



THURSDAY 29TH NOVEMBER 2018, CARDIFF

ABB Solutions for Asset Management

“Less Boots on Ballast” – Predictive Maintenance Approach

ABB Speakers - Robert Alonso and Jay Mehta



Welcome!

ABB's Electrification on Great Western now approaching Wales !!



PELTON EVENTS



Robert Alonso

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ABB at a glance

ABB Globally

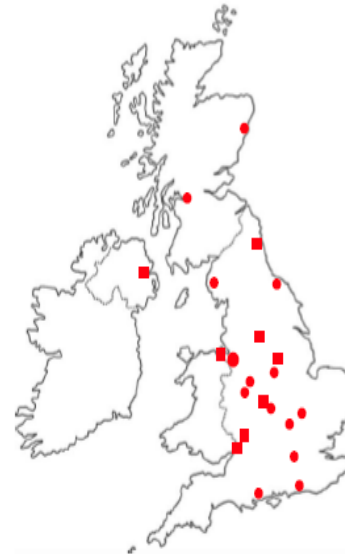
- 135,000 employees
- \$34B revenue

Serving

- Utilities
- Industries
- Transport
- Infrastructure

ABB in the United Kingdom

At a glance



3,000

People work for
ABB in the UK



22

Sites where
products are
manufactured, sold,
serviced or
engineered



\$1.2bn

Annual UK
revenues

Skilled and experienced UK team, backed by global networks

<https://www.youtube.com/watch?v=S3wPcrAUTfM>

Agenda



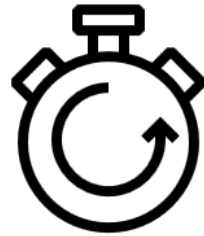
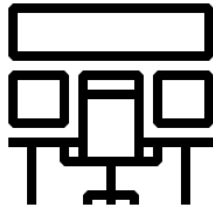
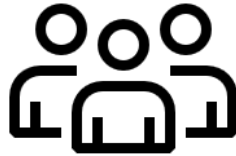
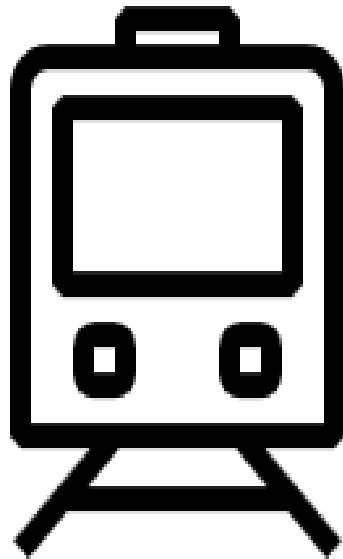
1 Predictive maintenance
Unlocking the potential of digital

2 Utilising data
Support for all operations

3 Energy Efficiency
Awards and recognition



Why predictive maintenance?

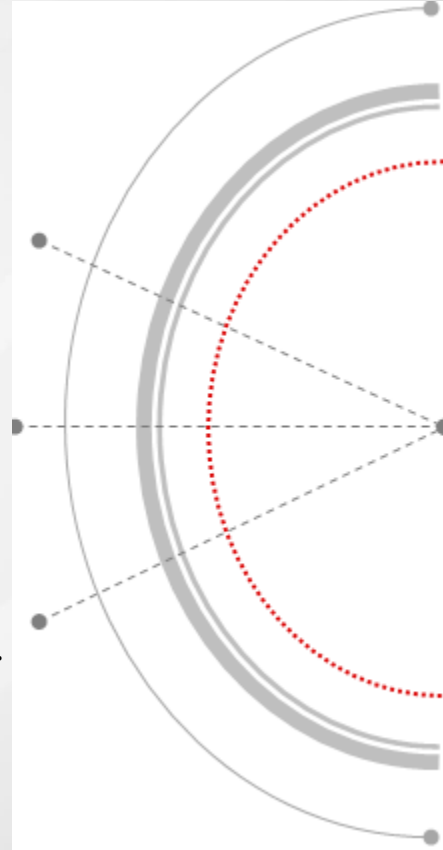


Safety: Most important. Well being of all operatives on and off track

Reliability Robust and well thought design of plant and systems. Experience from Original Equipment Manufacturer. Design for Reliability as core for any project.

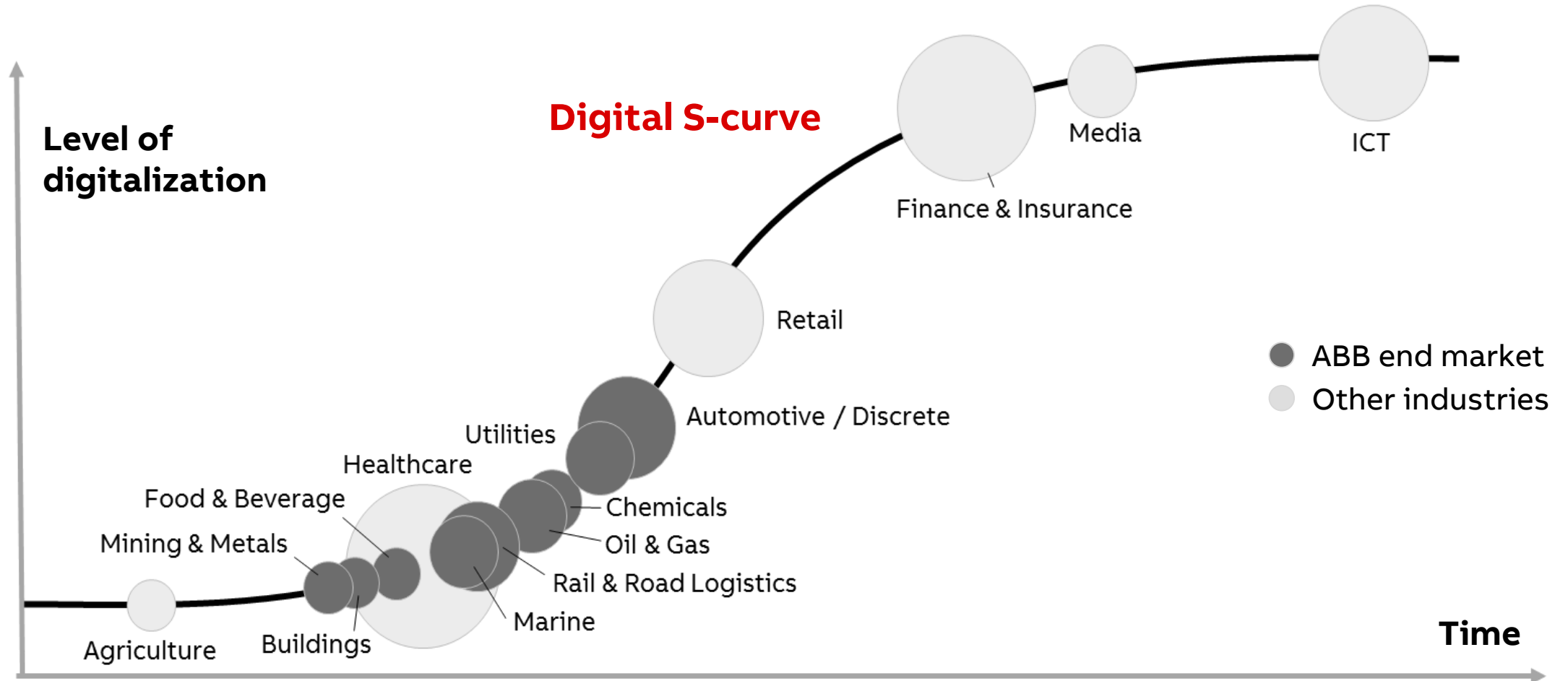
Availability: Make the most of your assets. Keep them running 'happier and for longer.

IMPROVED CUSTOMER EXPERIENCE



Industrial markets primed to adopt digital technologies

Computing + connectivity + cloud + analytics set to unlock value



Note: relative size of industry for advanced economies
Source: ABB analysis

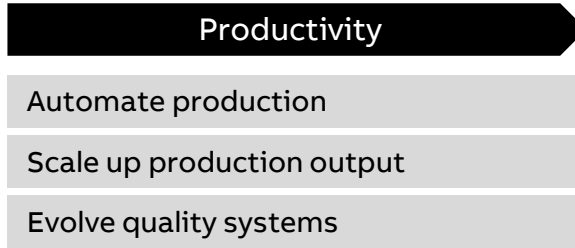
The Digital Era

Next productivity leap
in digital era from
collaboration

Productivity baseline

Industrial Era

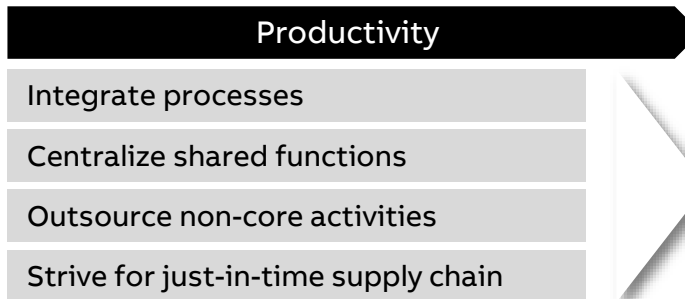
Automating manual labour



Growth by automating
CAPEX

Information Era

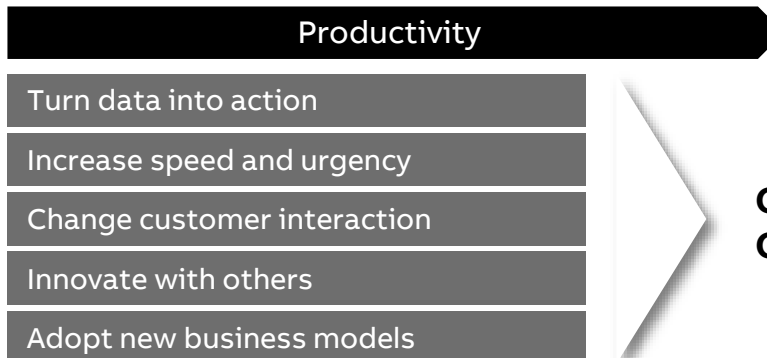
Transforming internal processes



Growth by integrating
CAPEX & OPEX

Digital Era

The networked enterprise

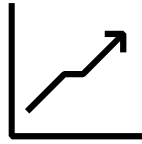


Growth by collaborating
OPEX

Solving the key asset management questions

What should I maintain? What should I replace?

Digital challenges: Too much data – little intelligence



- 4v – Variety, volume, veracity, speed

Operational challenges



- Quality/validity of data
- Disconnect with operations
- Preventive & Corrective
- Unknown condition
- Limited predictive capacity
- Understanding of "Systems"
- Approximate Portfolio risk

Solving the equation

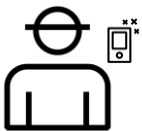
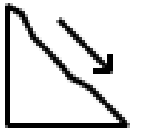


- **Analytical models for interpreting data**
- Drastic improvement in the **health knowledge of each asset**
- **Minimizing/prioritizing preventive activities**
- **Predict/anticipate** failures
- **"Utility"** -based optimization towards business objectives
- Intelligence-> **actions**

Benefits

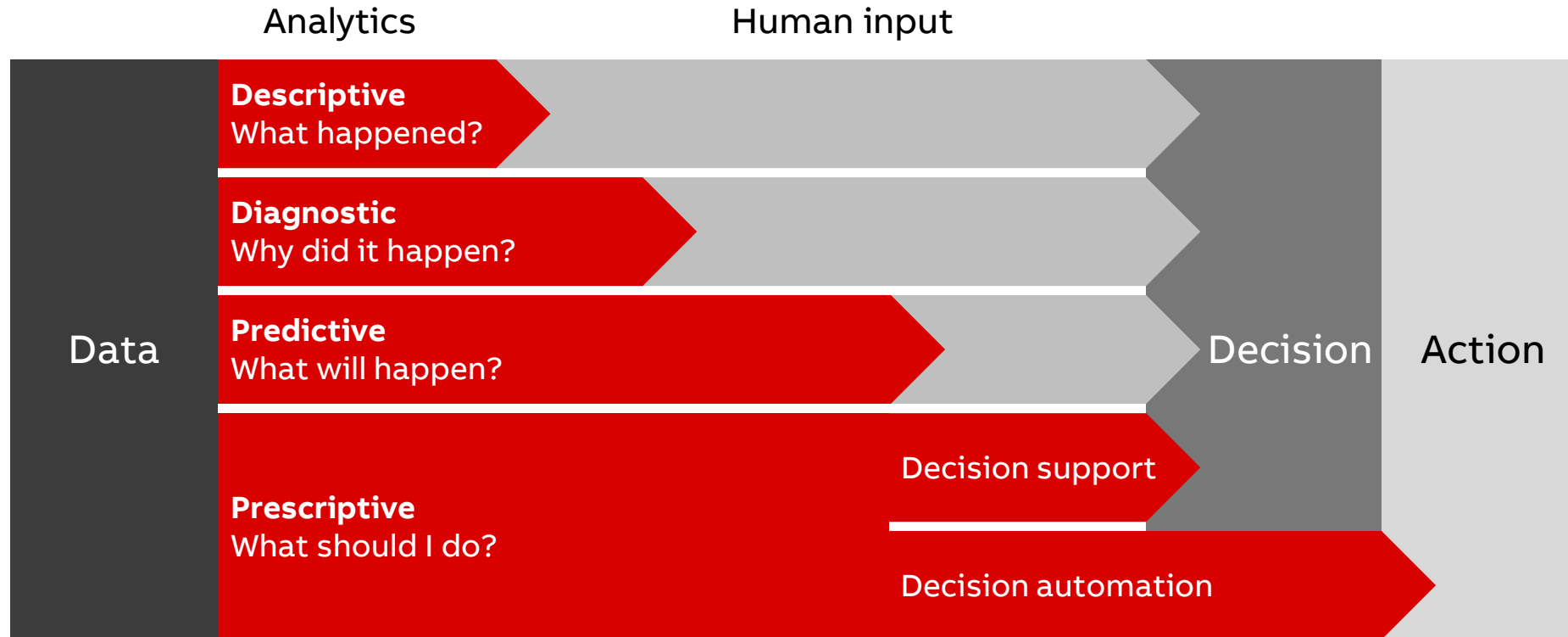


- **Optimize CAPEX** when and where they are needed
- **Reduce OPEX** – Act where it is useful
- **Reduce risks** – anticipate and avoid risk situations
- **Enhanced service** – Prevent/mitigate critical events



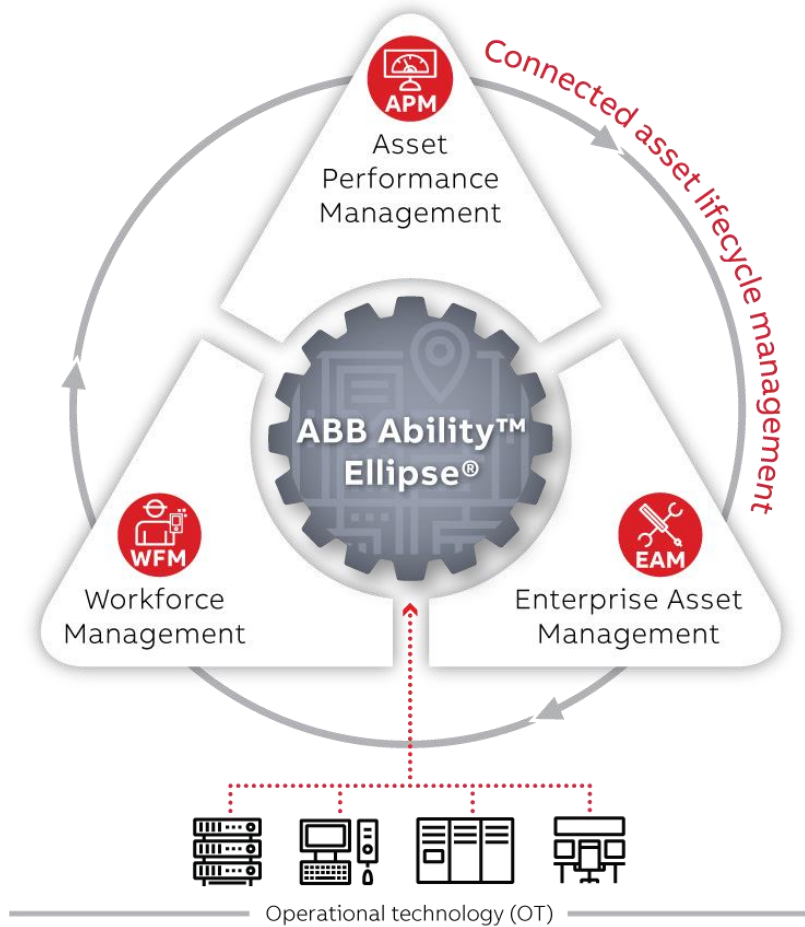
Evolution of digital business and analytics

Need for operational improvement steers analytics from descriptive to predictive



Leveraging digital transformation in asset and workforce management

ABB Ability™ Ellipse®



The orchestration of IT/OT, people, process and priority

\$9.0M

average savings in first year operations¹

1.3M

assets monitored and growing²

20%

improvement in labor productivity¹

10%

reduction in asset running costs¹

1 Value model valuation by Deloitte® for Ellipse APM. No endorsement is expressed or implied.

2 American Electric Power

Connected Asset Lifecycle Management

Solution Scope

Asset Performance Management



Optimize asset performance while reducing costs, improving availability, and managing risks

Enterprise Asset Management



Manage physical assets, including asset register, work order management, inventory, and procurement functions

Workforce Management

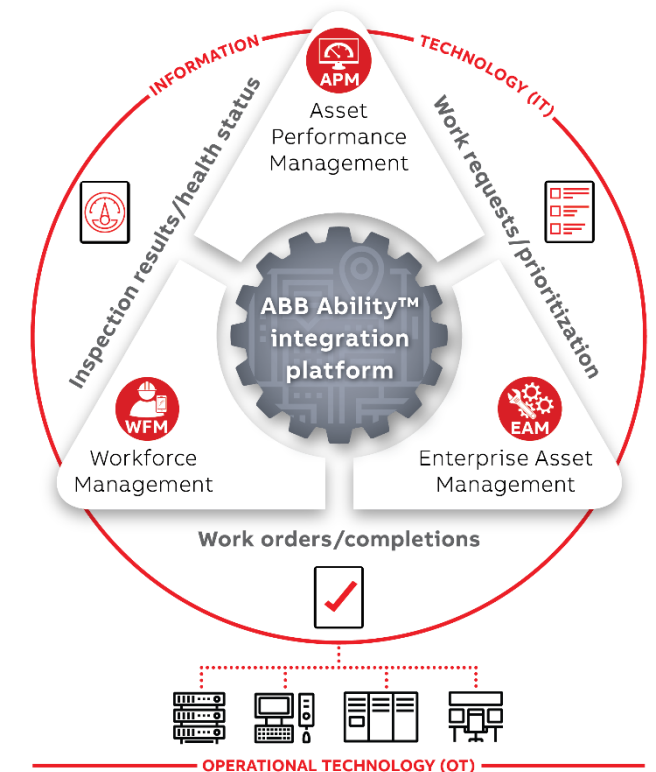


Maximize productivity of the organization and the individual

Connection to Real Time Systems



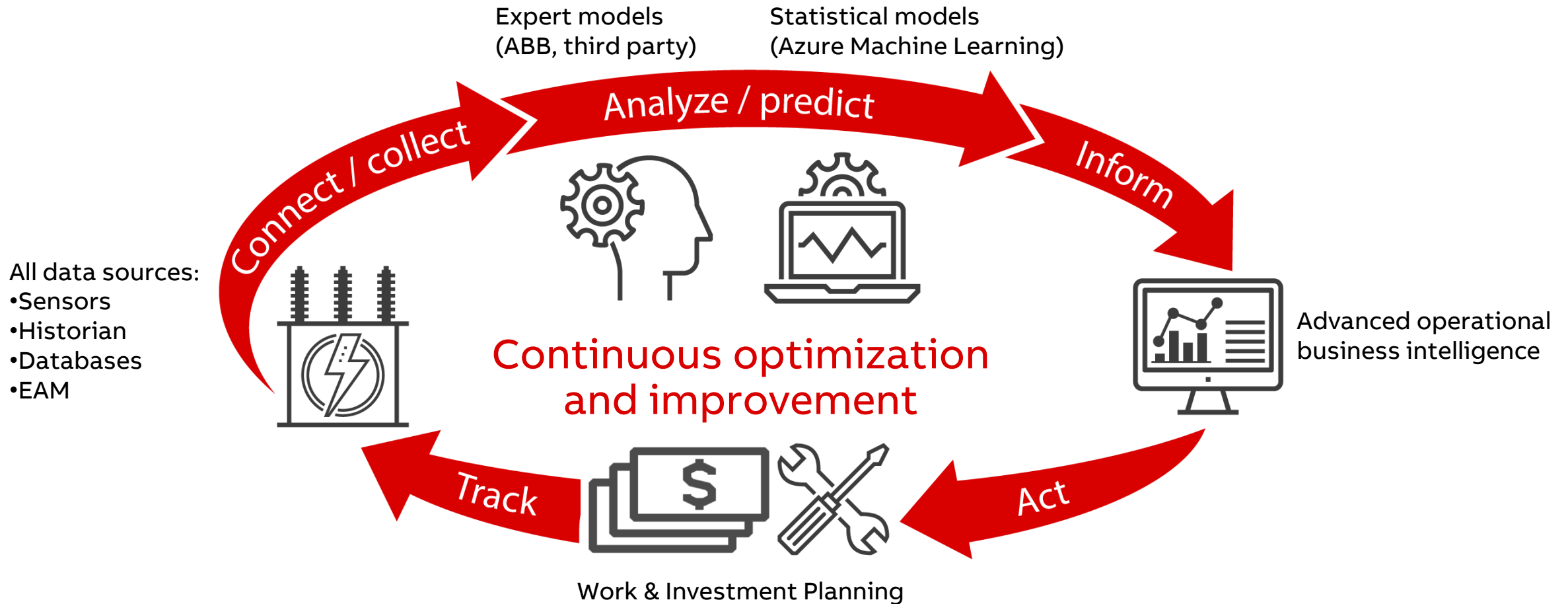
Connection to real time systems ensures immediate and reliable data integration



Asset Lifecycle Management is the process of optimizing the business benefit from assets throughout their lifecycle

ABB Ability™ Ellipse® Asset Performance Management (APM)

Improves process through continuous risk-based optimization

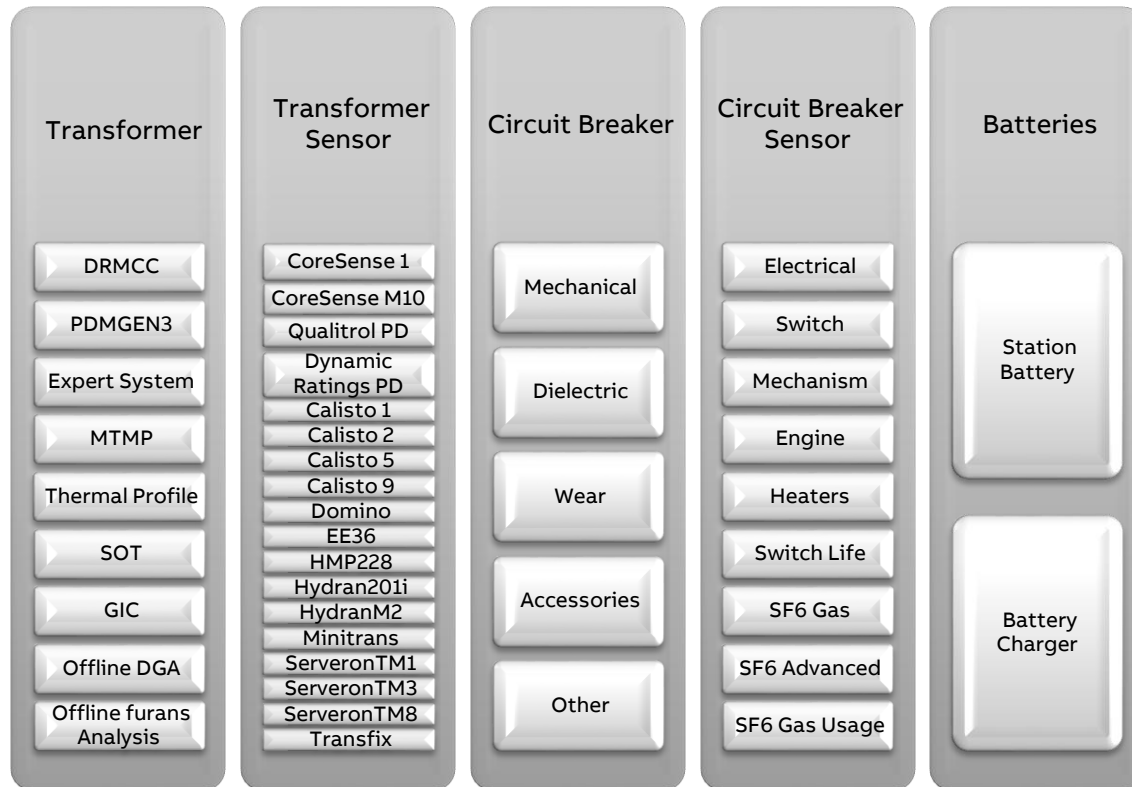


Analytics & First principles Models

Based on ABB's Domain Expertise and partner's Libraries

Selection of models "First principles" ABB

Based on ABB's Domain Expertise Building, Monitoring & Servicing T & D



Examples of Partner analytic models:

Substations



- Transformers
- Circuit Breakers
- Batteries
- Relays
- Capacitors
- Instrument Transformers
- Structures

Transmission



Overhead Transmission Line models include:

- Towers/Poles (wood, steel, composite, concrete)
- Conductors
- Static Wire (Shield wire) models
- Insulators
- UG cables (XLPE, PILC, HPFF, LPFF)

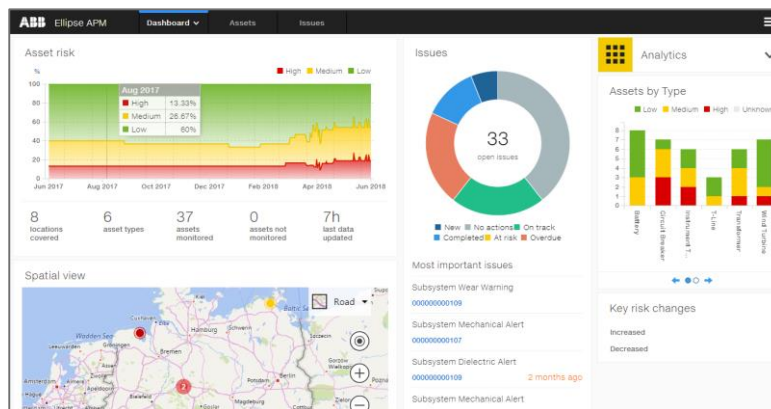
Distribution



- Pad Mounted Switchgear (live front, dead front)
- Load Break Switches (manual, motorized, remote/SCADA)
- UG Cables
- Conductors
- Poles, Insulators

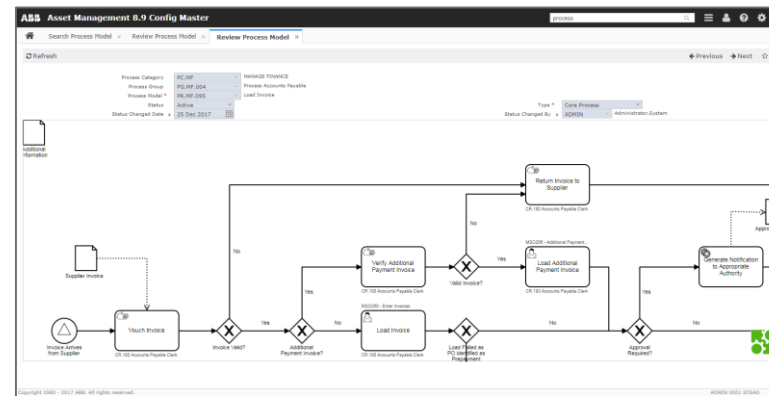
Primary applications

Asset Performance Management



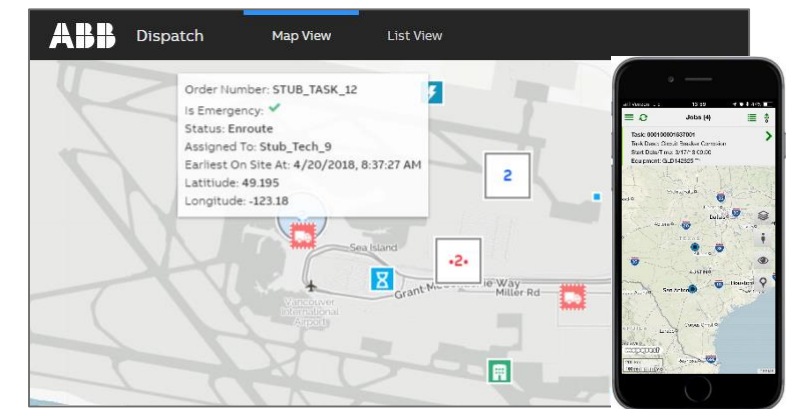
Predictions & Recommendations

Enterprise Asset Management



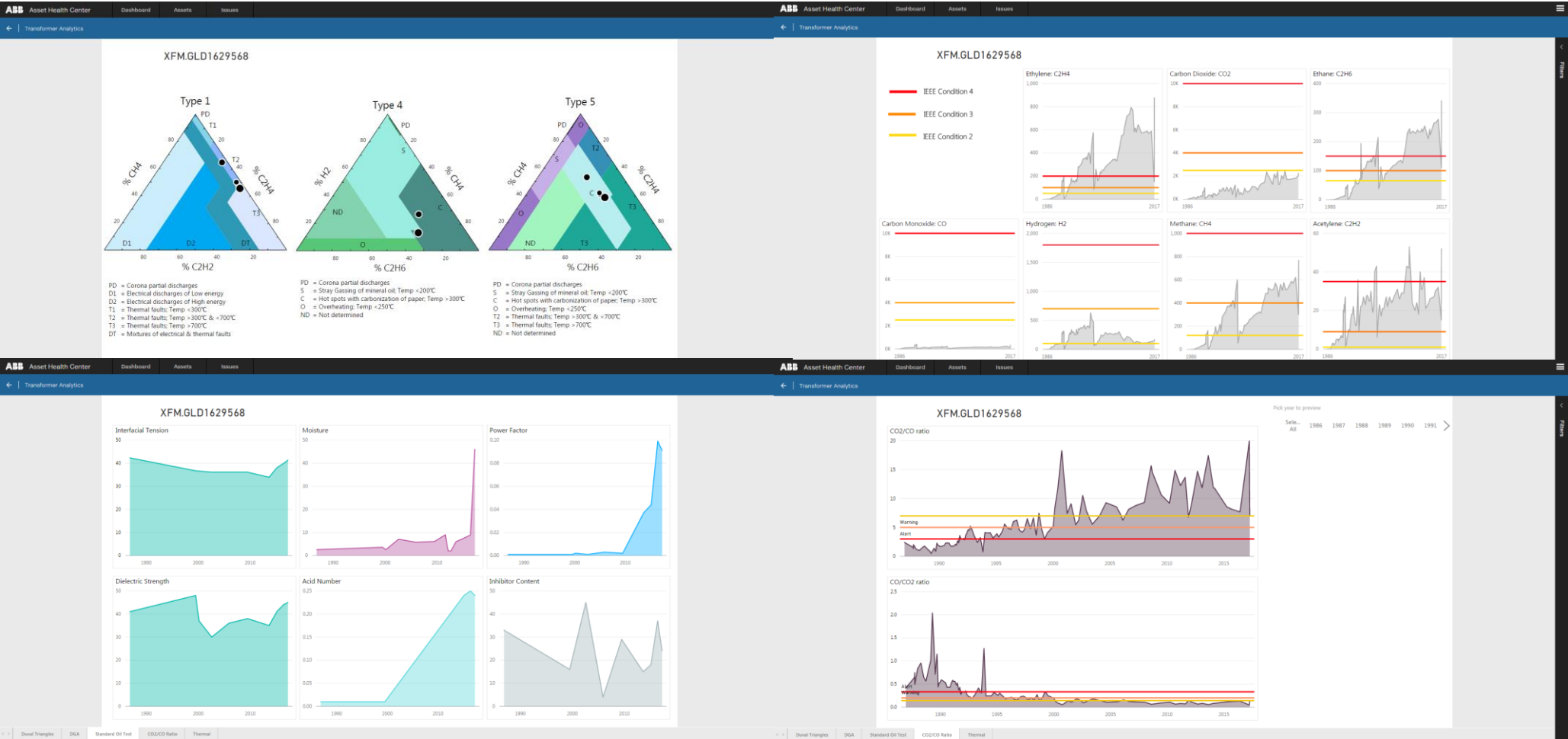
Standardized Work Tasks

Workforce Management





Specific Dashboards



Agenda



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Unlocking the potential of digital

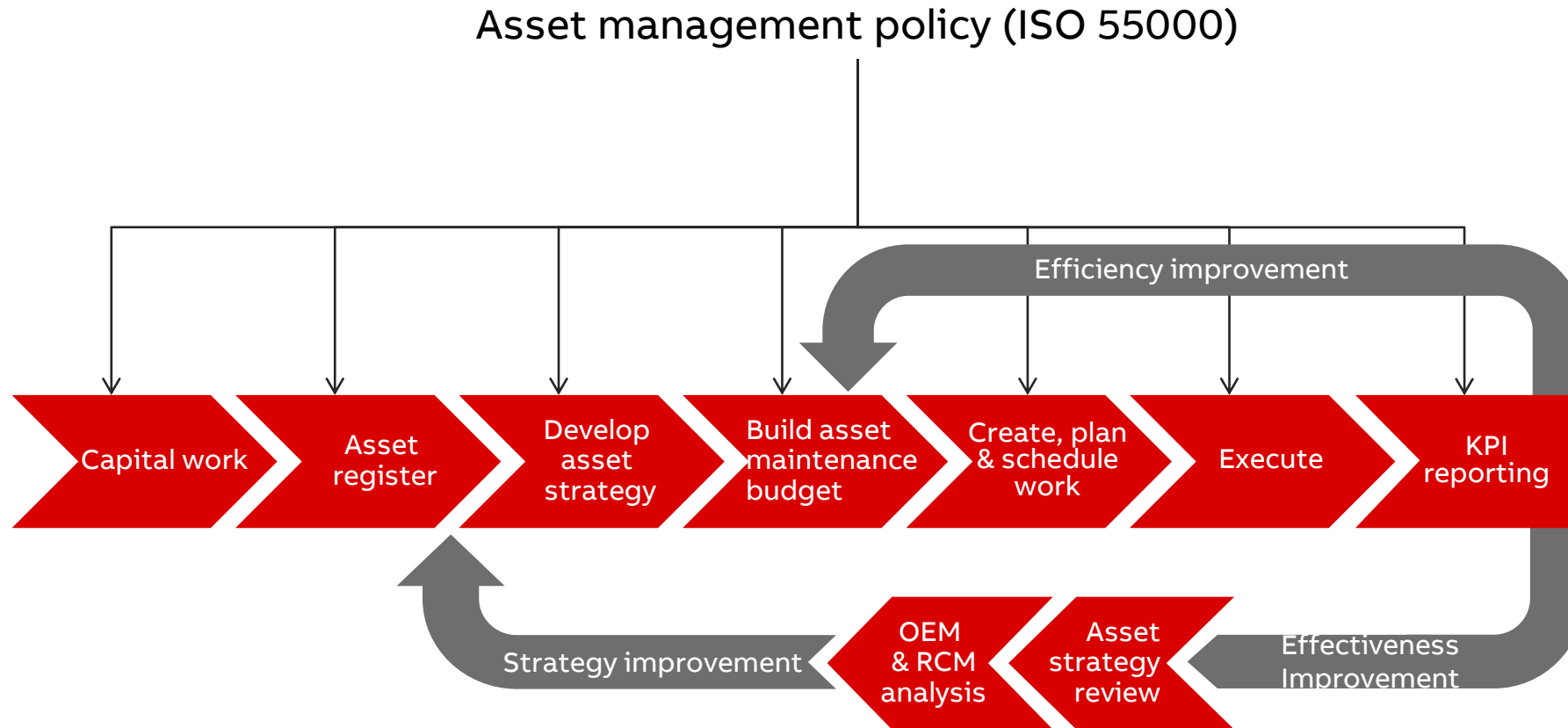
2 Utilising data
Support for all operations

3 Energy Efficiency
Awards and recognition



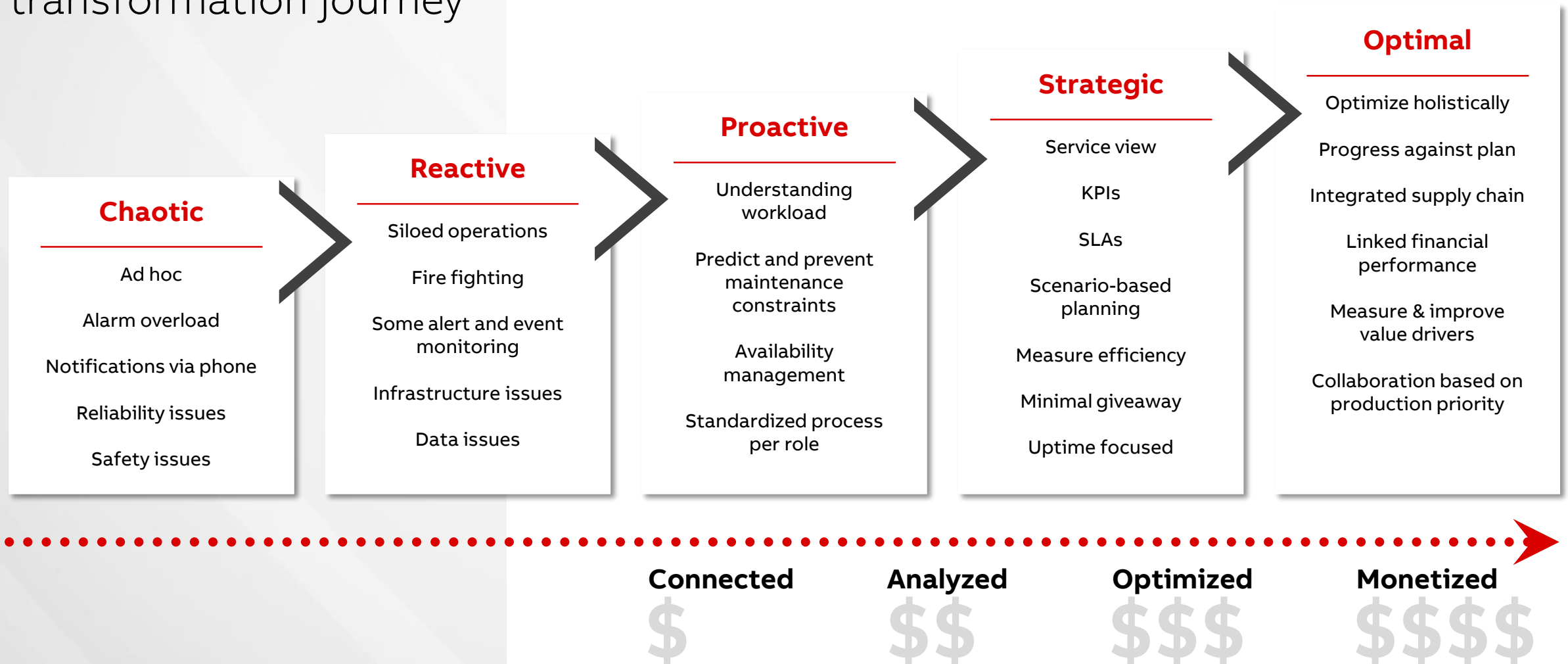
What is asset management?

Asset management achieves an appropriate balance of asset cost, risk and performance to meet organization goals and deliver stakeholder value.



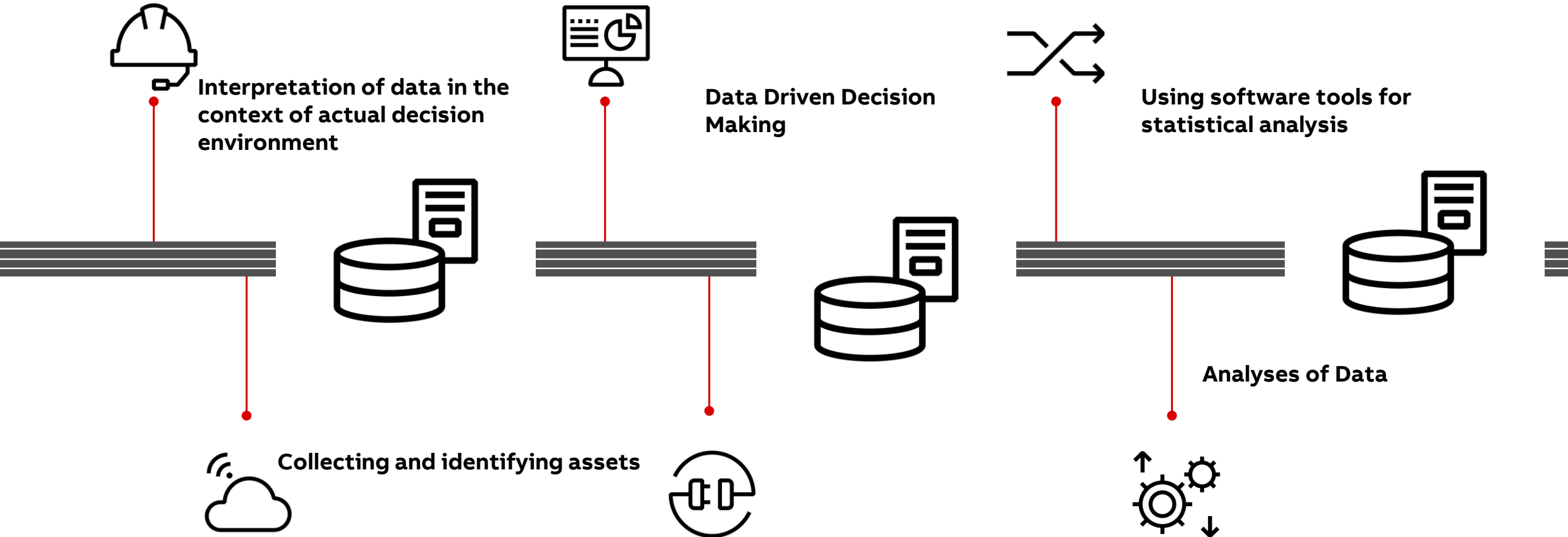
Strategy

Enable the digital transformation journey



Data as an asset

Skills needed by the organization



Asset Systems and Data - Digital Transformation

Stepwise Implementation

Phase 3: Create prescriptive planning and delivery

- Manage change
- Predictive modelling for internal needs and stakeholder preferences
- Real-time analytics, prescriptive models
- Continuous learning and optimization

Phase 2: Gain insight to speed up and improve

- Model and analyze data for operational patterns and insight
- Stakeholder journey and touchpoints
- Asset management
- Collaborative and shared workspaces

Phase 1: A 360 degree view for fundamental visibility

- Gather internal and external data
- Create access and visualization to all necessary data

Infrastructure

- Big Data
- ML
- Data modelling
- Simulation
- Centralized data access
- Dashboards and reports
- Analytics
- Collaborative Operations
- Data management and aggregation
- Ability Edge
- Ability Cloud
- Data visualization
- Open API's

Value

Time

Agenda

1 Predictive maintenance

Unlocking the potential of digital

2 Utilising data

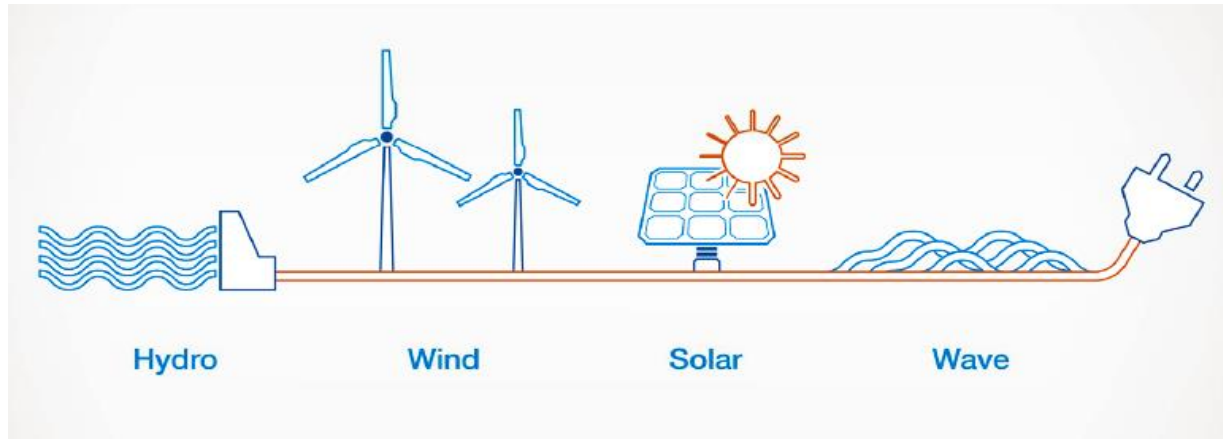
Support for all operations

3 Energy Efficiency

Awards and recognition

Decarbonisation of Rail

- Decarbonisation of Rail - In the UK removal of all diesel only trains from the network by 2040.
- In Germany – DB have stated 80% electricity sourced from renewables by 2030.
- Changes in the Utility Grid dynamics and different sources of Energy.



Efficient Electrification

Growth in railway electrification

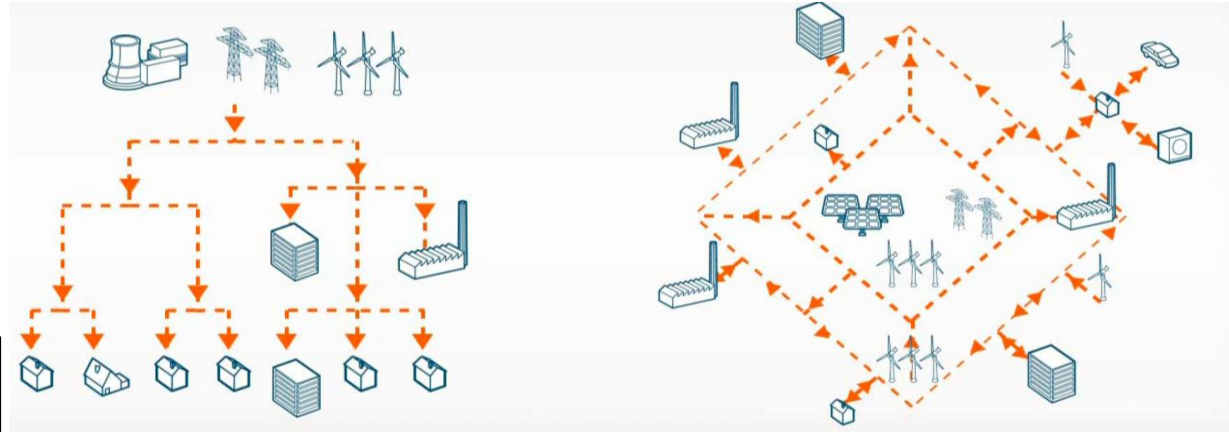
Increased power demand

Power demand increases due to:

- Increased traffic relative to
 - More passengers are travelling
 - More freight on rail
- New lines
- Electrification of existing lines
- Request for high speed lines

Sources of bulk Energy can be varied e.g Green Energy (Windfarms) via Microgrid solutions and other embedded sources.

Lowering the cost of Electrification.



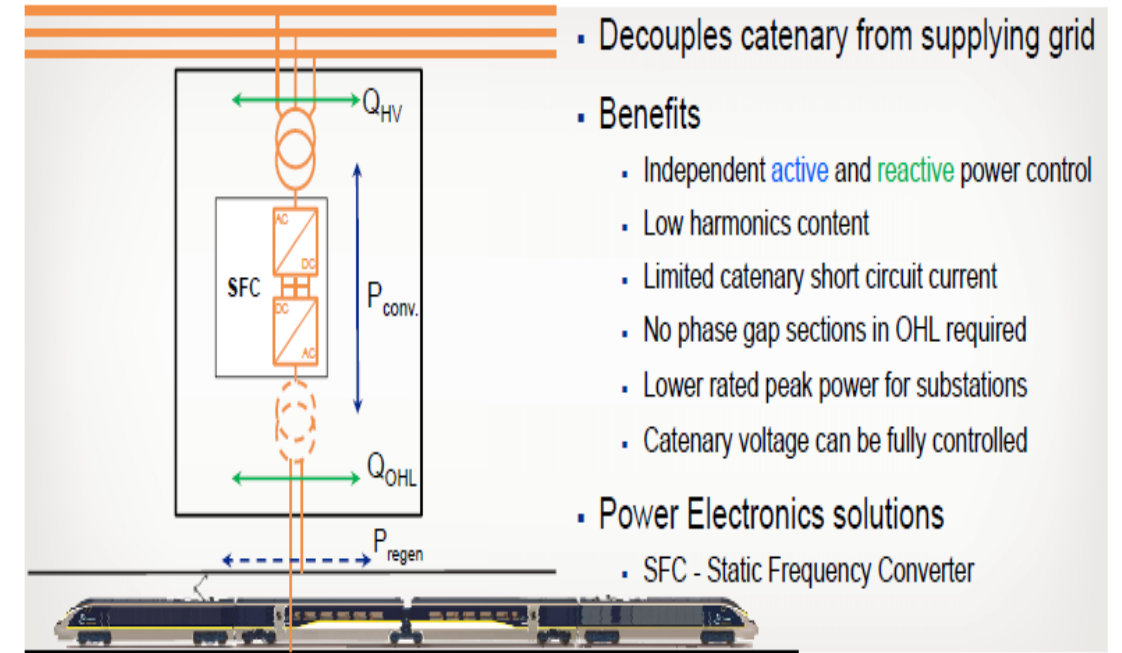
Innovative Solutions for Electrification

Static Frequency Convertor for Network Rail UK – Doncaster Project

- Innovative solutions for Electrification – **Power Supplies**....Use of Static Frequency Convertors to deliver clean power to Overhead Lines – much lower cost of grid connection.
- Savings identified and being realised through the project.



Static Frequency Converters (SFC's)



— Your Questions





ABB