OIIE Use Case 14 – Condition/Operational Data Acquisition

This Use Case describes the process for collecting condition and operational data of functional locations or serialized assets. Measurements from measurement locations or tags can originate from several sources, including: Condition Monitoring System (CMS), operational process control system or data historian (CONTROL), or IIoT sensors or Smart Devices (IIOT). These measurements are then processed by O&M Systems. The scenarios typically use an Operational Risk Management (ORM) System, which analyze the condition/operational data to generate diagnoses/prognoses and advisories, as an example due to its importance in performing Condition-Based Maintenance.

Background

The benefits of interoperability start to pay significant dividends when the near-real time decision support systems (such as ORM) begin to properly interact with the transaction processing-oriented business systems (such as EAM) based on data/information feeds from true real-time systems involved in monitoring and control. While it is fairly easy to show a hierarchy of data/information/knowledge on a PowerPoint slide, the nature of the use cases needs to be fully contemplated when the transforms are taking place as part of the systems interaction scenarios. This involves several categories of systems spanning three basic layers (real-time, near real-time and transaction processing) in the interoperability stack and they are normally provided by several communities of solutions providers, with multiple vendors in each community. Providing sustainable interoperability for all of these systems of systems is a critical focal-point for open standards-based interoperability.

This use case covers the acquisition of condition and operational data from the variety of data/information feeds spanning real-time, near real-time, and transaction-based processing and stemming from a variety of protocols and data formats. Traditionally, such data has been gathered from monitoring and control systems and associated data historians. However, the rise of the (Industrial) Internet of Things is shifting the way sensors and devices are integrated into complex systems. The integration of installed and portable/handheld IIoT devices is changing the way data is gathered, making it more accessible. Moreover, Smart Sensors/Devices are becoming available with the ability to perform local processing in support of edge computing, which further changes the nature of the acquisition of condition and operational data by interested systems. In the condition-based maintenance context, such Smart Devices can potentially perform (limited) condition monitoring and health assessments. In the future, it may become possible for such devices (individually or in small groups) to diagnose/prognose an asset and generate a maintenance advisory independently of the centralized, specialized systems currently available.

Scope

The scope of this use case is limited to the acquisition of condition and operational information from various sources (e.g., Control Systems, IIoT devices, Condition Monitoring Systems, etc.): it is not concerned with the analysis performed on the collected data.

This use case does not explicitly address any security concerns, particularly in relation to IIoT devices. It is assumed any necessary configuration, out-of-band exchange of security tokens, access controls, etc., has occurred prior to the execution of this use case.

Preconditions

This Use Case is predicated on Use Case 1, Use Case 4 (at least the provisioning of make/model information workflow), and Use Case 10 occurring prior so that O&M systems, chiefly the Control System (CONTROL), Condition Monitoring System (CMS), Operational Risk management System (ORM), and Maintenance Management System (MMS), are populated with functional location, equipment asset information with make/model information, and measurement location "tags".

Successful End Condition

Condition and/or Operational data has been published or otherwise made available to any interested O&M systems.

Actors

Business Actors

- Technician

System Actors

- Condition Monitoring System

- Control System

- IIoT Device(s)

- Other O&M systems

Triggers

There are no specific triggers as data acquisition is an ongoing process throughout the operation of a plant/facility/asset.

Main Success Scenario

The following is a simplified workflow of data acquisition intended to indicate the interoperability-based interactions with enterprise and automation systems within a general business process context. The process is illustrated using an Operational Risk Management (ORM) System as an example O&M system that may make use of condition and operational data from a variety of systems.
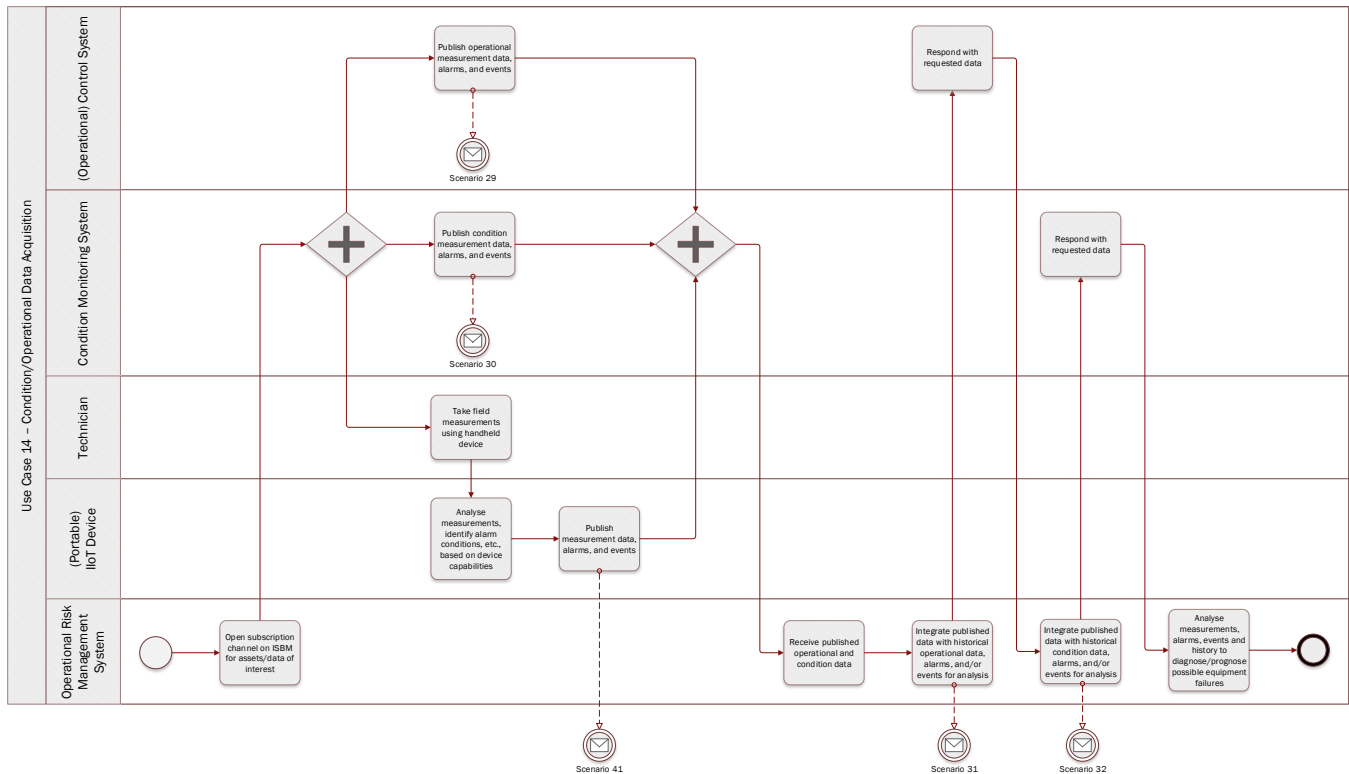
(Optional) **Open filtered subscription session**	The ORM (or any O&M system) can open a filtered subscription session on the ISBM to receive data of interest. Filters could be based on data type, serialized asset, functional location, measurement location, etc.
Publish measurement, alarm, and event data	The different sources of data, condition or operational, may publish whatever data they produce depending on their capabilities, including measurements, alarms, and events. Control Systems and Condition Monitoring Systems can typically produce a wide range of data, while that produced by IIoT Devices may be more limited.
Receive and aggregate published data	The ORM receives the published condition and operational data in which it expressed interest (if it opened a filtered ISBM session), aggregating with other data held in the system and otherwise initiating or incorporating it into any analyses the system performs.
Retrieve historical operational and condition data as required	The ORM may query other systems for historical condition and/or operational data based on its analytical needs.
Diagnose/prognose equipment failures and generate advisories	The ORM processes the received data to generate actionable Condition-Based Maintenance events, health assessments, advisories, and requests for work based on diagnoses/prognoses obtained from the data analysis.
	NOTE The ORM is only an example O&M system that utilizes the condition and operational data, other systems will perform whatever analyses and generate whatever outputs that are within their function and capabilities.

System Interoperability Scenarios

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- Scenario 41 – Publish Current Operational/Condition Data and Events from EDGE and IIOT to O&M (Placeholder)

- Scenario 42 – Pull Operational/Condition Data and Events from EDGE and IIOT to O&M (Placeholder)

Document Versioning

Version	Date	Major Changes
1.1	2020-12-08	Updated to use OpenO&M template
1.0	2019-02-06	Added new Use Case; splitting scenarios 29, 30, 31, 32 out of Use Case 7.