

THALES



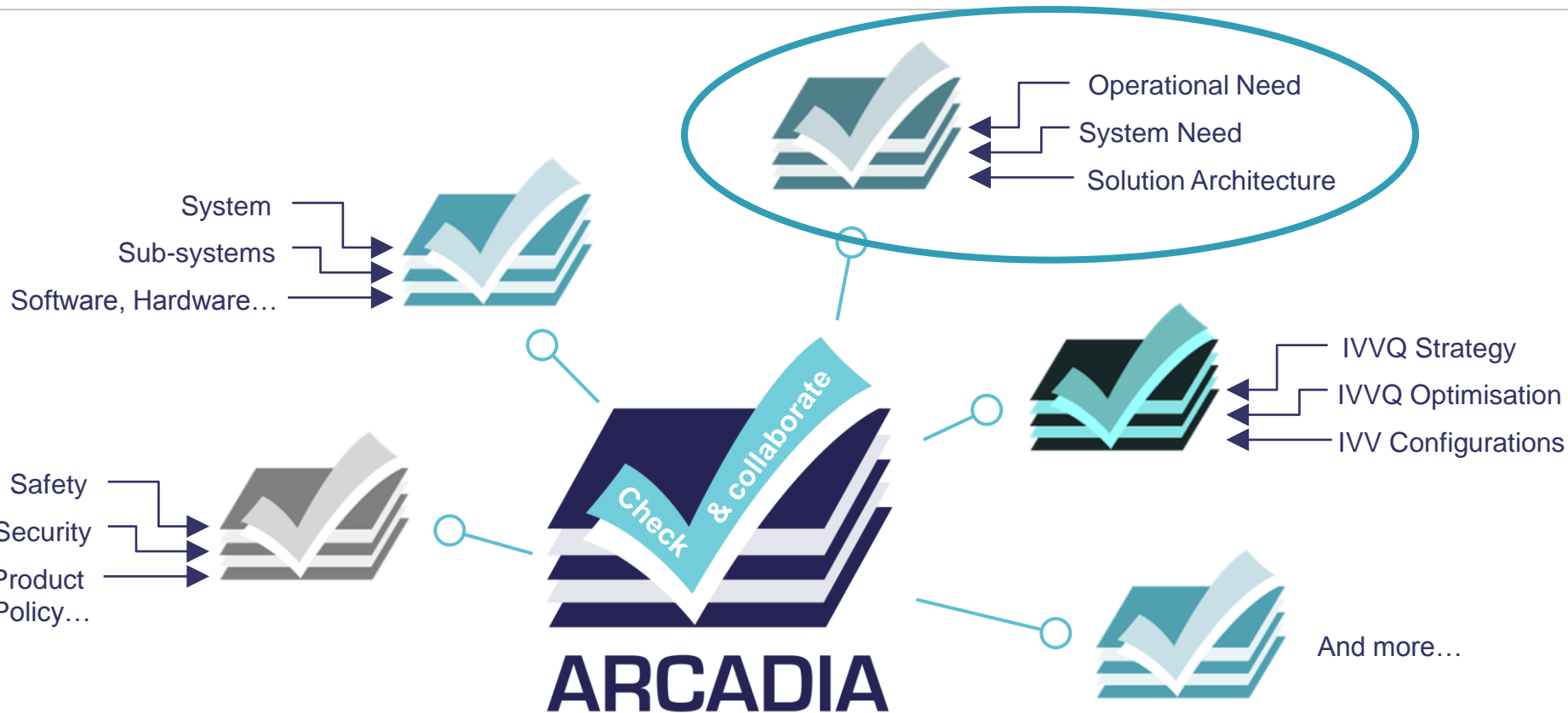
Sample Arcadia / Capella Model

Railway Level-crossing Command & Control



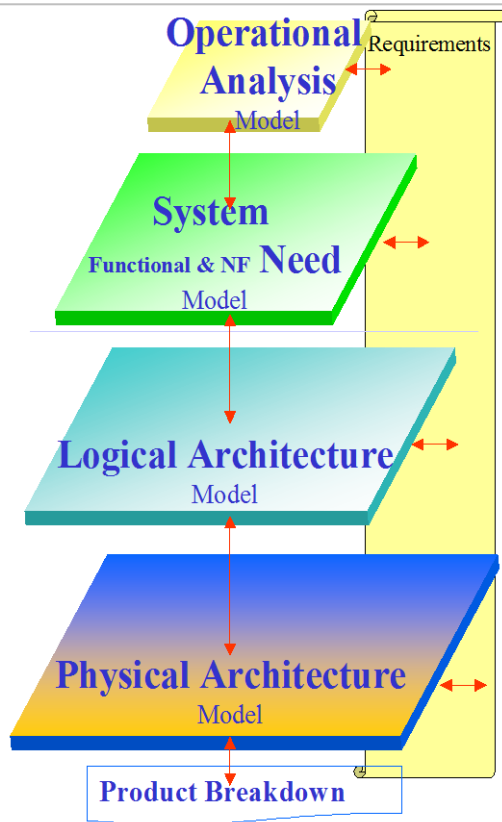
What ARCADIA is

Focus here today



OPEN

Method Perspectives: formalising & sharing Need & Solution



User Need

What **the users** of the system need to accomplish

System Need

What the system has to accomplish for the Users

Notional Solution

How the system will work so as to fulfil expectations

Final Solution

How the system will be developed & built

Sub-contractors input

Summary: Perspectives & Models

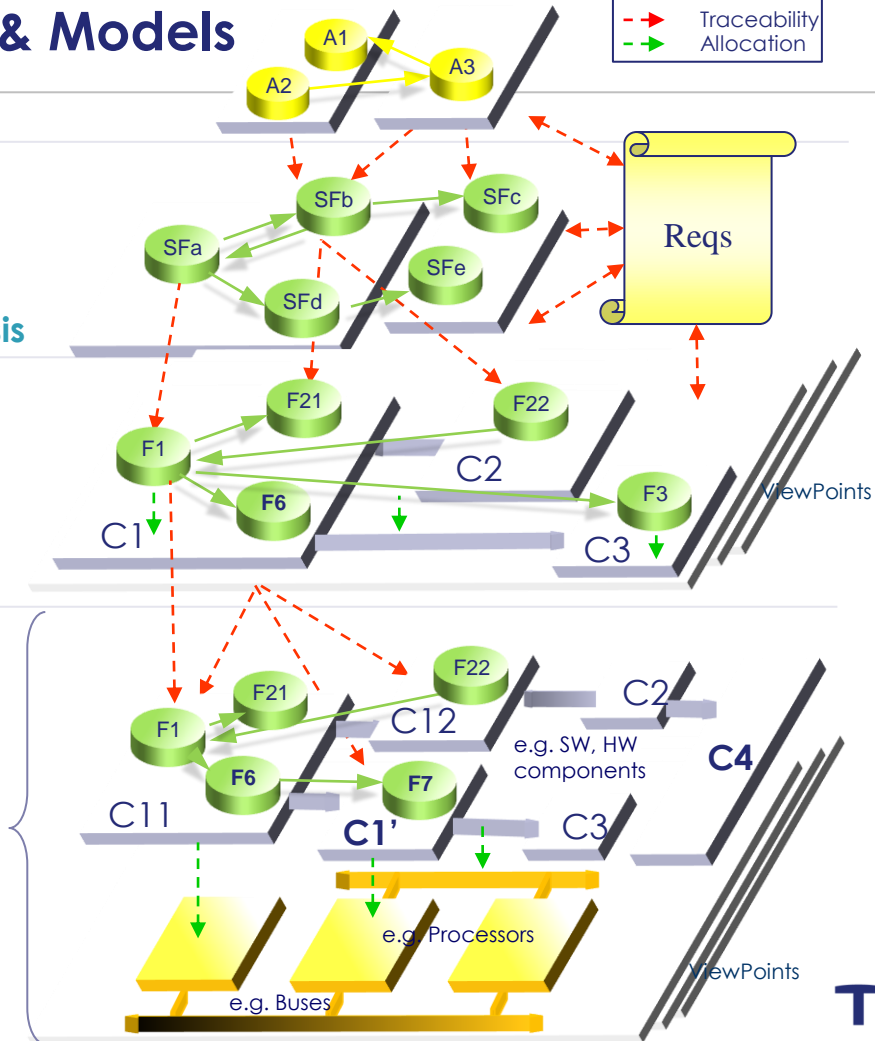


Operational Analysis

Functional/NF Need Analysis

Logical Architecture Viewpoints trade-off

Physical Architecture Viewpoints trade-off



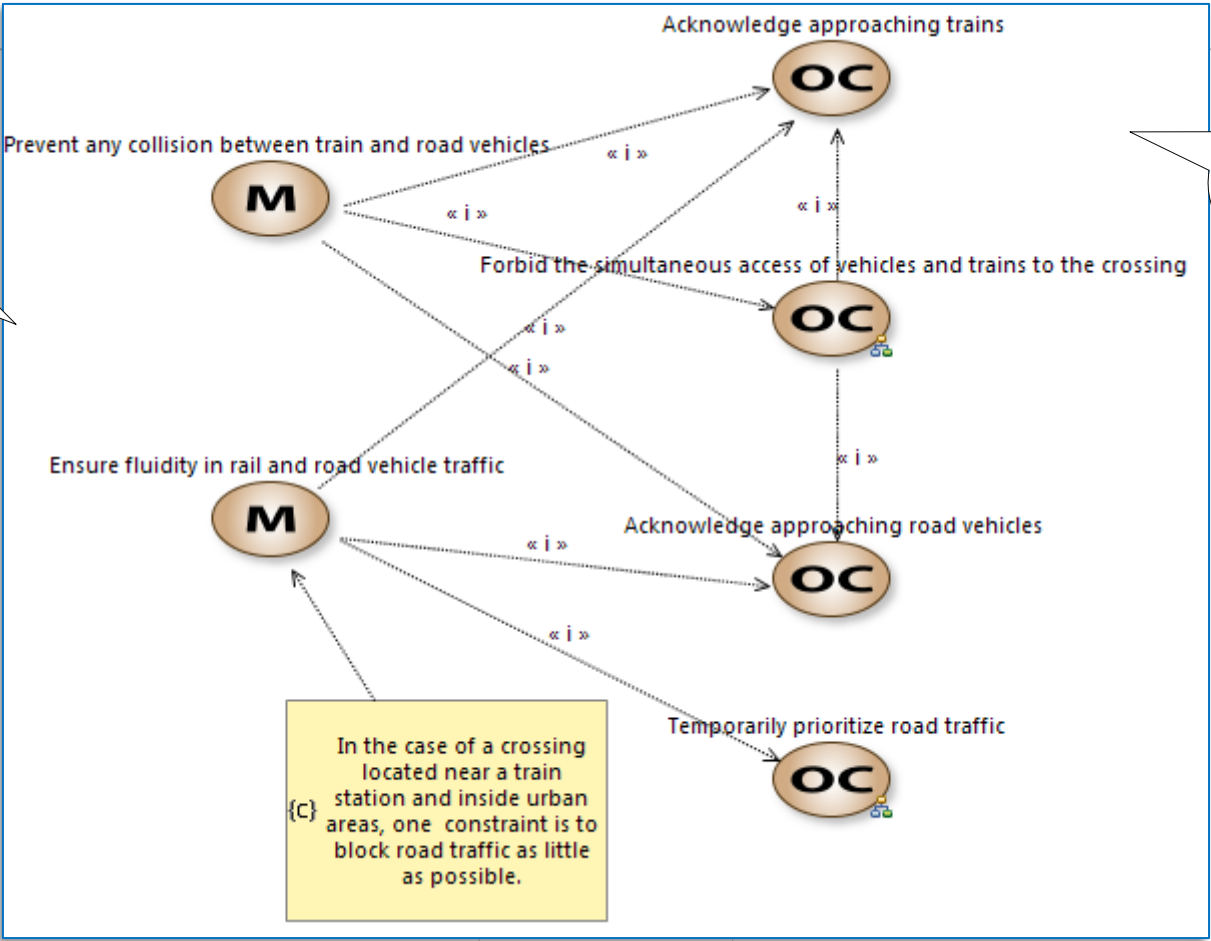
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Operational Analysis

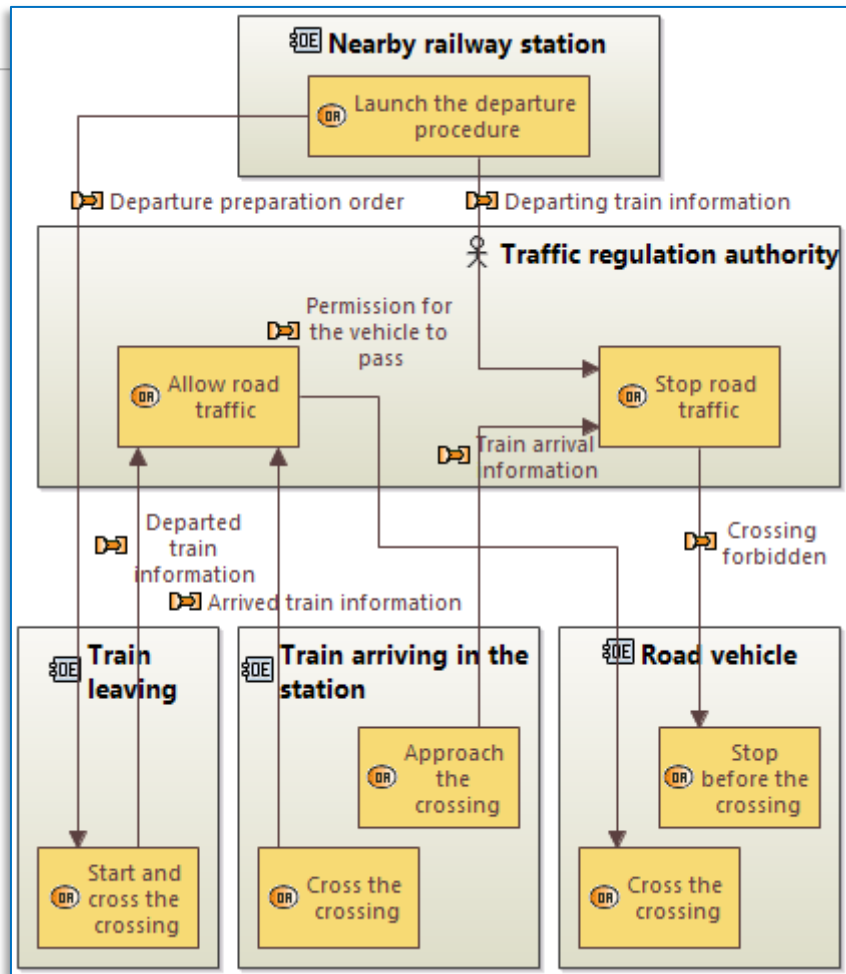
What the users of the system need to accomplish



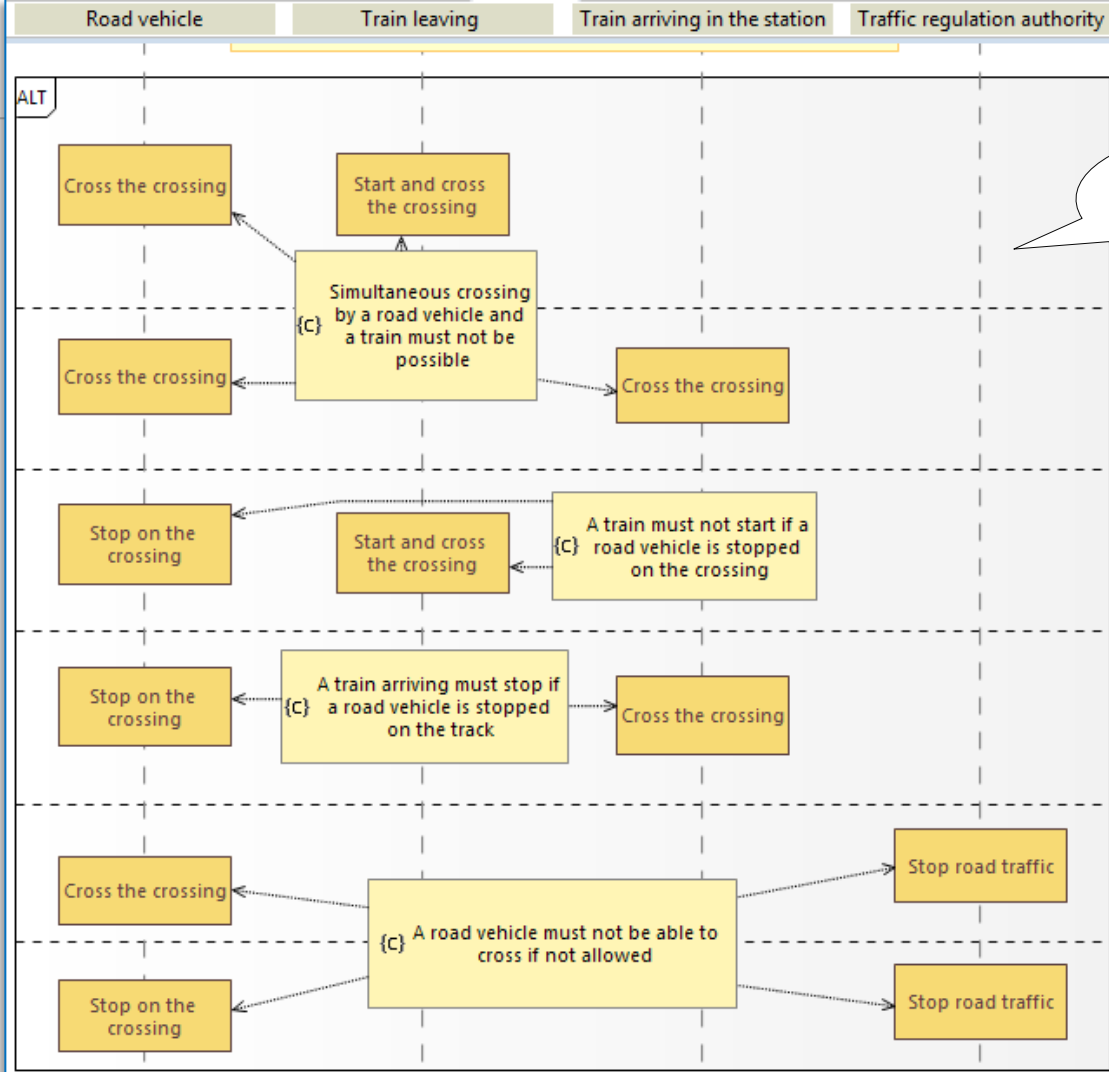
Missions to be fulfilled by the users



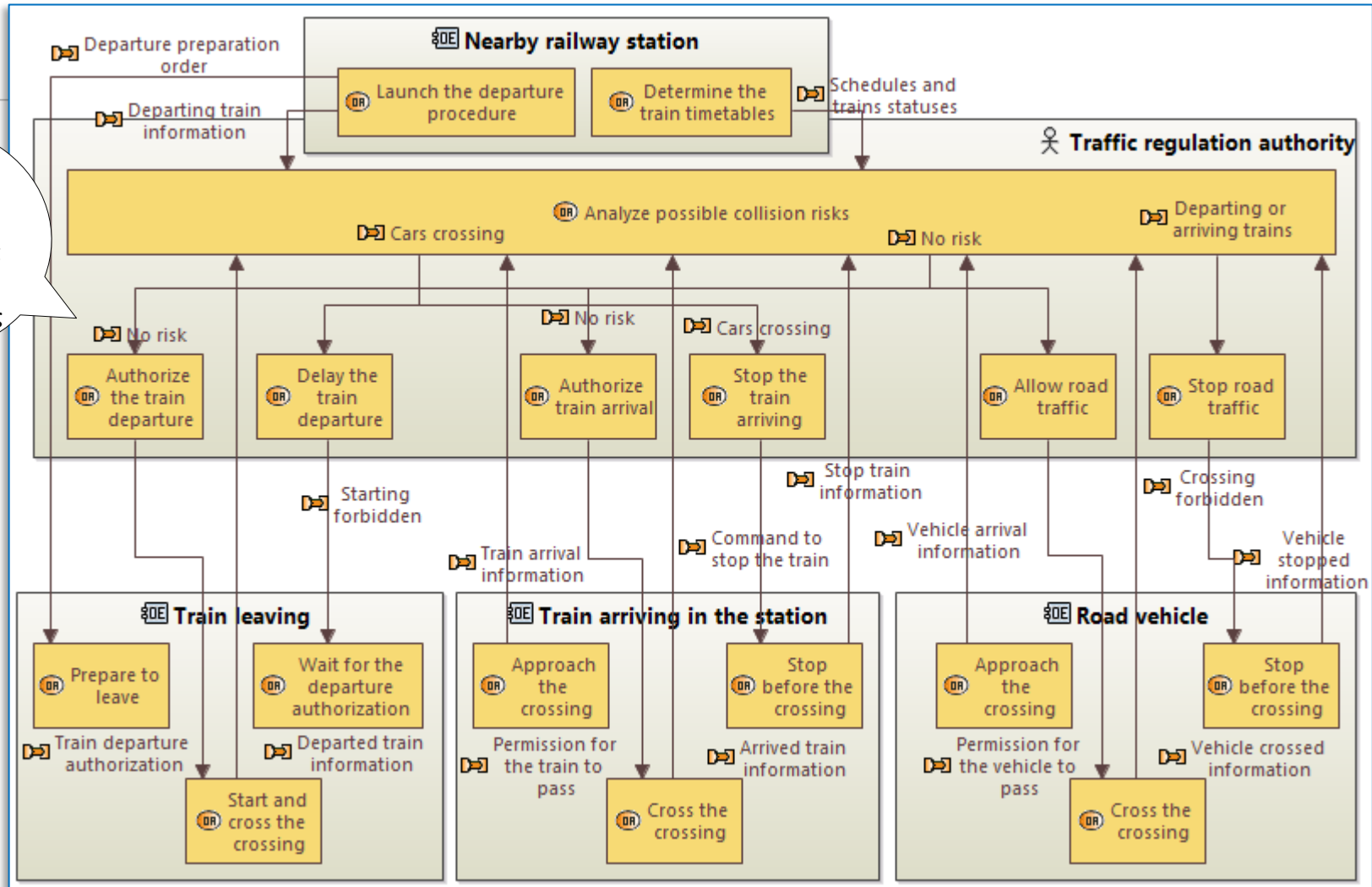
Capabilities needed to fulfil the missions



Initial description of users and stakeholders activities & interactions



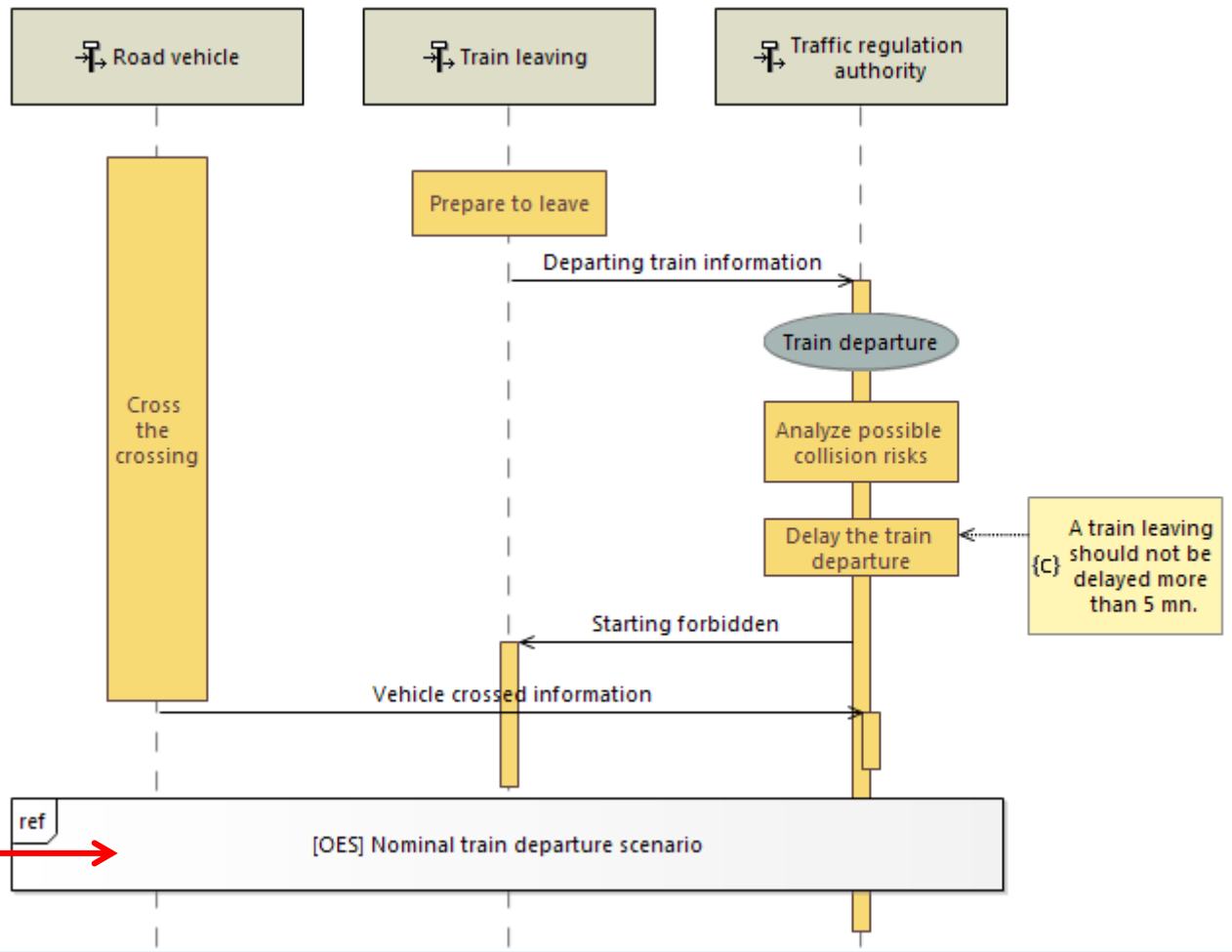
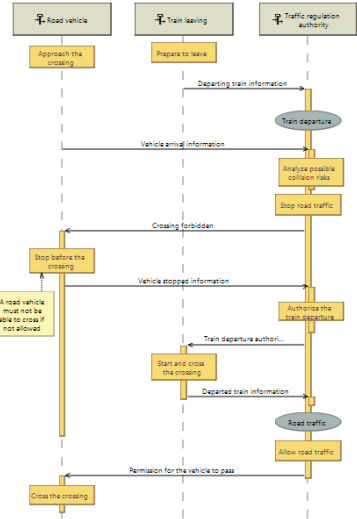
Revised description of users and stakeholders activities & interactions



Temporarily prioritize road traffic

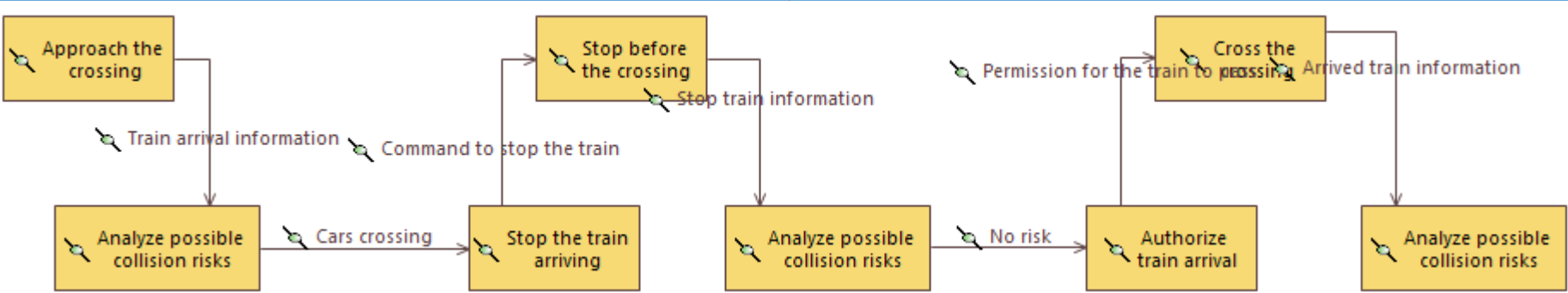
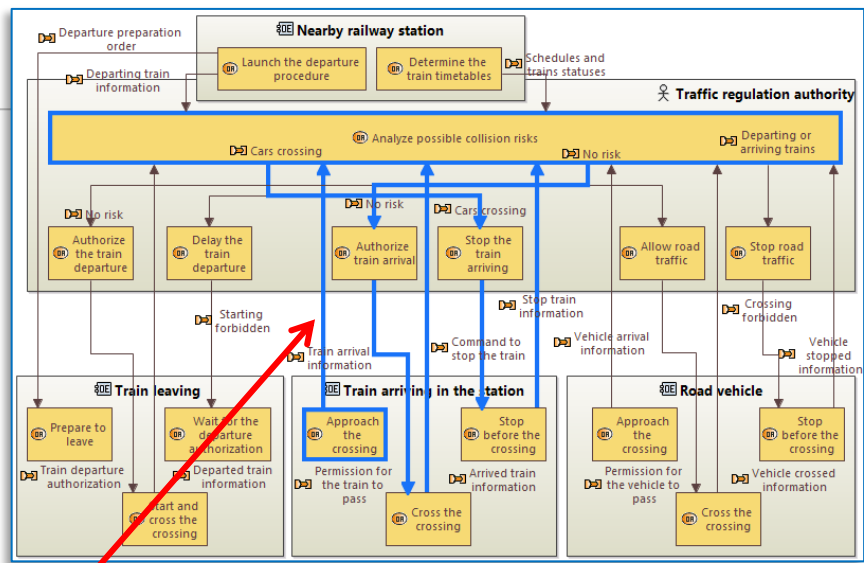


Capability description:
time-related Scenarios





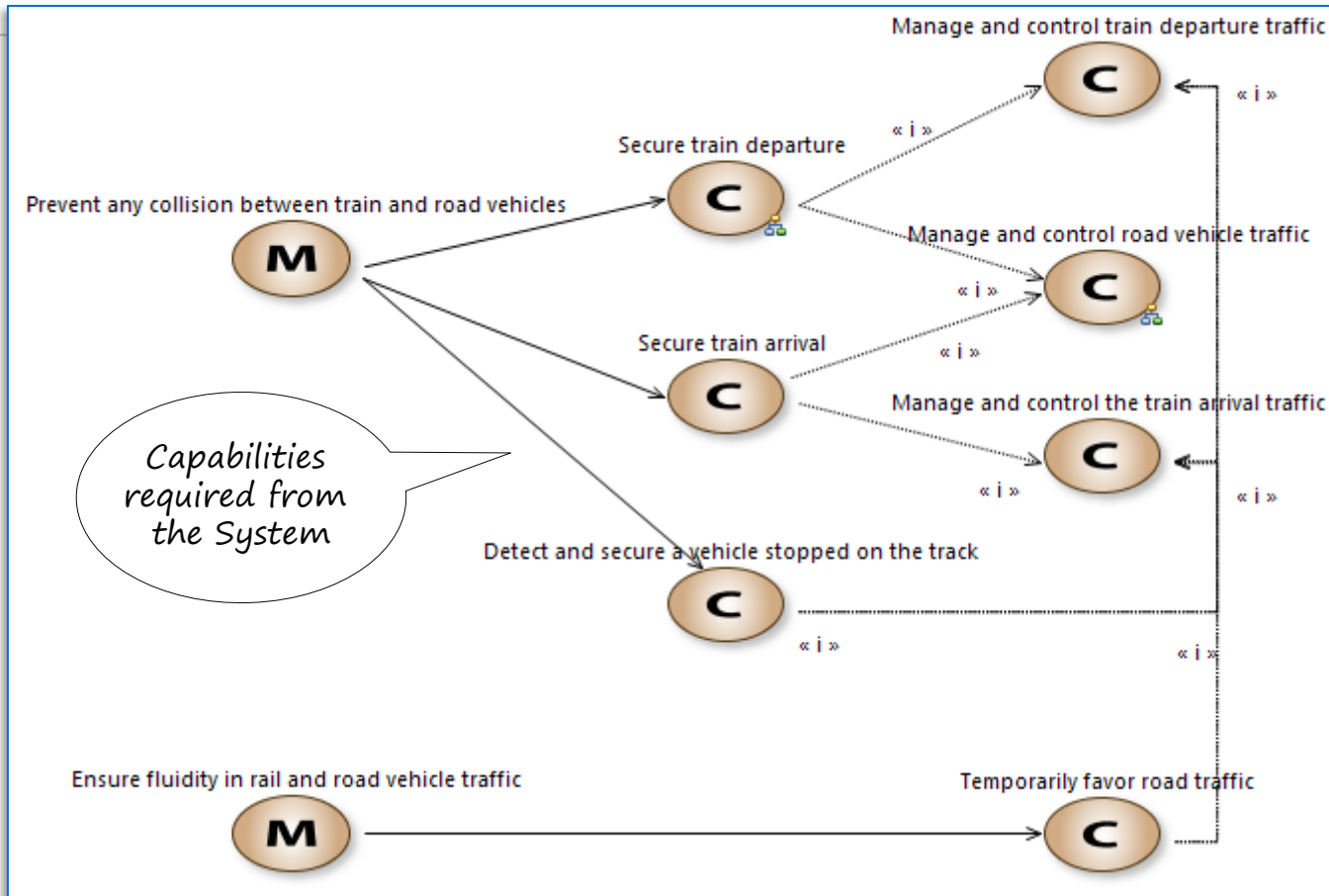
Capability description:
Operational Processes



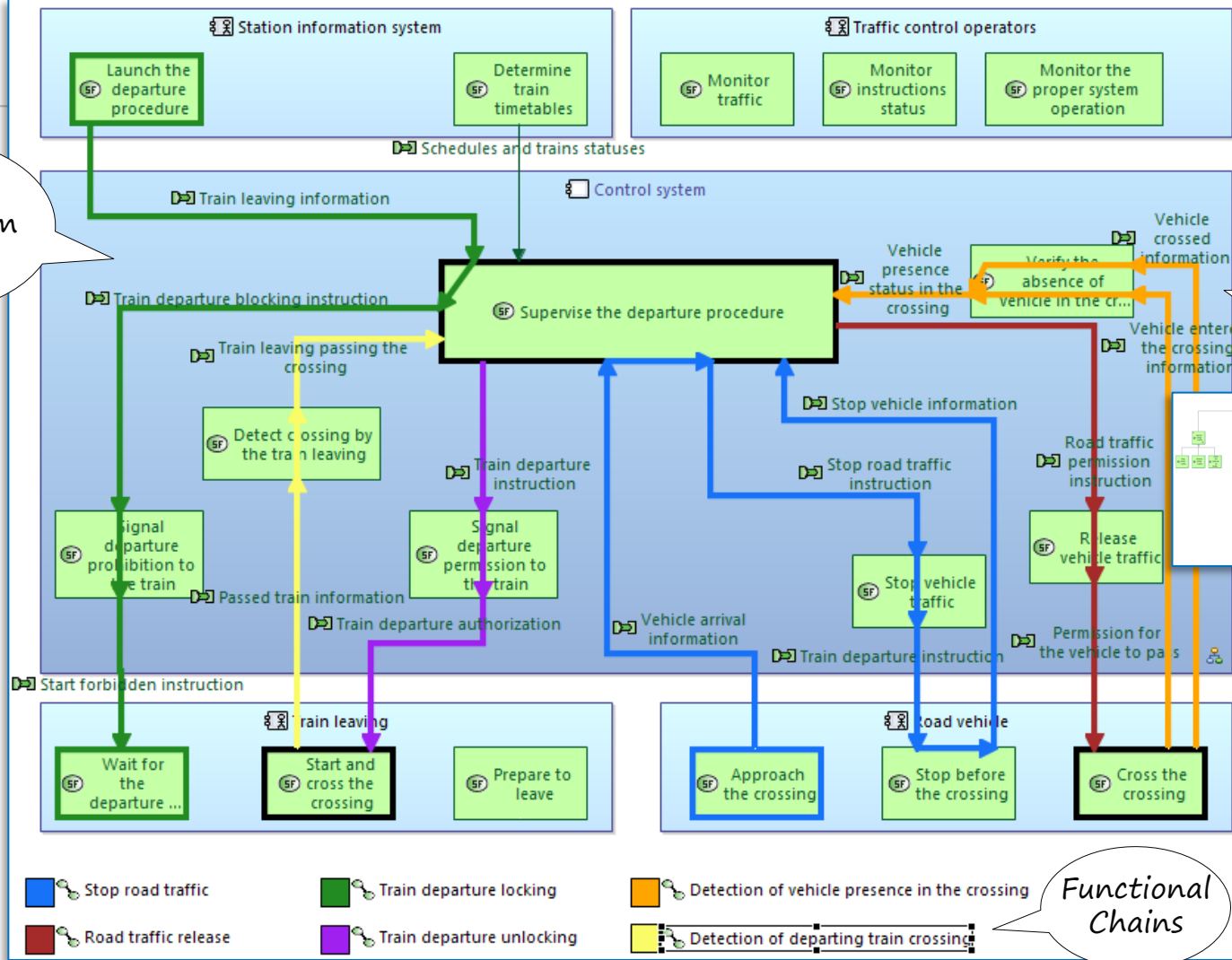
System Need Analysis

What the system has to accomplish for the Users

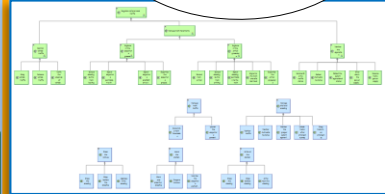




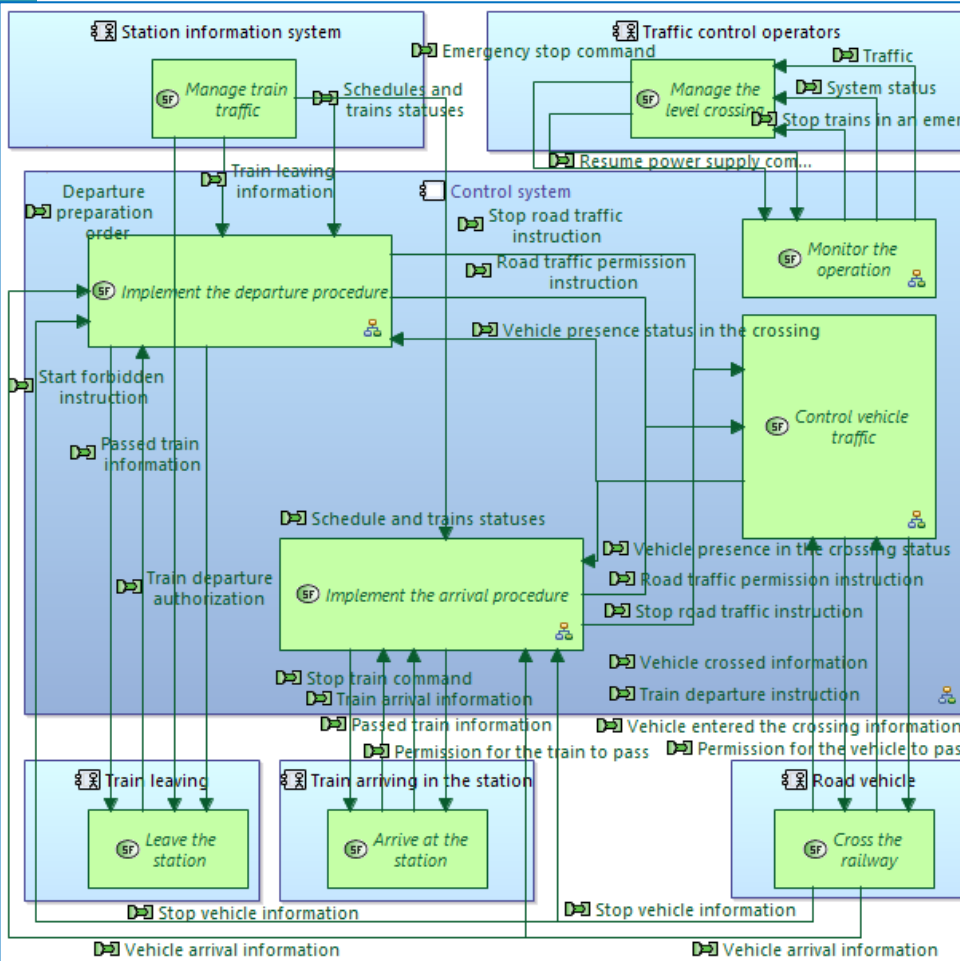
Services required from the system



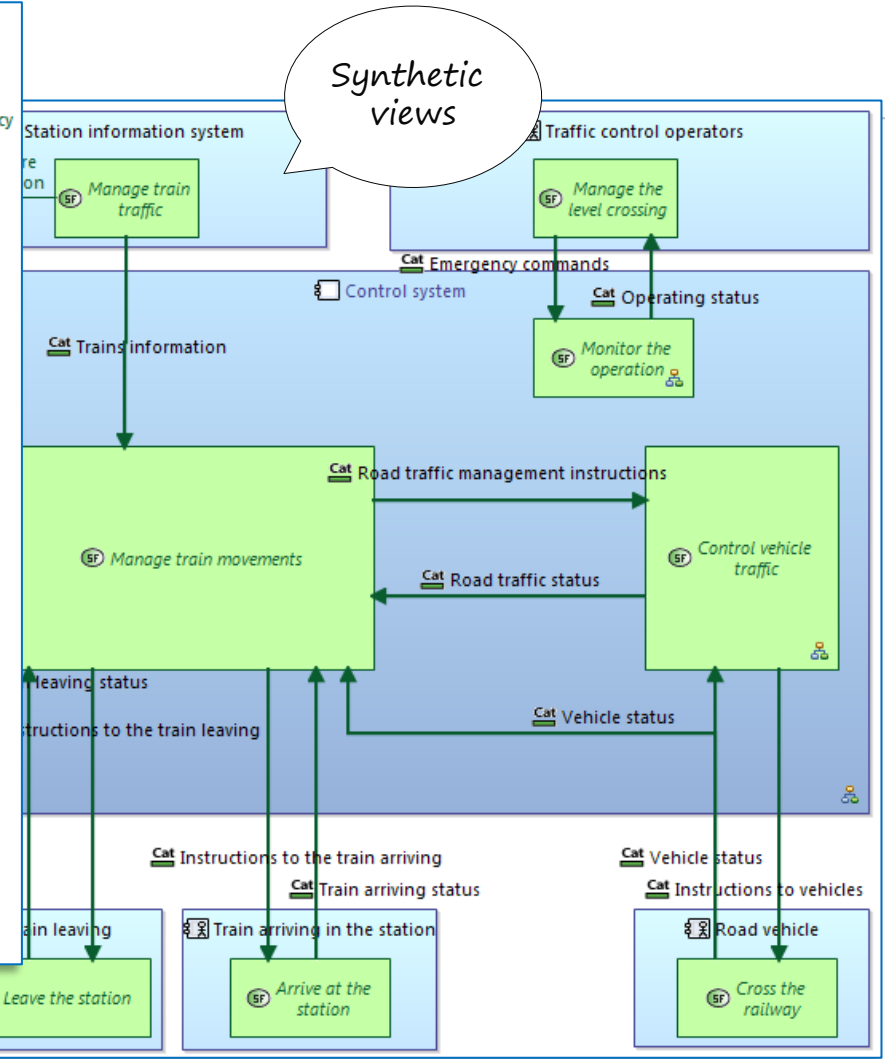
Focus on Train departure



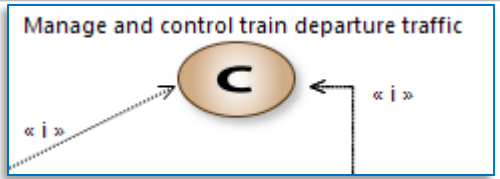
Functional Chains



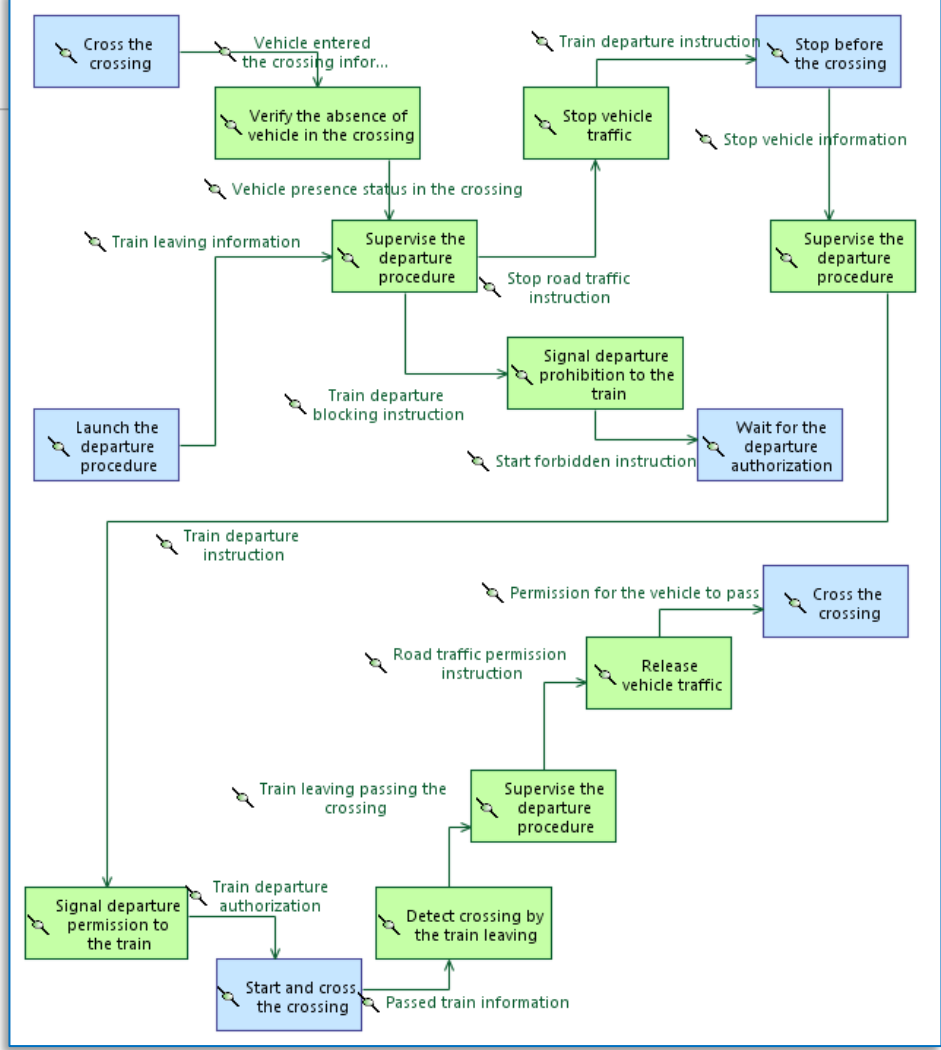
Synthetic views

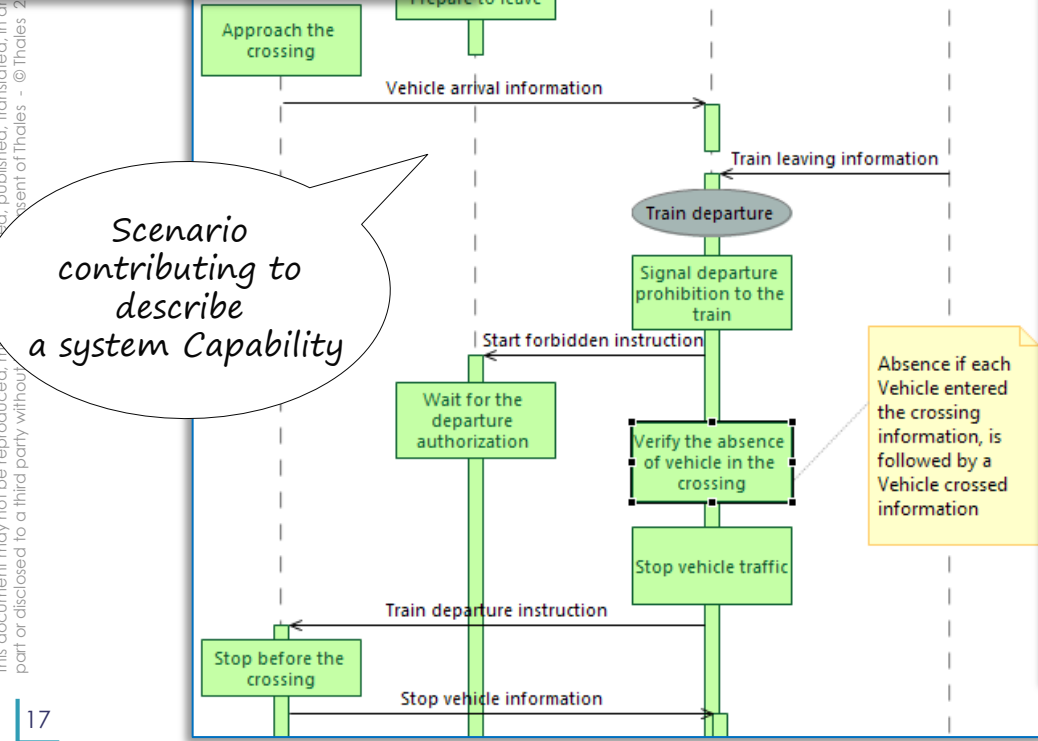
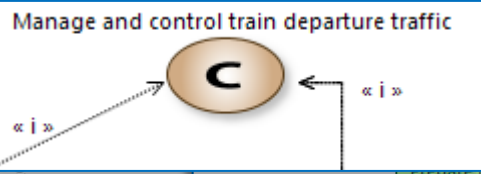
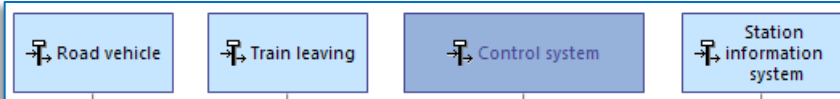


This part



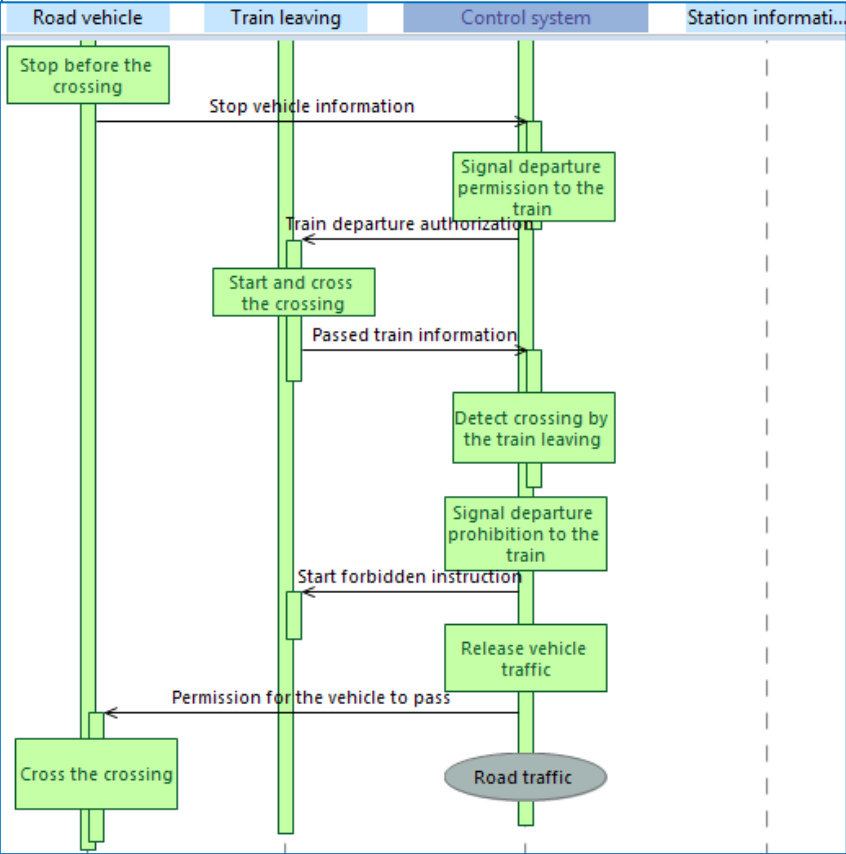
Functional Chain contributing to describe a system Capability

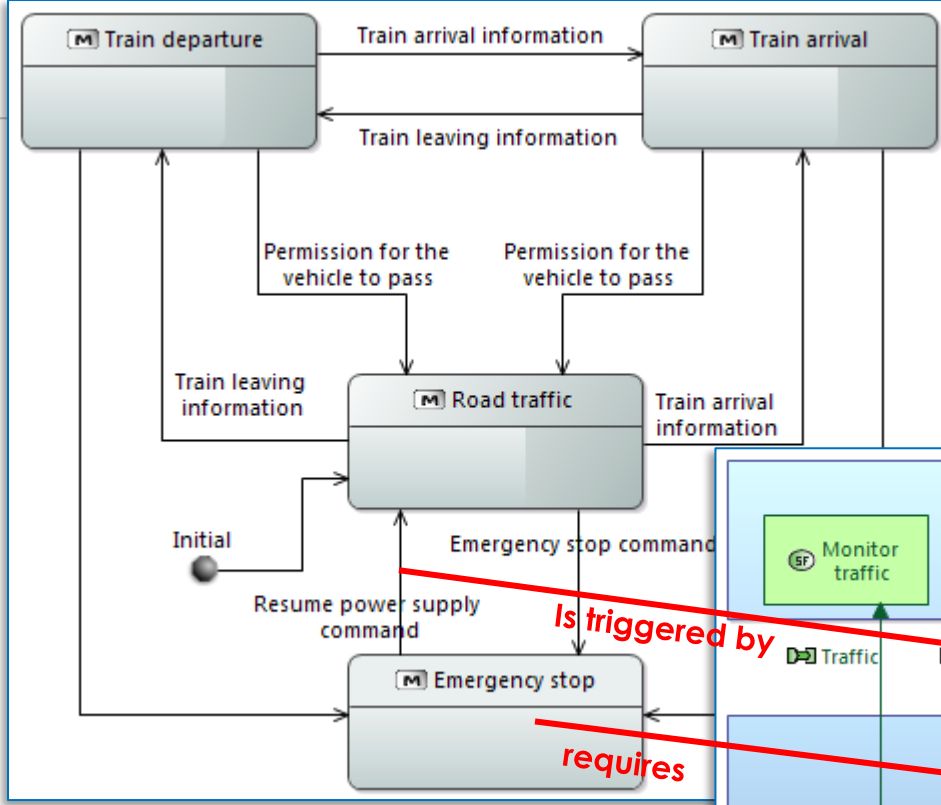




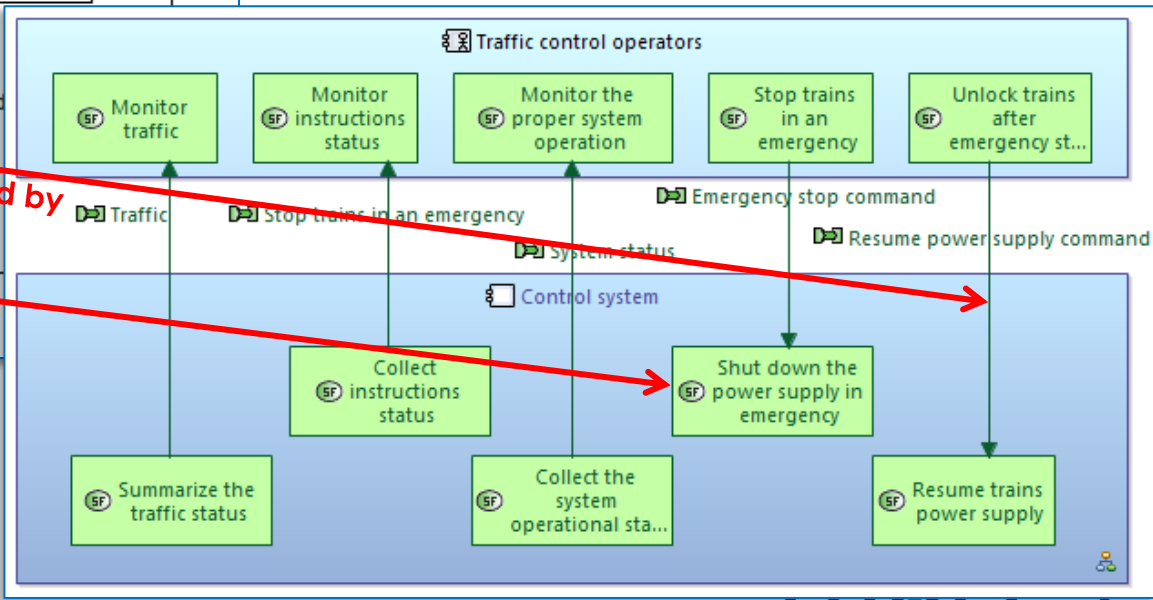
Scenario contributing to describe a system Capability

Absence if each Vehicle entered the crossing information, is followed by a Vehicle crossed information





System Modes (and States) related to Required functions and exchanges triggering transitions



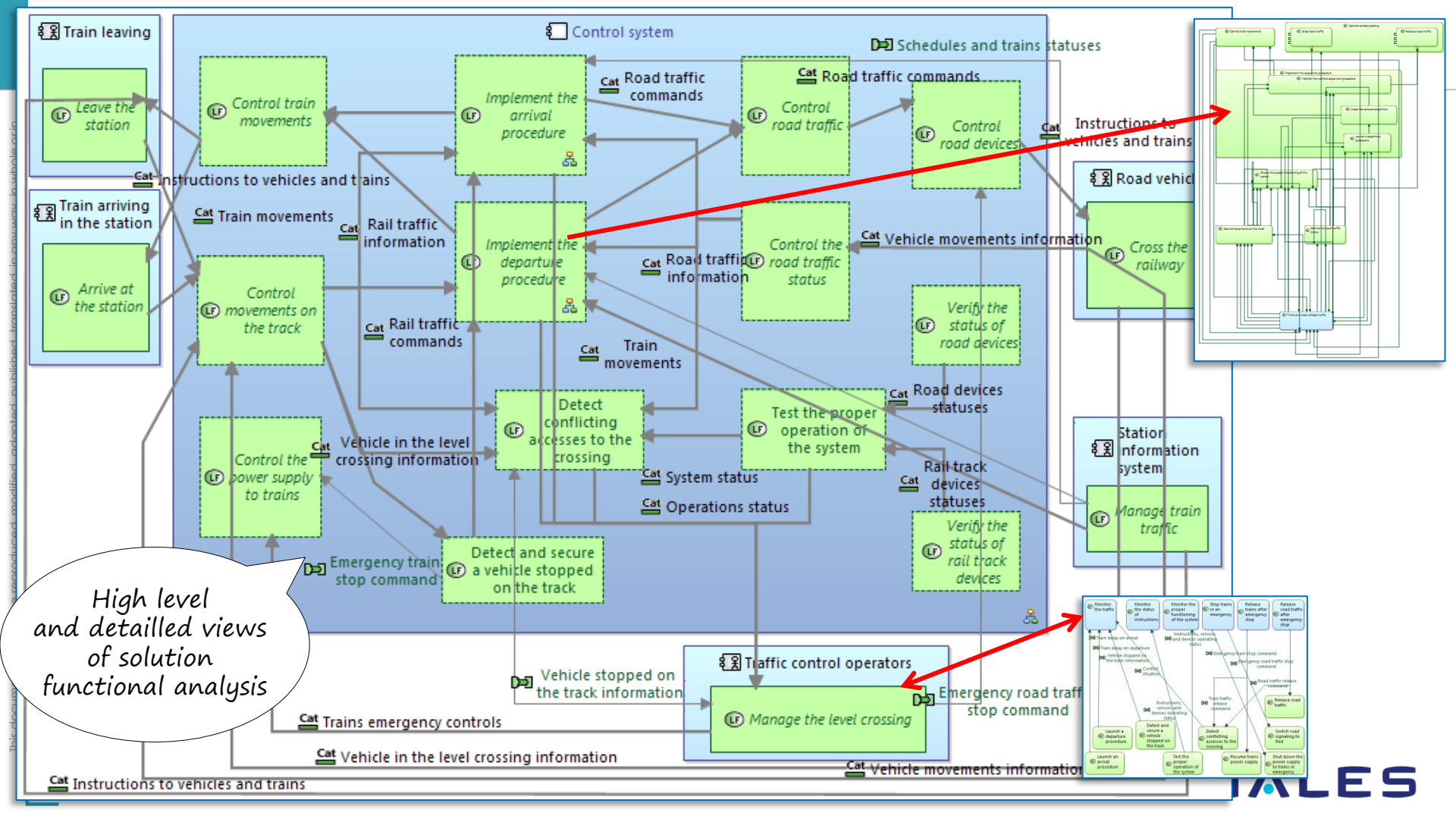
Is triggered by

requires

Logical Architecture

How the system will work so as to fulfil expectations





Train leaving

LF Leave the station

Train arriving in the station

LF Arrive at the station

Control system

LF Control train movements

LF Implement the arrival procedure

LF Control road traffic

Schedules and trains statuses

LF Control road devices

Instructions to vehicles and trains

Road vehicle

LF Cross the railway

LF Control movements on the track

LF Implement the departure procedure

LF Control the road traffic status

LF Verify the status of road devices

Station information system

LF Manage train traffic

LF Control the power supply to trains

LF Detect conflicting accesses to the crossing

LF Test the proper operation of the system

LF Road devices statuses

LF Rail track devices statuses

LF Verify the status of rail track devices

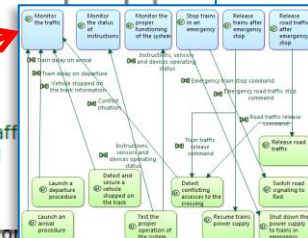
LF Detect and secure a vehicle stopped on the track

Traffic control operators

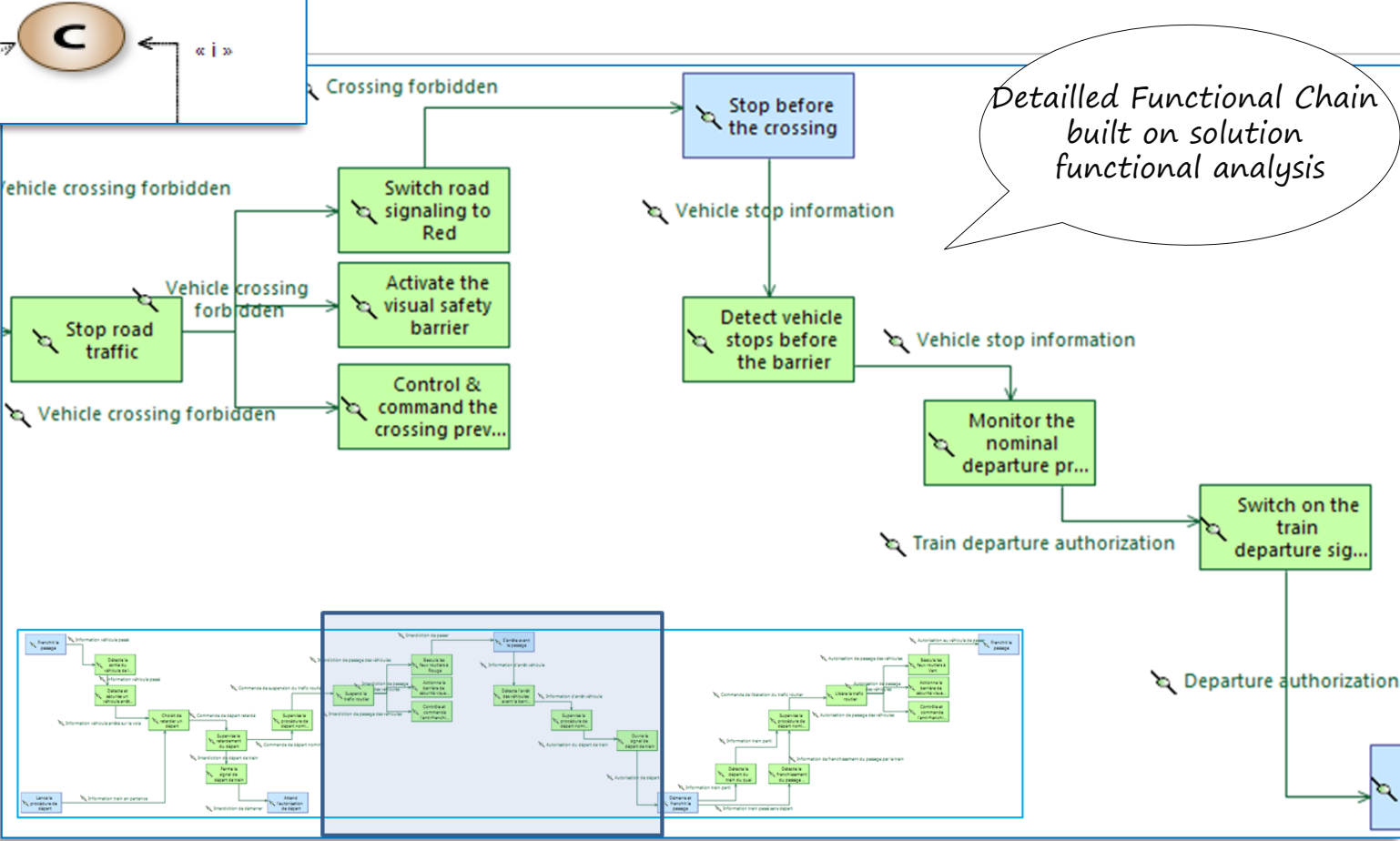
LF Manage the level crossing

Emergency road traffic stop command

High level and detailed views of solution functional analysis

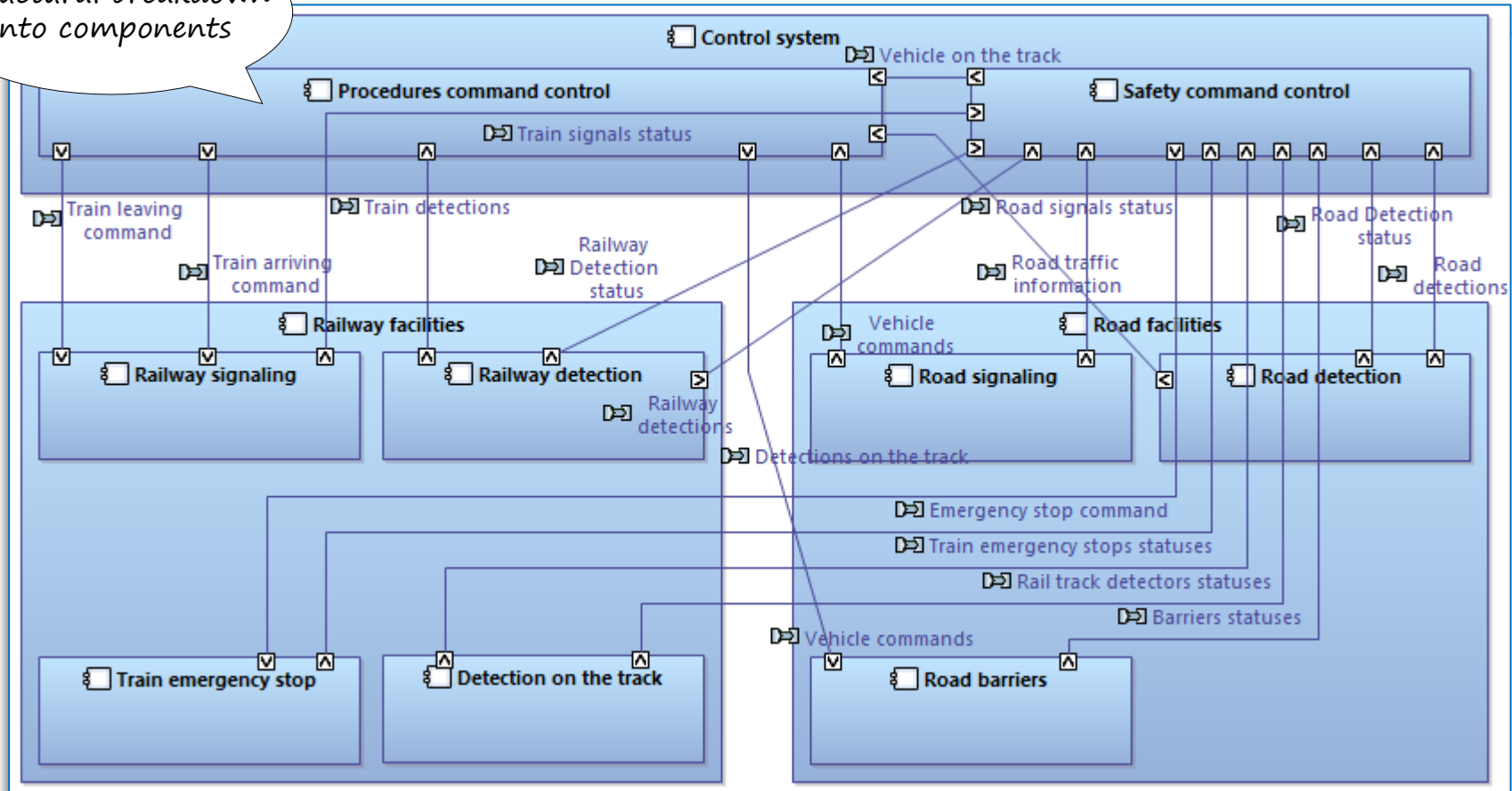


Manage and control train departure traffic

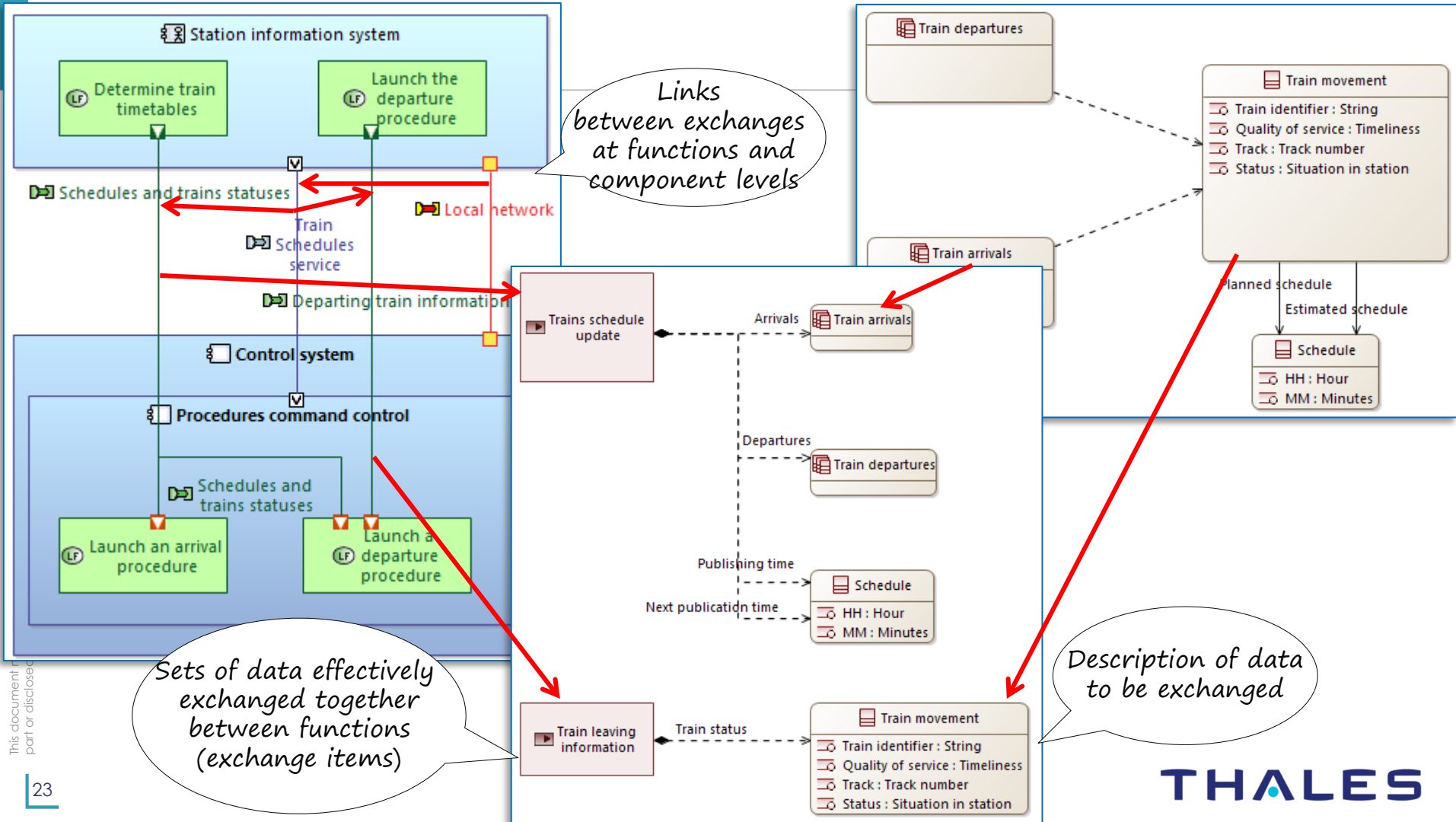


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Structural breakdown into components



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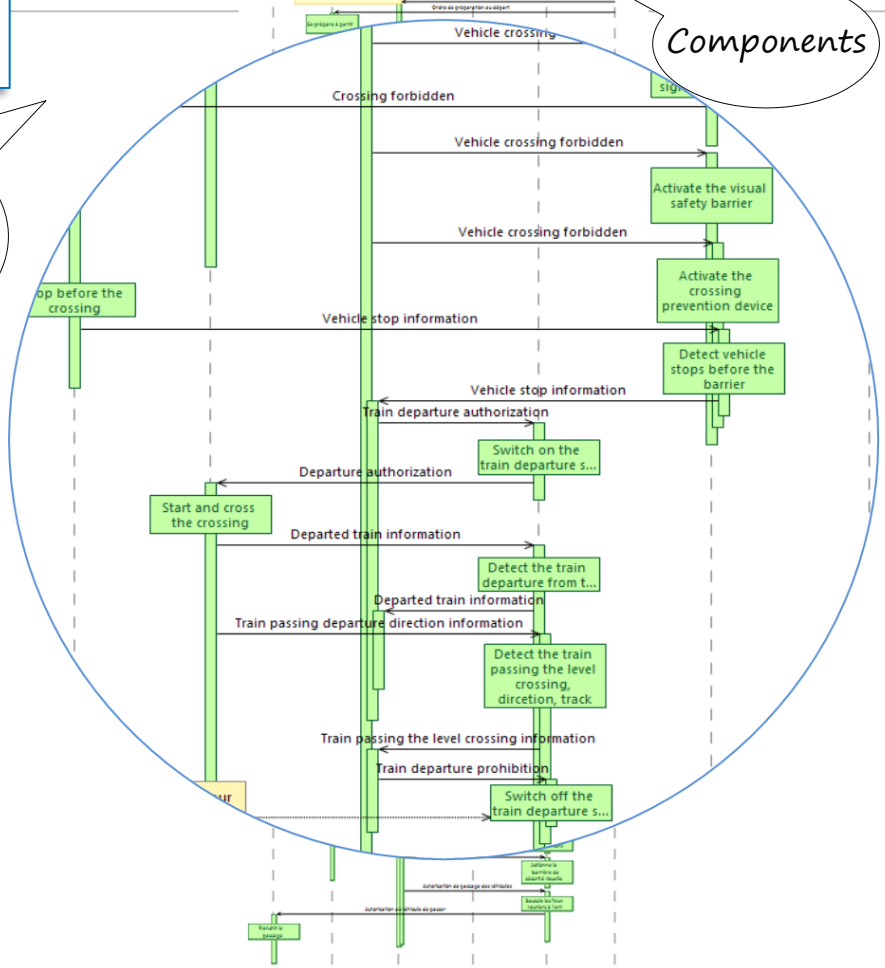
Manage and control train departure traffic



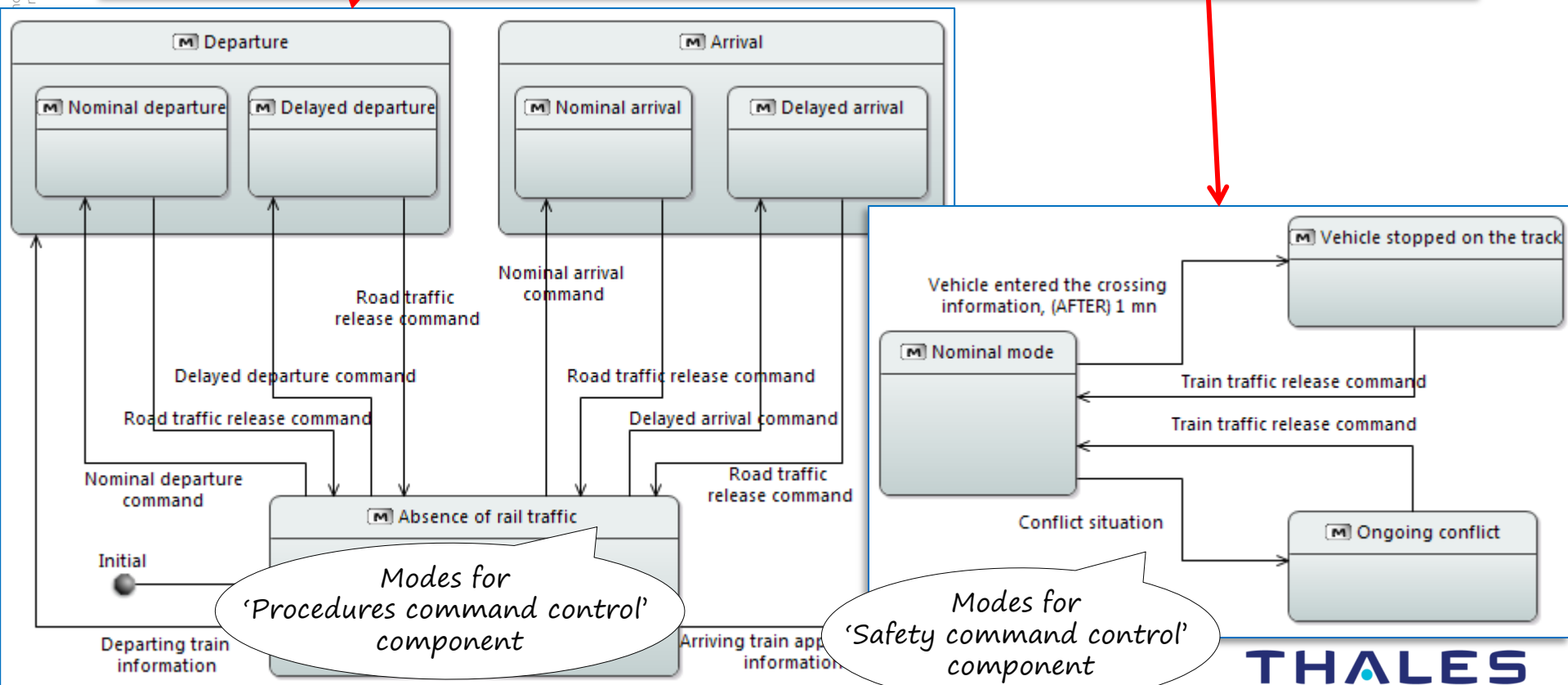
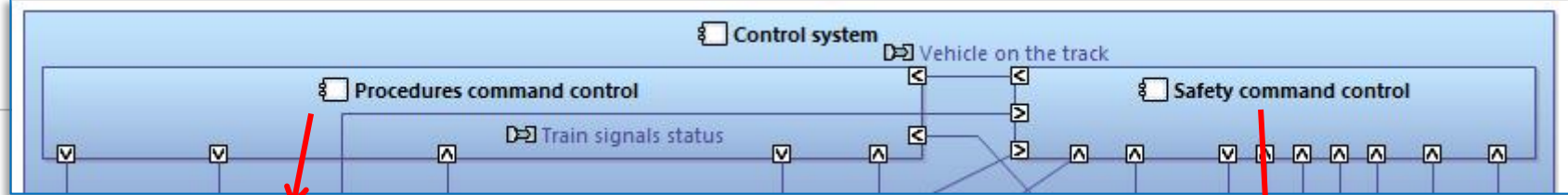
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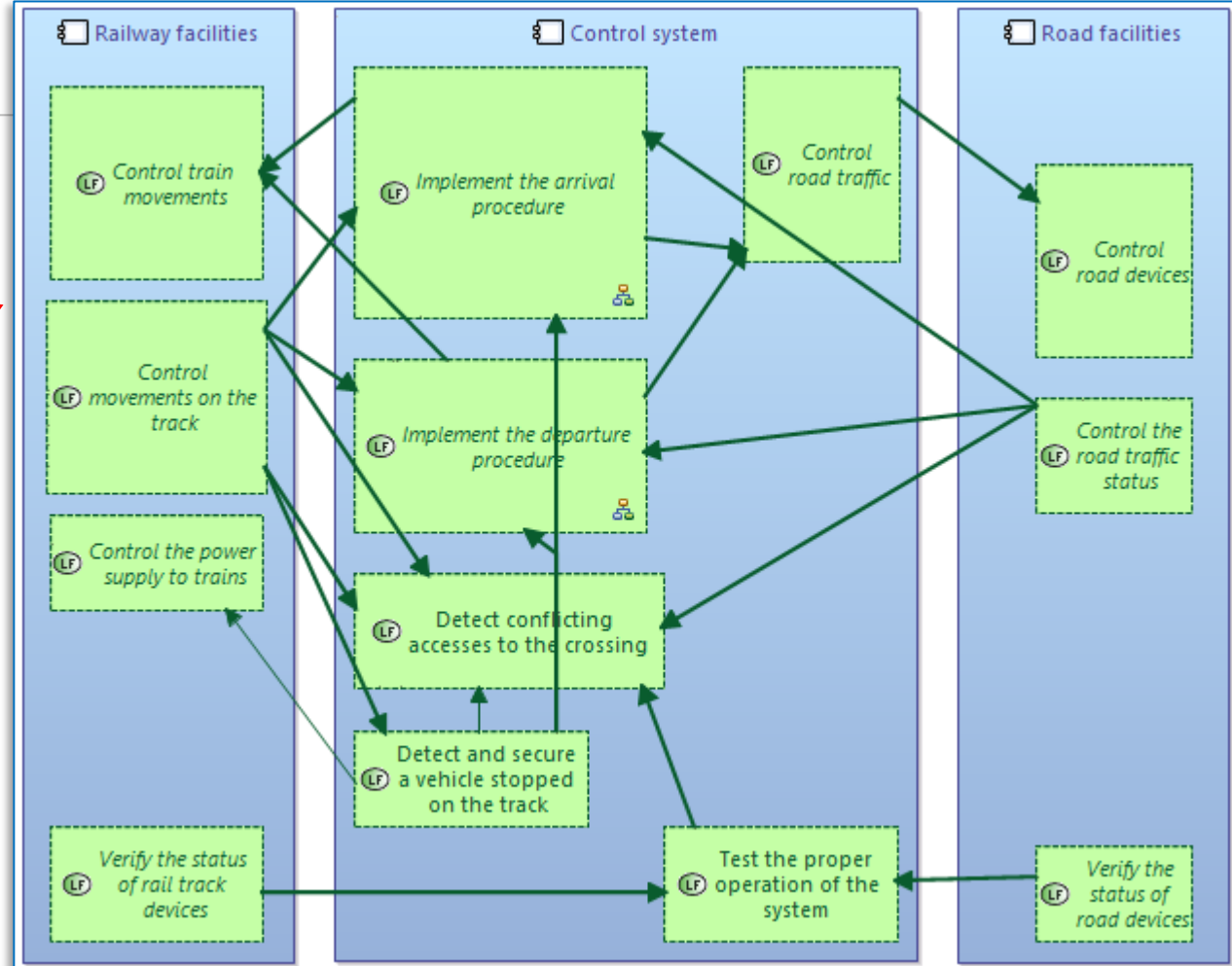
Scenarios describing detailed contribution of components



role or in reserved.



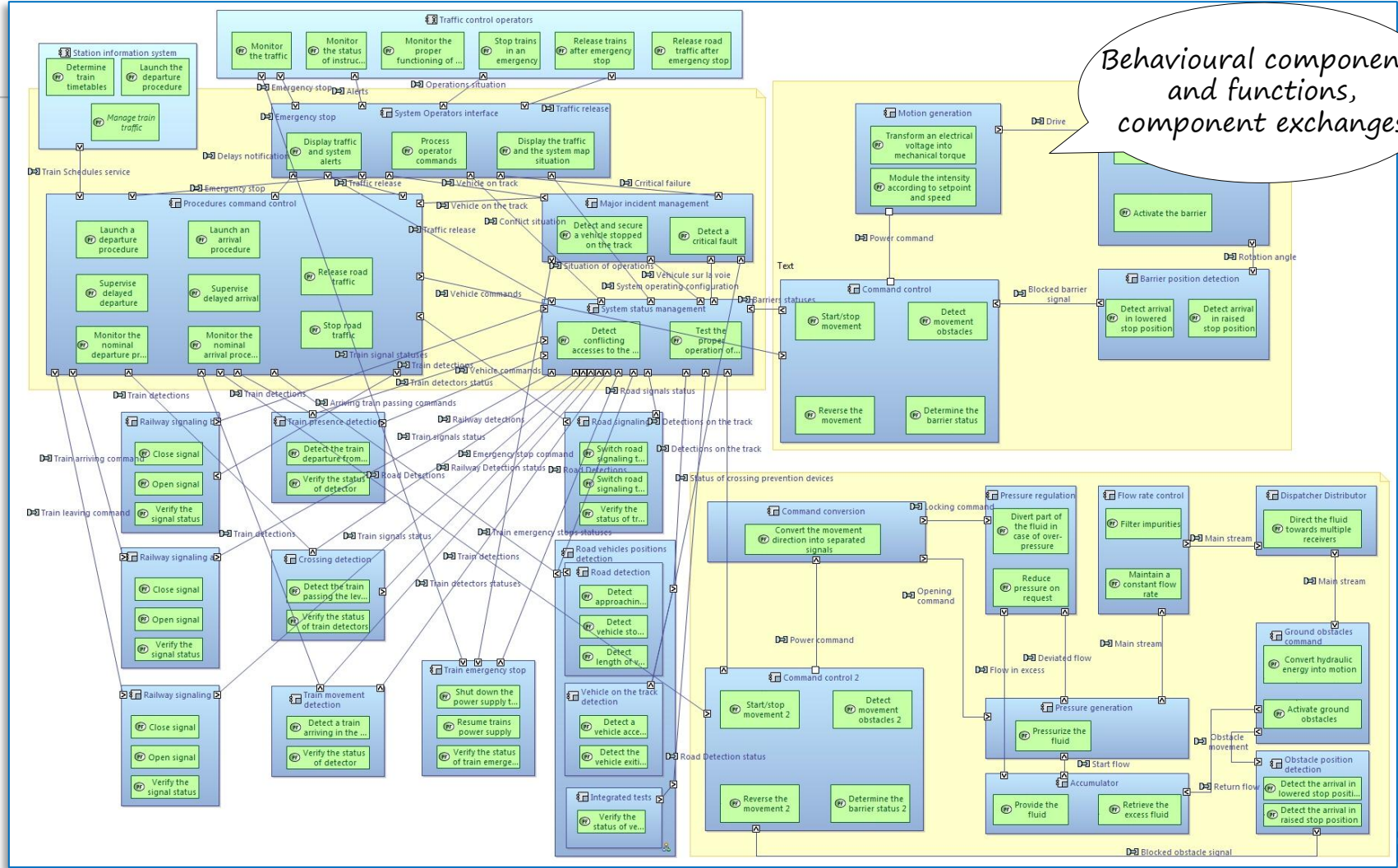
Synthesis view of functions & components

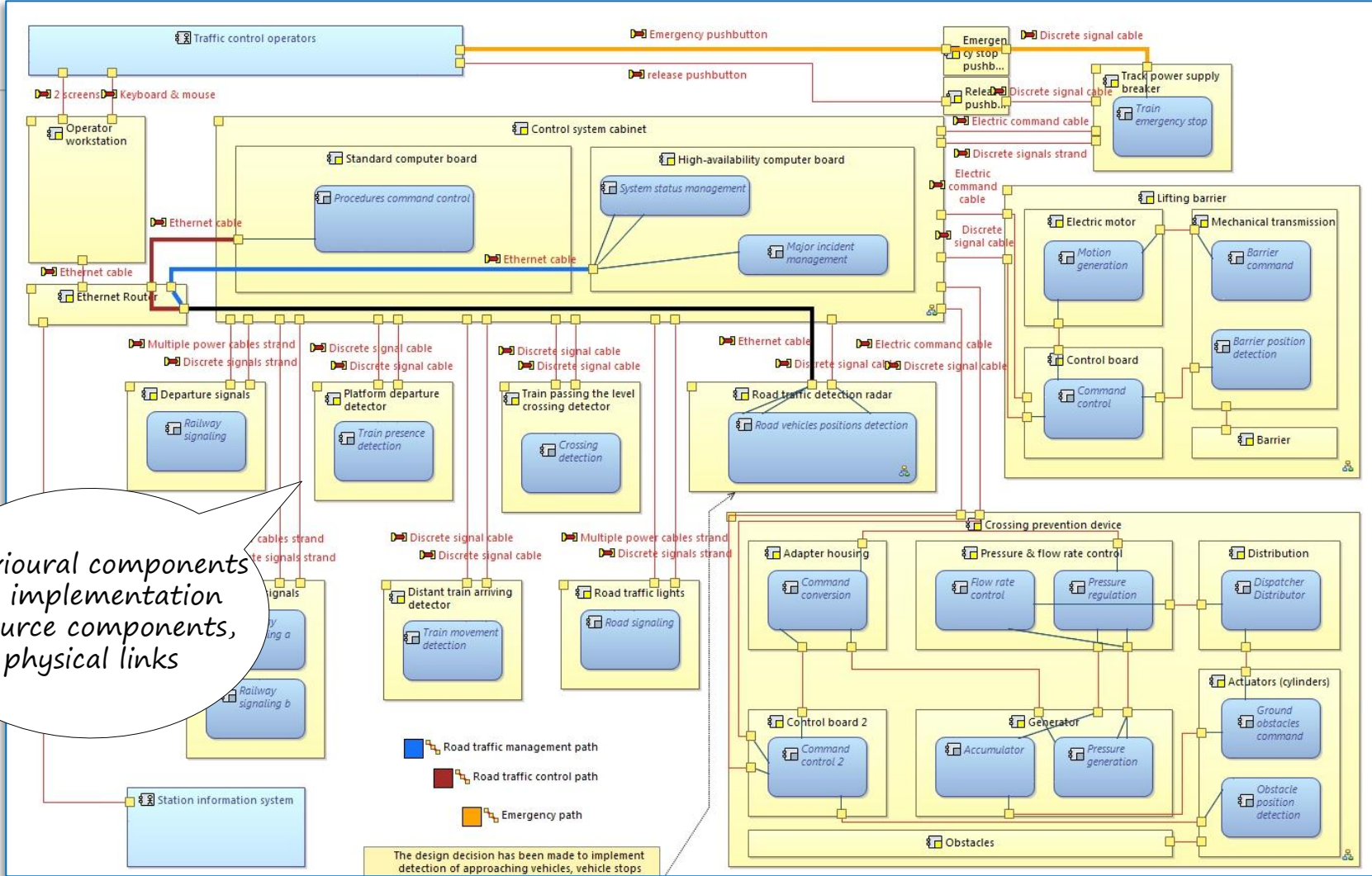


Physical Architecture

How the system will be developed & built

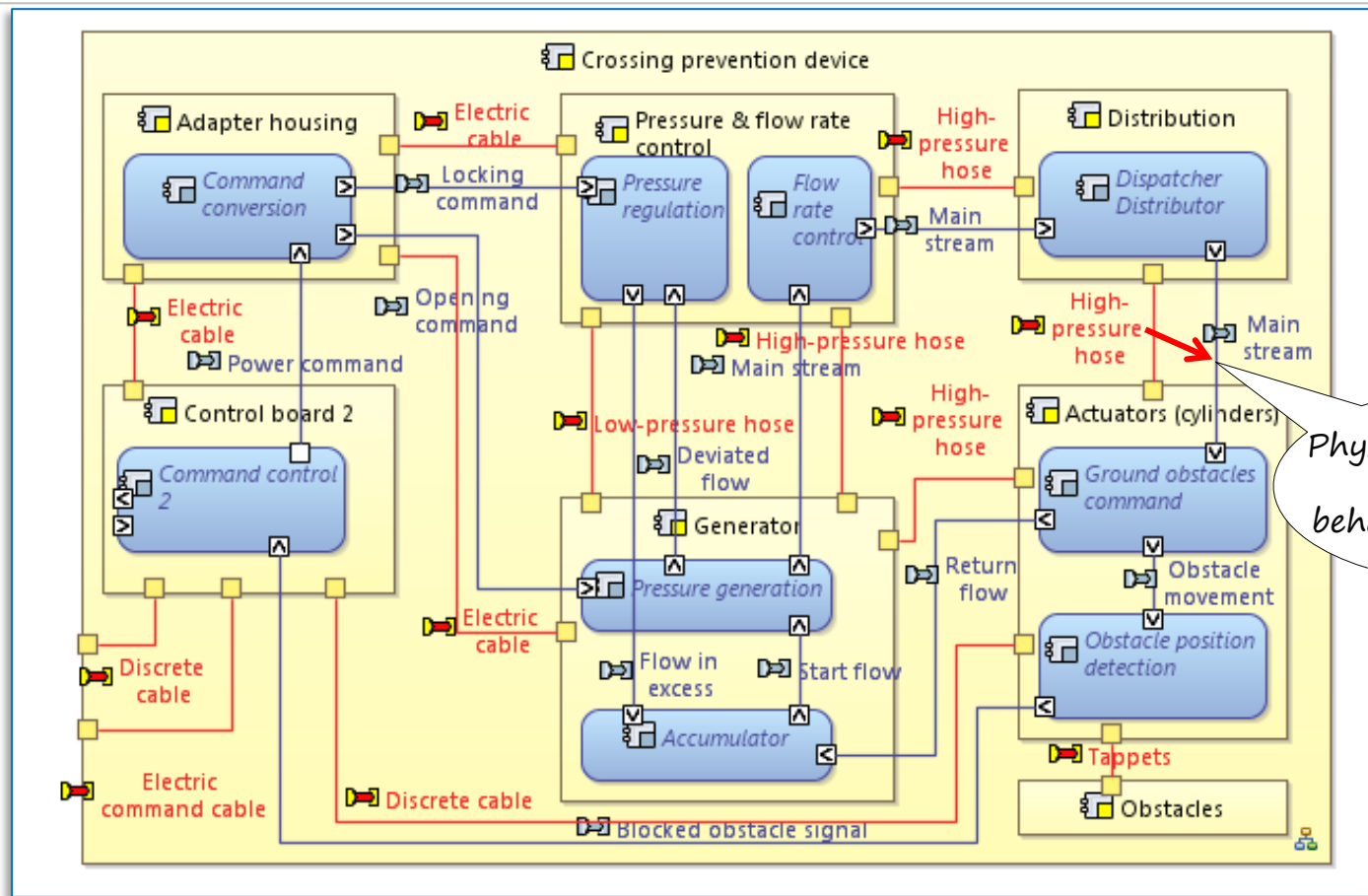






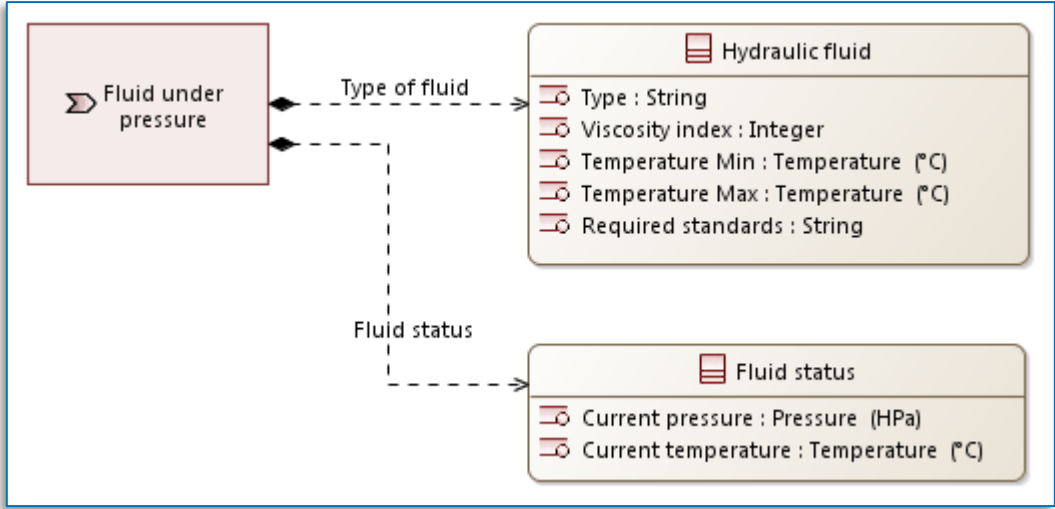
Behavioural components and implementation resource components, physical links

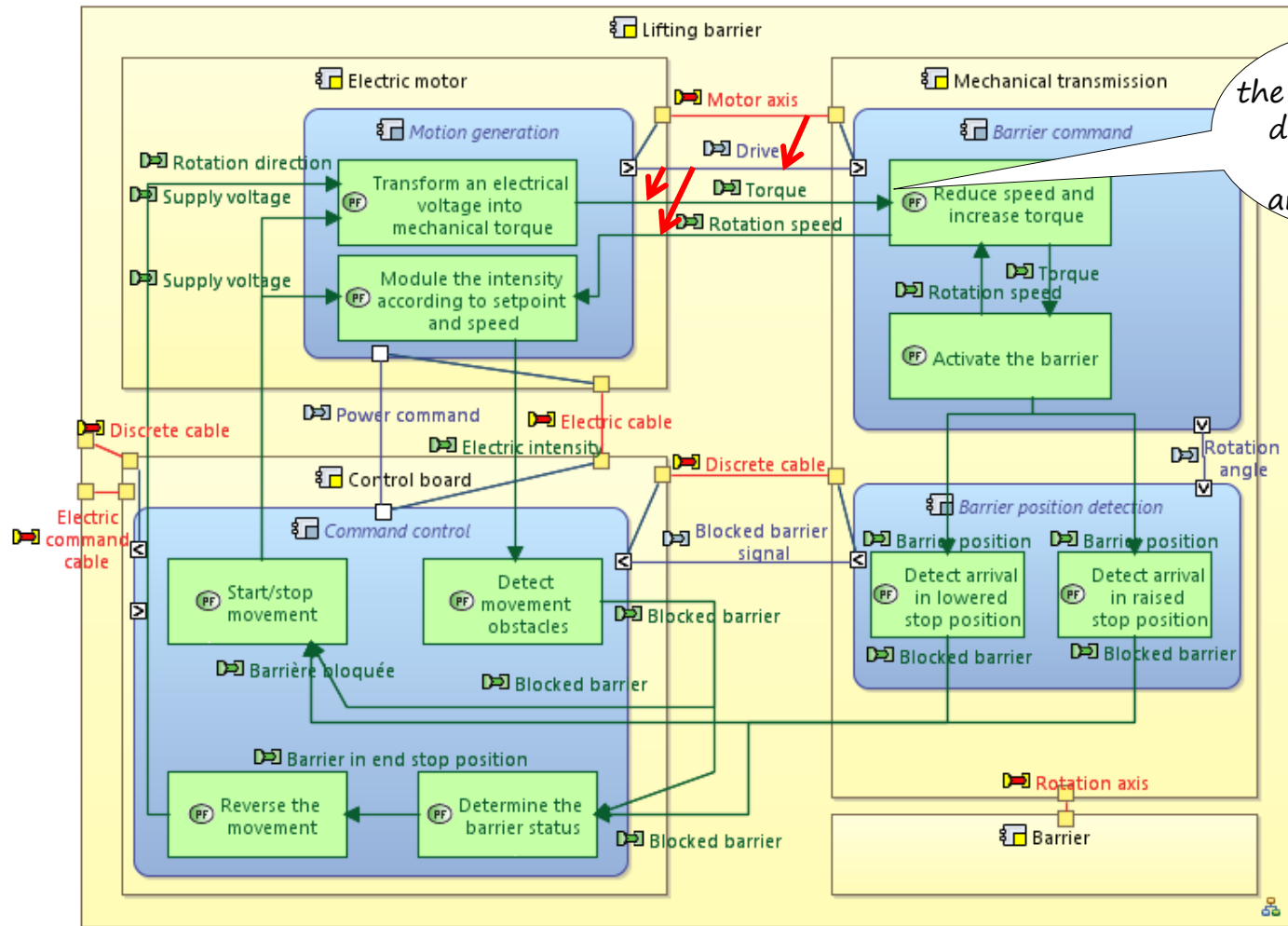
The design decision has been made to implement detection of approaching vehicles, vehicle stops



Physical connections and their behavioural contents

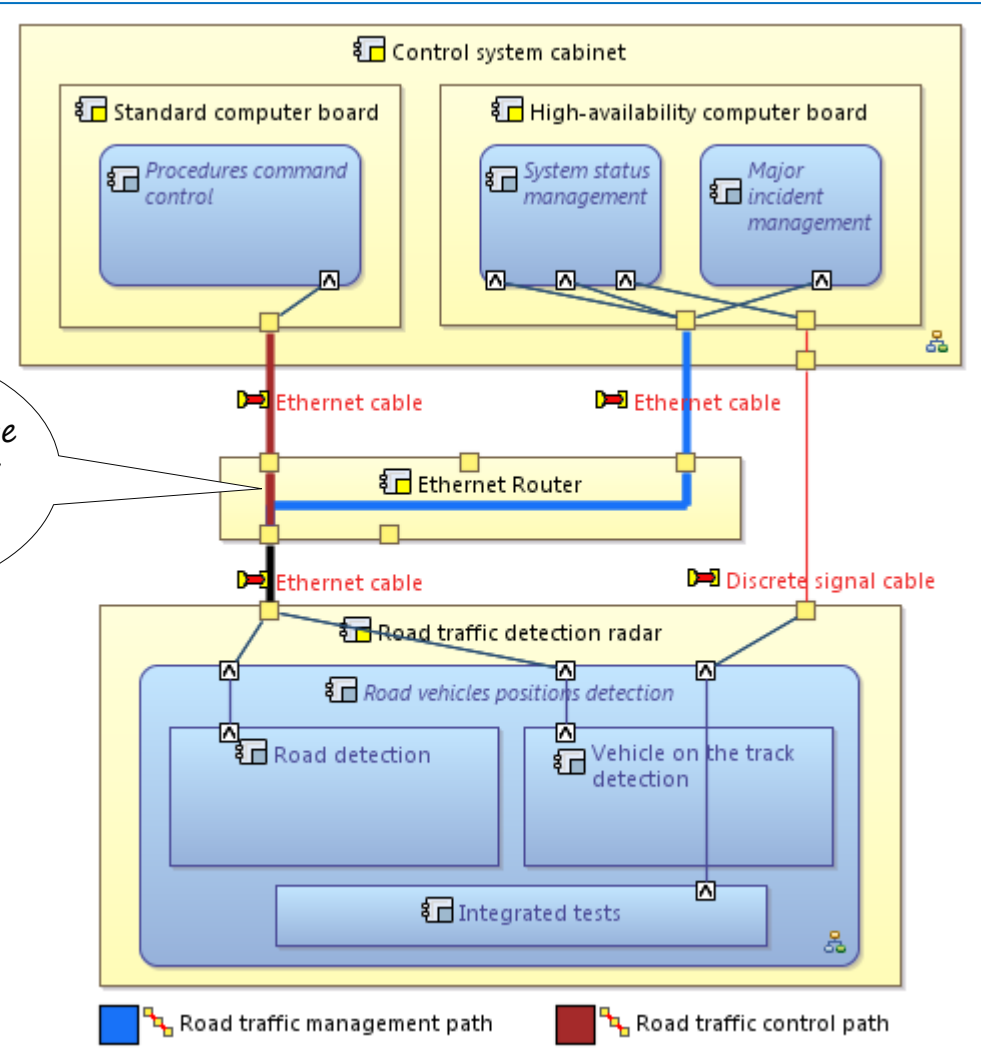
Not only data or information can be described!

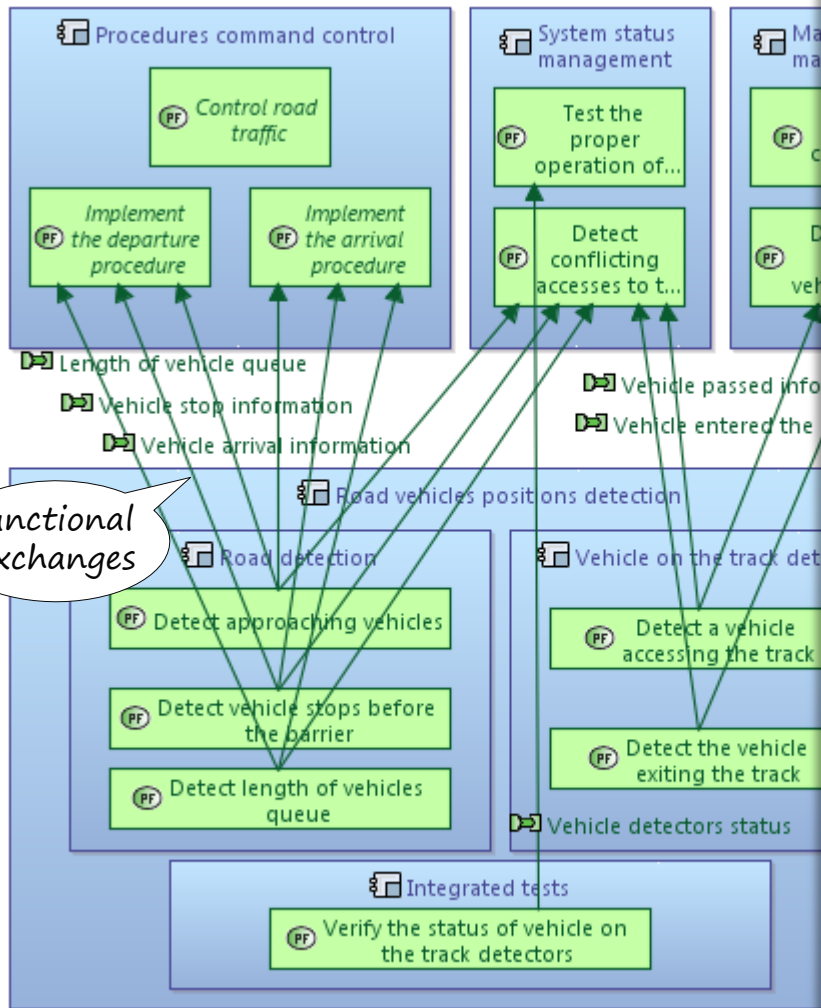




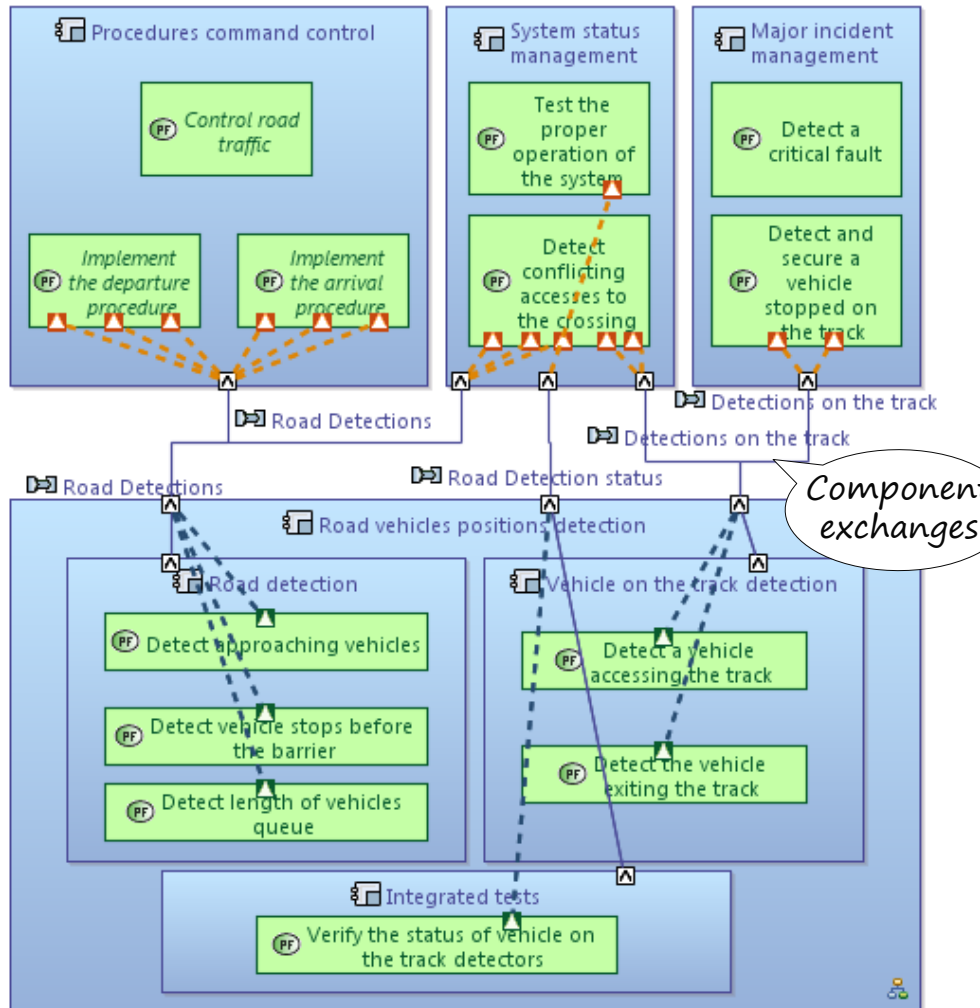
Note
the way to describe
different levels
of semantics
and interaction

Routing an exchange through a complex physical path



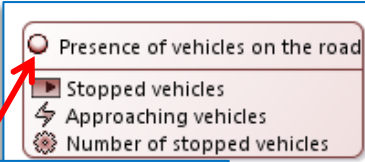


Functional exchanges

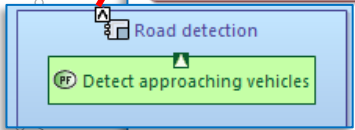


Component exchanges

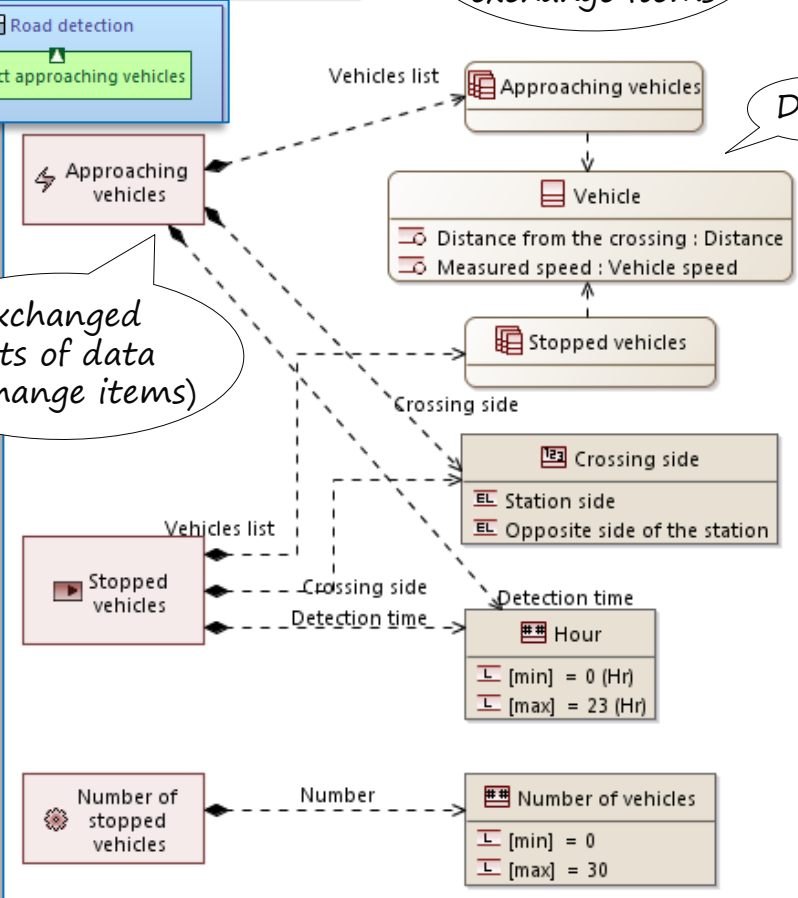
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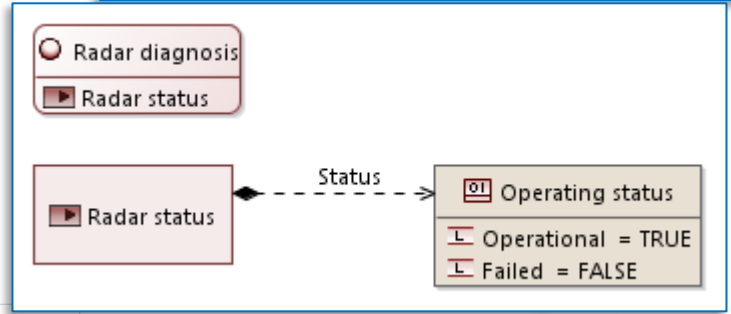
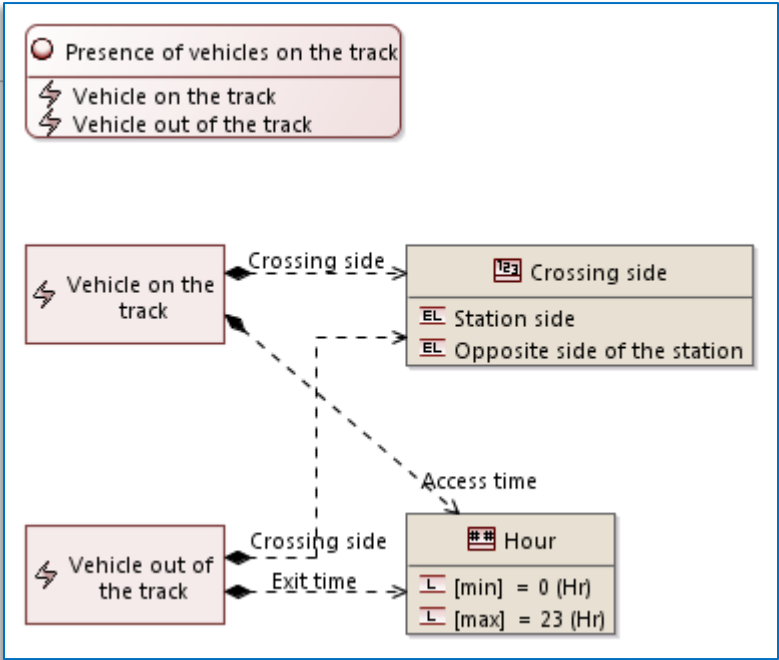
Interfaces on component ports grouping exchange items



Exchanged sets of data (exchange items)

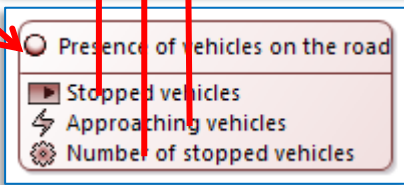
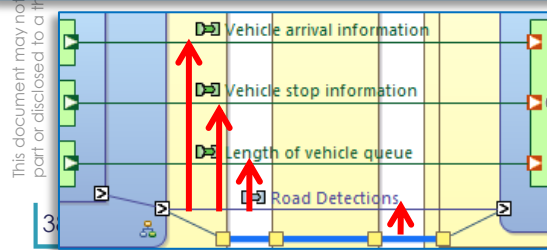
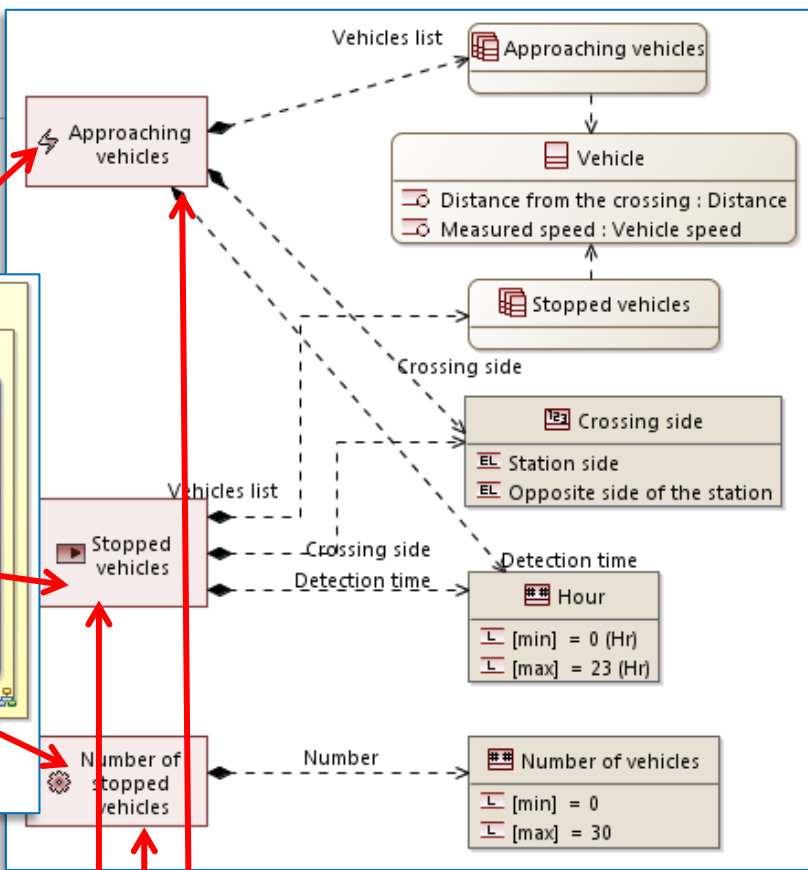
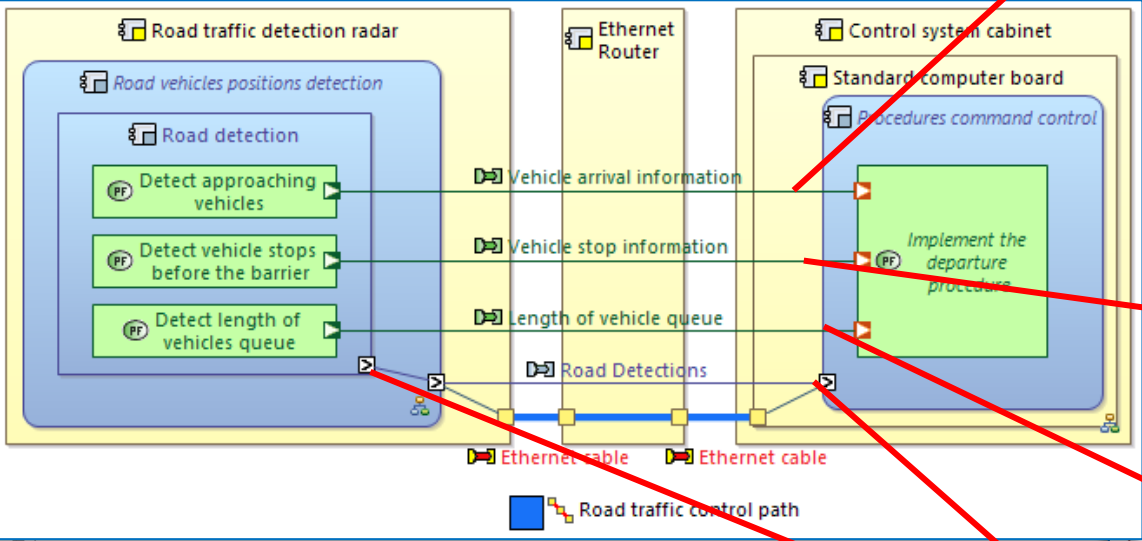


Data



Summary...

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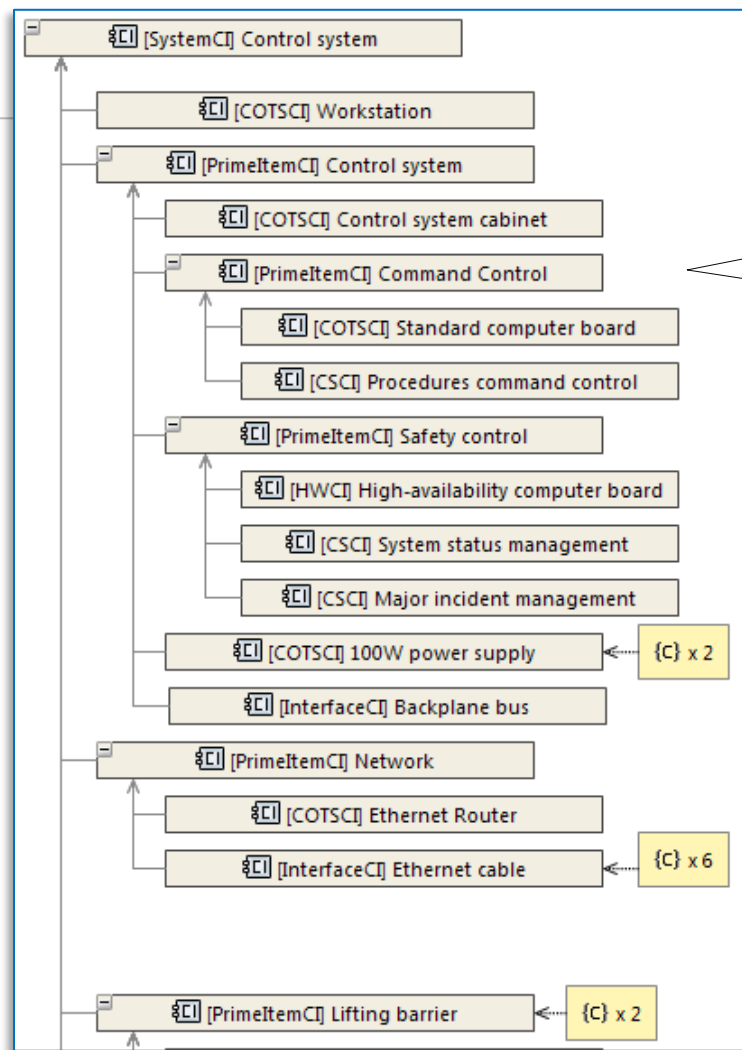
THALES GROUP INTERNAL



Building Strategy

Input for Sub-systems development and IVV





*Configuration Items
Built from
physical architecture*

To get more details on this model...

French and English versions of the Level-Crossing Traffic Control **system model** available for download on the Capella website.

<http://polarsys.org/capella/download.html>

4 videos thoroughly comment the model and explain the design choices:

- Customer Operational Need Analysis: <https://lnkd.in/dvyhjae>
- System Need Analysis: https://lnkd.in/dve_wdR
- Logical Architecture: <https://lnkd.in/dqfSs65>
- Physical Architecture: <http://youtube.com/watch?v=1EEcDtLaiXk>

To go further...

Capella & Arcadia website:

<http://www.polarsys.org/capella/>

LinkedIn

<http://www.linkedin.com/company/capella-modelling-workbench>

Capella forum:

<https://polarsys.org/forums/index.php/f/13/>

Clarity consortium for the Capella ecosystem

<http://www.clarity-se.org/>

Books:



JEAN-LUC VOIRIN

Model-based System and Architecture
Engineering with the Arcadia Method

**About
the Method**



PASCAL ROQUES

Systems Architecture Modeling with the
Arcadia Method - A Practical Guide to
Capella Modeling Tool

**About
the Tool**

Publisher: ISTE Press - ELSEVIER