
Objectives OFFSHORE STRUCTURES

Assessment, Inspection and Management

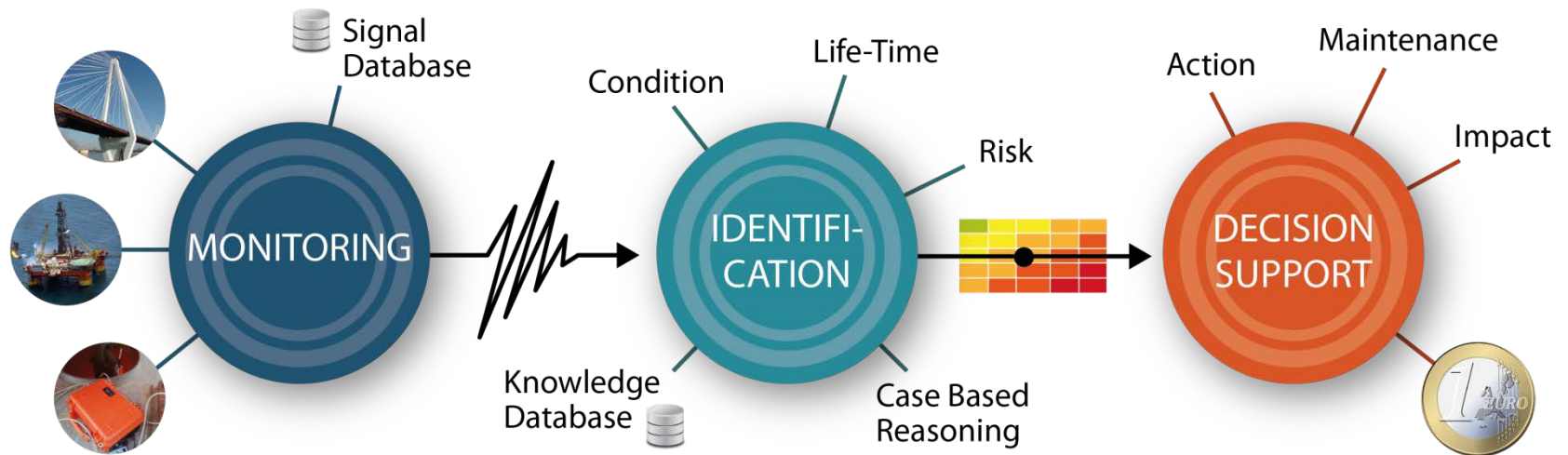
Helmut **WENZEL**

COST TU1402, Barcelona 2016

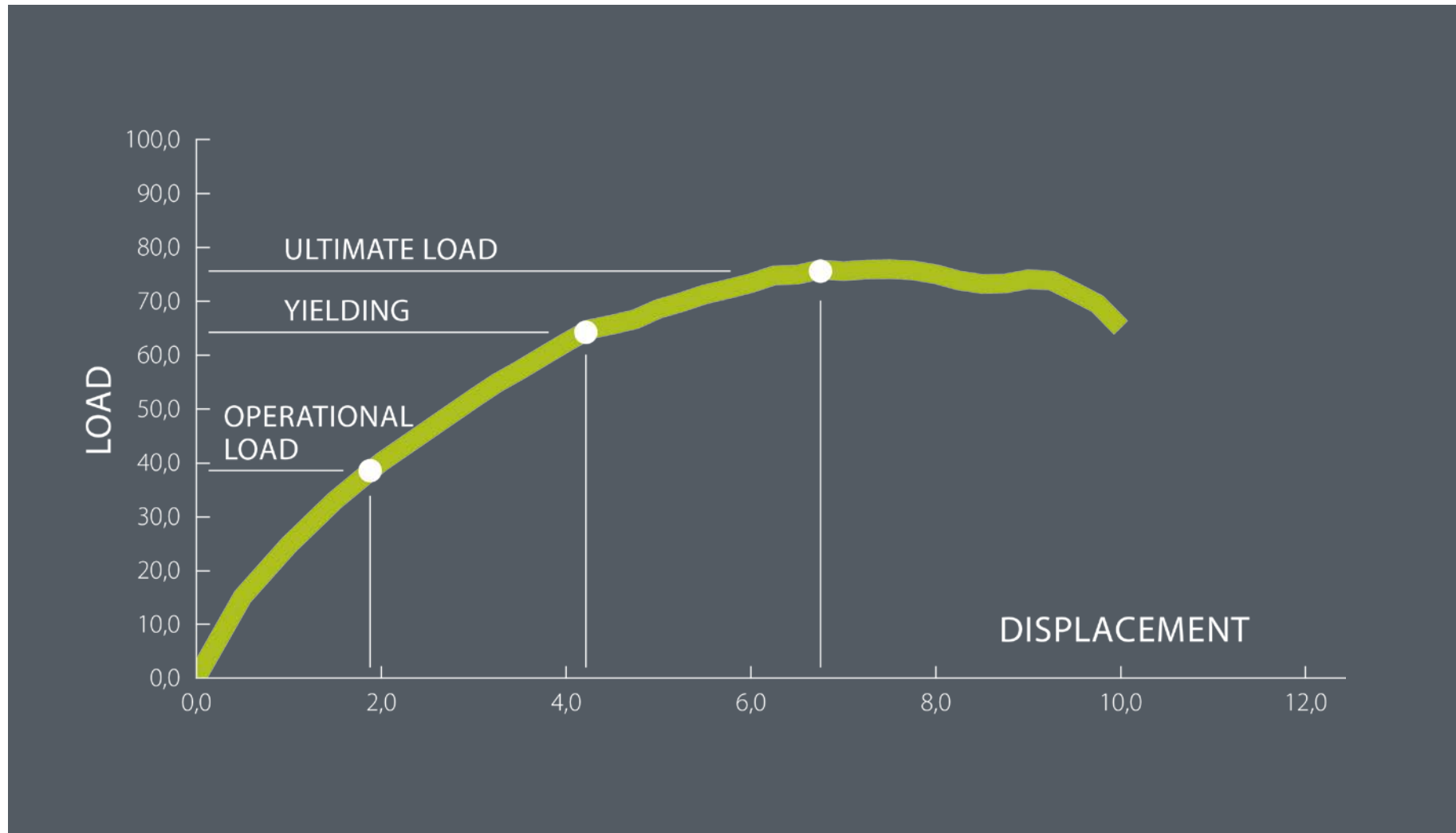


Objectives

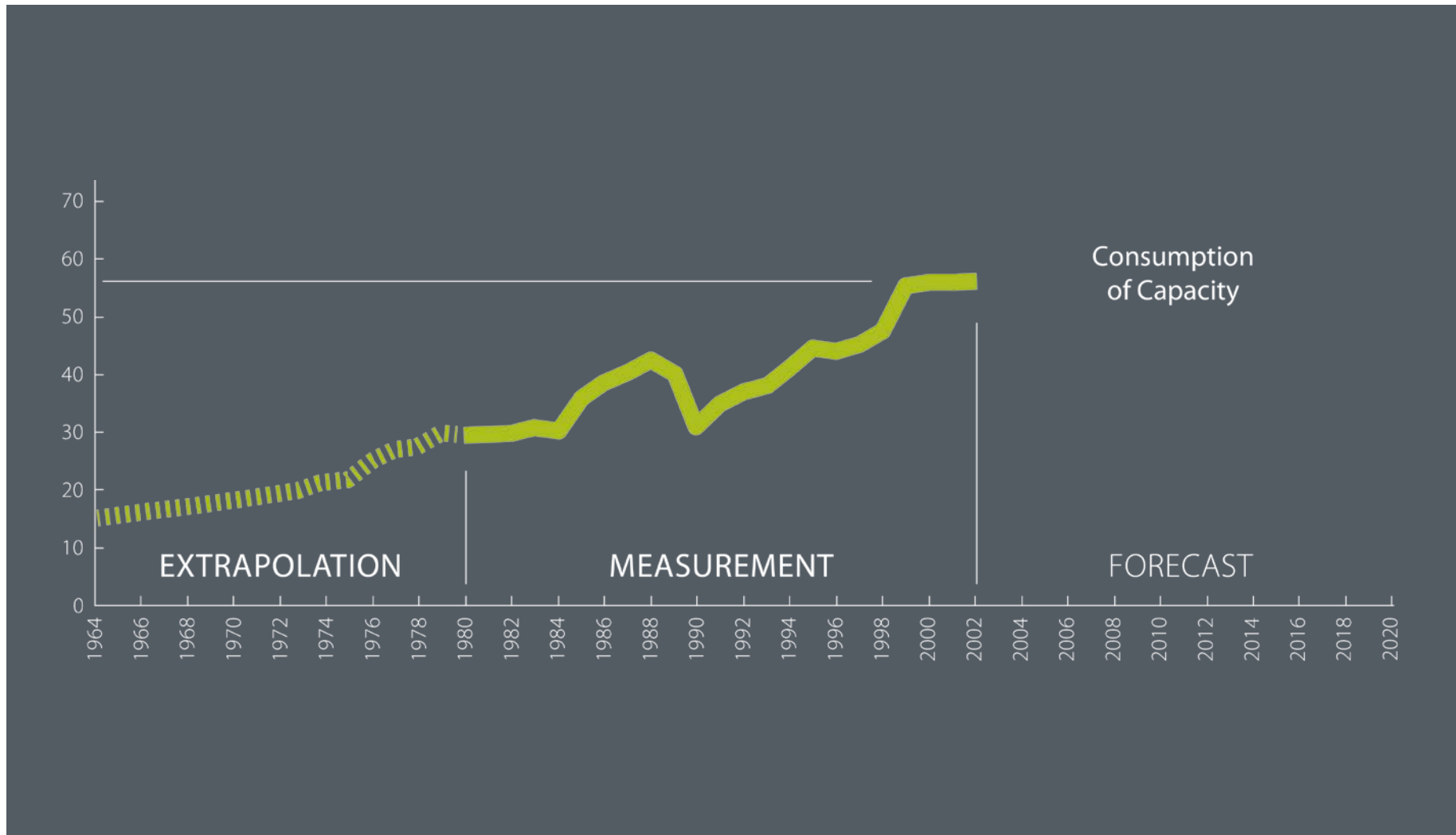
1. Ultimate Load
2. Fatigue Life Determination
3. Targeted Inspection Programme
4. Quantification of Life Extension



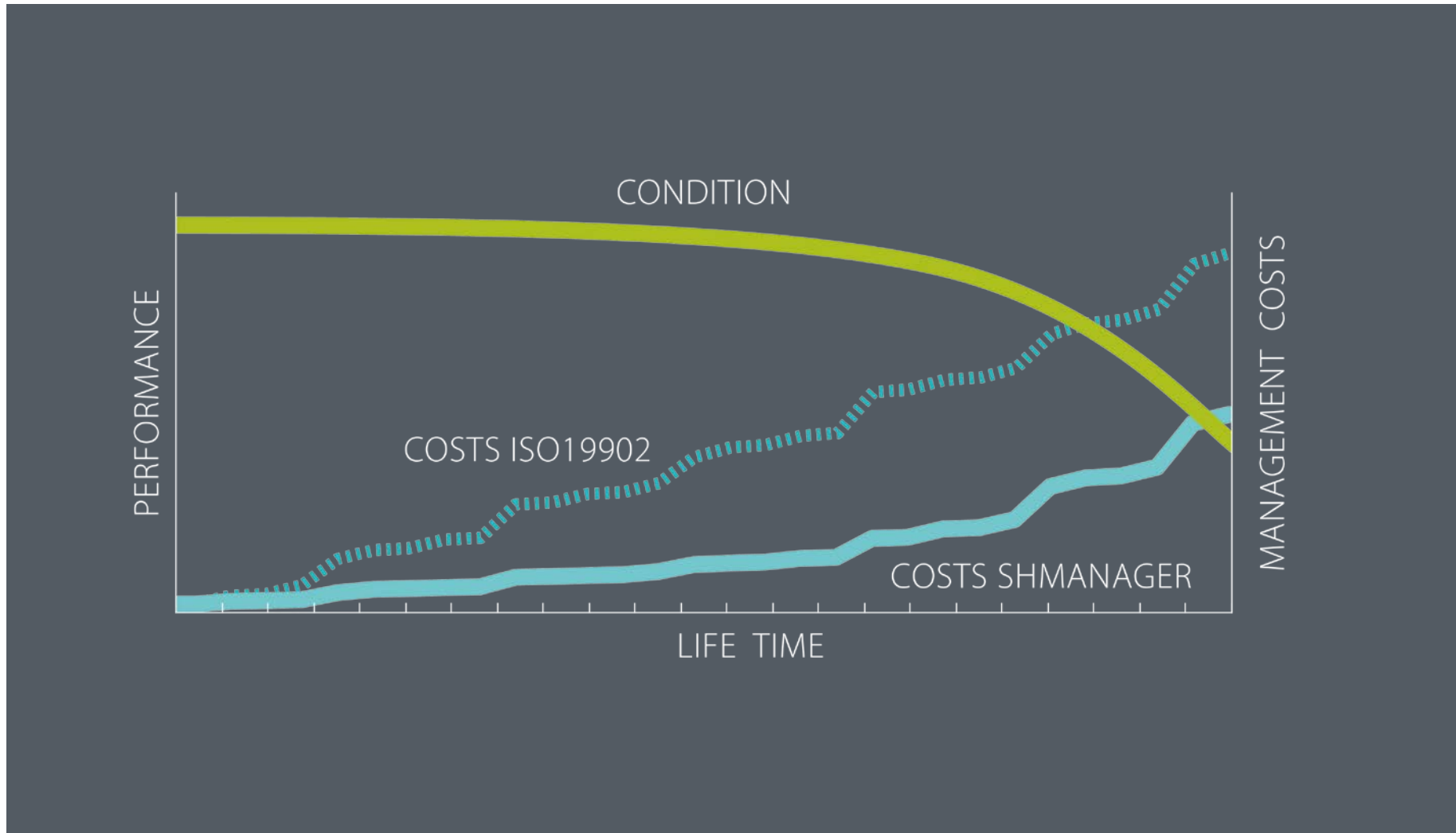
Ultimate Load



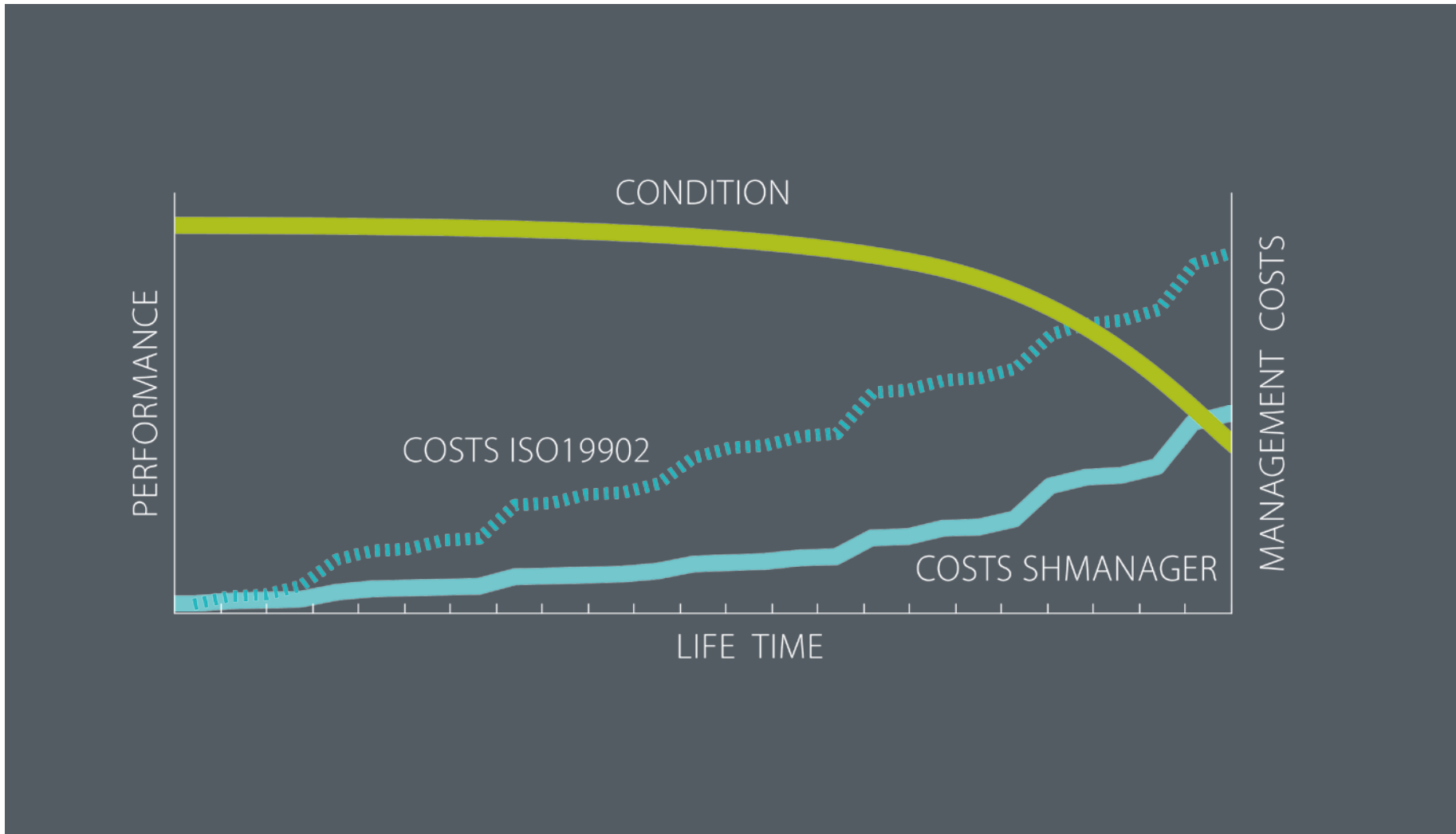
Fatigue Status



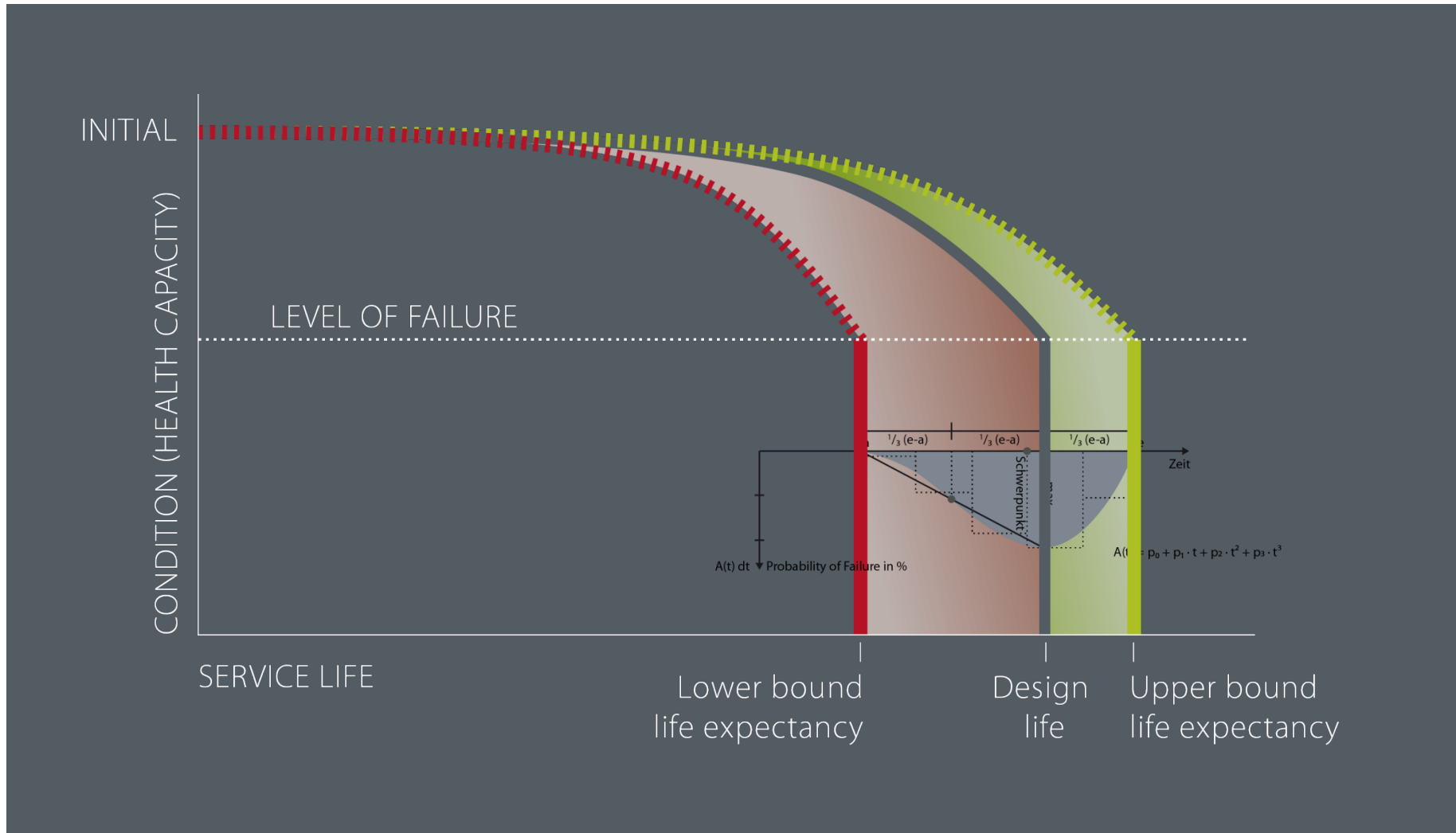
Targeted Inspection



Targeted Inspection



Life Time Performance



Extension of Life



ci_n ... condition index

ci_0 ... construction

n ... years

Ultimate Load

UL Design: 59 400 kN

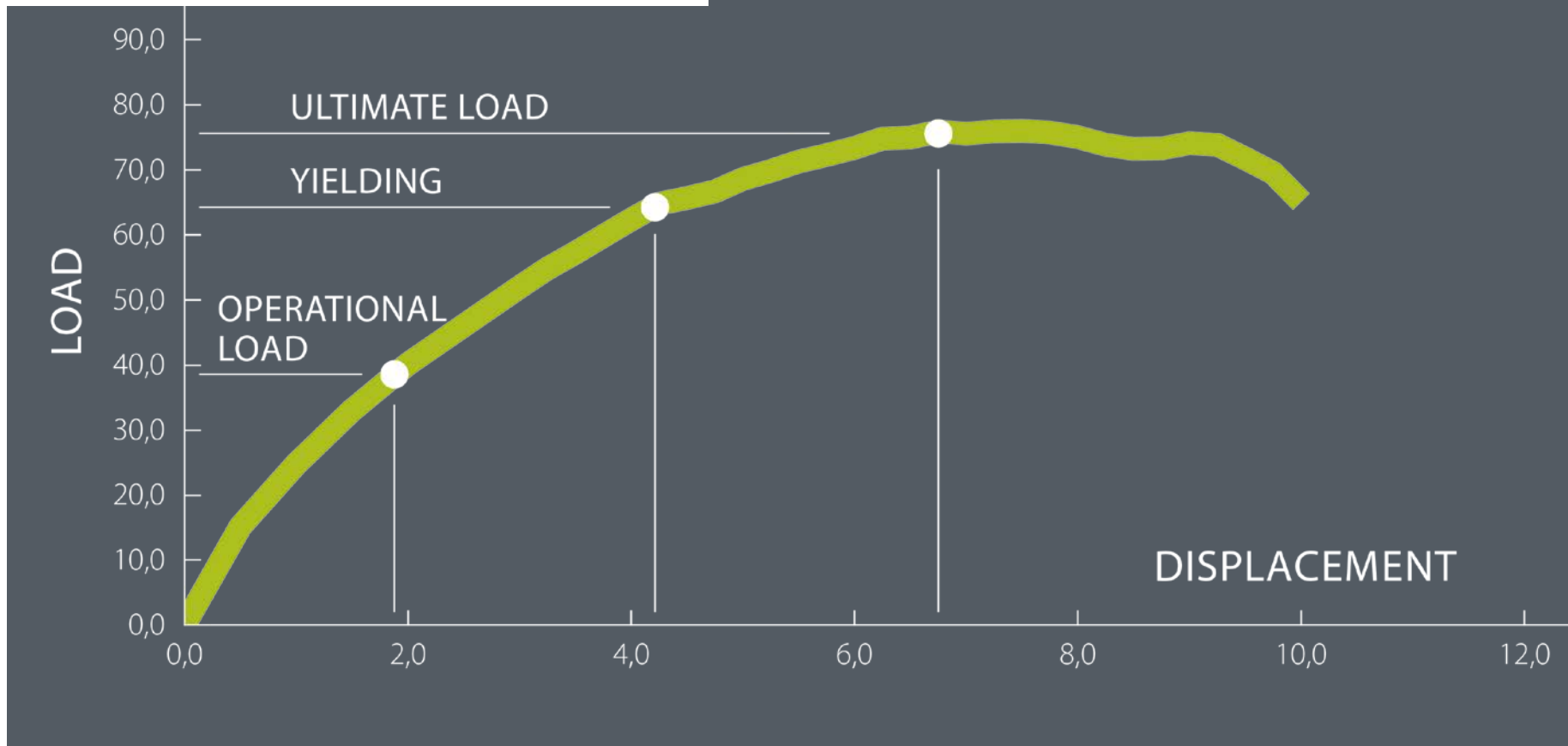
UL Monitoring: 76 000 kN

CAPACITY: 128 %

Ultimate Load

Maximum Strain

► Ultimate Load 76000 kN ◀

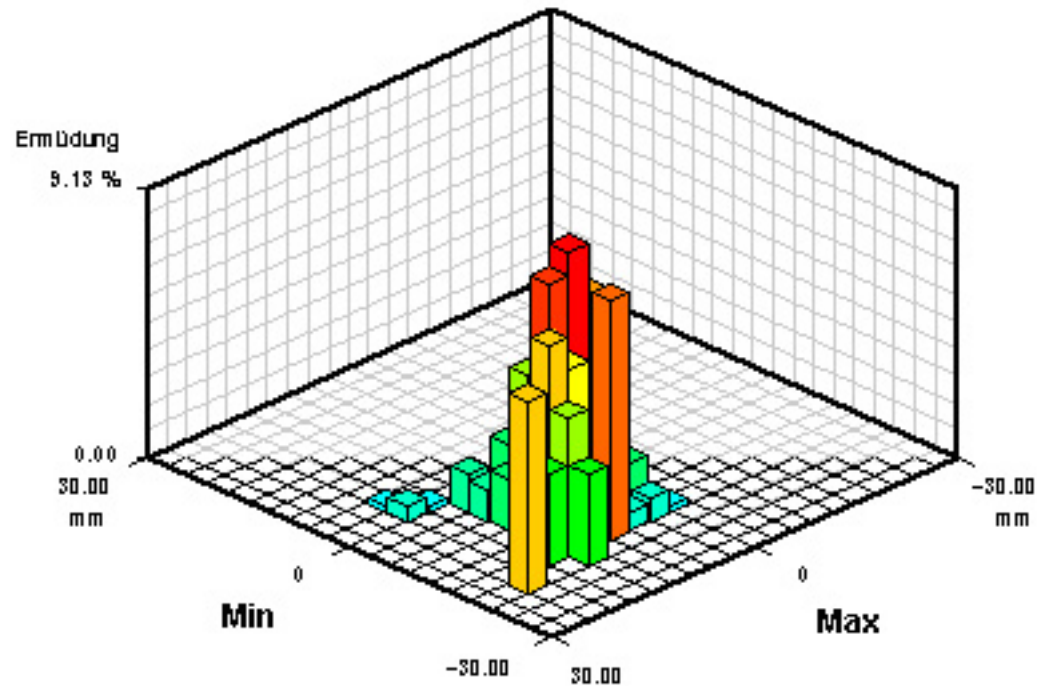


Fatigue Life Determination



Fatigue Life Determination

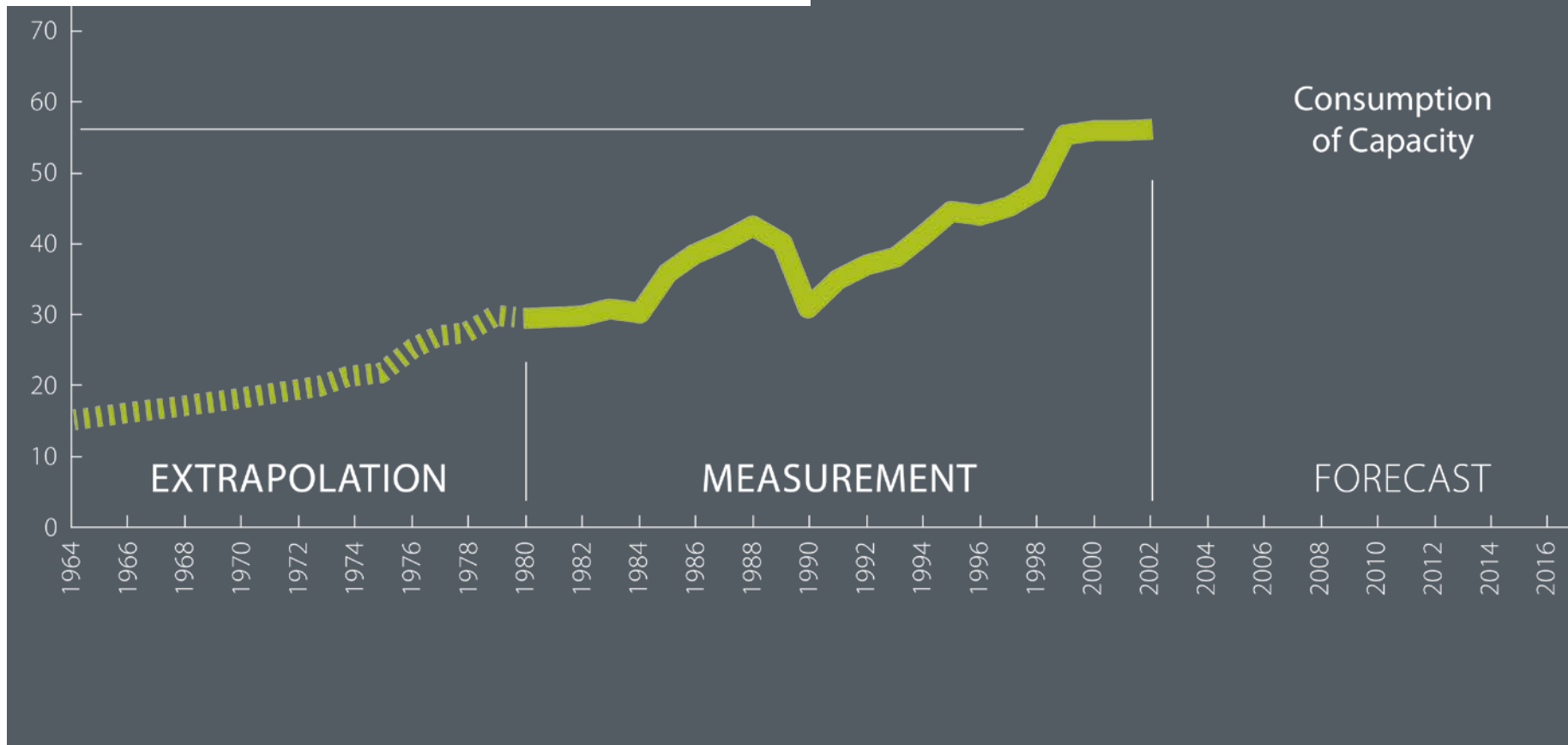
Damage-Matrix (Assessment)



Fatigue Life Determination

Consumed Life

► Fatigue Life Consumed 60 % ◀



Targeted Inspection Programme

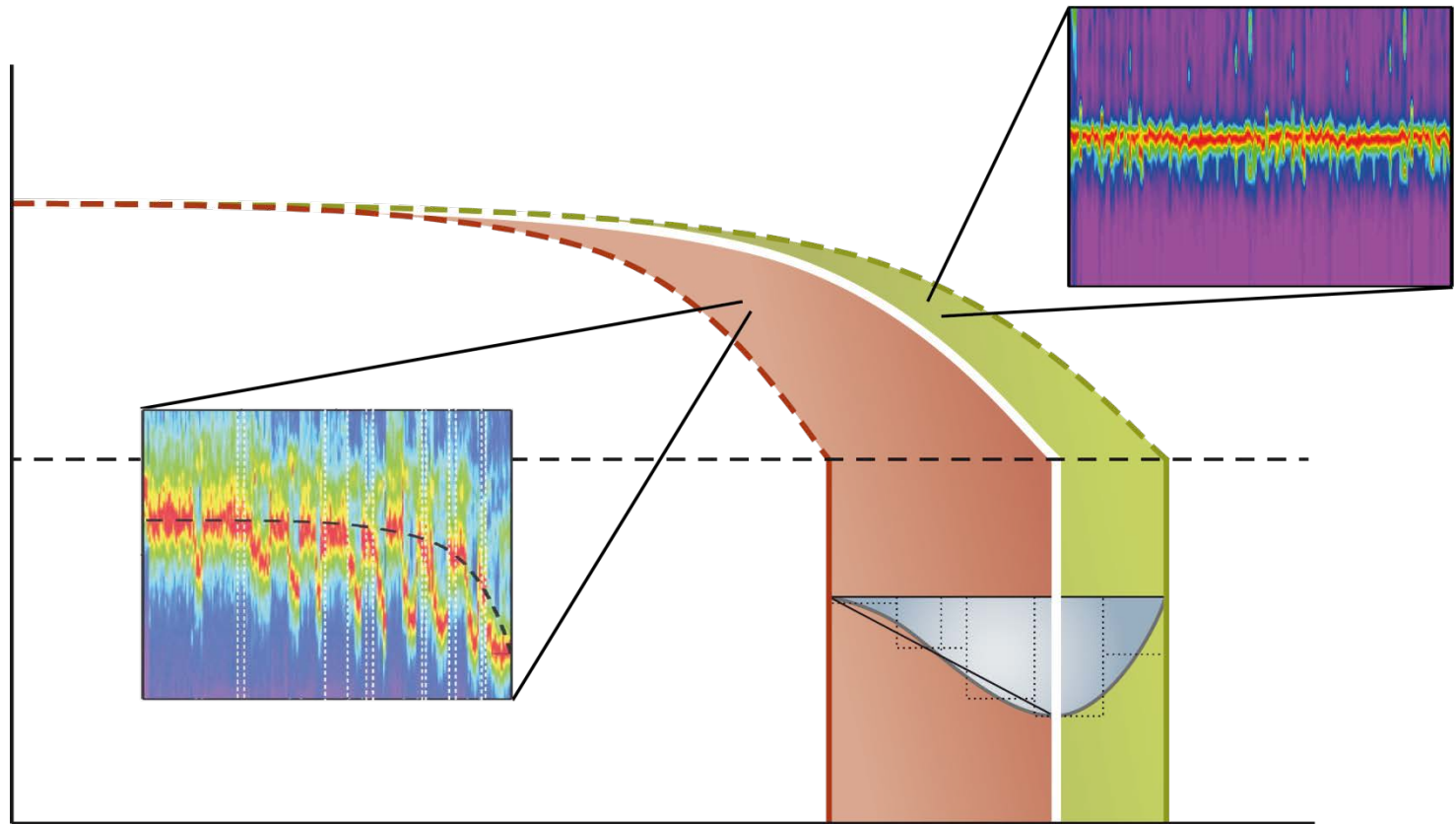
EUROCODE Potential

Date: 2014-01
CEN/TC 319
Secretariat: UNI

Risk-Based Inspection Framework

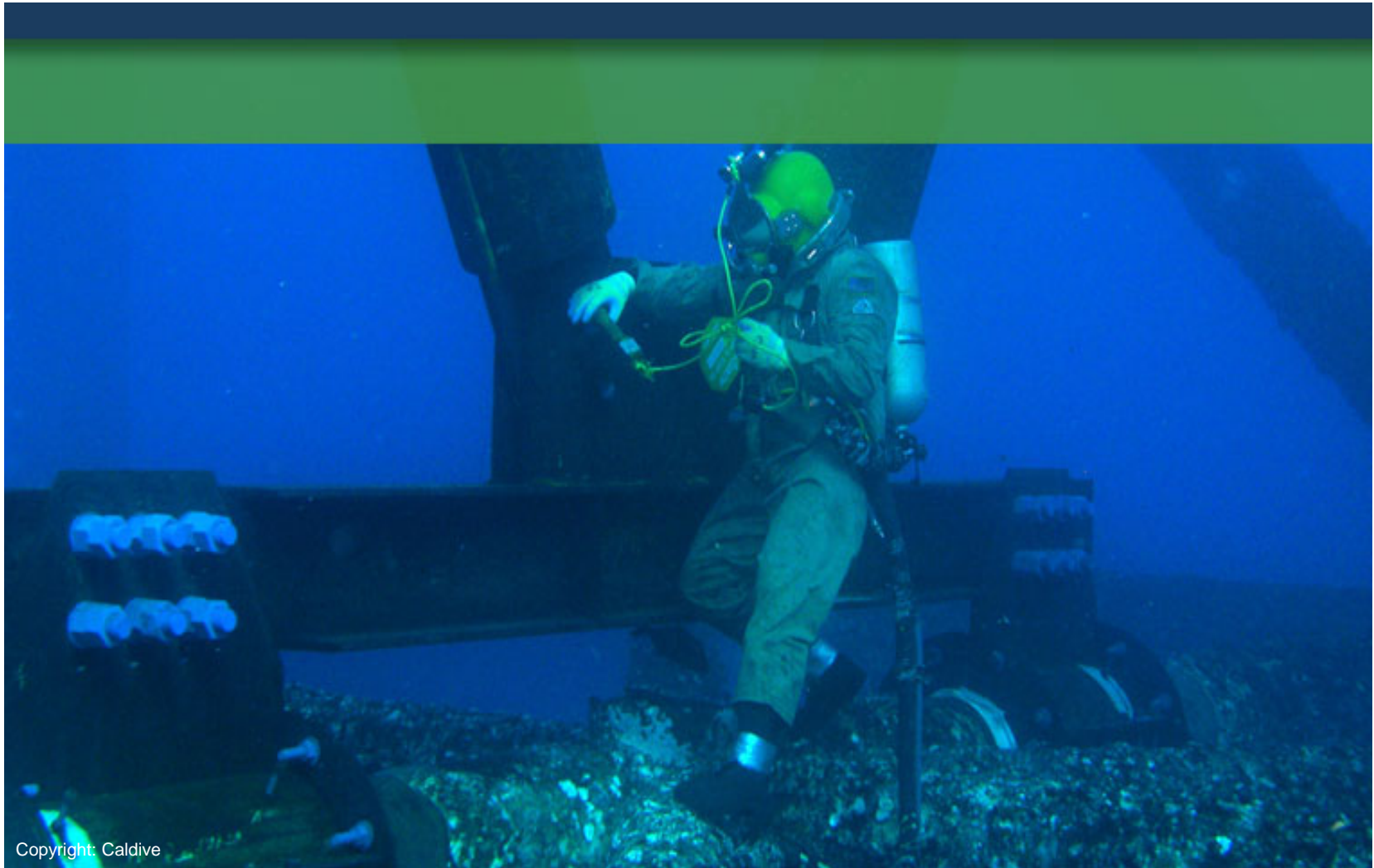
Document type: European Standard
Document subtype:
Document stage: CEN Enquiry
Document language: E

Targeted Inspection Programme



Offshore Wind Industry

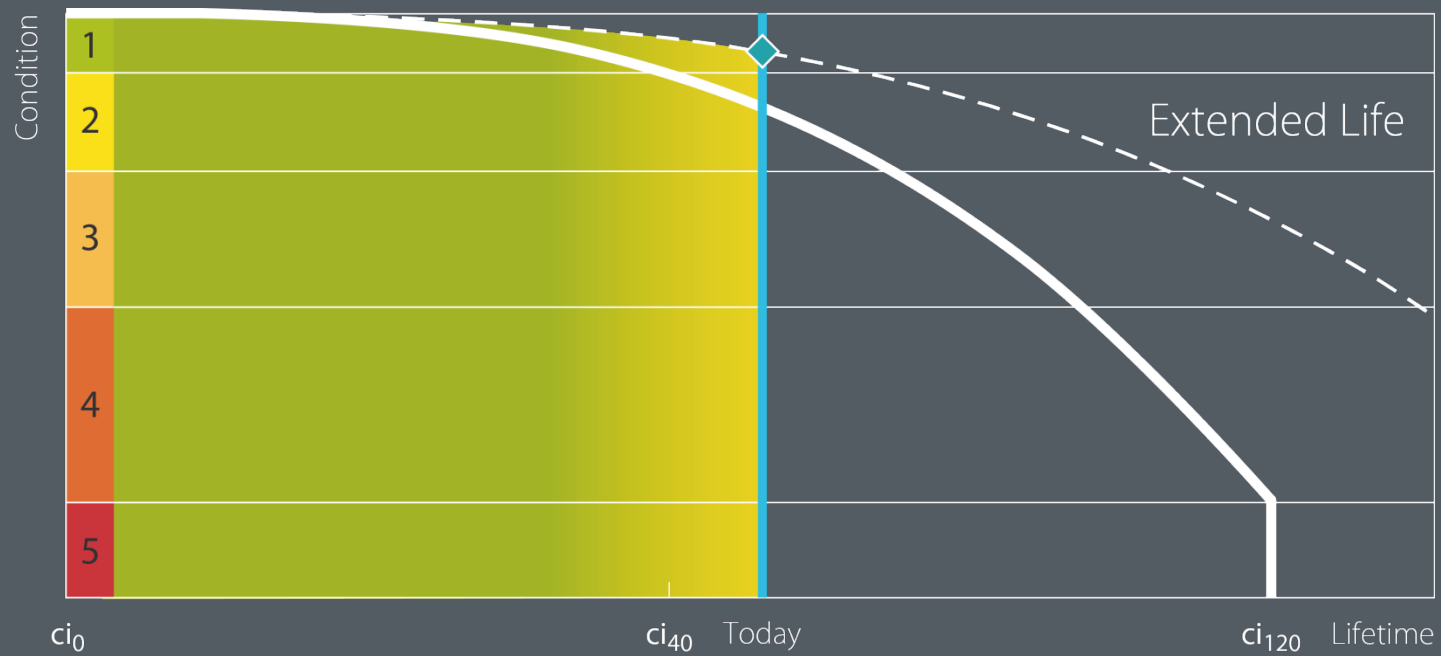
Different Asset Management Concepts



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Targeted Inspection Programme

Actual Degradation



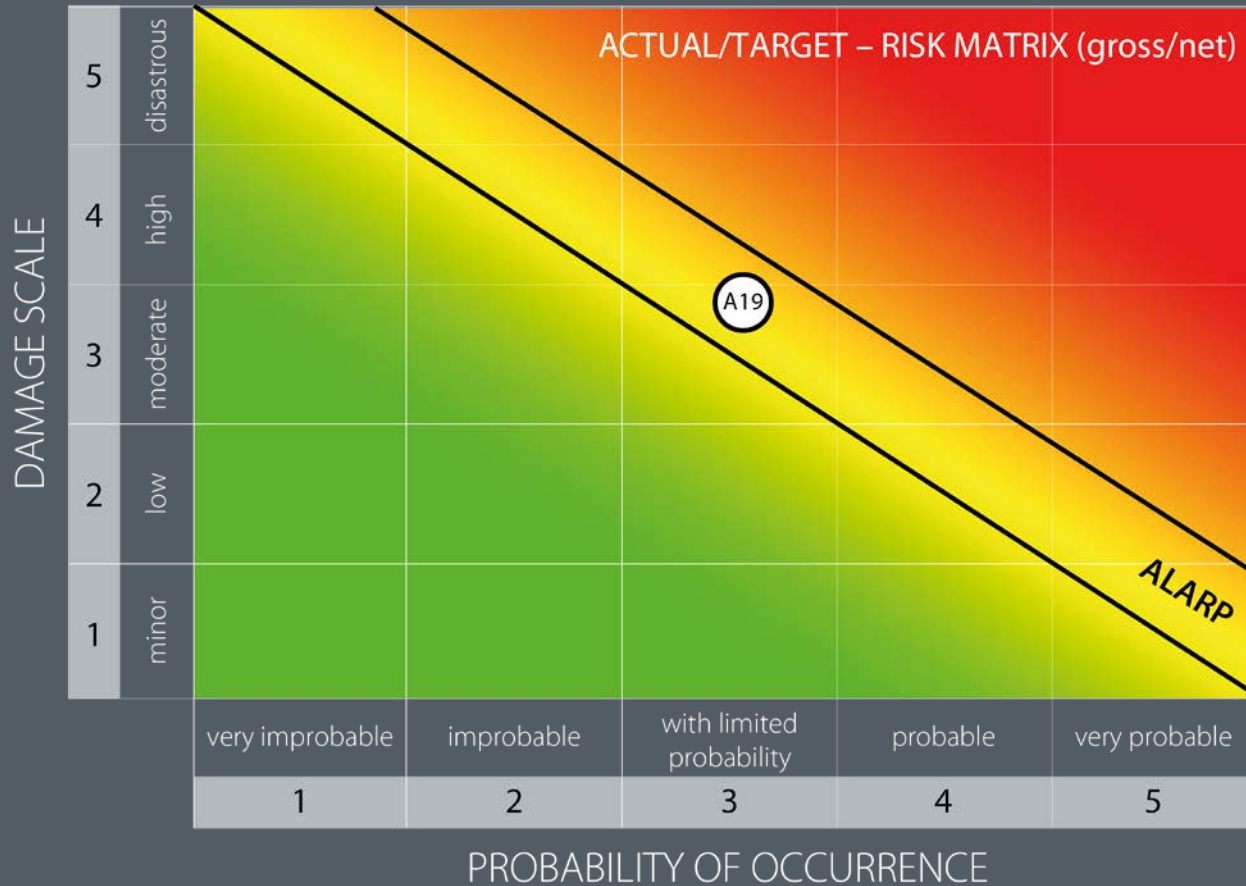
ci_n ... condition index

ci_0 ... construction

n ... years

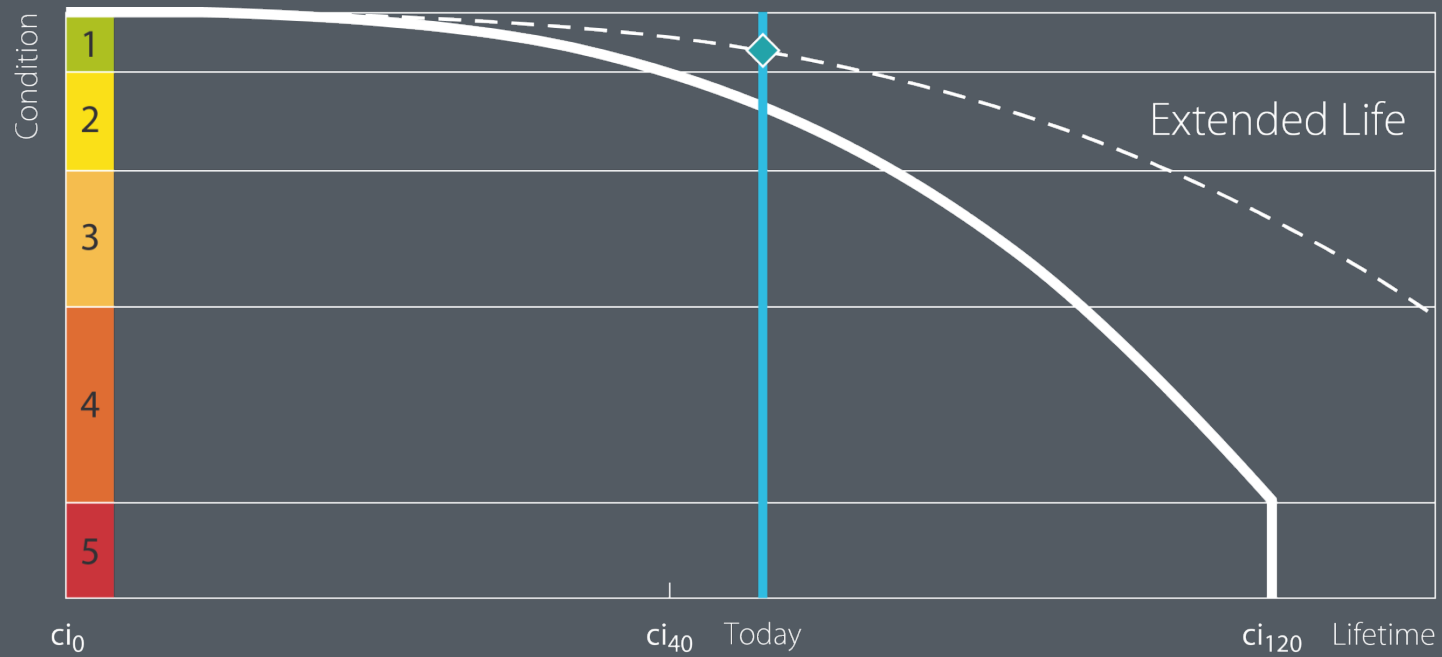
Targeted Inspection Programme

Risk Quantification



Targeted Inspection Programme

Inspection Schedule & Programm



ci_n ... condition index

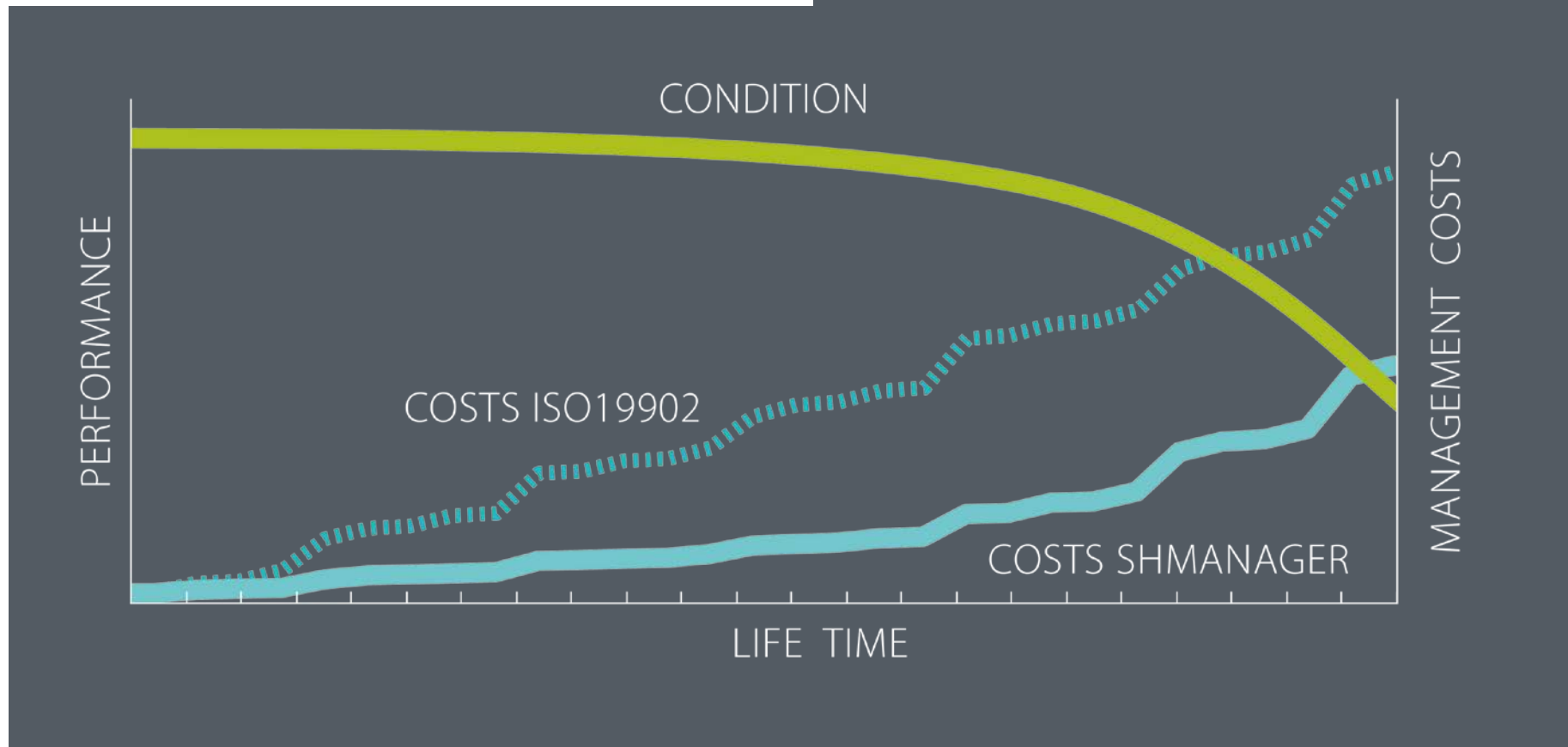
ci_0 ... construction

n ... years

Targeted Inspection Programme

Condition vs. Management Costs

► Reduced Management Costs ◀



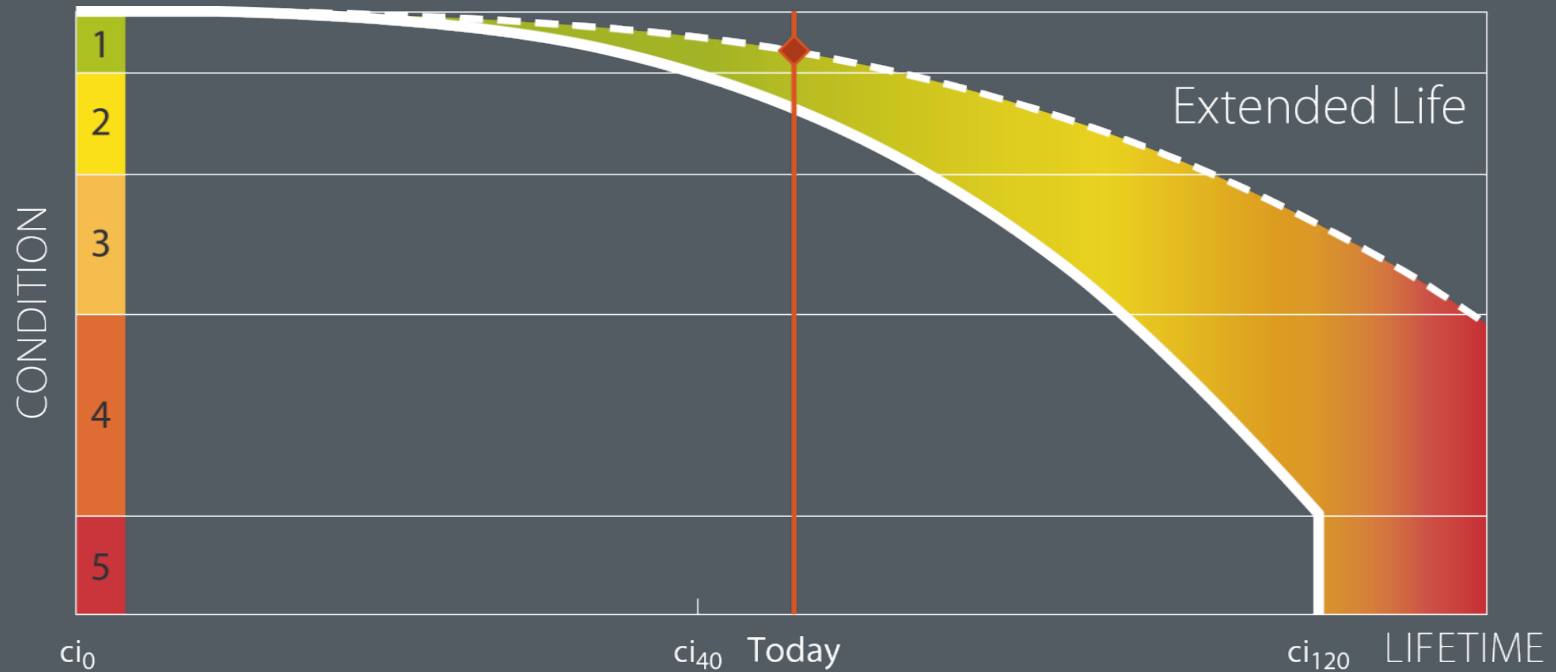
Quantification of Life Extension



Quantification of Life Extension

Extension of Life Potential

► Potential Life Extension: 16 Years ◀



ci_n ... condition index

ci_0 ... construction

n ... years

Offshore Wind Industry

Different Asset Management Concepts



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Summary

- Accurate Condition rating and performance assessment is feasible using Monitoring Information
- Ultimate Loads are determined and compared
- Consumed Fatigue Life is determined by counting
- Inspection programs are individually designed
- Extension of life time is quantified and justified

Thank You !

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