

**COROMANDEL
INTERNATIONAL:
DIGITAL
MANUFACTURING**



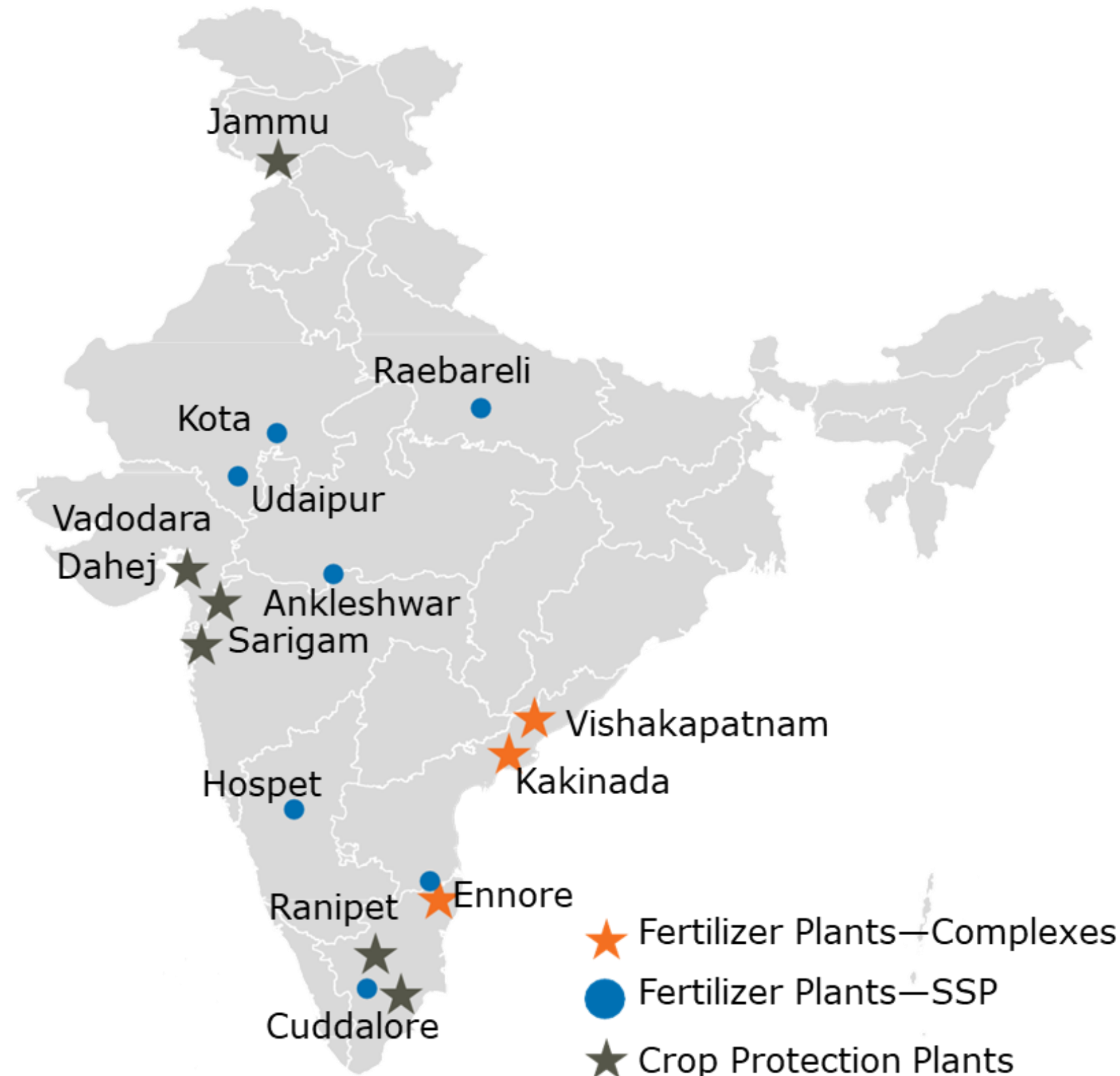
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Coromandel: India footprint

- India's largest private sector Phosphatic Fertilizer company
- Pioneers & market leaders in Specialty Nutrients
- India's largest Single Super Phosphate (SSP) company
- 5th largest Crop Protection Indian company
- Worlds' largest Neem based Bio pesticide manufacturer
- No. 1 Organic Manure player in India
- Largest Rural Retail Chain in India



- 17 manufacturing locations
- ~750 Retail centres
- ~20,000+ dealers
- Presence across ~81 countries
- ~ 2,000+ strong market development team

Revenue in 2022-23
₹ 29,628 crores

Over 13,650
employees worldwide

Partnering with over
2 crore farmers

OUR VISION, MISSION and VALUES



VISION

To be the leader in farm solutions business in geography of choice, consistently delivering superior value to stakeholders through highly engaged employees, with a strong commitment towards sustainability and our values.



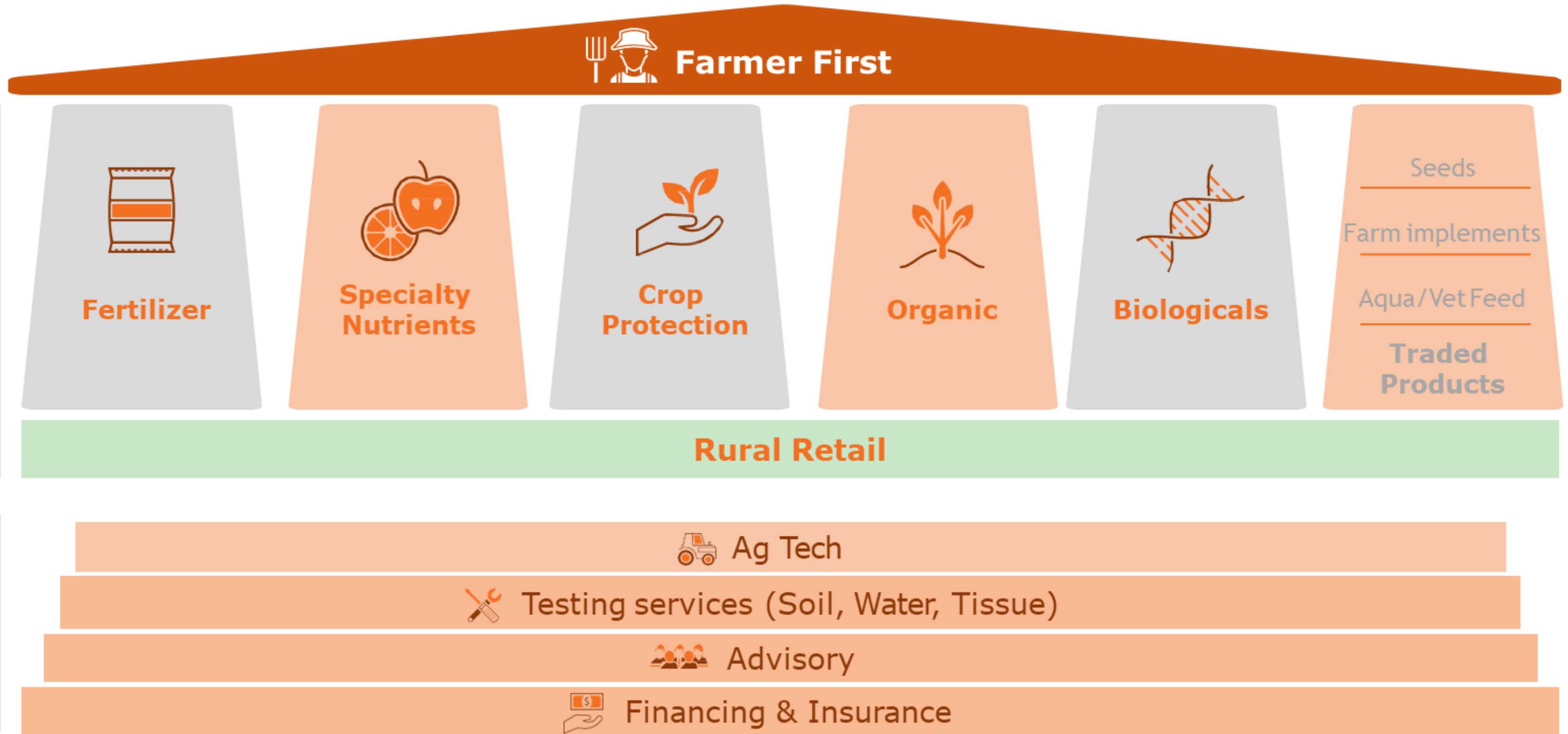
MISSION

To enhance prosperity of farmers through quality farm solutions with sustainable value for all stakeholders.



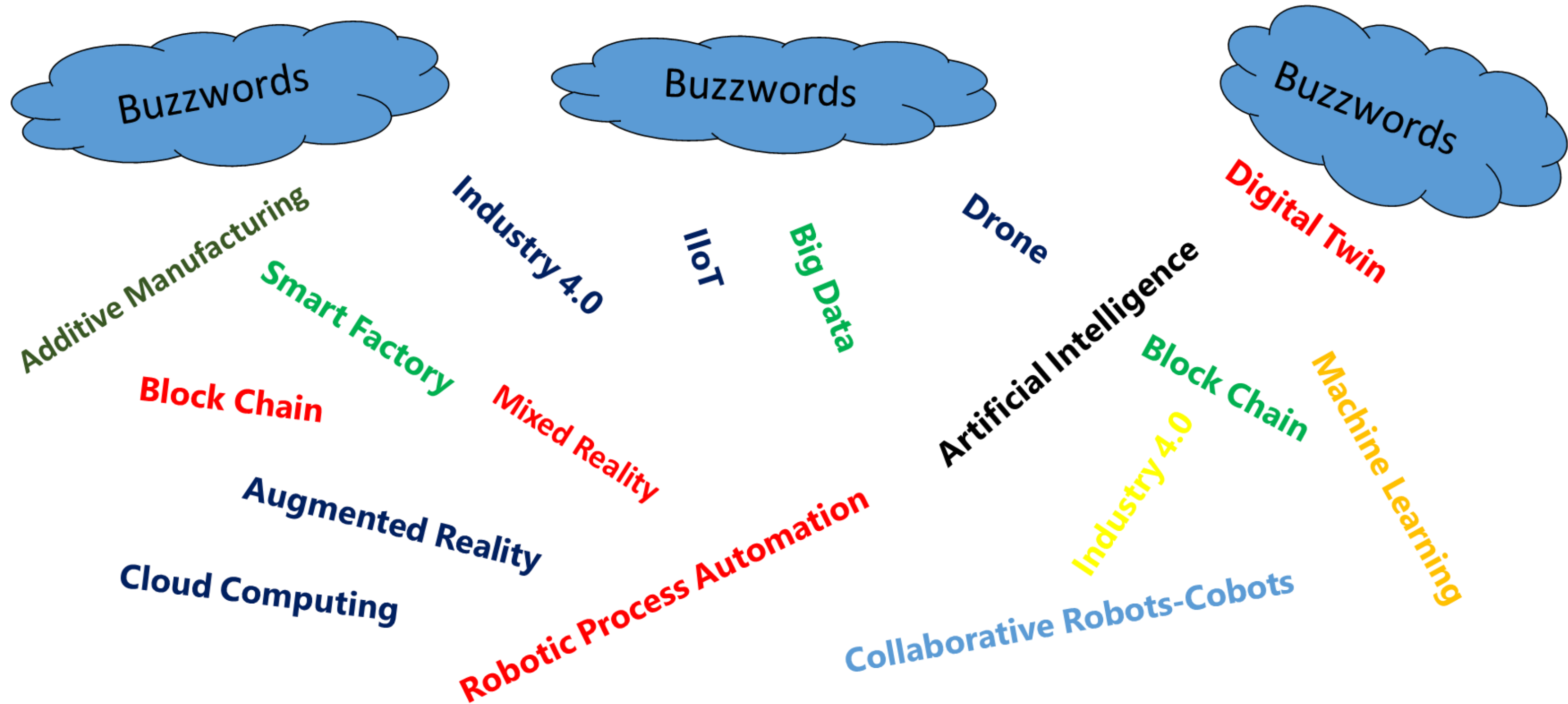
VALUES AND BELIEF

The fundamental principle of economic activity is that no man you transact with will lose then you shall not.



A 'Farmer First' winning business model

Buzzwords in Manufacturing



We just need to know How to utilize these technologies for improving our business processes and eliminating our pain points

Industry 4.0 in the Context of Digitalization and Smart Manufacturing:

- **Industry 4.0 Definition:** Industry 4.0 refers to the fourth industrial revolution, characterized by the integration of digital technologies into manufacturing processes. It includes technologies such as the Internet of Things (IoT), artificial intelligence (AI), big data analytics, and automation.
- **Digitalization in Manufacturing:** Digitalization involves the use of digital technologies to transform traditional manufacturing processes, making them more efficient, agile, and data-driven. This includes the use of sensors, connectivity, and real-time data analysis to optimize production.
- **Smart Manufacturing:** Smart manufacturing focuses on leveraging intelligent technologies to enhance the entire manufacturing ecosystem. This includes intelligent automation, predictive maintenance, and the integration of data across the entire value chain.

Success Criteria for Digital Transformation

Success Criteria for Digital Transformation:

- **Alignment with Business Objectives:** Successful digital transformation aligns with the overall business strategy and objectives.
- **Employee Engagement:** Ensuring that employees are trained and engaged in the digital transformation process.
- **Customer Satisfaction:** Improvement in customer experience and satisfaction through digital initiatives.
- **Adoption of New Technologies:** Successful integration and adoption of new technologies that enhance efficiency and innovation.

Aim for Digital Manufacturing

Centralized Digital Manufacturing Platform(CDMP) aimed at providing one version of truth around Manufacturing effectiveness

CMMS- As Part of Digital Manufacturing Strategy

CMMS (Computerized Maintenance Management System) is an essential tool in digital manufacturing strategy. It is a software-based system that automates the maintenance management process and provides real-time visibility into equipment health and maintenance activities.

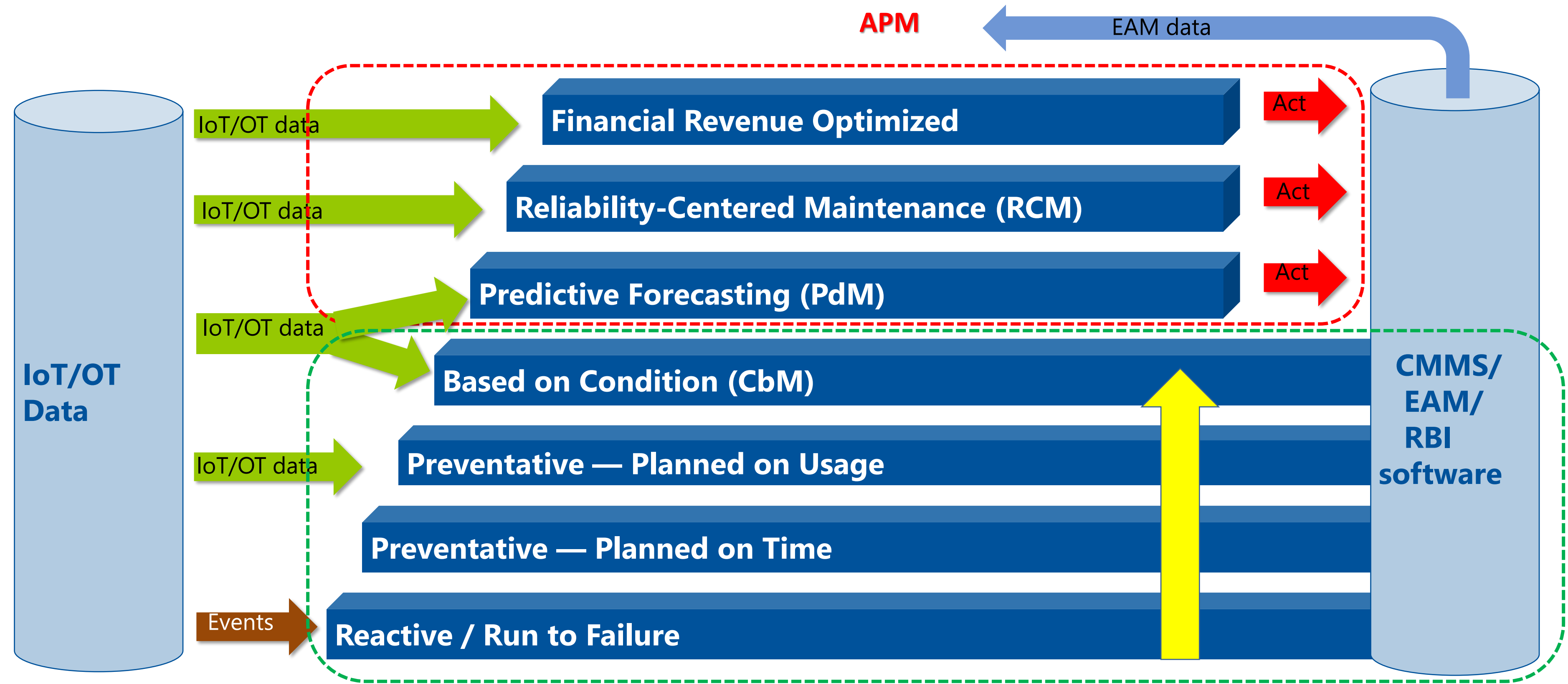
In a digital manufacturing strategy, CMMS helps to improve overall equipment effectiveness (OEE) by reducing downtime, increasing equipment reliability, and minimizing maintenance costs. CMMS also helps in creating a more efficient maintenance workflow by automating routine maintenance tasks, scheduling work orders, tracking maintenance history, and providing detailed reports on equipment maintenance activities.

Moreover, CMMS can be integrated with other digital manufacturing technologies like IoT sensors, predictive maintenance analytics, and data analytics tools to create a comprehensive digital maintenance ecosystem. This ecosystem enables manufacturers to collect, analyze, and act on data insights in real-time, allowing for predictive and preventive maintenance.

In summary, CMMS is an essential component of digital manufacturing strategy, enabling manufacturers to optimize their maintenance workflows, reduce downtime, increase equipment reliability, and minimize maintenance costs.

Digital Maintenance System

Asset Reliability and Performance Management

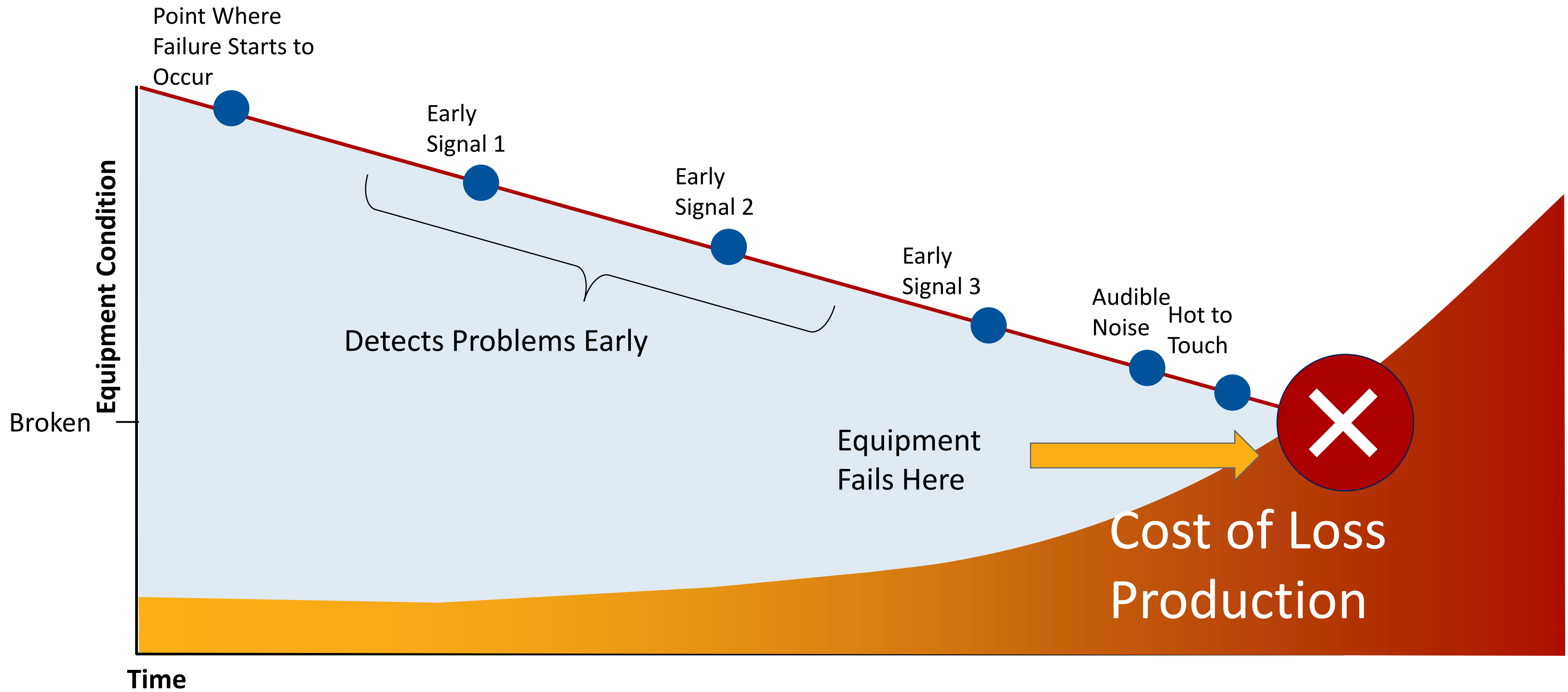


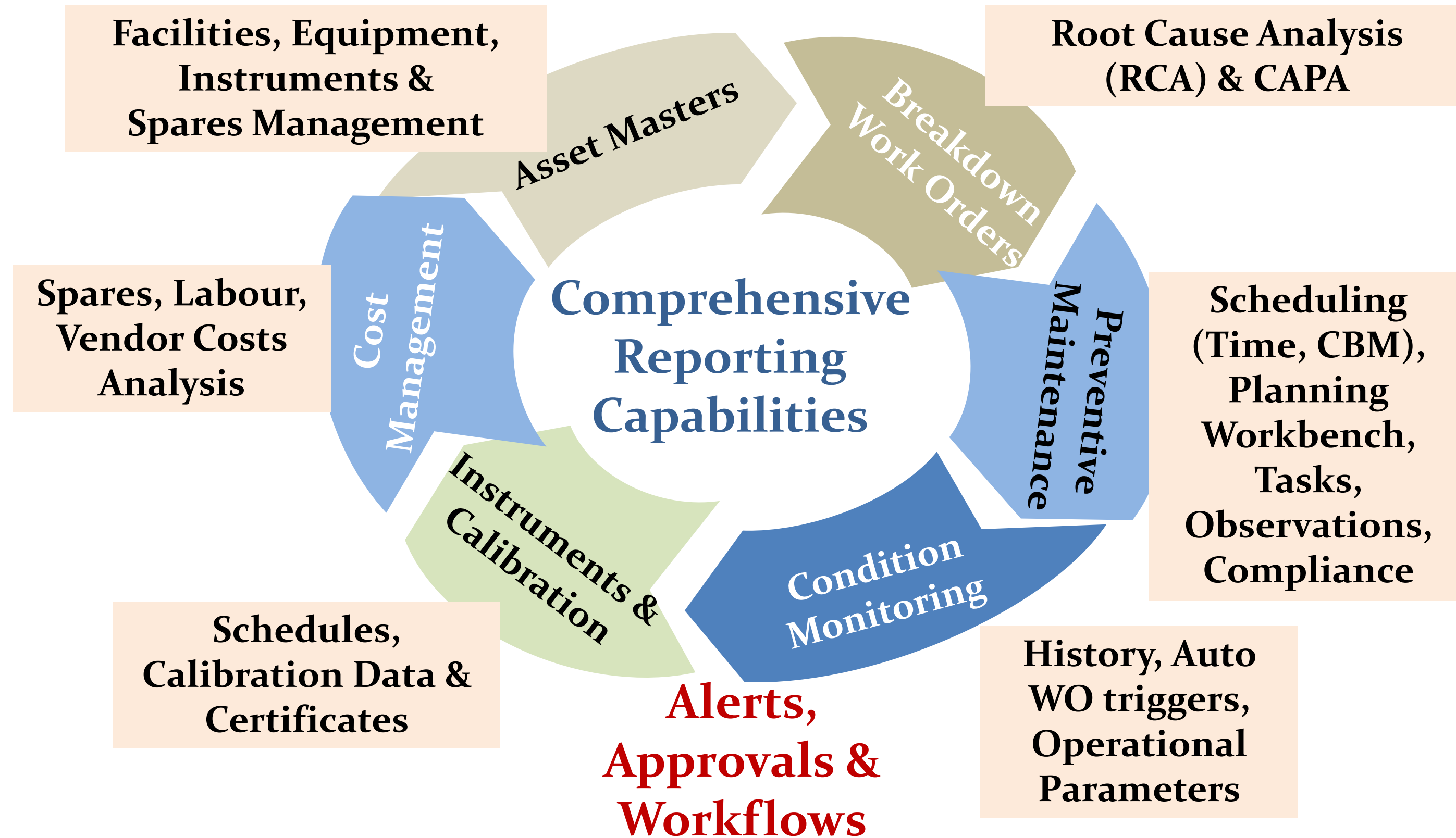
OT = operational technology

APM = Asset Performance Management

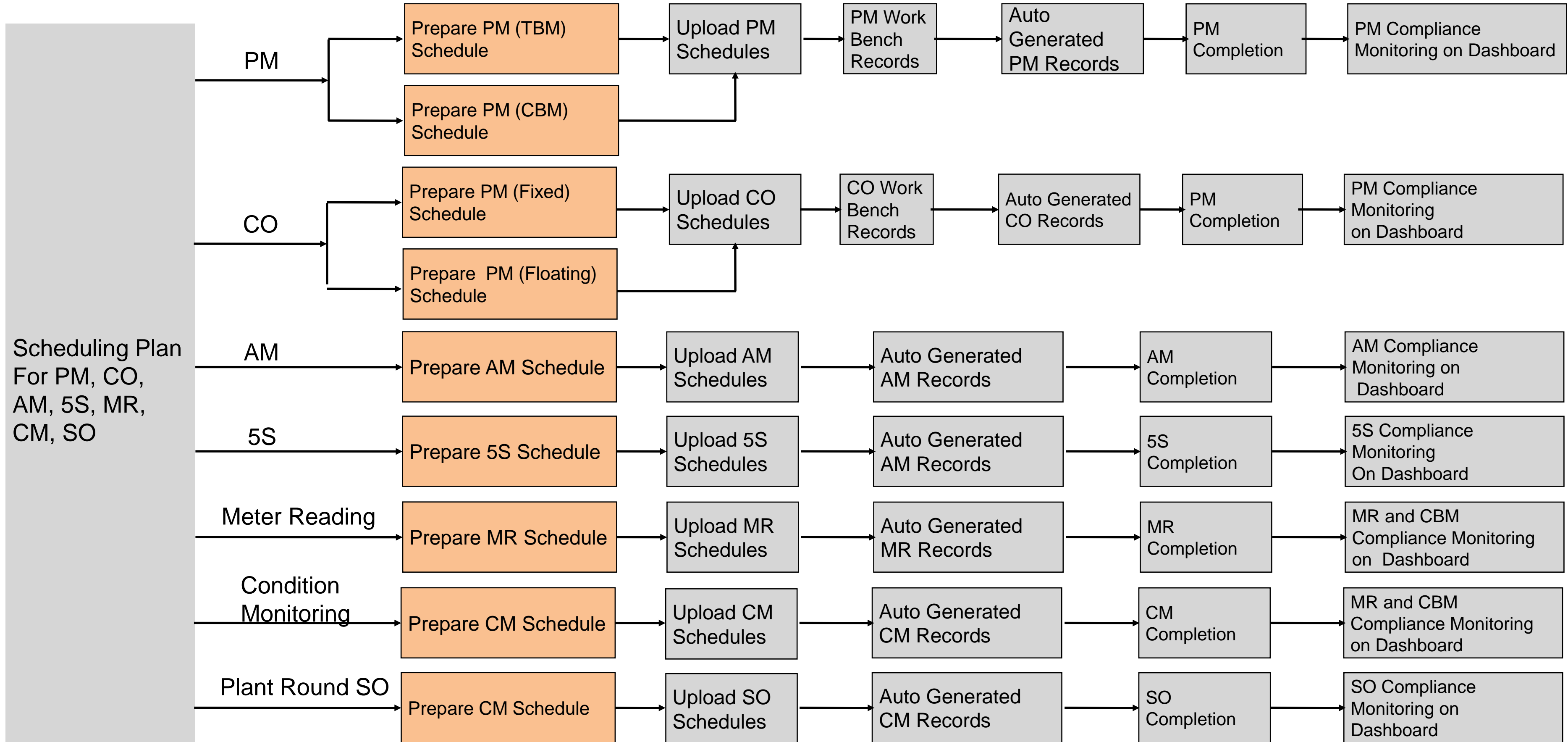
EAM = Enterprise Asset Management

CMMS Requirement





Scheduled Transactions



Training Solutions



Connected Workforce

- Virtual Reality : Operator Training made simple
- Augmented Reality: Explains complex components in a realistic and simple manner.
- DIY Training Platform & Authoring Tool
- Dial an Expert with annotations for understanding
- Easy Maintenance functions with step-by-step guide

6 PILLARS OF CONNECTED WORKERS



Application Platform

Enable workers to share information and interact with real-time broadcasting of their surrounding in more immersive ways.



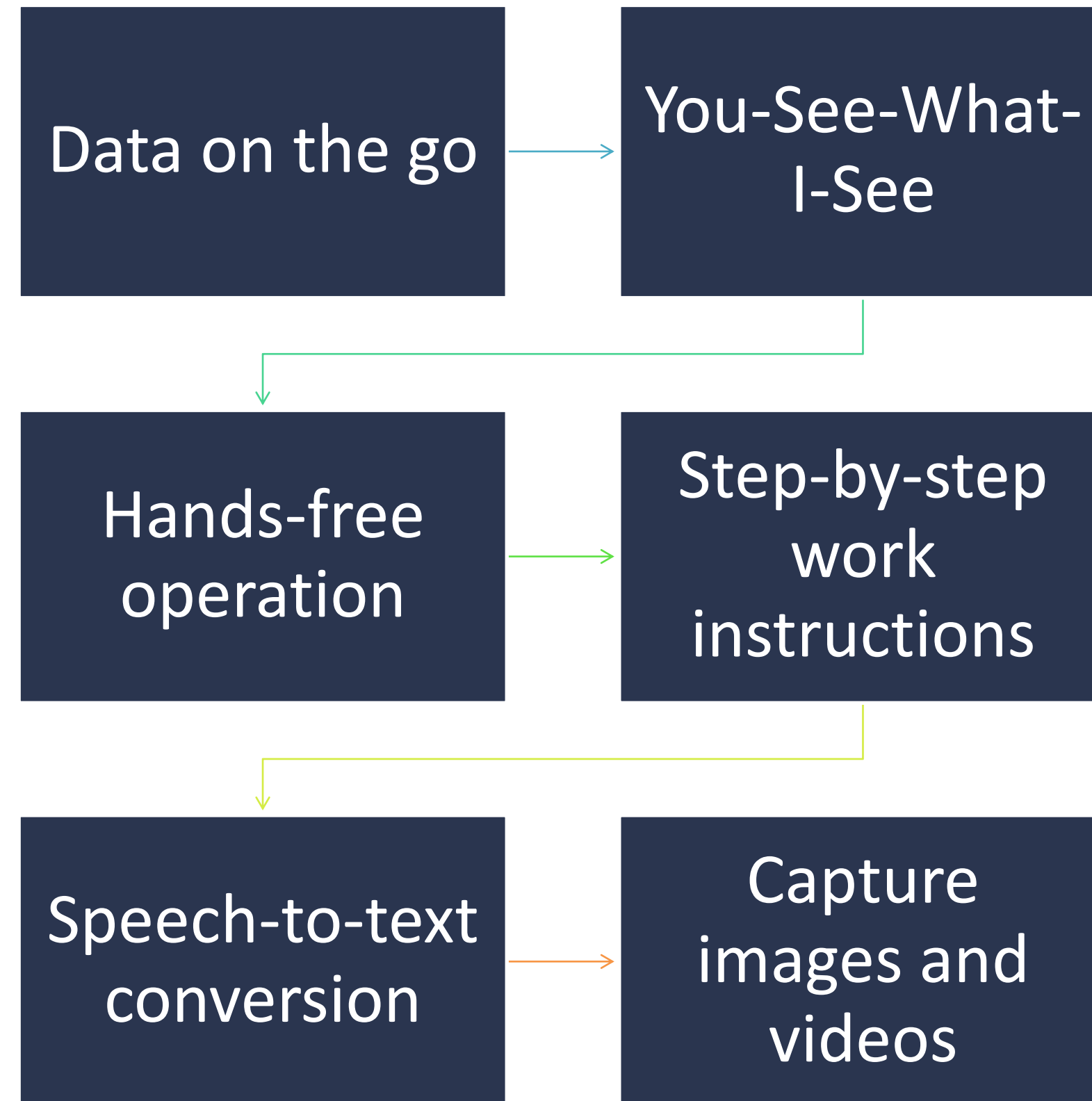
Smart IoT Devices

Industrial-grade Wearable Smart Glasses, users now have access to augmented reality and artificial intelligence, enabling them to engage with their surroundings in novel ways.



Tech Convergence

With edge computing, which decreases latency and boosts network performance by relocating workloads to network endpoints, employees can connect like never before thanks to the convergence of cloud, WiFi, and mobile accessibility.



Augmented Reality Intelligent Glasses

Maintenance & Repair

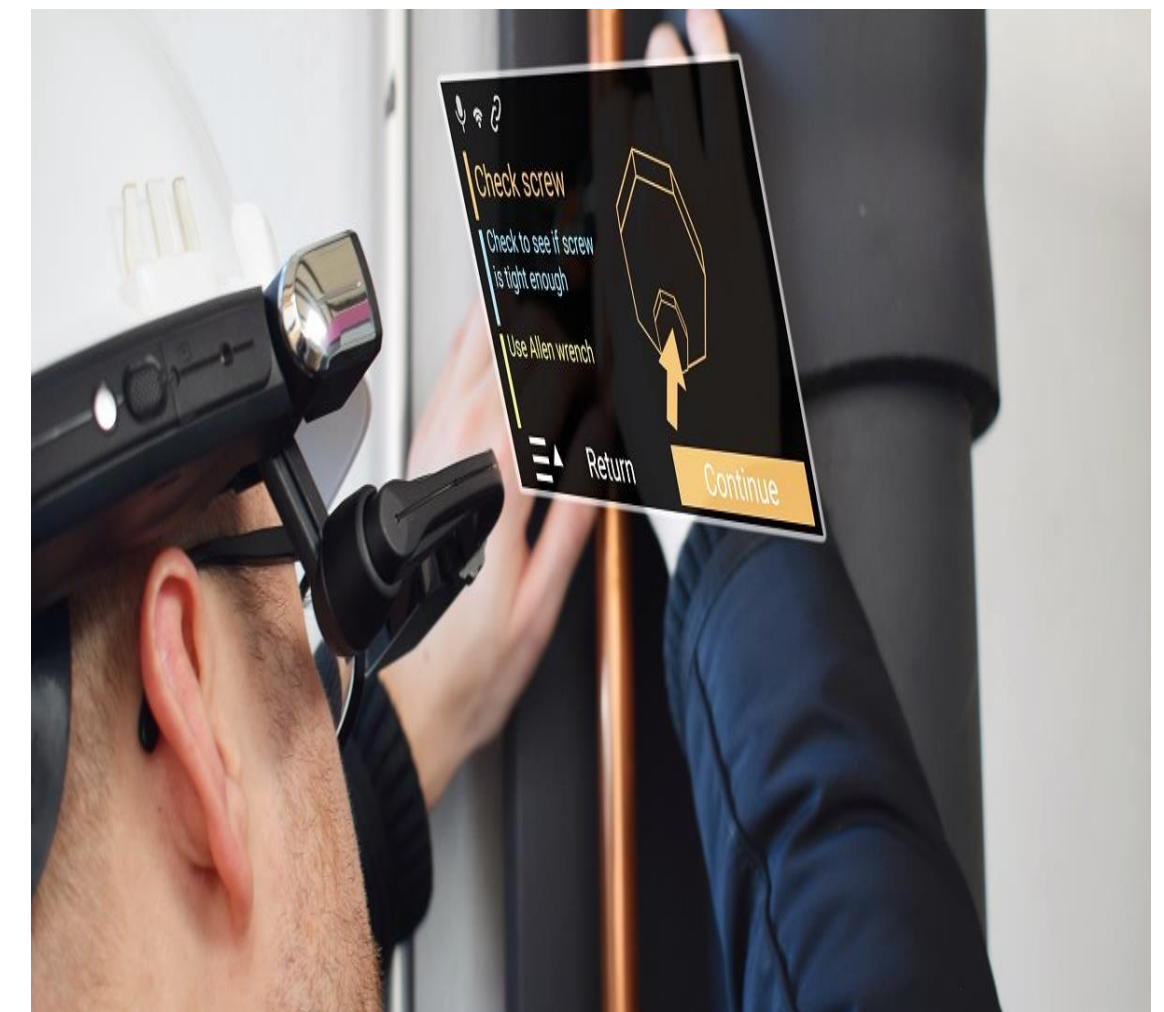
- Step-by-step workflow for 1st time right
- Digital and intelligent diagnosis agent for help
- Integrated multi-media documentation
- Digital operating manual guided by the digital agent

Inspection & Quality

- Digital workflow and acceptance processes
- Video participation of remote experts
- Immersive training for process steps

Logistics & Warehouse Operations

- Real-time collaboration with instructions
- In-warehouse and shop-floor navigation
- Automated vision-based inventory check
- Handsfree scanning
- Handsfree pick by vision
- Last-mile delivery with guided instructions



Asset Health Prediction by IoT devices and AR/VR

CRITICAL EQUIPMENT PERFORMANCE CHALLENGES

- Will it fail suddenly?
- Why will it fail to function?
- When will it stop to function?
- How to find and fix the fault?
- How to eliminate failures?
- Are critical spares in stock?
- Is production quality maintained?
- Is equipment well-maintained?
- Business impact?



Motors



Pumps



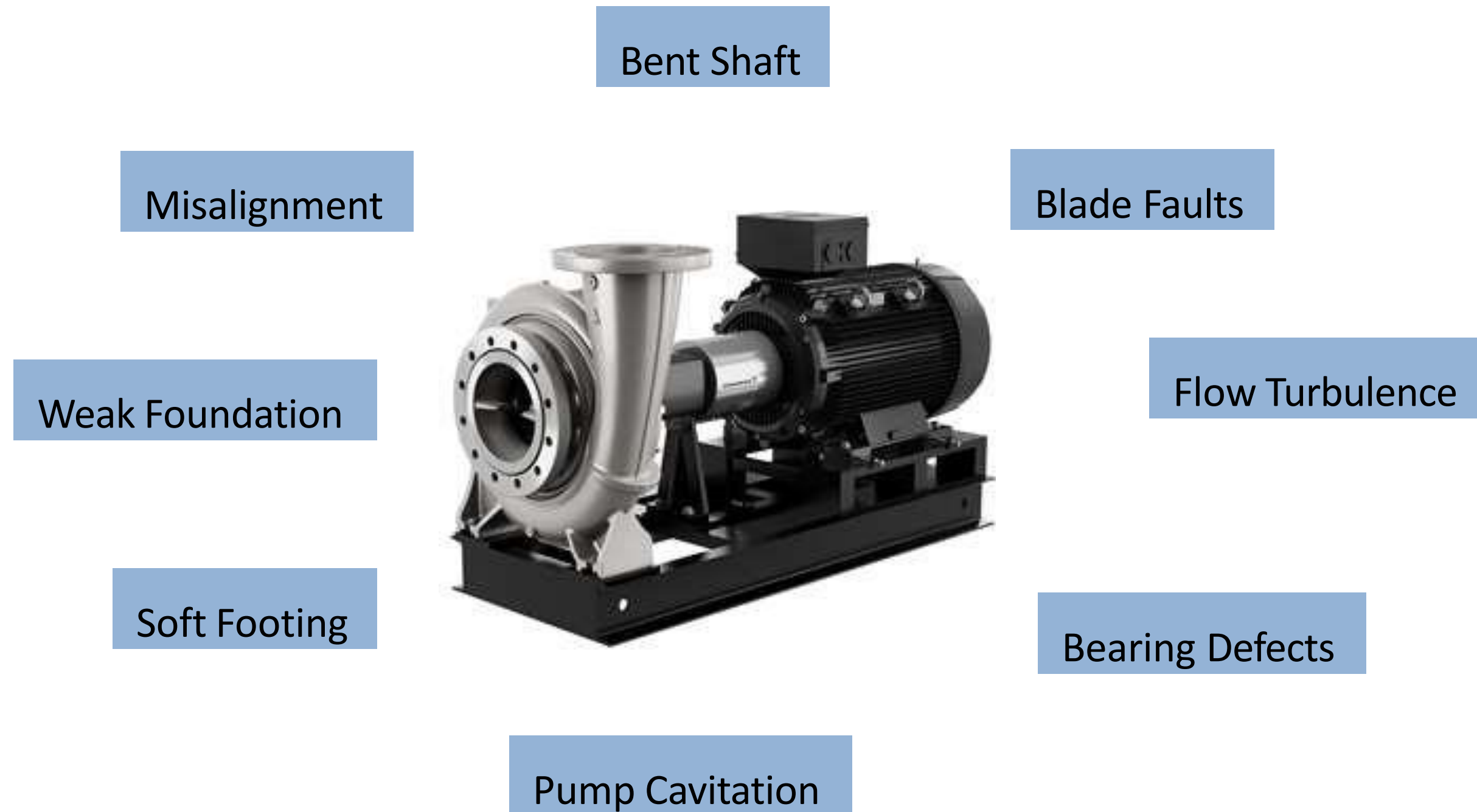
Bearings



Gearbox

FAULT DIAGNOSIS FOR ROTATING MACHINES

IoT Sensors can help to determine the following faults and more..



INDUSTRY GAP: LACK OF MECHANICAL PREDICTIVE ANALYTICS

20% of breakdown

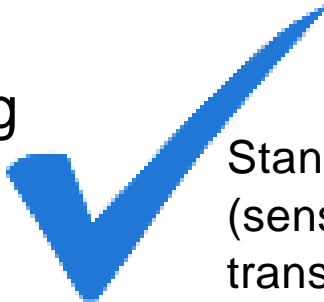
- Hydraulics
 - Pressure
 - Temperature
 - Flow Rate
 - Contamination
 - Density



Standard IoT
(sensors + wireless
transmission)

5% of breakdown

- Thermal
 - Temperature
 - Thermal Mapping
 - Thermal Flux



Standard IoT
(sensors + wireless
transmission)

70% of breakdown

- Mechanical
 - Wear
 - Deterioration
 - Backlash
 - Increase in clearances
 - Vibrations
 - Acoustics



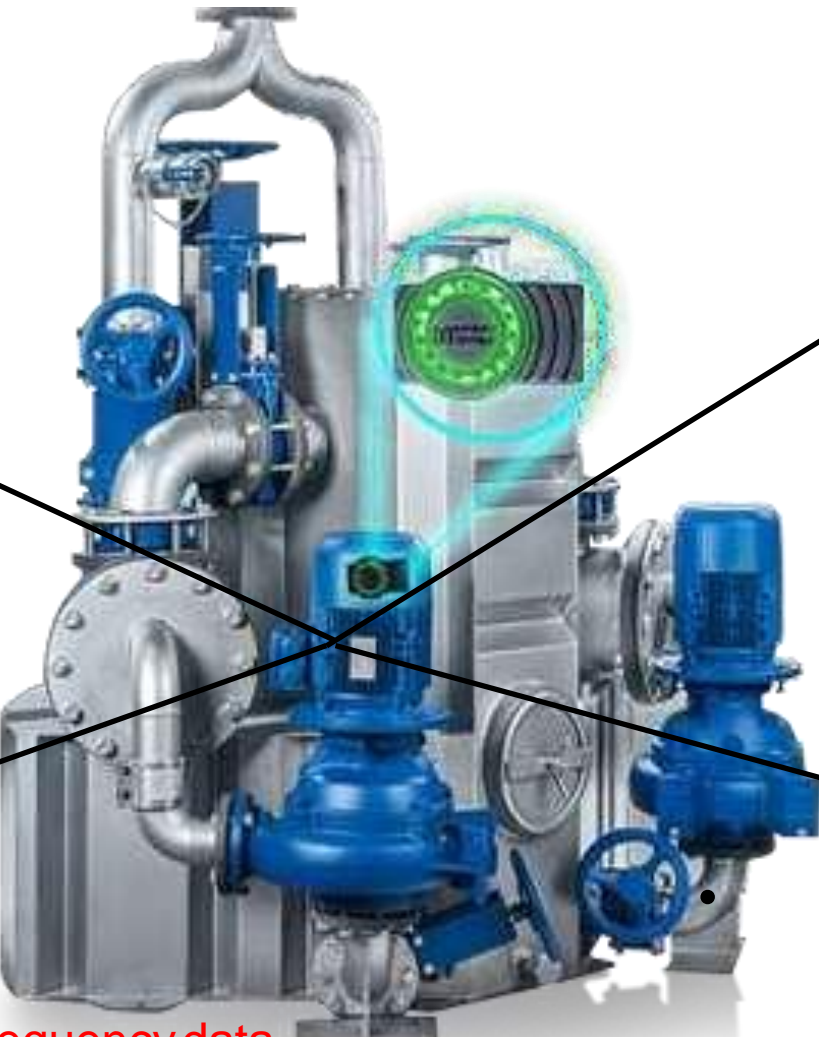
Very high frequency data
Difficult to decipher signal from noise
Bandwidth limitations
Storage limitations
Standard IoT does not work :-/

5% of breakdown

- Electrical
 - Electronics Life
 - Power surge
 - Current
 - Voltage
 - Power factor
 - Energy Efficiency



Standard IoT
(sensors + wireless
transmission)



What are the typical Stress parameters of the rotating Equipment's?

Triaxial Vibrations

Temperature

Sound

FFT data for in-depth analysis of the problem

Trend of change over a period of time

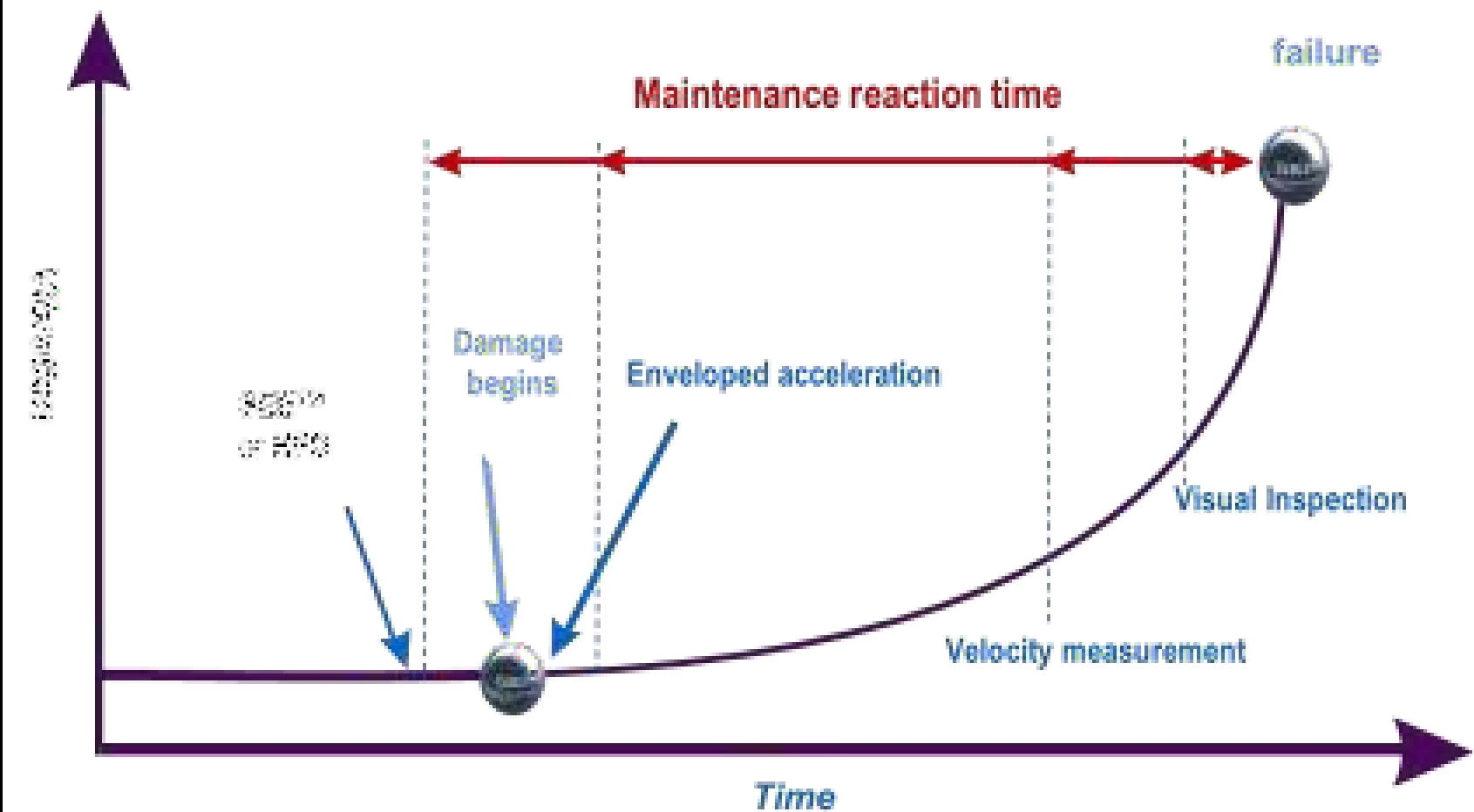
Immediate SMS & Email alert in case of any anomaly detected

DATA CAPTURING AND MONITORING

OFFLINE MONITORING Vs ONLINE MONITORING Vs EDGE MONITORING

Data Capturing Mechanism	Offline	Online	On-Edge
Data Sampling in No Load	✓	✓	✓
Data Sampling in Load	✗	✓	✓
Equipment Condition Monitoring	✗	✓	✓
Event Capturing	✗	✓	✓
Trend Visualisation	✗	✓	✓
Spectrum Analysis 24x7 and over the Air	✗	✗	✓
Recording of important health Parameter (Vibration, Temperature, Acoustic) on Mobile	✓	✗	✓
Local Alarms	✗	✗	✓
FFT on Mobile	✗	✗	✓

Vibration monitoring buys you time



EQUIPMENT EDGE MONITORING- WHY SHOULD I DO IT ?

End User

- Reduce sudden breakdowns
- Listen to your machine real time
- Build Maintenance Plan



- Real-time Data with Edge computing
- Insights for decision-making
- Equipment Health Monitoring
- Increases Safety



• KPIs to be influenced

- To align Maintenance actions with business strategy to meet goals.
- Increase Uptime.
- Improve MTBF (Mean Time Between Failures).
- Reduction in MTTR (Mean Time to Repair).
- Decrease Unplanned maintenance costs.



HOW IS THE SOLUTION DEPLOYED?



Vibration Sensor(IoT)

SAMPLE INSTALLATION

IoT Complete System



1 Installs on any machine **within seconds** through a magnetic connection.



2 **Immediate feedback** through visual fault-detecting indicators.



3 **Monitor remotely and wirelessly**, to mirror notifications and record data.

USING FFT ANALYTICS FAULTS CAN BE DIAGNOSED

Motor Problems

Mechanical
Looseness

Bent Shaft

Unbalance

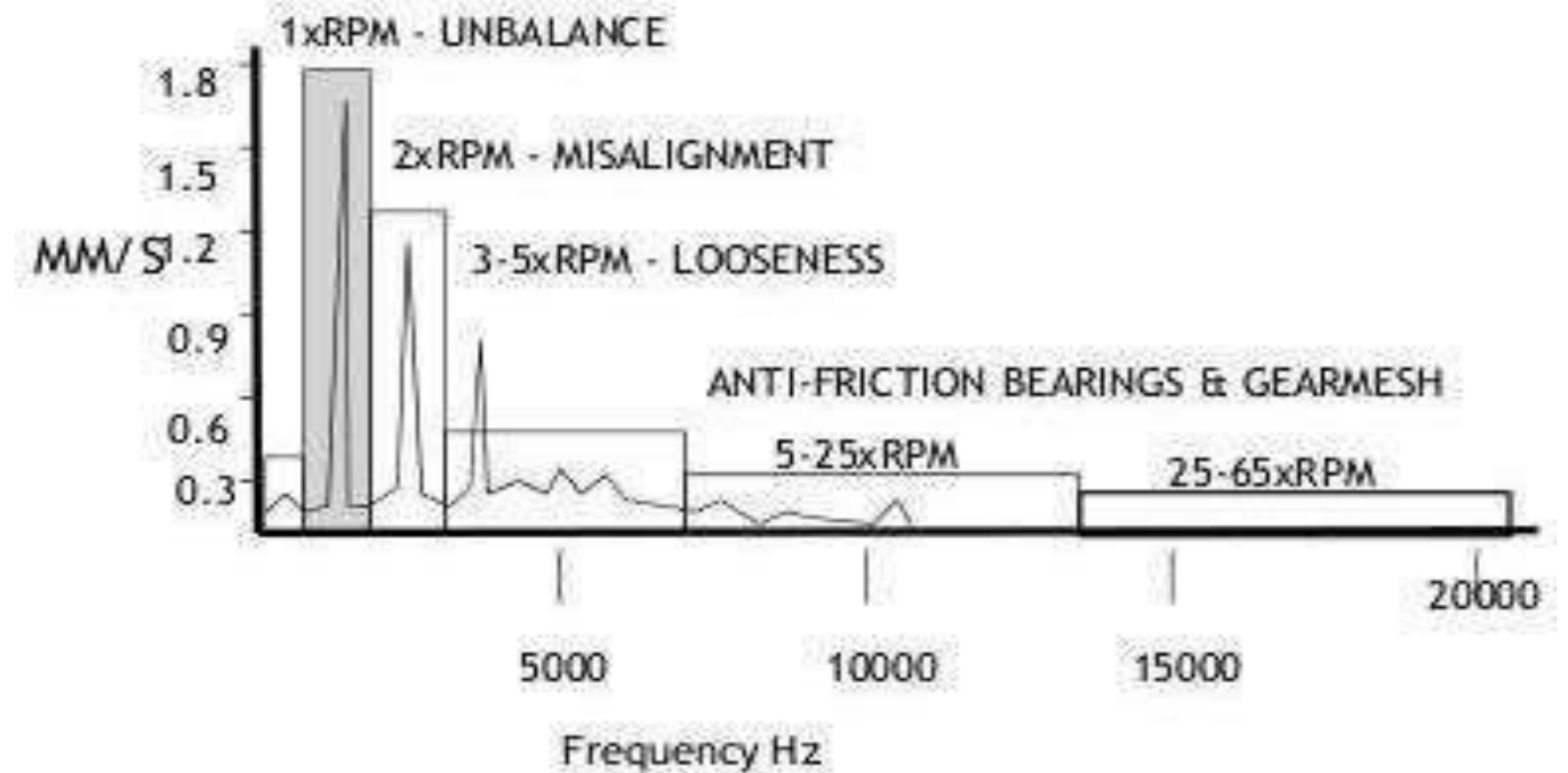
Cocked Bearing

Misalignment

Gear Problems

Foundation
Looseness

Predefined Spectrum Analysis Bands



ROOT CAUSE ANALYTICS IN THE FREQUENCY DOMAIN

How can Predictive Maintenance solution add value while saving costs

Prevent any future downtime

Improve Asset life-
Continuous condition based monitoring

Move from Preventive (time based) to predictive Maintenance

Reduce Spares costs

Reduce labor costs

Know the status of the health of machines at all times in single view

Save product cost and quality loss if caused due to unplanned stoppages

Plan ROI based on being able to even improve productivity by 5-10%

Tangible Benefits



Proactive notification



Reduces unexpected downtime



ROI by catching failures before they happen



Performance & Reliability Improvements

Intangible Benefits



Reliable information



Prevent unnecessary labour & maintenance



Awareness of asset health versus time-based maintenance



Impact on performance improvement means additional revenues



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Thank You