RISK BASED INSPECTION FOR AGEING EQUIPMENT.

What are the challenges and how do we cover these?

Geert Henk Wijnants
DACE Contact meeting 18 June 2026.

DACE CONTACTBIJEENKOMST

Het DACE Prijzenboekje: al generaties lang
een anker voor de cost engineer

18 juni 2026 | 15.00 - 18.00 uur | Soesterduinen

The Leading Industrial Service Provider – Our Group at a Glance
No. 1 in Efficiency and Sustainability for Our Customers

BILFINGER

Digitalization

Consultancy | **Engineering** | **New builds & modifications** | **Maintenance & Turnarounds**

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82 %

Engineering & Maintenance

9 Global Product Centers:

- Project Solutions
- Maintenance Solutions
- Turnaround Solutions
- Engineering
- Insulation, Scaffolding and Corrosion Protection
- Inspection
- Electrical, Instrumentation and Control
- Mechanical
- Digital

16 %

Technologies

Projects and components

3 Business Lines:

- Energy Transition
- Life Science
- Nuclear

Europe

BeNe | DACH | Eastern Europe | Nordic | UK

International

North America | Middle East

Industries: Energy | Chemicals & Petrochemicals | Pharma & Biopharma | Oil & Gas

€4,486 m revenue[1]

31,350 employees[2]

> 140 years of engineering expertise

OUR SERVICES

BILFINGER

Consultancy

- Asset management & maintenance
- Environment
- Energy
- Logistics
- Process integrity & safety
- Industrial sustainability
- Compliance management
- Authority engineering & permitting
- Feasibility
- Due diligence

Design & Engineering

Conceptual, basic and detailed engineering in all relevant disciplines:

- Civil, structural and architectural
- Building services
- Pipelines and infrastructure
- Electrical, instrumentation and process control
- Energy
- Piping
- Logistics
- Mechanical
- Process

Project Management

- Management of EPCm services
- Estimating and cost control
- Scheduling and progress control
- Quality and safety assurance
- Commissioning management and assistance
- Program management

Procurement

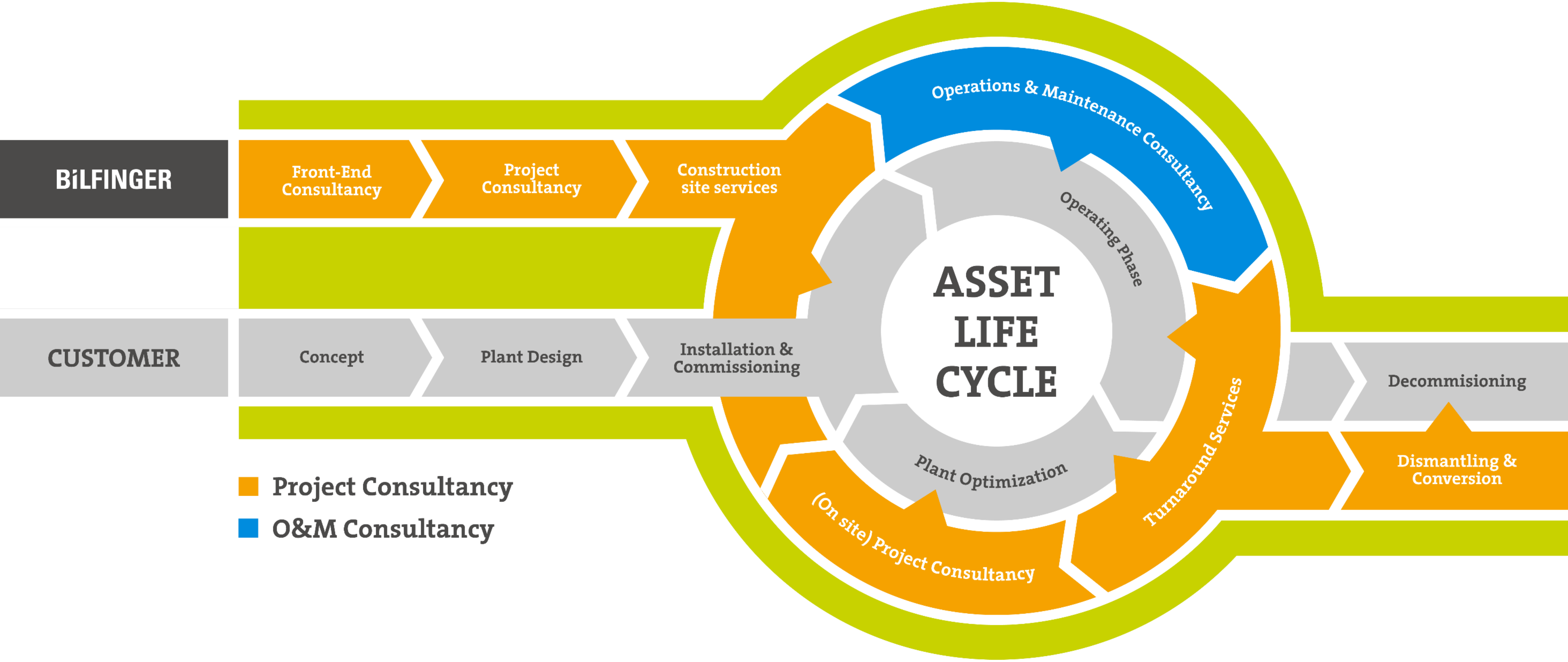
- Project purchasing, expediting and inspection
- European tenders
- (non) production related purchasing
- Performance based maintenance / tendering
- Contract management

Construction Management

- Construction quality, health, safety and environment (QHSE) management
- Site management
- Construction supervision
- planning, cost and progress control

Bilfinger Consultancy

Full life cycle Consultancy integrated in our Bilfinger Solutions



Topics

What we deliver

Integrated solutions and multidisciplinary services

01

What we deliver

Asset life-cycle care

Our products & services

Spanning the full asset life cycle

RISK BASED INSPECTION FOR AGEING ASSETS.

STORYLINE OF THIS PRESENTATION

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Steps in the story line, using framework based on available standards:

- Framework for condition assessment
  - As per design resp. as per actual condition
  - How to improve performance with use of intelligent assets
- Definition of acceptance criteria
  - Flaw or anomaly? Repair or replacement?
- Perspective on integrity management as a linear process
- Decision process for “best option” on LCC basis.
- Integrated planning, discipline independent.
- Summary / conclusions

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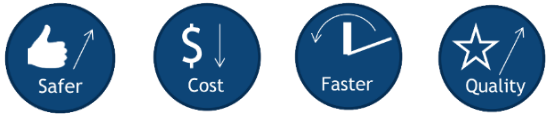
Asset management Framework

Integrity assessment

- We continually improve the performance of your facility, avoiding unplanned downtime and reducing planned downtime as much as possible.

We do that by using the next standards:

- Assessing your facility along three lines of sight, as required in order to reveal the causes of deviations (in alignment with **ISO 37301**; compliance management systems):
  - Compliance with respect to:
    - “as-is” built in comparison to original design (**A**- Design compliance)
    - “as-is” condition in comparison to requirements (**B** – Condition compliance)
    - “as-is” use in comparison to current (new) (legislative) requirements (**C** – Management of Change requirements)
- Assessment by using standards, such as **CEN 17385**:
  - Standard condition classification on 1-6 scale (6: “unacceptable”; 1 “new”).



Framework Operational Asset management

Integrity assessment: sample...

- The causes for deviations can vary widely, based on the perspective that has been applied.
- The perspective that has been chosen needs to be clarified explicitly, in order to be able to manage the various causes for deviations effectively:
- Overview of requirements with related control measures (compliance register) – in terms of A/B/C.
- Assessment of deviations by classification with respect to requirements, with wrap-up to asset level.
- The standard which urges for this effectivity is **ISO 37301** (Compliance management systems); the standard which calls for condition classification is CEN 17385.

Number of findings:	Condition class:							
Line of sight (assessment):	1	2	3	4	5	6	Remark:	*: Assessment of the change management concerns the comparison of the [current type of use] with respect to [use as specified in the design] (eg production line that is taken out of operation without being formally known as such).
A: Design			1	2	1	1		
B: Maintenance	6	12	37	20	7			
C: Management			2	3	2	3	See *	

Condition class		
6	Unacceptable	Out of control.
5	Very bad	Immediate action required.
4	Bad	Planned action foreseen.
3	Average	Clear indications for reduction in performance.
2	Good	Meets all set requirements.
1	Very good	No or ample reduction in condition.

Framework Operational Asset management

Integrity assessment: ANOMALY, FLAW or EOL.

Note I; note that:

- **Anomaly** is something which is deviating yet is not automatically related to loss of functionality. Eg. Being an Olympic athlete can be considered an anomaly.
- **Flaw** is a deviation which has a direct relationship with the capability to perform.
- **End of Life (EOL)** refers to a condition in which the asset is unable to meet the set requirements. This can relate to integrity, reliability, costs or even maintainability (obsolescence; no spare parts).

Note that in all these cases repair is considered an unfeasible option.

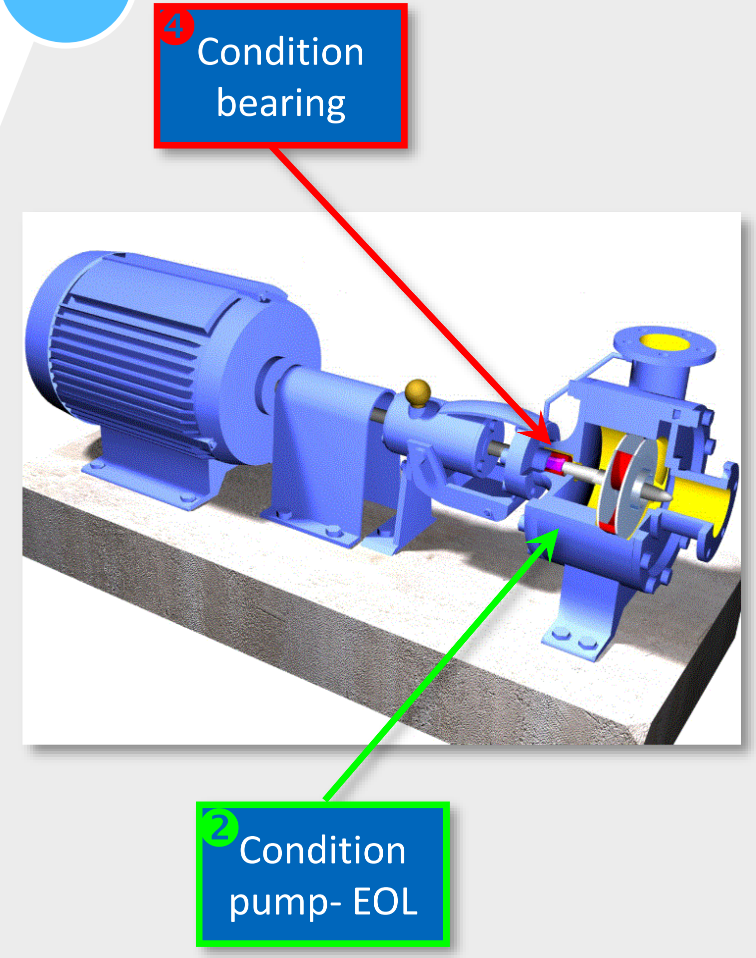
Note II:

- A flaw can usually be repaired. So a condition level 5 related to a flaw, can be associated from EOL perspective with a condition level 2 since the overall lifetime expectancy is not impacted by such a single flaw.

==➔ Be explicit on the condition assessment perspective. **EOL** or **functional.**

Note III:

- Condition assessment of **multiple parts** can be **compiled** to an **EOL** condition.
  (Using CEN 17385 methodology on previous sheet).



Note IV:

It is now possible to add sensors, combine use with performance.
IE next level in condition assessment; ***intelligent assets***. Having clear assessment criteria is crucial.

ASSET Management

05

Set acceptance criteria: align Risk

Integrity management as a linear process. What is the view?

The next considerations in general apply:

Although the cause of a failure commonly is discipline related, the consequences do not call for a discipline dependent view.
In other words: whether a failure is triggered by failing instrumentation, pumps or lines, …, in the end the weakest link in the chain will fail.
The risk of all subsequent links in the integrity chain, need to be on the same risk level. This calls on the various processes for risk management as well, whether SIL, RCM or RBI.

➔Use a uniform risk-matrix, independent of the specific discipline under consideration.

➔Determine the preventive required tasks by means of a uniformed, risk management strategy.

Guidance can be found with the help of these standards:

- ISO 31.000 on Risk Management with ISO 55.001 (see decision info).
- EN 16991 on Risk Based Inspection framework
(we simplified it in order to emphasize *one line of sight with respect to Risk assessment*).

Examples of integrated approaches: Oil & Gas; API 580/581 **APM packages**.

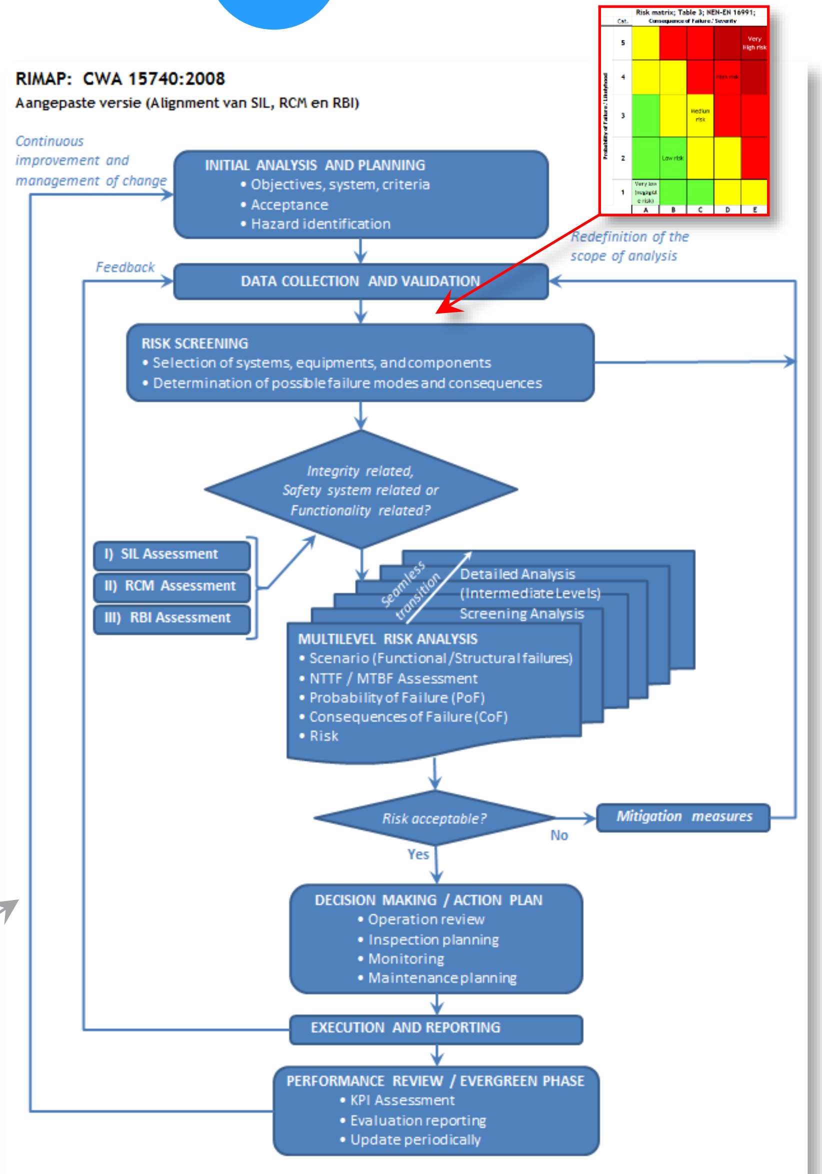
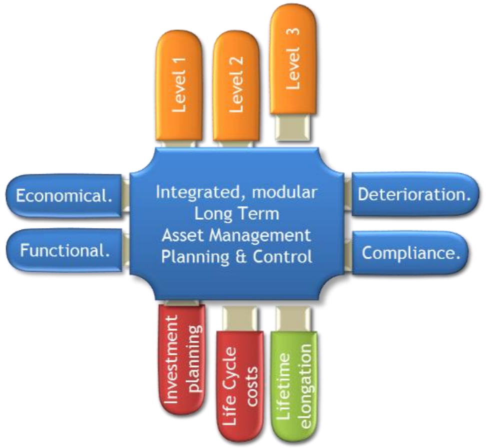


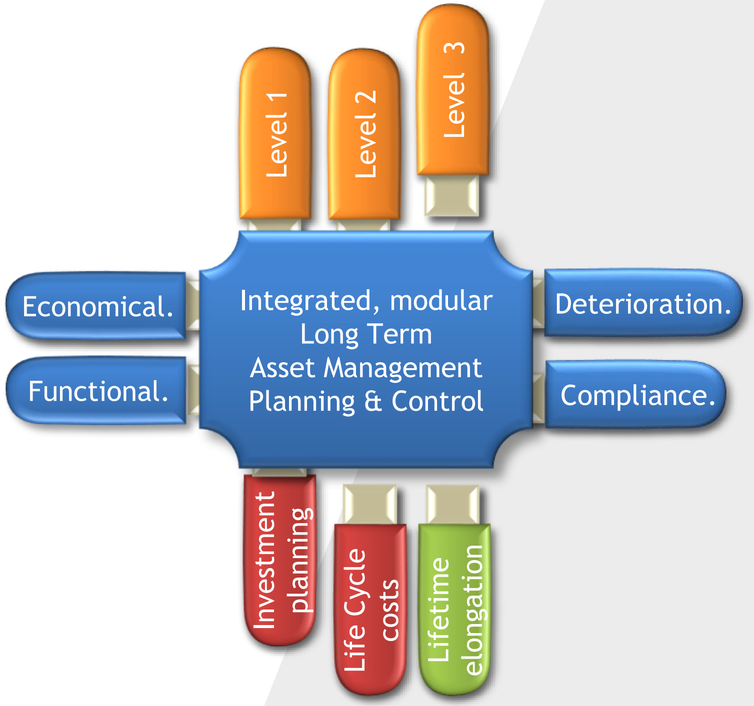
Figure 1 - Framework of RIMAP procedure within the overall management system

Operational Asset management

Linear process: Lines of sight AS PART OF EOL



- Assessment along lines of sight:
- Technical aging
- Maintainability (obsolescence)
- Functional aging (efficiency)
- Costs (overall costs level)
- … options….flexibility required.



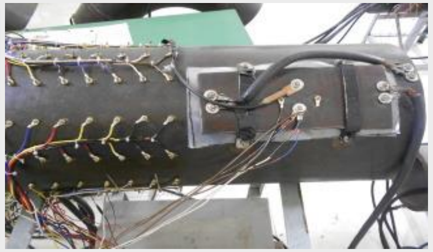
		(Deterioration) Aging	(Obsolescence) Function	(Ownership costs) Economy	(Compliance) Compliance	
Water pumps type centrifugal	•Condition: •Remnant life:	4 5 Yr.	2 3 Yr.	NA 4 Yr.	NA NA	Function. 3 Yr.
Cooling units type local (airco)	•Condition: •Remnant life:	3 10 Yr.	4 3 Yr.	NA NA	2 10 Yr.	Function. 3 Yr.
Heating type hot air.	•Condition: •Remnant life:	3 12 Yr.	2 > 15 Yr. (Nvt)	NA NA	NA NA	Aging 12 Yr.

OPERATIONAL ASSET MANAGEMENT

HOW TO USE The Intelligence of Assets.

Intelligent assets, meaning:

- Identifying their actual condition (CBM)
  - — Examples: Online WT measurements (FSM™), WT-Array (Sensorlink)
- Signaling the conditions of use
  - — Examples: Moisture monitoring (CUI; Isenspro; CorrosionRadar).
  - Checking performance by contained automatic testing
    - — Examples: Smart valves
  - Predicting and alerting on defined acceptance limit
    - — Example: GE-APM Smartsignal technology (Multiple parameter)


In general: what is the effectivity in identifying deviations?

What is the long-term performance (?drift?; ?reliability?)

⇨ To what extent are we capable of preventing actual failure?

What maintenance does it require? Maintainable Y/N?

⇨ **Once again, a risk-driven approach is required** to determine what to use, where and when**.**

⇨ **Again,** condition acceptance decision criteria with related successive measures are required as mentioned earlier.

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Intelligent assets & monitoring

Intelligent assets call for intelligent use so intelligent monitoring.

This implies:

a) What and where do we want to measure?

b) How accurate do these measurements need to be?

c) When, how often do we need to measure?

d) What are the defined acceptance criteria?

e) What are the related actions in case the (d) criteria are trespassed? Can these directly be triggered? What response time?

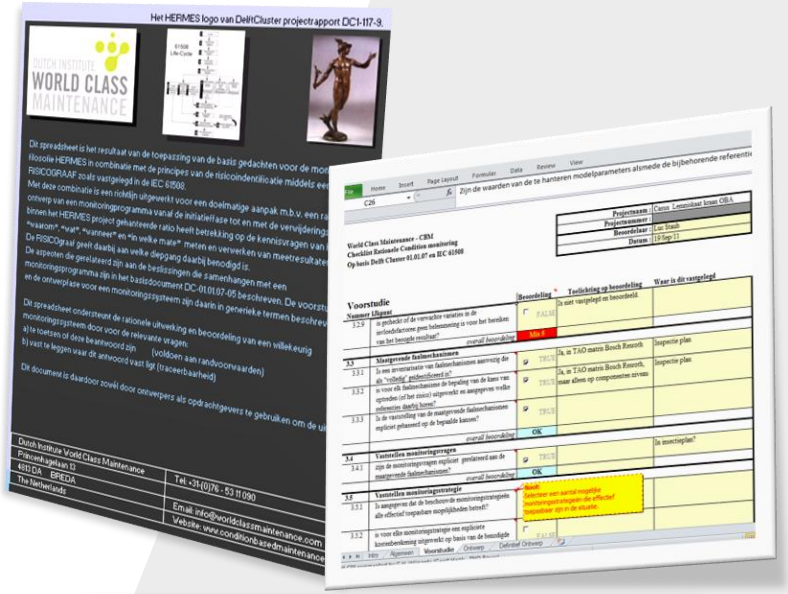
f) Does the system need maintenance, what, when, how…

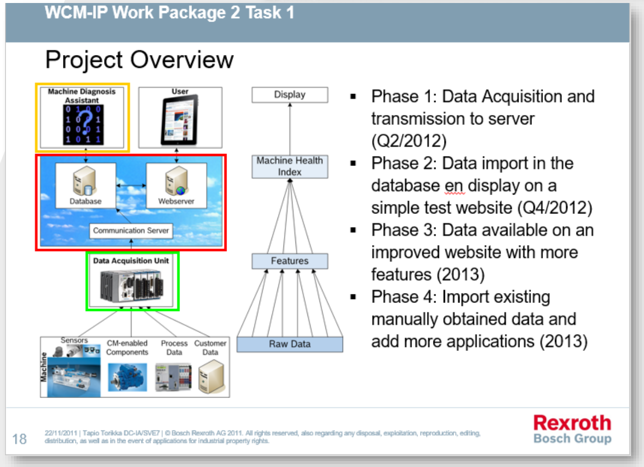
All this calls for an integrated, rational approach *for a managerial goal*.
Guidance on generic management requirements are provided by **ISO HLS ***.

- The required assessment steps have been developed in the 90's as part of the Hermes concept and have been resurged in 2012 by means of the World Class Condition Based Maintenance project.

  - **A life cycle approach**
  - **Based on a result driven view**

- Concept available4free as *best practise CUI monitoring* on **wcmvector.com**





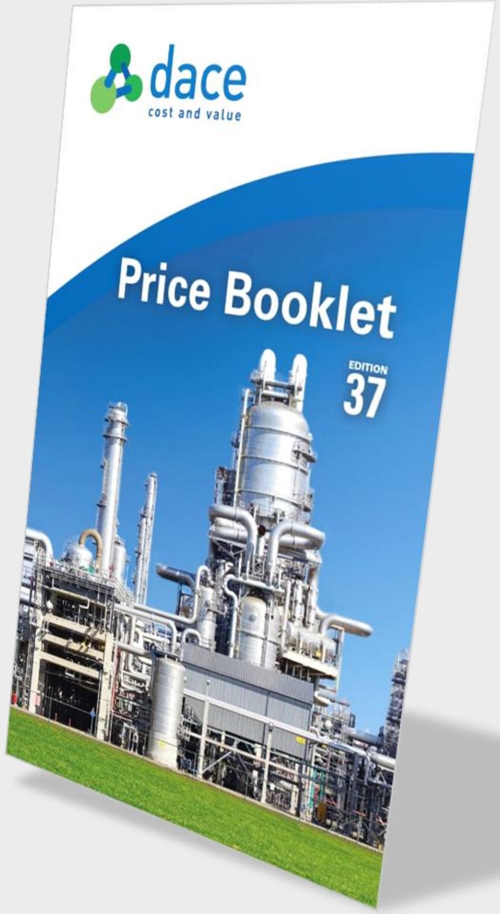
* **ISO HLS**: The ISO High Level Structure; ISO/IEC Directives, Part 1, Annex 2.

How to create transparency in the applied approach.

The Way Of Working (WOW) is based on applying models for key elements, being:.

a) End of Life estimation, applying data from identified sources.

b) Costs calculation, applying data from Costs Engineering sources (DACE)



In short, this is based on the next steps:

1) Get an overview on hard data: Condition related / Costs related.
2) Determine which parameters are decisive for the forecast. Use / System / Dimensions / ..
3) Identify which approach / fit describes behavior best, given 1)
4) Implement the forecast and plan replacement accordingly
5) Result-grill: have the results challenged by trusted sources as per company
6) Finalize the forecast and have it monitored on a yearly basis for accuracy

(Note: more data over time reduces uncertainty and thereby increases forecast-accuracy)

Simplest relationships: linear Costs = A*X+B, also A(X)*X^n etc. as per fit.

So far, all about “like for like replacement”, Momentarily CAPEX costs only.

* **ISO HLS**: The ISO High Level Structure; ISO/IEC Directives, Part 1, Annex 2.

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How to create transparency in the applied approach.

A variety of models is being applied, depending on the applicable data.

The DACE booklet is the first source for data.

Other sources may be applied in case a gap is existing.

This in its turn can than lead to expansion of the current 292 items.

Example: solar panels, wind turbines.

Future approach:

Create coded link towards standardised equipment taxonomy.

Standards like ISO 14224 to be applied.

/ System / Plant:	Price level 2024 (updated items)			Price:	With accuracy within bandwidth Δ (%).	LINK
ompressor installation.			Output capacity (m^3/h):	Price:		
ompressor installation.			4,000 m^3/h.	756 k€	with Δ within 10% for given range	A400
ucts; square shaped	Non-insulated	Total surface L*B*H:	Material:	Price per 100 m:		
ucts; square shaped		300 m^2	Galvanized steel plate	22.8 k€	with Δ as per DACE booklet Ed.33.	B200
alve (internal stainless)	Diameter (inch):	Pressure (lbs):	Type:	Price:		
alve (internal stainless)	4"	300 lbs	Cast	8.3 k€	with Δ within 7% for given range	E700
r (plant)	Pressure (BarG):	Single / multiple unit:	Steam capacity (ton/h):	Price:		
r (plant)	30 BarG	Single	30 ton/h	2,384 k€	with Δ within 30%.	A400
rfly valve:	Diameter (inch):	Pressure (lbs):	Material:	Price:		
rfly valve:	50"	150 lbs	Cast Iron	31.3 k€	with Δ within 40% for given range	B300
rifugal pump		Power (kW):	Type:	Price:		
rifugal pump		22 kW	Cast steel	8.01 k€	with Δ of 18%.	A200
k valve:	Diam. (inch):	Pressure (lbs):	Material:	Price:		
k valve:	8"	300 lbs	Cast Iron	1.61 k€	with Δ of 22% (apart from Δ of DACE booklet Ed.37)	B300
ney	Weigth:	Part:	Additional:	Costs		
ney	4275 kg	Corten Steel	Steel_Construction	77 k€	with Δ as per DACE booklet Ed.33.	B200
ng water-recirculation-unit			Cooling capacity (m^3/h):	Price:		
ng water-recirculation-unit			8,000 m^3/h.	4,640 k€	with Δ within 10% for given range	A400
rical power generation (Diesel)		Incl:	Power (kW):	Costs		
rical power generation (Diesel)		Control panel	2,250 kW	322 k€	with Δ within 60% for given range	D100
Centrifugal type			Suction capacity (m^3/h):	Price:		
Centrifugal type	RPM 1.500-3.000; Mat.: PVC or carbon steel.		23,000 m^3/h	35,683 k€	with Δ of max. 40%.	A200
valve	Diameter (inch):	Pressure (lbs):	Material:	Price:		
valve	12"	600 lbs	AISI_316	21.0 k€	with Δ within 28% for given range	B300
Control valve	Diameter (inch):	Pressure (lbs):	Material:	Price:		
Control valve	6"	600 lbs	AISI_316	36.2 k€	with Δ within 21% for given range	E700
exchanger, bundle type.	Surface (m^2):	Type:	"U" tube:	Price:		
exchanger, bundle type.	8 m^2	Cst	No	16 k€	with Δ of 50%.	A100
exchanger, plate type.		Type:	Surface (m^2):	Price:		
exchanger, plate type.		Titanium	160 m^2	137 k€	with Δ of 26%.	A101
ontal screw conveyor.		Trough length (m):	Diameter (mm):	Price:		
ontal screw conveyor.		20 m.	630 mm.	33 k€	with Δ of 23%.	A300
ation	Type of equipment:	Insulation thickness:	Particular parts:	Price:		
ation	Vessels, tanks and he	30 mm.	Flat head, cap. Lid o	149 €/m2	with Δ within 3% for given range	C200
ning protection			M^2 covered:	Price:		
ning protection	(Dace ed. 37, F5006)		2,500 M^2	33.8 k€	with Δ within 48% for given range	
Pressure ventilation system			Capacity in M^3/h:	Price:		
Pressure ventilation system	(Dace ed. 37, A5003)	10.000-100.000 M^3/h	10,000 M^3/h	32.0 k€	with Δ within 38% for given range	
ure safety valve	Inlet (Inch):	Pressure (lbs):	Type:			
ure safety valve	6"	150 lbs	Inox	7.8 k€	with Δ within 27% for given range	B301
less pipe		Diam. (inch):	Schedule:	Price per 100 m:		
less pipe		12"	XS	11.1 k€	with Δ within 15% for given range	B1001
el; Cylindrical; Horizontal	Contents (m^3):	Material:	Wallthickness (mm):	Price:		
el; Cylindrical; Horizontal	10 m^3	C-staal	8 mm	31 k€	with Δ below 50% (>10 m^3 typically 15%).	A100
el; Cylindrical; Vertical	Material:	Type:	Volume (m^3):	Costs		
el; Cylindrical; Vertical	C-steel.	Cone roof	50m^3	100 k€	Cone: with Δ below 5% with content above 13.000 m^3.	A100
r treatment plant		Type of installation:	Steam capacity (ton/h):	Price:		
r treatment plant		Demineralisation	50 m^3/h.	4,808 k€	with Δ within 21%.	A400

... Costs | KostenSpec | DACE 37 Ed. | DACE 33 Ed. | DACE 32 Ed. | Turbine | PowerSupply | CylindricalSto ...

It’s all about traceability.

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Costs model based on traceable source (DACE Booklet):

Cost **A1002 Vertical storage tanks** — Bron: Uit DACE Price booklet, Ed. 37., Nov. 2024, Blz. 18

Material: Carbon steel.

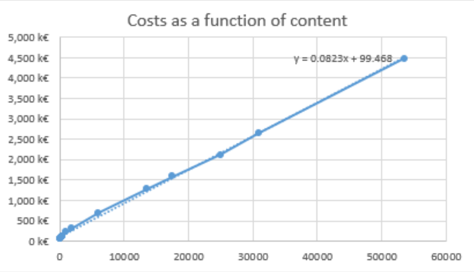
Type: Cone roof, floating roof or sphere.

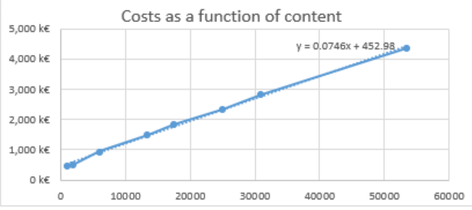
Including: 1 Outside cage ladde | Hand raili | 2 Manholes; | Assembly on site. | Several nozzles;

Excluding: Internals; — Civil work, painting and insulation.

C=A*X+B

Design	Volume in m³	Height (h) in m	Diameter (d) in m	[illegible] area in m²	Weight [illegible]	Cost each (in k€)				
								A= 0.0823		
								B= 66		
Cone roof	50	5.00	3.60	77	3.65	52 k€		Delta=35%	70 k€	
	100	6.00	4.60	120	5.65	64 k€	Volume	25,000m³	74 k€	
	150	6.00	5.60	155	7.30	69 k€	Costs	2,124 k€	78 k€	Max: 35%
	200	7.50	5.80	190	9.00	82 k€			82 k€	Min: 36%
	250	7.50	6.50	220	10.40	93 k€		Delta=-7%	87 k€	
	300	7.50	7.10	247	11.70	101 k€		Delta=-10%	91 k€	
	350	8.00	7.50	277	13.10	108 k€		Delta=-12%	95 k€	
	400	8.00	8.00	302	14.25	119 k€		Delta=-17%	99 k€	
	500	9.00	8.50	355	16.70	130 k€		Delta=-18%	107 k€	
	1000	9.15	12.20	585	38.00	232 k€		Delta=-36%	148 k€	
	1800	10.70	14.60	825	54.00	311 k€		Delta=-31%	214 k€	
	6000	12.90	24.40	1,923	137.00	688 k€		Delta=-19%	560 k€	
	13500	14.70	34.20	3,415	290.00	1,280 k€		Delta=-8%	1,177 k€	
	17500	14.70	39.10	4,205	380.00	1,595 k€		Delta=-6%	1,506 k€	
	25000	16.50	44.00	5,319	520.00	2,120 k€		Delta=0%	2,124 k€	
	31000	16.50	48.80	6,267	640.00	2,660 k€		Delta=-2%	2,617 k€	
	53500	18.30	61.30	9,422	1,070.00	4,470 k€		Delta=-0%	4,469 k€	
Floating roof	1000	9.15	12.20	585	50.00	459 k€		A= 0.0746	528 k€	
	1800	10.00	14.60	825	67.00	512 k€		B= 452.98	587 k€	
	6000	12.90	24.40	1,923	158.00	946 k€	Volume	25,000m³	901 k€	Max: 15%
	13500	14.70	34.20	3,415	290.00	1,475 k€	Costs	2,099 k€	1,460 k€	Min: 5%
	17500	14.70	39.10	4,205	385.00	1,840 k€		Delta=-4%	1,758 k€	
	25000	16.50	44.00	5,319	530.00	2,335 k€		Delta=-1%	2,318 k€	
	31000	16.50	48.80	6,267	650.00	2,820 k€		Delta=-2%	2,766 k€	
	53500	18.30	61.30	9,422	1,050.00	4,370 k€		Delta=2%	4,444 k€	
Sphere	610		10.50		100.00	1,190 k€	A= 0.72575	B= 747.291	1,190 k€	No Error
	3600		19.00		430.00	3,360 k€	Volume	25,000m³	3,360 k€	
This is assumably a spherical tank.							Costs	18,891 k€		

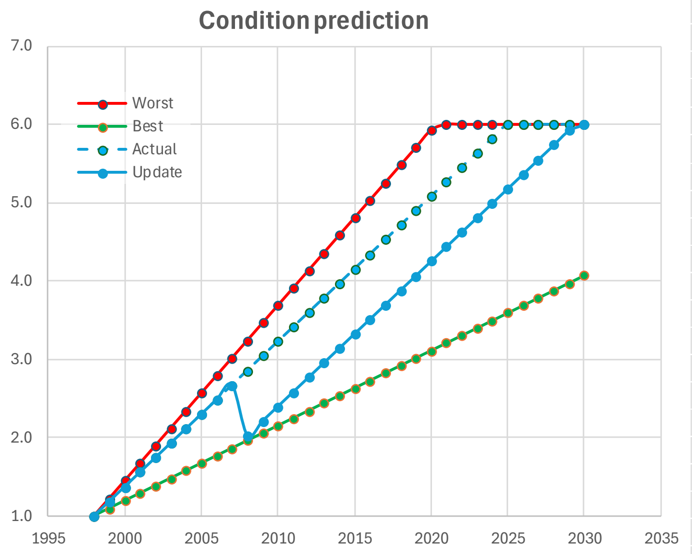




Turbine | PowerSupply | CylindricalStorageVessel | CylindricalVessel | Boiler | CentrifugalPump | Fans

Lifetime model based on traceable source (Oreda, IEEE Std 500, ..):

	Condition prediction				
Condition:		Worst	Best	Actual	Update
	1998	1.0	1.0	1.0	1.0
	1999	1.2	1.1	1.2	1.2
	2000	1.4	1.2	1.4	1.4
	2001	1.7	1.3	1.6	1.6
	2002	1.9	1.4	1.7	1.7
	2003	2.1	1.5	1.9	1.9
	2004	2.3	1.6	2.1	2.1
	2005	2.6	1.7	2.3	2.3
	2006	2.8	1.8	2.5	2.5
	2007	3.0	1.9	2.7	2.7
2	2008	3.2	2.0	2.9	2.0
	2009	3.5	2.1	3.0	2.2
	2010	3.7	2.2	3.2	2.4
	2011	3.9	2.2	3.4	2.6
	2012	4.1	2.3	3.6	2.8
	2013	4.4	2.4	3.8	3.0
	2014	4.6	2.5	4.0	3.1
	2015	4.8	2.6	4.2	3.3
	2016	5.0	2.7	4.3	3.5
	2017	5.3	2.8	4.5	3.7
	2018	5.5	2.9	4.7	3.9
	2019	5.7	3.0	4.9	4.1
	2020	5.9	3.1	5.1	4.3
	2021	6.0	3.2	5.3	4.4
	2022	6.0	3.3	5.5	4.6
	2023	6.0	3.4	5.6	4.8
	2024	6.0	3.5	5.8	5.0
	2025	6.0	3.6	6.0	5.2
	2026	6.0	3.7	6.0	5.4
	2027	6.0	3.8	6.0	5.6
	2028	6.0	3.9	6.0	5.7
	2029	6.0	4.0	6.0	5.9
	2030	6.0	4.1	6.0	6.0



Model: flexible and adapted to actual behavior in practice.

It’s all about traceability.

- DACE price booklet is the best available costs reference.

  “best” in terms of being clear on costs estimation level and uncertainty bandwidth.

- Alternative approaches such as “Rule of six-tenth” (costs increase in proportion with a factor 0.6 related to size – size being most relevant property – power / producing cap. Etc.) are highly dependent on reference costs value and have ambiguity related to factor.

OPERATIONAL ASSET MANAGEMENT

Definition of best approach

What is best? Depends on your lines of sight. Short term result, long term profitability, exposure,….

In most cases: it's all about:

- Meeting requirements as defined by company value model
- Minimized expenditure incl. minimized profit losses.

This calls for an LCC approach.

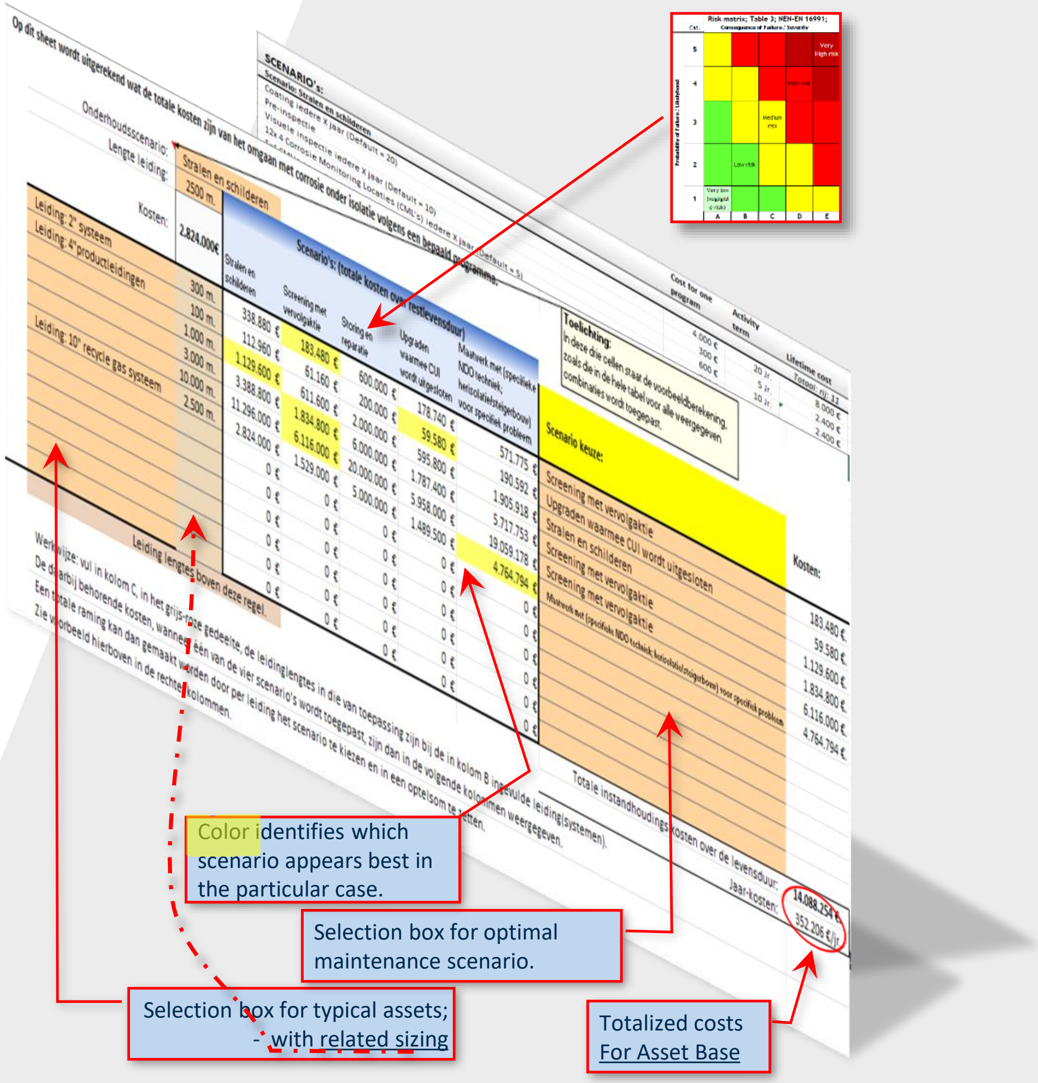
A sample for linearized assets:
Scenario assessment as part of risk-driven CUI management program for piping systems (WCM project Risk Based CUI Management).

Common options:
❶ Repair & Recondition (Standard)
❷ Complete renewal (original design)
❸ Run To Failure (then Fix) –reveals failure costs
❹ Upgrade (increased robustness, longer lifetime)
❺ Tailored approach (combination of options)

All costs per scenario summarized over the lifecycle.
Totals averaged to costs/yr over remaining lifetime.

All options need to be complaint with the risk-acceptance criteria as defined. This defines a bottom line for the quality of all considered maintenance options.

For critical applications, option ❸ therefore is not actually applicable and then just serves to envisage the consequences of failure (COF).



What about an integrated approach

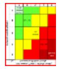
An integrated approach can be applied both in

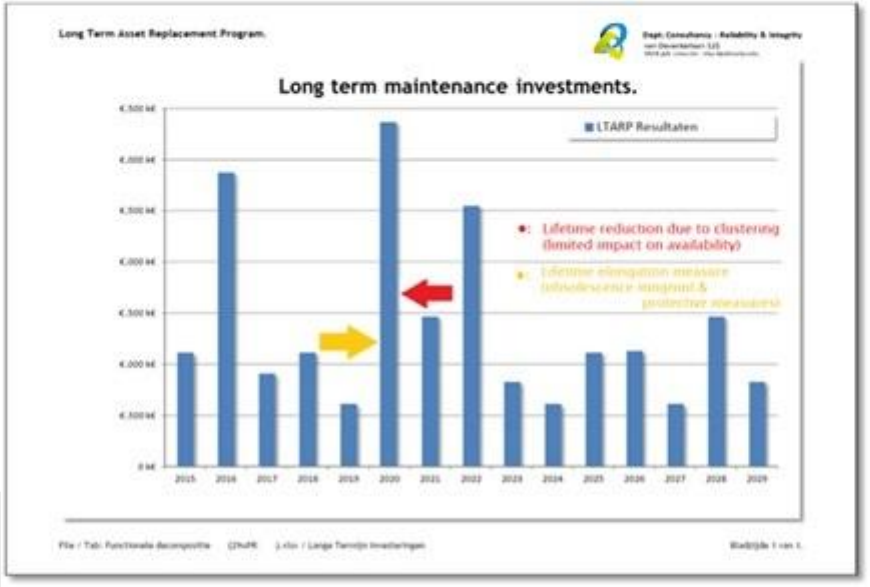
- risk based maintenance & inspection planning and
- Long term investment planning

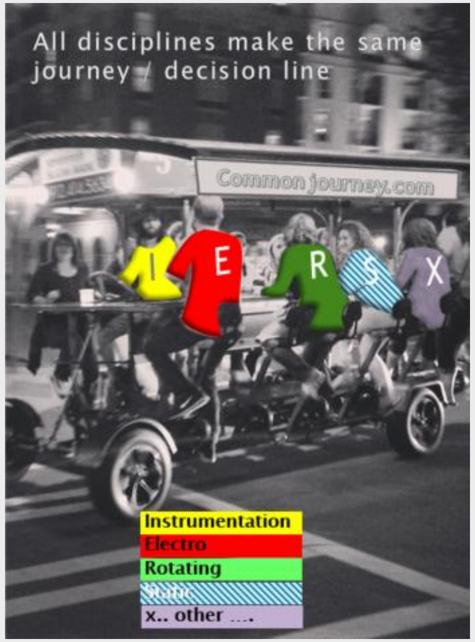
Risk based maintenance & inspection: a variety of APM solutions can be applied.

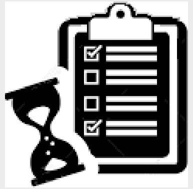
Long term investment planning: can be implemented as an add-on to common CMMS systems.

Integration ideally is applied by means of, over the disciplines:

- Shared view on how to identify, apportion and appraise risks 
- Share classification of identifying applicable condition level (1-6)
- Discipline independent approach for assessing best scenario (LCC) 
- Costs reduction by combining long term planning (LTARP™) 







OPERATIONAL ASSET MANAGEMENT

APPLICATIONS of integrated approach.

BILFINGER

Snapshot of companies and employees that used the methodology:

Asset types involved:

- Process equipment (Static / Rotating / Instrumentation / Electric / Control systems – DCS)
- Civil constructions

Applications of investment planning:

- Oil & Gas
- Fine Chemicals
- Waste Incineration
- Power generation
- Nuclear (alike Power generation)
- Facility
- Leisure
- …….

- Anyone with a query “when to invest in renewal / replacement / upgrade”

OPERATIONAL ASSET MANAGEMENT

How to get going?

Just as an –almost- last remark, being aligned with *all levels* within the organization is NOT the least thing to mention.

In general, this may be the most tedious part.

The IAM has made a nice video in order to draw attention to this issue, nice to view with colleagues when you're in company or at home:

https://www.youtube.com/watch?v=pLuMX_9WVFg&t=334s

So a corner point, to build on, is:

- Managing on risk.
- Acting accordingly.
- Be transparent.

The standard supporting this is: **ISO 37301 (Compliance management**

SUMMARY; what have we seen?

Summarizing, we go backwards. What is useful if you want to harvest the benefits of risk-based asset-management:

- **Get full alignment in the organization with respect to risk-awareness and risk acceptance. "Practise what you preach" with respect to your risk matrix.**
- **Ensure the presence of the same risk perspective in multiple "tribes" in your organization matrix**
- **Make sure this is top-down as well as bottom-up, across and along disciplines. No tribal issues on this aspect!**
- **Ensure that attention and focus is obtained as per prioritization on risk assessment (as an objective means for "what's important")**
- **Base decision-making processes on scenario assessment from a long-term costs-optimization perspective.**
- **It you experience hurdles on this, try to get response in terms of action on the IAM message for "how to create value".**
- **Risk based asset management provides the framework for effective risk-based inspection.**

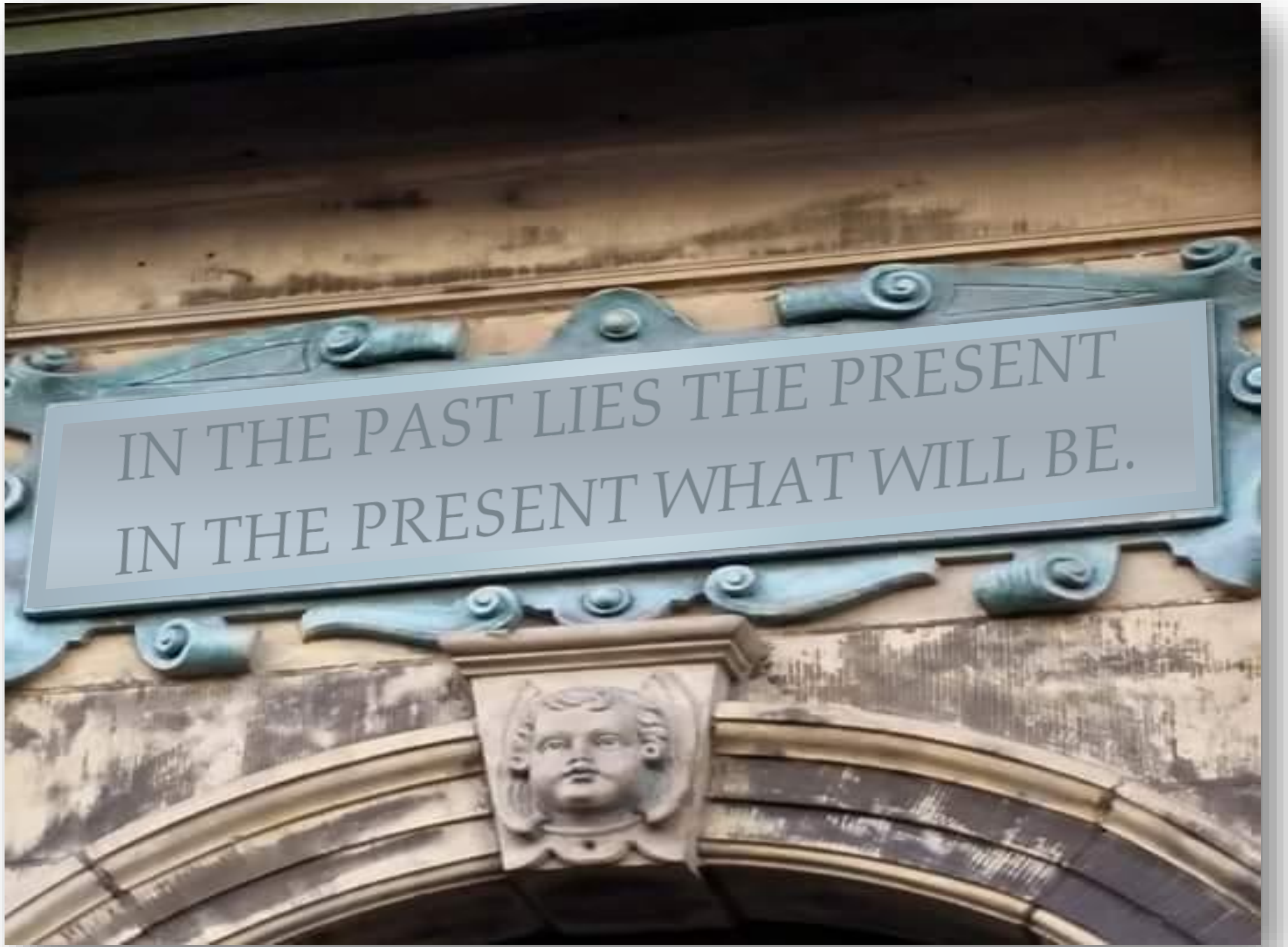
Applications:

- Oil & Gas
- Chemicals
- Waste Incineration
- Power generation
- Nuclear (alike Power generation)
- Facility
- ……..

Further worthwhile reading on asset & risk management:

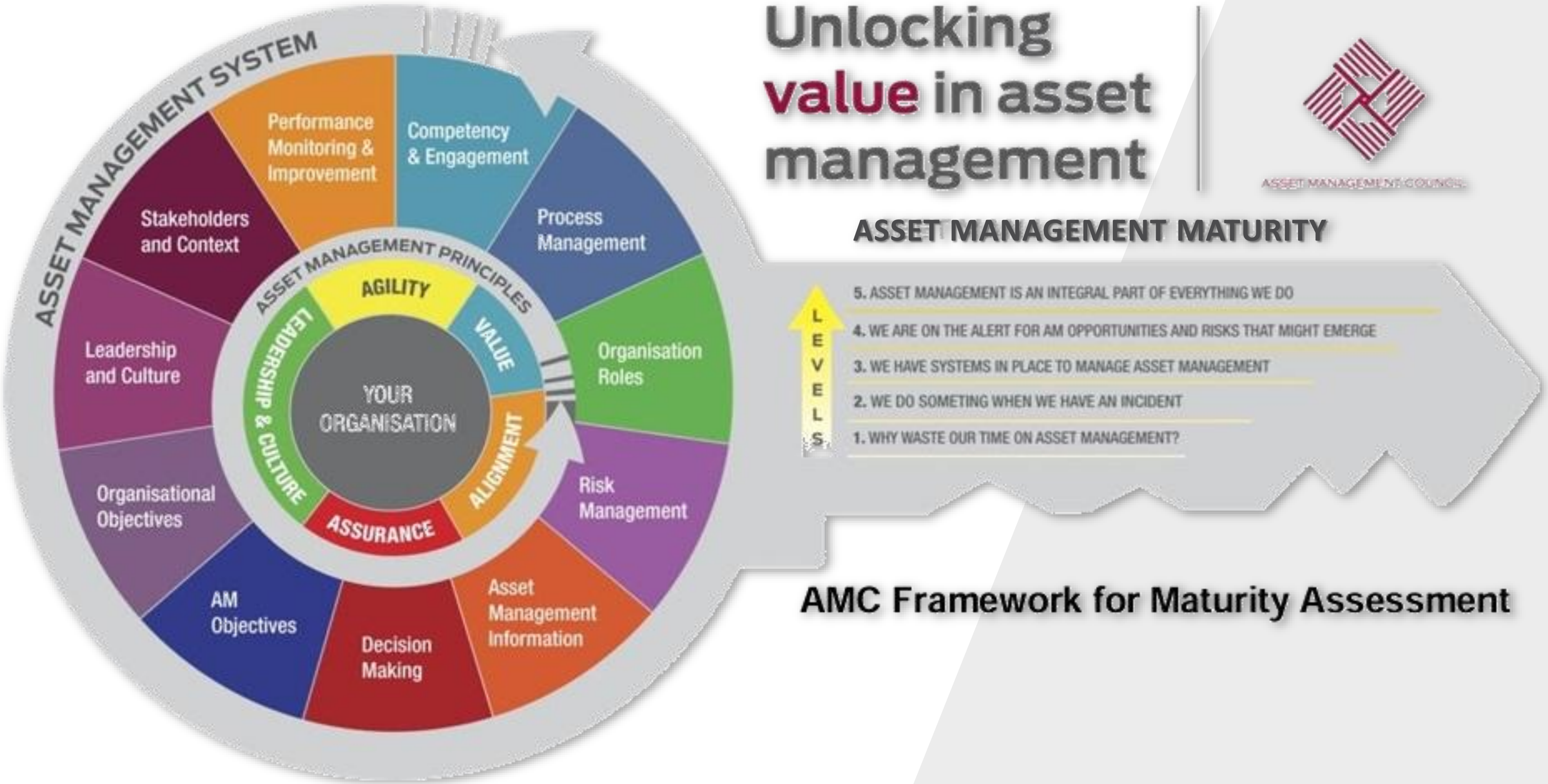
AN INTEGRATION OF INSIGHTS TO FINALIZE:

You will see it ONCE YOU UNDERSTAND IT



AN INTEGRATION OF INSIGHTS TO FINALIZE:

Or: ONCE YOU HAVE SEEN IT YOU WILL UNDERSTAND IT



HOW FAR HAVE WE COME?

▪ TO THE LEVEL OF FULL USE OF THE ASSET, ITS USE AND ITS EXPECTED BEHAVIOR.

Dedicated solutions are now available, providing:

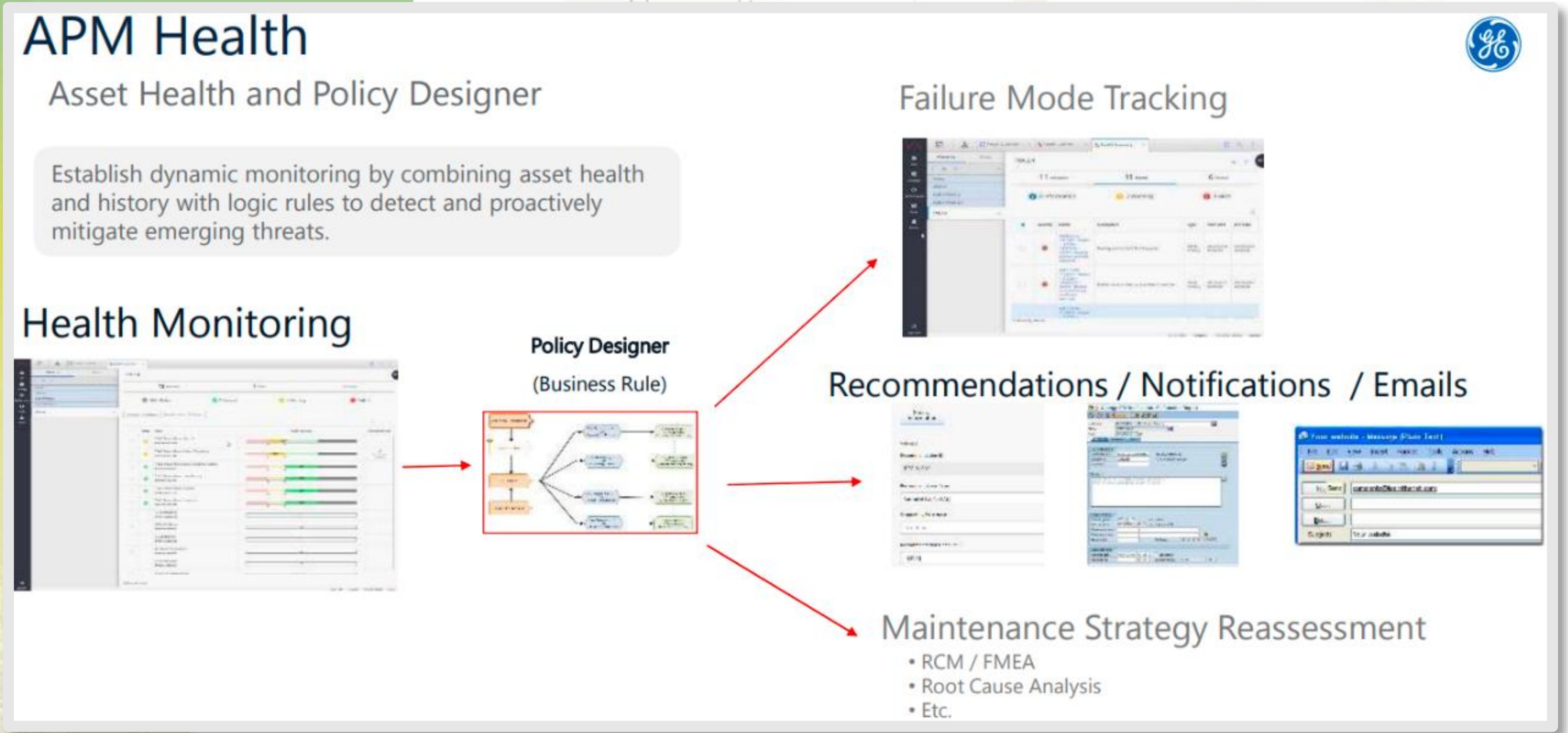
- Integrated health management
- APM Smart-signal
  - Failure prediction

Based on:

- Behavior characteristics
- History
- Trend
- Use (load)
- Multi parameters (P,T,..)

Featuring:

- Modelling
- Prototypes
- Validation



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Thank you

- for your attention

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