

# RCA

Reference CCS Architecture

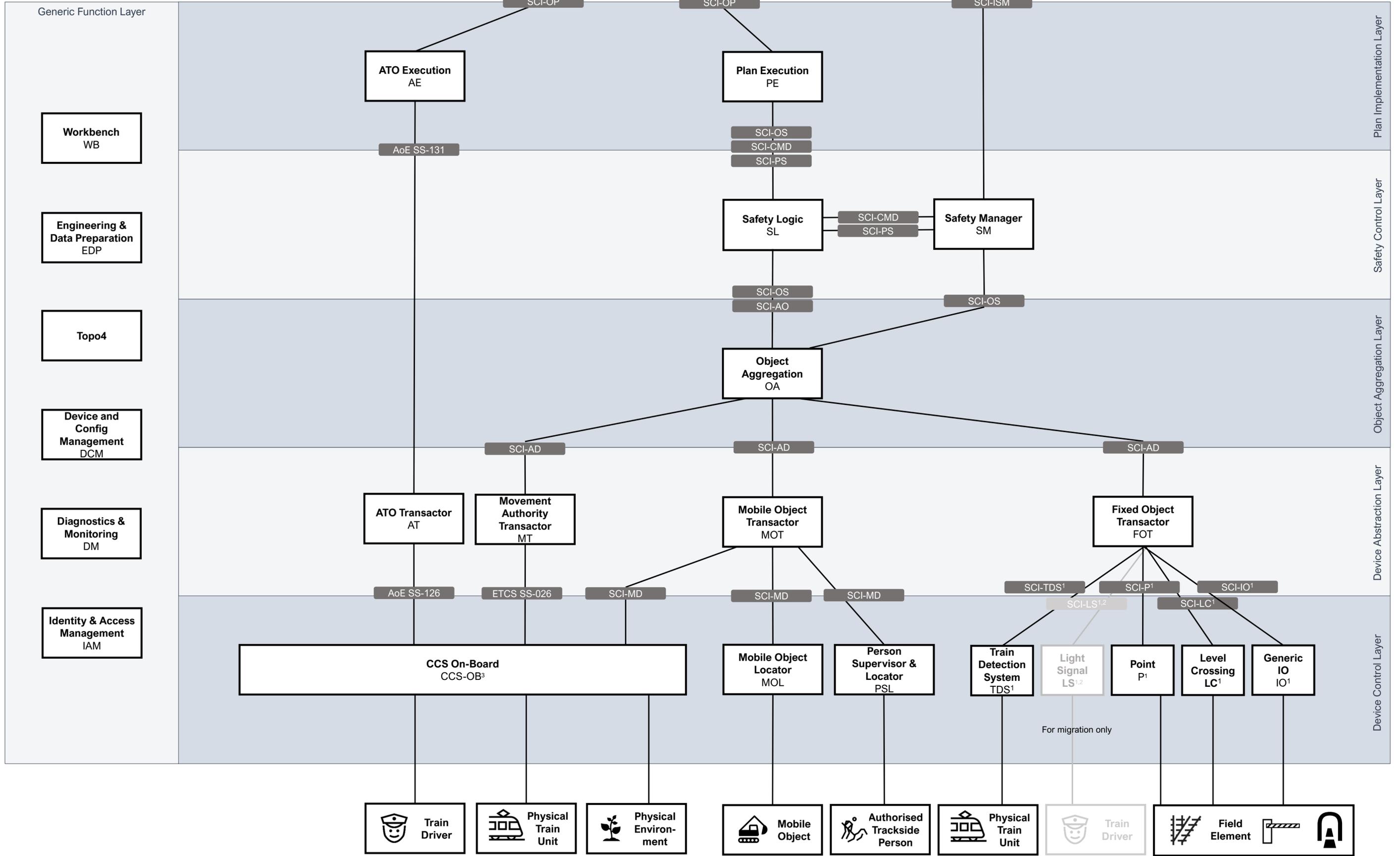


*An initiative facilitated by the ERTMS Users  
Group and the EULYNX consortium*

## RCA Architecture Poster

### Preliminary issue

*Note: SCI-IPM towards CCS On-Board will be added in a future release*



**RCA Logical Architecture Overview**

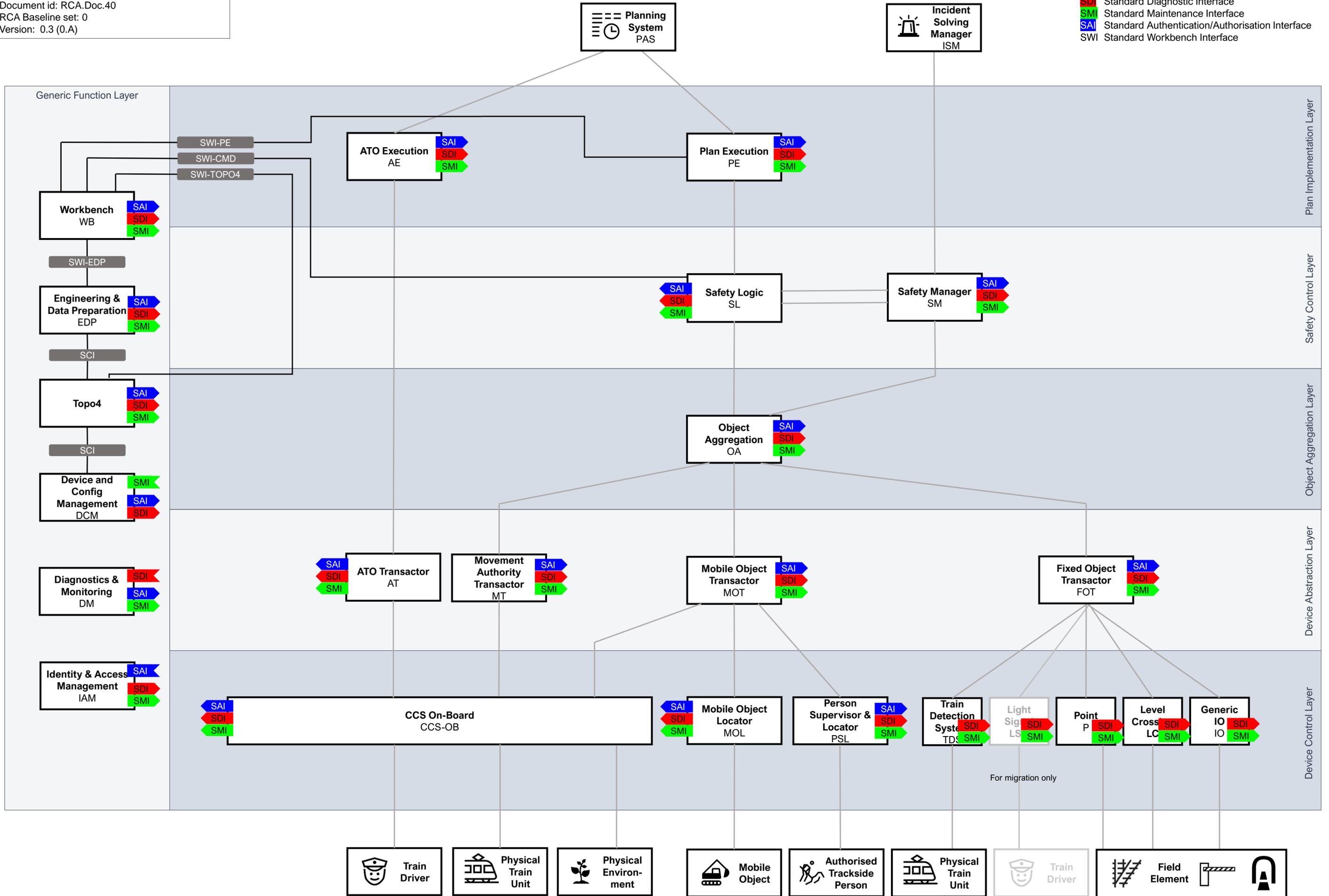
Viewpoint: Supporting Interfaces

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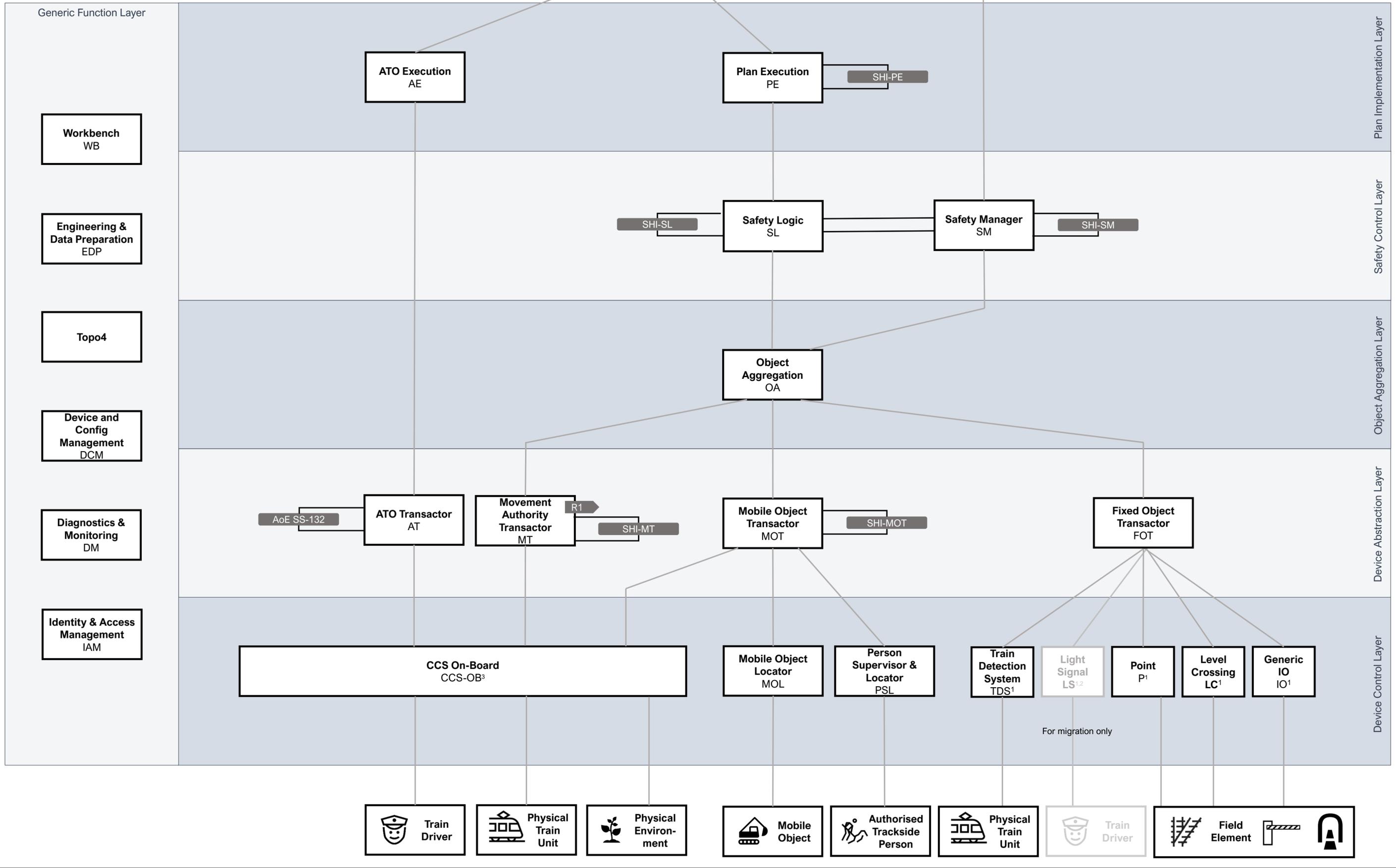
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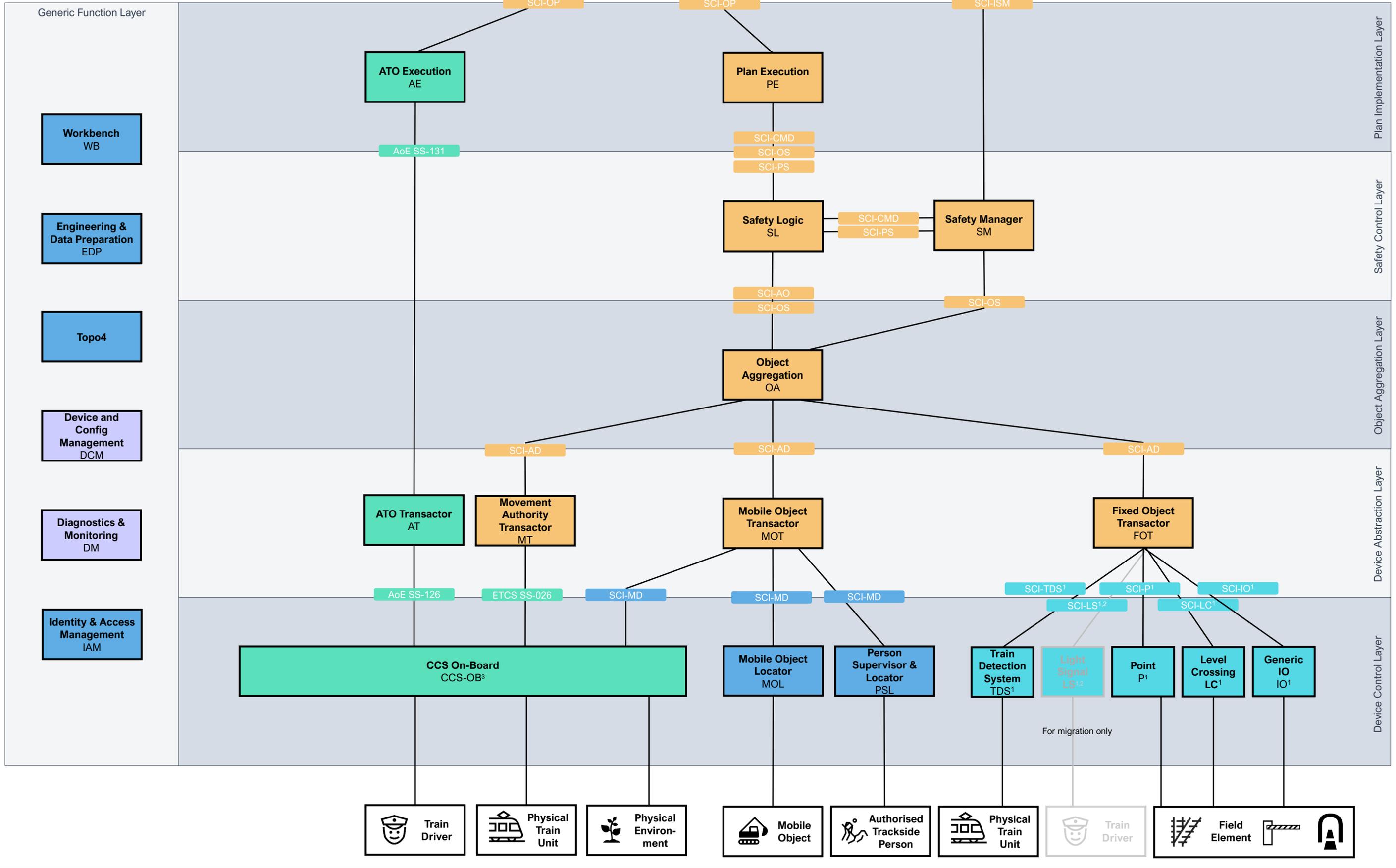
Version: 0.3 (0.A)

- SCI Standard Communication Interface
- SDI Standard Diagnostic Interface
- SMI Standard Maintenance Interface
- SAI Standard Authentication/Authorisation Interface
- SWI Standard Workbench Interface



SHI  
 P1, R1  
 Standard Handover Interface  
 Legacy Interface  
 (Note: This is a preliminary version, based on an architectural design hypothesis. Handover and legacy interfaces will be refined in a future version)





**RCA Logical Architecture Overview**

Viewpoint: Safety Integrity Level

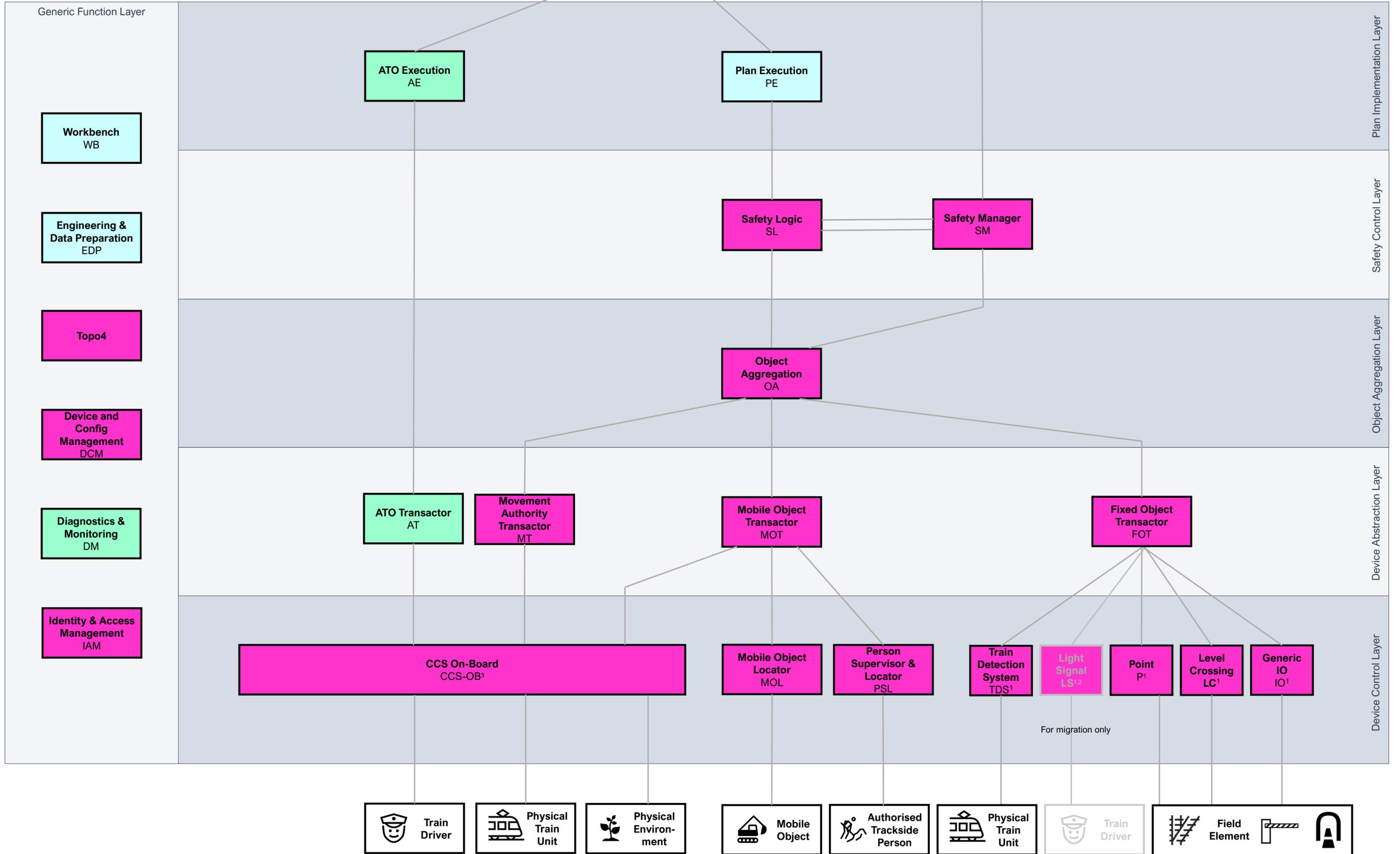
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- Safety critical
- Out of scope
- Not safety critical
- To be determined

(Note: This is a preliminary version, based on an architectural design hypothesis. Final SIL will be assigned after safety risk analysis)



## RCA Logical Architecture Overview

Notation, descriptions and abbreviations

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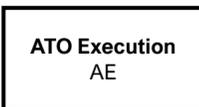
### Graphical notation



This graphical element shows an Architecture Layer. The text contains the name of the Layer. Architecture Layer are used for structuring the overall architecture



This graphical element shows an interface. The text contains the type of the interface. The lines are connecting the interface to the systems.



This graphical element shows a system. The text in bold font contains the full name of the system. The text in plain font contains the short name of the system (abbreviation).

### 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

Field Element	Railway fixed equipment on/or adjacent to track, e.g. light signal, level crossing, 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.
Train Driver	A person capable and authorised to drive trains
Physical Train Unit	Physical Train Unit (PTU) is physically existent, driveable and made up of a single or an ordered sequence of Physical Consists coupled together.
Physical Environment	Environment provides information about conditions and influences the railway operation. It can be a trackside or vehicle-based.
Incident Solving Manager	The Incident Solving Manager coordinates the non-safety related actions to cope with the incidents.
Planning System	The Planning System for the traffic management.

### System 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 CCS On-Board of Physical Train Units.
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.
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)	The EULYNX subsystem P is used to control and monitor the Point machines of moveable elements based on a request from the FOT.
Level Crossing (LC)	The EULYNX subsystem LC protects the crossing area of rails and vehicles through its level crossing protection facility.
Train Detection System (TDS)	The EULYNX subsystem TDS monitors the vacancy and occupancy status of TVP sections.
Light Signal (LS)	The EULYNX subsystem LS transmits information to Train Driver.
Generic IO (IO)	The EULYNX subsystem 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 RCA subsystems.
CCS On-Board (CCS-OB)	All train-borne subsystems needed for CCS and ATO. CCS On-board is specified by OCORA.

### System 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-PS	Planned State Interface
SCI-OS	Operational State 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
SCI-ISM	Incident Solving Interface
AoE SS-131	CCS TSI ATO over ETCS SUBSET-131
AoE SS-126	CCS TSI ATO over ETCS SUBSET-126
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

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**Document History**

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<i>Version</i>	<i>Content / Changes</i>
Version 0.1	First version of document
Version 0.2 (0.A)	Incorporation of SCI-OS and SCI-PS GoA 3, 4 additions
Version 0.2 (0.B)	Incorporation of review comments after internal review
Version 0.3 (0.A) Preliminary	Train-borne system and interfaces aligned with OCORA Update on GoA4 trackside subsystems Clean up SCI-CMD, SCI-OS, SCI-PS

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