

The Evolution of Condition Monitoring

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Driving Asset Management Forward

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Our Background

Experience



- 14-years of providing Superior Maximo Services
- 100s+ of Years of Maximo Experience
- Commitment to Maximo Community

Credentials



- IBM Gold Partner
- Certified IBM Maximo consultants
- Awarded ISO 9001:2015 Certification



References



- High customer satisfaction
- Long-standing relationships based on trust
- Teaming partnerships with clients

Services



- Upgrades
- Tech Services
- Managed Services
- Training
- Data Management
- Mobile
- Process Realignment
- And more!

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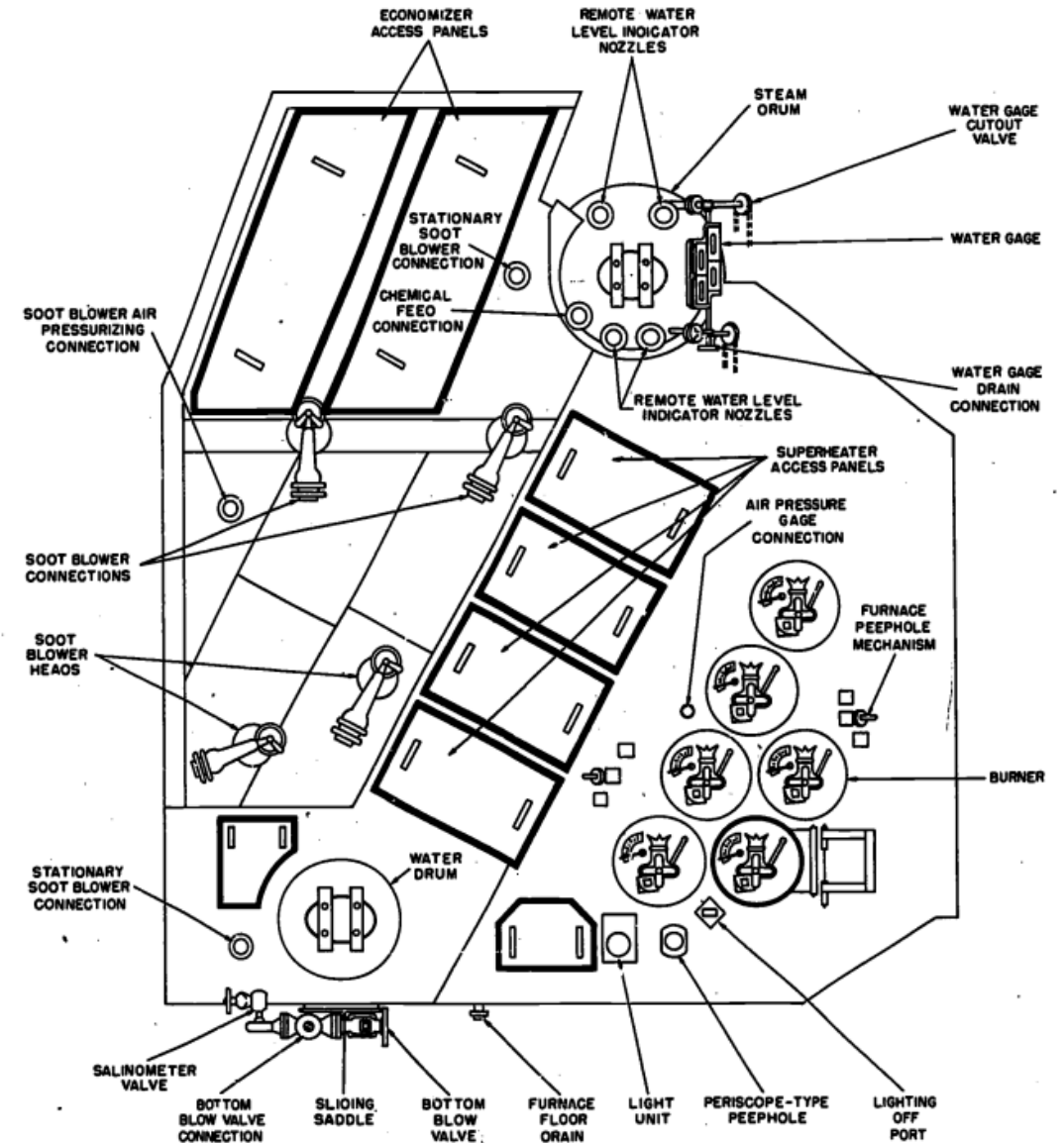
What is condition monitoring?

- CM is the process of monitoring a parameter or condition in a piece of equipment in order to identify a significant change which is indicative of a developing fault.
- CM is a major component of an asset management program and a predictive maintenance program
- CM supports a reliability program.
- The use of condition monitoring allows maintenance to be scheduled, or other actions to be taken to prevent consequential damages and avoid its consequences.
- It identifies conditions that would shorten normal lifespan that can be addressed before they develop into a major failure.
- CM replaces time based intrusive PMs that can actually introduce a failure point

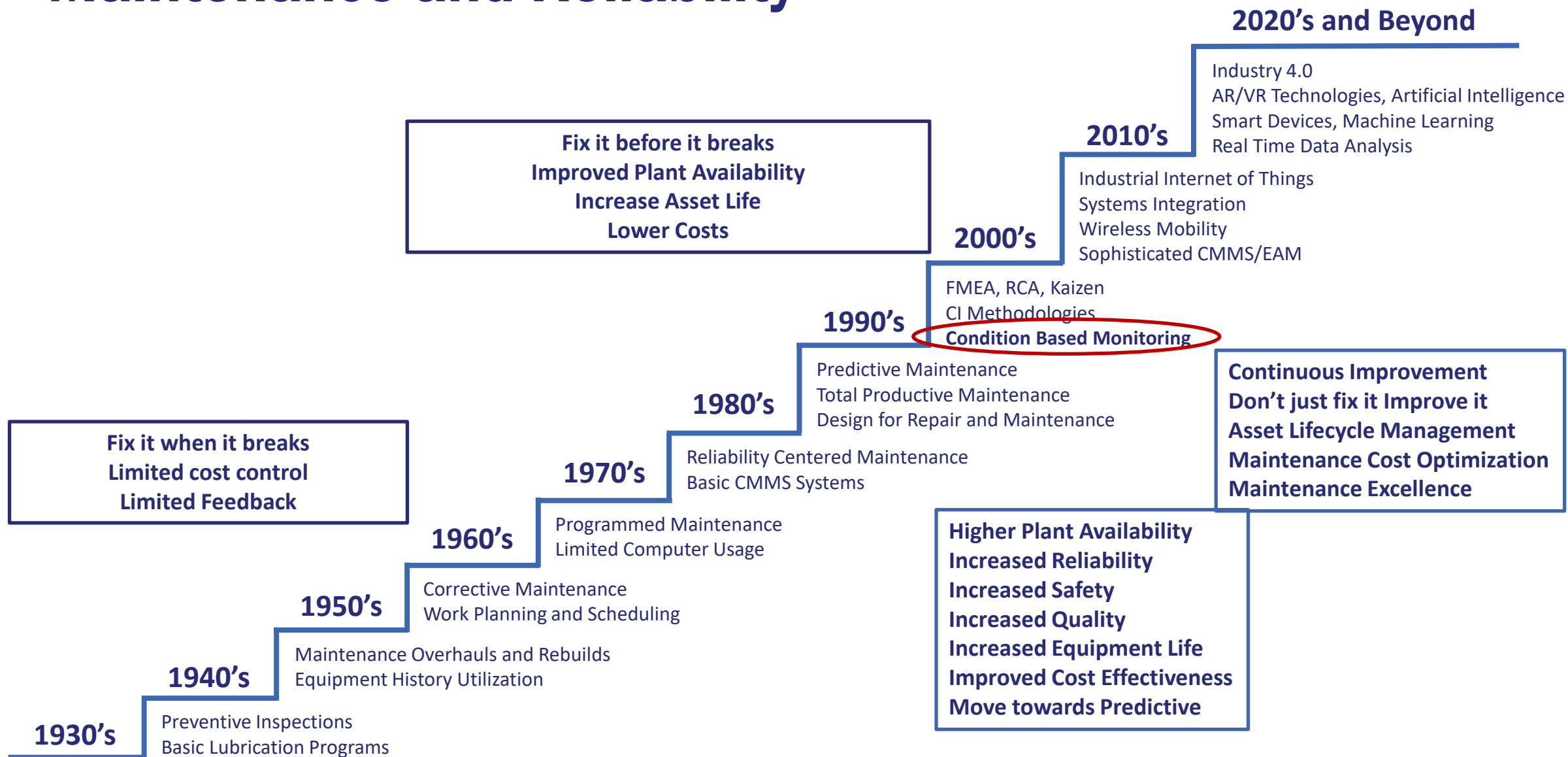
Early Examples

- In 1593, Galileo Galilei invented a rudimentary water thermoscope, which for the first time allowed temperature variations to be measured.
- The Italian, Santorio Santorio (1561-1636) is generally credited with having applied a scale to an air thermoscope at least as early as 1612 and thus is thought to be the inventor of the thermometer as a temperature measuring device. The more modern thermometer was invented in 1709 by Daniel Fahrenheit.
- In 1654 the first sealed glass tube was developed by Ferdinand II, the Grand Duke of Tuscany. It contained alcohol and had a numerical scale, but wasn't very accurate.
- In 1849, the French engineer Eugène Bourdon patented the pressure-measuring device commonly known today as the Bourdon tube.

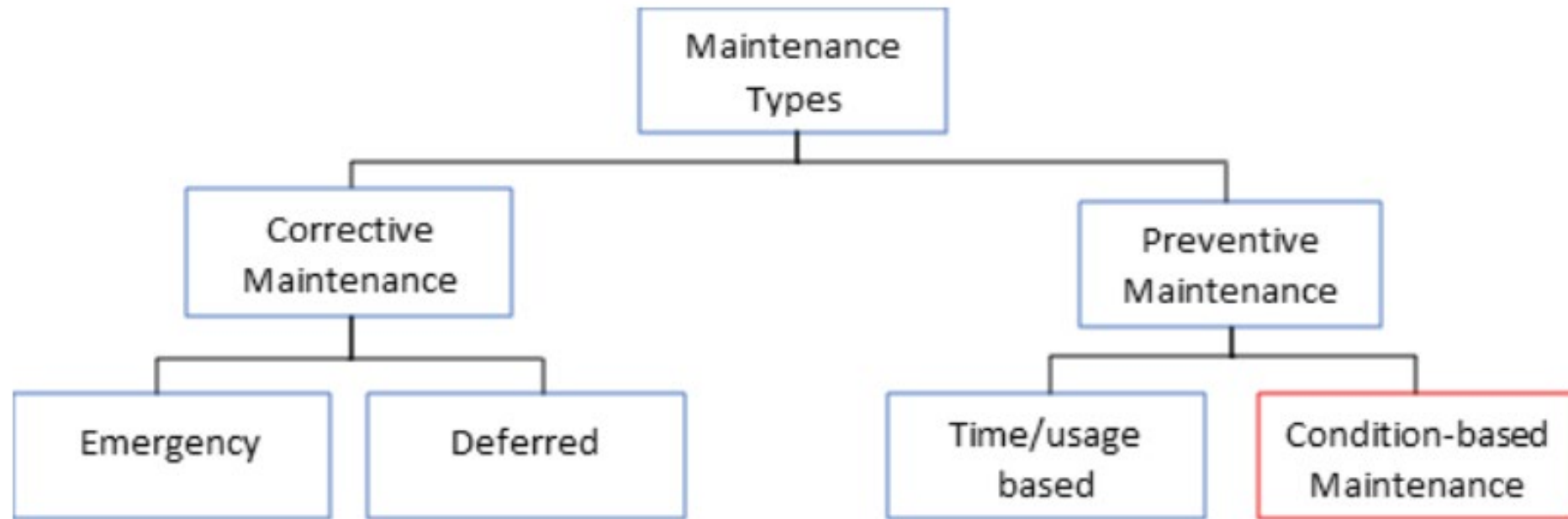
Examples



Maintenance and Reliability



Where does Condition Monitoring Play



What is the difference between Condition Based Maintenance and Condition Based Monitoring?

Common Methods for Condition Monitoring

- Vibration Analysis
- Oil Analysis
- Infrared thermography
- Ultrasound
- Acoustic emissions
- Electrical Monitoring
- Electromagnetic Measurement
- Laser Interferometry
- Motor Circuit Analysis

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Some things to consider

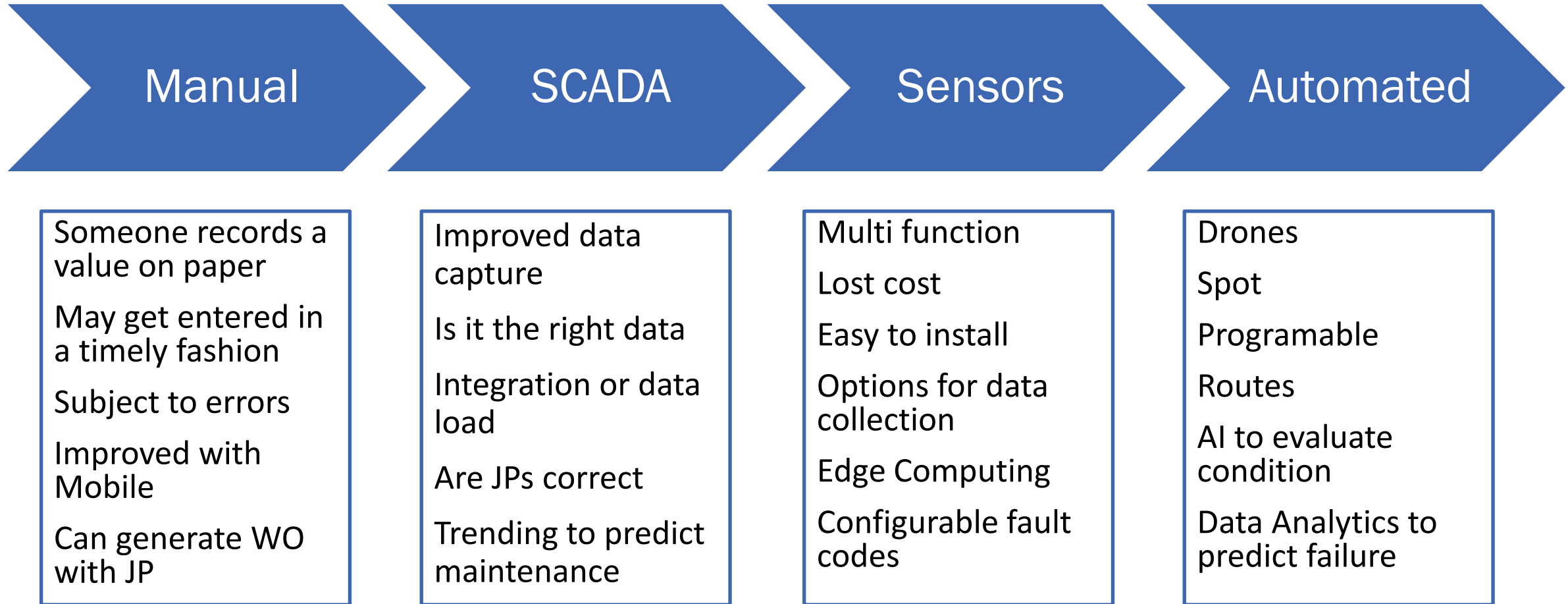
- People have been using devices since the at least the 1600's to measure temperature and pressure
- Do you have assets with meters or sensors associated with them?
- Are you doing rounds to collect data from meters?
- Do you have control systems
- Do you have a data historian - SCADA
- How many of you do something with the information from the meter or sensor?
- Are meters set up in Maximo?
- Manually enter data into Maximo?
- Integration to feed meter readings
- Do you generate a work order with a Job Plan

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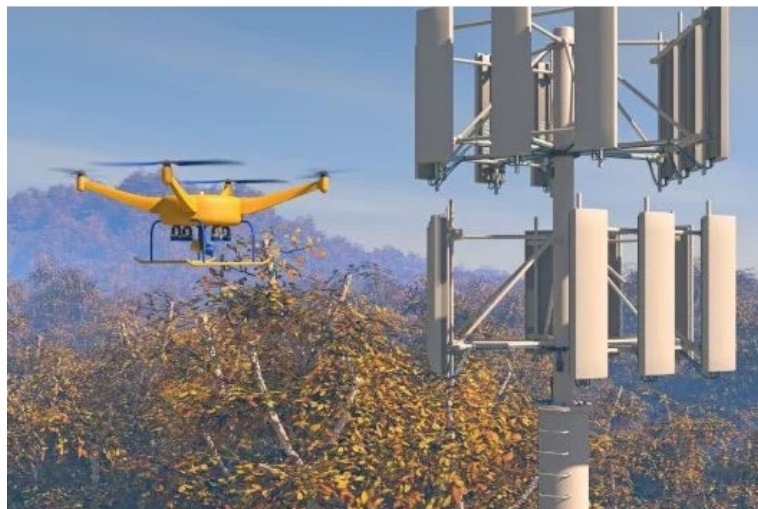
Advances in technology have enabled us to vastly improve how we monitor our assets

- These improvements in how we monitor our assets will exponentially increase the amount of data we need to manage.
- Do you have a proper data strategy to manage your data?
- Maximo Monitor or other sensor dashboards?
- Are they connected to Maximo?
- Sensors are smaller, have multiple functions, extended battery life, easy to install
- Drones?
- Spot?
- Digital Plant?

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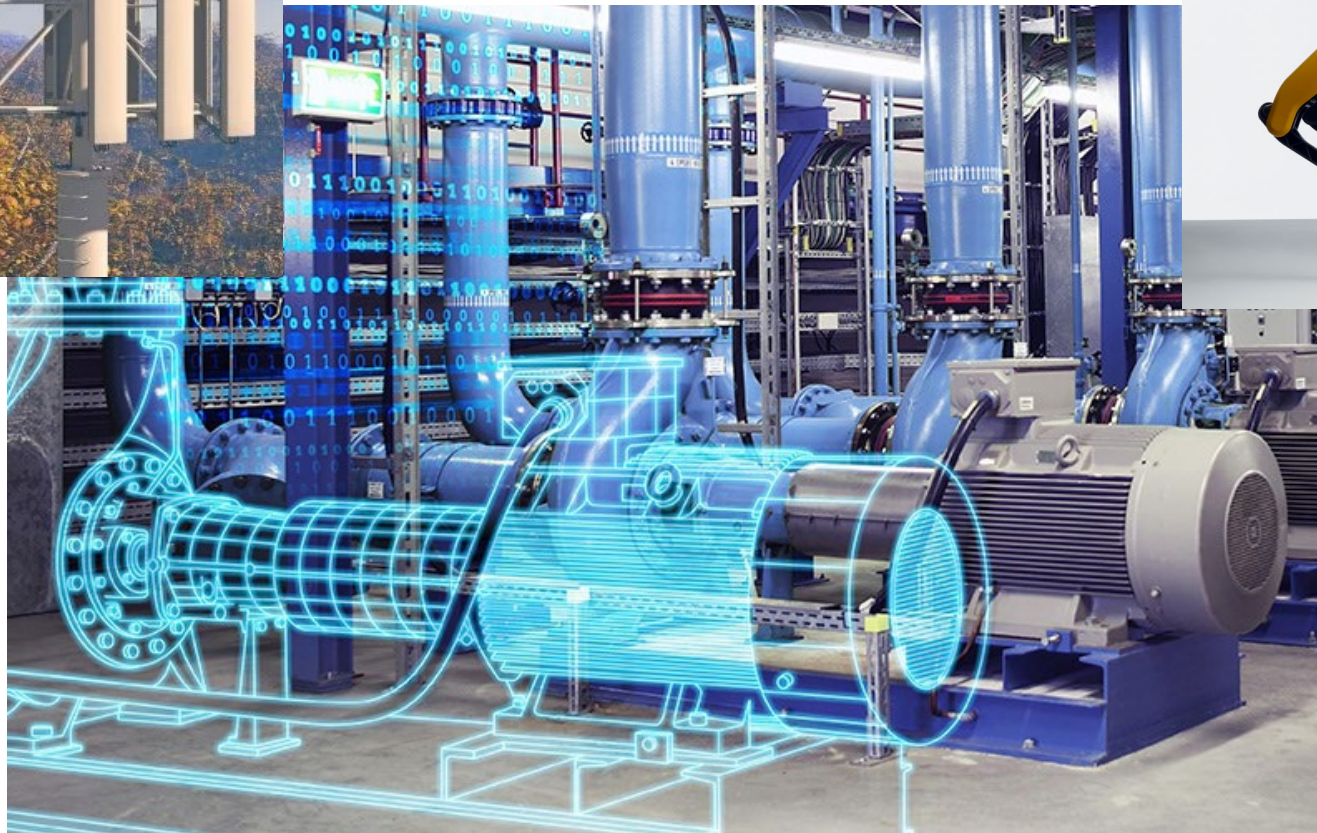


Automation



Digital Twin

- Digital representation of the asset
- Digital representation of the plant
- Full visibility of sensors/performance
- Data intensive



Drones

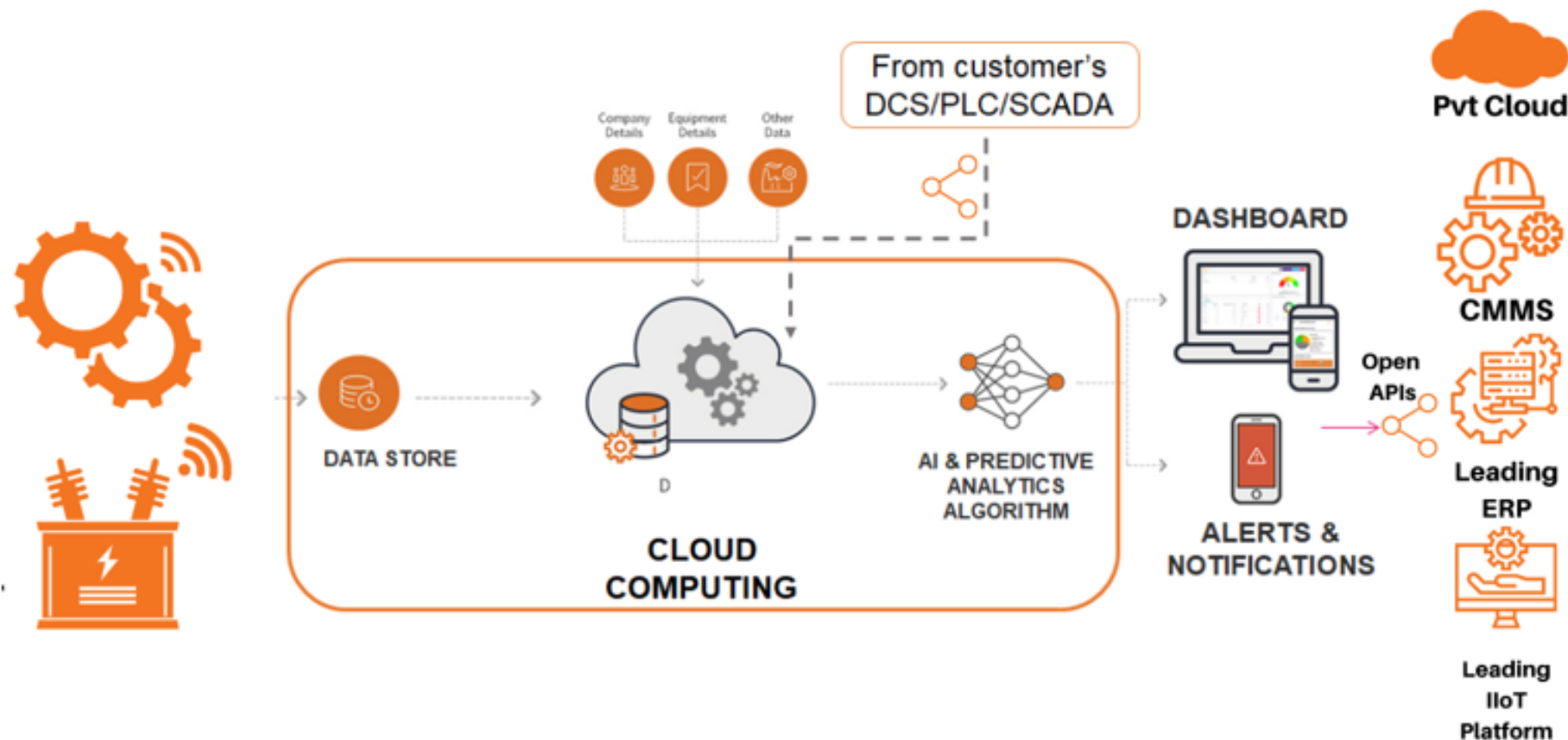
- Affordable way to perform Inspections
- Can improve efficiency



Spot

- Repeatable routes
- Highly flexible
- Highly configurable
- Multiple sensors and payloads

Sensor Capabilities



Sensors

- Vibration Triaxial
- Acoustic Emissions
- Temperature
- True RPM
- Humidity
- Magnetic Flux

Multiple ways to mount
Wi-Fi enabled
Long lasting batteries
Low cost of entry

IBM Maximo Monitor

Monitoring with AI-based Anomaly Detection at Enterprise-Scale



Solution

- Enterprise Scale Monitoring
- AI-based anomaly detection



Capabilities

- Ingest data through MQTT and SCADA connectors
- Easily Configurable dashboard: No-Code Widgets
- Enterprise-wide view of operation
- Shared Asset Hierarchy with Manage
- Feed Meters with Monitor data for Condition Based Maintenance
- Generation of Service Requests



Business Value

- Reduce unplanned downtime
- Shorten duration of outages
- Increase production output
- Decrease wasted time investigating false-positive alerts



OT Data Pipeline

SCADA, Historian, PLC, ICS, Sensors, Devices, EMS, MES, BMS



Monitor



Connectivity at Scale

Omnio Connectors, Asset Hierarchy, Asset Management



No-Code AI/Analytics

AI-based Anomaly Detection, Meta Model, Analytics Catalog



Customizable UI

Summary Dashboard, Pre-Built Widgets, Configurable Rules & Alerts

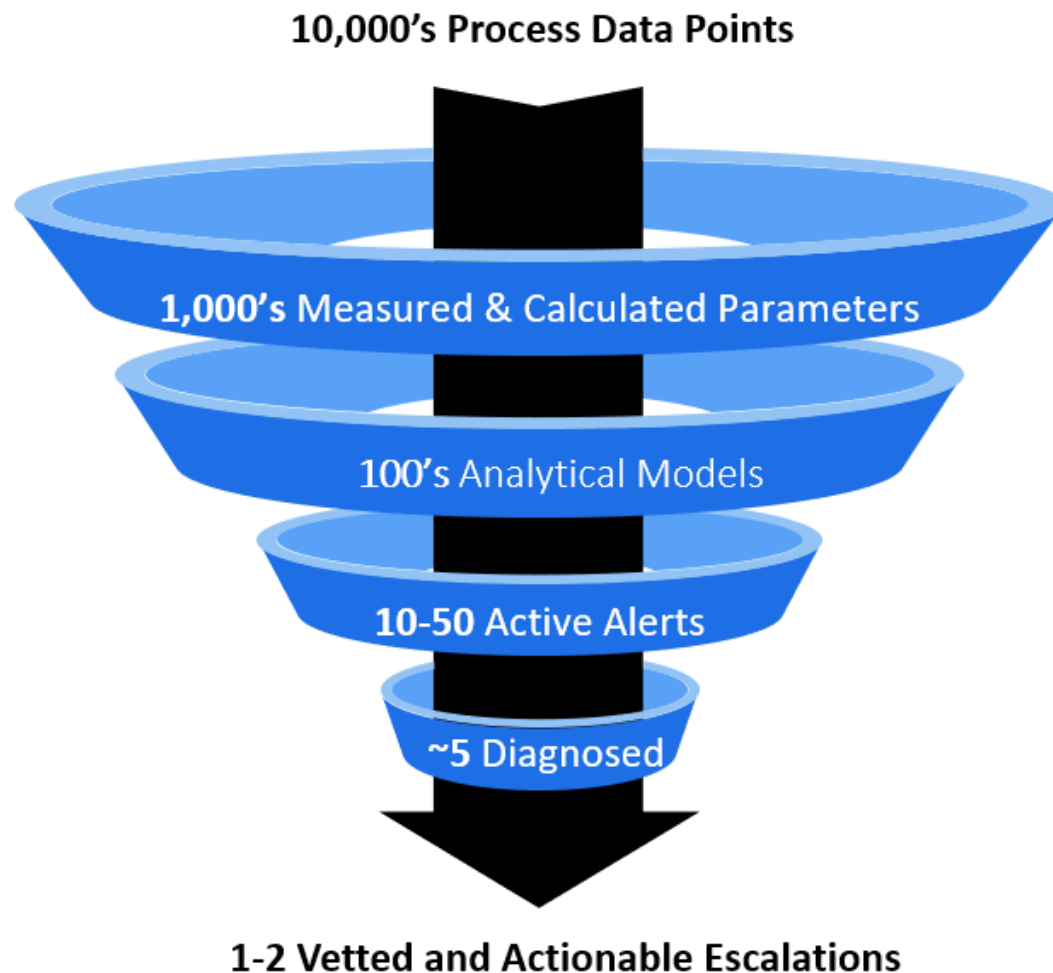


Maximo Applications

Maximo Manage
Maximo Health & Predict

Flow of Insights

Evolution of Condition Monitoring



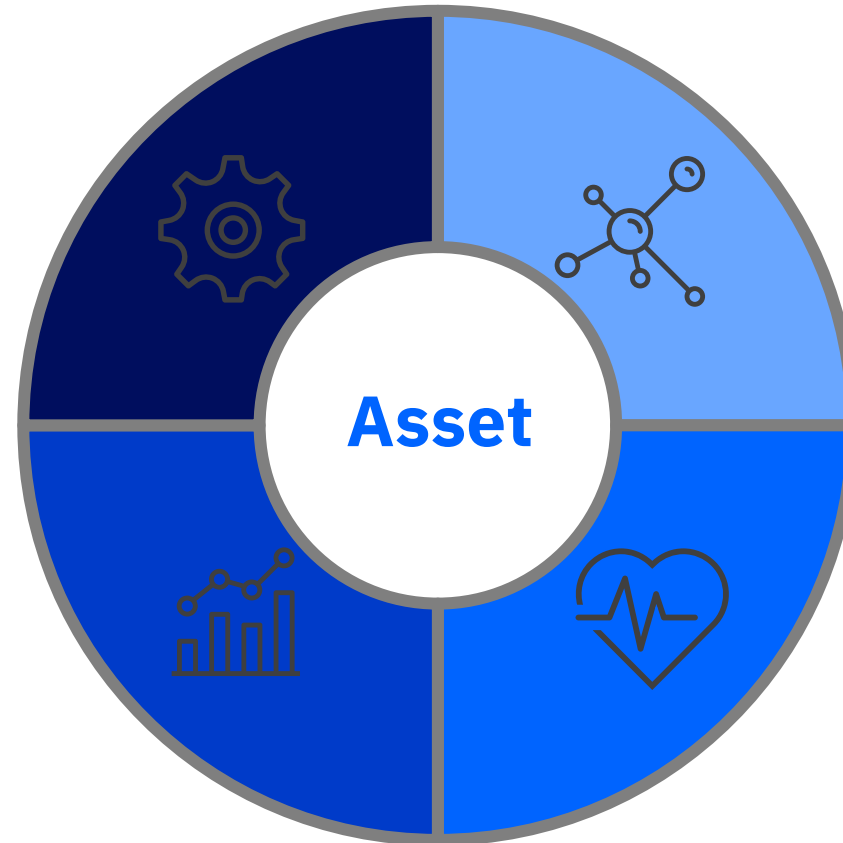
- Technology is increasing the amount of data we gather
- Edge computing can quickly analyze these large quantities of data
- Identify conditions that we need to know about
- Identify conditions that are problems and need to be addressed before they be catastrophic
- Have defined actions already identified to address actionable conditions

Maximo Application Suite:

Journey to Intelligent Asset Management

Manage

Feed Meters from
Monitor data for
Condition Based
Maintenance



Monitor

Visualize and
identify anomalies

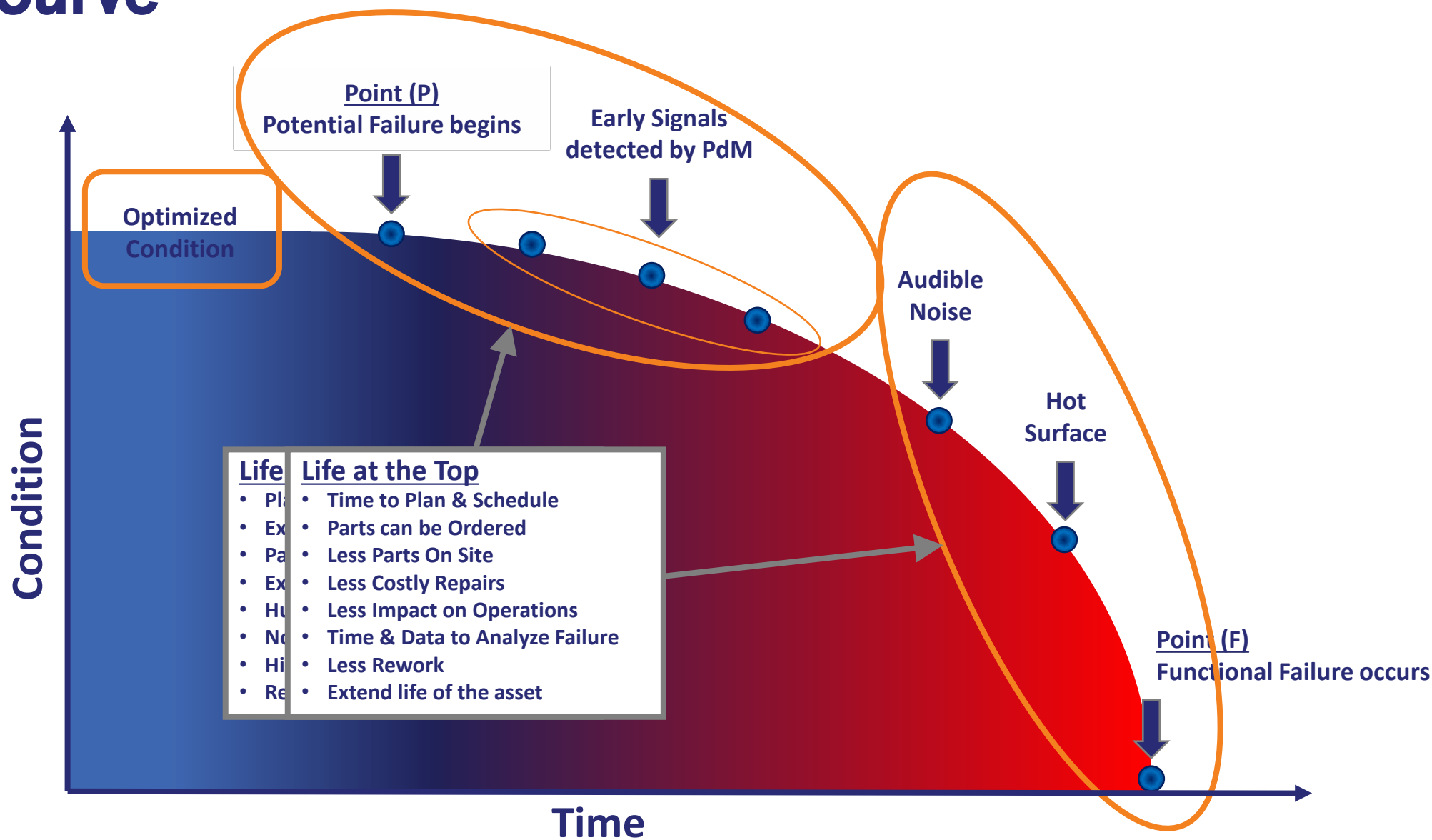
Predict

Use data to
predict failures

Health

Evaluate health from
Manage Meter data

P-F Curve



Benefits Of Condition Monitoring

- Reduced Unplanned Downtime
- Increased production output
- Maximizes Asset Life
- Optimizes Maintenance Budgets and Resources
- Offers insights, not just alerts
- More accurate data > better KPIs and Reports
- Allows more time to plan and schedule work
- Improves efficiency and effectiveness
- Improves safety
- Improves morale
- Improves Reliability

Maintenance Excellence

EAM is the management of assets across departments, locations, facilities and/or business units.

The goal of EAM is for organizations to maximize the return on investment from their asset base by managing the asset throughout its life.

- Acquisition (design, construction, commissioning)
- Operations
- Maintenance
- Decommissioning/Replacement

Benefits

- Improve Asset Utilization and Performance
- Reduce Capital Costs
- Reduce Asset-related Operating Costs
- Know whether it is more cost-effective to continue to maintain, overhaul or replace a failing asset.
- Extend Asset Life
- Maximize Overall Asset Productivity
- Minimize Total Cost of Ownership

Credits and Sources

- Maintenance and Operational Reliability: The 24 Essential Building Blocks, Don Hyman & Bill Mountjoy
- Asset Management: Evolution to Revolution, Klaus M. Blanche
 - <https://www.efficientplantmag.com/2019/04/asset-management-evolution-to-revolution/>
- Predictive Maintenance Management, Jack R Nicholas, Jr. P.E., CMRP, CRL, IAMC, BS, MBA, CAPT USNR (Ret.)
- Asset Condition Monitoring Management, Jack R Nicholas, Jr. P.E., CMRP, CRL, IAMC, BS, MBA, CAPT USNR (Ret.)
- Condition Monitoring - Wikipedia

**MAVEN**

Thank You.

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Components Of Condition Monitoring

List components of condition monitoring

Asset Data

Asset Criticality

Job Plans

Meters

Conditions

Trending

