

IFC Rail Project

Storyline (SL) Implementation Report (IR)

Level Crossing (LC)
Detailed Design Phase (DD)



SL-LC-DD

Contents

1	Storyline documentation update	4
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
2.1	ES Test description and results	11
3	Supporting Files and Storyline Archives	12
3.1	SL Data archives	12
4	Appendices	12
4.1	The Prioritization of Exchange Requirement	12
4.2	Exchange Requirement Fulfilment Table	12

Room: Railway Room
Project/Activity: IFC Rail Phase 2

Date: 2021.09.07
Test Leader: Marion Schenkwein,
Peter Axelsson

Document Title: WP1: Storyline (SL) Implementation Report
Version: 1.0

ID: SL-LC-DD
Stakeholder: FTIA, Trafikverket

Intellectual Property Rights for Data provided for Unit Tests (including Dataset)

As far as the data for the Unit Tests (Data) has been provided by the IFC Rail Consortium members (Stakeholder) either directly or on behalf of a IFC Consortium member by a 3rd party the following regulations apply to the Intellectual Property (IP) Rights of the data:

The IP of the data is entirely owned by the Stakeholder.

The Data is provided and can be used only for the purpose of testing to implement the IFC Rail Standard by Software Developers.

Any other utilization of the Data beyond the scope of the implementation of the IFC Rail Standard needs prior written approval of the IP owner of the Data.

In course of performing the services of the tests or providing advice pre-existing invention, discovery, original works of authorship, development, improvements, trade secret, concept, or other proprietary information or intellectual property right owned by the Software Developer who performs the tests are not affected and remain in the ownership of the Software Developer

By participating in the project IFC Rail Phase 2 and using the Data the Software Developer acknowledges the above IP rights for the Data.

1 Storyline documentation update

1.1 Work organization

Project team:	Marion Schenkwein, Finnish Transport Infrastructure Agency, Test Leader Peter Axelsson, Tarfikverket/Swedish Transport Administration, Test Leader (Jitka Hotovcová Tarfikverket/Swedish Transport Administration, Test Leader) Lars Wikström, Triona, Technical Expert Juha Hyvärinen, Jhy Consulting Riitta Juutinen, Sweco Infra & Rail
Software vendors:	Michelangelo Cianciulli, ACCA Alfonso D'Urso, ACCA Ian Rosam, Bentley Dimple Patel, Bentley Paddy Wang, Bentley Bruno Morin, Dassault Systemes Pedro Diez Cocero, Dassault Systemes Rahul Nimbalkar, Dassault Systemes Sebastien Tremblay, Dassault Systemes Peter Bonsma, RDF Michel Rives, Vianova Systems Lee Gregory, 12d Solutions
IFC Rail PMO:	Chi Zhang Fei Wang Guy Pagnier

1.2 Organization in terms of periodic SL Meetings, Storyline documents

We regularly organized project team meetings when it was needed.

We held the first Nordics Level Crossing Storyline kick-off meeting with software vendors on 27th April 2021. The meetings continued after that fortnightly from May 2021 to November 2021. The meetings were organized a total of 14 times. The memorandums and records of the meetings have been saved in the Box platform. Link: <https://app.box.com/s/hqmxhknko49milcsklt95s2mzusouvsi>

1.3 Stakeholder contribution and Test Team/stakeholder satisfaction

As Stakeholder in the IFC Rail-project and the Level crossing Storyline we see this work as one of the corner stones for a standardised and machine-readable information exchange process. Some of the main subjects addressed in this work are

- IFC as a tool to enrich railway asset data over its life cycle to equally serve the needs of design, construction, maintenance and asset management
- IFC Spatial structure breakdown to describe the complex entities of different domains of a level crossing

- IFC as a prerequisite for M2M management of asset information
- IFC as an enabler to increase international competition when we can require information in a standardised form
- Reduced costs for asset information management in a life cycle perspective

This storyline combines both rail and road which is important for us as Stakeholders with responsibility for both road and rail infrastructure. The result has proven that IFC 4.3 will be able to model, store and exchange the necessary information needed for the design, build and maintain phases for the physical/built aspect of the infrastructure assets.

One of the fundamental parts for rail design is the alignment, which also have been used in this Storyline and proved to work. This is important for our internal acceptance of a new method of data delivery.

1.4 Details and modifications of objectives related to SL, tests and expected results

For detailed design (SLLC-DD), we decided to focus on the safety and signalling systems from the perspectives of the following exchange scenarios:

- SLLC-DD-SIG.QTO_ES8: Railway signalling design to quantity take-off
- SLLC-DD-SIG.3DV_ES11: Railway signalling design to 3D visualization

This resulted in the test team creating an IFC reference file (indicating a desired IFC structure including spatial structure, system structures, assemblies, elements, Psets and QTOs) and an exchange requirements table in which IFC entities, predefined types and property sets/quantity sets are prioritized for this storyline. The table grouped the different elements into six (6) groups which could be used to sub-divide the testing into smaller tasks:

- Basic
- Axle counting
- Boom barrier
- Tech cabin
- Facility parts
- Track structure

This table is provided as an appendix 4.1. This table is available at GitHub here:

[https://github.com/IFCRail/IFC-Rail-Unit-Test/tree/master/8_Storylines%20Test%20\(SL\)/SL08_Level%20Crossing](https://github.com/IFCRail/IFC-Rail-Unit-Test/tree/master/8_Storylines%20Test%20(SL)/SL08_Level%20Crossing)

Based on this input and also the input data described below, we asked the software vendors to export and import a dataset according to our specification. If there is time, we also want the software vendors to import each other's exported files as well. The table describing software vendors' fulfilment of exchange requirements is available at GitHub here: [IFC-Rail-Unit-Test/8_Storylines Test \(SL\)/SL08_Level Crossing/IFC files from implementers at master · IFCRail/IFC-Rail-Unit-Test \(github.com\)](#)

This table is provided as an appendix 4.2.

The tech team verified the datasets using this tooling:

- Dataset schema compliance with the checker from Karlsruhe Institute of Technology (KIT)

- Specific alignment checking with dedicated tooling from RDF
- Structural checking (e.g. alignments, assemblies, property sets) with Regola
- Ocular verification

In an optimal scenario, a machine readable specification in e.g. mvdXML could have been created and used for verification.

In addition to the above, the software vendors did their own tests and reported the results on GitHub.

We decided to not elaborate the storyline “Maintenance & Operation” (SLLC-MO) further due to the following reasons:

- Lack of available time for the test team and the software vendors.
- When looking at the available requirements, we concluded that the SLLC-MO storyline would mainly include additional property sets, that often are specific to the stakeholder and the information needed in their asset management solutions. We concluded that adding these property sets would cost time but add little value to the testing of the IFC 4.3 schema.

In addition to the unit- and storyline testing for IFC Rail, the storyline and its input data was also used for unit testing within the Infraroom. More specifically, the following infraroom unit tests originated from the level crossing storyline:

- Drainage systems:
 - o DrainageSystem-1, (<https://github.com/bSI-InfraRoom/IFC-infra-unit-test/tree/main/DrainageSystem-1>). *The data from this unit test is included also in the IFC file provided by ACCA for this storyline*
 - o DrainageSystem-2, (<https://github.com/bSI-InfraRoom/IFC-infra-unit-test/tree/main/DrainageSystem-2>)
- Machine guidance (for roads):
 - o MCON-1, (<https://github.com/bSI-InfraRoom/IFC-infra-unit-test/tree/main/MCON-1>)
 - o MCON-2, (<https://github.com/bSI-InfraRoom/IFC-infra-unit-test/tree/main/MCON-2>)
- Spatial structure (multi-domain rail/road/building):
 - o SpatialStructure-4, (<https://github.com/bSI-InfraRoom/IFC-infra-unit-test/tree/main/SpatialStructure-4>). *The spatial structure from this unit test was used as basis for the testing of this storyline and is present in the provided reference file and files from software vendors.*

1.5 Planning and Test schedule

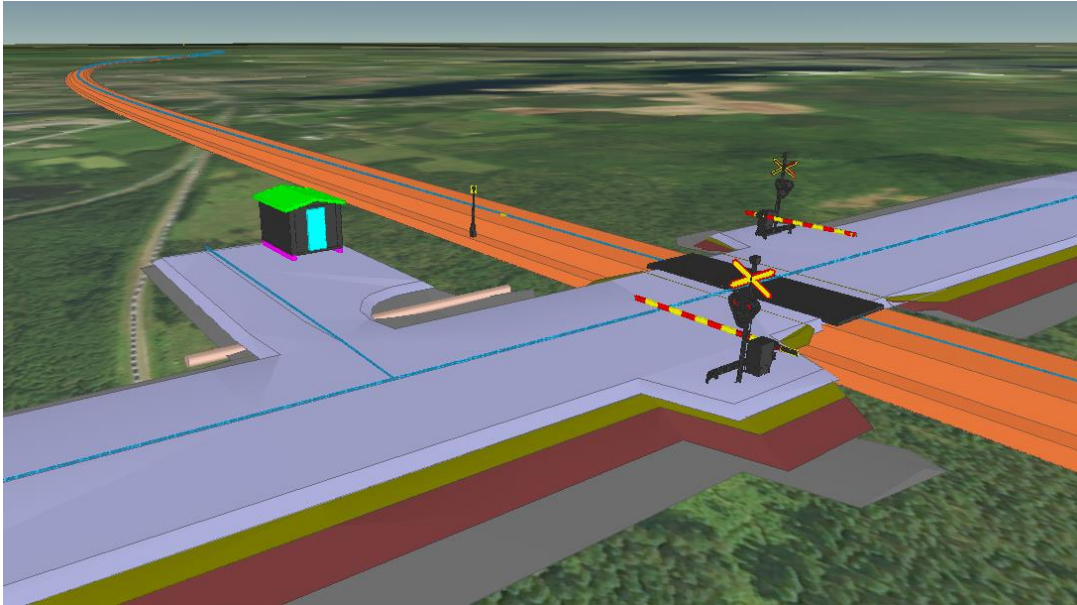
We organized fortnightly meetings with software vendors. The test schedule was from end of the April to end of October 2021. We didn't provide any milestones from software vendors. They were able to decide their own schedule and milestones within agreed test schedule.

1.6 All input and output data

The dataset from Finnish Transport Infrastructure Agency was uploaded to GitHub and it was available for the software vendors. The dataset included for example alignments (format: Inframodel/LandXML and IFC),

surface models (Inframodel/LandXML), parts of railway superstructures (3D dwg/ IFC), safety and signalling systems (3D dwg/ IFC). Link to dataset:

[https://github.com/IFCRail/IFC-Rail-Unit-Test/tree/master/8_Storylines%20Test%20\(SL\)/SL08_Level%20Crossing/Dataset](https://github.com/IFCRail/IFC-Rail-Unit-Test/tree/master/8_Storylines%20Test%20(SL)/SL08_Level%20Crossing/Dataset)



1.7 Updated Storyline Synthesis

Room:	Railway Room	Author: Domain Expert	Marion Schenkwein, Peter Axelsson		
Project/Activity:	IFC Rail Phase 2	Verification: Technical Expert	Lars Wikström		
Document Title:	Storyline: Level Crossing	Approbation: Test leader	Marion Schenkwein		
Version:	1.0	PMO checker:	Guy Pagnier		
Date:	2021.09.07	ID:	SLLC-DD		
Description (a)	This operation concerns the renewal of a level crossing in an existing track during the Detailed Design phase (ID = SLLC-DD).				
Project Phases (b)	<input type="checkbox"/> PL - Planning <input type="checkbox"/> Build <input type="checkbox"/> ID - Intermediate design <input type="checkbox"/> Operation & Maintenance <input checked="" type="checkbox"/> DD - Detailed design <input type="checkbox"/> Dismiss				
Use Cases (c)	<input checked="" type="checkbox"/> ECM - Existing Condition Modelling ¹ <input type="checkbox"/> RDM - Railway Design Modelling <input type="checkbox"/> RDM.DD - Feasibility Study for Railway <input type="checkbox"/> RDM.RIDM - Railway Intermediate Design Modelling <input checked="" type="checkbox"/> RDM.RDDM - Railway Detailed Design Modelling <input checked="" type="checkbox"/> ICM - Interference and Coordination Management ² <input checked="" type="checkbox"/> 3DV - 3D Visualization <input checked="" type="checkbox"/> QTO - Quantity Take-Off <input type="checkbox"/> INMP - Handover from Builder to Maintainer (Information Needed for Maintenance Perspective)				
Domains	<input type="checkbox"/> Track (*) ³	Ballasted track will not be changed			
	<input checked="" type="checkbox"/> Signalling (*)				
	<input type="checkbox"/> Energy (*)				
	<input type="checkbox"/> Telecom (*)				
	<input checked="" type="checkbox"/> Alignment (*)				
	<input checked="" type="checkbox"/> Other (*)	Road domain			
Tested Concepts (d)	Cant, alignment, linear placement, spatial structure, track elements (rail...), signalling, road alignment, road substructure, drainage, road lamps				
Test Leader TL (e)	Peter Axelsson peter.axelsson@trafikverket.se Marion Schenkwein marion.schenkwein@vayla.fi				
Domain Experts DE (e)	Lars Wikström / Triona / lars.wikstrom@triona.se				
Technical Experts TE (e)	Lars Wikström lars.wikstrom@triona.se				
Software Vendors SW (e)	ACCA, Dassault Systemes, Bentley				
Test Dataset (e)	FTIA				

(a) 2 lines description (b) chose maxi 1 phase and 4 use cases (c) list only domains for the test (d) indicate Covered Unit Test Topics (e) specify names and companies
 (*) specify further sub-disciplines

¹ ECM terrain model was included optional

² ICM was not included in testing

³ Track structure with rail, sleeper and ballast was included

1.8 Updated Storyline Description

Description of the Business case	In this design phase, the railway geometry usually is not changed. The main focus is on signalling, telecom and in the disciplines associated with the road that crosses the railway tracks. The initial data model is collected from different sources, for example open data services (e.g. National Land Survey laser scanning data) as well as surveyed data (terrain model and existing objects) and cadastral information.			
Duration	6 months maximum			
Aim	Updated level crossing			
In Scope	<div>Safety and signalling systems<ul style="list-style-type: none">axle counting<ul style="list-style-type: none">axle countercable junction boxsnow plough protectionboom barrier system<ul style="list-style-type: none">footingpolepostladdertraffic signal (audio and visual)traffic signcentral devicetech building<ul style="list-style-type: none">cabinetscables<div>Track structure<ul style="list-style-type: none">railssleepersballast<p>A detailed breakdown of the scope is found in this table: https://github.com/IFCRail/IFC-Rail-Unit-Test/tree/master/8_Storylines%20Test%20(SL)/SL08_Level%20Crossing</p></div></div>			
Out of Scope	<ul style="list-style-type: none">Maintenance and operations			
<div>Specific Detailed Process Map for this Storyline</div> <div>[process map that defines realistic exchange scenarios between software applications ; reference to general processes defined in the IFC Rail Requirements analysis report Chapter 2 : IFC Rail Process Map also called High-level Reference Process Map (HLRP)]</div> <div>The process map or the exchange scenarios were not modified during the storyline work. Please see the process map images:<ul style="list-style-type: none">SLL-DD-Process-map-1.png https://app.box.com/s/i8buyr4z01twd2z8dq5g7gswxy1qthzrSLL-DD-Process-map-2.png https://app.box.com/s/p3c1isyj9tvsjvhc25p4ctpw1dzbz1rs</div>				
HLRP	ES nbr	From	To	Note [optional]

2 Exchange Scenario (ES) and Tests

Initially, we had created 15 exchange scenarios in the storyline documentation:

- SLTTR-DD-ECM.RDM-ES1 - Existing Condition Model (ECM) to Railway Design Model (RDM)
- SLLC-DD-RDM.RAS-ES2 - Railway Design Model (RDM) to Road Alignment and Substructure Designer (RAS)
- SLLC-DD-RDM.SIG-ES3 - Railway Design Model/RDM to Signalling Designer/SIG
- SLLC-DD-RAS.SIG-ES4 - Road Alignment and Substructure designer/RAS to Railway Signalling Designer/SIG
- SLLC-DD-RAS.RSD-ES5 - Road Alignment and Substructure Designer/RAS to Road Sign Designer/RSD
- SLLC-DD-RDM.RSD-ES6 - Railway Design Model / RDM to Road Sign Designer / RSD
- SLLC-DD-RAS.QTO-ES7 - Road Designer to Project manager - QTO - Quantity Take-Off
- SLLC-DD-SIG.QTO-ES8 - Railway Signalling Designer/SIG to Project manager for Quantity Take-off/QTO
- SLLC-DD-SSD.QTO-ES9 - Road Sign Designer/RSD to Project manager for Quantity Take-off/QTO
- SLLC-DD-SSD.3DV-ES10 - Road Alignment and Substructure Designer/RAS to Project manager for 3D Visualisation / 3DV
- SLLC-DD-SIG.3DV-ES11 - Railway Signalling Designer/SIG to Project manager for 3D Visualisation / 3DV
- SLLC-DD-RSD.3DV-ES12 - Road Sign Designer/RSD to Project manager for 3D Visualisation / 3DV
- SLLC-DD-RAS.ICM-ES13 - Road Alignment and Substructure Designer/RAS to Project manager for Interference and Coordination Management / ICM
- SLLC-DD-SIG.ICM-ES14 - Railway Signalling Designer/SIG to Project manager for Interference and Coordination Management / ICM
- SLLC-DD-RSD.ICM-ES15 - Road Sign Designer/RSD to Project manager for Interference and Coordination Management / ICM

The directives for our storyline work were to focus on the signalling aspects and the exchange scenarios concerning 3D visualization and quantity-take-off. Therefore, we decided to focus on the following two exchange scenarios:

- SLLC-DD-SIG.QTO_ES8: Railway signalling design to quantity take-off
- SLLC-DD-SIG.3DV_ES11: Railway signalling design to 3D visualization

These scenarios contain the combination of the previous exchanges and are therefore comprehensive content wise. To make the testing easier to achieve for the test team and the software vendors, we split the exchange requirements into the different categories as specified in the exchange requirements table mentioned earlier in this document.

2.1 ES Test description and results

Test Completion					
(Specify level of completion and if reserves/punchlist opened, additional TS works....)					
The test completion for ACCA and 3DS based on the exchange requirements table is collected in an excel file here: https://app.box.com/file/888805110679					
Test Team and Test Leader Satisfaction					
(Specify the Box/Github links to find the test results or documents....)					
<p>For test results please see Github. For the Acca file, we used the schema conformance checker from KIT (IfcCheckingTool_Lite_V2.2_Build-97) and further validation with Regola (https://beta.regola.io/validations) and uploaded the results to the folder containing the files provided by Acca here: https://github.com/IFCRail/IFC-Rail-Unit-Test/tree/master/8_Storylines%20Test%20(SL)/SL08_Level%20Crossing/IFC%20files%20from%20implementers/ACCA. The Regola validation consisted of the following checks:</p> <ul style="list-style-type: none"> - IFC Version compliance (IFC4X3_RC4) - Alignment decomposition structure - Mandatory components are present in assemblies using the specification according to the table below. More complex spatial structures are currently hard to validate this way. E.g. the test case contains IfcRailway (COMPLEX) decomposed into IfcRailway (ELEMENT) and IfcBuilding where the IfcRailway (ELEMENT) is decomposed into IfcFacilityPart etc: 					
Assembly	Assembly Type	Minimum	Maximum	Element	Element Type
IfcElementAssembly	SIGNALASSEMBLY	0	1	IfcDoor	BOOM_BARRIER
IfcElementAssembly	SIGNALASSEMBLY	0	1	IfcSignal	VISUAL
IfcElementAssembly	SIGNALASSEMBLY	0	1	IfcSignal	AUDIO
IfcElementAssembly	SIGNALASSEMBLY	0	1	IfcSign	PICTORAL
IfcElementAssembly	SIGNALASSEMBLY	0	1	IfcStair	LADDER
IfcElementAssembly	SIGNALASSEMBLY	0	1	IfcMember	POST
IfcSite		3	3	IfcRoad	
IfcSite		1	1	IfcRailway	
IfcElementAssembly	TRACKPANEL	1	-1	IfcTrackElement	SLEEPER
IfcElementAssembly	TRACKPANEL	2	2	IfcRail	RAIL
IfcBuilding		1	1	IfcBuildingStorey	
<p>From 3DS, there are powerpoint presentations available in the 3DS folder on GitHub providing information on the testing done by 3DS, here: https://github.com/IFCRail/IFC-Rail-Unit-Test/tree/master/8_Storylines%20Test%20(SL)/SL08_Level%20Crossing/IFC%20files%20from%20implementers/3DS-Test-Result</p> <p>The ocular test concentrated on checking the objects that could not be checked with other tools, such as the more complex spatial structures, the system structure or an audio signal in combination with a signal of a boom barrier. For ocular checking, different tooling was used, e.g.:</p> <ul style="list-style-type: none"> - ACCA web viewer - BIMVision free desktop application - IFC Tree browser from GeometryGym - Notepad++ 					
Tests and Results Archives					
(Specify the Box/Github links to find the test results or documents....)					
<p>IFC reference file: https://github.com/IFCRail/IFC-Rail-Unit-Test/tree/master/8_Storylines%20Test%20(SL)/SL08_Level%20Crossing/IFC%20Reference%20files</p> <p>Files from software vendors: https://github.com/IFCRail/IFC-Rail-Unit-Test/tree/master/8_Storylines%20Test%20(SL)/SL08_Level%20Crossing/IFC%20files%20from%20implementers</p>					

3 Supporting Files and Storyline Archives

3.1 SL Data archives

All files and Data are archived in:

- BOX directory: <https://app.box.com/s/5dlyiwqxqmemvxulppd4ggv6620ptajz2>
- GITHUB: [IFC-Rail-Unit-Test/8 Storylines Test \(SL\)/SL08 Level Crossing/IFC files from implementers at master · IFCRail/IFC-Rail-Unit-Test \(github.com\)](https://github.com/IFCRail/IFC-Rail-Unit-Test)

4 Appendices

4.1 The Prioritization of Exchange Requirement

See Appendix 4.1. The table describing priorities of exchange requirement.

4.2 Exchange Requirement Fulfilment Table

See Appendix 4.2. The table describing software vendors' fulfilment of exchange requirements.

The Prioritization of Exchange Requirement

	Basic	Axle counting	Boom barrier	Tech cabin	Facility parts	Track structure
SPATIAL						
IfcProject	x	x	x	x	x	x
IfcSite	x	x	x	x	x	x
IfcBuilding				x	x	
IfcBuildingStorey				x	x	
IfcRoad	x	x	x	x	x	
IfcRailway	x	x	x	x	x	x
IfcFacilityPart						
ROADSEGMENT					x	
INTERSECTION					x	
RAILWAYCROSSING					x	
TERMINAL					x	
TRACKSTRUCTUREPART					x	x
LEVELCROSSING					x	x
POSITIONING						
IfcAlignment	x	x	x	x	x	x
IfcMapConversion	x	x	x	x	x	x
IfcProjectedCRS	x	x	x	x	x	x
IfcReferent						
REFERENCEMARKER	(x)	x	(x)			
PHYSICAL ELEMENTS						
IfcElementAssembly						
SIGNALASSEMBLY			x			
IfcElementAssembly						
USERDEFINED						
TECHNICALBUILDING				x		
IfcElementAssembly						
TRACKPANEL						
IfcBuiltElement						
IfcSignal						
VISUAL			x			
AUDIO			x			
IfcSign						
PICTORAL			x			
IfcStair						
LADDER			x			
IfcMember						
POST			x			
IfcDoor						
BOOM_BARRIER			x			

Appendix 4.1

IfcFooting						
PAD_FOOTING			X			
IfcRailing						
GUARDRAIL			X			
IfcCableSegment		X	X	X		
IfcFurniture						
TECHICALCABINET				X		
IfcSwitchingDevice						
TOGGLESWITCH				X		
IfcController						
PROGRAMMABLE				X		
IfcCommunicationsAppliance						
COMPUTER				X		
IfcSensor						
WHEELSENSOR		X				
IfcJunctionBox						
DATA		X		X		
IfcDiscreteAccessory						
RAIL_MECHANICAL_EQUIPMENT		X				
IfcTrackElement						
SLEEPER						X
IfcRail						
RAIL	(x)					X
IfcCourse						
BALLASTBED	(x)					X
IfcGeomodel (Terrain)	(x)					
IfcSolidStratum (Terrain)	(x)					
SYSTEMS						
IfcDistributionSystem		X	X			
RELATIONSHIPS						
IfcRelAggregates	X	X	X	X	X	X
IfcRelNests	X	X	X	X	X	X
IfcRelInterferesElements					X	
IfcRelContainedInSpatialStructure	X	X	X	X	X	X
IfcRelReferencedInSpatialStructure		X	X			
IfcRelConnectsElements			X			
IfcRelAssignsToGroup		X	X			
IfcRelDefinesByProperties		X	X	X		
IfcRelDeclares		X	X			
PROPERTIES & QUANTITIES						
Qto_CableSegmentBaseQuantities		X	X	X		
Eventual properties from MO SL		X	X	X		

The Exchange Requirement Fulfilment Table

	Prioritization						ACCA												DASSAULT SYSTEMES (3DS)											
	Basic	Axle counting	Boom barrier	Tech cabin	Facility parts	Track structures	Basic		Axle counting		Boom barrier		Tech cabin		Facility parts		Track structures		Basic		Axle counting		Boom barrier		Tech cabin		Facility parts		Track structures	
							Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export
SPATIAL ELEMENTS																														
IfcProject	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
IfcSite	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
IfcBuilding				x	x								x	x	x	x								x	x	x	x			
IfcBuildingStorey				x	x								x	x	x	x								x	x	x	x			
IfcRoad	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x														
IfcRailway	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x
IfcFacilityPart																														
ROADSEGMENT					x										x	x											x	x		
INTERSECTION					x										x	x											x	x		
RAILWAYCROSSING					x										x	x											x	x		
TERMINAL					x										x	x											x	x	x	x
TRACKSTRUCTUREPART					x	x									x	x													x	x
LEVELCROSSING					x	x									x	x	x	x									x	x	x	x
POSITIONING															x	x	x	x												
IfcAlignment	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x												
IfcMapConversion	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x												
IfcProjectedCRS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x												
IfcReferent																														
REFERENCEMARKER	(x)	x	(x)																											
PHYSICAL ELEMENTS																														
IfcElementAssembly																														
SIGNALASSEMBLY			x								x	x											x	x						
IfcElementAssembly																														
USERDEFINED																														
TECHNICALBUILDING				x									x	x											x	x				
IfcElementAssembly																														
TRACKPANEL																														
IfcBuiltElement																														
IfcSignal																														
VISUAL			x								x	x											x	x						
AUDIO			x								x	x																		
IfcSign																														
PICTORAL			x								x	x											x	x						
IfcStair																														
LADDER			x								x	x											x	x						
IfcMember																														
POST			x								x	x											x	x						
IfcDoor																														
BOOM_BARRIER			x								x	x											x	x						
IfcFooting																														
PAD_FOOTING			x								x	x											x	x						

[illegible]