

Digitalization concepts to optimize O&M strategies in Offshore Wind Energy

Session 3: Disruptive digitalization concepts: cloud-based ecosystems for O&M optimisation.
CASE STUDIES: Wikingen/East Anglia One/Teeside



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 745625.

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Cloud-based ecosystems

Data ingestion

- Multiprotocol real time and historical

Data storage

- Relational, NonSQL, TimeSeries




Data processing

- Analytics, data cleaning, value-added data, forecasting

Data availability

- Secure data access APIs

Cloud participants

-  Producers
-  Prosumers
-  Consumers

Functional layers

- Data Acquisition
- Cloud (Storage & Analytics)
- O&M



Cloud-based ecosystems

Traditional Cloud concept

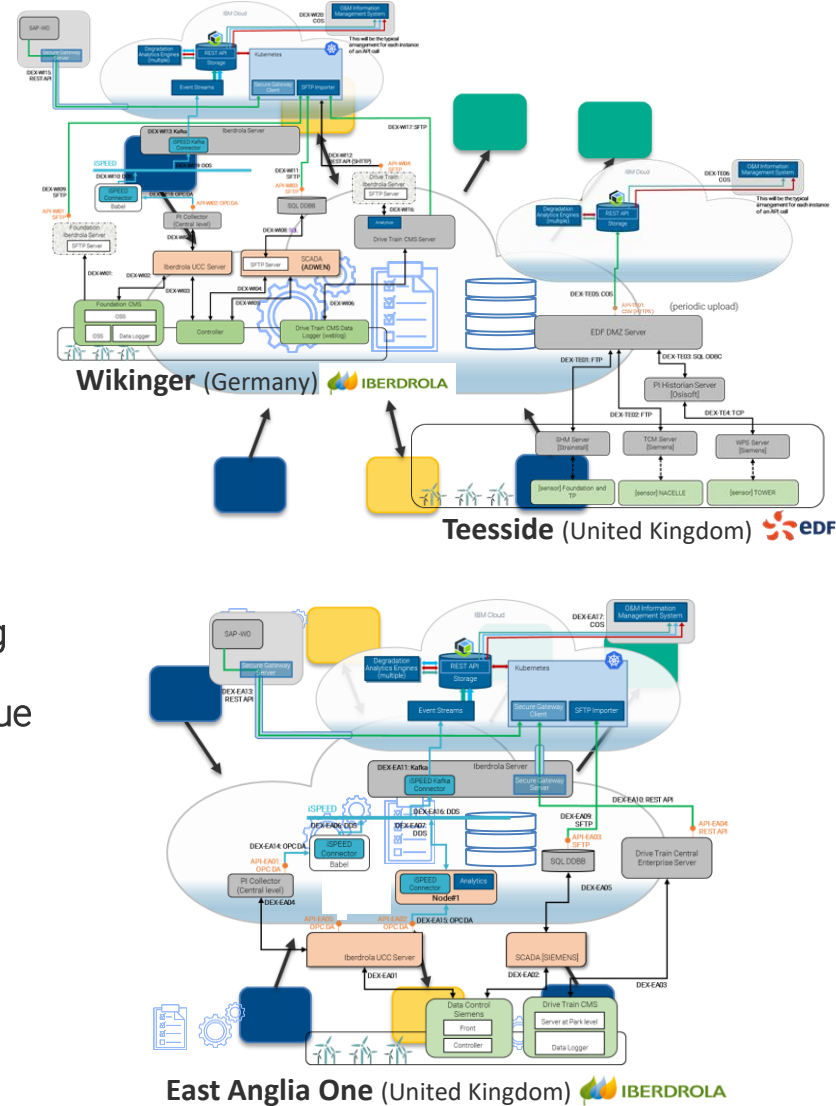
The chain of information acquisition has only one step and intelligent processing is carried out globally in a single “virtual place”, the cloud itself

Romeo Hybrid Edge/Cloud proposal

A common architecture, capable of integrating, processing and reacting to data in real time directly in the field at the same time that is capable of managing and generating value on the cloud on massive amounts of information.

Information processing is also placed closer to the field devices that produce the relevant data

Only the processed information that is truly relevant to the business is centralized and available



Data Acquisition

Real-time Systems



SCADA Connector applications integrated with the real-time operation systems for acquiring all the Wind farm monitoring data

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Edge Computing



For handling well known problems in the deployment of the traditional IoT

- The volume of information
- The latency in the assisted or automatic decisions.

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Historical Data



It is also available to be uploaded on the Cloud through secure multiprotocol APIs

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ROMEIO Project components

iSPEED

Real Time Data Integration Platform

Babel connector

SCADA Data acquisition

Industrial Node#1

SCADA Data acquisition & Edge Computing

IBM ingest data APIs

CSV, json, text files, SQL ...



Cloud Platform

Ingestion



The IoT Cloud analytics infrastructure collects data from the back-office systems and merges it with real-time data.

Storage



The IoT Cloud platform enables efficient access for both large and small data objects, while maintaining individual access controls for multiple partners.

Analytics



The IoT Cloud platform allows the execution of the models and delivers the results and KPIs to the O&M end-user layer

ROMEО Project components

Ingestion protocols

SFTP, Kafka, HTTPS, S3 API, Aspera, ...

IBM COS

CSV, JSON, Pandas, ...

Analytics Algorithms

Physical Models,
Supervised Learning,
Anomaly Detection



Cloud Platform

Cloud Object Storage is at the centre

- Data is grouped in buckets
- Access is assigned per-bucket

Ingestion

- Each source populates its own bucket

Transformation

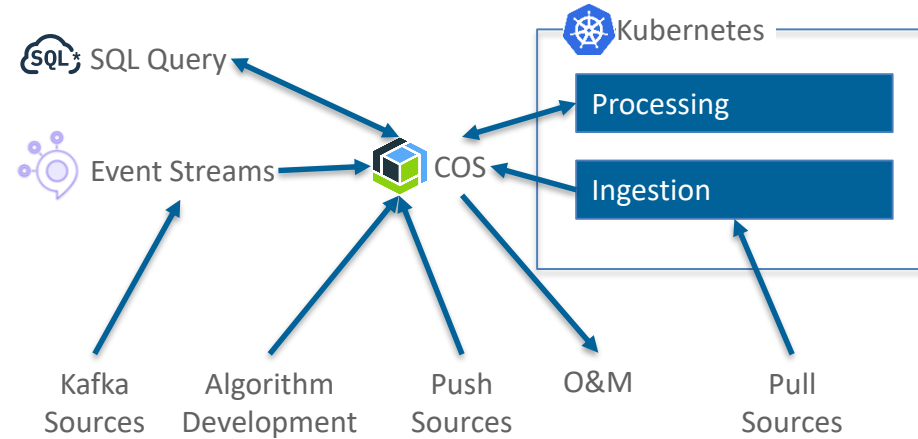
- Reads one bucket, writes to another

Output

- O&M reads prepared results directly

Out-of-band

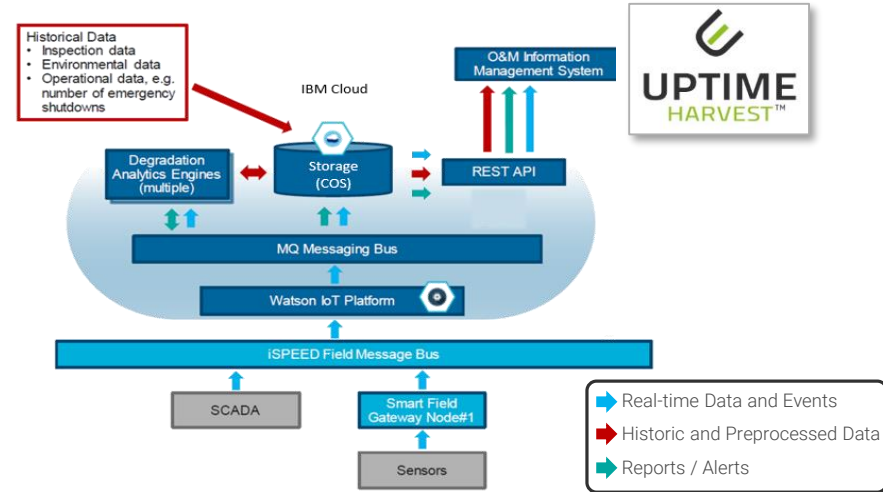
- External access improves flexibility for development and testing of algorithms



Operation & Maintenance Management Platform

Making information usable

- Integration of multiple data sources
- Analysis and combination of information
- Centralized O&M Platform for access by multiple stakeholders
- Support of maintenance process
- Reporting and communication



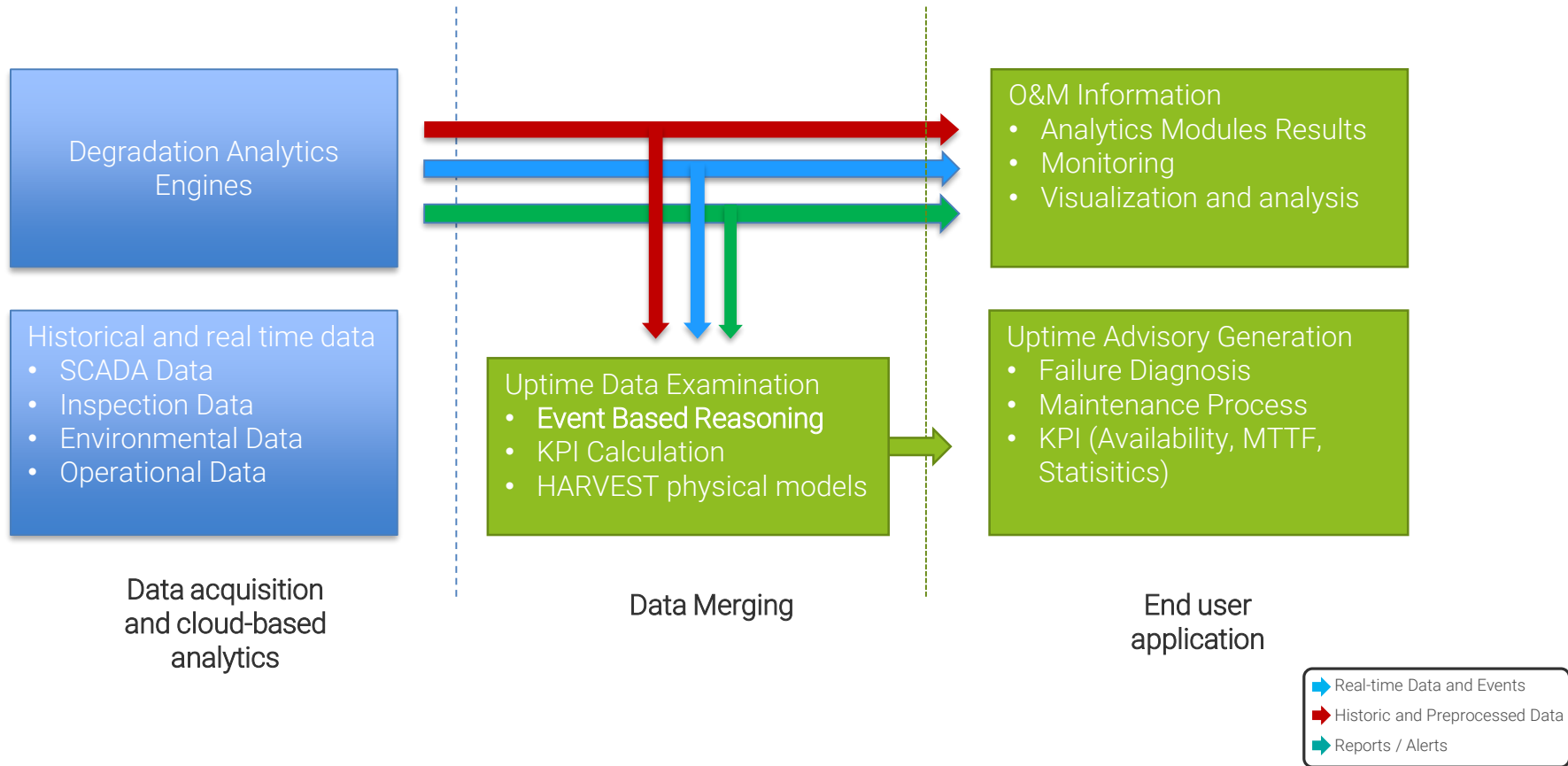
Key Benefits

- Higher reliability
- Lifetime extension
- Reducing O&M costs

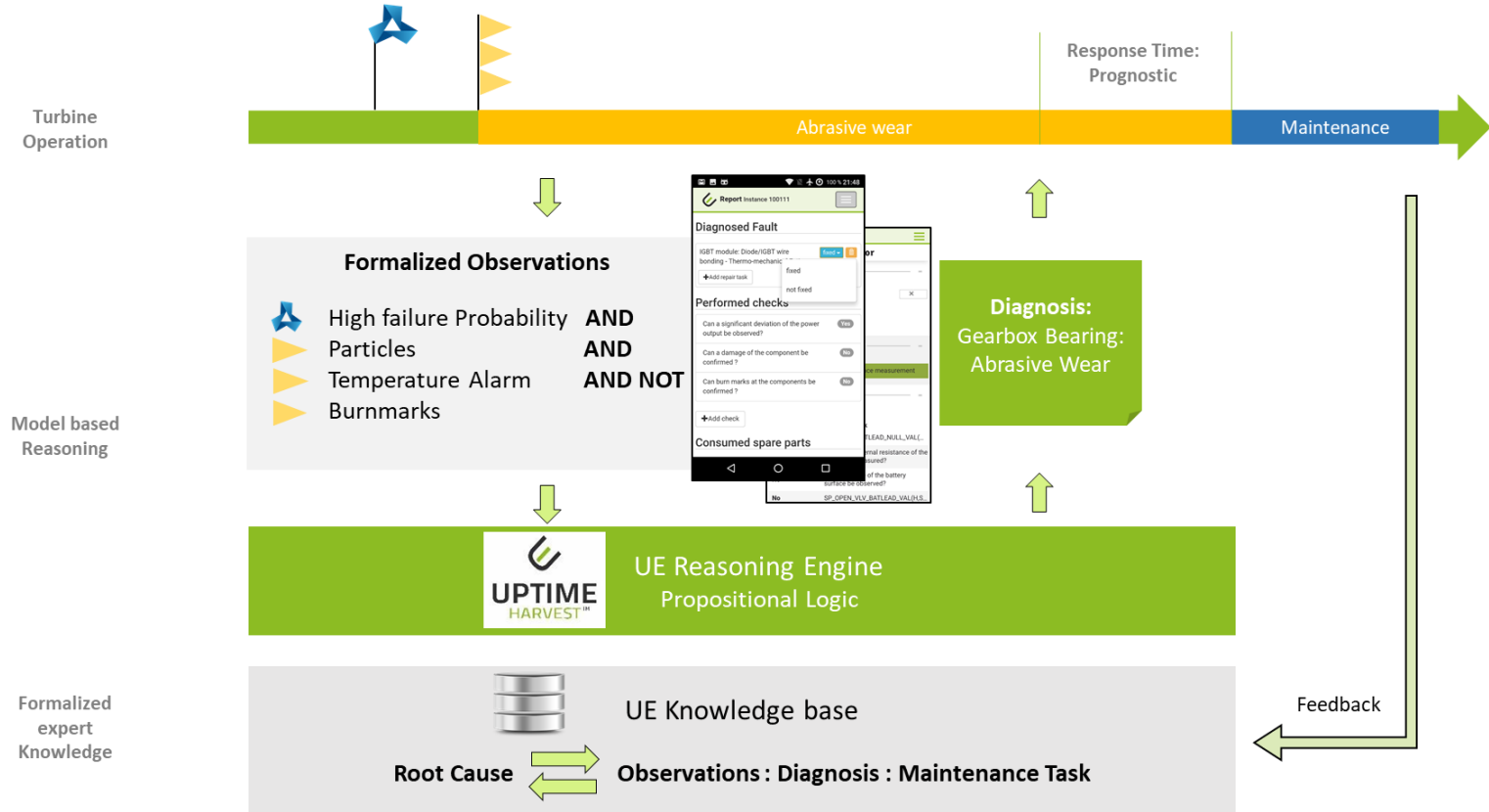
ROMEEO Project components

Uptime Engineering
UPTIME Harvest

Operation & Maintenance Management



Operation & Maintenance Management



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