

IFC Rail Project

Storyline (SL) Validation Report

Phase 2 Final Storyline (SL) Validation Report (including all Storyline Implementation Reports)



SL-P2VR-PMO

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Date: 2022.03.11
Leader: Guy Pagnier
ID: SL-P2VR-PMO
Stakeholder: bSi

1 Introduction

This document is built to summarize the objectives and scope, storyline selected by the stakeholders, process and methodology, organization, deliverables breakdown or background, test team conclusion and stakeholder satisfaction and results of storyline through the 11 storyline tests carried out by the stakeholder test leaders. This storyline validation report as well as the 11 storyline implementation reports are part of WP2 of IFC Rail Phase 2 project as shown below.

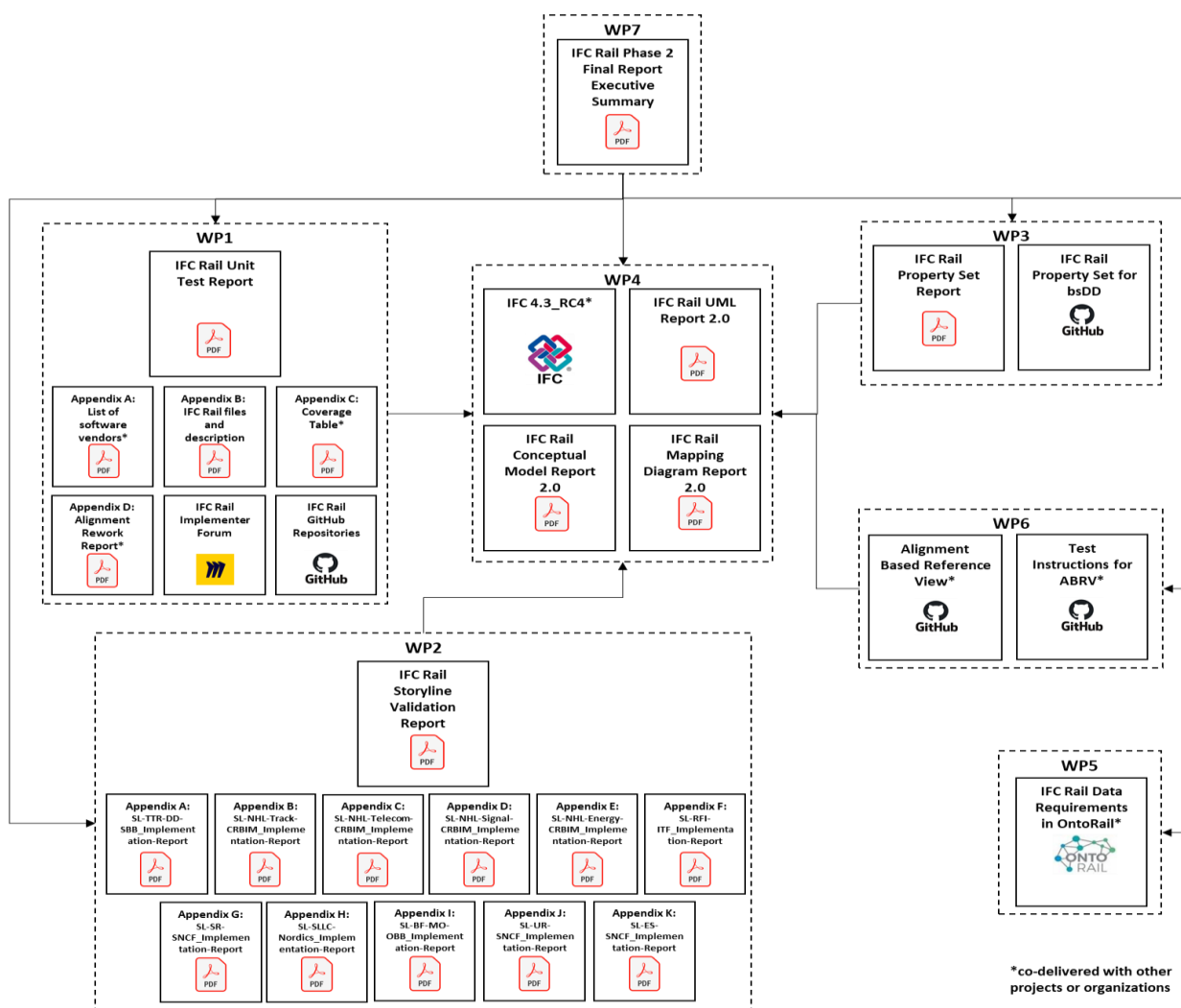


Figure 1 The position of this document in the structure of IFC Rail Phase 2 deliverables

This document reports the work of implementing the IFC 4.3 in stakeholder business-oriented storylines through dedicated railway Unit Tests managed and developed by IFC Rail project. These Storyline Tests based on project phases, use cases and rail domains were designed to make sure that IFC 4.3 is a valid standard that can be implemented and will be correctly implemented by software vendors to meet the railway project

required by all stakeholders. This document introduces the storylines overview, demonstrate all subject coverage and reports the objectives (Chapter 2), storylines selected by stakeholders (Chapter 3), process and methodology (Chapter 4), organization and test teams (Chapter 5), storyline documentation and deliverable breakdown (Chapters 6 and 7) and test team conclusion and stakeholder satisfaction (Chapter 8). All the 11-storyline works are detailed in the 11 appendices: one “storyline implementation report” per storyline team.

2 Storyline Objectives and Scope

Storyline test objectives were to focus around these 4 axes (shown in Figure 2):

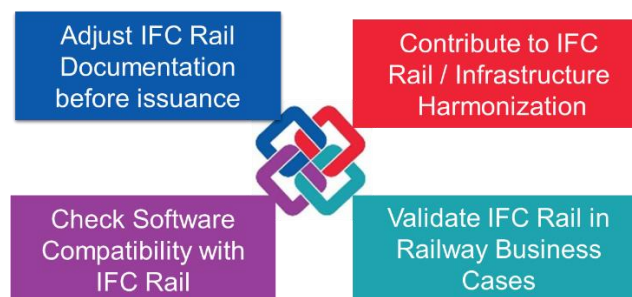


Figure 2 IFC Rail objectives for storyline tests

This document will present and detail the activities linked to the storylines.

Indeed, the IFC Rail Project stakeholders were looking in IFC Rail Phase 2 to test the IFCs in real railway conditions with business-oriented storylines. Each of them identified the storyline more adequate with their requirements and agreed to develop them with in-kind resources and provided project datasets.

The objectives were to:

- demonstrate, it will satisfy their end-users, i.e., track, energy, signalling and telecom engineers,
- combine unit tests (UT) implementation works in a real-world project configuration,
- involve software vendors (SWV) into railway network requirements through their storyline,
- integrate, when possible, infra domains with rail domains and harmonize data requirements and property sets.

The Phase 2 organization to succeed was as follows:

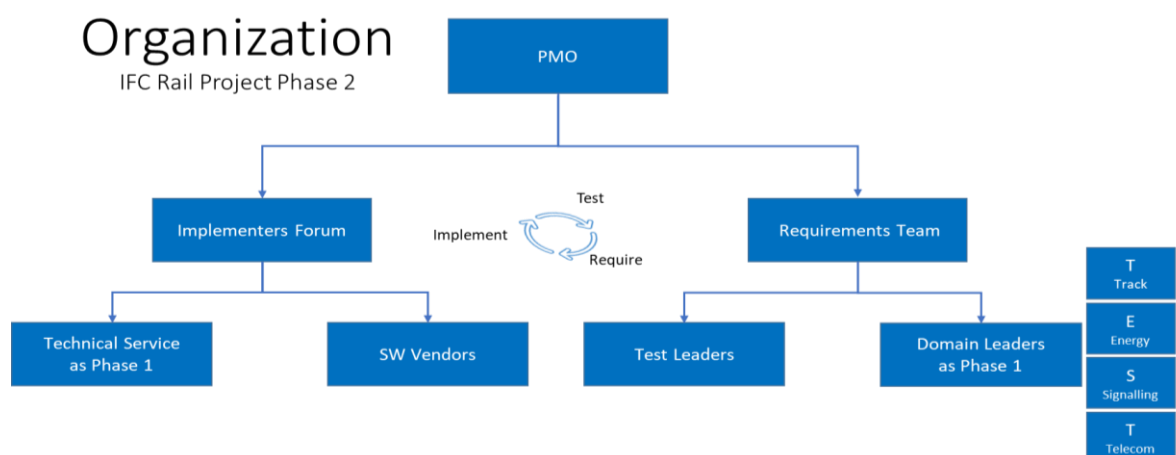


Figure 3 Phase 2 organization

3 Storyline Description

In the following table, the selected projects for each storyline agreed with the stakeholder are listed:

Country	Stakeholder	Storyline Title	Business-oriented Storyline Project
Austria	ÖBB	BIM2Field2BIM	Tamping works on ÖBB+FTIA+SBB+SNCF Railway Lines
China	CRBIM	New High Speed Line (HSL): Track	Jakarta-Bandung Jakarta-Bandung
China	CRBIM	New High Speed Line (HSL): Energy	Xi'an to Shiyao High-Speed Railway Line
China	CRBIM	New High Speed Line (HSL): Signaling	Lu-nan High-Speed Railway Line
China	CRBIM	New High Speed Line (HSL): Telecom	Wuhan-Xiangyang-Shiyao High-Speed Railway Line
Finland, Sweden, Norway, Denmark	TFIA, Trafikverket, Bane NOR, Banedanmark	Level Crossing	Existing Level Crossing Modernization
France	SNCF / MINnD	Subgrade Renewal	Charles de Gaulle Airport to Paris Gare de l'Est Railway Liaison
France	MINnD	Urban Railway infra-System Integration	New Urban Railway Project in France
France	SNCF	European Rail Traffic Management System (ERTMS)	Cannes-Grasse Railway Line
Italy	RFI	Acquisition and upgrade of an existing railway line	Cancello – Benevento Railway Line
Switzerland	SBB	Track Turnout Renewal	Track Renewal (FbE) 20, Basel GB Gl. Z19-Z21, W 895, 897

Figure 4 Stakeholder projects selected for IFC Rail storylines

In order to satisfy stakeholders, it was necessary to cover all the rail domains (if possible, with some infrastructure domains), some of the agreed use cases, one project phase and be in accordance to railway networks activities such as the construction works (new, renewal or modernization/upgrade) or the railway line types (conventional or high-speed line - HSL).

Each stakeholder named a “test leader” from its company. She/he was responsible for completing the test in time and organized them with technical and rail domain experts as well as the interested software vendors.

All the test leaders were in charge of managing storyline tests after determining which exchange scenario and unit tests they wanted to carry out according to the rail domains, the project phase and the use cases. Tests were carried out as per the test implementation methodology defined at the beginning of IFC Rail Phase 2 by the PMO team.

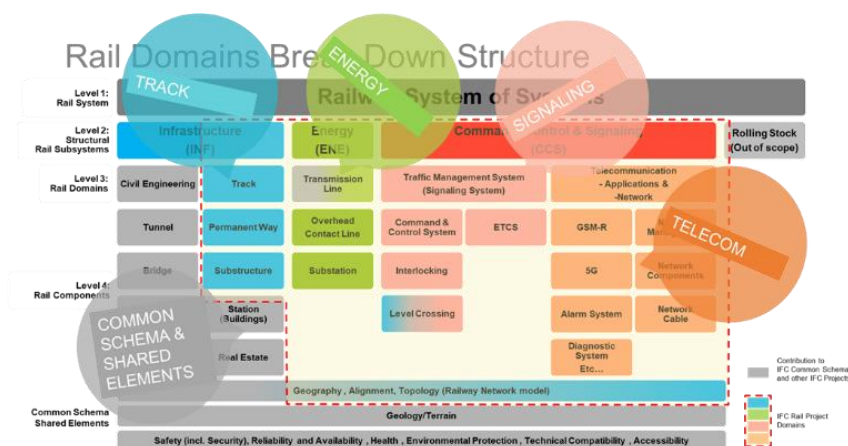


Figure 5 Rail domains breakdown structure

		Domains					
		Alignment	Track	Energy	Signaling	Telecom	Infra: Earthworks, Geotechnic, Drainage, Bridge, Tunnel, Road, Utilities, Railway station(rs), Subgrade, Building rooms (br), Station Yard (sy)
SBB	Track Turnout Renewal	X	X				
CRBIM	New High Speed Line (HSL): Track	X	X				EB
CRBIM	New High Speed Line (HSL): Energy	X	X	X	X		rsBSbr
CRBIM	New High Speed Line (HSL): Signaling	X	X		X		sySbr
CRBIM	New High Speed Line (HSL): Telecom	X	X	X		X	br
RFI	Acquisition and upgrade of an existing railway line	X	X	X	X	X	BT
SNCF / MINnD	Subgrade Renewal	X	X				EGD
Nordics	Level Crossing	X			X		R
ÖBB	BIM2Field2BIM	X	X				
MINnD	Urban Railway infra-System Integration	X	X	X	X	X	RBDU
SNCF	European Rail Traffic Management System (ERTMS)			-	X	X	

Figure 6 Selected domains for each storyline

Each test leader has chosen the uses cases within the ones agreed during the Dusseldorf bSI Summit and detailed in the “Requirement Analysis Report”:

- ECM: Existing condition modelling,
- RDDM: Railway detailed design modelling,
- ICM: Interference & coordination management,
- 3DV: 3D Visualization,
- SVC: Signal visibility checking,
- QTO: Quantity take off,
- INMP: Information needed for maintenance perspective (part of handover – build phase).

		Use cases					
		ECM Existing Condition Modelling	RDM Railway Design Modelling	ICM Interference and Coordination Management	3DV 3D Visualization	QTO Quantity Take-Off	INMP Information Needed for Maintenance Perspective
SBB	Track Turnout Renewal	X	X		X	X	
CRBIM	New High Speed Line (HSL): Track	X	X		X	X	
CRBIM	New High Speed Line (HSL): Energy		X	X	X	X	
CRBIM	New High Speed Line (HSL): Signaling		X	X	X	X	
CRBIM	New High Speed Line (HSL): Telecom		X	X	X	X	
RFI	Acquisition and upgrade of an existing railway line	X			X	X	
SNCF / MINnD	Subgrade Renewal		X				
Nordics	Level Crossing	X	X	X	X	X	
ÖBB	BIM2Field2BIM						X
MINnD	Urban Railway infra-System Integration	X	X	X	X		
SNCF	European Rail Traffic Management System (ERTMS)	X	X	X	X		

Figure 7 Selected use cases for each storyline

The project phases are based on the “IFC Rail Reference Process Map” also known as “High-Level Reference Process Map” (HLRP) defined in the “Requirement Analysis Report” produced in Phase 1:

- PL – Planning,
- ID - Intermediate design,
- DD - Detailed design,
- Build,
- Operation & maintenance,
- Dismiss.

		Phases				
		Planning	Intermediate Design	Detailed Design	Build	Operation & Maintenance
SBB	Track Turnout Renewal			X		
CRBIM	New High Speed Line (HSL): Track			X		
CRBIM	New High Speed Line (HSL): Energy			X		
CRBIM	New High Speed Line (HSL): Signaling			X		
CRBIM	New High Speed Line (HSL): Telecom			X		
RFI	Acquisition and upgrade of an existing railway line	X				X
SNCF / MINnD	Subgrade Renewal			X		
Nordics	Level Crossing			X		
ÖBB	BIM2Field2BIM				X	X
MINnD	Urban Railway infra-System Integration		X	X		
SNCF	European Rail Traffic Management System (ERTMS)			X		

Figure 8 Selected project phase for each storyline

According to the major railway activities in each country, stakeholders decided to orientate the project storyline on either new construction works or renewal or upgrade line construction works as shown below.

		Project Types		
		New Construction	Renewal	Modernization / Upgrade
SBB	Track Turnout Renewal		X	
CRBIM	New High Speed Line (HSL): Track	X		
CRBIM	New High Speed Line (HSL): Energy	X		
CRBIM	New High Speed Line (HSL): Signaling	X		
CRBIM	New High Speed Line (HSL): Telecom	X		
RFI	Acquisition and upgrade of an existing railway line			X
SNCF / MINnD	Subgrade Renewal		X	
Nordics	Level Crossing			X
ÖBB	BIM2Field2BIM		X	
MINnD	Urban Railway infra-System Integration	X		
SNCF	European Rail Traffic Management System (ERTMS)			X

Figure 9 Selected project types for each storyline

Storyline

IFC Rail Project Phase 2 Proposal



Figure 10 Example of storyline construction types

4 Storyline Realization Process and Methodology

At the beginning of Phase 2, the following IFC Rail validation process (V process) was presented for implementation works.

V Cycle for Railway IFC Rail Implementation

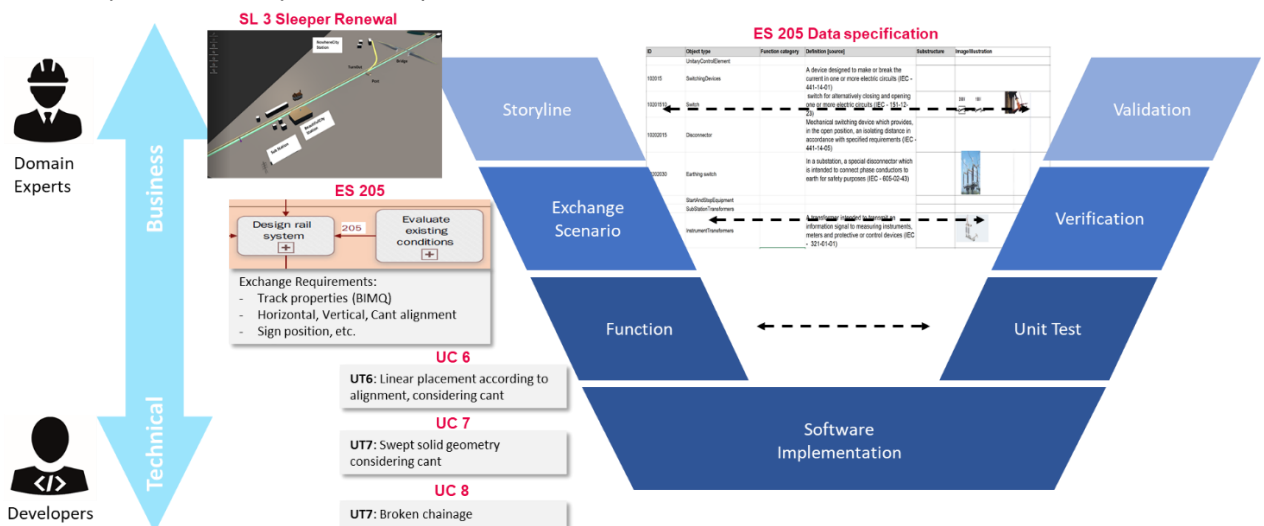


Figure 11 V cycle for Railway IFC Rail implementation

All the unit tests are presented in a specific report and all storyline tests (Exchange Scenario Tests) according to domains and use cases are presented for each storyline in the appendices of this documents.

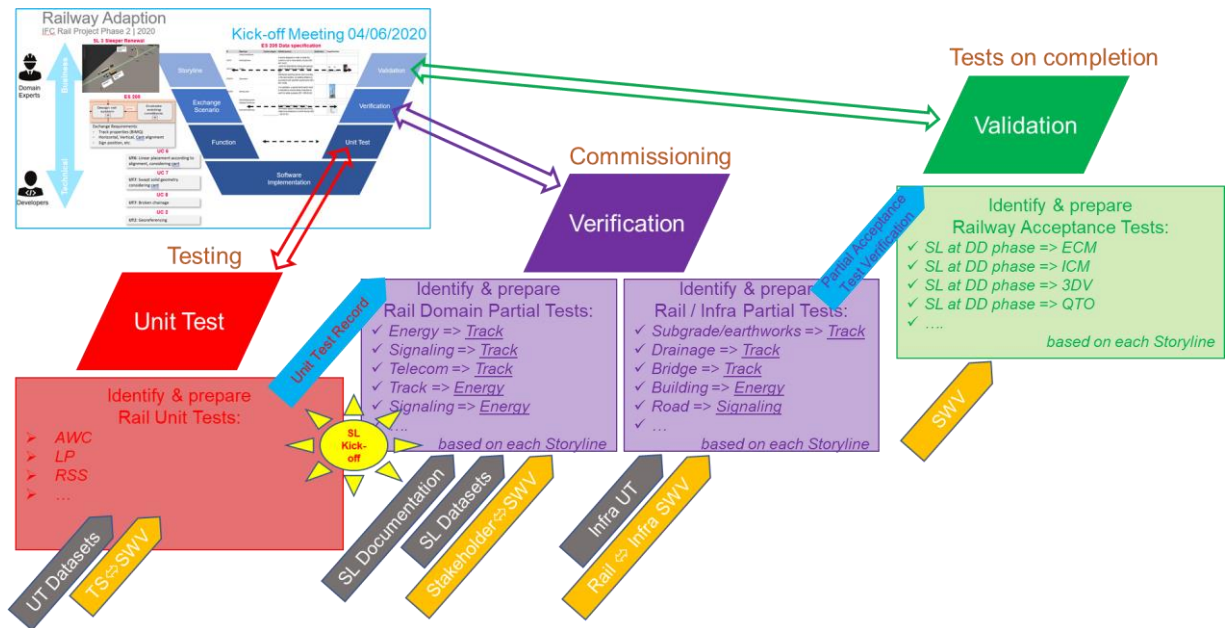


Figure 12 IFC Rail Testing Process

All details and results for each storyline are provided in a “Storyline (SL) Implementation Report” produced by each test Leader and presented in the appendices. They described their organization, their contribution to the implementers forum and the test teams, how the tests were carried out and the synthesis of the results as well as the Test team satisfaction, where the data are archived and the details of their progress, issued documents, etc..

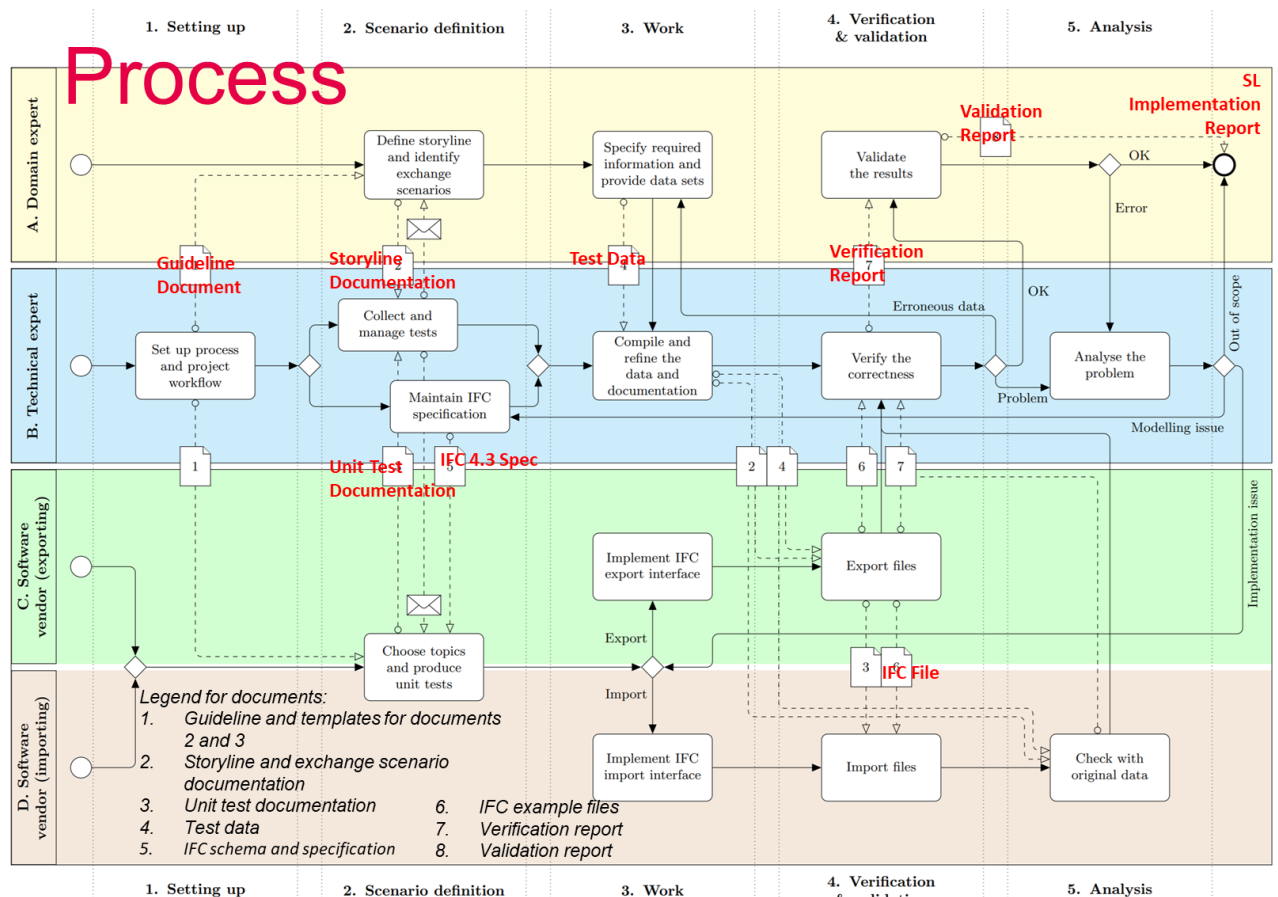


Figure 13 Storyline test process

In order to follow the progress of storylines, share experience and feedbacks, test leaders meetings were organized by PMO every week as well as some specific reviews according to the Project progress. Various presentations have been produced and are archived in box.

The implementers forum was the place to share, exchange details on unit tests and storyline tests works between the software Vendors, the technical experts and test leaders.

Every month, a domain leaders meeting was organized to share and exchange information related to test progress and rail domain activities (rail domain modifications such as for property sets) and inform the rail domain leaders on the IFC Rail Project Phase 2 progress. They were thus able to cascade information to all domain experts working in the various storylines.

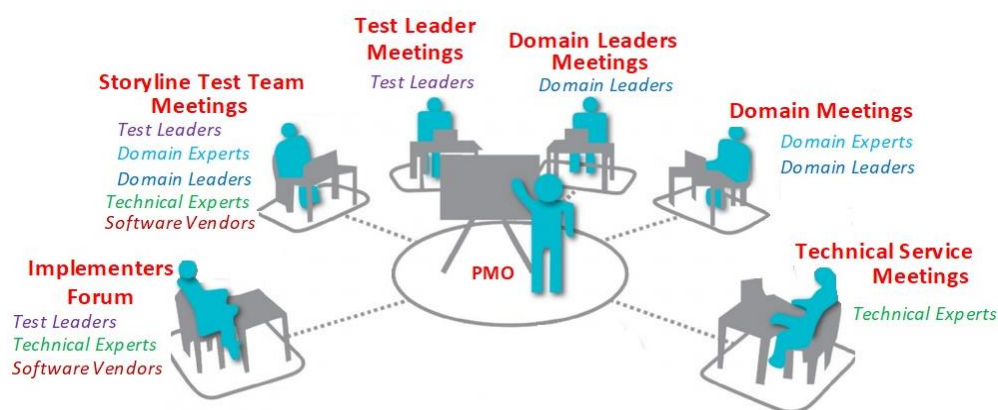


Figure 14 Storyline implementation meetings

To maintain an international work, each stakeholder according to its interest, could participate to all storylines as shown below:

Storyline	Stakeholders					
	Austria	China	Italy	Nordics	France	Switzerland
BIM2Field2BIM OEBB	TL			C	C	C
New HSL Track CRBIM		TL				
New HSL Energy CRBIM		TL				
New HSL Signaling CRBIM		TL	C			
New HSL Telecom CRBIM		TL			C	
Level Crossing Nordics			C	TL		
Substructure Renewal SNCF			C		TL	C
Infra-System integration MINnD			C		TL	C
ERTMS SNCF		C	C		TL	
Acquisition / upgrade line RFI			TL		C	C
Track Renewal SBB					C	TL

TL=Test leaders C=Contribution

Figure 15 Stakeholder contribution in storylines

5 Storyline Test Teams

In the following tables, all in-kind resources involved were provided by each stakeholder. Each storyline defined by each stakeholder, had a dedicated test team constituted of:

- one test leader,
- one technical expert (in relation to the technical service group),
- several rail domain experts
(according to the storyline scope and in relation with rail domain co-leaders of phase 1),
- Infra domain experts when infra is part of the storyline, and
- Software vendors.

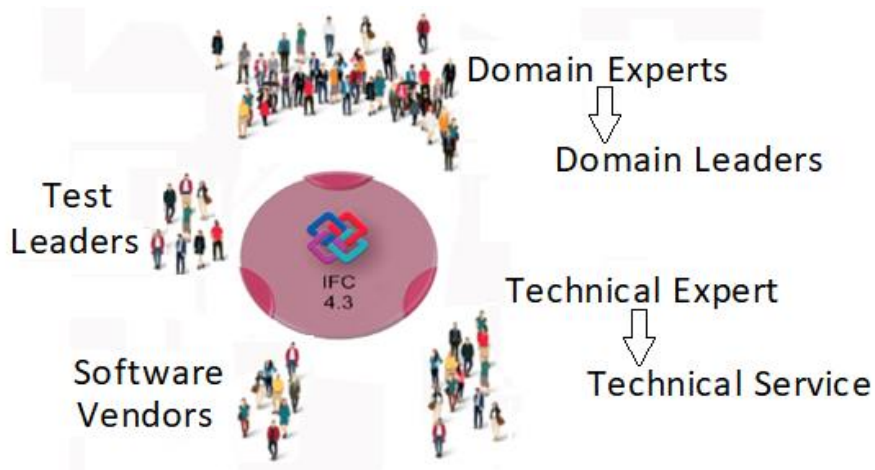


Figure 16 Storyline test team structure

Activities Storyline	Test Leaders	Technical Expert	Track	Energy	Signaling	Telecom	CS/SE	Infra
Leader	Guy PAGNIER	Chi ZHANG	Yan FENG + Ali TATAR	Guang JIN + Judicael DEHOTIN	Huaisong WANG + Domenico FRAIOLI	Lihai LIU + Mourad BOUTROS	FeiFei ZHAO + Guy PAGNIER	na
Track Renewal SBB	Ali TATAR	Claude MASCHAL	SIMON-NGUYEN Cedric + Heidi CASTELLANOS LEYRA	na	na	na	na	na
New HSL Track CRBIM	Feng YAN	Feng YAN	Feng YAN + Yang XUCHUN + Su NING + Kong GUOLIANG + Mao NING + Wang KAIJUN + Zhang JIAN + Yao YIMING	na	na	na	FeiFei ZHAO	Liu XAOLONG + Zhang CHEN + Liu SIMING + Zhang JUNDA + Yao FENG FENG + Zhu QINGQING
New HSL Telecom CRBIM	Lihai LIU + Qing ZHONG	Qing ZHONG + Ping CHEN	Wan MA	Xiao GENG	na	Lihai LIU + Qing ZHONG + Min LI + Jieyun ZHOU + Sai DAI + Chao CUI	na	Xianbao PENG + Zechang SUN + Yueyue ZHAO + Xiechang ZHANG + Chi CHEN
New HSL Signaling CRBIM	WANG Huaisong	WANG Huaisong	NA	NA	CRBIM: WANG Xuelin + WANG Yong + WANG Huaisong + XU Yue + WANG Lin + YANG Xuli RFI: Domenico FRAIOLI + Daniel PUGLISI + Caterina VARRIALE and Roberto MERLO	NA	LIU Houqiang + WU Danqi	LIU Houqiang + WU Danqi
New HSL Energy CRBIM	Jin Guang	Jin Guang + Jin Song	Zhang Gaoyang	Jin Guang + Huang Wenxun + Zhao Le + Jin Song + Liang Chongliang	Liu Xiaoqi	NA	Liu Yangming	Li Zongjian + Jin Meng + Wang Jing + Wei Fanghua
Acquisition / upgrade line RFI	Palma ZAIRA LATERZA	Evandro ALFIERI	Federica Di GIUSTINO (RFI) + D'ALO' Annamaria (RFI) + CASULA Stefano (ITF) + PIANESI Mirko (ITF)	IACOMELLI Alessio (RFI) + BAPST Cedric (SBB) + Grégory OKONSKI (COLAS Rail) + VERGARI Daniele (ITF) + LANNAIOLI Marco (RFI)	COLANGIULO Giovanni (RFI) + CRITOFORI Enrico (RFI)	CARPINTERI Claudio (RFI) + GUGLIELMI Giovanni (RFI) + CORTELLESA Davide (RFI) + AIELLO Nello (RFI)	EBNER Stefano + DI MELLA Antonella + MASSARI Filippo + NARINO Gabriel	Mirko PIANESI (ITF) + Stefano CASULA (ITF) + Antonella DI MELLA (RFI) + Annamaria D'ALO' (RFI)
Substructure Renewal SNCF	Alan BROOK-DIAZ + Romaric BOUDOU	Florian HULIN	SIMON-NGUYEN Cedric	na	na	na	RAMBALDI Ivano (RFI) + Marc PINGOUD (SBB)	Christophe BLANCHET (MinNdRoad) + SALERNO Davide (RFI) + LASAPONARA Francesco (RFI-hydra) + Lonis COLLOT (SNCF)
Level Crossing Nordics	Marion SCHENKWEIN + Peter AXELSSON	Lars WIKSTRÖM	na	na	Vesa Ruohomäki FTIA & others	na	RFI (support): EBNER Stefano + NARINO Gabriel + RAMBALDI Ivano	Road Substructure?
BIM2Field2BIM OEBB	Agnes SCHÖPP	Andreas PINZENÖHLER	SIMON-NGUYEN Cedric + Marion SCHENKWEIN + Marc PINGOUD	na	na	na	na	na
Urban Railway Infra-System integration MINnD	Vincent KELLER	Matthieu PERIN + Sylvain MARIE	Thomas DEGUIBERT (MINnD/COLAS RAIL) + Mirko PIANESI (ITALFERR)	Grégory OKONSKI (MINnD/COLAS RAIL) + Daniele VERGANI (ITALFERR) + Alessandro GIUSEPPONE (ITALFERR)	Adressed by CSSE (signs visibility)	Adressed by CSSE (cabling)	Vincent KELLER (MINnD/EGIS) + Erik GARDON (MINnD/COLAS RAIL) + Philipp AMMON (SBB) + Giovanni SORRENTINO (RFI)	Bridge : Pierre BENNING (MINnD/Bouygues) + Road : Charles-Edouard TOLMER (MINnD/Eurovia) + Tunnel : Michel RIVES (MINnD/Vianova) + Geotechnics : Mickaël BEAUFILS (MINnD/BRGM tbc)
ERTMS SNCF	Achraf DSOU	Florian HULIN + MP/SM?	na	Judicael DEHOTIN (SNCF) + Marco LANNAIOLI (RFI)	Liliane BAS + Gael FRANQUET + Gaetan MARTON + Franco TOMASSONI + Christophe HEDE + Ludovic AUBRY + Loic City MENDES (All SNCF)	Sondés KAROUÏ + Stéphane GUILLEMAUT + Achraf DSOU (All SNCF) + Giovanni GUGLIELMI (RFI) + Nello AIELLO (RFI) + Davide CORTELLESA (RFI)	Edouard CHABANIER (SNCF)	Ludovic AUBRY + Loic City MENDES (All SNCF)

Figure 17 Test team per storyline

6 Storyline Documentation for tests

The documentation for storyline issued last July 2020 is describing storyline tests planned to be realized.

Such documentation presents the storyline [overview and meta- information of the storyline] with:

- forecasted test team, short description, project phases, use cases, domains (track, signalling, energy, telecom, alignment, etc.), detailed description and exchange scenario process planned for the storyline, in-or-out of scope,
- dedicated and particular process map for the storyline defining realistic exchange scenarios between software applications; reference to general processes defined in the “IFC Rail Requirements Analysis Report” chapter 2: “IFC Rail Reference Process Map”, aka. “High-level Reference Process Map (HLRP)”.

Each selected exchange scenario (ES) have been codified and described with their relation to:

- Geometry and positioning requirements [general description / concepts],
- Spatial requirements [general description of spatial element requirements],
- Physical and functional requirements [general description of physical elements, functional elements and important information],
- Covered unit test [covered unit test concepts].

The “IFC Rail Storyline Documentation” as shown hereafter was published in July 2020. It includes all the “IFC Rail Project Storyline (SL) Documentation” produced by the test leaders for each storyline.

Storyline Documentation

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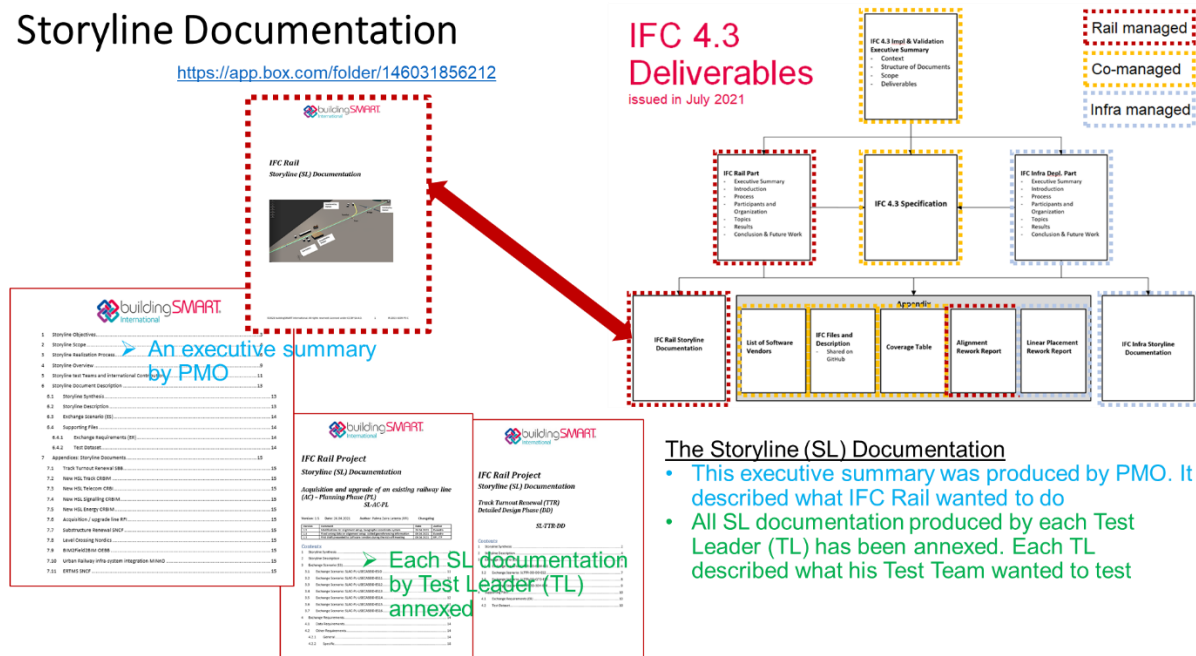
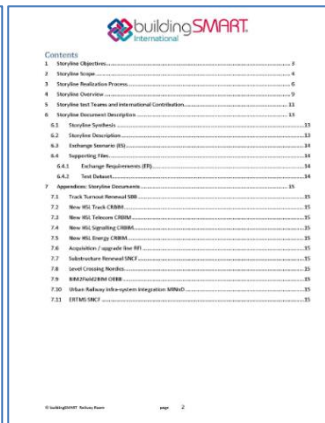
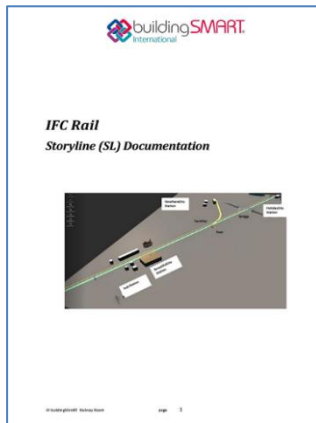
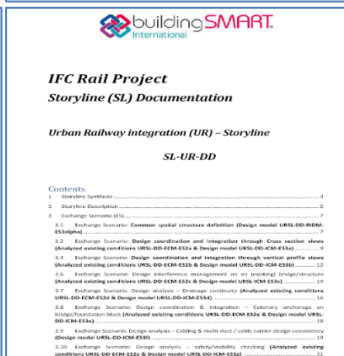
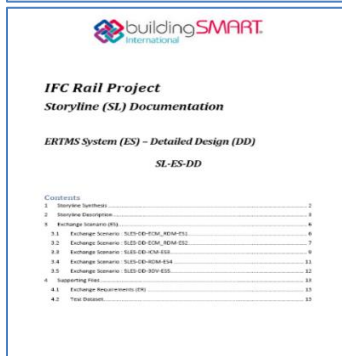
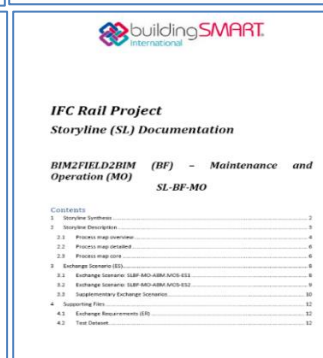
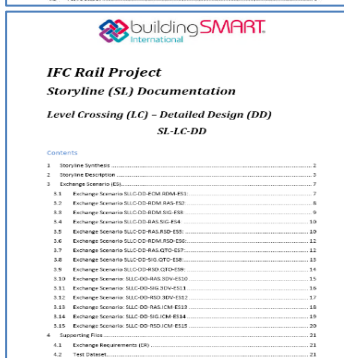
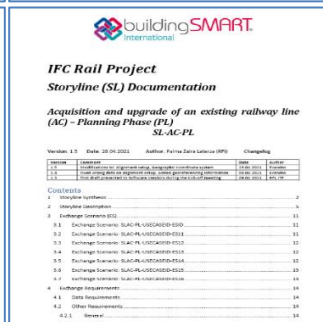
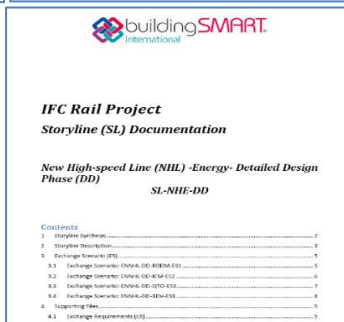
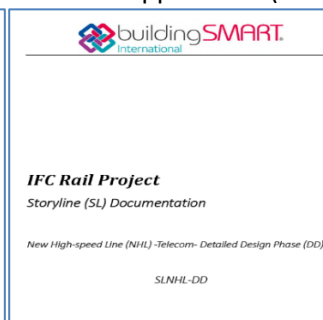
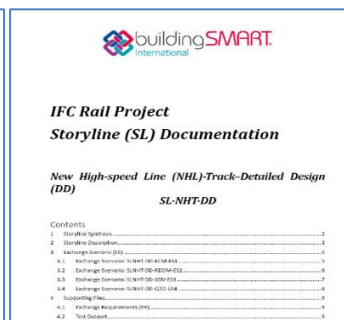
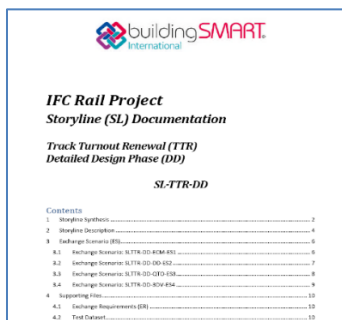


Figure 18 Storyline documentation for Test description, part of IFC 4.3 deliverables



and all the appendices (one per storyline)



7 Storyline Validation and Implementation Reports

The Storyline (SL) Validation Report is an executive summary produced by PMO and contains overall Project analysis and details all storylines. It describes the agreed process and methodology used for testing.

The Storyline (SL) Validation Report contains all the Storyline Implementation Report produced by each Test Leader and her/his Team. Their works are described in each Storyline Implementation Report.

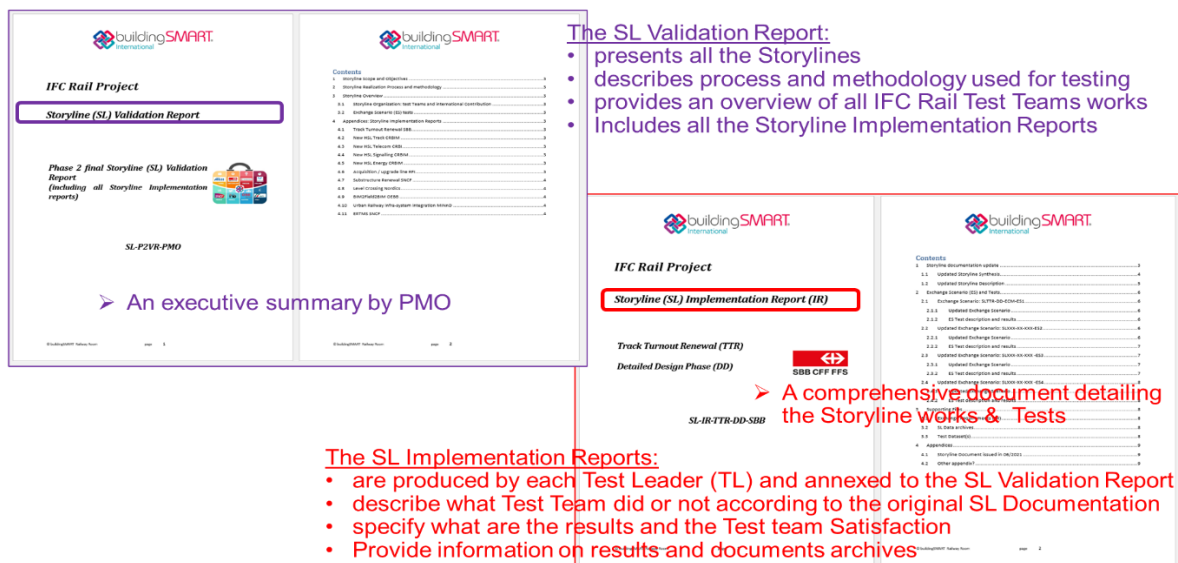


Figure 19 Storyline implementation and validation reports

Each “Storyline Implementation Report” describes the test team, the test organisation, the test results, the files/documents information related to archiving and the test team satisfaction.

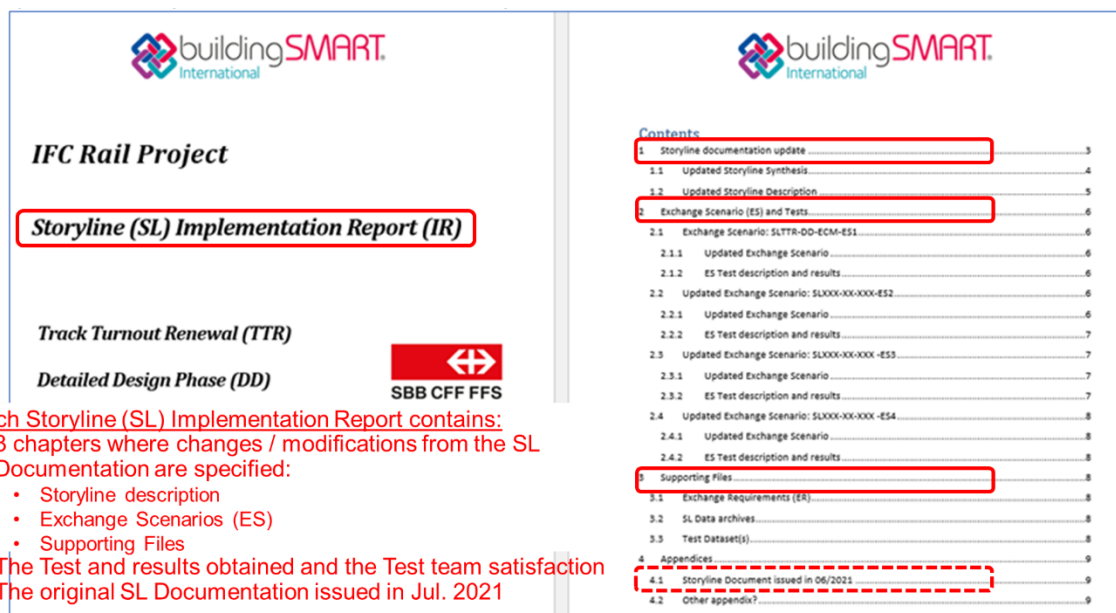


Figure 20 Details of storyline implementation reports to be produced by test leaders

8 Test team conclusion and stakeholder satisfaction

Each test leader with the storyline test team planned a number of exchange scenarios (ES) to be tested; such details are presentation in each “storyline documentation” produced for the IFC 4.3 deliverables.

The “Storyline (SL) Implementation Report” of each storyline describes the works for the ES which have been tested as it is presented in the following table. According to their own organisation, some test leader faced difficulties to get/maintain/involve the resources to do the job in time. Due to the lack of time or technical/domain experts or software vendors participation, some of the planned ES have been cancelled by test team decision or not completed. Sometime, test scope has been reduced or modified.

Storylines	Stakeholders					
	Austria	China	Italy	Nordics	France	Switzerland
Track Renewal SBB						4 ES / 4
New HSL Track CRBIM		4 ES / 4				
New HSL Telecom CRBIM		4 ES / 4				
New HSL Signaling CRBIM		4 ES / 4				
New HSL Energy CRBIM		4 ES / 4				
Acquisition / upgrade line RFI			6 ES / 16			
Level Crossing Nordics				2 ES / 15		
Substructure Renewal SNCF					2 ES / 6	
Infra-System integration MINnD					2 ES / 8	
ERTMS SNCF					4 ES / 5	
BIM2Field2BIM OEBB	2 ES / 2					

x ES/y = x Exchange Scenarios realized over y planned (lack of: time or technical/domain resources or software vendors' contributions)

Figure 21 Exchange Scenarios realized per storyline

All the tests have been carried out in 2021 (from april to october), test team satisfaction is detailed in each Storyline Implementation Report and summarized hereafter.

Storylines	realized Exchange scenario tests					
Track Renewal SBB	4 ES / 4	☑️😊	☑️👍	☑️👍	☑️👍	
New HSL Track CRBIM	4 ES / 4	☑️😊	☑️👍	☑️😊	☑️👍	
New HSL Telecom CRBIM	4 ES / 4	☑️👍	☑️👍	☑️👍	☑️👍	
New HSL Signaling CRBIM	4 ES / 4	☑️👍	☑️👍	☑️👍	☑️👍	
New HSL Energy CRBIM	4 ES / 4	☑️👍	☑️👍	☑️👍	☑️👍	
Acquisition / upgrade line RFI	6 ES / 16	☑️👍	☐️✂️ from ES02toES10	☑️👍 from ES11toES12	☐️✂️	☑️👍 from ES14toES16
Level Crossing Nordics	2 ES / 15	☐️✂️ from ES01toES07	☑️👍	☐️✂️ from ES09toES10	☑️👍	☐️✂️ from ES12toES15
Substructure Renewal SNCF	2 ES / 6	☐️✂️	☑️👍	☑️👍 Cabling/ducts	☐️✂️ from ES04toES06	
Infra-System integration MINnD	2 ES / 8	☐️✂️ all ES reviewed	☑️👍 Cabling/ducts	☑️👍 Spatial structure		
ERTMS SNCF	4 ES / 5	☑️👍	☑️👍	☑️👍	☐️✂️	☑️👍
BIM2Field2BIM OEBB	2 ES / 2	☑️👍	☑️👍			



Satisfactory Exchange Scenario Test



Partly satisfactory or completed Exchange Scenario Test



Non-satisfactory Exchange Scenario Test



Cancelled Exchange Scenario Test

Figure 22 Test team satisfaction in relation to tested exchange scenarios

The following table is presenting, more in detail, the various unit tests which have been developed and checked in each storyline with some specific software vendors interested in this storyline.

SBB	CRBIM	CRBIM	CRBIM	CRBIM	CRBIM	CRBIM	CRBIM	CRBIM	RFI	SNCF / MINnD	Nordics	ÖBB	MINnD	SNCF
Track Turnout Renewal	New High Speed Line (HSL): Track	New High Speed Line (HSL): Energy	New High Speed Line (HSL): Signaling	New High Speed Line (HSL): Telecom	Acquisition and upgrade of an existing railway line	Subgrade Renewal	Level Crossing	BIM2Field2BIM	Urban Railway infra-System Integration	European Rail Traffic Management System (ERTMS)				
Common Infra Unit Test topics														
<input type="checkbox"/> Geo-reference	-		X						X	X			X	X
<input type="checkbox"/> Alignment (Horizontal+Vertical)	X	X	X						X	X		X	X	X
<input type="checkbox"/> Linear Placement (Point)	X	X	X	X			X		X	X	X	X	X	X
<input type="checkbox"/> Linear Span Placement (From-To)	X	-	X	X			X		X	X		X	X	X
<input type="checkbox"/> Linear Placement with broken chainage		-	X	X			-		X	X	-	X	X	X
<input type="checkbox"/> Terrain													X	X
<input type="checkbox"/> Subgrade, Earthworks	X	-	-				X			X	X			
<input type="checkbox"/> Drainage, Geotechnics	-						X			X	X		X	-
<input type="checkbox"/> Bridge, Tunnel	X	-	-				-			-			X	
<input type="checkbox"/> Road, Road Substructure							X				X			
<input type="checkbox"/> Railway Station (rs), Station Yard (sy)		-	-											
<input type="checkbox"/> Building rooms (br), Utilities		-	-										X	-
Railway Specific Unit Test topics														
<input type="checkbox"/> Cant Alignment	X	X							-	X	X	X		
<input type="checkbox"/> Linear Placement with Cant	X	X							-	X	-	X		
<input type="checkbox"/> Swept Area Solid Geometry	X	X							X	X			X	
<input type="checkbox"/> Railway Spatial Structure and Spatial Zone	X	X	X					X	X	X	X	X	X	X
<input type="checkbox"/> System functional breakdown		X	X						X	-		X	X	X
<input type="checkbox"/> Wireless connection														X
<input type="checkbox"/> Track elements	X	X							X	-	X	X	X	
<input type="checkbox"/> Signalling elements			X						X		X		X	X
<input type="checkbox"/> Overhead Contact Line elements		X							X				X	
<input type="checkbox"/> Telecom elements				X				X	X				X	X
<input type="checkbox"/> Energy elements		X							X				X	
Existing concepts														
<input type="checkbox"/> System									X				X	
<input type="checkbox"/> System of systems									X					
<input type="checkbox"/> Assembly of assemblies									X				X	
Others														
<input type="checkbox"/> Interference relationships													X	
<input type="checkbox"/> Gauge													X	
<input type="checkbox"/> Wireless connectivity and radio coverage representation for GSMR														D
<input type="checkbox"/> Power supply system for signaling/telecom active equipment in technical buildings														D
<input type="checkbox"/> Space management inside technical rooms														D




Figure 23 Table of unit tests per storyline

- Test not realized due to lack of time & resources
X Test completed
D Not tested, only documented

9 Appendices: 11 “Storyline Implementation Reports”




All the "Storyline (SL) Implementation Reports" produced by the test leaders are available in one of these appendices.

9.1 Appendix A: Track Turnout Renewal SBB

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>Track Turnout Renewal (TTR)</p> <p>Detailed Design Phase (DD)</p> <p>SL-IR-TTR-DD-SBB</p> 	 <p>Contents</p> <ul style="list-style-type: none"> 1 Storyline documentation update 3 <ul style="list-style-type: none"> 1.1 Updated Storyline Synthesis 3 1.2 Updated Storyline Description 5 2 Exchange Scenario (ES) and Tests 5 <ul style="list-style-type: none"> 2.1 Exchange Scenario: SLTTR-DD-ECM-ES1 5 <ul style="list-style-type: none"> 2.1.1 Updated Exchange Scenario 5 2.1.2 ES Test description and results 6 2.2 Updated Exchange Scenario: SLTTR-DD-DD-ES2 6 <ul style="list-style-type: none"> 2.2.1 Updated Exchange Scenario 6 2.2.2 ES Test description and results 7 2.3 Updated Exchange Scenario: SLTTR-DD-QTO -ES3 11 <ul style="list-style-type: none"> 2.3.1 Updated Exchange Scenario 11 2.3.2 ES Test description and results 11 2.4 Updated Exchange Scenario: SLTTR-DD-3DV -ES4 12 <ul style="list-style-type: none"> 2.4.1 Updated Exchange Scenario 12 2.4.2 ES Test description and results 12 3 Supporting Files and Storyline Archives 13 <ul style="list-style-type: none"> 3.1 Exchange Requirements (ER) 13 3.2 SL Data archives 13 3.3 Test Dataset(s) 13 4 Appendices 14 <ul style="list-style-type: none"> 4.1 Storyline Documentation 14 4.2 Turnout checking rules 14
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9.2 Appendix B: New HSL Track CRBIM

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>New High-speed Line (NHL) –Track (TR)</p> <p>Detailed Design Phase (DD)</p> <p>SL-IR- NHL-Track-DD-CRBIM</p> 	 <p>Contents</p> <ul style="list-style-type: none"> 1 Storyline documentation update 4 <ul style="list-style-type: none"> 1.1 Work Organization 4 <ul style="list-style-type: none"> 1.1.1 Test Team, SWV participation 4 1.1.2 Organization in terms of periodic SL Meetings 4 1.1.3 Work progress of the SL test 4 1.1.4 Stakeholder contribution and Test Team satisfaction 4 1.2 Updated Storyline Synthesis 5 1.3 Updated Storyline Description 6 2 Exchange Scenario (ES) and Tests 8 <ul style="list-style-type: none"> 2.1 Exchange Scenario: SLNHL-TR-DD-ECM-ES1 8 <ul style="list-style-type: none"> 2.1.1 Updated Exchange Scenario 8 2.1.2 ES Test description and results 8 2.2 Updated Exchange Scenario: SLNHL-TR-DD-RDDM-ES2 9 <ul style="list-style-type: none"> 2.2.1 Updated Exchange Scenario 9 2.2.2 ES Test description and results 10 2.3 Updated Exchange Scenario: SLNHL-TR-DD-3DV-ES3 12 <ul style="list-style-type: none"> 2.3.1 Updated Exchange Scenario 12 2.3.2 ES Test description and results 13 2.4 Updated Exchange Scenario: SLNHL-TR-DD-QTO-ES4 14 <ul style="list-style-type: none"> 2.4.1 Updated Exchange Scenario 14 2.4.2 ES Test description and results 15 3 Supporting Files and Storyline Archives 17 <ul style="list-style-type: none"> 3.1 Exchange Requirements (ER) 17 3.2 SL Data archives 17 3.3 Test Dataset(s) 17 4 Appendices 17 <ul style="list-style-type: none"> 4.1 Storyline Documentation 17 4.2 Business and business process related findings 17
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9.3 Appendix C: New HSL Telecom CRBI

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>New High-speed Line (NHL) - Telecom</p> <p>Detailed Design Phase (DD)</p> <p>SL-IR- NHL-DD-CRBIM</p> 	 <p>Contents</p> <p>1 Storyline documentation update 4</p> <p>1.1 Work Organization 4</p> <p>1.1.1 Test Team, SWV participation 4</p> <p>1.1.2 Organization in terms of periodic SL Meetings 4</p> <p>1.1.3 Work progress of the SL test 4</p> <p>1.1.4 Stakeholder contribution and Test Team satisfaction 4</p> <p>1.2 Updated Storyline Synthesis 5</p> <p>1.3 Updated Storyline Description 6</p> <p>2 Exchange Scenario (ES) and Tests 7</p> <p>2.1 Exchange Scenario: SLNHL-DD-RDDM-ES1 7</p> <p>2.1.1 Updated Exchange Scenario 7</p> <p>2.1.2 ES Test description and results 8</p> <p>2.2 Updated Exchange Scenario: SLNHL-DD-ICM-ES2 9</p> <p>2.2.1 Updated Exchange Scenario 9</p> <p>2.2.2 ES Test description and results 10</p> <p>2.3 Updated Exchange Scenario: SLNHL-DD-QTO-ES3 10</p> <p>2.3.1 Updated Exchange Scenario 10</p> <p>2.3.2 ES Test description and results 11</p> <p>2.4 Updated Exchange Scenario: SLNHL-DD-3DV-ES4 11</p> <p>2.4.1 Updated Exchange Scenario 11</p> <p>2.4.2 ES Test description and results 12</p> <p>3 Supporting Files and Storyline Archives 12</p> <p>3.1 Exchange Requirements (ER) 12</p> <p>3.2 SL Data archives 12</p> <p>3.3 Test Dataset(s) 13</p> <p>4 Appendices 13</p> <p>4.1 Storyline Documentation 13</p>
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9.4 Appendix D: New HSL Signalling CRBIM

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>New High-speed Line (NHL) - Signalling(SL)</p> <p>Detailed Design Phase (DD)</p> <p>SL-IR-SLNHL-DD-CRBIM</p> 	 <p>Contents</p> <p>1 Storyline documentation update 4</p> <p>1.1 Updated Storyline Synthesis 4</p> <p>1.2 Updated Storyline Description 5</p> <p>2 Exchange Scenario (ES) and Tests 6</p> <p>2.1 Exchange Scenario: SLNHL-DD-ECM-ES1 6</p> <p>2.1.1 Updated Exchange Scenario 6</p> <p>2.1.2 ES Test description and results 7</p> <p>2.2 Updated Exchange Scenario: SLNHL-DD-ICM-ES2 8</p> <p>2.2.1 Updated Exchange Scenario 8</p> <p>2.2.2 ES Test description and results 9</p> <p>2.3 Updated Exchange Scenario: SLNHL-DD-3DV-ES3 10</p> <p>2.3.1 Updated Exchange Scenario 10</p> <p>2.3.2 ES Test description and results 10</p> <p>2.4 Updated Exchange Scenario: SLNHL-DD-QTO-ES4 11</p> <p>2.4.1 Updated Exchange Scenario 11</p> <p>2.4.2 ES Test description and results 11</p> <p>3 Supporting Files and Storyline Archives 12</p> <p>3.1 Exchange Requirements (ER) 12</p> <p>3.2 SL Data archives 12</p> <p>3.3 Test Dataset(s) 12</p> <p>4 Appendices 12</p> <p>4.1 Storyline Documentation 12</p> <p>4.2 Business and business process related findings 12</p>
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9.5 Appendix E: New HSL Energy CRBIM

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>New High-speed Line (NHL)- Energy</p> <p>Detailed Design Phase (DD)</p> <p>SL-IR- NHL-DD-CRBIM</p> 	 <p>Contents</p> <p>1 Storyline documentation update 4</p> <p>1.1 Work Organization 4</p> <p>1.1.1 Test Team & SWV 4</p> <p>1.1.2 Organization in terms of periodic SL Meetings 4</p> <p>1.1.3 Tasks of SL test 4</p> <p>1.2 Updated Storyline Synthesis 5</p> <p>1.3 Updated Storyline Description 6</p> <p>2 Exchange Scenario (ES) and Tests 8</p> <p>2.1 Exchange Scenario: SLNHL-DD-RDDM-ES1 8</p> <p>2.1.1 Updated Exchange Scenario 8</p> <p>2.1.2 ES Test description and results 8</p> <p>2.2 Updated Exchange Scenario: SLNHLT-DD-ICM-ES2 10</p> <p>2.2.1 Updated Exchange Scenario 10</p> <p>2.2.2 ES Test description and results 10</p> <p>2.3 Updated Exchange Scenario: SLNHLT-DD-QTO-ES3 12</p> <p>2.3.1 Updated Exchange Scenario 12</p> <p>2.3.2 ES Test description and results 12</p> <p>2.4 Updated Exchange Scenario: SLNHLT-DD-3DV-ES4 13</p> <p>2.4.1 Updated Exchange Scenario 13</p> <p>2.4.2 ES Test description and results 13</p> <p>3 Supporting Files and Storyline Archives 15</p> <p>3.1 Exchange Requirements (ER) 15</p> <p>3.2 SL Data archives 15</p> <p>3.3 Test Dataset(s) 16</p> <p>4 Appendices 16</p> <p>4.1 Storyline Documentation 16</p>
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9.6 Appendix F: Acquisition / upgrade line RFI/Italferr

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>Acquisition and upgrade of an existing railway line (AC)</p> <p>Planning Phase (PL)</p> <p>SLAC-PL</p>  	 <p>Contents</p> <p>1 Storyline documentation update 4</p> <p>1.1 Updated Storyline Synthesis 4</p> <p>1.2 Updated Storyline Description 7</p> <p>2 Exchange Scenario (ES) and Tests 11</p> <p>2.1 Updated Exchange Scenario: SLAC-PL-ECM-ES11 13</p> <p>2.1.1 Updated Exchange Scenario 13</p> <p>2.1.2 ES Test description and results 14</p> <p>2.2 Updated Exchange Scenario: SLAC-PL- ECM-ES12 15</p> <p>2.2.1 Updated Exchange Scenario 15</p> <p>2.2.2 ES Test description and results 16</p> <p>2.3 Updated Exchange Scenario: SLAC-PL-ECM-ES14 17</p> <p>2.3.1 Updated Exchange Scenario 17</p> <p>2.3.2 ES Test description and results 18</p> <p>2.4 Updated Exchange Scenario: SLAC-PL-ECM-ES15 19</p> <p>2.4.1 Updated Exchange Scenario 19</p> <p>2.4.2 ES Test description and results 20</p> <p>2.5 Updated Exchange Scenario: SLAC-PL-ECM-ES16 21</p> <p>2.5.1 Updated Exchange Scenario 21</p> <p>2.5.2 ES Test description and results 22</p> <p>3 Supporting Files and Storyline Archives 23</p> <p>3.1 Exchange Requirements (ER) 23</p> <p>3.2 SL Data archives 23</p> <p>3.3 Test Dataset(s) 24</p> <p>4 Appendices 27</p> <p>4.1 Storyline Issues 27</p> <p>4.2 Example of alignment report by regola 28</p>
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9.7 Appendix G: Substructure Renewal SNCF/MINnD

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>Subgrade Renewal (SR) Detailed design phase (DD)</p>  <p>SL-IR-SR-DD-SNCF-SETEC</p>	 <p>Contents</p> <ul style="list-style-type: none"> 1 Storyline documentation update 3 <ul style="list-style-type: none"> 1.1 Updated Storyline Synthesis 4 1.2 Updated Storyline Description 6 2 Storyline test objective update 8 3 Storyline test organisation 8 4 Exchange Scenario (ES) and Tests 9 <ul style="list-style-type: none"> 4.1 Exchange Scenario: SLSR-DD-DDA-ES2 9 <ul style="list-style-type: none"> 4.1.1 Exchange Scenario: SLSR-DD-DDA-ES2 9 4.1.2 ES Test description and results 10 4.2 Exchange Scenario: SLSR-DD-DD-ES3 11 <ul style="list-style-type: none"> 4.2.1 Exchange Scenario: SLSR-DD-DD-ES3 11 4.2.2 ES Test description and results 12 5 Supporting Files and Storyline Archives 13 <ul style="list-style-type: none"> 5.1 Exchange Requirements (ER) 13 5.2 SL Data archives 13 5.3 Test Dataset(s) 13
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9.8 Appendix H: Level Crossing Nordics

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>Level Crossing (LC) Detailed Design Phase (DD)</p>  <p>SL-LC-DD</p>	 <p>Contents</p> <ul style="list-style-type: none"> 1 Storyline documentation update 4 <ul style="list-style-type: none"> 1.1 Work organization 4 1.2 Organization in terms of periodic SL Meetings, Storyline documents 4 1.3 Stakeholder contribution and Test Team/stakeholder satisfaction 4 1.4 Details and modifications of objectives related to SL, tests and expected results 5 1.5 Planning and Test schedule 6 1.6 All input and output data 6 1.7 Updated Storyline Synthesis 8 1.8 Updated Storyline Description 9 2 Exchange Scenario (ES) and Tests 10 <ul style="list-style-type: none"> 2.1 ES Test description and results 11 3 Supporting Files and Storyline Archives 12 <ul style="list-style-type: none"> 3.1 SL Data archives 12 4 Appendices 12 <ul style="list-style-type: none"> 4.1 The Prioritization of Exchange Requirement 12 4.2 Exchange Requirement Fulfilment Table 12
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9.9 Appendix I: BIM2Field2BIM OEBB

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Documentation</p> <p>BIM2FIELD2BIM (BF) – Maintenance and Operation (MO)</p> <p>SLBF-MO</p> 	 <p>Contents</p> <ul style="list-style-type: none"> 1 Storyline documentation update 3 1.1 Management Abstract 3 1.2 Details of the work organization 3 1.3 Details and modifications of Storyline related objectives 4 1.4 Generalization of tamping process model 5 1.4.1 Tamping Process on Finnish Railway Network 5 1.4.2 STRABAG - perspective of the contractor 7 1.4.3 Conclusion 8 2 Storyline Synthesis 9 3 Storyline Description 10 3.1 Processmap overview 11 3.2 Processmap detailed 13 3.3 Processmap core 13 4 Exchange Scenario (ES) 15 4.1 Exchange Scenario: SLBF-MO-ABM.MOS-ES1 15 4.2 Exchange Scenario: SLBF-MO-ABM.MOS-ES2 16 4.3 Supplementary Exchange Scenarios 17 5 Supporting Files 19 5.1 Exchange Requirements (ER) 19 5.2 Test Dataset 19 6 Available input and output data 20 6.1 Input data 20 6.1.1 OEBB 20 6.1.2 FTIA 20 6.1.3 SBB 20 6.1.4 SNCF 20 6.1.5 RDB 20 6.2 Output data 21 6.2.1 "tmc" (Track machines connected) 21 7 Backlog 24 7.1 Tamping obstacles 24 7.2 Precision Tamping 25
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9.10 Appendix J: Urban Railway infra-system integration MINnD

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>Urban Railway infra-system integration (UR) – MINnD</p> <p>Detailed Design Phase (DD)</p>  <p>SL-IR-UR-DD-MINnD</p>	 <p>Contents</p> <ul style="list-style-type: none"> 1 Storyline documentation update 4 1.1 Updated Storyline Synthesis 5 1.2 Updated Storyline Description 8 2 Exchange Scenario (ES) and Tests 11 2.1 Selection of exchange scenarios 11 2.2 Testing goals 12 2.3 Exchange Scenario: Common spatial structure for interface management 13 2.3.1 Exchange scenario description 13 2.3.2 Testing goals 15 2.3.3 Test plan 17 2.3.4 Test completion 19 2.4 Exchange Scenario: Design analysis – Cabling & multi-duct / cable carrier design consistency 21 2.4.1 Exchange scenario description 21 2.4.2 Testing goals 23 2.4.3 Testing plan 24 2.4.4 Test completion 26 3 Supporting Files & Storyline Archives 27 3.1 Exchange Requirements (ER) 27 3.2 SL Data archives 27 3.3 Test Dataset 27 3.3.1 Exchange scenario : common spatial structure for interface management 27 3.3.2 Exchange scenario : cabling 28 4 Appendices 28 4.1 Storyline Issues 28 4.2 Example of checking report 28
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9.11 Appendix K: ERTMS SNCF

See appendix

 <p>IFC Rail Project</p> <p>Storyline (SL) Implementation Report (IR)</p> <p>ERTMS System (ES)</p> <p>Detailed Design Phase (DD)</p>  <p>SL-IR-ES-DD-SNCF</p>	 <p>Contents</p> <p>1 Storyline documentation update 3</p> <p>1.1 Updated Storyline Synthesis 4</p> <p>1.2 Updated Storyline Description 5</p> <p>2 Exchange Scenario (ES) and Tests 6</p> <p>2.1 Exchange Scenario: SLES-DD-ECM_RDM-ES1 6</p> <p>2.1.1 Updated Exchange Scenario 6</p> <p>2.1.2 ES Test description and results 7</p> <p>2.2 Updated Exchange Scenario: SLES-DD-ECM_RDM-ES2 8</p> <p>2.2.1 Updated Exchange Scenario 8</p> <p>2.2.2 ES Test description and results 8</p> <p>2.3 Updated Exchange Scenario: SLES-DD-ICM-ES3 9</p> <p>2.3.1 Updated Exchange Scenario 9</p> <p>2.3.2 ES Test description and results 10</p> <p>2.4 Updated Exchange Scenario: SLES-DD-RDM-ES4 10</p> <p>2.4.1 Updated Exchange Scenario 10</p> <p>2.4.2 ES Test description and results 11</p> <p>2.5 Updated Exchange Scenario: SLES-DD-3DV-ES5 11</p> <p>2.5.1 Updated Exchange Scenario 11</p> <p>2.5.2 ES Test description and results 12</p> <p>3 Supporting Files and Storyline Archives 13</p> <p>3.1 Exchange Requirements (ER) 13</p> <p>3.2 SL Data archives 13</p> <p>3.3 Test Dataset(s) 14</p> <p>4 Appendices 16</p> <p>4.1 Storyline backlog 16</p>
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