

# RCA

Reference CCS Architecture

*An initiative facilitated by the ERTMS Users  
Group and the EULYNX consortium*



## RCA Architecture Poster

### Preliminary issue

RCA Architecture Poster

Introduction  
Document id: RCA.Doc.40  
RCA Baseline set: 0  
Version: 0.2 (0.A)

About this document

This document is part of the RCA specifications, created from joint effort of infrastructure managers of the RCA initiative.

Release information

This issue is a preliminary version of this document. The content of this document reflects the current ongoing specification work of RCA. The content may be unfinished, will likely contain errors and can be changed without prior notice.

Support and feedback

For feedback, or if you have trouble accessing the material, please contact [rca@eulynx.eu](mailto:rca@eulynx.eu).

Imprint

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Purpose of the document

The architecture poster provides a simplified overview of the Reference CCS Architecture (RCA). The poster contains the main subsystems, actors, interfaces and layer defined and used within RCA. The different viewpoints are showing different aspects of RCA.

Provided viewpoints

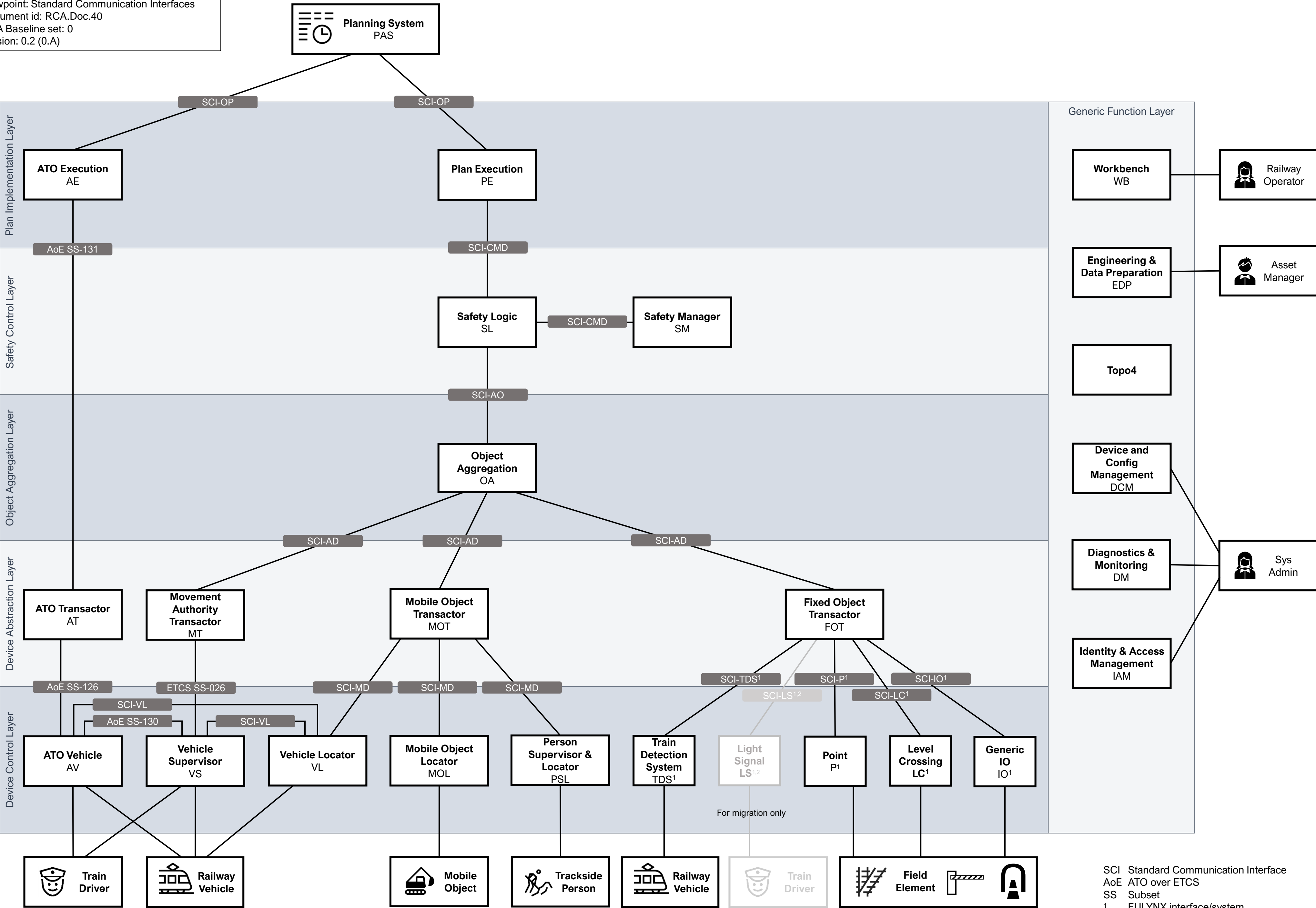
Standard Communication Interfaces	page 3
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References

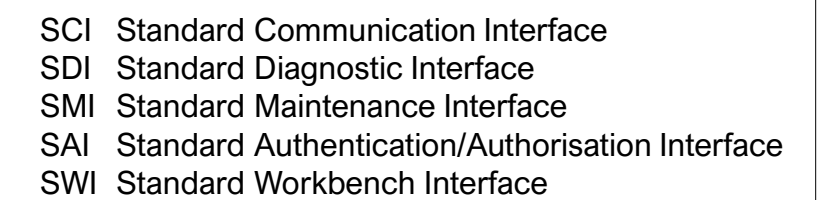
The last delivered version of all RCA documents are available on Basecamp:  
<https://3.basecamp.com/4168621/buckets/10801981/documents/2363880420>

For readers new to RCA the following reading order may be useful to get started:

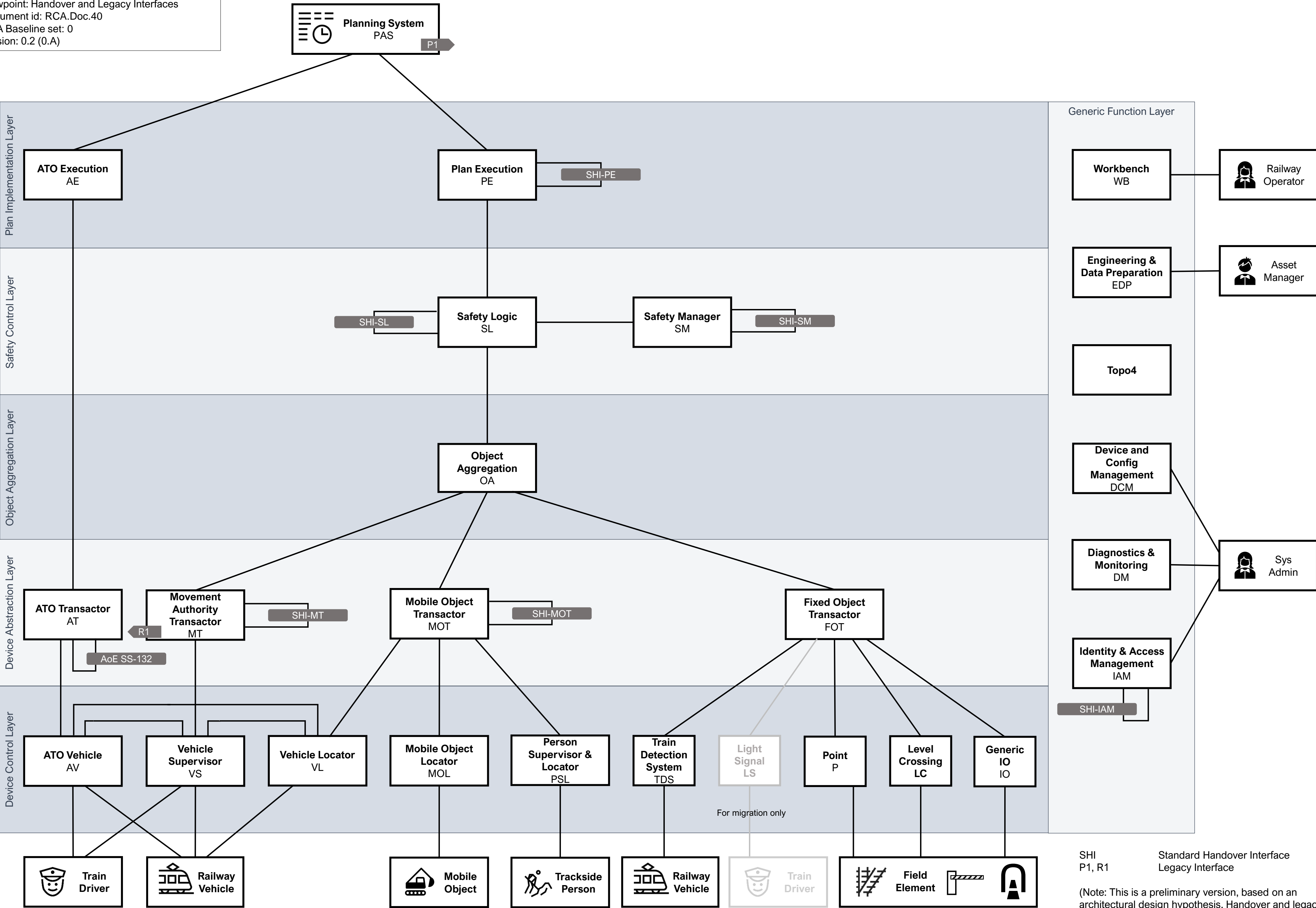
RCA.Doc.1	RCA White Paper
RCA.Doc.5	RCA Release Notes
RCA.Doc.6	RCA Documentation Plan
RCA.Doc.7	RCA FAQ
RCA.Doc.14	RCA Glossary
RCA.Doc.35	RCA System Architecture

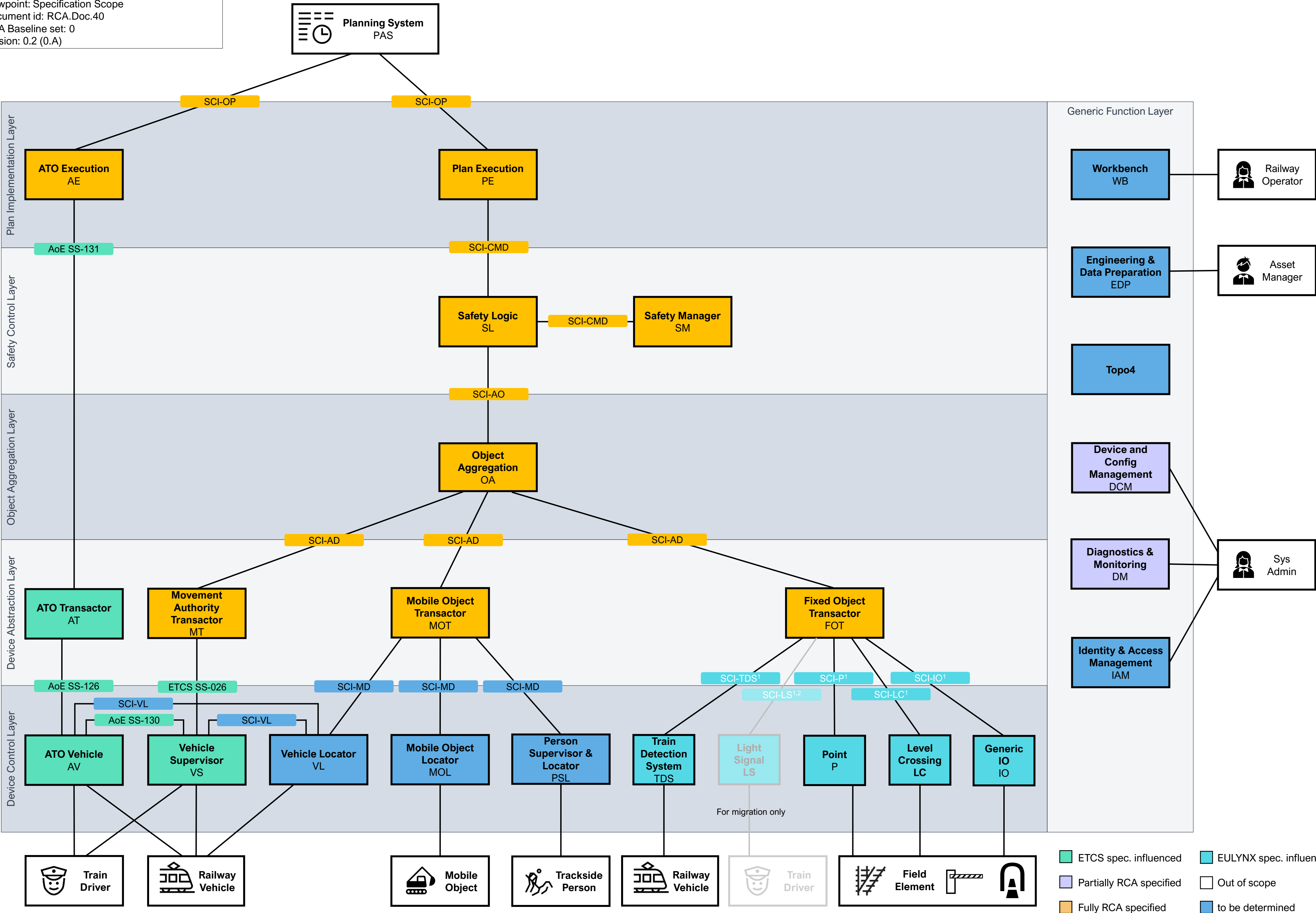


Viewpoint: Generic Function Interfaces  
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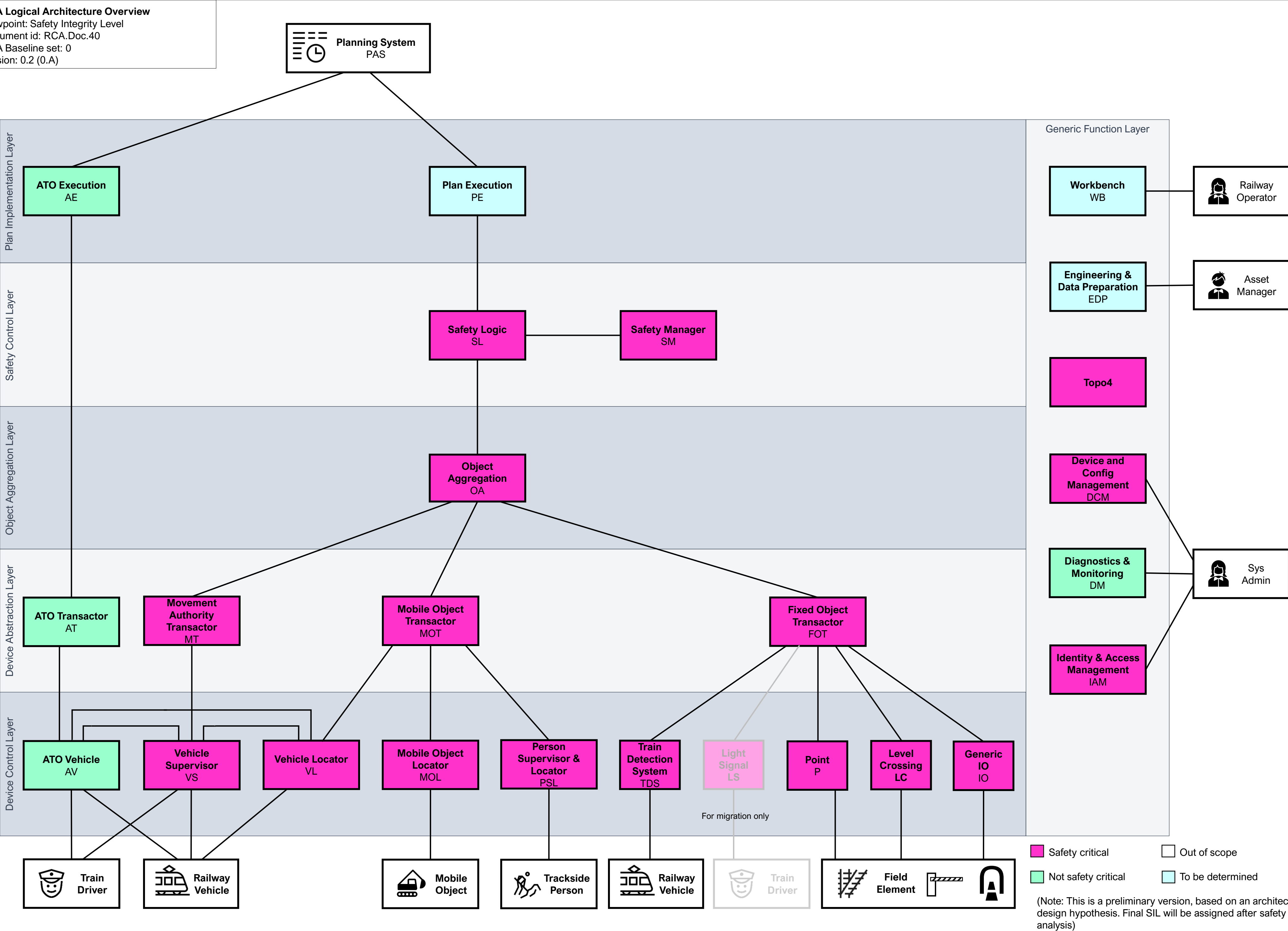


I\* Interface will be defined in a future version

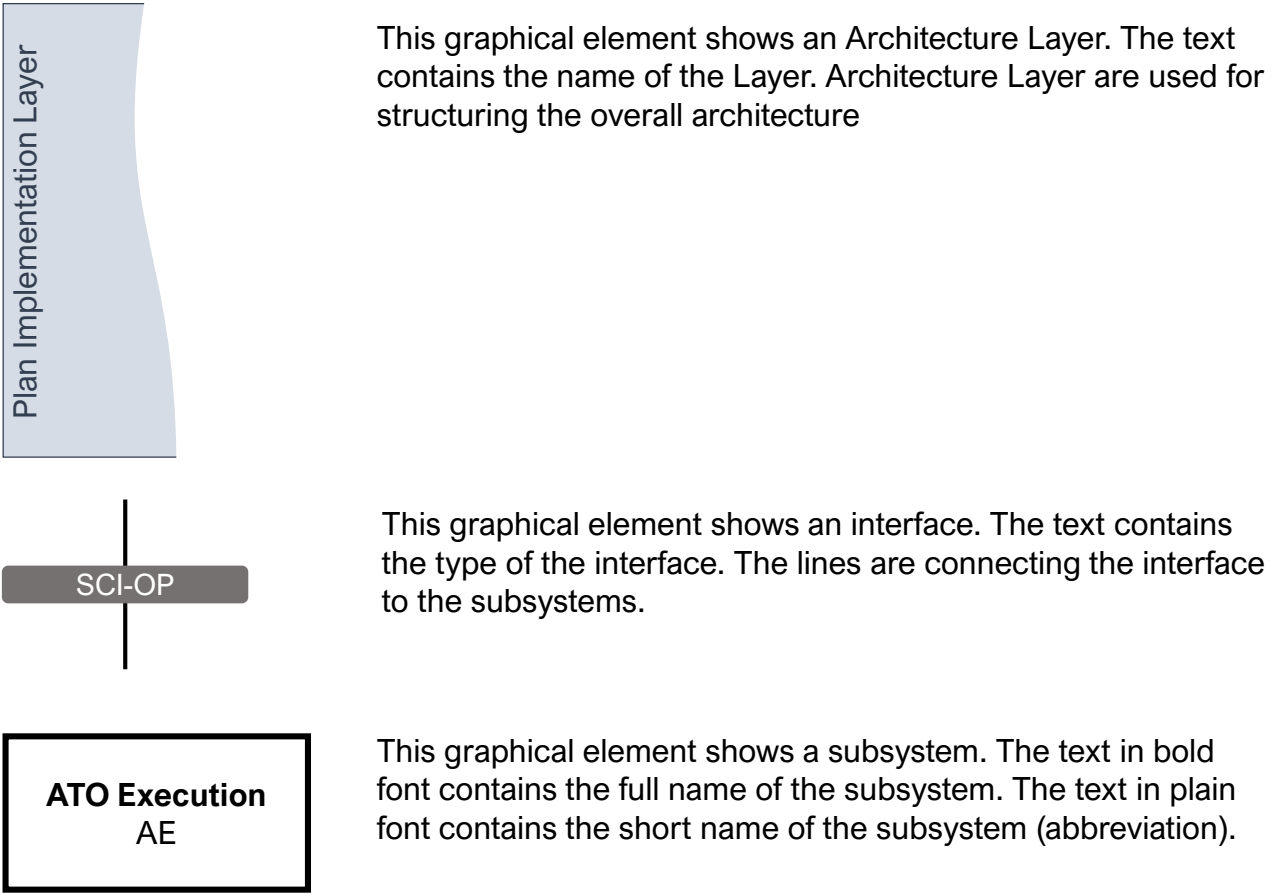








Graphical notation



Abbreviations

SCI	Standard Communication Interface
SDI	Standard Diagnostic Interface
SMI	Standard Maintenance Interface
SAI	Standard Authentication/Authorisation Interface
SWI	Standard Workbench Interface
SHI	Standard Handover Interface
AoE	ATO over ETCS
SS	CCS TSI ETCS Subset

Actor descriptions

Railway Operator	The Railway Operator manages, directs and facilitates the movement of trains over an assigned area.
Asset Manager	The Asset Manager provides all relevant infrastructure data and manages this data.
Sys Admin	Sys Admin is responsible for the technical operation and maintenance of the RCA systems.
Field Element	Railway fixed equipment on/or adjacent to track, e.g. light TDS, Point, etc.
Trackside Person	Trackside Person is a person working on the construction or maintenance of the trackside infrastructure.
Mobile Object	An object that is reporting to RCA system but is not able to be controlled directly by RCA, e.g. construction equipment. (not track bound)
Train Driver	A person capable and authorised to drive trains
Railway Vehicle	A Railway Vehicle can be a train unit, consist or a vehicle (track bound).
Planning System (PAS)	The planning system for the traffic management.

Subsystem descriptions

Plan Execution (PE)	PE translates operational plans into discrete requests for movement permissions and state changes of abstract objects representing Field Element.
ATO Execution (AE)	AE translates operational plans into journey profile for automatic train operations.
Safety Logic (SL)	SL grants or rejects requests for state changing of either a Field Element or for a planned movement, based on a safety evaluation.
Safety Manager (SM)	SM monitors the state of the railway operation, recognises hazardous combinations of states, and triggers safety reactions.
Object Aggregation (OA)	OA routes and disaggregates abstract commands to the transactors and aggregates state from into abstract representations of the state of the railway operation.
ATO Transactor (AT)	AT distributes automatic train operation journey profiles, to the on board unit of individual Railway Vehicles.
Movement Authority Transactor (MT)	MT translates commands and state feedback between the device-specific track-train message set specified.
Mobile Object Transactor (MOT)	MOT translates between the abstract objects used by the Object Abstraction Layer and the device-specific commands and vice versa.
Fixed Object Transactor (FOT)	FOT translates between the abstract objects used by the Object Abstraction Layer and the device-specific commands from EULYNX subsystems and vice versa.
ATO Vehicle (AV)	AV executes journey profile packet and segment profile packet by controlling the physical functions of the Railway Vehicle.
Vehicle Supervisor (VS)	SubSys VS implements the supervision part of the ETCS on board unit.
Vehicle Locator (VL)	VL uses mobile localization technology to safely and reliably provide position and speed information of the train.
Mobile Object Locator (MOL)	MOL provides the position of a trackbound or non-trackbound object on the railway network topology.
Person Supervisor & Locator (PSL)	PSL provides additionally to MOL warnings and protection from approaching movable objects.
Point (P)	P is used to control and monitor the Point machines of moveable elements based on a request from the FOT.
Level Crossing (LC)	The LC protects the crossing area of rails and vehicles through its level crossing protection facility.
Train Detection System (TDS)	TDS monitors the vacancy and occupancy status of TVP sections.
Light Signal (LS)	LS transmits information to Train Driver.
Generic IO (IO)	IO is used for integrating signalling systems, controlled and monitored by FOT.
Workbench (WB)	WB is a platform for providing process specific user interfaces.
Engineering & Data Preparation (EDP)	EDP support commissioning and maintenance processes.
Topo4	Topo4 provides a correct, validated topology and topography data for SIL4 systems.

Subsystem descriptions (cont.)

Device and Config Management (DCM)	DCM is used to register, setup and manipulate Devices.
Diagnostic & Monitoring (DM)	DM collects monitoring and diagnostics information from subsystems.
Identity & Access Management (IAM)	IAM authenticates and authorizes users and technical systems and grants or denies access to the system.

Interface descriptions

SCI-OP	Operational Plan Interface
SCI-CMD	Command Interface
SCI-AO	Abstract Object Interface
SCI-AD	Abstract Device Interface
SCI-MD	Mobile Device Interface
SCI-VL	Vehicle Locator Interface
SCI-P	EULYNX SCI-P
SCI-LC	EULYNX SCI-LC
SCI-TDS	EULYNX SCI-TDS
SCI-LS	EULYNX SCI-LS
SCI-IO	EULYNX SCI-IO
AoE SS-131	CCS TSI ATO over ETCS SUBSET-131
AoE SS-126	CCS TSI ATO over ETCS SUBSET-126
AoE SS-130	CCS TSI ATO over ETCS SUBSET-130
AoE SS-132	CCS TSI ATO over ETCS SUBSET-132
ETCS SS-026	CCS TSI ETCS SUBSET-026
SHI-PE	PE Handover Interface
SHI-SL	SL Handover Interface
SHI-SM	SM Handover Interface
SHI-MOT	MOT Handover Interface
SHI-MT	MT Handover Interface
P1	Legacy Interface
R1	Legacy Interface



RCA Logical Architecture Overview

Name changes  
Document id: RCA.Doc.40  
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Subsystems

<i>Subsystem name from version RCA 0.1</i>	<i>Subsystem name in previous versions</i>
Planning System (PAS)	TMS-PAS (Planning)
Plan Execution (PE)	TMS-PE (Plan Execution)
ATO Execution (AE)	TMS-AE (ATO Execution)
Safety Logic (SL)	APS-SL (Safety Logic)
Safety Manager (SM)	APS-SM (Safety Manager)
Object Aggregation (OA)	APS-OA (Object Aggration)
ATO Transactor (AT)	ATO-AT (ATO Transactor)
Movement Authority Transactor (MT)	APS-MT (Movement Authority Transactor)
Mobile Object Transactor (MOT)	APS-MOT (Mobile Object Transactor)
Fixed Object Transactor (FOT)	APS-FOT (Fixed Object Transactor)
ATO Vehicle (AV)	ATO-AV (ATO Vehicle)
Vehicle Supervisor (VS)	VS (Vehicle Supervisor)
Vehicle Locator (VL)	VL (Vehicle Locator)
Mobile Object Locator (MOL)	MOL (Mobile Object Locator)
Person Supervisor & Locator (PSL)	PSL (Person Supervisor & Locator)
Point (P)	OC-Point
Level Crossing (LC)	OC-LX
Train Detection System (TDS)	OC-TDS
Light Signal (LS)	OC-LS
Generic IO (IO)	OC-Generic-IO
Workbench (WB)	RCA WB (Workbench)
Engineering & Data Preparation (EDP)	EDP (Engineering & Data Prep)
Topo4	APS-Topo4 (Topology for safe appications)
Device and Config Management (DCM)	DCM (Device & Configuration Management)
Diagnostic & Monitoring (DM)	DM (Diagnostics & Monitoring)
Identity & Access Management (IAM)	IAM (Identity & Access Management)

Interfaces

<i>Interface name from version RCA 0.1</i>	<i>Interface name in previous versions</i>
SCI-OP	1
SCI-CMD	2
SCI-AO	3
SCI-AD	4
SCI-MD	5
SCI-VL	22
AoE SS-131	7
AoE SS-126	8
ETCS SS-026	6
AoE SS-130	21
SCI-P	11
SCI-LC	11
SCI-TDS	11
SCI-LS	11
SCI-IO	11
SHI-PE	h1
SHI-SL	h2
SHI-SM	h9
SHI-MOT	h5
AoE SS-132	h7
P1 (will be renamed in a future version)	P1
A1 (will be renamed in a future version)	A1
R1(will be renamed in a future version)	R1
I1 (will be renamed in a future version)	I1
I2 (will be renamed in a future version)	I2
Standard Diagnostic Interface	41
Standard Maintenance Interface	42
Standard Authentication/Authorisation Interface	43