



The logo for Safe4RAIL, featuring the text "Safe4RAIL" in a green and blue font, with a blue and white checkered pattern below it, all set against a background of blue and white light streaks.

General Specification of next-generation TCMS

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Safe4RAIL – SAFE architecture for Robust distributed Application Integration in rolling stock (730830)

CONNECTA – CONTRIBUTING TO SHIFT2RAIL'S NEXT GENERATION OF HIGH CAPABLE AND SAFE TCMS AND BRAKES (730539)



What is the General Specification NG TCMS?

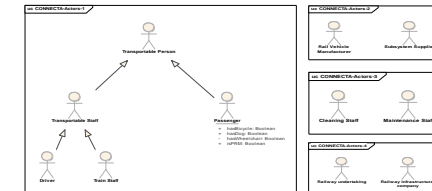
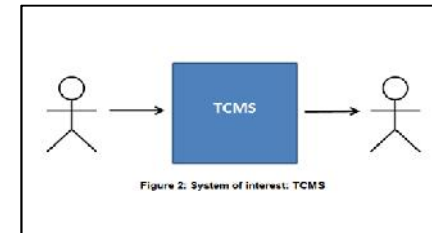
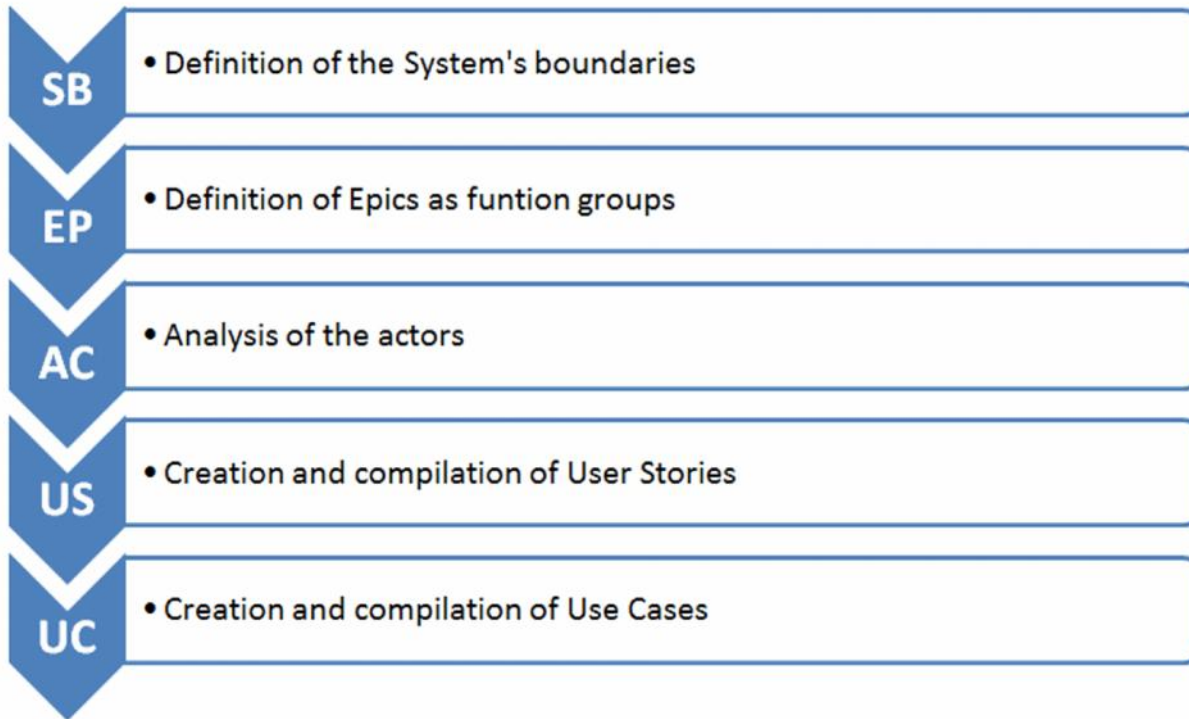
- It describes what a **NG TCMS needs to do**
- It describes the **functions of the NG TCMS**
- It describes what functions a **NG TCMS needs to fulfil**
- It's the **basis** for the development **of the NG TCMS**
- It's the basis for **ALL further development**



Why General Specification TCMS?

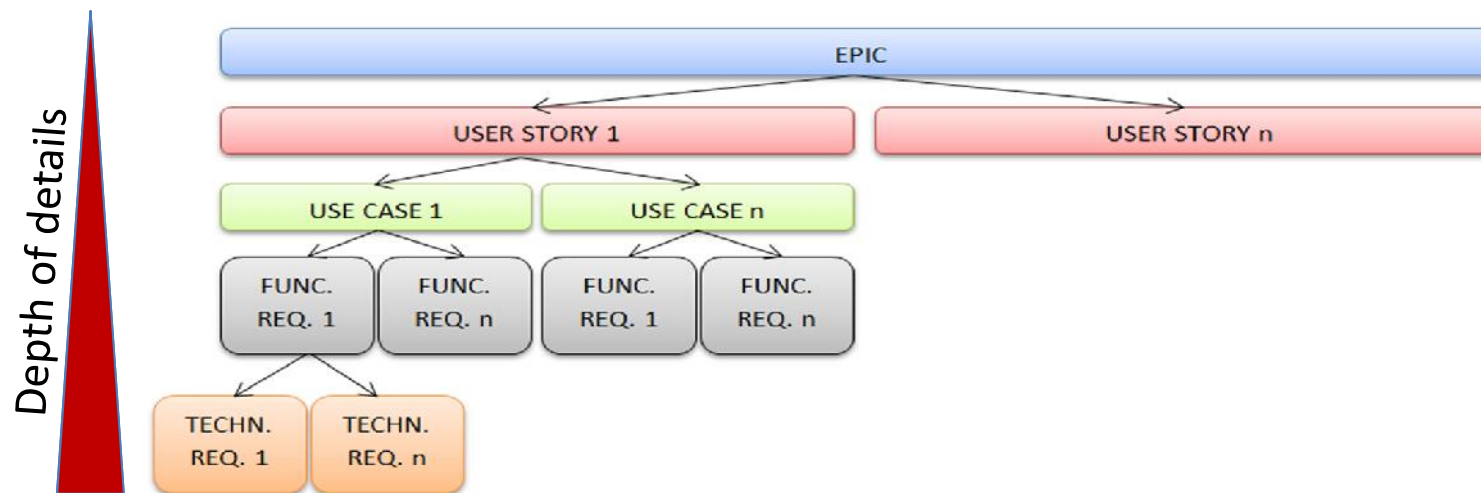
Today	NG TCMS SPECIFICATION
TCMS today is described by requirement specifications	The NG TCMS is described by its functions by User Stories and Use Cases
TCMS today is described by long lists of requirements	For the NG TCMS we used a SysML Modelling Tool, named Magic Draw
Local Databases within company	Tracing from functional requirement to technical requirement to implementation
Working on databases within the company LAN	Europe wide collaboration to work on the general specification on a secure server
Inconsistencies in requirement specifications	Structured procedure from function to technical implementation

- Engineering and Modelling the System Step by Step



Structuring the „General Specification“

- From the system’s Big Picture to the technical detail
- Structure for functional specification created Epics - UserStories - UseCases - non functional requirements





Functional System Development II

User Stories



A "user story" describes what a user wants to achieve with the system. It describes the "**who**", "**what**" and "**why**" of a request at the highest abstraction level.

The user story sentence template is:

"As a <role>, I want <goal/desire> so that <benefit>"

Example:

1. As a train driver, I want to release the doors so that passengers can exit and enter the train.
- 2.
- ...
- 300.



Functional System Development III – Use Cases

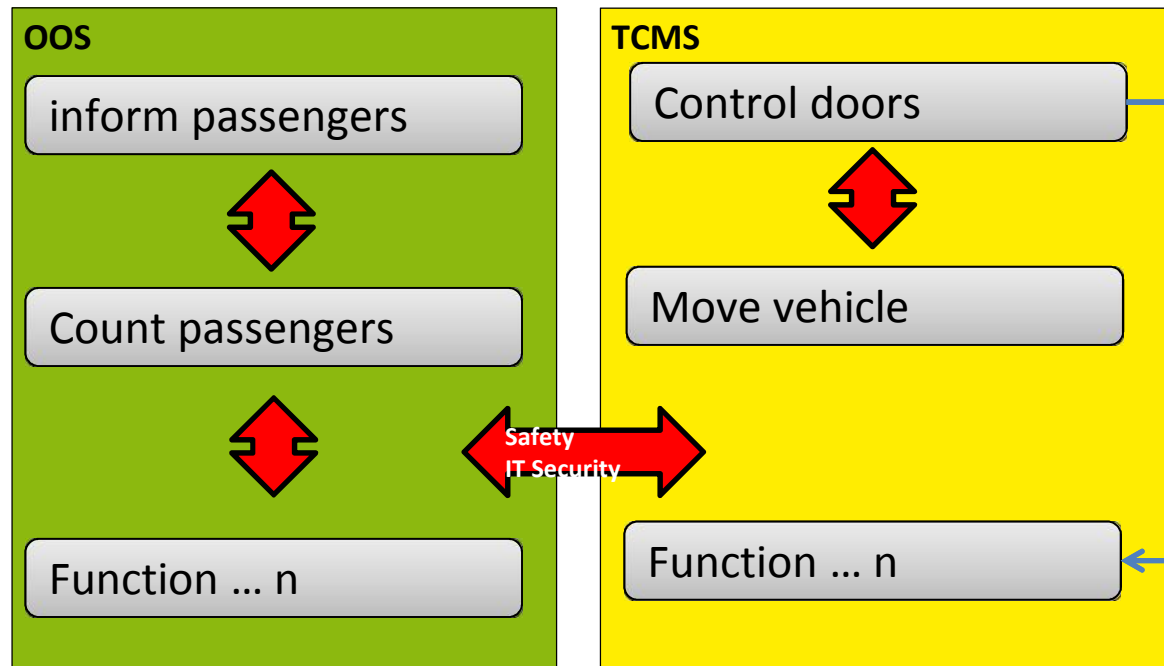
- A use case describes the different ways a user (actor) can use a system to achieve a specific goal. An entire set of use cases describes all uses of the system and the resulting benefits. A complete set describes the scope of the system - which functions it fulfills and which function does not.

ID	Epic	User Story ID	Name	Short Description	Basic Flow	Subject	Primary Actor	Secondary Actor	Trigger	Precondition
UC-1.2-008	[1.2] Superordinate Vehicle Control		Set Seat Reservation	The RU wants to set the seat reservation.	1.) RU has the collected data for the seat reservation of the train 2.) RU triggers the transfer mechanism 3.) Information is received by train 4.) Reservation system transfer the reservation information to the seat	TCMS	Railway Undertaking		Railway Undertaking uses the Set Seat Reservation Mechanism to set the seat reservations.	PIS is online

Functional System Development III: Logical architecture

Logical structures of a system.

The communication requirements between the functions are shown. Interfaces do derive from that



Functions of a system and their classification to a function domain are shown

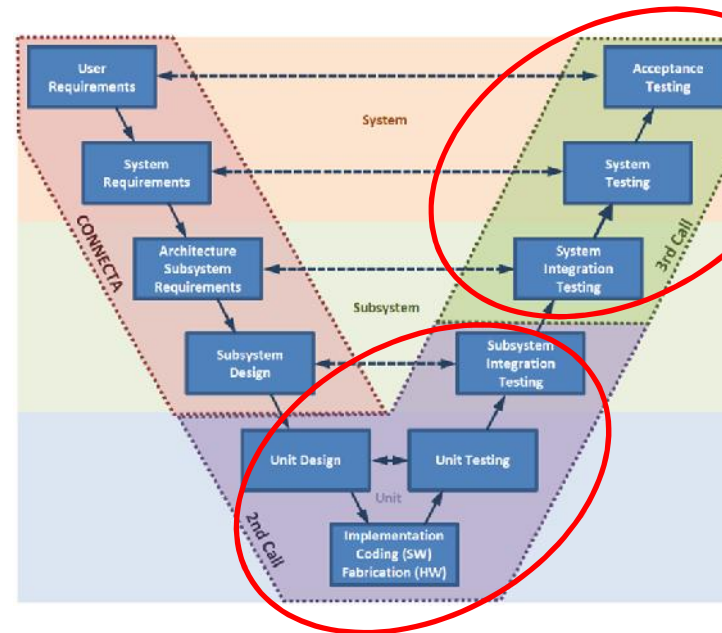


Conclusions

- NG TCMS needs to be **modeled by using SysML** due to the high complexity
- Great **team collaboration** that supports the common understanding of the system
- The “General Specification” **leaves open space** for possible technical implementations
- The “General Specification” will be **consequently updated, specification gaps closed** with new insights generated during the system development

Next station is

CTA II:
Development of the NG TCMS based on the general specification and iteration loops



CTA III:
Testing and validation of the general Specification