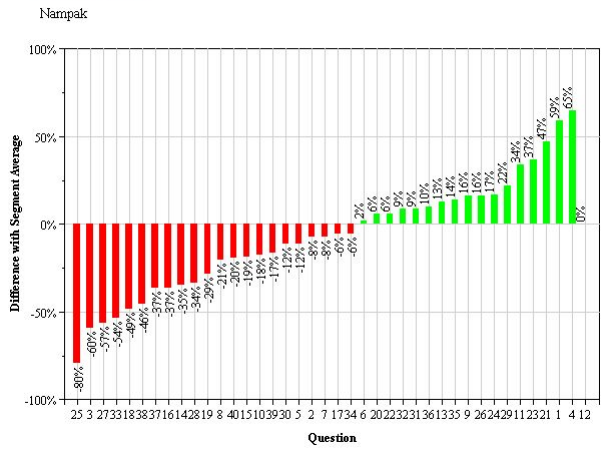
SKF Client needs analysis (C.N.A.)

Spider chart

All industry segments



Pareto chart



Summary Matrix

Main Facet / Maturity	Absent	Fire Fighting	Maintaining	Promoting	Innovating	Not Applicable	Not Understood	Totals
Maintenance strategy	3.11	5.13	3.38	5.92	6.93	0.13	0.39	25.0
Work identification	5.35	3.82	2.46	3.38	9.39	0.53	0.09	25.0
Work control	3.82	3.73	5.09	5.79	6.27	0.13	0.18	25.0
Work execution	4.85	7.85	3.68	3.64	4.78	0.22	0.18	25.0
Subtotals per choice of response	16.93	20.53	14.61	18.73	27.37	1.01	0.83	100.0

What is Asset Efficiency Optimization?

It delivers:

- A PLAN for Asset Maintenance & Management
- Where Asset Efficiency is Optimized to the clients' Business needs

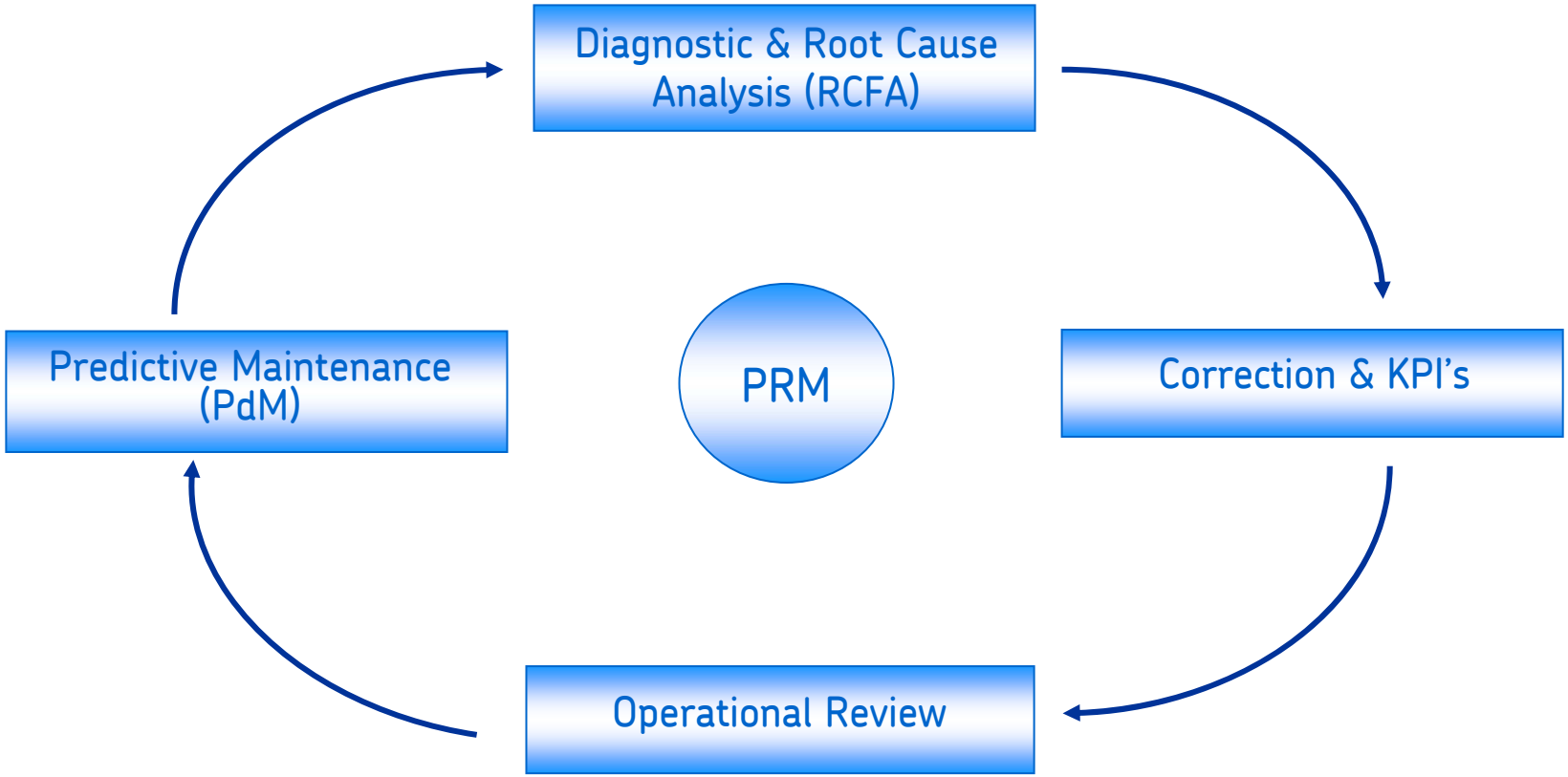
It defines the:

- MAINTENANCE STRATEGY - justified by the business goals
- TECHNOLOGY & SKILLS - required to deliver it
- PROCESSES applied - right technique, right equipment, right time
- TASK LIST – More, Less, Different maintenance activities

2

Reliability improvement?

Proactive reliability maintenance (PRM)



Centrifugal pump failures - main causes

16%

Design

Pump Selection
System design
Shaft stiffness
Seal housing
Seal selection
Impellor size
Suction design

22%

Maintenance

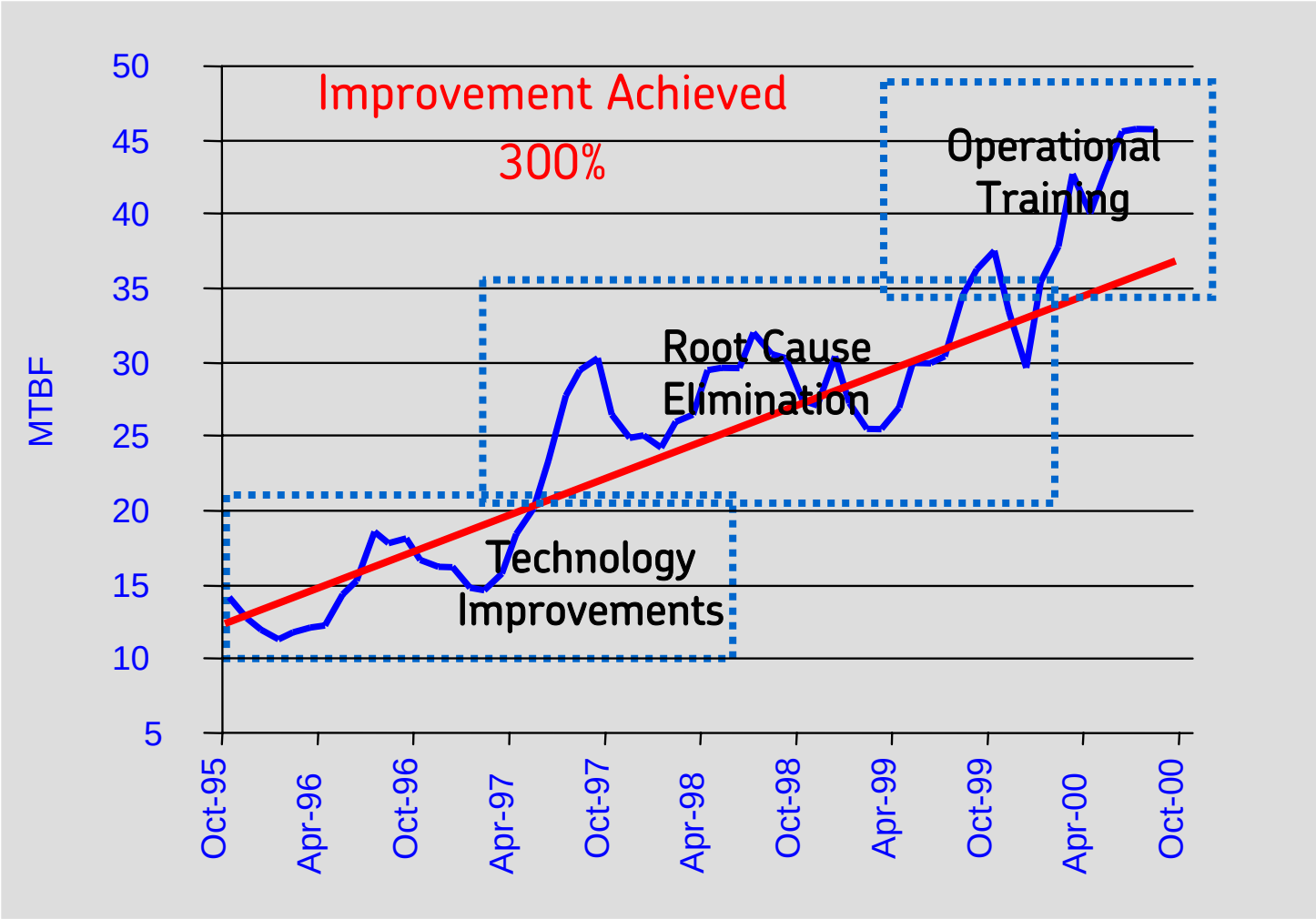
Alignment
Clearances
Runout
Assembly
Seal fitting
Bearing fit
Lubrication
Base plate
Venting
Cleaning

62%

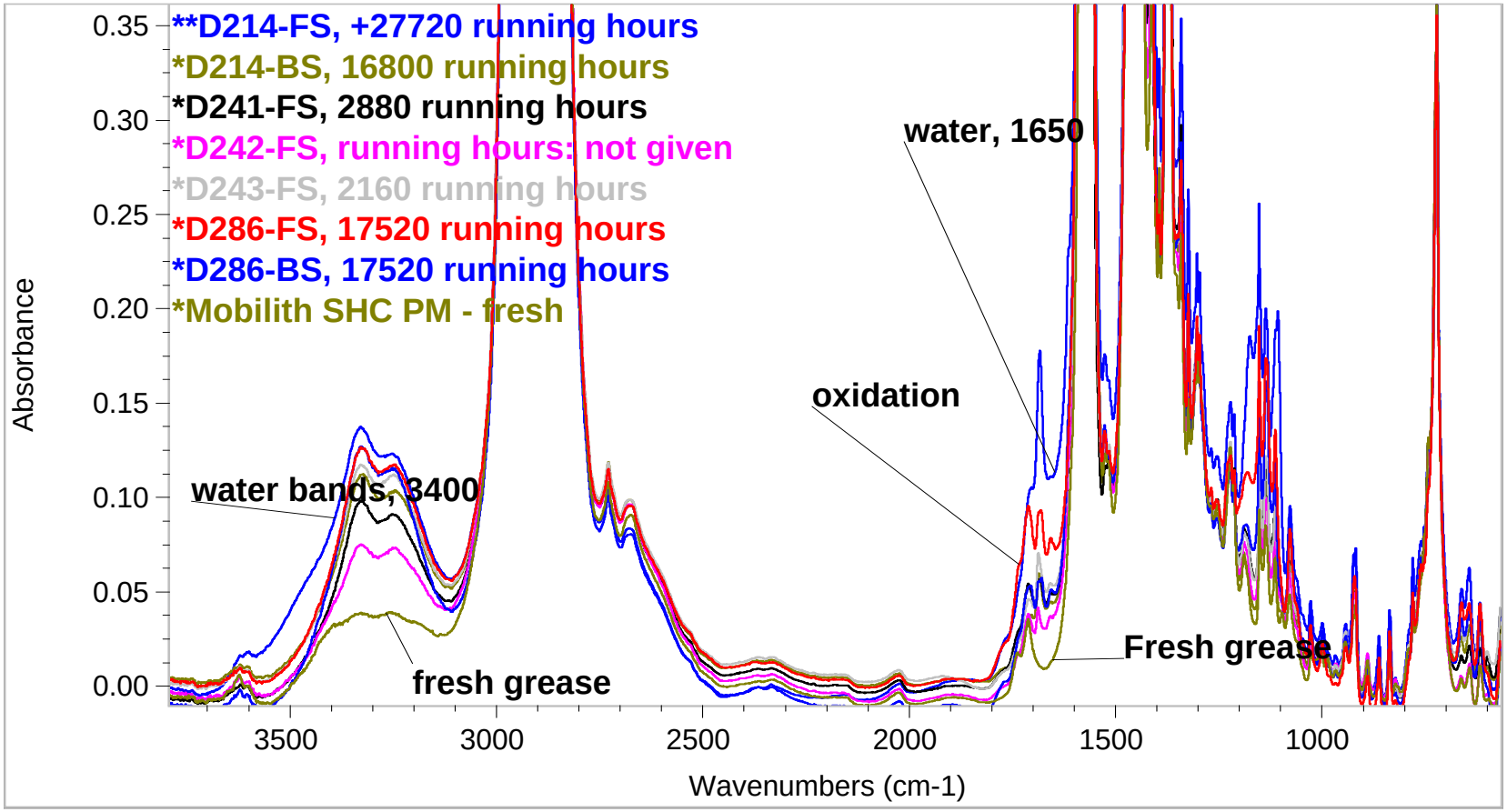
Operation

Priming
Process upsets
Wrong duty
Dry running
Valves closed
Foreign objects
Cavitation
Cooling
Flushing
Procedure consistency

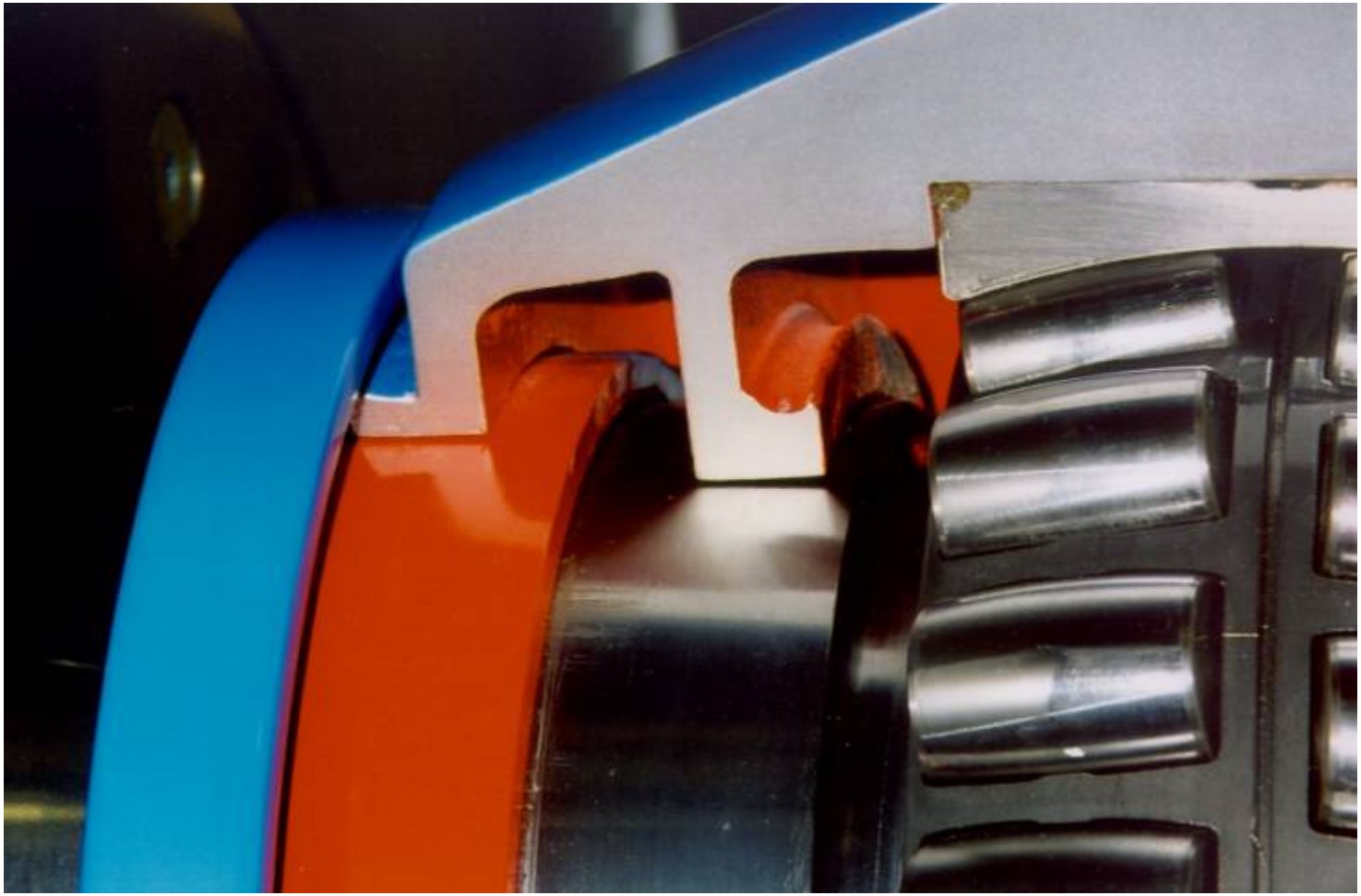
Proactive Reliability Maintenance process



Lubricant analysis and RCFA



New sealing design for improved reliability



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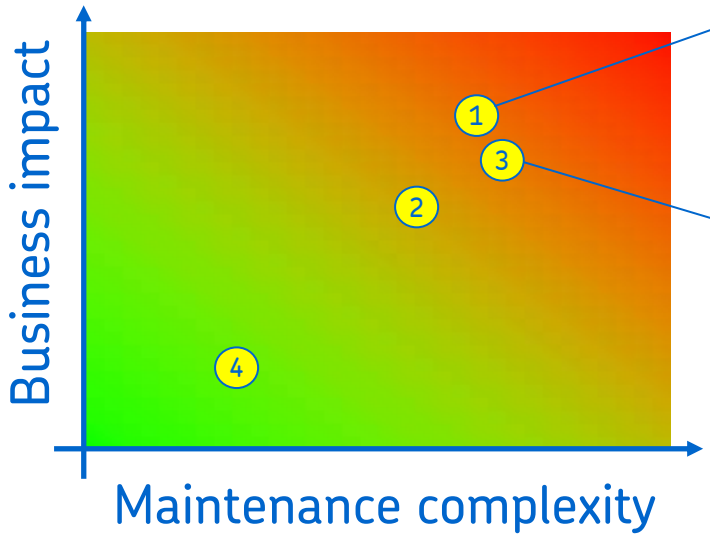
What are the hurdles?
How do we clear them?

Ship machinery

- "A ship is like a factory"
- MEL & asset criticality analysis
- Defined maint. strategy & tasks



Lubrication pumps

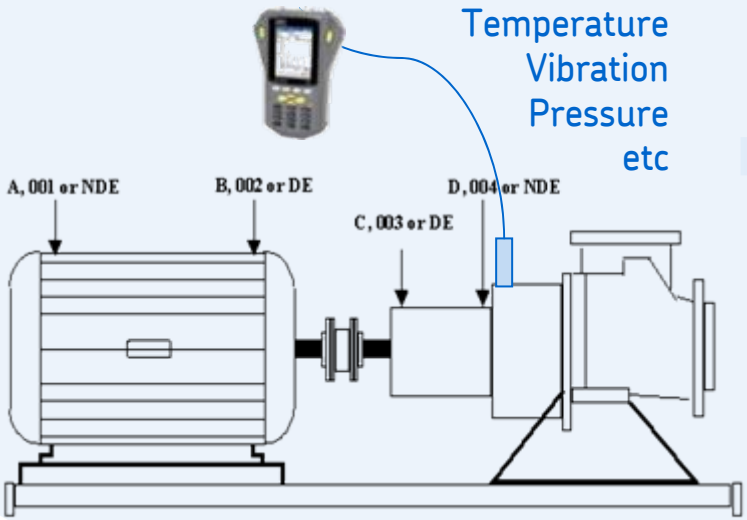
Ballast pumps

Maintenance in the marine industry

Background:

- Wide use of time-based maintenance today
- Class Inspection of critical ship machinery
- Underlying need to improve vessel availability and reliability
- Strong industry focus on future use of CBM to reduce operating risk
- Effective CBM requires accurate assessment of machine condition:

1. Collect data



2. Assess machine condition

Assessing machine condition

To assess machine condition, the Marine CBM engineer requires:

- Knowledge and understanding of machinery operation
- Knowledge and understanding of how to apply CM technology
- Knowledge and experience of CM data analysis, decision-making and reporting

Ships normal situation:

- Itinerant workforce
- CBM is outside the ship engineer's field of expertise
- Limited availability of central technical support

Solution:

SKF Remote Diagnostic Centre support service

- SKF CM technology onboard - capable but simple to use
- SKF competent Marine CBM diagnostic engineer support
- SKF CBM implementation and management to deliver quality and value

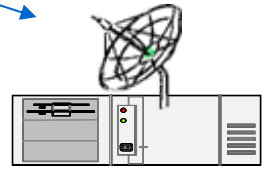
Remote monitoring

On ships

Data collection

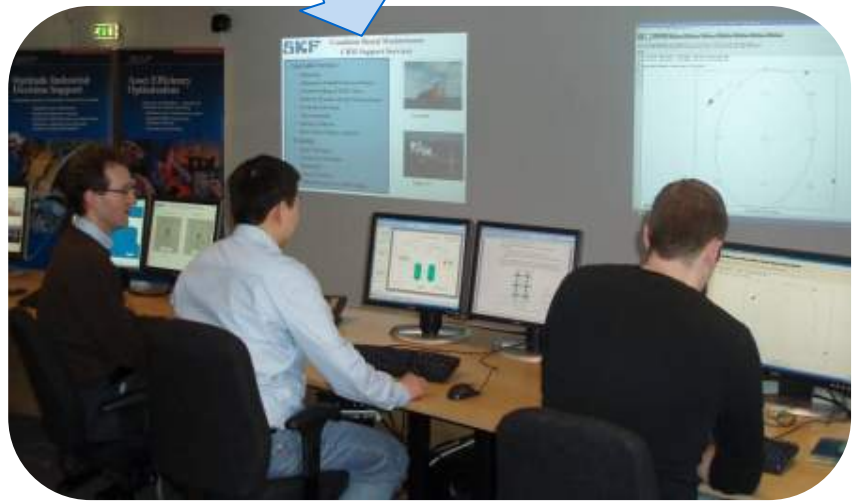
On land

Internet



Database

Analysis centre



Clearing the Hurdles to a Successful Condition Based Maintenance Programme

Requirement / Activity area	Critical Success Factors	Main Requirements
Strategy	Select critical machines	Select the right plant and machinery
	Collect data at the right time	Determine monitoring frequency/mode
	Good quality data	Competent data-collection staff Fool-proof data-collection process
Resources	Available data-collection staff	Top management commitment Keep skill requirement low (itinerant staff)
	Available analysis staff	High skill requirement (permanent staff)
Technology	Capable CM technology	Fit for purpose H/W & S/W Competent vendor support
	Class acceptability	Recognised H/W & S/W Up to date calibrations and S/W upgrades Database acceptable to Class Good communications

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Requirement / Activity area	Critical Success Factors	Main Requirements
Activity Planning	Effective scheduling	Planning & scheduling tool
	Schedule compliance	Data collection on time Analysis on time Reporting on time
Data Management	Effective data transfer	Reliable I.T. systems and support Centralised database Routine database maintenance
Accurate Analysis	Quality of analysis	Qualified, competent analysts Good quality control
	Fast & efficient analysis	Increased automation Equipment datasheets Equipment history/information
Reporting	Credible report	Standard template Standardised/automated processes Common fault codes Good corrective action advice
	Report on time	Compliance with schedule

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Requirement / Activity area	Critical Success Factors	Main Requirements
Feedback & Integration	Good feedback to analyst	Good feedback from C/E or Reliability Team Integration with CMMS
Reliability Improvement	Reliability data available Focus on repetitive faults Improve machine reliability	Equipment reliability database Analysis of fault summaries Earlier fault detection Root Cause Analysis Reliability improvement advice Monitor Mean Time Between Failures
Value for money	Demonstrate value	Cost/Benefit Report

Conclusions

Why Condition based maintenance?

- An effective maintenance strategy to reduce operating risks
- Classification agencies have adapted to CBM
- Maximize fleet availability
- Improve equipment reliability
- Improve health and safety risks

How to implement CBM?

- Simple, high quality data collection processes
- Remote analysis and recommendations by expert engineers

Why SKF?

- More than 100 years experience
- Global presence and acceptance
- Relevant technology, processes and Marine expertise


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