



F&B CUSTOMER EVENT , MAKASSAR MARCH 28TH , 2019

Digitalizing Manufacturing processes

Online Remote Monitoring (Internet of Things – IoT) and enterprise software

ABB Ability MOM and ABB Ability CALM



1

Digitalization

General Overview

2

Asset Management

ABB Ability™ Ellipse CALM Overview

3

Control System

ABB Ability™ System 800xA Overview

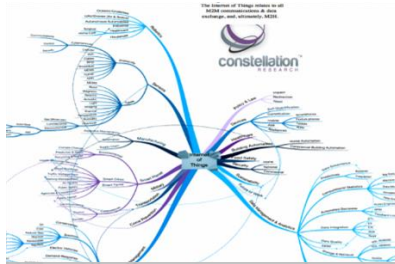
4

Live Demo



Digitalization

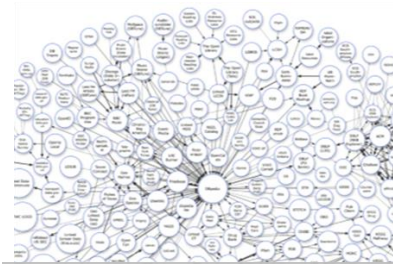
Key Drivers



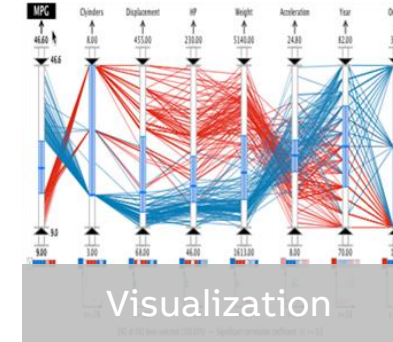
Internet of Things



Wireless Communication



Information & Big Data Analytics



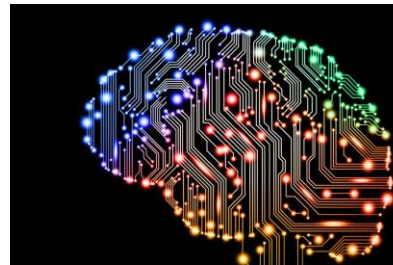
Visualization



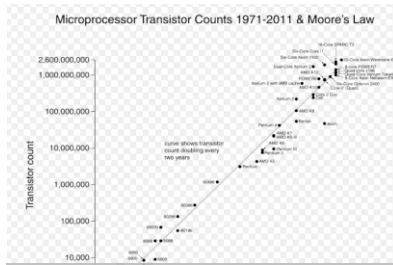
Cloud



Mobility



Artificial intelligence, machine learning



Processing power



Price



Collaborative Robots

Anything Can Be Connected, Will Be Connected

What is “Digital” and Why Digital matters

- **Digital** means different thing to different people. In ABB, it is about **customer focus**, **data driven**, **close the loop of people**, **process**, **asset**, with **technology**.
- The advancement of technology means very soon,
 - Almost any “thing” that can be connected – will be connected.
- Connected devices will change how the industry works,
 - Will disrupt the current business and enable new business models
- Digital topics are driving customer benefits in:
 - Decision Making
 - Innovation
 - Growth
 - Efficiency



What can we do with LOTS of Digital Data?

- There is basically unlimited amount of data available, some digitally collected, but...
... it is useless if they make no sense ...
- How to create knowledge from the unknown:
 - Digitally collect data into Unified Data Storage
 - Visualization of information
 - Closing the loop of manufacturing operations
 - Algorithms approach (predictive analysis, machine learning, advanced statistics etc)
 - Prioritize data collection with domain knowledge
 - Prioritize action items using newly acquired knowledge!



ABB Ability™ Powered Data Analytics

Analytics Enhanced by ABB Knowledge

Less data to process saves cost and improves accuracy.

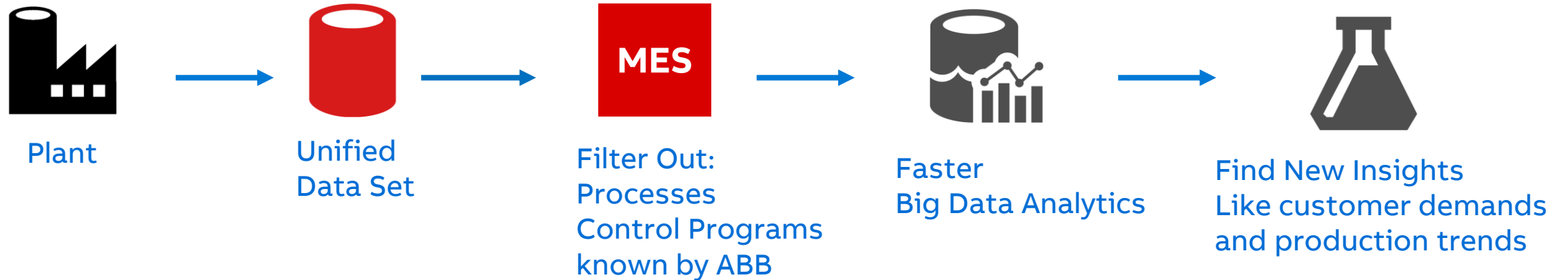
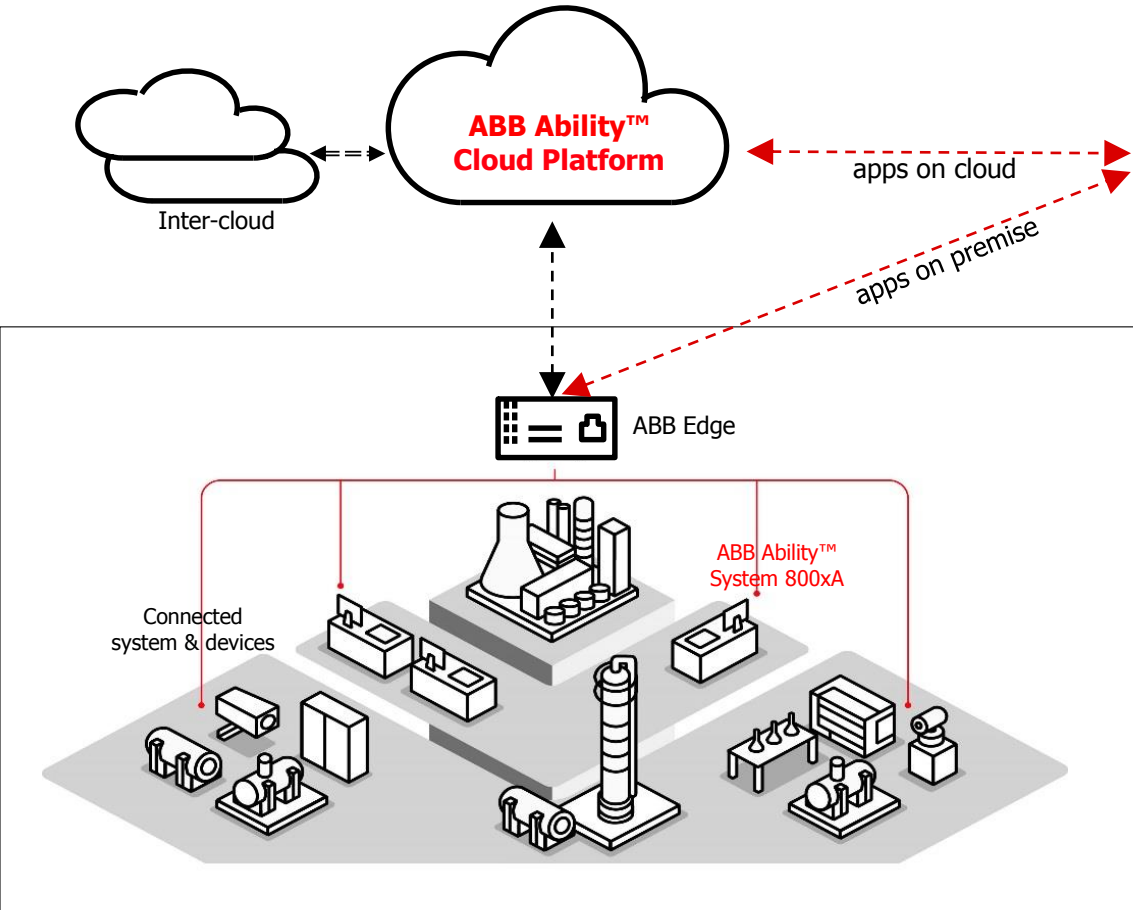


ABB Proposition & Digital Strategy



Business Planning & Logistics –
Business Analytics, Advanced Visualization, Enterprise Asset Management Strategy, Operation Optimization, Service Strategy, ...



Apps on premise and/or cloud

Manufacturing Operations –
Dispatching Production, Quality Management, Materials, Track & Trace, Production Scheduling, Reliability Assurance, ...

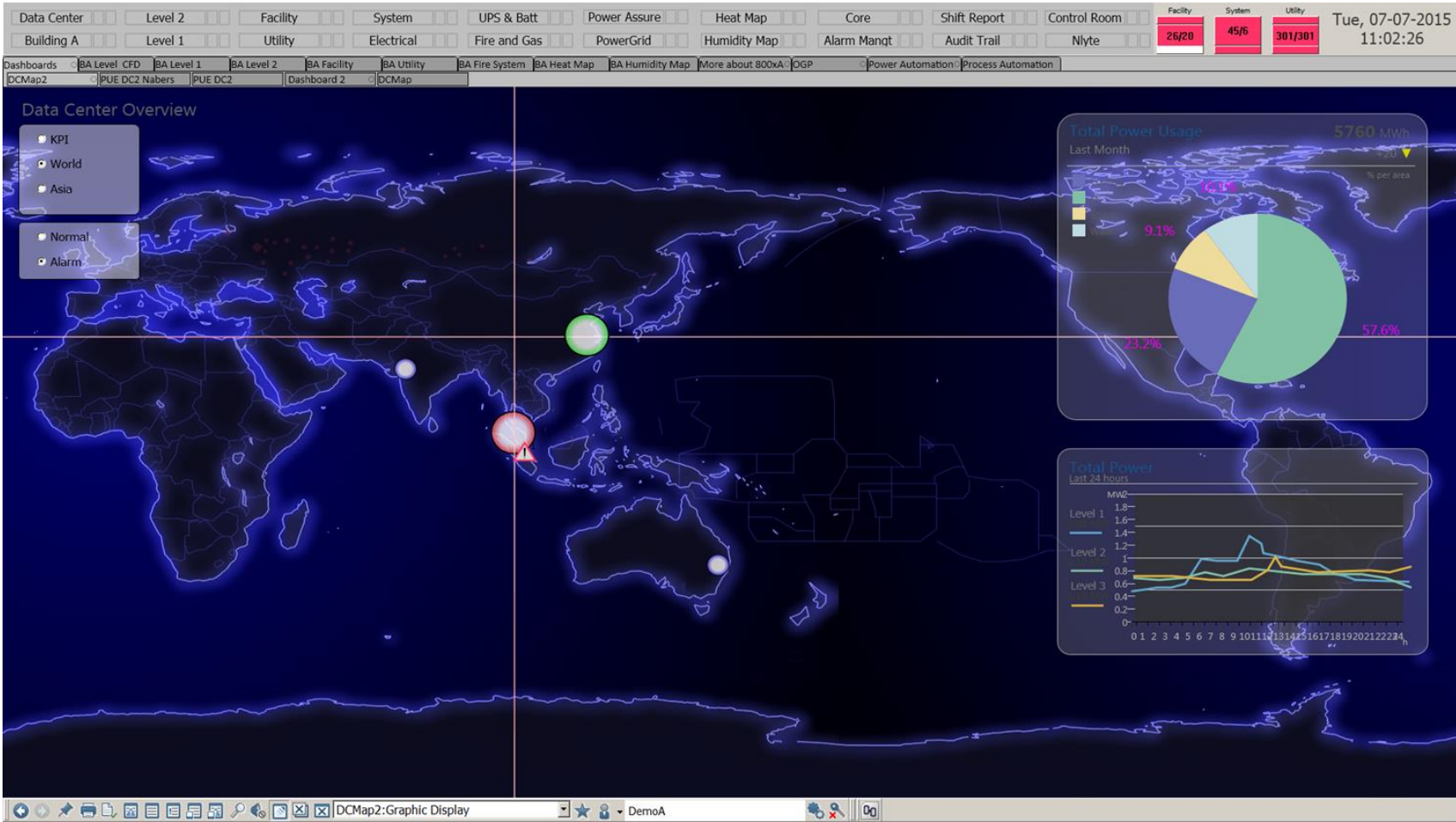


Plant Wide Extended Automation & Lifecycle Management – Process & Production Control, Electrical, Safety, Cybersecurity, Lifecycle Support, ...



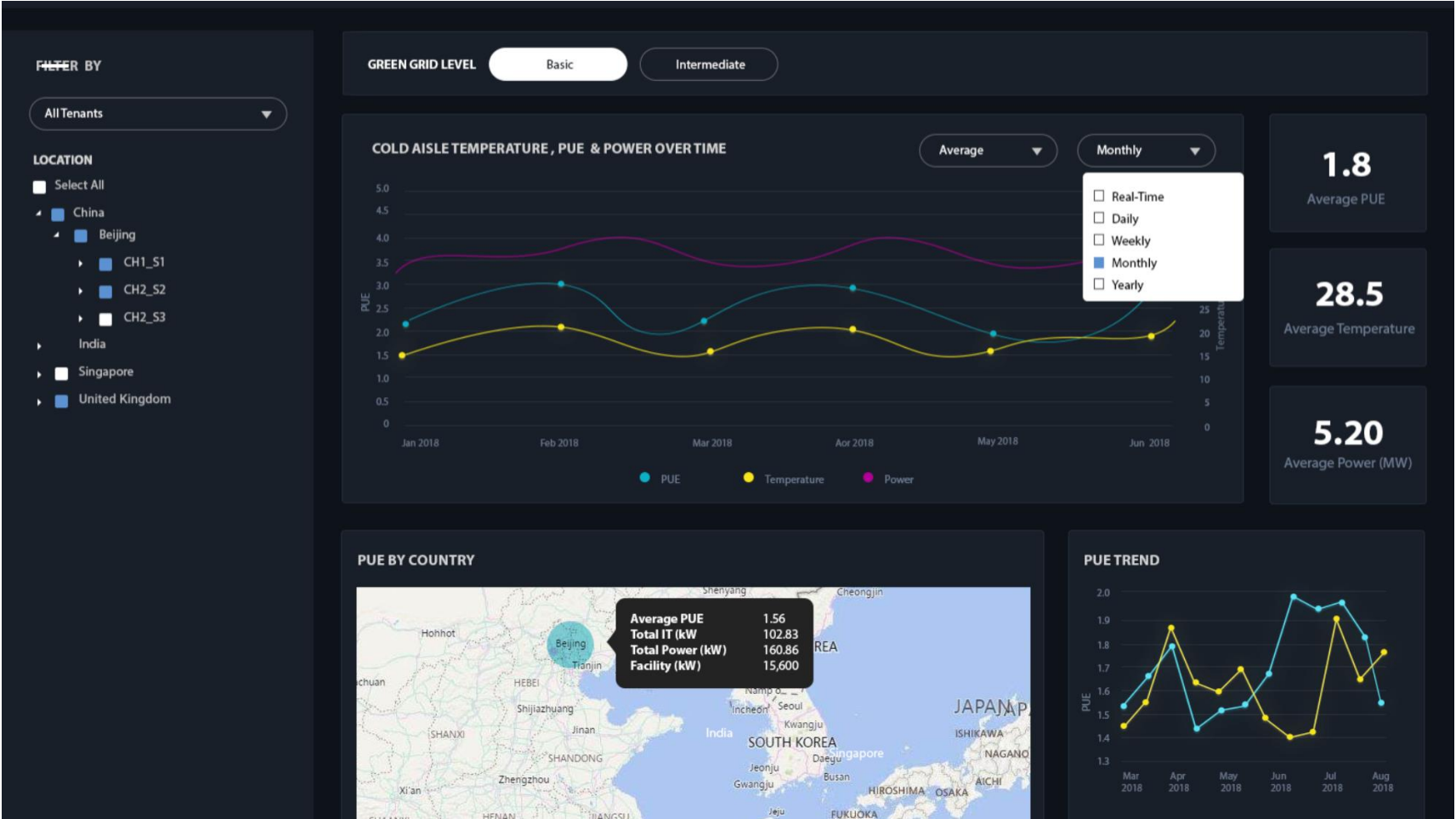
Global Multi Site Operations

Dashboard



Global Multi Site Operations

Energy Monitoring Dashboard





Global Multi Site Operations

Interactive instant reports and analysis



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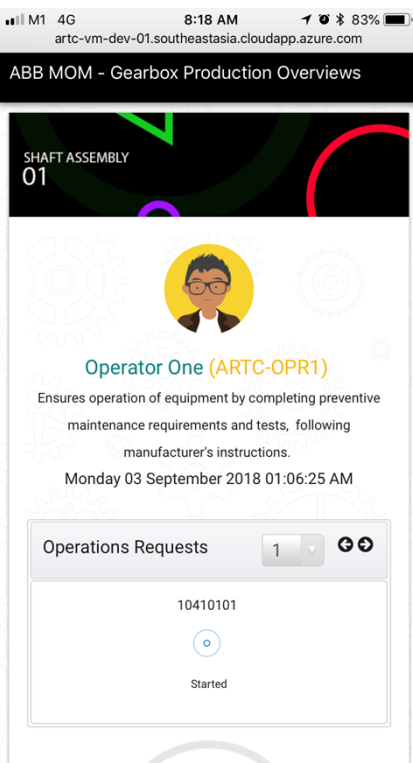
Live Demo



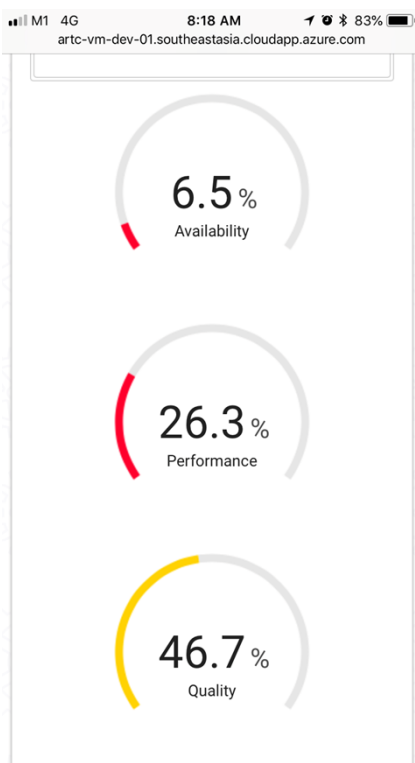
Manufacturing Operations Management

Remote Monitoring on your mobile

Operator



OEE



Material Consumption

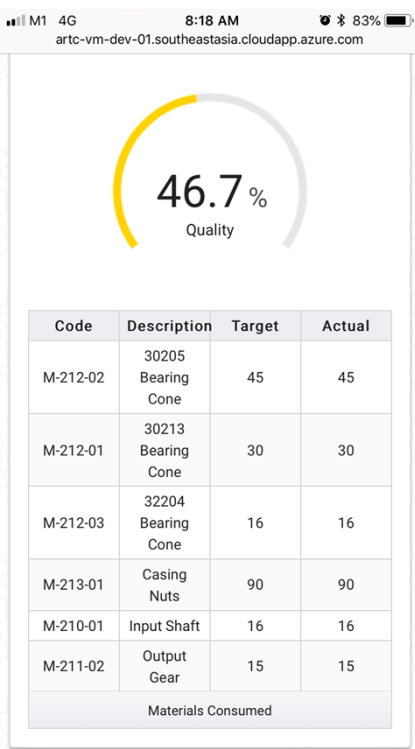


ABB Ability™ Manufacturing Operations Management

Overview



ERP / Business Systems

ABB Ability™ Manufacturing Operations Management

Process intelligence



Manufacturing execution



Production intelligence



Production optimization



Connectivity



Data Storage



Common Services



UX



Reporting

Scalable and modular suite:

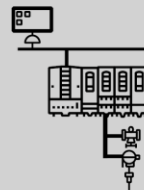
- Process intelligence
- Manufacturing execution
- Production intelligence
- Production optimization

Enables the various stakeholders effective decision-making and production execution with fully integrated operations

Platform Independent encompassing core common services



PLC/SCADA/DCS



Digitally Enabled Automation Systems

Enabling new values through Digital

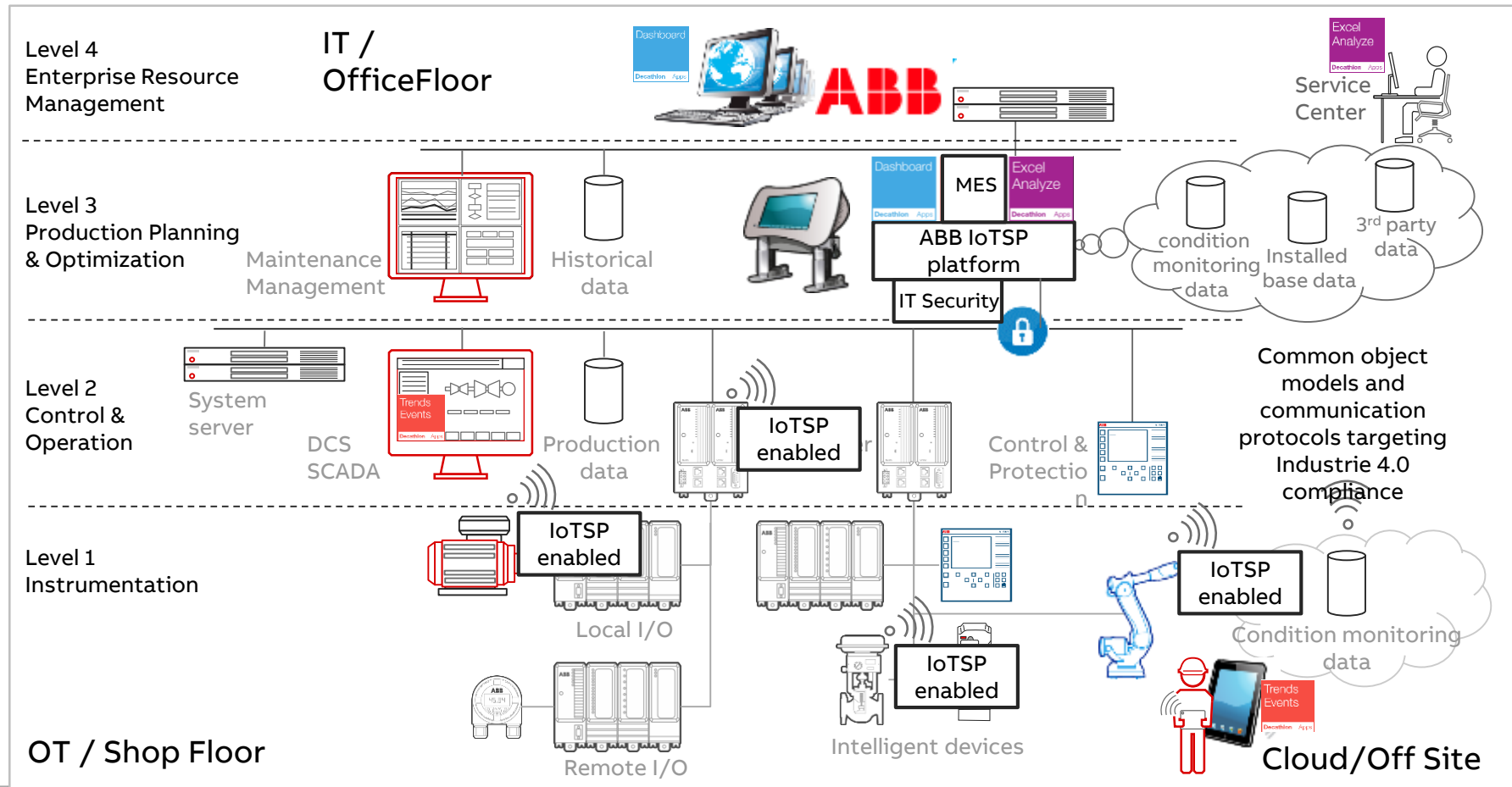


ABB Ability™ Manufacturing Operations Management

ABB Ability™ System 800xA

Operator Effectiveness

- Full scope and features set including optimal collaborative environment through control room design based on human factors best practices

Electrical Integration

- Combines process and power automation in a common infrastructure for improved operations, maintenance and collaboration

Enterprise Asset Management

- Full scope asset monitoring that helps operators, maintenance and manufacturing operations management streamline procedures and become more predictive

Integrated Safety

- Combines basic process control and high integrity applications for improved control strategies and improved safety

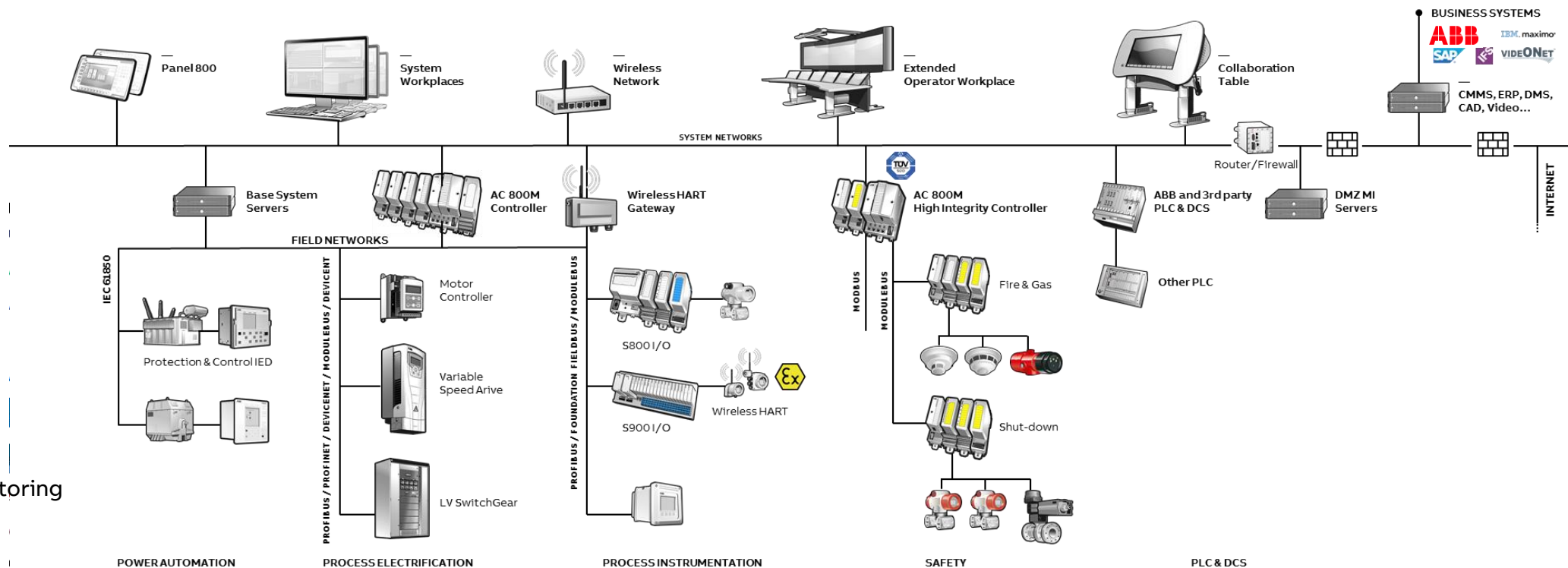


Plant-wide consolidation, collaboration, and optimization!

System 800xA

Extended Automation

- Operations
- History
- Batch
- Cyber Sec
- Notification (SMS)
- Reporting
- Calculations
- Alarm Mgt.
- Video Integration
- Public Address
- Document Mgt.
- CMMS Integration
- Asset Condition Monitoring
- Loop Performance



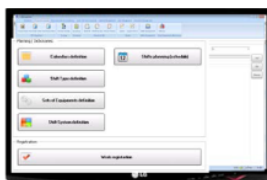
See www.abb.com/800xA for more information!

ABB Ability™ Manufacturing Operations Management

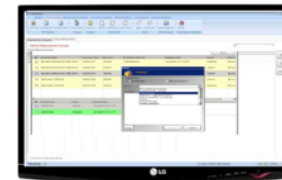
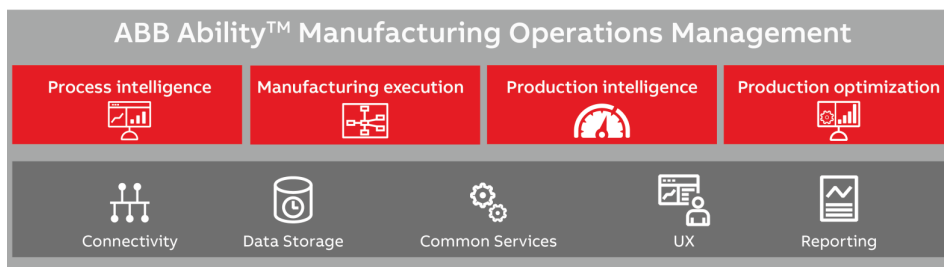
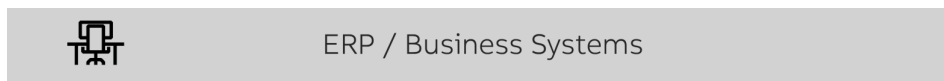
Improve operating procedures, integrate existing plant equipment and control end-to-end production process



Production management
Plan, respond and change on demand: order and production buffers, workflow management, automatic mapping of routing from ERP



Labor management
Accurate management and tracking of staff attended hours (Join/Leave) and activities on a given product against defined production time



Downtime management
Real-time downtime info to make immediate improvements, long-term data collection for investigation of production process problems



Equipment maintenance management
Plan, create and execute equipment maintenance with support of instructions, checklists and task tracking



Material management
Tracking, tracing individual parts, lots, batches, assemblies. Material identification, real-time reporting of material consumed and produced, material compatibility and availability



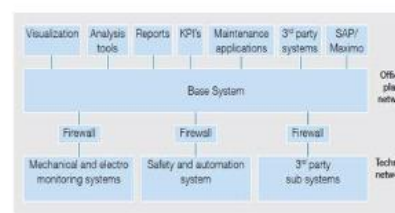
Quality management
Quality data collection, test certificates, in-process quality control, automatic tolerance validation, non-conformities reporting, checklists



Genealogy
Comprehensive track and trace capabilities from raw material, intermediates to finished products



Weigh and dispense
Improve productivity, safety and accuracy of weighing, integrate scales, bar code scanning and label generation



Enterprise connectivity
Seamless integration of ERP, SCM, MES, databases, applications, various production equipment and control systems from different vendors



Warehouse Management
Control storage locations & levels, movement within warehouses, compatibility, manage silos and containers, integrate with external warehouses / inventory management systems



Overall Equipment Effectiveness (OEE)
Out-of-the-box software based on the standardized method of measuring and improving productivity

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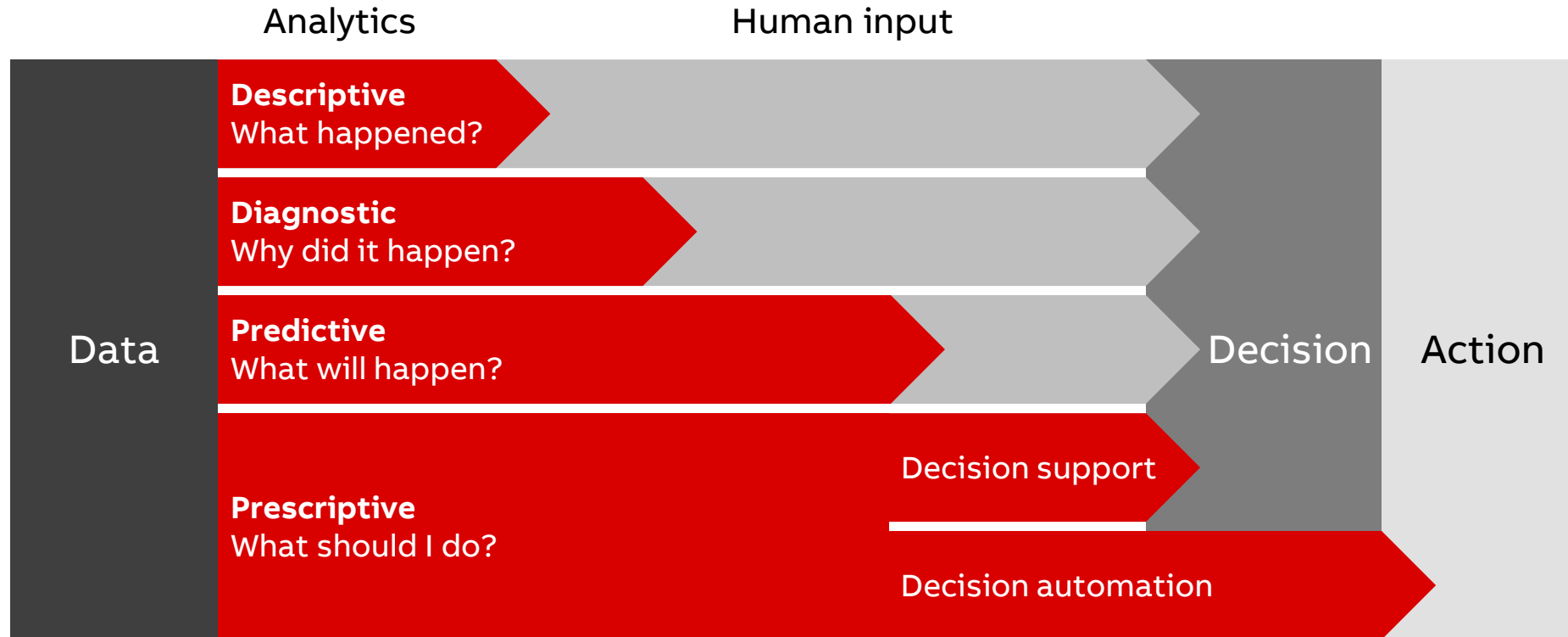
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Live Demo

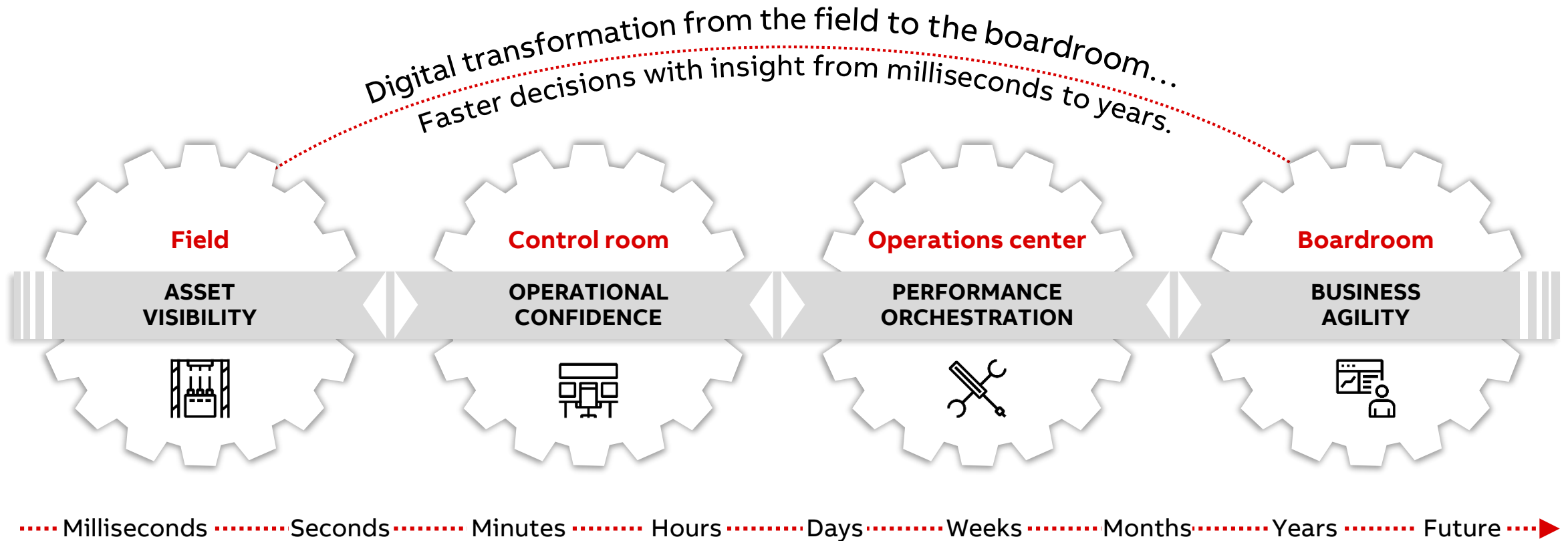


Evolution of digital business and analytics

Need for operational improvement steers analytics from descriptive to predictive

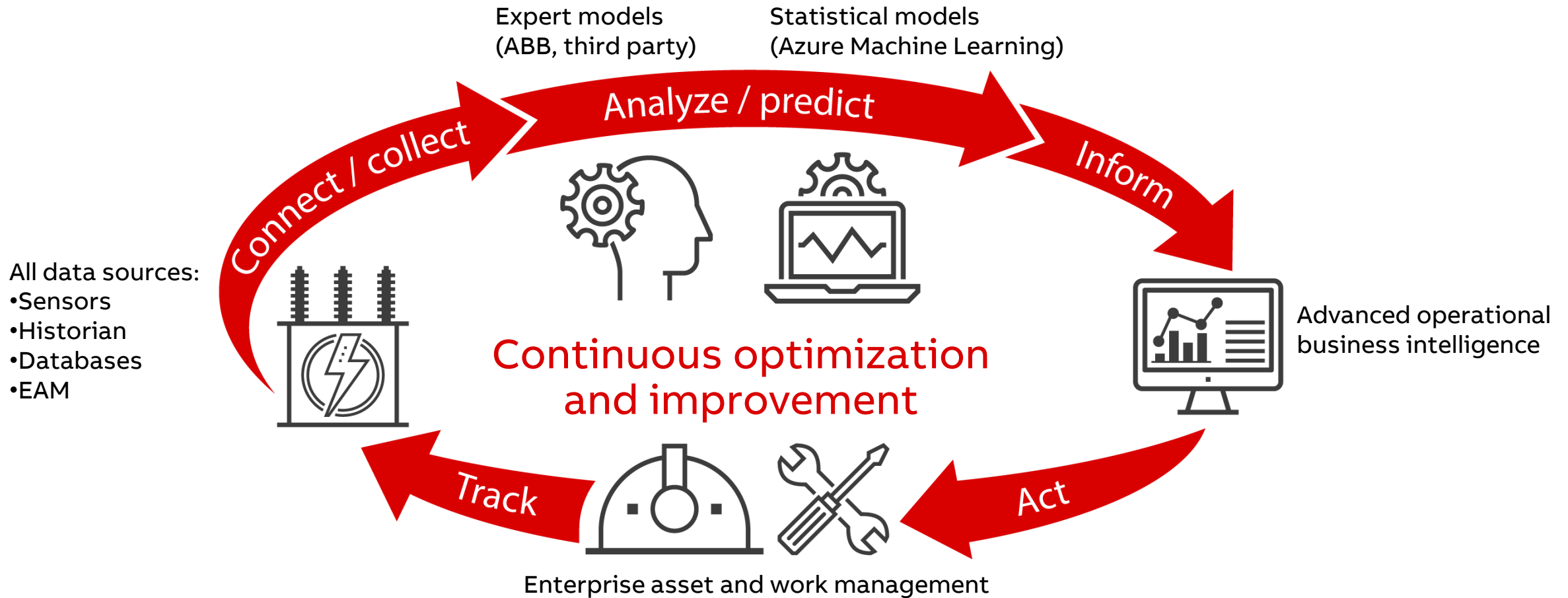


The dynamic digital world requires dynamic business operations



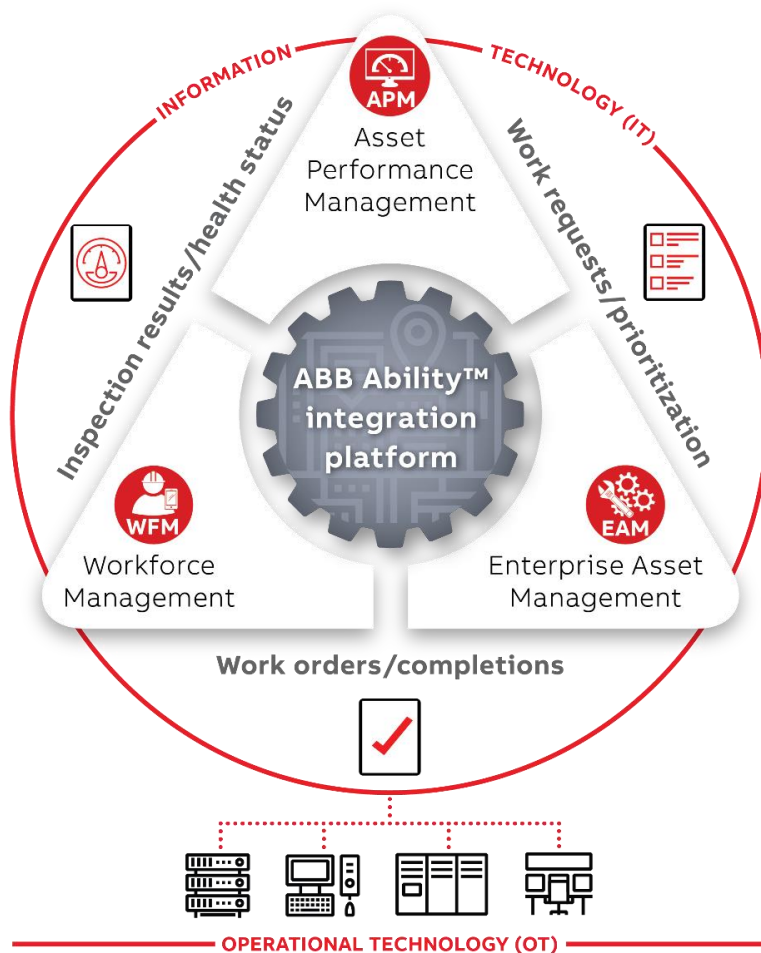
Continuous Improvement

Simple process, superb solution, extraordinary value



Leveraging digital transformation in asset management

ABB Ability™ Ellipse® – Connected Asset Lifecycle Management



The solution for next-generation asset management

- Unifies award-winning¹ functionality for asset performance management, enterprise asset management and workforce management
- Provides unprecedented orchestration of priority, process & people
- Proactively predicts, prescribes and prioritizes maintenance
- Enables planning based on risk of failure and operational criticality
- Utilizes expert data modeling for continual improvement
- Leverages real-time operations data for improved efficiencies
- Improves responsiveness by delivering the right work at the right time to the right people

Connected Asset Lifecycle Management

Example Scenario

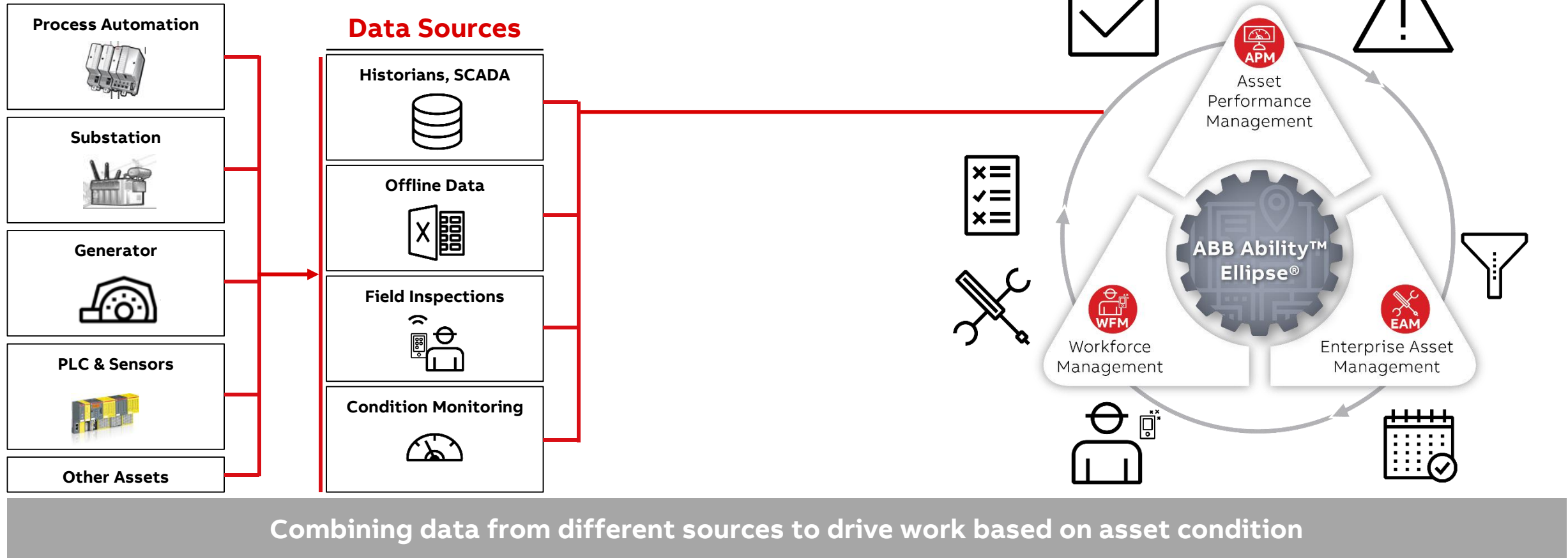
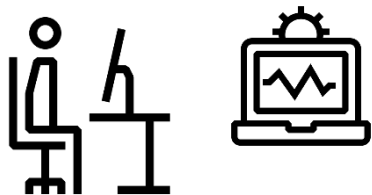
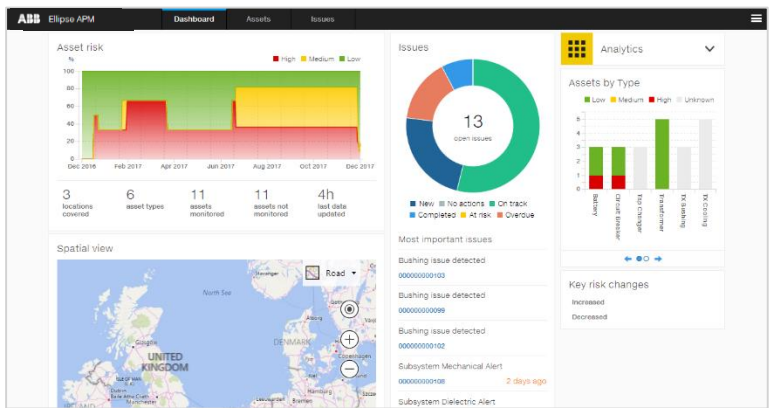


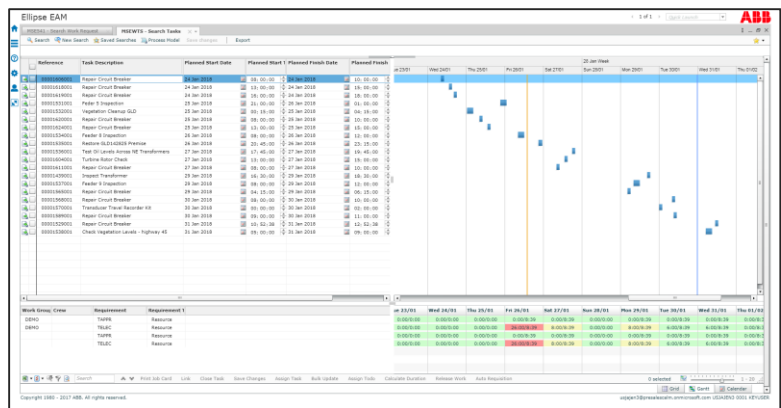
ABB Ability™ Ellipse®

Core Solution Applications

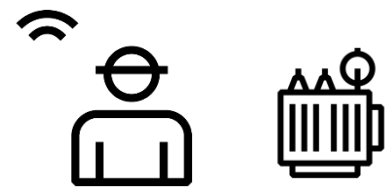
Asset Performance Management



Enterprise Asset Management



Workforce Management



Effective Asset Management Requires Engineering, Maintenance, and Operations Working Together

ABB Ability Ellipse APM (UI)

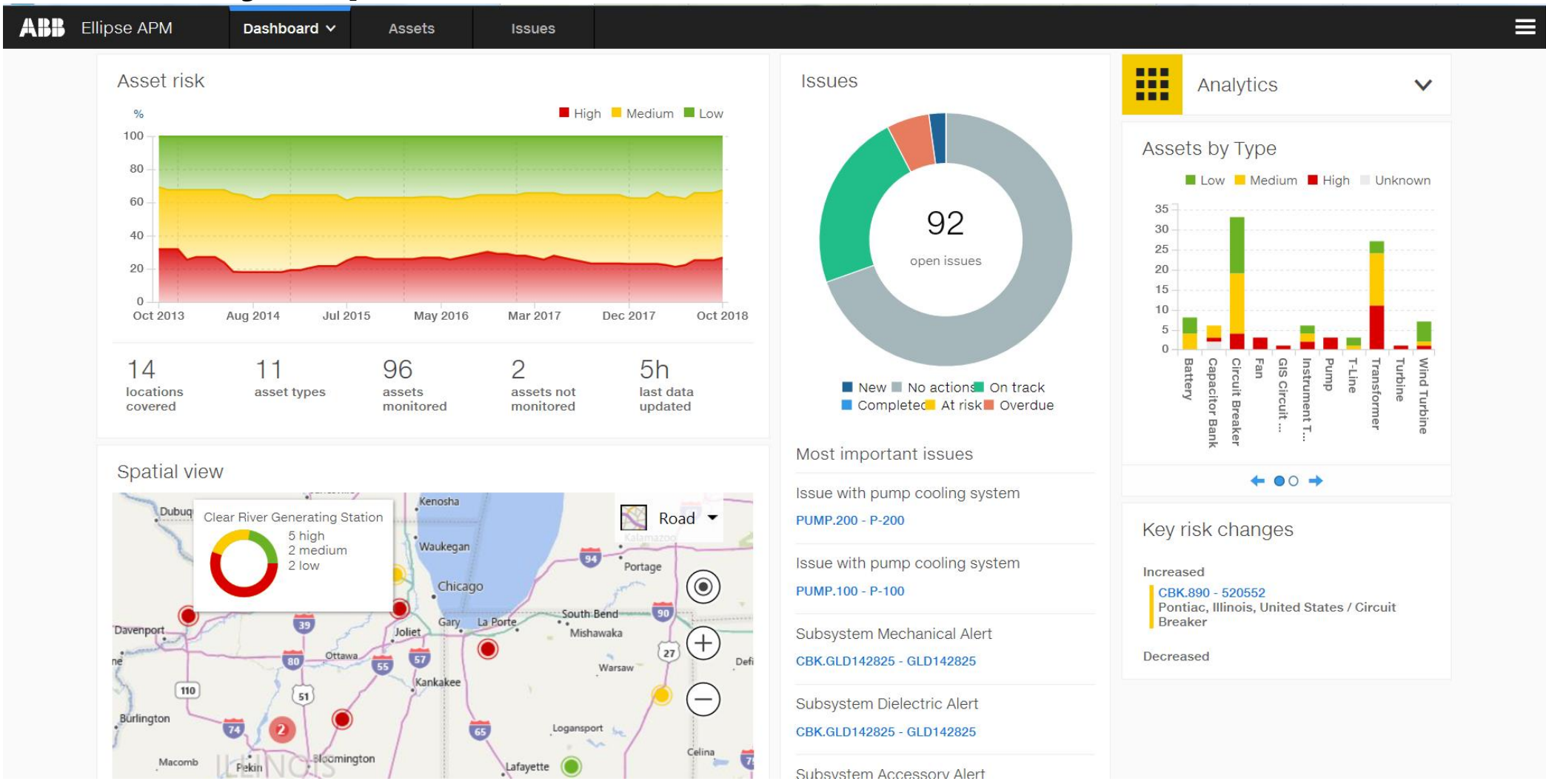


ABB Ability Ellipse APM (UI)

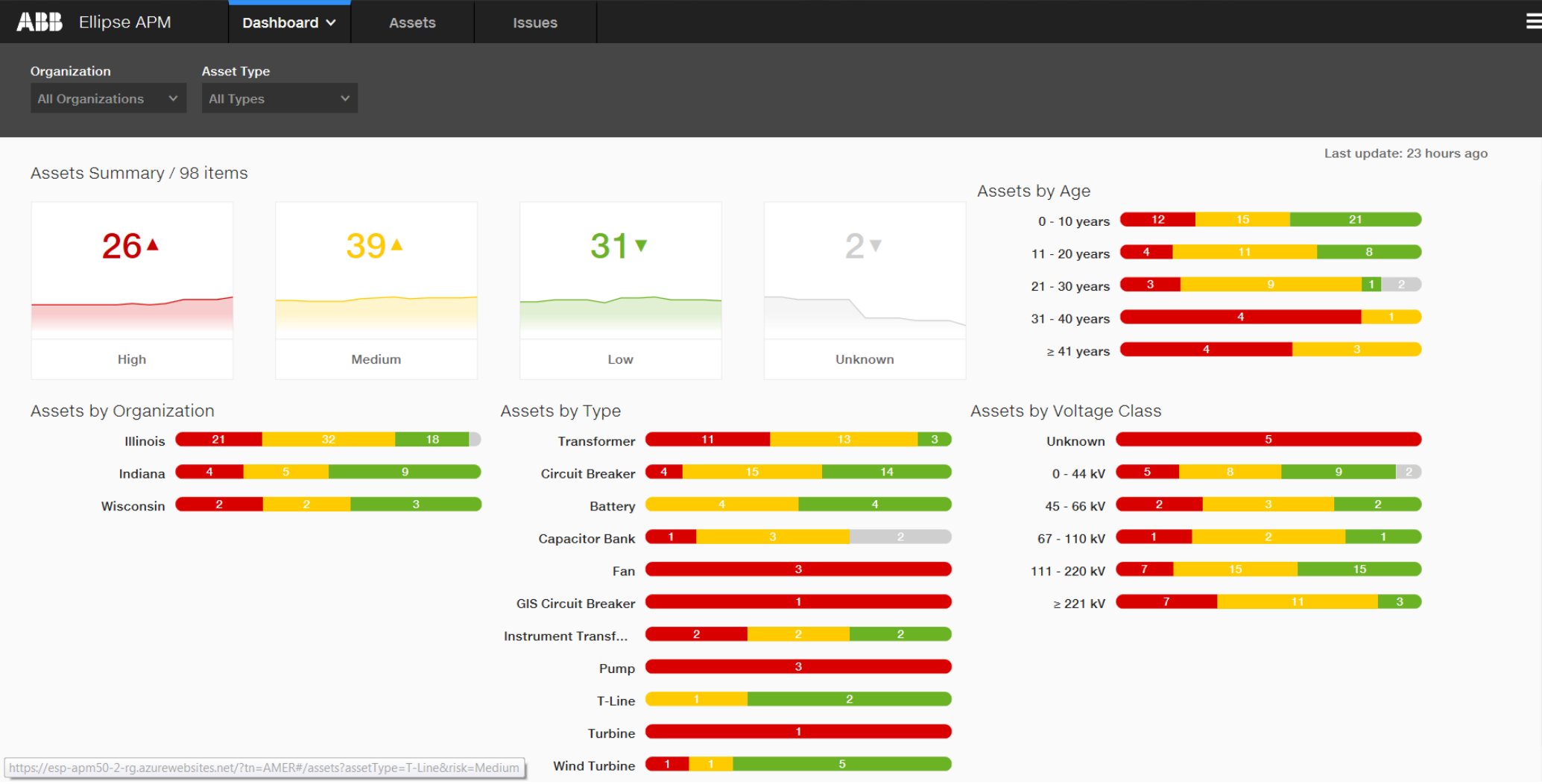


ABB Ability Ellipse APM (UI)

ABB

Ellipse APM

Dashboard ▾

Assets

Issues

⋮

Search

Organization

All Organizations ▾

Location

All Locations ▾

Asset Type

All Types ▾

Importance

All Importance ▾

Status

All Statuses ▾

Issues / 92 items

Asset	Condition	Risk	Issue	Maintenance Priority	Status	Actions
PUMP.200 - P-200 Chicago / Pump	28.0	●	Issue with pump cooling system	1.4	New	0
PUMP.100 - P-100 Chicago / Pump	22.0	●	Issue with pump cooling system	1.1	New	0
CBK.GLD142825 - GLD142825 Chicago, Illinois, United States / Circuit Breaker	71.6	●	Subsystem Mechanical Alert	17.2	On track	1
CBK.GLD142825 - GLD142825 Chicago, Illinois, United States / Circuit Breaker	71.6	●	Subsystem Dielectric Alert	17.2	On track	1
CBK.GLD142825 - GLD142825 Chicago, Illinois, United States / Circuit Breaker	71.6	●	Subsystem Accessory Alert	17.2	No actions	0
CBK.889909 - 520551 Chicago, Illinois, United States / Circuit Breaker	45.3	●	Subsystem Mechanical Warning	13.6	Overdue	1
CBK.889909 - 520551 Chicago, Illinois, United States / Circuit Breaker	45.3	●	Subsystem Dielectric Information	13.6	On track	1
CBK.889909 - 520551 Chicago, Illinois, United States / Circuit Breaker	45.3	●	Subsystem Wear Information	13.6	No actions	0
CBK.S1000823598 - SG008470003 Pontiac, Illinois, United States / Circuit Breaker	46.3	●	Subsystem Dielectric Information	11.9	No actions	0



INSPECTION RESULTS GATHERED ON THE MOBILE DEVICE

ABB Ellipse WFM FieldWorker

ABB

Back

EllipseOrder, Collect Data

0

Forms

Collect Data !

- Labour Costing
- Additional Info
- Defect Request

*Is it OK to Proceed? This is to ensure that working environment is safe to proceed.

YES ☒ NO ☐

Send

Measure the contact resistance:

Record the Contact Resistance P3

93

Record the Contact Resistance P2

93

Contact Resistance P1

95

Post-maintenance operational checks

Maintain the VT

Maintain outdoor OCBs and cabinets

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COMBINED W/ DATA FROM OTHER SOURCES IN APM TO CALCULATE RISK OF FAILURE

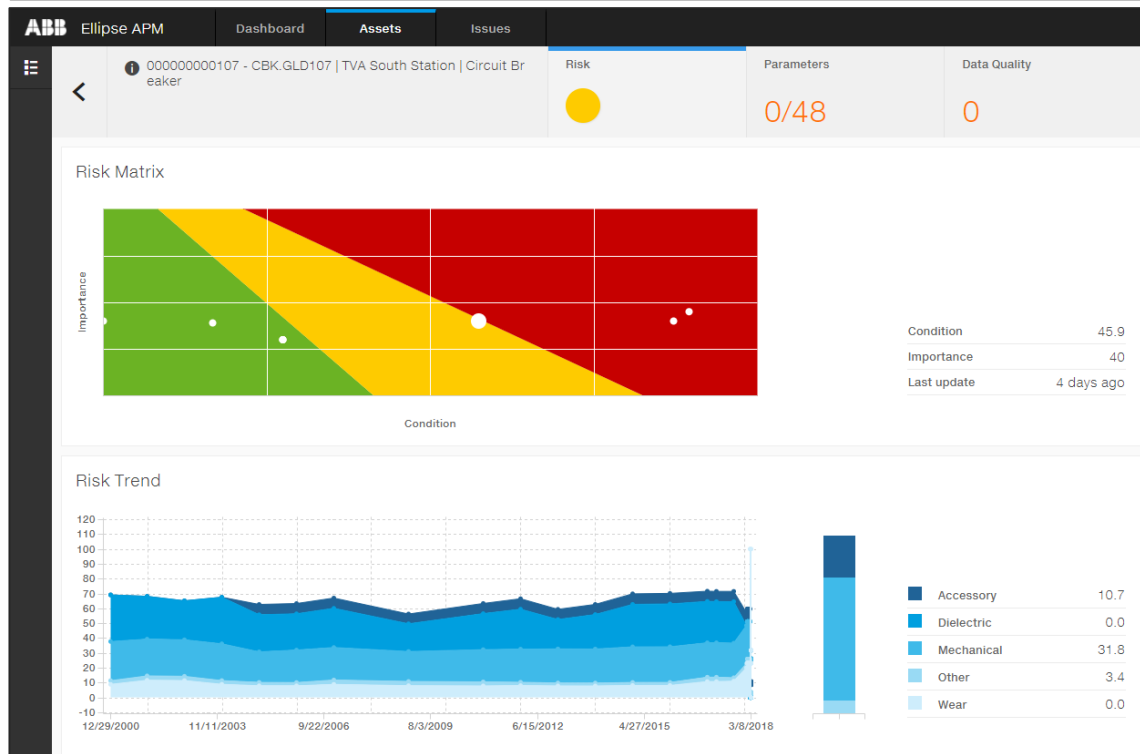


ABB Ability Ellipse EAM

A complete Asset management Solution



Assets

- Capital and expense projects
- Construction works management
- Maintenance strategy
- Equipment costing & performance



Materials

- Requirements determination
- Vendor management
- Inventory management
- Contracts & procurement



People

- Organization & people management
- Time, attendance & payroll
- Training
- Health, safety, security and environment (HSSE)



Work

- Plan, schedule
- Execute, complete
- Job & project costing / analysis



Finance

- Budgeting and forecasting
- Project costing
- AR / AP
- CPR / fixed assets



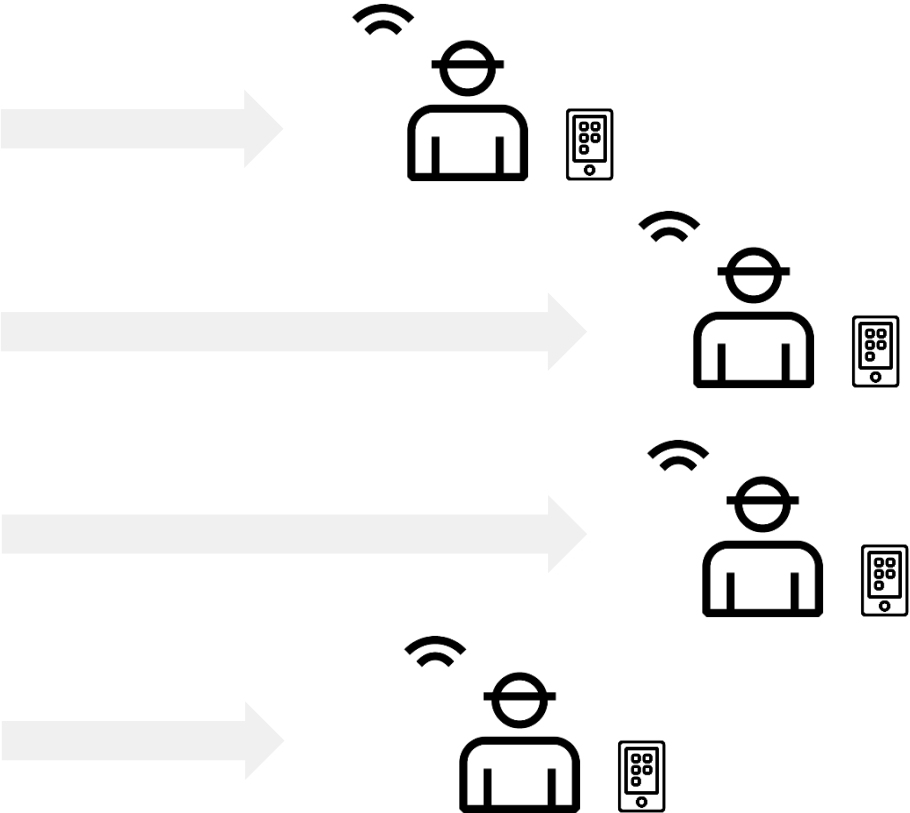
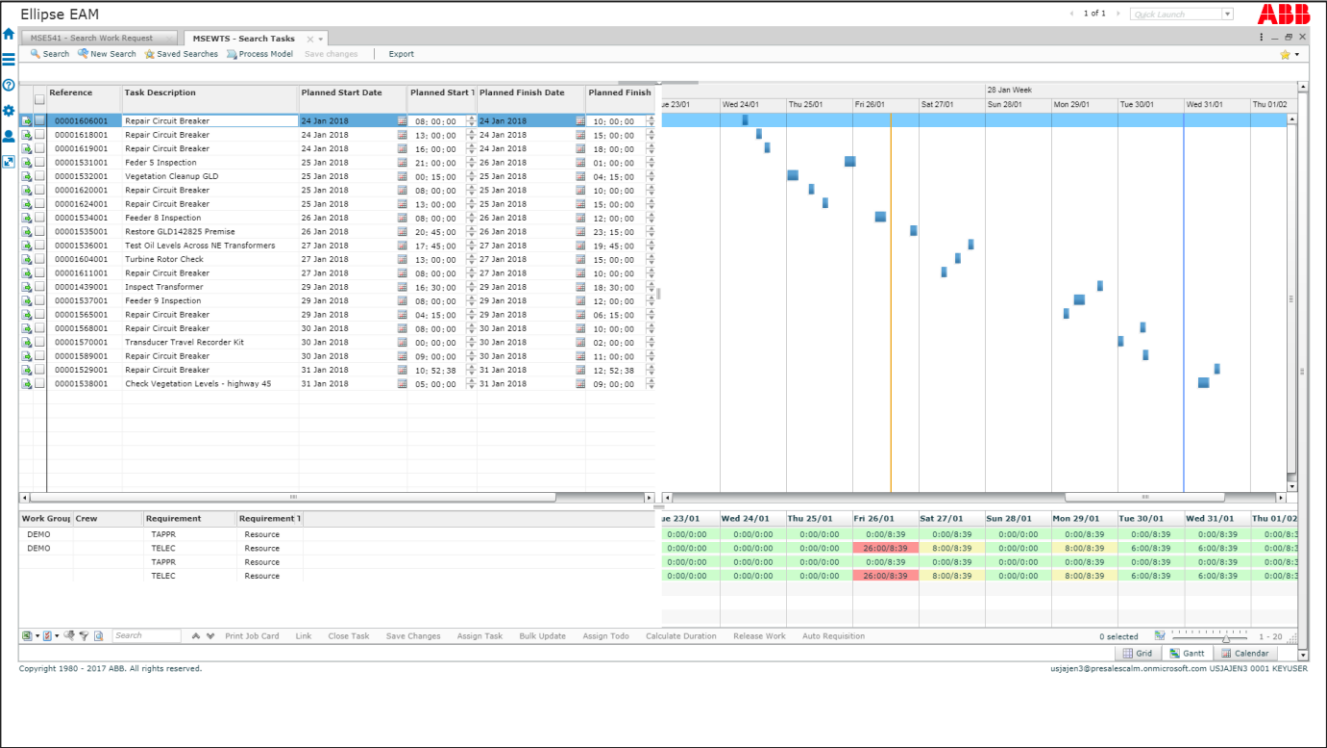
Analytics

- Asset & operations insight
- Construction through operations
- Informed decision making
- Improves outcomes



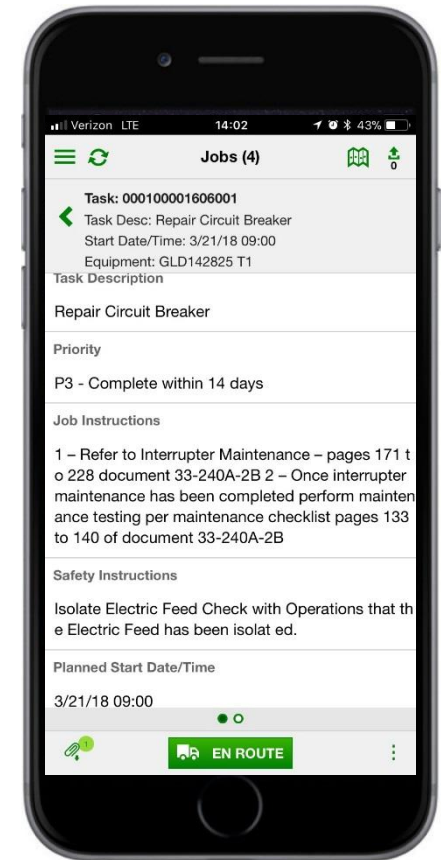
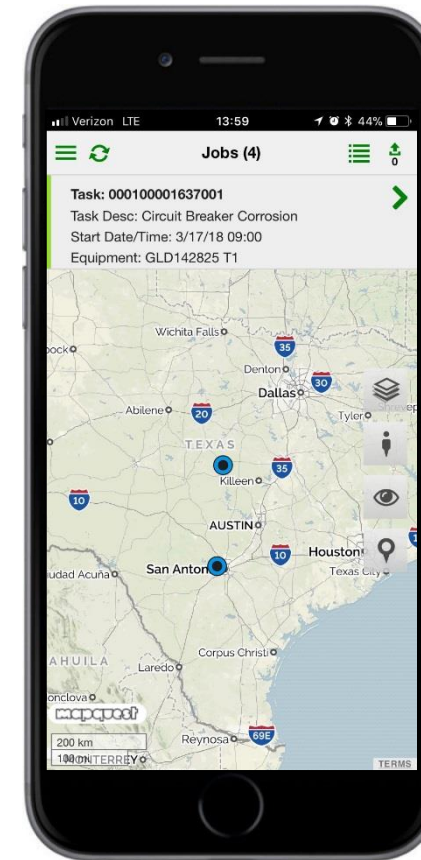
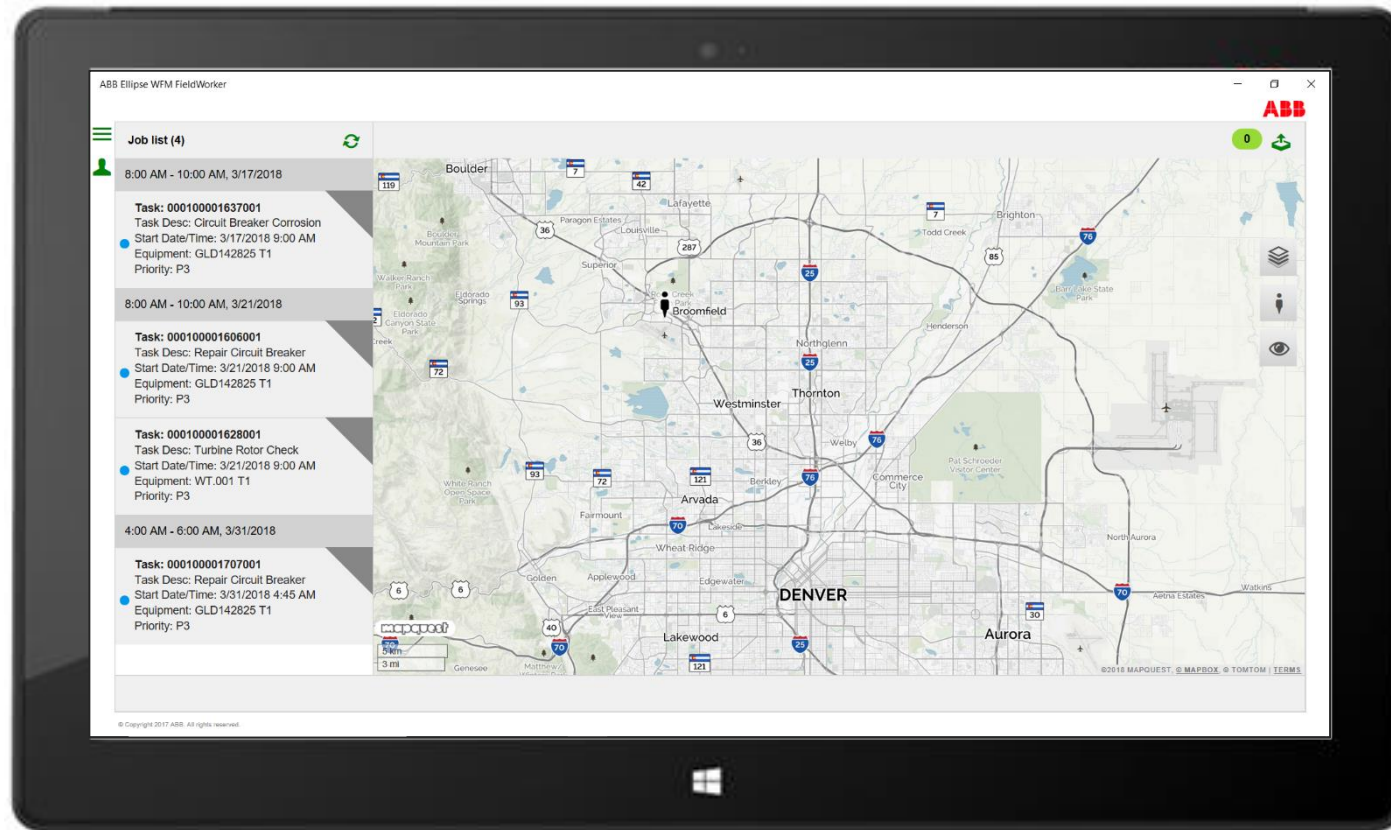
Work -> Mobile Execution

Schedule and Assign Work Orders -> Release Updates to Field Technicians



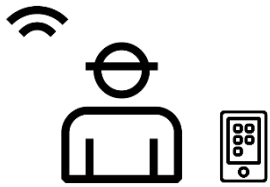
Work -> Mobile Execution

Field Work Execution via Mobile Application



Work -> Mobile Execution

Work Order Updates from the Field

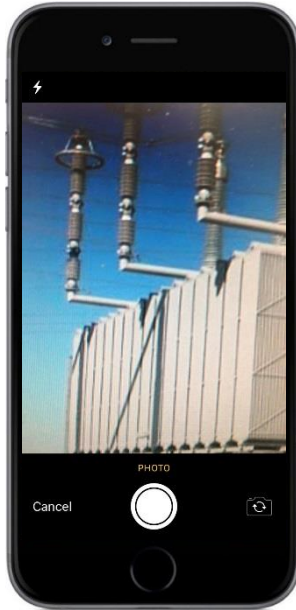


Completion Details

A screenshot of a mobile application interface titled "Labour Costing". It displays fields for "Labour Costing", "Completion Date", "Earnings Code" (set to "001 - Ordinary Hours"), and "Number of Hours". Below these fields is a table with columns for month, day, and year. The table shows data for February 11, 2017; March 12, 2018; and April 13, 2019. At the bottom, there are buttons for "Cancel", "Clear", and "Done".

Month	Day	Year
Feb	11	2017
Mar	12	2018
Apr	13	2019

Attach Photographs



Defect Request

A screenshot of a mobile application interface titled "Defect Request". It displays fields for "Defect Request", "Description of Fault Found", "Priority of Fault Found", "Severity of Fault Found", and "Description of Correction Action Required". At the bottom, there is a "Send" button.A screenshot of the Ellipse EAM system interface. It shows a "MSEWOT - Update Work Order Task" window. The window displays various fields including "District", "Work Order", "WO Task", "Task User Status", "Work Release", "Creation Date", "Highest task No. allocated", "Job Description Code", "Location To", "Activity", "Commercial Reference", and "Commercial Indicator". The "Work Order" field is set to "00001749" and the "WO Task" field is set to "001 Inspect Circuit Breaker". The "Work Release" field is set to "CLOSED". The "Creation Date" is "09 Mar 2018". The "Highest task No. allocated" is "1". The "Job Description Code" is "IN" and the "Location To" is "Inspect". The "Activity" is "Inspect". The "Commercial Reference" is "AN ELEVATED NUMBER OF HYDRAULIC PUMP". The "Commercial Indicator" is "CLOSED".

WORK ORDER RESULTS ARE STORED IN THE EAM SYSTEM

WFM and the RealWear HMT-1: Hands Free Work in the Field



Coming in 2H 2018

[illegible]

The screenshot displays the 'Host request - SaaS Demo001' interface. On the left, a sidebar contains a 'Back' button, a user profile icon, and a list of host requests. The first request, 'SaaS Demo001 Requests', is selected and highlighted in green. Below it, a list of requests is shown, with the first one, 'At C: \Program Files\...', selected and highlighted in green. The main content area on the right shows the details of the selected request. It includes a 'Common' section with a 'Asset Id' field, a 'Collecting Data' status with a red error message 'Collecting Data is required', and an 'Installation Date' field. Below this, there is a section for 'Off Preservation Type'.

Hi, how can I help you?
 Create order
 What is this about?
 Wire is down
 Can you describe the location?
 1st and main
 Issue: Wire is down
 Location: 1st and main
 Create action request?
 Yes

[illegible]

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Live Demo Scenario

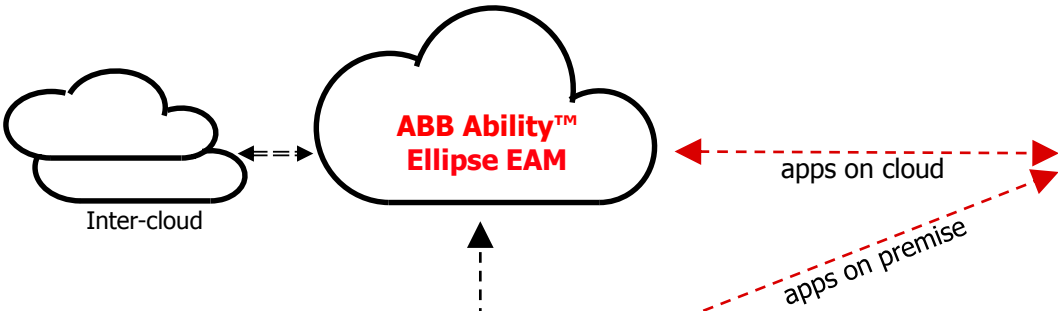


ABB Presales 9.0.5

MSE345 - Update Condition Monitoring Measurements

Equipment Reference: DWP300
Component Code: 8080 MOTOR
Position Code: COMPART OIL COMPARTMENT
Modifier Code: PROD -1 MSV-120-USV
Monitoring Type: TP Temperature

Condition Monitoring Set Measurements

Meas Date	Meas Time	Meas Type	Meas Value	Alarm Dst	Alarm WO
20/03/2019	11:08:31	DEG C - Degrees C	25.60		
20/03/2019	11:08:01	DEG C - Degrees C	25.70		
20/03/2019	11:07:31	DEG C - Degrees C	26.10		
20/03/2019	11:01:01	DEG C - Degrees C	25.60		
20/03/2019	10:57:01	DEG C - Degrees C	29.20		
20/03/2019	10:54:31	DEG C - Degrees C	25.80		
20/03/2019	10:54:01	DEG C - Degrees C	25.80		
20/03/2019	10:53:31	DEG C - Degrees C	25.70		
20/03/2019	10:53:01	DEG C - Degrees C	25.80		
20/03/2019	10:52:31	DEG C - Degrees C	26.10		
20/03/2019	10:52:01	DEG C - Degrees C	27.50		
20/03/2019	10:50:01	DEG C - Degrees C	29.00		
20/03/2019	10:48:31	DEG C - Degrees C	27.60		
20/03/2019	10:48:00	DEG C - Degrees C	26.00		
20/03/2019	10:47:30	DEG C - Degrees C	26.20		
20/03/2019	10:47:00	DEG C - Degrees C	26.40		
20/03/2019	10:46:30	DEG C - Degrees C	26.50		

OPC DB

Results Messages

id	NAME	NUMERICID	VALUE	TIMESTAMP	QUALITY	STATUS
39	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	25.2	2019-03-20 10:58:01.097	192	SUCCESS
40	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	25.3	2019-03-20 10:58:31.100	192	SUCCESS
41	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	25.3	2019-03-20 10:59:01.107	192	SUCCESS
42	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	24.9	2019-03-20 10:59:31.107	192	SUCCESS
43	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	24.6	2019-03-20 11:00:01.110	192	SUCCESS
44	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	25	2019-03-20 11:00:31.117	192	SUCCESS
45	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	25.6	2019-03-20 11:01:01.120	192	SUCCESS
46	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	24.4	2019-03-20 11:01:31.123	192	SUCCESS
47	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	25.2	2019-03-20 11:02:01.133	192	SUCCESS
48	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	25.1	2019-03-20 11:02:31.137	192	SUCCESS
49	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	25	2019-03-20 11:03:01.137	192	SUCCESS
50	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	24.8	2019-03-20 11:03:31.147	192	SUCCESS
51	ABB OPC.ABB Freelance 700F.PS_7.Temp721	0	24.7	2019-03-20 11:04:01.150	192	SUCCESS

Query executed successfully. ID-L-7000943\SQLXPRESS (12... ellipse (56) DemoDB 00:00:00 84 rows

ABB