COHESIVE solutions

IBM Watson IoT

Utilities Performance Management:

Harvesting Decision Support for Enterprise Asset Health and Risk

WEBINAR: July 29th, 2pm EDT

Introductions

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Cohesive Solutions

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Industry Leader
IBM

Summer 2016
Webinar Series

All Utilities Share a Common Challenge

Deliver reliable safe uninterrupted services at a reasonable cost.

Utilities also share a common risk with their operating infrastructure

near where people reside: schools; hospitals; city centers; sub-division; commercial operations and sensitive protective reserves and right of ways. One single catastrophic failure can have extreme damaging effects on financial health; safety; environment; and public image.

Asset Management Strategy guided by visibility of Asset Health and Risk

Utilities must manage performance and risk

By leveraging the asset's condition…

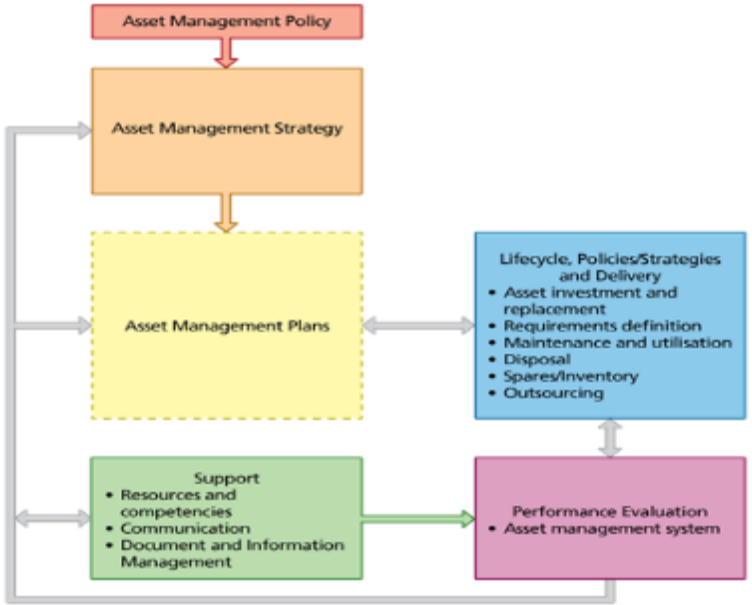
*to inform us as to its "performance, risks and expenditures **over its lifecycle"** – PAS 55 (now ISO 55000-03 & ISO 31000)*

ISO 55000: Overview; Principles and terminology

ISO 55001: Requirements: The "Shall Statements"

ISO 55002: Guideline: guidance for each section

ISO 31000: Risk Management Framework and Process 24 pages



Fingrid is PAS 55 Certified:
http://www.fingrid.fi/en/news/announcements/Pages/news7.aspx

Fingrid is using IBM Internet of Things solutions to create a smarter grid
https://www.youtube.com/watch?v=00ga070uzL4

NIE Northern Ireland Electric id Pas 55 Certified
http://www.nie.co.uk/Network/PAS-55

Then leverage the Asset Management System

Understand:

What we Have

Where is it

Availability

- of Assets
- of Parts / Spares
- of Tools
- of Skills

How equipment fails

Impact of failure (Risk)

Asset Health

Asset Management: The Big Picture
theIAM.org/BigPicture
https://www.youtube.com/watch?v=8xM5P4CrUnY

Modified ISO Diagram

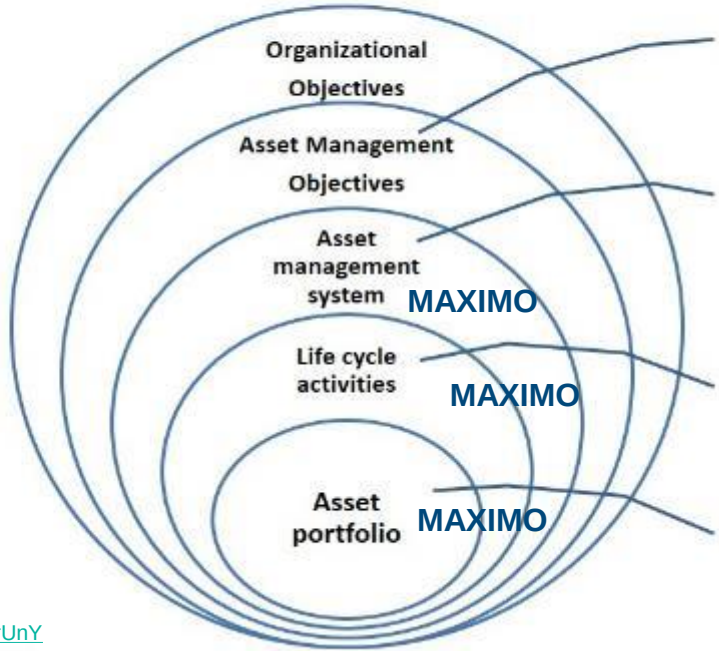


Figure1

ISO55000 QuickCalc™ Questionnaire and Report
https://www.ibmserviceengage.com/asset-management/articles/iso55000

Coordinated activity of an organization to **realize value** from assets

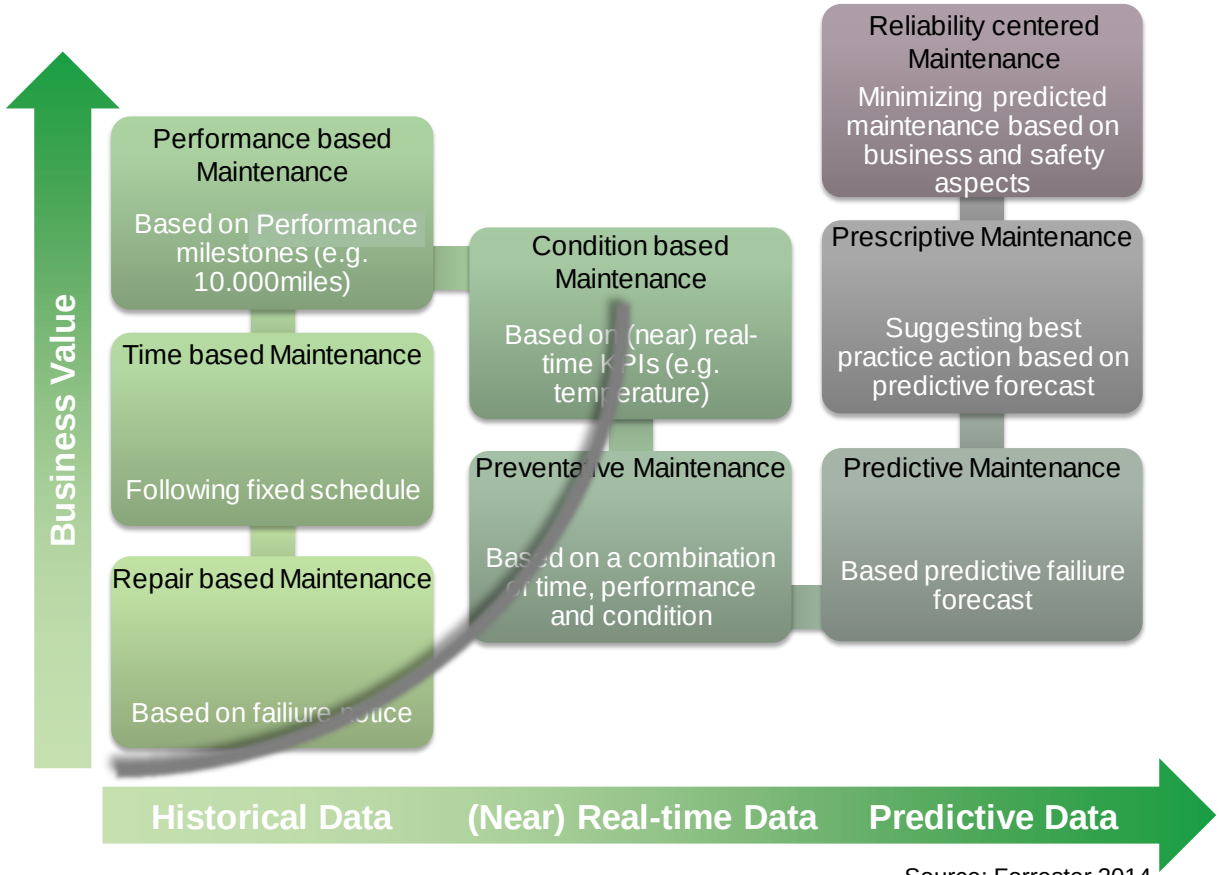
Set of **interrelated or interacting elements** to support AM policy, AM objectives, AM plans, and processes to achieve those objectives

The activities **applied directly to assets** during the life cycle stages

Assets that are within the scope of the asset management system

Diagram Source: Terrence O'Hanlon, CEO/Publisher: Uptime Magazine, Reliabilityweb.com

The Maintenance Maturity Model

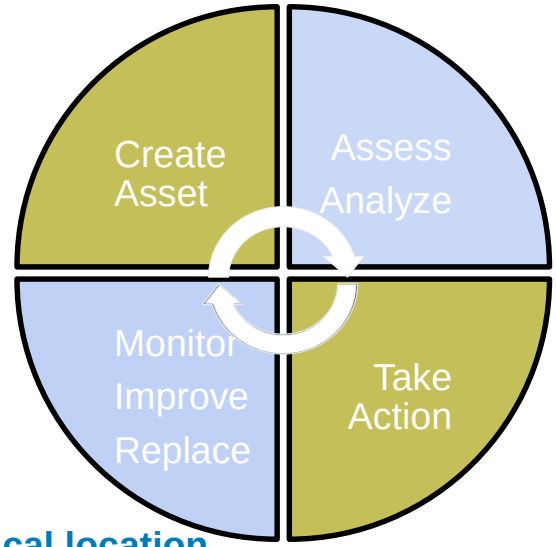


Source: Forrester 2014

Asset Condition = Asset Health

Asset Condition is a **measure of the health** of an asset

- Used to predict how long it will be before an asset needs to be: **repaired, renewed or replaced.**
- An indicator of how well an asset is able to **perform its function**.
- The **condition** of most assets **deteriorate over time**.



Factors that Affect an Assets Condition

- Its **age**
- Its **environment** (what weather it is exposed to) along with **physical location**
- Its **maintenance history**
- How well it is treated and its **usage**

Reasons for Assessing Assets' Conditions

- To **identify assets** that are **not performing satisfactorily**
- To help **predict** when an **asset** will reach the **end of** its useful **life**
- To find out **why** an asset is **not performing satisfactorily**
- To **determine work** required **to return an asset to satisfactory condition**

Identify, Understand and Manage Risk in HSE while monitoring Asset Health – Decision Support

RAGS Approach
Red, Amber, Green

- Risk Assessment application
- Risk Matrix application - model risk based on consequence, severity and likelihood
- Risk Matrix Report - consequence records by severity and organization
- Job Plan Details, Risks sub-tab and tasks risks section
- Work Order Tracking Details tab, Risks sub tab and tasks risk section
- MOC Management Of Change Risks and Projects tab
- Incidents and Investigations
- Risk Assessment fields
  - Locations
  - Operating Policy
  - Permit to Work, Audit and Survey
- Hazards

			Credible Severity				
			Very MINor or No INJURY	FIRST AID Treatment	TREATMENT Beyond First Aid	LOST TIME Accident	DEATH or catastrophic Loss
			1	2	3	4	5
Credible Likelihood	EXTREMELY UNLIKELY	1	C	C	B1	B1	B1
	UNLIKELY	2	C	C	B2	B2	A
	UNLIKELY BUT POSSIBLE	3	B1	B2	A	A	A
	QUITE LIKELY	4	B1	B2	A	A	A
	CERTAIN OR ALMOST CERTAIN	5	B1	A	A	A	A

Field on Location Records, Conditional UI used to color code Risk Records and Work Orders on the Start Center

Drax Power – “ensuring compliance and minimizing business risk”

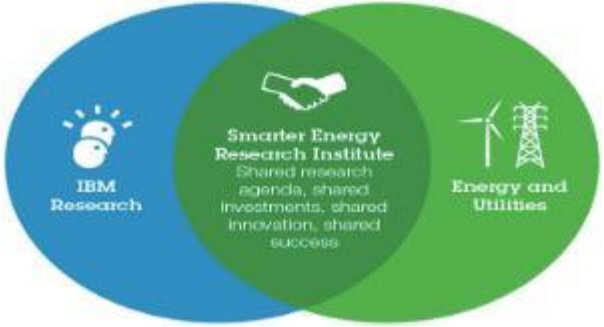
Drax Power Station in Selby, England is the largest of the UK power stations. Keeping energy plants running smoothly demands tight control of a wide range of assets. *“With IBM Maximo Asset Management, we can determine the optimal approaches to maintenance – enabling us to deliver the highest levels of asset availability without driving up operational costs,” says Richard Barber, Maintenance Systems Section Head, Drax.* Drax Power Station is supporting the future of the business with up to GBP5 million in operational cost savings.

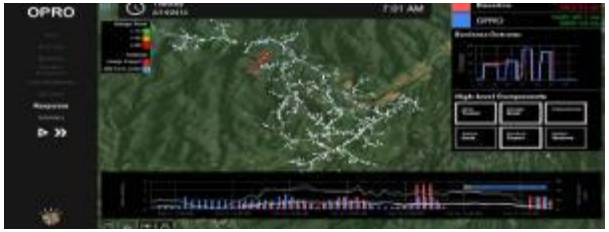
http://www-03.ibm.com/software/businesscasestudies/us/en/corp?synkey=G157055G43566W20

- “Drax implemented Maximo Work Management, Scheduler and HSE Health, Safety and Environment modules, enabling a graphical view of resources and open work orders, in addition to automated work planning capabilities. By using the IBM Maximo Risk Assessment module to assign the correct safety processes according to the status of every work order, Drax ensures compliance with workplace safety requirements”

- “Regulations in the energy industry are stringent, and it is vital that we can ensure all of our suppliers are compliant,” says Lisa Bower. “Maximo helps us to ensure that suppliers have the appropriate insurance in place for on-site work, minimizing our business risk”.

IBM Smarter Energy Research Institute (SERI)

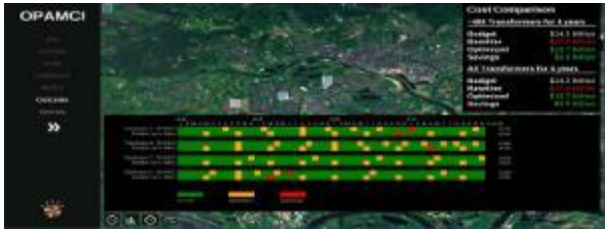




Outage Prediction and Response Optimization (OPRO)
OPRO uses advanced weather prediction, predictive damage estimates, and optimized crew positioning and response planning to improve a utility's preparation for and response to weather-related power outages.

http://www.youtube.com/watch?v=hlfxOlkeL-M

Asset Risk Management and optimized Repair-Rehab-Replace (ARMOR3)
ARMOR3 applies predictive and prescriptive analytics on big data to identify, quantify and ultimately optimize infrastructure maintenance and planning for all electrical assets including transformers, cables, poles, circuits. ARMOR3 converts data into information, insight and foresight with the aim of providing decision support across the complete electric infrastructure.



Optimized Planned Asset Maintenance and Capital Investment (OPAMCI)
OPAMCI improves visibility into utility asset health conditions based on existing partial instrumentation results and power flow simulation, enabling better asset maintenance, capital investment, and deferment of instrumentation rollout. OPAMCI aims to reduce the outage cost associated with asset failure by more than 10% through optimizing asset maintenance and replacement schedules.

http://www.research.ibm.com/client-programs/seri/applications.shtml

http://www.youtube.com/watch?v=GoT4kBeTXJk

DTE Energy – “Enterprise System Consolidation with Maximo”

DTE Energy is a large multi-business unit utility serving over 3 million customers for electric and gas and reported over $75 million dollars in post Maximo implementation benefits:
ftp://ftp.software.ibm.com/software/solutions/pdfs/ODC03081-USEN-01_DTE_final_SP_Sep29-09.pdf

DTE Energy has also leveraged IBM Research to anticipate impending Storm Response and stage work crews ahead of the storms anticipated path and predicted damage.

DTE Energy engaged with IBM Research to identify the asset condition and risk of Transformers, Poles and Cable.

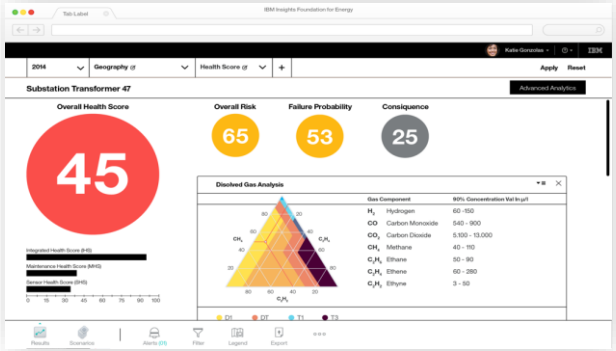
IBM Insights Foundation for Energy developing pre-built predictive models

Distribution Transformers

Substation Trans-formers

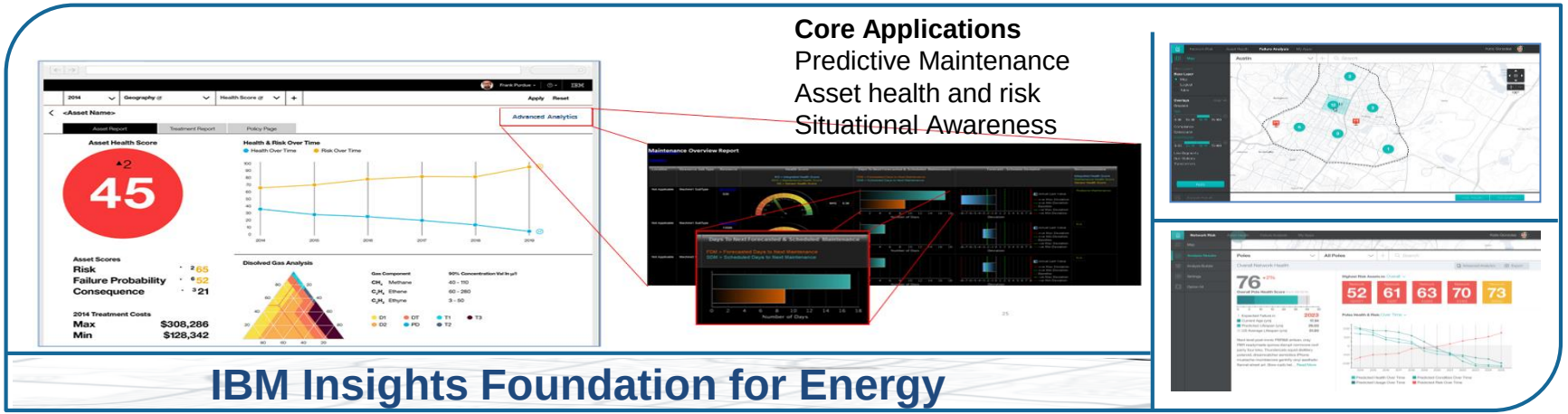
Poles

Cables Underground & overhead



DTE Youtube Video:
https://www.youtube.com/watch?v=kvwH6sOnhqo#t=15

IBM Insights Foundation for Energy
Powerful analytic insights to help address today's challenges



Strategic foundation and partnership

- Strategic, enterprise-wide foundation
- Open and extensible
- Built-in analytic solutions

Asset health and risk application

- Predictive Failure Analysis
- Asset and Network Risk
- Consequences and cascading effect

https://www.youtube.com/watch?v=-_tB25NS040

How to get started?

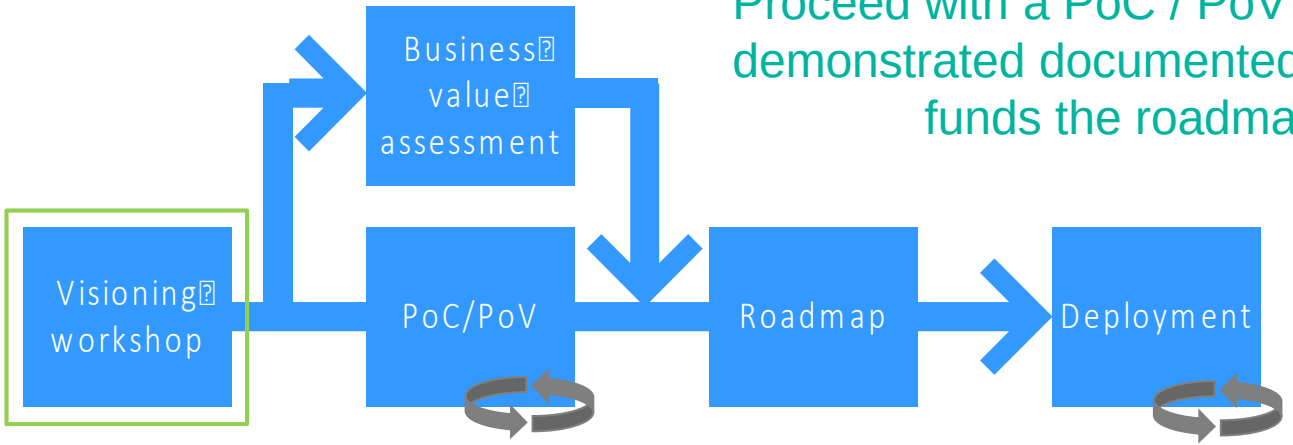
Start very focused:

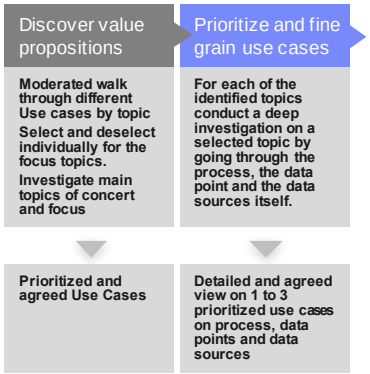
Select a set of Asset Classes

Proceed with a PoC / PoV

demonstrated documented Value

funds the roadmap to proceed





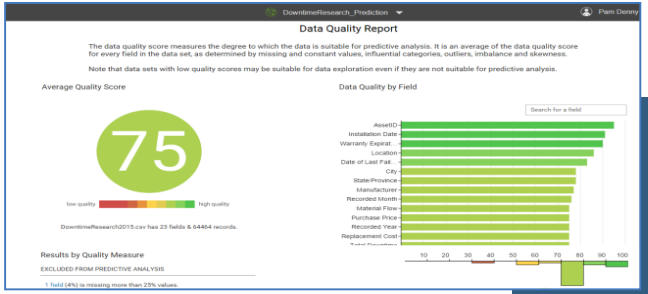
There is more than one way to approach this. Guiding principles include:

- Find the intersection of value and viability
- Use agile approaches to explore, learn, and deploy
- Build data, process, and organizational foundation for continuous improvement

What else can you do? Explore your data with Watson Analytics

Watson Analytics

Decision Support with Maximo 7.6 In with the New



Refine

Enrich and shape your data.

Explore

Find patterns and relationships in your data.

Assemble

...itor and share insights in dashboards and stories.

Predict

Learn what drives behavi...

What is the relationship between **Replacement Cost** and **Purchase Price** by **Year**

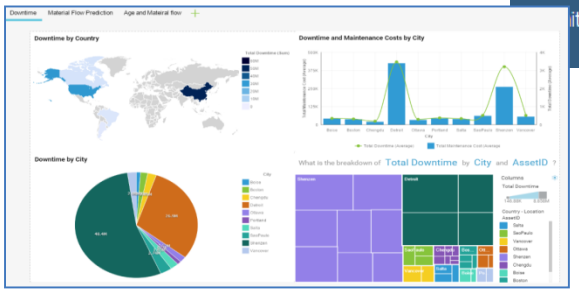
What are the values of **Location** for **Failed Date** and **Year (Reported Date)**?

What are the values of **TOTDOWNTIME** and **YTDCOST** and **PURCHASEPRICE** by **SITEID**?

What is the trend of the number of **Day (Failed Date)** over **Year (Reported Date)** by **Site**?

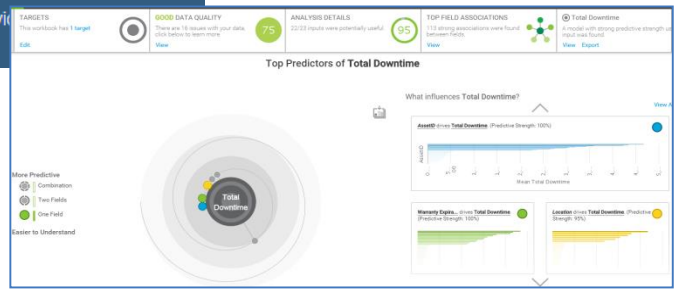
Link to IBM Watson Analytics:

https://www.ibm.com/marketplace/cloud/watson-analytics/us/en-us



Maximo Watson Demo

https://youtu.be/xIkYM2TUE8c



In with the New….
A New User Experience Design Approach

Move users from an Application Centric world to Process Centric

Define roles/personas and their responsibilities to drive requirements

Deliver an alternative no-charge UI option (Work Centers) with Maximo 7.6.0.5

Additional Prioritized Personas/Processes will be offered over time

Provide connectivity to The Weather Company and IoT Platform

In with the New ….Maximo Work Centers

Offering Perceptive, Stateless, Responsive applications for a more intuitive user experience.

- With **continuous delivery** new **Work Centers** will be made available that work in conjunction with 7.6
- Initial focus will target key user types and **processes**

Supervisor Work Center

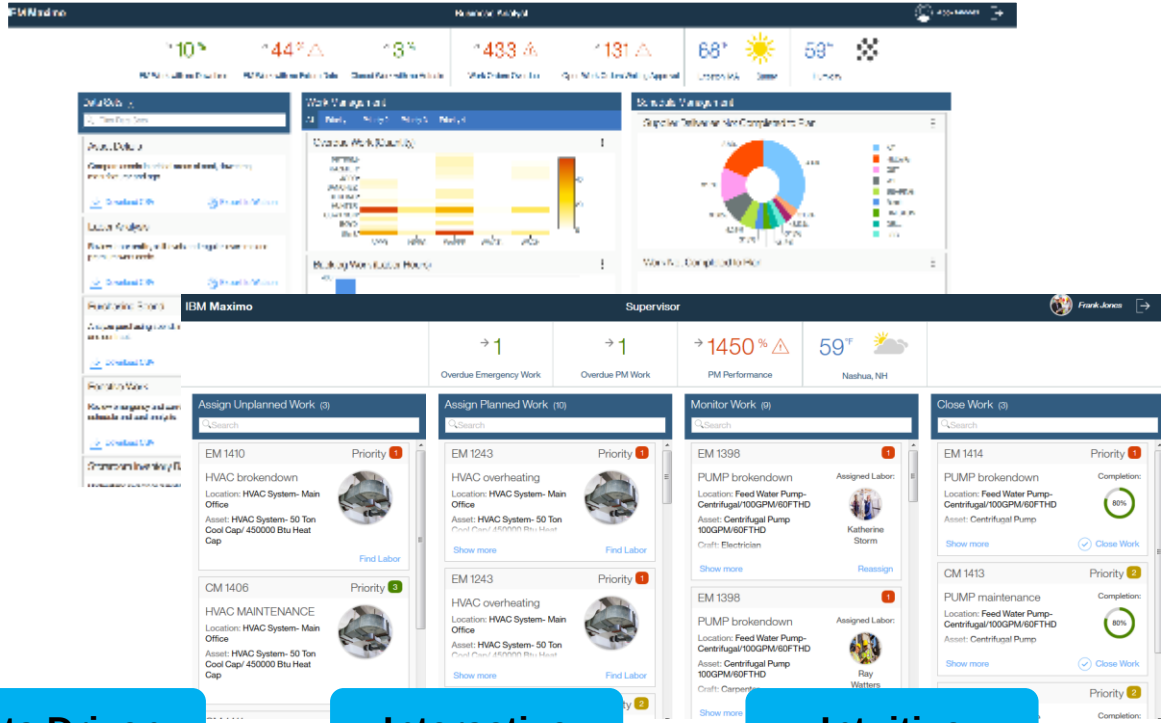
Focus: Assigning and Managing Work and His Team
Quote: “What are the priorities today…and how often will they change?”

Technician Work Center

Focus: Starting and Completing Work.
Quote: “Just let me fix the problem. Hand me my wrench.”

Business Analyst Work Center

Focus: Analyzing data to best Manage Assets
Quote: “What will I investigate today to help improve operation and user performance”



Role Based **Data Driven** **Interactive** **Intuitive**

Business Analyst Work Center

NEW KPIs focused on data quality
Trends, Details, Export

Pre-defined analytic data sets

Auto export of Maximo data to Watson

NEW Charts prioritizing key organizational metrics
Change Type, Details, Export

https://www.youtube.com/watch?v=A_no0bpRv60

Traditional Preventive Maintenance
Most companies are aware of wasted work efforts and seek to eliminate it

Traditional preventive maintenance embraces a time based approach

- Consuming expensive resources
- Potentially introducing failure by disrupting stable systems

40% of preventive maintenance costs are spent on assets with negligible affect on uptime [1]

30% of preventive maintenance activities are carried out too frequently [2]

45% of all maintenance efforts are ineffective [2]

1 Source: T.A. Cook, Maintenance Efficiency Report 2013, August 2013. http://uk.tacook.com/fileadmin/files/3_Studies/Studies/2013/T.A._Cook_Maintenance_Efficiency_Report_2013_En.pdf?tracked=1
2 Source: Oniqua Enterprise Analytics, Reducing the Cost of Preventative Maintenance, http://www.plant-maintenance.com/articles/PMCostReduction.pdf

Condition based maintenance uses IoT data to assess asset health

Monitor and analyze asset health data, both historical and real-time

Intervene at the right time, before assets go down

Prioritize and optimize resources

Reduce maintenance costs by up to 25%

Eliminate up to 70% of breakdowns

Reduce downtime by up to 50%

The results speak for themselves

Cut unplanned outages by up to 50%

Reduce scheduled repairs by up to 12%

Reduce capital investment by 3-5%

Maximo Asset Health Insights

Just Released

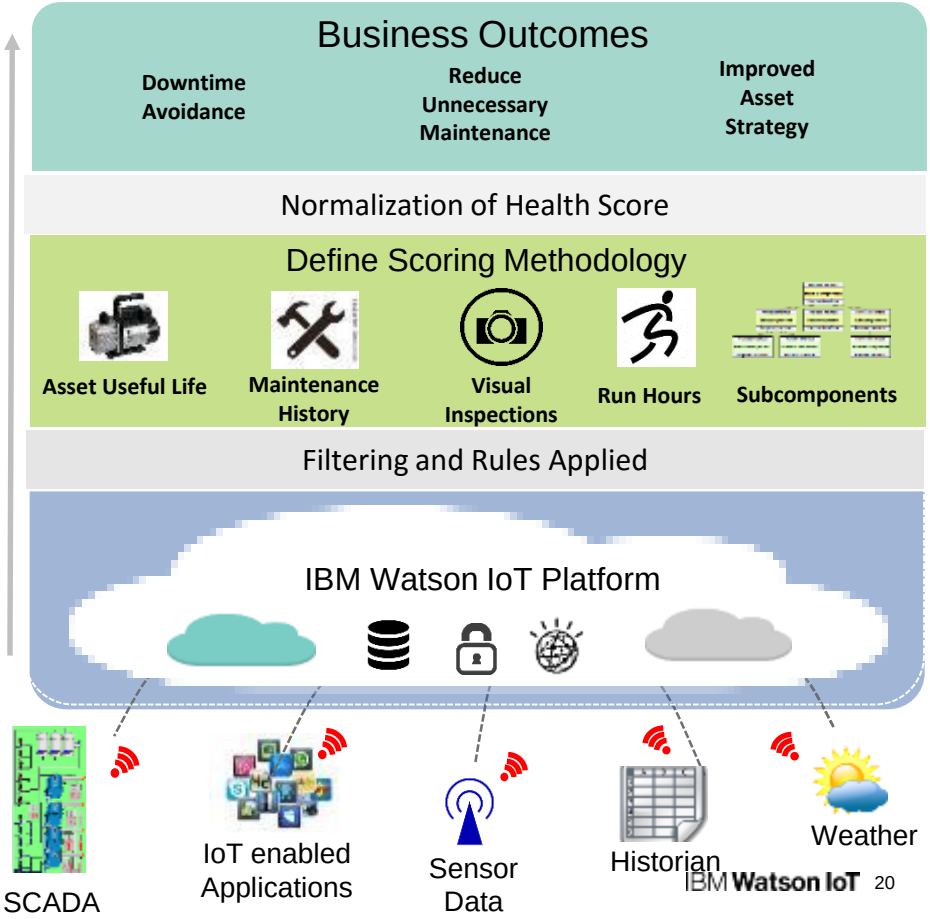
Subscribe to warnings and notifications for response to Asset issues prior to failure.

Define Asset Health using data from many sources including Maximo and Real-time
- Remaining useful life
- Maintenance and failure history
- Asset Condition based on real time and historical information

Leverage Historical Weather as a Key Element in determining Asset Health

Minimize unnecessary maintenance based on Asset Health score.

Insights to determine repair vs. replace



https://public.dhe.ibm.com/common/ssi/ecm/ww/en/www12370usen/WWW12370USEN.PDF

Maximo, and the Watson IoT Platform delivering value together

1 **Real Time data from low cost add-on sensors**

2 **Real time filtered data from automation systems**

SCHAD ENGINEERING MOBILITY

3 **Historical sensor data**

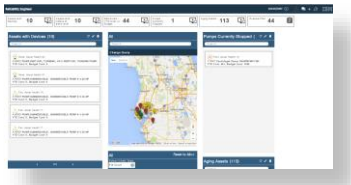
4 **Historical Weather data**

IBM **Watson IoT**

- **Contextualizes** device data
- **Monitors** streaming data to detect situations
- **Filters** the data for analysis by Maximo Users
- **Stores** data for further analysis

IBM Watson IoT Platform

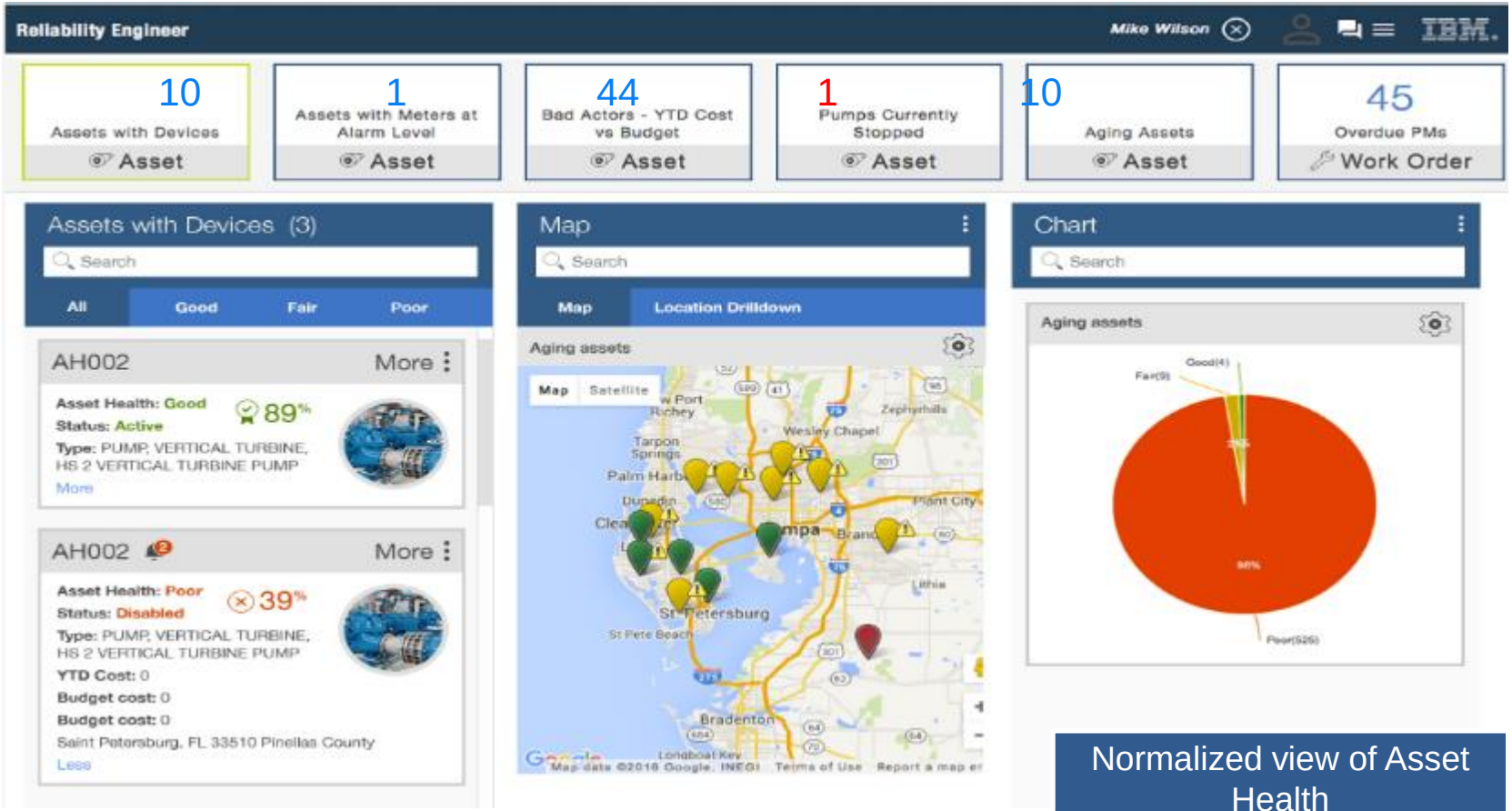
IBM Maximo Asset Health Insights



- Enables Immediate action and/or
- Provides engineers with rich set of sensor and asset data to determine proper course of action

- **Visibility into asset condition**, from asset lifecycle perspective
- **Consolidates Asset data**, historical and real-time, including data from external data systems, weather data, etc.
- Advanced dashboard view enables **proactive asset and maintenance** decisions

Customizable Workcenters for Reliability Engineers



Normalized view of Asset Health

Maximo customers across the ‘extended’ utilities industry

Fossil

aps

NRG

EnergyAustralia

Xcel Energy

MIGHTY RIVER POWER

DUKE ENERGY

Luminant

CALPINE

LCRA

Nuclear

SOUTHERN COMPANY
Energy to Serve Your World℠

TVA

DTE Energy

Dominion

Fortum

Constellation Energy

Bruce Power

Renewable

infinis

First Solar

acciona
Energía

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

NOVA SCOTIA POWER
An Emera Company

SunEdison

Transmission & Distribution

New York Power Authority

SRP
Delivering More Than Power.™

Eskom

UTE

VE

Western
AREA POWER ADMINISTRATION

DUKE ENERGY

DTE Energy

ERDF
ÉLECTRICITÉ RÉSEAU DISTRIBUTION FRANCE

Gas Distribution

ervia

BORD GÁIS

Colorado Springs Utilities
It's how we're all connected

ONE Gas

Scotia Gas Networks
Delivering gas safely, reliably and efficiently

NiSource

Ameren
FOCUSED ENERGY. For Life.

Laclede Gas

APA Group

Vehicle Fleet

DUKE ENERGY

DTE Energy

Eskom

NiSource

Water/ Wastewater

south east water

Melbourne Water

هيئة مياه وكهرباء أبوظبي
Abu Dhabi Water & Electricity Authority

VEOLIA

Sydney WATER

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

IrishWater
Programme

IBM Watson IoT

Thank you!

IBM

COHESIVE solutions

http://www.cohesivesolutions.com/