



The 23rd International Asset Facility and Maintenance Management Conference

Data-Driven Strategies for Effective Asset Management



12-14 January 2026

Riyadh, KSA

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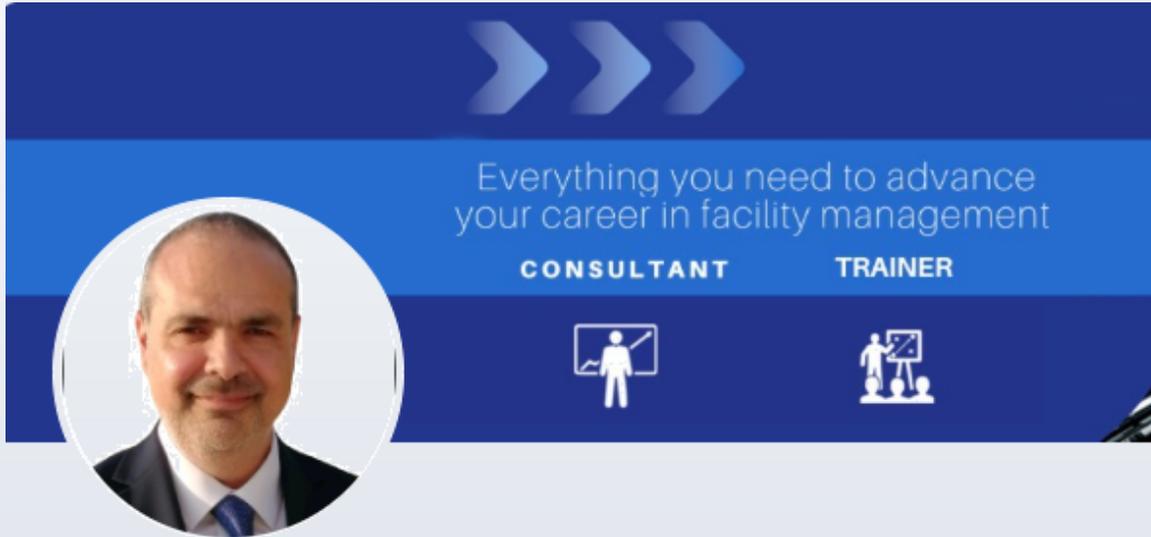
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Speaker



Shukri Habib, FMP [Add verification badge](#)

Facility Management Consultant & Trainer | IFMA Qualified Instructor |
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Shukri is an approved instructor for the following institutions:

- The International Facility Management Association for FMP and Essentials of FM
- The Order of Engineers in Beirut,
- The Jordan Engineers Association in Amman,
- The American University of Cairo in Cairo,
- The training center of King Saud University in Riyadh,
- The Saudi Experts Institute for Training and Development in Riyadh,
- The Qatar Society of Engineers in Doha, and other regional training centers.

Shukri is also:

- Chairperson of the Lebanese technical committee LN TC 267
- Founding member of the Lebanese Facility Management Association
- Winner of **IFMA distinguished educator** award for year 2023
- **EuroFM** Ambassador to Lebanon 2023 – 2025
- A speaker in international and regional FM conferences like; **IMFA**, **EuroFM**.
- Member of the FM organizing committee for **IFMA Global Middle East Summit**
- A facility management expert for several international organizations.
- The managing director of QualiServ which is one of the leading facility management consultancy and training companies in the Middle East.

Outline

Topic 1

Introduction to Data-Driven Asset Management

Topic 2

Overview of current trends and challenges in asset management

Topic 3

Importance of data in decision-making

Topic 4

Introduction to analytical tools and methodologies

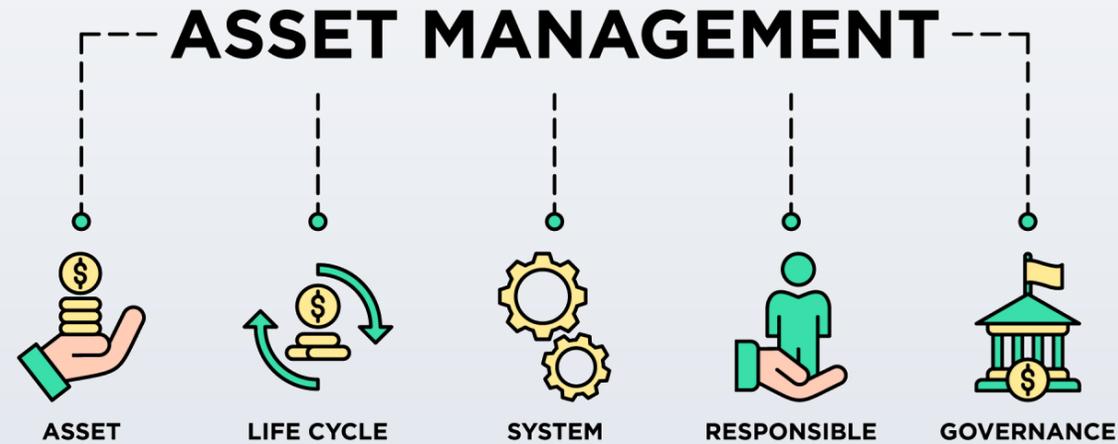
Topic 5

Demonstration of data visualization techniques for asset tracking

Topic 6

Maximising asset value

Introduction to Data-Driven Asset Management



Asset management, at its core, is the systematic process of deploying, operating, maintaining, upgrading, and disposing of assets **cost-effectively**.

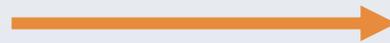
Introduction to Data-Driven Asset Management



Core Concept of Data-Driven Asset Management

= The systematic use of digital information to optimize cost, risk, and performance

"Subjective"
(Experience-based)



"Objective"
(Evidence-based)



Goal

- Maximize value delivery
- Predict potential failures,
- Extend asset lifecycles
- not just "keeping it running"

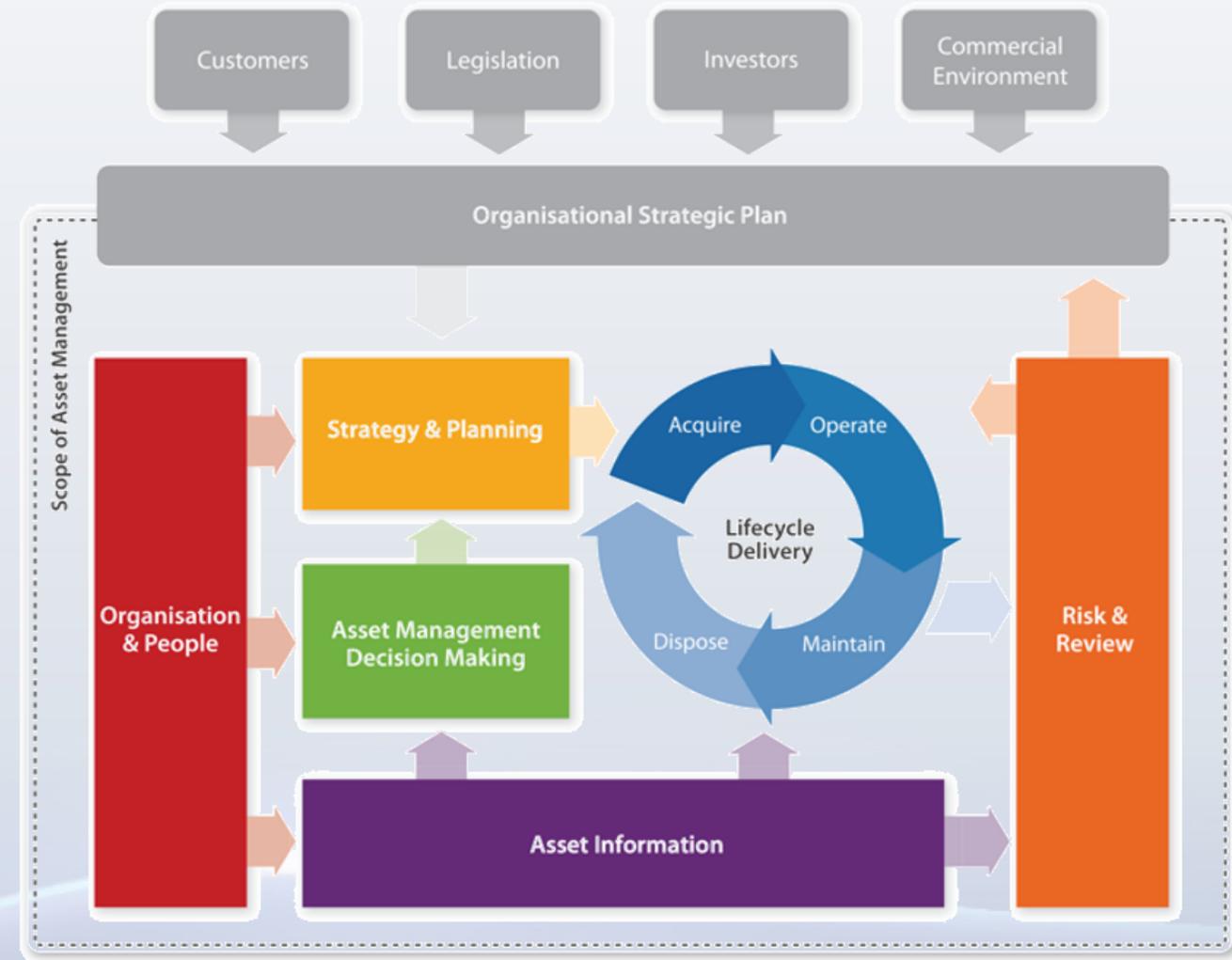
Introduction to Data-Driven Asset Management



International Standards



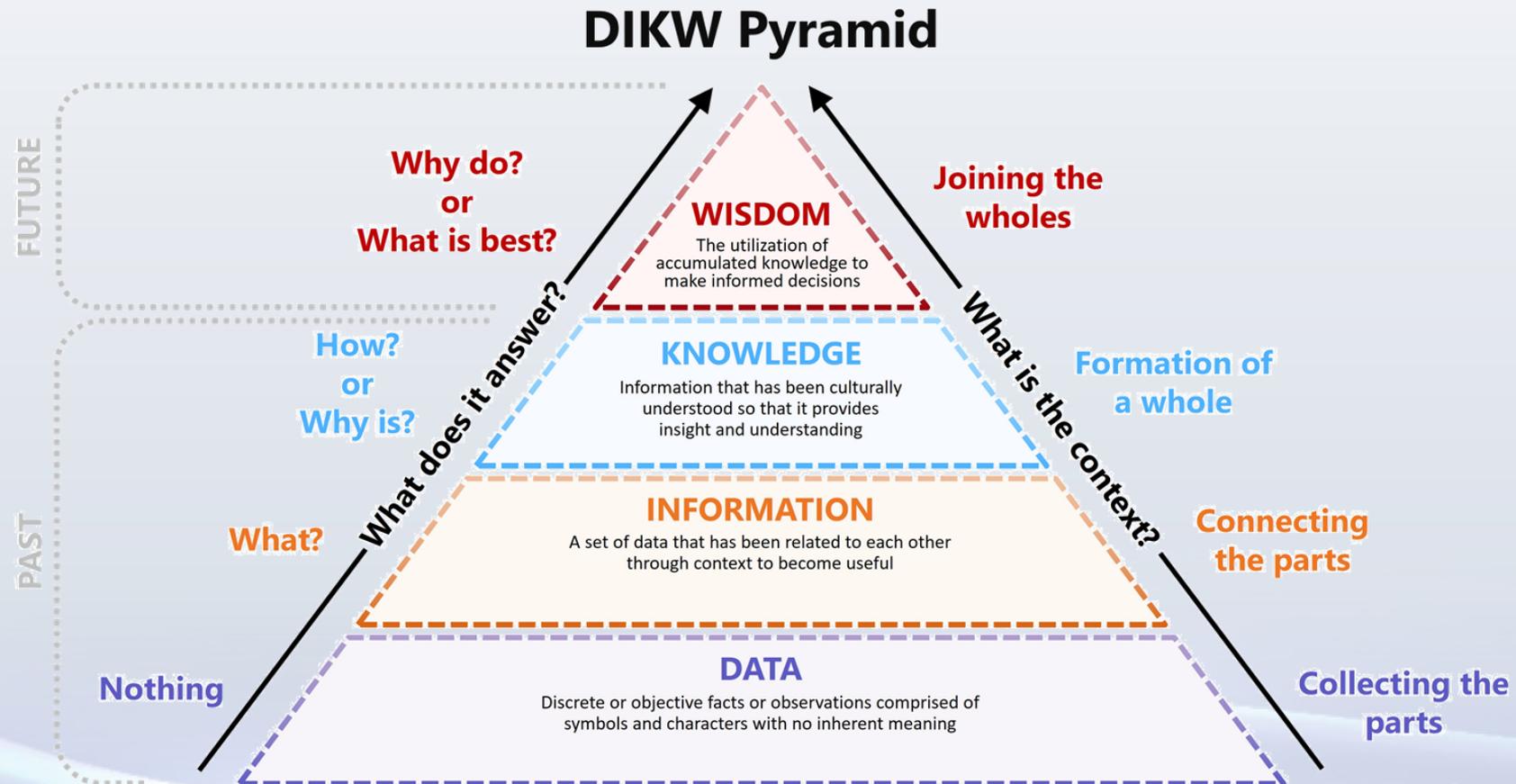
- **ISO 55001 Clause 7.5:** Information requirements.
- Data is a compliance requirement, not just an IT luxury.
- **Key Requirement:** The data collected must directly support the **Strategic Asset Management Plan (SAMP)**.



Introduction to Data-Driven Asset Management



The Wisdom Hierarchy – DIKW Pyramid

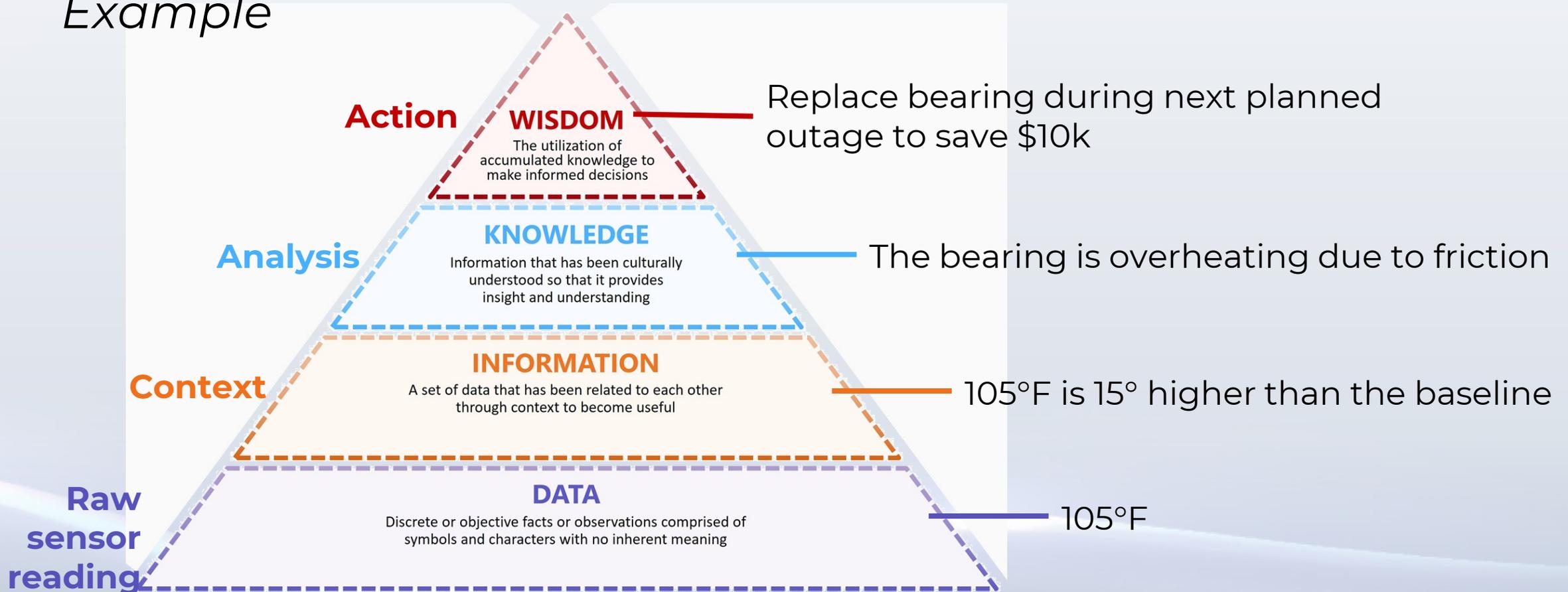


Introduction to Data-Driven Asset Management



The Wisdom Hierarchy

Example



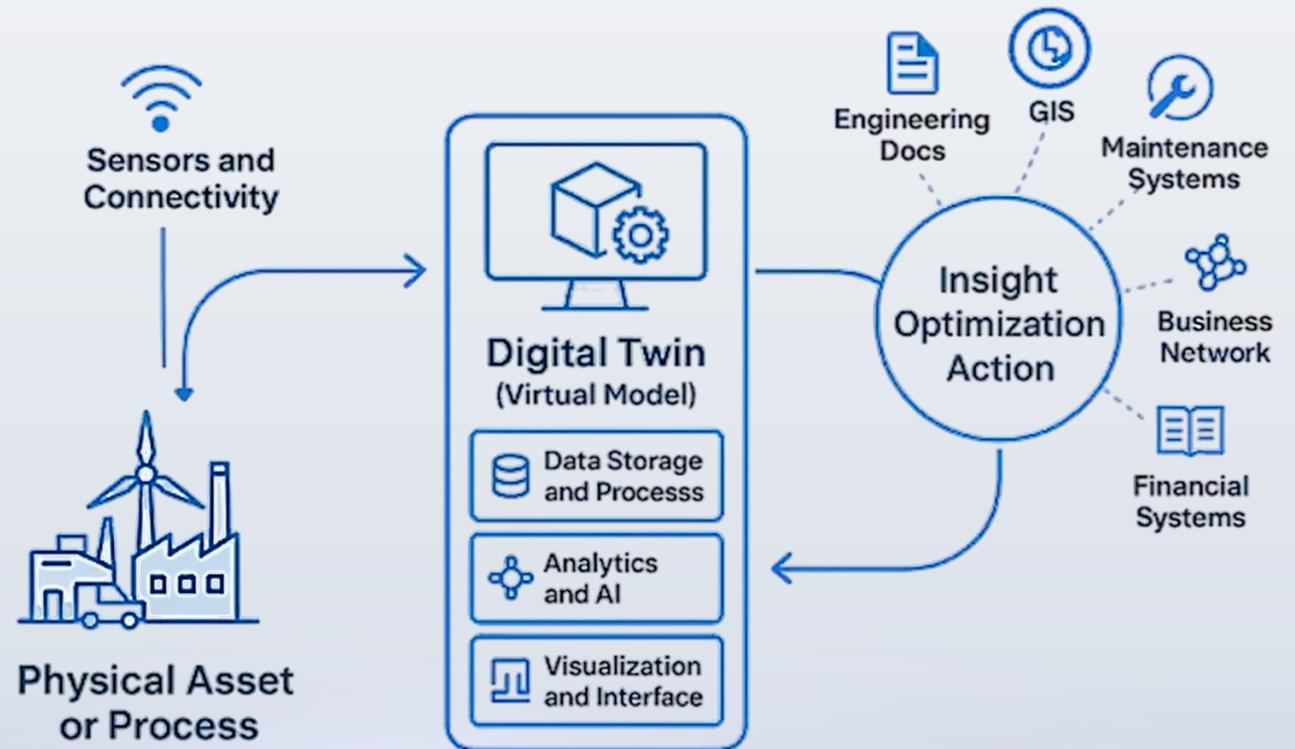
Introduction to Data-Driven Asset Management

The Digital Twin

A digital twin is a virtual replica of a physical asset.

Usage: Simulation

"What happens if we increase load by 20%?"



Fail in the digital world so you don't fail in the real world

Introduction to Data-Driven Asset Management



Literature Review: The Value Proposition

Deloitte.

**Deloitte
(2017)**

"Predictive Maintenance" study shows material cost savings of **5–10%** and equipment uptime increase of **10–20%**.

https://www.beekeeper.io/wp-content/uploads/iderP_ettioleD/2024/10/fdp.repaPnoitisoP_ecnanetniaM-evitc

McKinsey
& Company

**McKinsey & Co
(2018)**

"The Value of Data" report indicates data-driven organizations are **23x** more likely to acquire customers.

<https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/five-facts-how-customer-analytics-boosts-corporate-performance>

pwc

**PwC
(2018)**

"Maintenance 4.0" report confirms a **12%** reduction in scheduled repairs through digital implementation.

<https://www.pwc.nl/en/publicaties/predictive-maintenance--eht-tciderp-40/mth.elbatciderpnu>

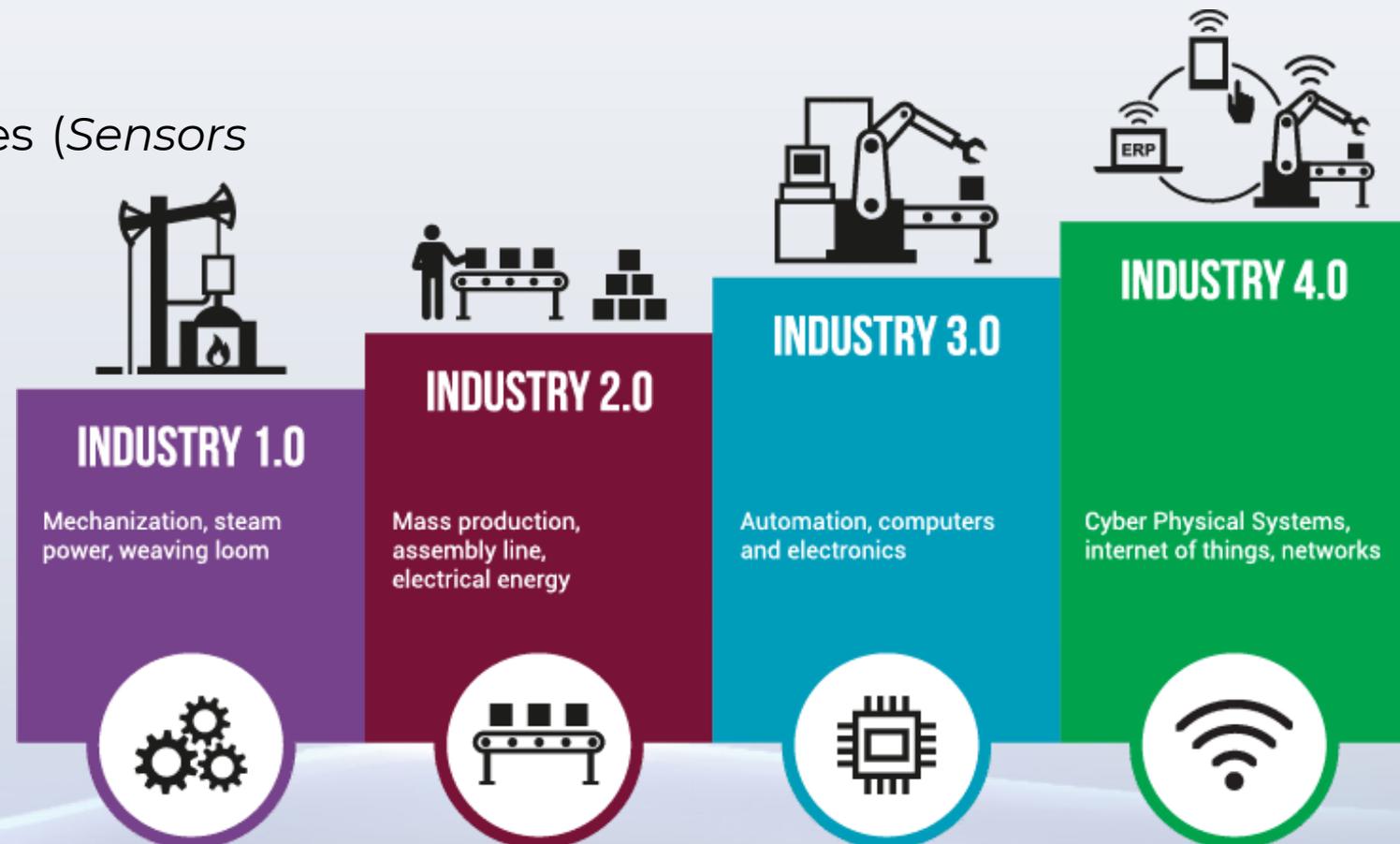
Overview of current trends and challenges in asset management

Trends

IoT and Industry 4.0

- Explosion of connected devices (*Sensors for vibration, heat, acoustics*)
- Cost of sensors has dropped **90%** in the last decade

Assets now "self-report" their health status



Overview of current trends and challenges in asset management

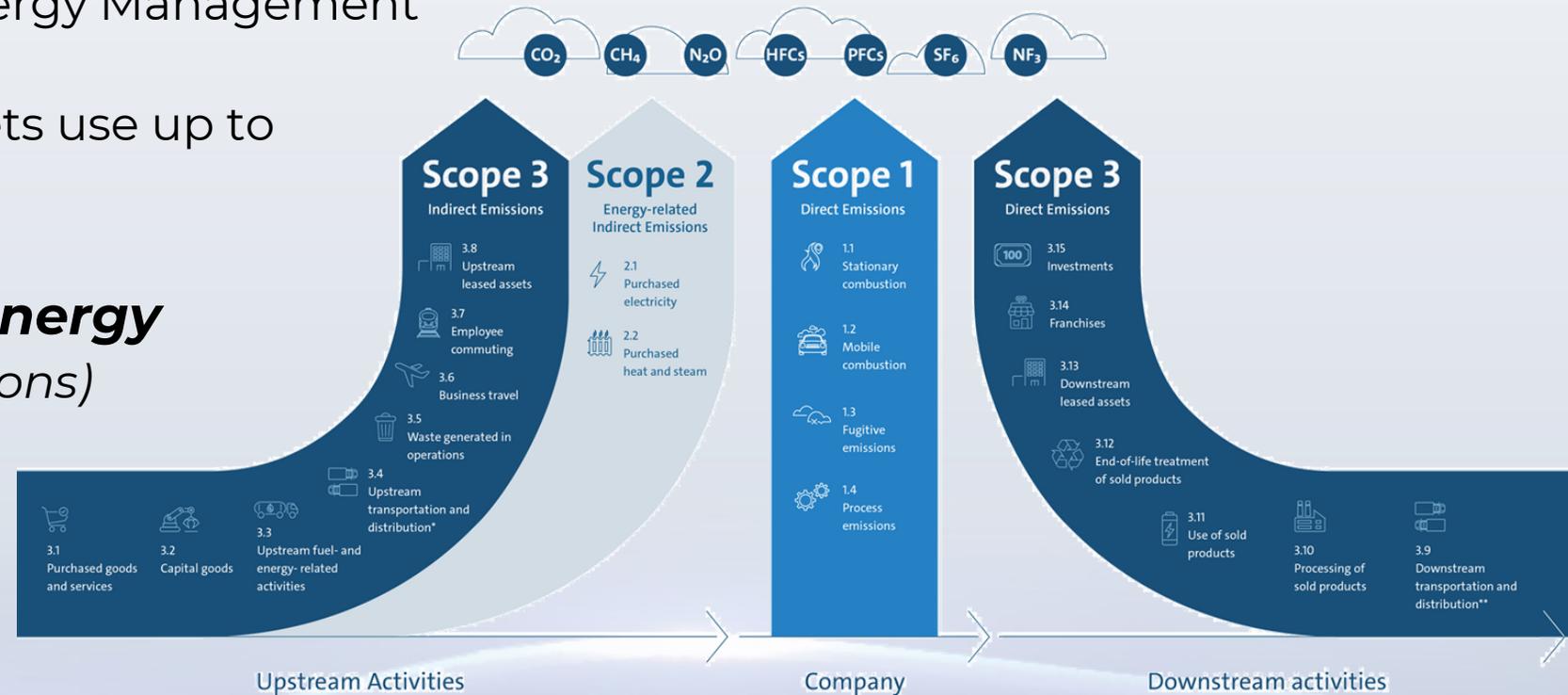
Trends

Sustainability & ESG

Asset Management **is** Energy Management

- Poorly maintained assets use up to 20% more energy.

Using data to optimize energy usage (Scope 1 & 2 emissions)



* Purchased/commissioned by the company ** Not purchased/commissioned by the company

Overview of current trends and challenges in asset management



Challenges

Aging Infrastructure

Many assets have exceeded their design life

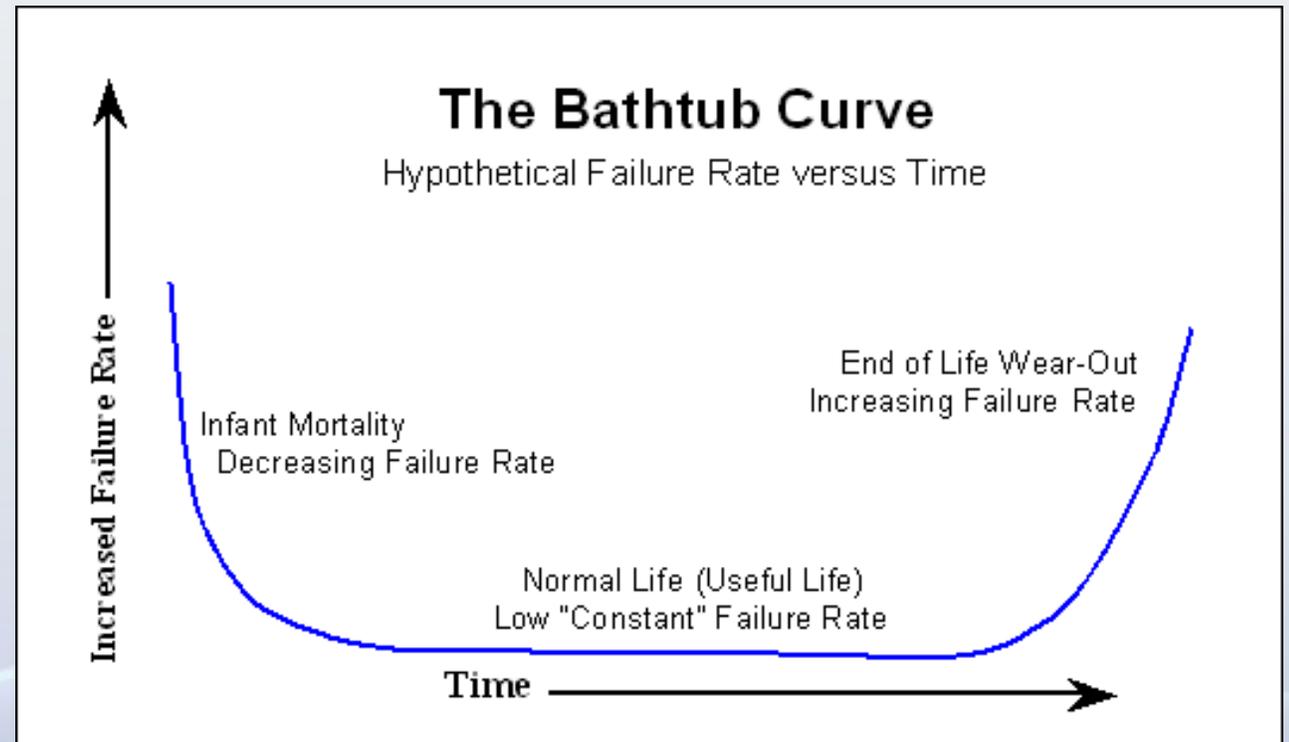
Challenge

Risk of catastrophic failure increases annually.



Data Role

Determining "Economic End of Life" (EoL)



Overview of current trends and challenges in asset management

Challenges

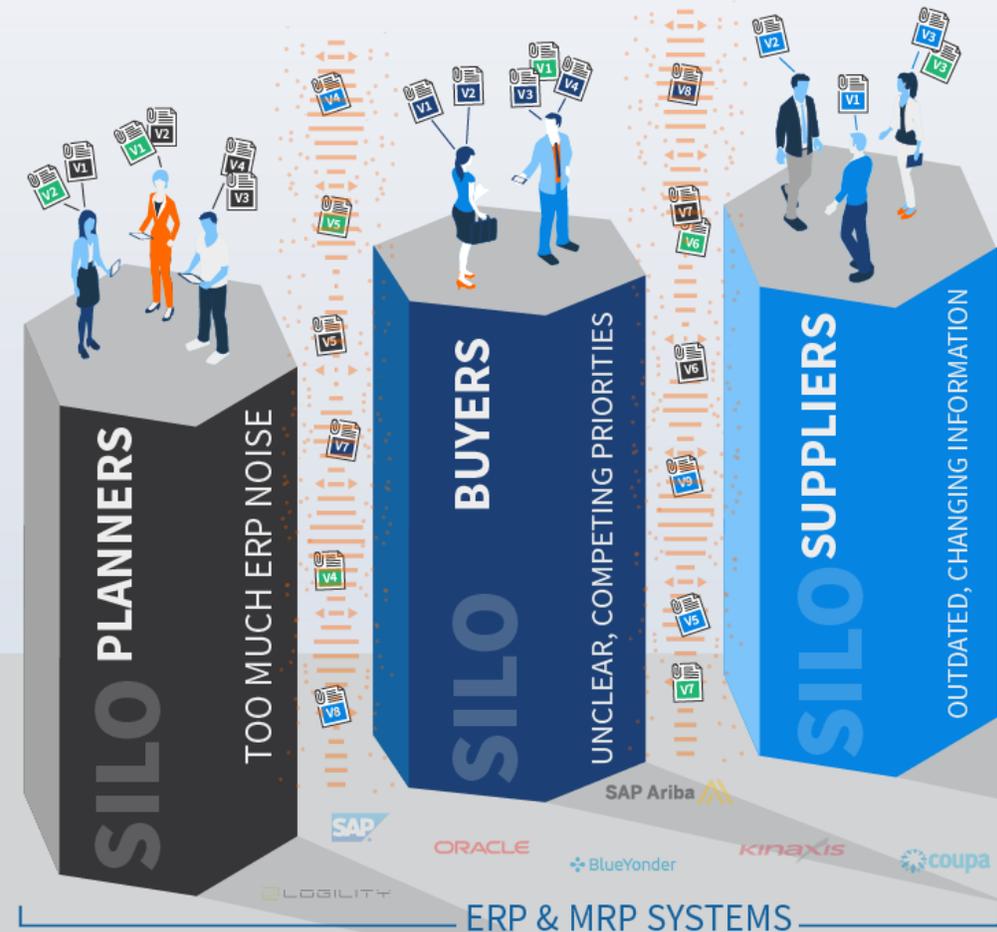
Data Silos

- Maintenance data lives in CMMS (Maximo).
- Financial data lives in ERP (SAP).

Challenge

These systems do not talk, leading to fragmented decisions.

Teams & Technology are **Not Working** Together Efficiently.



Overview of current trends and challenges in asset management



Challenges *Data Quality*

Ensuring data quality, accuracy, and relevance is crucial, as poor-quality data can lead to erroneous insights and suboptimal decisions

- **Problem:** Incomplete work orders (e.g., Cause of Failure listed as "Other").
- **Impact:** Cannot train Machine Learning models on bad data

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	stim_mic-1561130818_277	cc1bsf12	0.222246	ctbsf12	0.348499	cc2bsf12	0.704951	ccs1bsf12	0.222246	cts1bsf12	0.348499	ccs4bsf12	0.207021	ccs5bsf12	0.497793
2	stim_mic-1561130827_267	cc1blf12	0.742186	ctblf12	0.608528	cc2blf12	0.795805	ccs1blf12	0.111925	ccs2blf12	0.153055	ccs3blf12	0.477205	cts1blf12	0.608528
3	stim_mic-1561130845_213	cc1blf32	0.69032	ctblf32	0.427741	cc2blf32	0.648759	ccs1blf32	0.110153	ccs2blf32	0.156614	cts1blf32	0.423553	cts1blf32	0.427741
4	stim_mic-1561130877_360	ec1bsf41	0.261098	etbsf41	0.645636	ec2bsf41	0.949583	ecs1bsf41	0.261098	ets1bsf41	0.166386	ets2bsf41	0.47925	ecs4bsf41	0.226734
5	stim_mic-1561130886_350	cc1bsf42	0.20609	ctbsf42	0.488048	cc2bsf42	1.112393	ccs1bsf42	0.20609	cts1bsf42	0.205718	ccs2bsf42	0.28233	ccs4bsf42	0.211516
6	stim_mic-1561130895_323	ec1blf21	0.569299	etblf21	0.539061	ec2blf21	0.657511	ecs1blf21	0.122783	ecs2blf21	0.130046	ecs3blf21	0.31647	ets1blf21	0.539061
7	stim_mic-1561130904_296	ec1blf41	0.697319	etblf41	1.141229	ec2blf41	0.936104	ecs1blf41	0.115039	ecs2blf41	0.136546	ecs3blf41	0.445733	ets1blf41	0.288269
8	stim_mic-1561130913_269	ec1bsf31	0.252543	etbsf31	0.55849	ec2bsf31	0.693112	ecs1bsf31	0.252543	ets1bsf31	0.55849	ecs4bsf31	0.180893	ecs5bsf31	0.512219
9	stim_mic-1561130922_242	cc1bsf22	0.198693	ctbsf22	0.449891	cc2bsf22	0.685172	ccs1bsf22	0.198693	cts1bsf22	0.449891	ccs4bsf22	0.217998	ccs5bsf22	0.467174
10	stim_mic-1561130931_215	cc1blf32	0.659507	ctblf32	0.441725	cc2blf32	0.919186	ccs1blf32	0.110068	ccs2blf32	0.172552	ccs3blf32	0.376888	cts1blf32	0.441725
11	stim_mic-1561130940_189	cc1alf62	0.55467	ctalf62	0.601504	cc2alf62	0.721005	ccs1alf62	0.123653	ccs2alf62	0.131615	ccs3alf62	0.299402	cts1alf62	0.280901
12	stim_mic-1561130958_135	ec1bsf11	0.295421	etbsf11	0.627227	ec2bsf11	0.647093	ecs1bsf11	0.295421	ets1bsf11	0.627227	ecs4bsf11	0.210808	ecs5bsf11	0.436285
13	stim_mic-1561130967_108	cc1bsf52	0.236056	ctbsf52	0.681208	cc2bsf52	0.763411	ccs1bsf52	0.236056	cts1bsf52	0.21981	ccs2bsf52	0.461398	ccs4bsf52	0.208984
14	stim_mic-1561130976_081	cc1bsf32	0.29969	ctbsf32	0.594292	cc2bsf32	0.749364	ccs1bsf32	0.29969	cts1bsf32	0.594292	ccs4bsf32	0.230958	ccs5bsf32	0.518405
15	stim_mic-1561130985_054	ec1blf31	0.711408	etblf31	0.661986	ec2blf31	0.741582	ecs1blf31	0.15859	ecs2blf31	0.182162	ecs3blf31	0.370656	ets1blf31	0.661986
16	stim_mic-1561130994_027	ec1bsf51	0.43634	etbsf51	0.884603	ec2bsf51	0.942097	ecs1bsf51	0.43634	ets1bsf51	0.217357	ets2bsf51	0.667245	ecs4bsf51	0.257096
17	stim_mic-1561131003_001	ec1bsf21	0.269372	etbsf21	0.749691	ec2bsf21	0.761183	ecs1bsf21	0.269372	ets1bsf21	0.749691	ecs4bsf21	0.229573	ecs5bsf21	0.53161
18	stim_mic-1561131012_974	cc1blf52	0.82462	ctblf52	0.952375	cc2blf52	0.895844	ccs1blf52	0.147047	ccs2blf52	0.139888	ccs3blf52	0.537685	cts1blf52	0.251473
19	stim_mic-1561131021_947	cc1asf62	0.284621	ctasf62	0.532087	cc2asf62	0.834935	ccs1asf62	0.284621	cts1asf62	0.27666	ccs2asf62	0.255428	ccs4asf62	0.227163
20	stim_mic-1561131030_920	cc1bsf12	0.306654	ctbsf12	0.576072	cc2bsf12	0.807964	ccs1bsf12	0.306654	cts1bsf12	0.576072	ccs4bsf12	0.255068	ccs5bsf12	0.552896
21	stim_mic-1561131039_893	ec1blf51	0.930282	etblf51	1.039447	ec2blf51	1.034041	ecs1blf51	0.165066	ecs2blf51	0.142353	ecs3blf51	0.622862	ets1blf51	0.301162

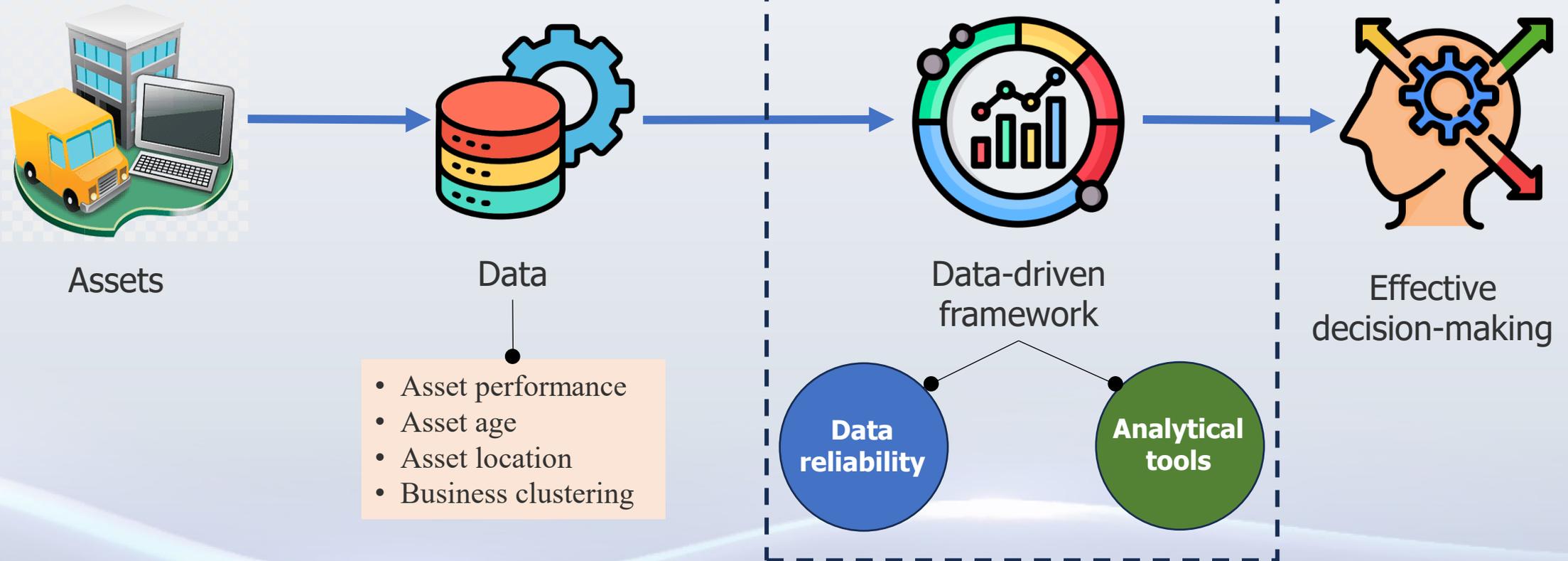
Requirement
Standardized taxonomy
(UniClass, OmniClass).

https://reliabilityweb.com/articles/entry/is_your_asset_management_program_built_on_a_house_of_cards

Overview of current trends and challenges in asset management

Challenges

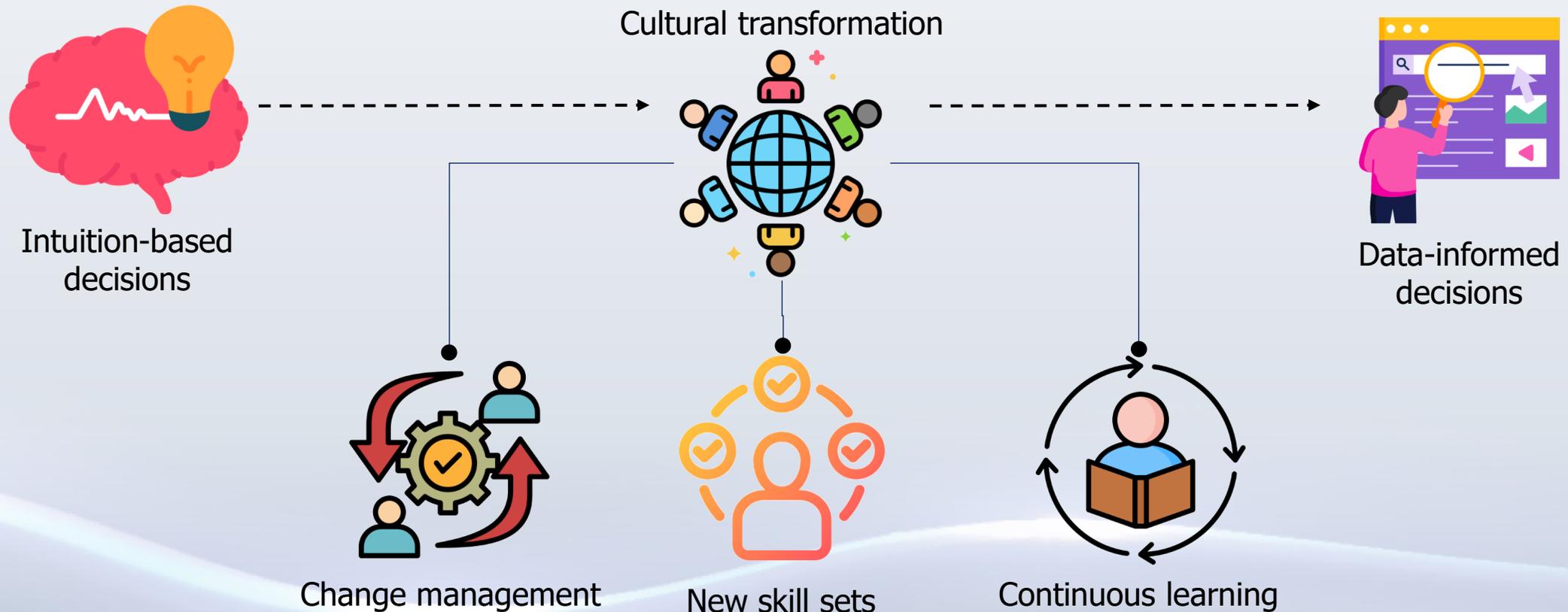
Data Integration



Overview of current trends and challenges in asset management

Challenges

Cultural Transformation



Importance of data in decision-making



What are different types of data used for asset management?

1. Financial Data

- Acquisition costs (purchase price, installation costs)
- Depreciation schedules (method and rates)
- Maintenance costs (regular upkeep, repairs)
- Disposal and salvage values

2. Operational Data

- Usage hours (time the asset is operational)
- Production metrics (output generated by the asset)
- Downtime (periods when the asset is not operational)
- Performance metrics (e.g., efficiency ratings)

3. Maintenance Data

- Maintenance logs (dates and types of maintenance performed)
- Service history (records of repairs and replacements)
- Maintenance schedules (planned servicing intervals)
- Predictive maintenance data (forecasts for repair needs based on usage)

4. Compliance and Regulatory Data

- Compliance reports (documentation of regulatory adherence)
- Safety inspection records (safety audits and findings)
- Certification and licensing information (required for operation)

5. Location and Asset Tracking Data

- Asset location (where the asset is physically located)
- RFID or IoT data (real-time tracking information)
- Accessibility status (ease of access to the asset)

6. User and Stakeholder Data

- User feedback (satisfaction with asset performance)
- Stakeholder engagement (involvement in asset management decision-making)
- Training records (skills and certifications of users handling the asset)

Importance of data in decision-making

Financial Data

- Acquisition costs (purchase, installation)
- Depreciation schedules (method & rates)
- Maintenance costs (regular upkeep, repairs)
- Disposal and salvage values

Lifecycle Costing (LCC) Total Cost of Ownership (TCO)

Purchase price is only ~20% of total cost

Return on Investment (ROI)
and evaluate cost-effectiveness
of assets over their lifecycle.



Acquisition:
Planning
Design
Procurement
Installation
Testing and commissioning
Training

O & M:
Energy consumption
Efficiency
Effectiveness
Uptime

Spending more on
Acquisition often lowers
LCC

$$\text{LCC} = \text{Acquisition} + \text{Operations} + \text{Maintenance} + \text{Disposal}$$

Importance of data in decision-making



Operational Data

- Usage hours (time the asset is operational)
- Production metrics (output generated by the asset)
- Downtime (periods when the asset is not operational)
- Performance metrics (e.g., efficiency ratings)



Optimization of asset utilization

By identifying trends in usage patterns

Asset Utilization

Counted amount of driven hours in a week

Actual Usage Hours

Total Available Hours

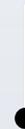
$$\frac{\text{Actual Usage Hours}}{\text{Total Available Hours}} \times 100 = \text{Asset Utilization}$$

As a Percentage %

*Fleet Vehicle Amount * Hours Available * Days of a week*

Maintenance Data

- Maintenance logs (dates and types of maintenance performed)
- Service history (records of repairs and replacements)
- Maintenance schedules (planned servicing intervals)
- Predictive maintenance data (forecasts for repair needs)



Predictive Maintenance

by identifying trends in asset failures



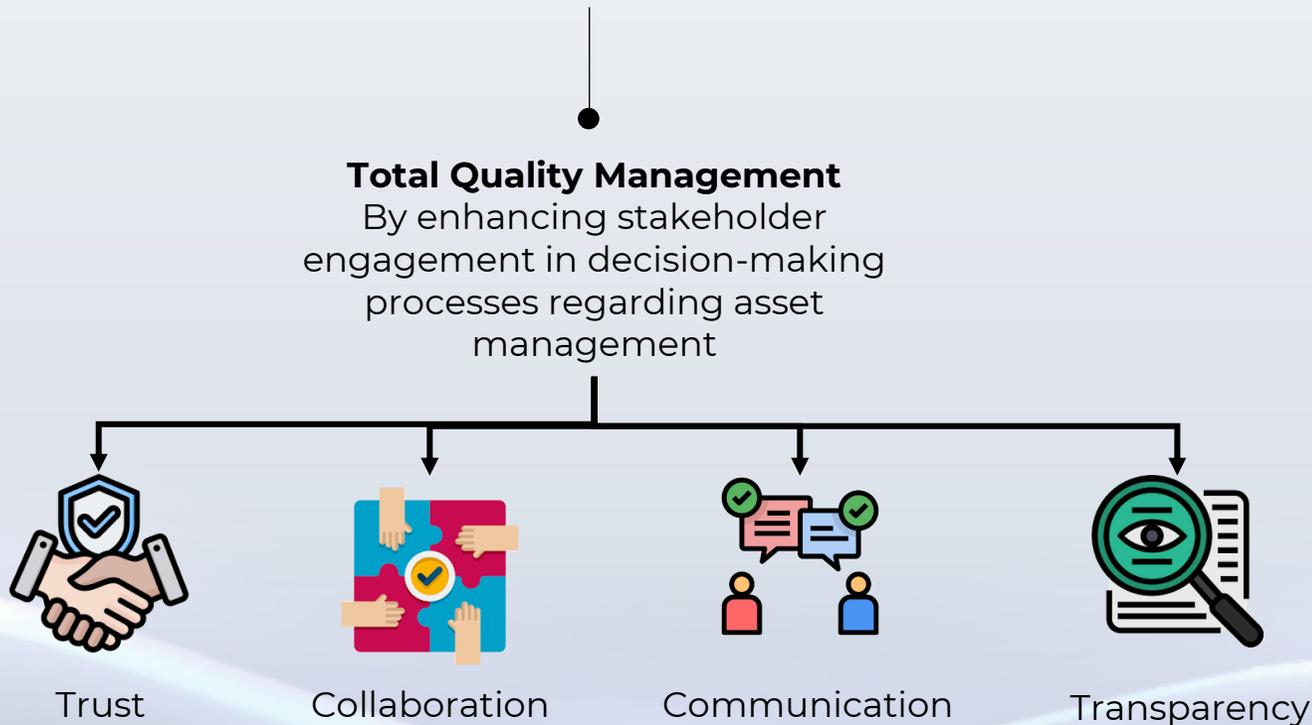
Reduces Unplanned Downtime

By scheduling timely services and through informed forecasting

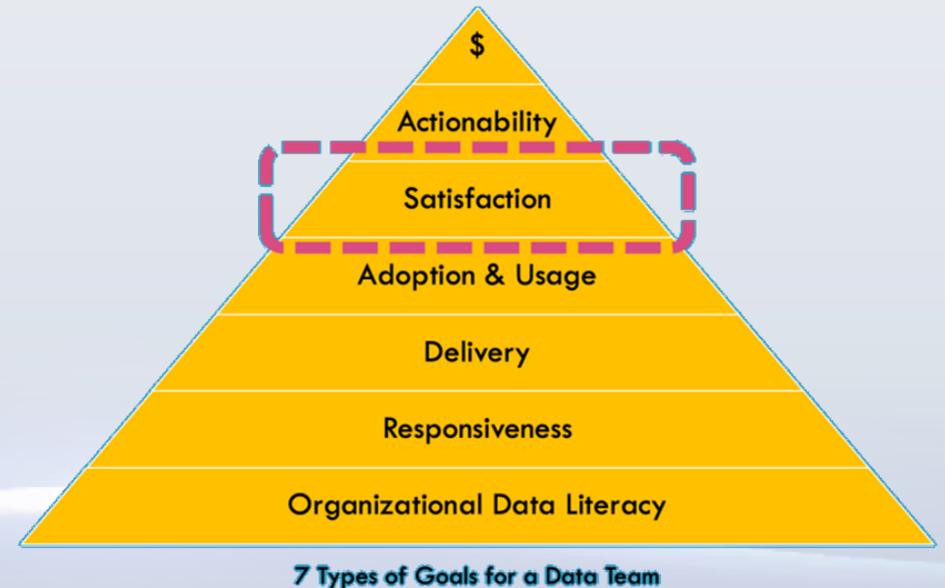
Importance of data in decision-making

User and Stakeholder Data

- User feedback (satisfaction with asset performance)
- Stakeholder engagement (involvement in asset management decision-making)
- Training records (skills and certifications of users handling the asset)



Measuring Stakeholder Satisfaction in Data Teams



Importance of data in decision-making

Risk-Based Decision Making

Risk = Probability of Failure (PoF) x Consequence of Failure (CoF)

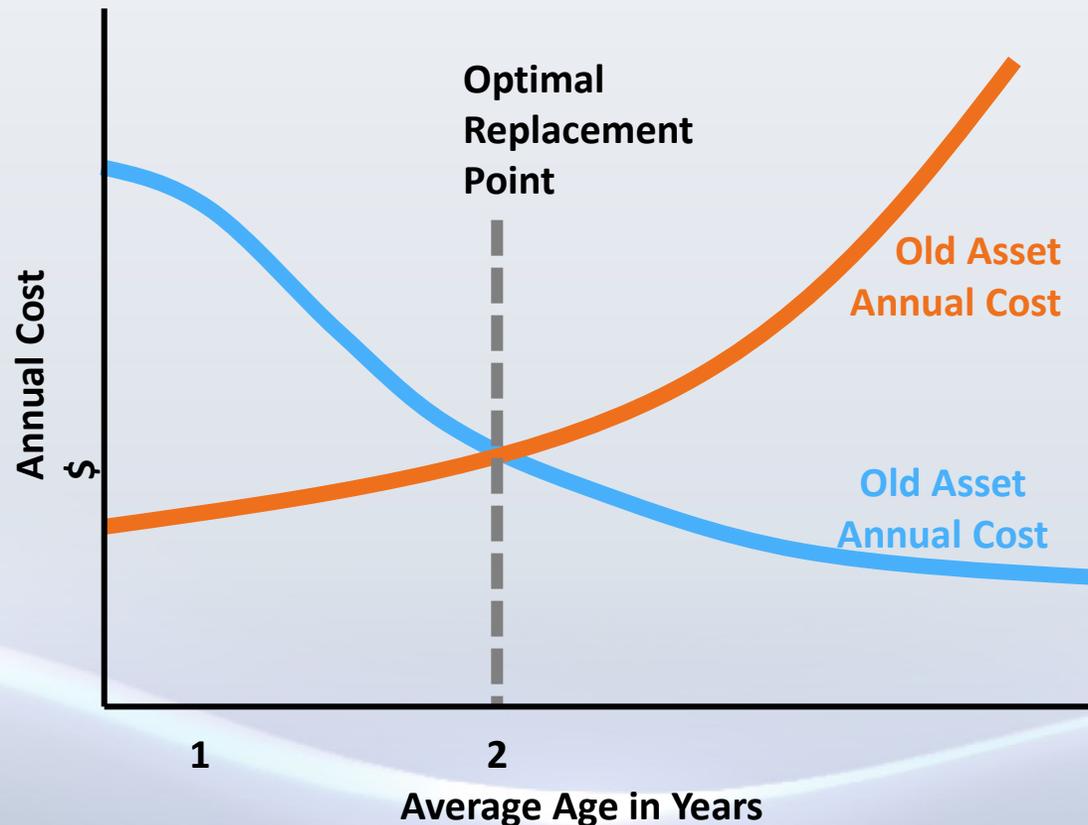
- **PoF** comes from condition data (Sensors).
- **CoF** comes from operational importance.

		Impact →				
		Negligible	Minor	Moderate	Significant	Severe
Likelihood ↑	Very Likely	Low Med	Medium	Med Hi	High	High
	Likely	Low	Low Med	Medium	Med Hi	High
	Possible	Low	Low Med	Medium	Med Hi	Med Hi
	Unlikely	Low	Low Med	Low Med	Medium	Med Hi
	Very Unlikely	Low	Low	Low Med	Medium	Medium

Importance of data in decision-making

End-of-Life Forecasting

The "Optimal Replacement" Point



- The exact moment where the cost of maintaining the asset exceeds the annualized cost of replacing it.
- We use data to find this intersection point.

Importance of data in decision-making

Exercise 1

Scenario: You manage a Chiller Unit.

- **Data Point A:** It costs **\$50,000** to buy a new one.
- **Data Point B:** Current unit costs **\$8,000/year to maintain**, rising by **20% each year** due to age.

Task

Calculate at what year you should replace the unit.



Importance of data in decision-making



Exercise 1 – Solution

Year	Annual Maintenance Cost	Cumulative Maint. Spend	vs. New Asset (\$50k)	Action Strategy
Year 1	\$8,000	\$8,000	16% of value	Maintain
Year 2	\$9,600	\$17,600	35% of value	Maintain
Year 3	\$11,520	\$29,120	58% of value	Maintain
Year 4	\$13,824	\$42,944	86% of value	PREPARE CAPEX
Year 5	\$16,589	\$59,533	119% of value	REPLACE (<i>Stop Loss</i>)
Year 6	\$19,907	\$79,440	158% of value	Financial Loss

By **Year 5**, maintenance costs exceed the asset value.

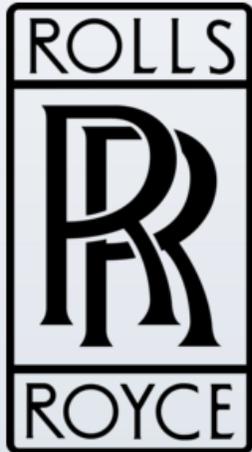
Decision

Plan CAPEX for **Year 4**.

Importance of data in decision-making



Case Study: Rolls-Royce "Power by the Hour"



- Rolls-Royce shifted from selling engines to selling "Engine Flying Hours."
- They use data from **70 trillion data points** per year to predict engine health.

The Data Decision:

- Because they own the risk, they use data to extend the "Time on Wing" (maintenance intervals).

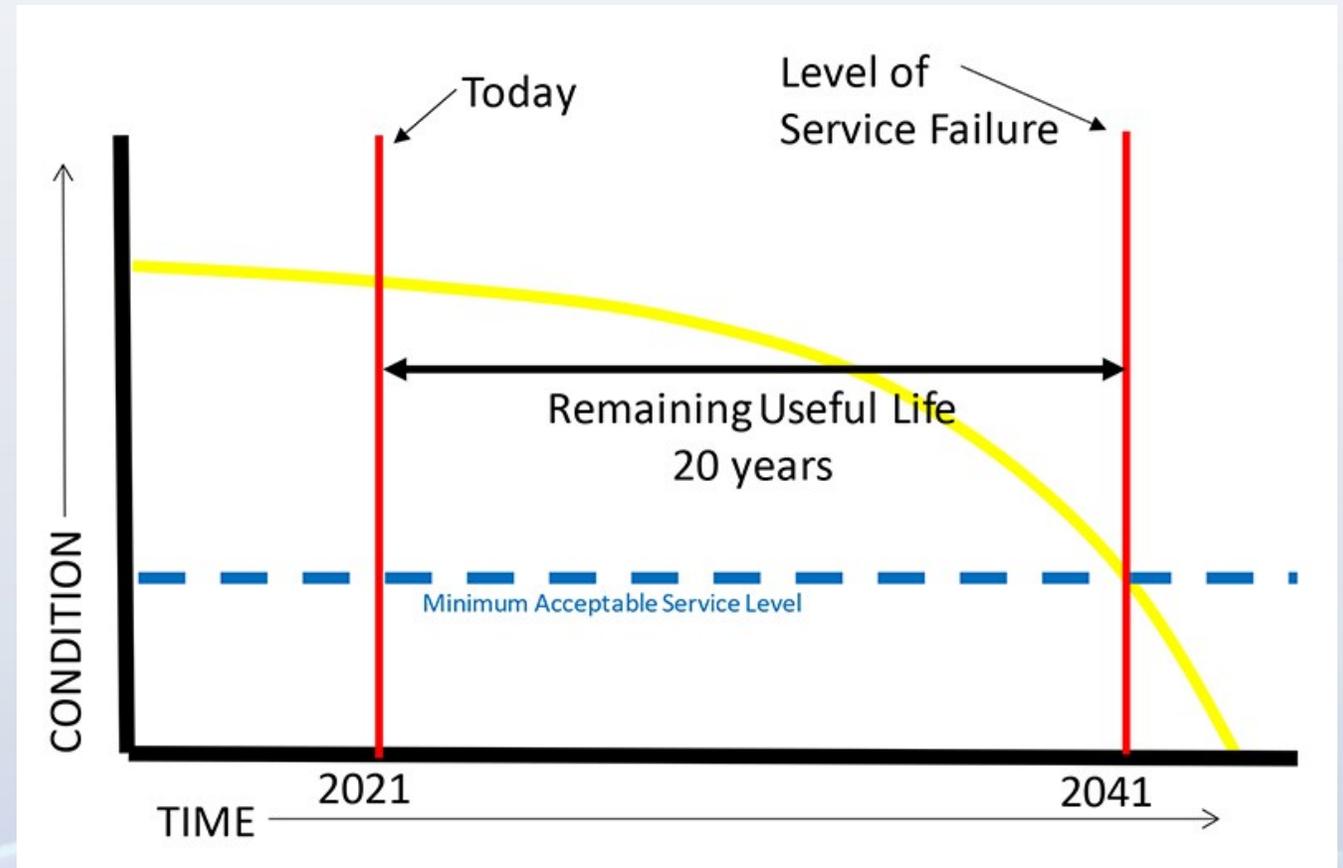
Published Result:

- **30%** Reduction in maintenance burden for airlines
- Asset life extended significantly through proactive monitoring.

Importance of data in decision-making

Remaining Useful Time (RUL) Prediction

- Remaining Useful Life (RUL) prediction using machine learning involves using sensor and historical operational data to estimate how much longer a machine or component will operate before it needs repair or replacement.
- This data-driven approach is a cornerstone of predictive maintenance programs, aiming to reduce costs and avoid unplanned downtime.



Introduction to analytical tools and methodologies



Condition-Based Maintenance (CBM) Tools



Vibration Analysis
Rotating equipment.



Thermography
Electrical hotspots.



Ultrasound
Early bearing wear / Leaks.

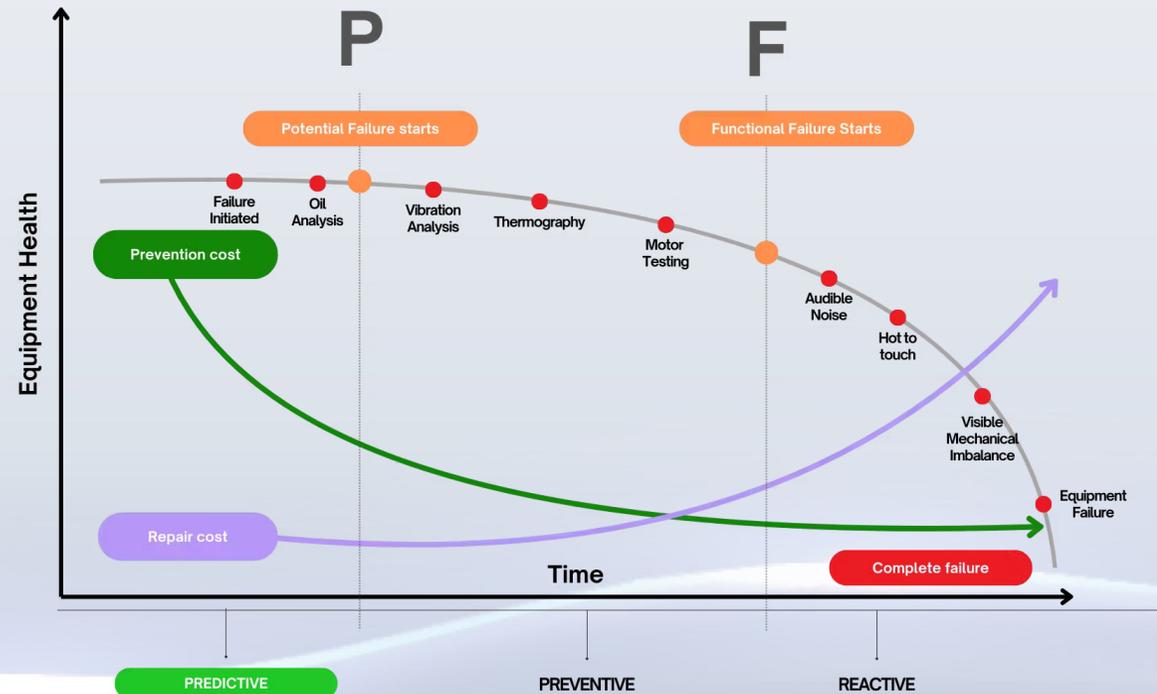


Oil Analysis
Internal wear particles.

Dynamic degradation curves

- **P (Potential Failure)**
Defect is detectable.
- **F (Functional Failure)**
Asset stops.

Detect at "P" to maximize the interval



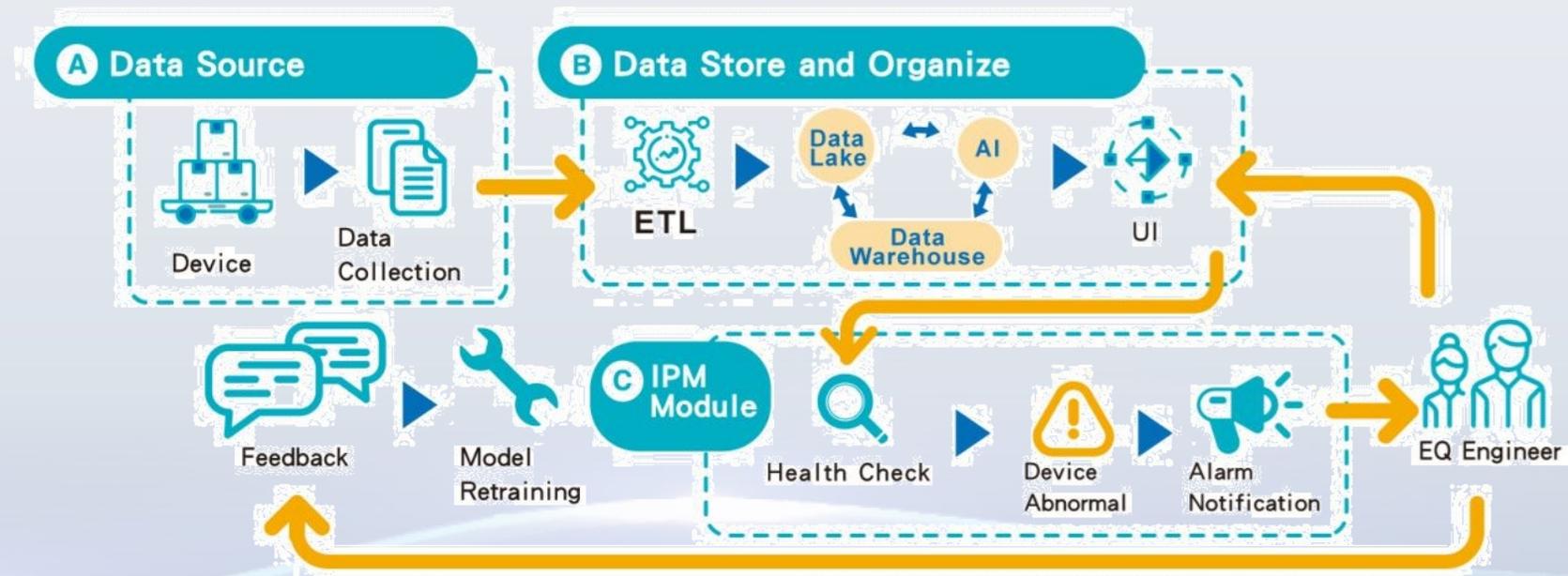
Reliability, Availability, and Maintainability (RAM) Analysis Methodologies are employed to guide decision-making and optimize asset performance

Introduction to analytical tools and methodologies

Predictive Analytics (Machine Learning) *Predictive Maintenance (PdM)*

Uses algorithms to detect **patterns**, not just thresholds.

Example
Temperature is normal,
BUT pressure is low.
Human misses it; AI
catches it.



Exercise 2

Triaging the Failure

You are the Asset Manager. You receive 3 alerts simultaneously.
You have budget to fix only **ONE** today.



Alert A

Vibration on Pump 1 is
6mm/s (High)



Alert B

Oil Analysis on
Generator shows high
iron content (Critical)



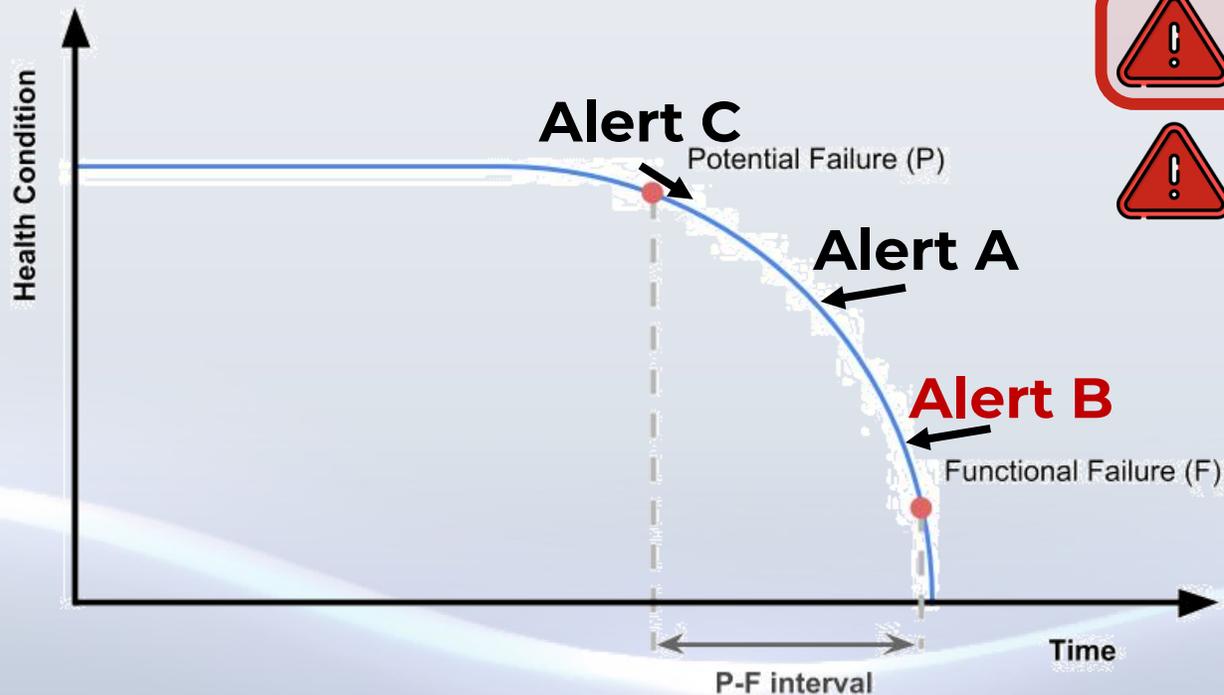
Alert C

Motor 3 is running 10
degrees hot
(Warning)

Which one do you fix first and why?

Exercise 2 – Solution

We look at the P-F Interval.



Alert A – Vibration: Failure is weeks away



Alert B – Oil – iron: **Failure is imminent (Days)**



Alert C – Heat: Failure is months away

Introduction to analytical tools and methodologies

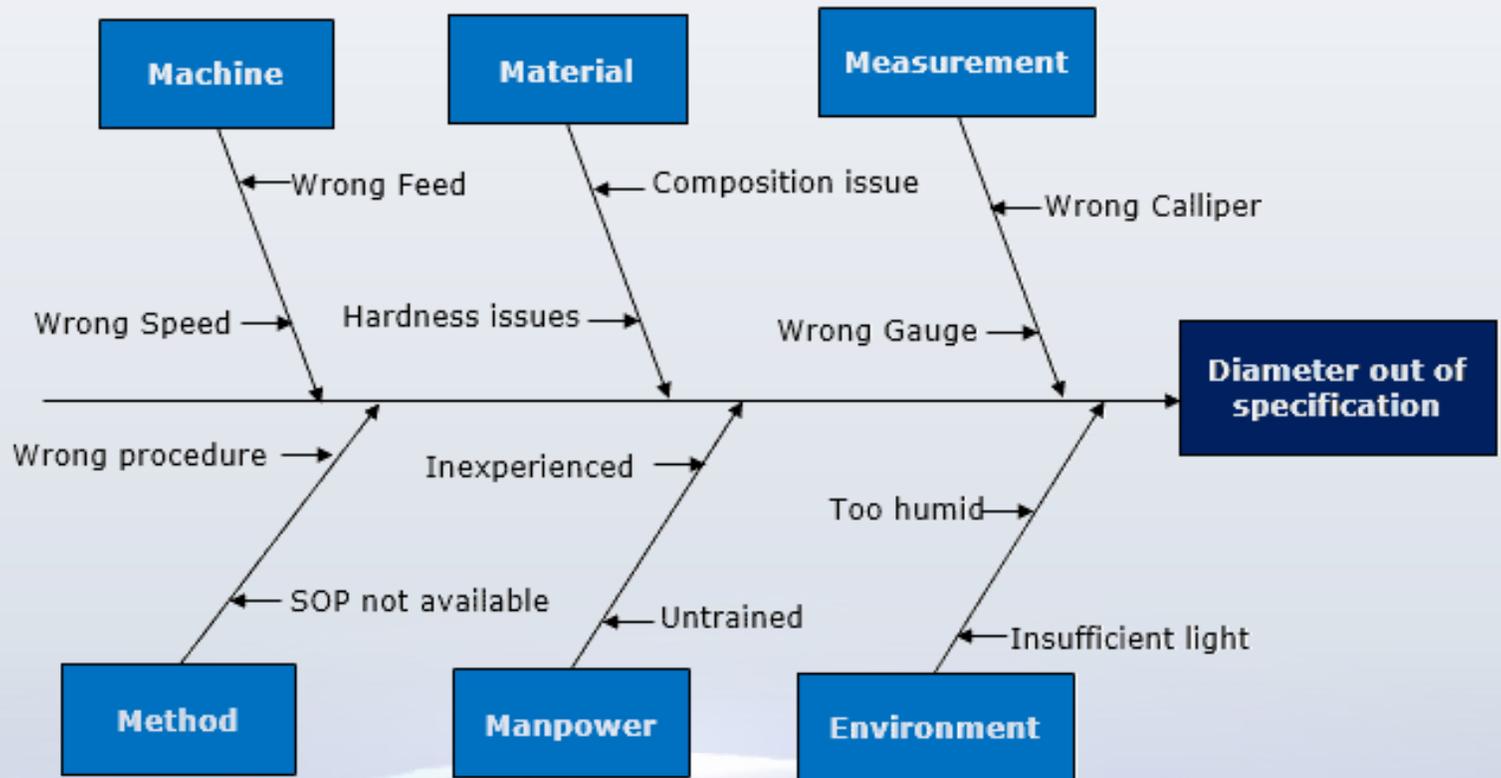


Root Cause Analysis (RCA)

Data tells us "**What**"
happened



RCA tells us "**Why**"



Introduction to analytical tools and methodologies



Case Study: Trenitalia Dynamic Maintenance

- Trenitalia manages a fleet of high-speed trains (Frecciarossa).
- Partnered with SAP to install **5,000+ sensors** per train.

The Methodology:

- Moved from "Mileage-Based" (Preventive) to "Condition-Based" (Predictive).
- Process up to **700 TB** of data annually.

Published Result:

- Maintenance costs reduced by **8-10%** (approx. **€100M+ savings**).
- Unplanned downtime reduced by **5%**.



Introduction to analytical tools and methodologies



Machine Learning for Predictive Analytics

- Use machine learning algorithms to analyze historical asset performance data and predict future maintenance needs, potential failures, and optimal replacement times.
- Implement models like Random Forest or Gradient Boosting for enhancing accuracy in predictions.

Digital Twin Technology

Create digital replicas of physical assets to simulate their performance under various conditions.

This allows for real-time monitoring and scenario testing to optimize asset operation and maintenance strategies.

Predictive Financial Modelling

Develop financial models that incorporate predictive analytics for forecasting cost and revenue impacts of asset decisions over their lifecycle, allowing for more informed budgeting and investment planning.

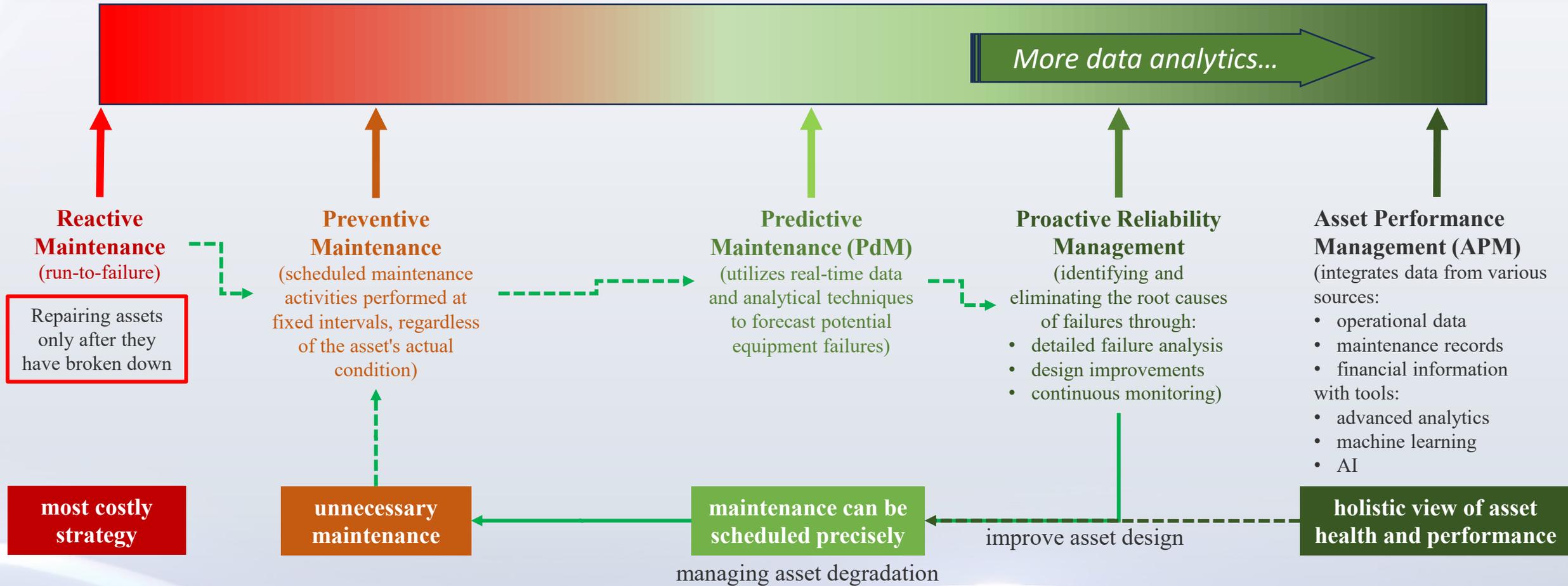
Scenario Planning and Simulation

Use advanced simulation tools to run "what-if" scenarios regarding asset performance under various conditions, helping to strategize for different market dynamics and operational challenges.

Reliability Strategy Continuum



Asset Health Management Strategy – *to maximize asset value throughout its lifecycle*



Optimize asset reliability, availability, and efficiency while minimizing risks and costs

Demonstration of data visualization techniques for asset tracking

Visualization Principles

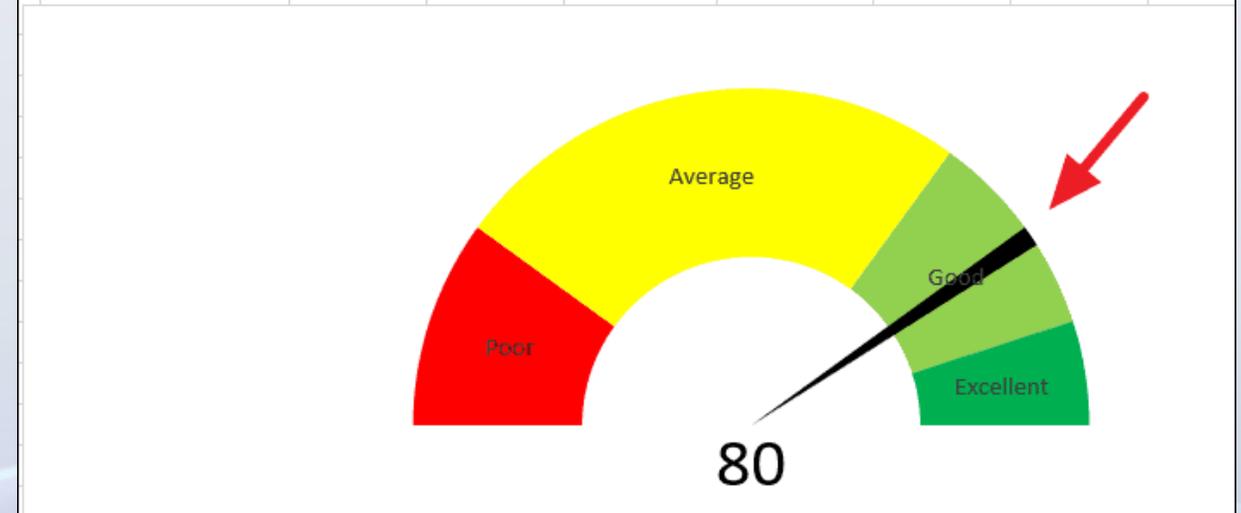
The 5-Second Rule

If you can't understand the asset status in 5 seconds, the dashboard has failed.

Context is King

A number (50psi) means nothing without a limit line.

	D	E	F	G	H	I	J	K
	The Pointer			Chart Data				
	Pointer Settings	Value		Student	Marks			
	Pointer	80		Jon	34			
	Thickness	2		Ned	70			
	Rest Value	118		Arya	60			
				Sasha	80			
				Tyrion	95			



Demonstration of data visualization techniques for asset tracking



Dashboard Levels

Different Views for Different Roles



Demonstration of data visualization techniques for asset tracking



Exercise 3

You are an executive reviewing the monthly report for a fleet of three critical pumping stations.

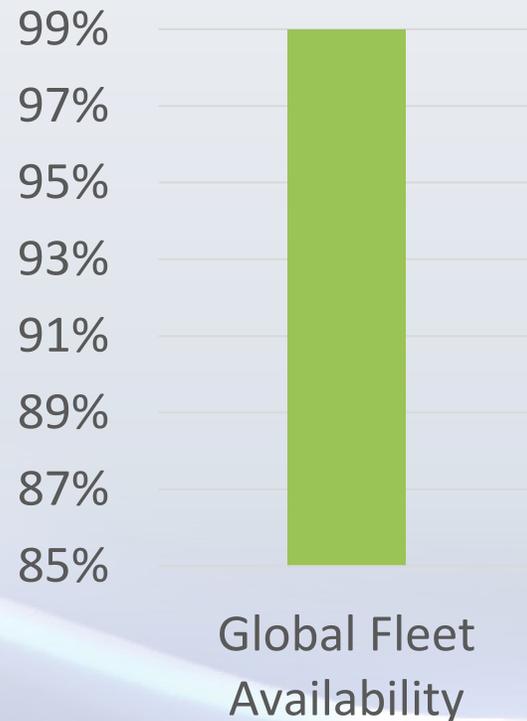


Demonstration of data visualization techniques for asset tracking

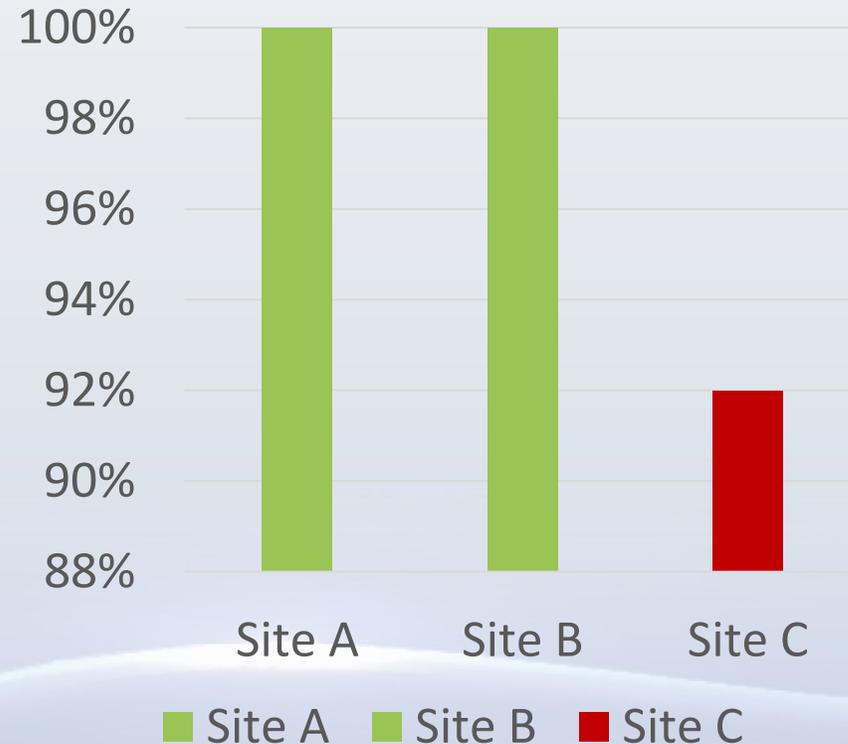


Exercise 3

The Executive Report:
"99% (On Target)"



The Reality:
SITE C – CRITICAL FAILURE



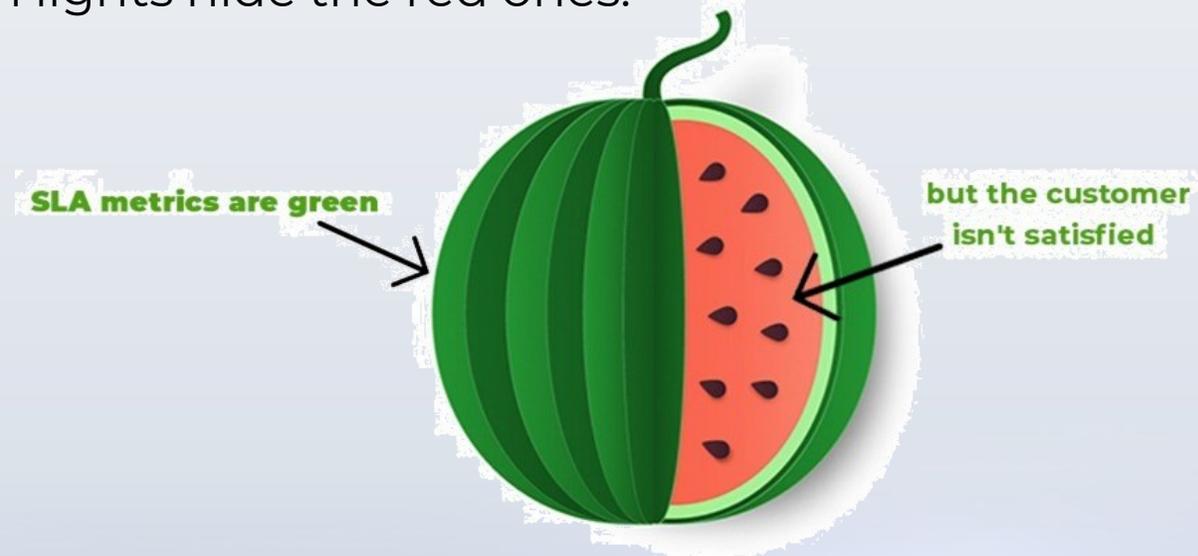
Demonstration of data visualization techniques for asset tracking

Exercise 3 – Debrief

The Problem:

Watermelon Metrics

= Too many green lights hide the red ones.



Dashboards should manage by exception
only show me what is wrong

Demonstration of data visualization techniques for asset tracking

Case Study: "The Edge" (Facility Management)

Known as the "Smartest Building in the World" (*Deloitte HQ*)

30,000 sensors connected to a central dashboard.

The Visualization:

- Heat maps show cleaning staff exactly which rooms were used
- If a room wasn't used, it is skipped (*Data-Driven Cleaning*)

→ **70%** less electricity usage than comparable buildings

→ Significant reduction in cleaning vendor costs.



Maximizing Asset Value

Dynamic, intelligent process that continuously seeks to optimize asset contributions to organizational success, ensuring a sustained competitive advantage





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THANK YOU!



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