



# Electronic Information Environment (EIE) Project

## Maintenance History Service Operational Model For Canada-performed Maintenance

### EIE Project

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# 1 Overview

In the context of Performance-Based Contracting (PBC) Canada performs first line maintenance, and may perform second line maintenance. As such Canada will use Canada Maintenance Management System (CMMS) to record the maintenance activities.

The industry partner is responsible for defining and providing all of the required information that needs to be populated within CMMS. Industry is measured on the effectiveness of the maintenance regime and thus is interested in data collected that will enable industry to monitor and report serviceability of a fleet based on the maintenance data that is captured within CMMS.

The maintenance history operational information exchange model has been designed and implemented with awareness as to the use of the data and the immediacy needs for the data as well. The data that is gathered during the execution of maintenance is not immediately required to be consumed by industry partners who are fulfilling their mandates as per PBC.

A class of the data that is gathered during conduct of maintenance contributes to the measurement of the Performance Management aspect of the PBC program, while other slices of the data are required for industry to conduct its technical functions of Maintenance and Reliability of the platform.

## 1.1 *Intended Audience*

The intended audience for this business use case includes:

- Industry partners who require detail of their business service-level interactions, benefits, and obligations under PBC.
- Canada Program Management Offices implementing PBC.
- Solution Architects who will define a Business Service Model for the business service(s) described here.
- Functional Testers who will use the business use case to define test scenarios for Integration testing.
- Designers who will perform detailed design and unit test.

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## 1.2 References

- [Ref. 1]    a. Annex A: Maintenance Process Model - In the Context of In-Service Support Contracting Framework (ISSCF)
- b. Annex H: Army Maintenance Process Model - In the Context of In-Service Support Contracting Framework (ISSCF)
- c. Annex L: Navy Maintenance Process Model - In the Context of Performance Based Contracting (PBC)
- [Ref. 2]    Electronic Data Exchange (EDE) Service Interaction Model

Note1: Only applicable references will be made available to industry partner based on the adoption by the platform authority within Canada – DND, since not all references are applicable to all platforms/fleet

Note2: In order to determine the specific version of references included in here, the reader is advised to read the accompanying 'Release Notes' for the Maintenance business domain that accompanied the release of this document.

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## 2 Principles of data capture and subsequent exchange

The driving principles of data capture for exchange with industry are established based on the need for the data to support broadly the following categories of the Weapon System Program in the In-Service-Support (ISS) phase namely:

- Reliability and Maintainability of the Platform
- Configuration Management Requirements for the As-Maintained Configuration
- Performance Based Accountability (PBA)

Each of the above categories warrants data to be captured with various characteristics as per the discussion below.

### 2.1 Reliability and Maintainability

Reliability and Maintainability (R&M) looks at the data with a bias to engineering analysis and thus requires data with regards to measurement readings of various sub systems on the platform. As well as the structural changes that may result while conducting maintenance and other related aspects.

The data captured for this category is typically at the conclusion of maintenance significant activity and will be triggered based on system lifecycle for the specific business process and the associated event. An example of this type of Maintenance Data is, a Creation of Work Order results in all data that is present at the time of creation is captured such as: Task List, Material required to conduct the work order, etc.

The transfer of this data will occur using web services, which will react to business process system events that fall into a lifecycle that resembles the conclusion of the maintenance activity; e.g., completing a work Order and changing it status to be “Technically Complete”.

### 2.2 Configuration Management Requirement

A Configuration Management (CM) data requirement falls into a category of data as to what configuration item from a platform perspective is being modified or replaced.

The data captured as part of this group typically falls into a Maintenance Action that impacts the structure or configuration characteristics of the Weapon System (WS)/platform. An example of this type of maintenance action: A Maintenance technician recording the removal of a system/subsystem and installation of a replacement system/subsystem.

The data in this category can be captured and transmitted at the conclusion of all the maintenance actions and as such can be packaged and transmitted similar to the R&M model.

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The web services that are enabled for this type of data transfer will contain multiple business object types; for example a Work Order object with all of its sub object types as defined in the [Ref.1] and the timestamp associated with this data extract will be reflective of the timestamp when the data was extracted for all of the data.

### **2.3 Performance Based Accountability**

The third category of data for Performance Based Accountability (PBA) is sensitive to the specific event and time when the event has occurred. Hence, this data determines the posture of the maintenance activity and by extension the posture of the weapon system/platform.

The information capture model during the execution of maintenance in this category will have time component and additionally may be augmented with other context data with regards to the event.

The data will be made available to industry as observed and captured by CMMS, thus reflecting the specific data with fidelity required to support Performance Based Contracting (PBC)..

The data captured for this purpose will have discrete web services that are reflective of the business event type and data generated by the business event.

### 3 Constraints/Behaviours of the Data Exchange

1. Canada conducts first and possibly 2<sup>nd</sup> level maintenance based on the defined model as provided by industry partner who has assumed the responsibility for the In Service Support phase of the platform.
2. Canada's Maintenance Management System is used to conduct the maintenance.
3. Maintenance can be conducted in both an operational and non-operational capacity.
4. Maintenance data will be subject to operational authority policies as it relates to release of the data outside Canada Maintenance Management System.
5. Data may be subject to latency model that is commensurate with the type of data and the sensitivity as determined by the operational authority. Please see [Ref. 1 as applicable] for details.
6. The Weapon System Manager<sup>1</sup> (WSM) or equivalent organisation for the platform and ISS Contractor industry partners are required to work within the constraints of data being released as defined by operational authority for the data.
7. A predetermined release model will be published to industry partner who will be receiving the data.

#### 3.1 Data Processing Model In Support of Performance Profiling

1. As stated earlier the maintenance data captures some raw data that will be used to compute the performance profile of the program. As such the data that is used for computing the performance profile during any given period needs to be clearly reconciled between source and destination. The source which will typically be Canada and the destination where the performance algorithms are built which will be industry systems.
2. Canada's system will capture the required raw data during conduct of maintenance and make it available as per the agreed schedule to industry.
3. Industry will accept the data and process it into a state to be used by Performance Management System.
4. Industry will then notify Canada with the required unique identifiers for each record of data that it received from Canada and was able to process without errors.

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<sup>1</sup> For Navy, Class Program Manager (CPM) is the equivalent of WSM

5. Canada will use this information to close its maintenance history data transfer transactions to a state indicating that it has been accepted by industry.
6. At this point both industry and Canada have the exact same picture of the required maintenance data to contribute to the performance management component of the PBC program.
7. Industry now can perform its monthly, quarterly, and annual reporting functions against the data with a degree of confidence that all of the data that Canada had released was the data that was used. Canada has the same visibility as to what data was sent from Canada and was successfully received by industry and would be used for the specific reporting period.

### **3.2 Benefits**

Based on the model described above, a summary of benefits is listed below:

- a. A complete and accurate picture of the data being used is clearly established prior to the commencement of performance reporting
- b. Avoids inconsistency in interpretation of what data was used in arriving at the reported results
- c. Treats the data with a financial discipline since it is the ultimate outcome of the reporting that occurs for each reporting period.

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### **3.3 Responsibilities**

Based on the model described above, associated responsibilities that both Canada and Industry have to accept are listed below:

- a. Canada has to ensure that all qualified data is released to support performance reporting in a timely manner. Thus ensuring industry partner has sufficient processing windows to validate the raw data that was received.
- b. Industry needs to process the raw data to a state that it has gone through a preliminary business validation phase. Industry can then notify Canada via exposed acknowledgment services that it has processed the data that was received.
  - i. The specific time lapse between receipt of data and electronically notifying Canada will be jointly agreed by both Industry and Canada.
  - ii. The business acknowledgment lapse time should be reasonably short. Recommended window being 1 – 7 days. The upper limit of 7 days will ensure that all of the data that was released on the last day of reporting period month can be included as well.

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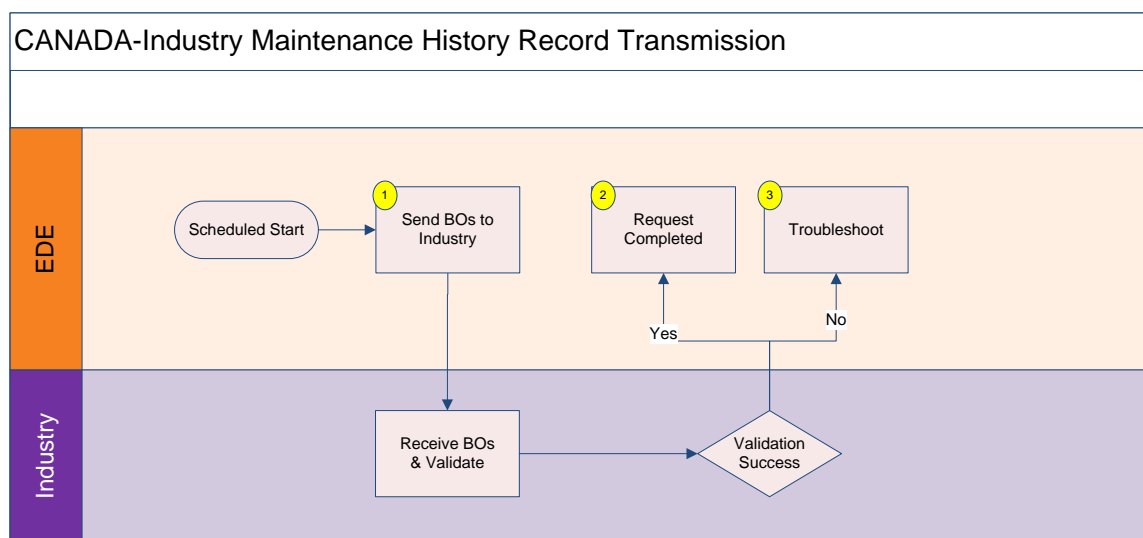
## 4 Maintenance History Service Execution Model

Maintenance History services will operate using a request/response model as defined in [Ref. 2].

Maintenance History services exposed by industry to Canada are invoked on a periodic basis which is based on a predetermined frequency.

### 4.1 Optimistic Model

The Figure 1 diagram illustrates the process under which Canada will transmit maintenance history records to Industry in an optimistic processing model.



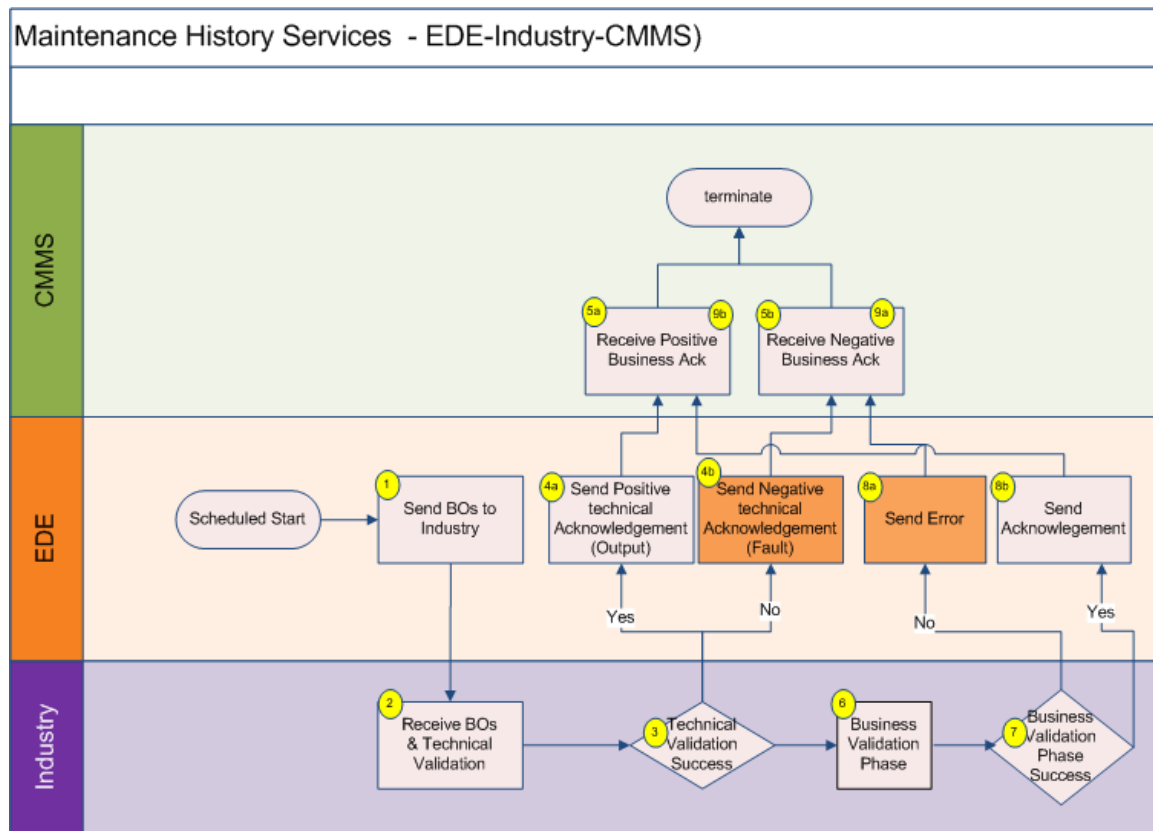
**Figure 1: Periodic Operational Model Maintenance History – Optimistic Model**

1. On a schedule negotiated with Industry, Canada will transmit maintenance history business objects (BOs) to industry's corresponding web services.
2. Industry validates the request and upon successful technical validation, sends back a positive Acknowledgement. After acknowledgement is received, Canada will mark the request as delivered.
3. Alternatively, industry validates the request and upon validation failure, sends back a negative Acknowledgement. After a negative acknowledgement is received, Canada will mark the request as a failure and initiates the required troubleshooting processes.

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## 4.2 Pessimistic Model

The Figure 2 diagram illustrates the process under which Canada will transmit maintenance history records to Industry in a pessimistic processing model.



**Figure 2: Periodic Operational Model Maintenance History – Pessimistic Model**

1. Canada invokes these services and dispatches all the maintenance history business objects (BOs) that have been designated by Canada for release to industry.
2. Industry receives the data and conducts basic technical compliance checking as defined in the [Ref.2] as the technical validation phase.
3. Industry sends a technical acknowledgement immediately after technical validation phase within the same technical conversation from a web services perspective (steps 3).
4. EDE accepts the technical acknowledgement and reports CMMS a successful technical delivery (4a & 5a); or

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5. EDE accepts the technical fault reported and reports CMMS an unsuccessful technical delivery (4b & 5b).
6. After some lapse of time Industry inducts the data into its system for the purpose of using the data to compute the Performance Metrics for the platform as well as other systems for R&M analysis (step 6).
7. Industry notifies Canada via the exposed acknowledgement service the successful processing of the data (step 7).
8. If the data fails business validation industry then reports to Canada via the exposed error service the nature of the failure (8a & 9a).
9. EDE notifies CMMS that that the data was successfully processed by industry (8b & 9b).
10. Canada will investigate the error reported and take the appropriate action to respond to the error.
11. Industry will exclude the erroneous data until appropriate remedial action is taken jointly by Canada and Industry.

The recommended model is the pessimistic model and is the preferred model that will ensure completeness of data across both Canada systems and Industry systems that have the same set of data for a specific period of time.



## 5 Definitions, Acronyms, Abbreviations

Term	Description
BO	Business Object
CM	Configuration Management
CMP	Class Program Manager
CMMS	Canada Maintenance Management System
DND	Department of National Defence
EDE	Electronic Data Exchange
ISS	In Service Support
ISSCF	In Service Support Contracting Framework
PBA	Performance Based Accountability
R&M	Reliability and Maintainability
WS	Weapon System
WSM	Weapon System Manager

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## 6 Document History

Revision Number	Description	Date
1.0	Baselined for release to Boeing	18 November, 2011
1.1	Added reference for latency	12 March, 2012
1.2	Added reference for Army Business Process Catalogue.	14 June, 2012
1.3	Specified the recommended delivery model	01 February, 2013
1.4	Removed PROTECTED-A markings from document and add proviso to page footer.	11 June 2013
1.5	Included Navy reference documents. Adapted to reflect PBC rather than ISSCF	30 September 2015

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