

# **Metrolinx Integration Report: Product Description**

MX-SEA-PD-133

Revision 00

Date: May 2023

# Integration Report: Product Description

MX-SEA-PD-133

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## Amendment Record

Revision	Date (DD/MM/YYYY)	Description of changes

# Preface

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This is the first edition of the Metrolinx Integration Report Product Description (MX-SEA-PD-133). It forms part of a suite of guidance documents that describe the procedures to be followed to comply with Metrolinx's Reliability, Availability, Maintainability and Safety (RAMS) requirements.

The purpose of this document is to describe the report that collects the results of the activities defined in the Integration Plan for the system under analysis. Project proponents may need to apply the process when they are undertaking a technical change to the railway system or modifying a maintenance regime or undertaking an operational change to the railway system.

Suggestions for revision or improvements can be sent to the Metrolinx Systems Engineering Assurance office at [Engineering.Assurance@metrolinx.com](mailto:Engineering.Assurance@metrolinx.com). The Director of the Systems Engineering Assurance office authorizes the changes. Include a description of the proposed change, background of the application and any other useful rationale or justification. Be sure to include your name, company affiliation (if applicable), e-mail address, and phone number.

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# Contents

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Documents.....	iv
Acronyms and Abbreviations.....	v
Definitions.....	vi
<b>1 Integration Report.....</b>	<b>1</b>
1.1 Purpose.....	1
1.2 Applicability.....	1
1.3 Supporting Materials.....	1
1.4 Products.....	1
1.5 Key Responsibilities.....	2
1.6 Competence.....	2
1.7 Structure.....	2
1.8 Contents.....	3
1.9 Quality Criteria.....	4
1.10 Document Management.....	4

# Tables

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Table 1 Supporting Documents.....	iv
Table 2 Acronyms and Abbreviations s.....	v
Table 3 Definitions.....	vi
Table 4: Document Phases.....	4

# Documents

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Table 1 Supporting Documents

Document Number	Document Title	Relation
BS EN 50126-1:2017	Railway Applications - The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) (PHASE 1: Adoption of European Standard EN 50126-1:2017)	Parent Standard
ISO 9001:2015	Quality management systems – Requirements	Supporting Standard
MX-SEA-STD-100	RAMS Process Standard	Related Standard
MX-SEA-GDC-133	Integration Report Guidance	Guidance
MX-SEA-TPL-133	Integration Report Template	Template
MXSD-SSA-L1-STD-0001	Railway Risk Assessment Standard	Supporting Standard
MX-SEA-TOR-001	Metrolinx System Review Panel (SRP) Terms of Reference (ToR)	Review Panel ToR
April 5, 2023	Metrolinx Safety Certification Committee (SSC) Terms of Reference (ToR)	Certification Committee ToR

# Acronyms and Abbreviations

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Table 2 Acronyms and Abbreviations

<b>Abbreviation</b>	<b>Full Name</b>
CTO	Consent To Operate
ISA	Independent Safety Assessor
RACI	Responsible, Accountable, Consulted and Informed
RAM	Reliability, Availability and Maintainability
RAMS	Reliability Availability Maintainability and Safety
SCC	Safety Certification Committee
SRP	System Review Panel

# Definitions

Table 3 Definitions

Term	Definition	Source
Asset owner	Groups and individuals that are responsible for asset ownership, asset maintenance, inventory management, document control, asset handover and reliability engineering	MX-ALM-STD-001
Availability	Ability of an item to be in a state to perform a required function under given conditions at a given instant of time or over a given time interval, assuming that the required external resources are provided.	BS EN 50126:2017
Integration	Process of assembling the elements of a system according to the architectural and design specification, and the testing of the integrated unit	BS EN 50126:2017
Maintainability	Ability to be retained in, or restored to, a state to perform as required, under given conditions of use and maintenance.	BS EN 50126:2017
Project Company	<p>The private sector entity which enters into the Project Agreement with Infrastructure Ontario and Lands Corporation and Metrolinx to design, build and where applicable, finance, operate or maintain a Project.</p> <p>The special-purpose entity which has entered into a Project Agreement with the Contracting Authority.</p>	CKH-QMA-FRM-003
Project Manager	<p>Appointed by Metrolinx as its representative and is responsible for the delivery of the Project within the prescribed Schedule and budget.</p> <p>Metrolinx employees fulfilling the role of the Project Manager may also be considered the Cost Centre Manager, if this person is also delegated signing authority in accordance with the Metrolinx Corporate Administrative Manual, Administrative Management, Approval Authorization Controls and Designations.</p> <p>It is noted that non-Metrolinx employees fulfilling the role of the Project Manager are not considered</p>	CKH-QMA-FRM-003

	Cost Centre Managers. In such cases refer to approved Project Chart of Accounts for the Program for the designated Cost Centre Manager.	
Reliability	Ability to perform as required, without failure, for a given time interval, under given conditions.	BS EN 50126:2017
Subsystem	Part of a system, which is itself a system	BS EN 50126:2017
System	Set of interrelated elements considered in a defined context as a whole and separated from their environment	BS EN 50126:2017

# 1 Integration Report

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## 1.1 Purpose

- 1.1.1 The purpose of the Integration Report is to collect the result of the activities defined in the Integration Plan for the system under analysis.
- 1.1.2 The overall objective of the Integration Report is to provide assurance that the equipment meets its integration requirements. This is achieved through demonstration that all the assessment activities (e.g. tests, analyses, reviews) defined in the Integration Plan have been successfully passed.
- 1.1.3 The purpose of the Integration Report is therefore to:
  - a) demonstrate that integrated system, subsystems, and components work together
  - b) list all open issues identified and the actions to be completed to ensure the safety and correct functional behaviour of the integrated system; and
  - c) provide a final statement of the success of the system integration
- 1.1.4 In case the system under analysis does not achieve the integration requirements, the results of the integration activities and analyses shall be fed back into the design process to ensure that the system is improved and that any threats to safety or performance are addressed.

## 1.2 Applicability

- 1.2.1 This product is mandatory for any project that undertakes a technical change to the railway system (i.e. introduction of a new subsystem, renewal of an existing subsystem, a modification to an existing subsystem, or introduction of a new or modified maintenance regime) or undertakes an operational change to the railway system.
- 1.2.2 This product is not applicable for established routine maintenance activities including like-for-like replacement of components.
- 1.2.3 This product is considered good practice when developing or modifying any complex system.

## 1.3 Supporting Materials

- 1.3.1 The Integration Report template is located in MX-SEA-TPL-133.
- 1.3.2 Guidance on completing the Integration Report is located in MX-SEA-GDC-133.

## 1.4 Products

- 1.4.1 The Integration Report is a product of the System Assurance process. Guidance on this process is available via MX-SEA-STD-100.

## 1.5 Key Responsibilities

- 1.5.1 The Project Company is the organization responsible for the contracted scope of work at the time of development.
- 1.5.2 The Project Company is responsible for the production of the Integration Report. Preparation of the Integration Report may be delegated, however the Project Company is responsible for its content and quality.
- 1.5.3 The System Review Panel (SRP) has delegated authority from the Safety Certification Committee (SCC) and is responsible for endorsing the Integration Report. The System Review Panel ensures that the Integration Report is compliant with the project requirements, applicable legislation, and national, industry, and Metrolinx standards. The SRP may also identify uncertainties, issues, and assumptions that may arise as the project progresses that should be addressed.
- 1.5.4 The Project Management may be performed by Metrolinx or may be contracted, for example in a Design/Build, whereby Metrolinx Project Management would ensure contract provisions for Integration Report are met and would not develop the Integration Report.
- 1.5.5 Some of the Asset Owner obligations and responsibilities may be transferred through contracting, whereby the contract contains Reliability, Availability and Maintainability (RAM) and operating requirements. The Metrolinx Asset Owner would participate in endorsing the Integration Report whereas a contracted party responsible for RAM would develop the Integration Report as directed by the Project Management.
- 1.5.6 The full Responsible, Accountable, Consulted, and Informed (RACI) information that sets out the interaction between all stakeholders involved in the production and endorsement of the Integration Report is available in MX-SEA-STD-100.

## 1.6 Competence

- 1.6.1 The Integration Report shall be completed by personnel with knowledge of safety management systems and the technical, organizational and operational aspects of the project, with a clear understanding of project integration.

## 1.7 Structure

- 1.7.1 The structure of the Integration Report is described in the Integration Report Guidance document located in MX-SEA-GDC-133.
- 1.7.2 The document requires the following section titles:
  - a) Introduction;
  - b) System Description;
  - c) Integration Process and Activities;
  - d) Integration Results;
  - e) Change Management;

- f) Caveats, Assumptions and Limitations;
- g) Outstanding Actions;
- h) Application Conditions; and
- i) Conclusions

## 1.8 Contents

1.8.1 The contents of the Integration Report are described in the Integration Report Guidance document located in MX-SEA-GDC-133.

1.8.2 As a minimum, it shall contain the following:

- a) Summary of the integration process and activities
- b) The results of each integration activity including
  - 1) Description of integration activity include equipment/interface being tested
  - 2) The status of the test (Pass, Fail, incomplete, or invalid)
  - 3) The safety and functionality impact of integration tests that were not passed
  - 4) Any nonconformances encountered during the test, including failures, procedure deviations, repeated integration activities, and a reference to non-conformance reports
  - 5) Detailed test information including the test author, time of testing, test environment, system configuration , software versions, pre-conditions for the test and pass/fail criteria or reference to a test record containing the information.
  - 6) The system or subsystem requirement(s) being analyzed/tested.
  - 7) Relevant caveats/assumptions/limitations
- c) References to additional reports if the scope of the Integration Reports were divided into multiple documents.
- d) a description of any temporary and permanent modifications to the system and supporting configuration management activities performed including their status.
- e) a list the application conditions for future lifecycle phases including a description of the condition, relevant equipment/interface, owner, status, impact if not fulfilled, any associated caveats/assumptions/limitations and any associated system or subsystem requirements
- f) a list of all non-conformances including:
  - 1) The status of the non-conformance
  - 2) the actions to resolve the non-conformance
  - 3) the status of the actions
  - 4) impact of the outstanding action if unfulfilled

- g) a statement on the system readiness to proceed to commissioning;
- h) statement about the safety and functional behaviour of the integrated system;
- i) the outstanding integration actions and their impact on integration;

## 1.9 Quality Criteria

- 1.9.1 The Integration Report shall have sufficient detail to summarize the results of integration activities and confirm that the delivered system is fit for service or has outstanding actions. It shall provide a clear statement on the system readiness for all actors responsible for the Consent To Operate (CTO) gate to consider.
- 1.9.2 The quality management system used shall conform to ISO 9001:2015 rules or equivalent rules accepted by the Metrolinx Project Delivery Team and be appropriate for the system under consideration.

## 1.10 Document Management

- 1.10.1 The Integration Report shall be produced at Phase 8 (Integration) and is a requirement for the CTO gate.
- 1.10.2 Table 4 provides an overview of the Integration Report document phases.

Document	Phase
Integration Report	8 - Integration

TABLE 4: DOCUMENT PHASES