



# From Use Case to Interoperability

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A contribution by Onno Tool and Paul Spaanderman

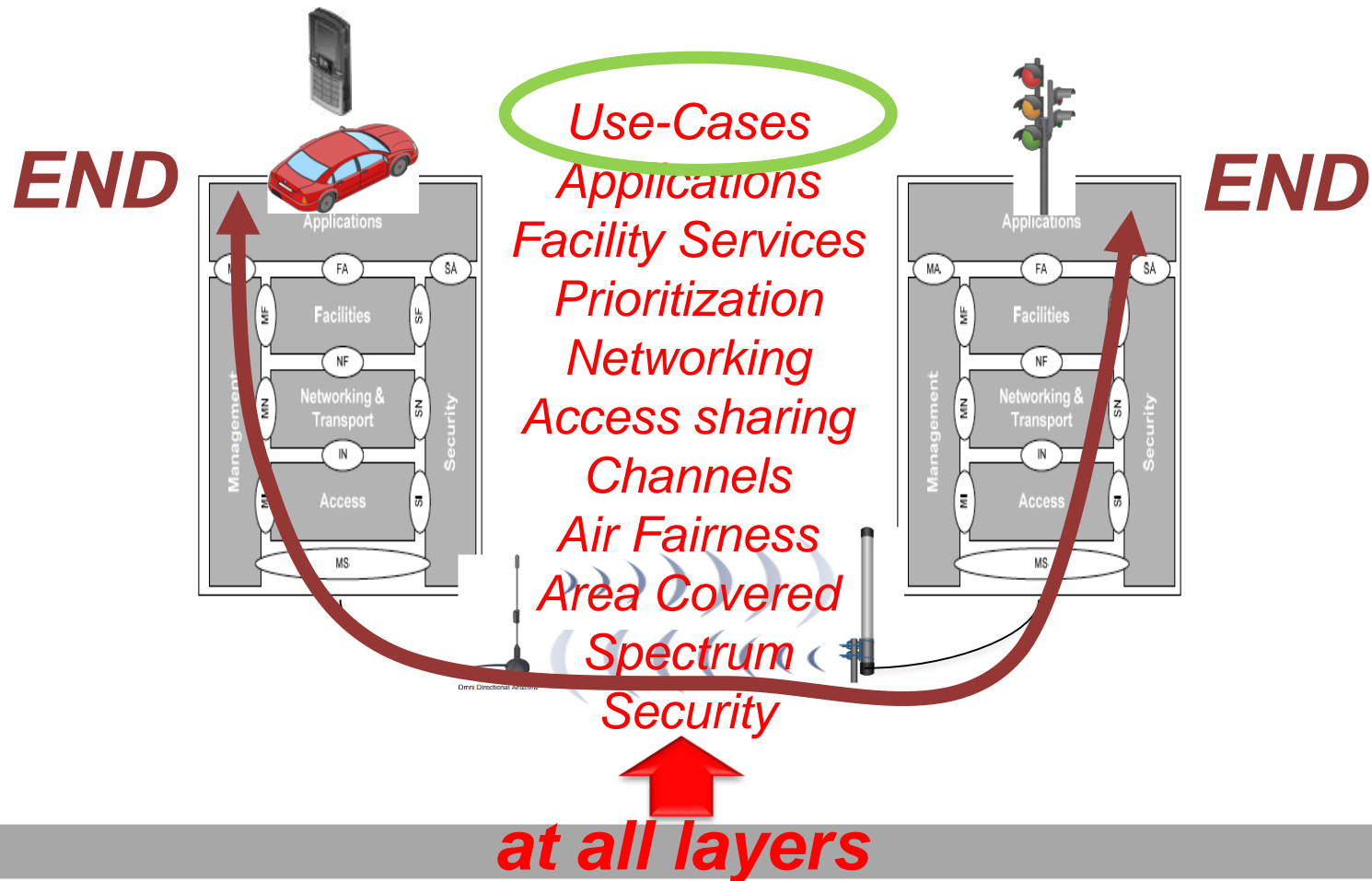
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- **Interoperability Essentials**
- **Use Case approach**

Reference: “Defining and Substantiating the Terms Scene, Situation, and Scenario for Automated Driving” by: Simon Ulbrich, Till Menzel, Andreas Reschka, Fabian Schuldt, and Markus Maurer. ISO/DTR 20529-1 (01-2017), ETSI TR 102 638, CODECS

# Safety Interoperability



# Safety Interoperability

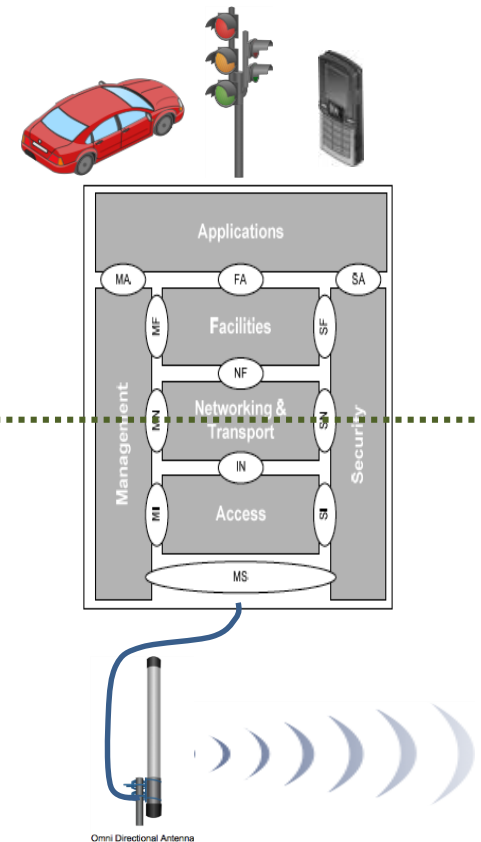


## Traffic Functional

- Traffic Services
- Traffic Use Cases
- Traffic Scenario's
- Traffic Scenes
- End2End Interoperability testing

## Facilitating ICT

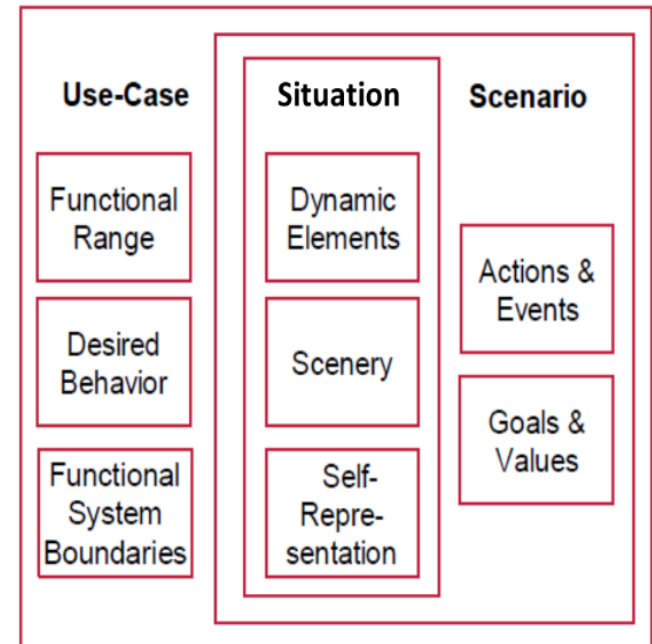
- ICT Architectural Scenarios
- ICT Profiles
- ICT Implementation specifications
- ICT compliance



# Some definitions



- **Situation:** describes relevant scenery (everything present within a static snapshot) considering (driving) function-related goals and values.
- **Scenario:** describes temporal development in a sequence of situations (e.g. initial and after) based on events and actions. It is story telling.
- **Use case:** function of the system, the desired behaviour (of the system and actors), specification of system boundaries and definition of one or more usage scenarios.
- **Service:** clustering of use cases based on a common denominator, for example 'signage' or 'hazards'.
- **Actors:** are external (human) entities that interact with the system. The system affects and is affected by the behaviour of actors, therefore these relations are described in the use case descriptions.



Ulbrich, S., Menzel, T., Reschka, A., Schuldt, F., Maurer, M. (2015): Defining and Substantiating the Terms Scene, Situation and Scenario for Automated Driving. IEEE International Annual Conference on Intelligent Transportation Systems (ITSC), Las Palmas, Spanien, pp. 982-988

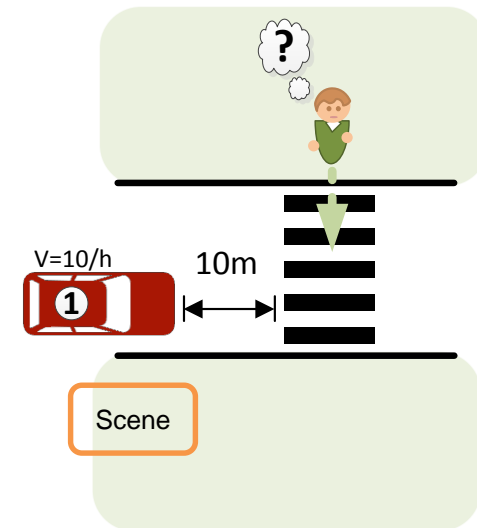
# Traffic Functionalities



## Scenes / Situations

### • Traffic Scene / Situation

- Shows one moment in the traffic environment
- Relevant static and dynamic elements
- Relationship of all involved entities to each other

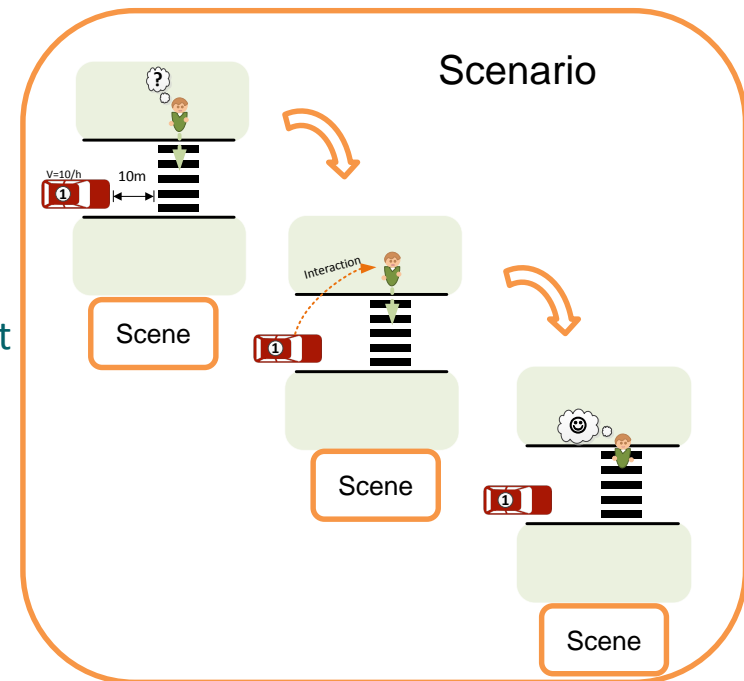


## Scenarios

### • Traffic Scenario

- Chronological Sequence of Scenes
- Sequence of Actions and Events
- Goals and intentions of actors get apparent

**When to trigger event(s) and what is the sequence of messages fitting to the scenario? (interoperability)**



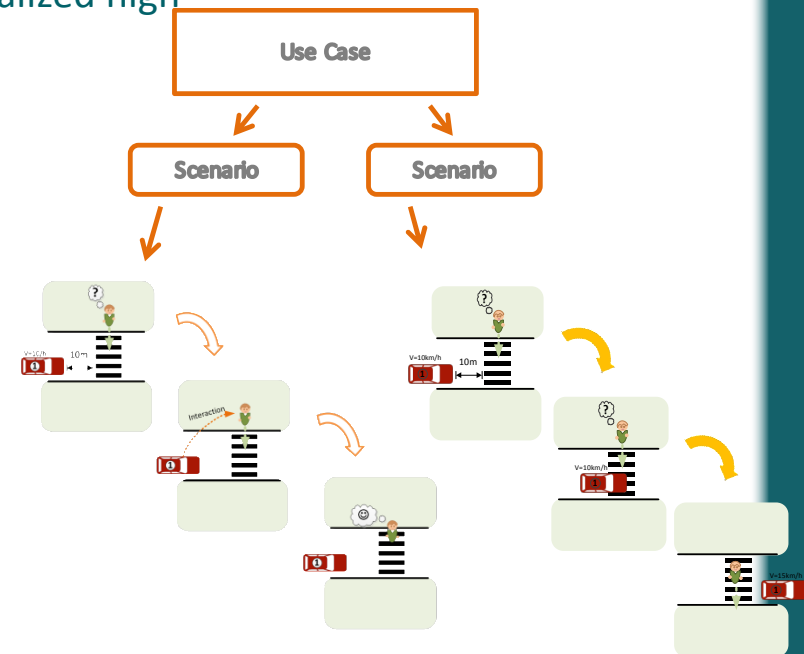
# Traffic Functionalities



## Use cases

- Use case

- Groupe of Scenario(s) making use of a generalized high level Functional System
- Required high level functional requirements
- System functional boundaries/limits

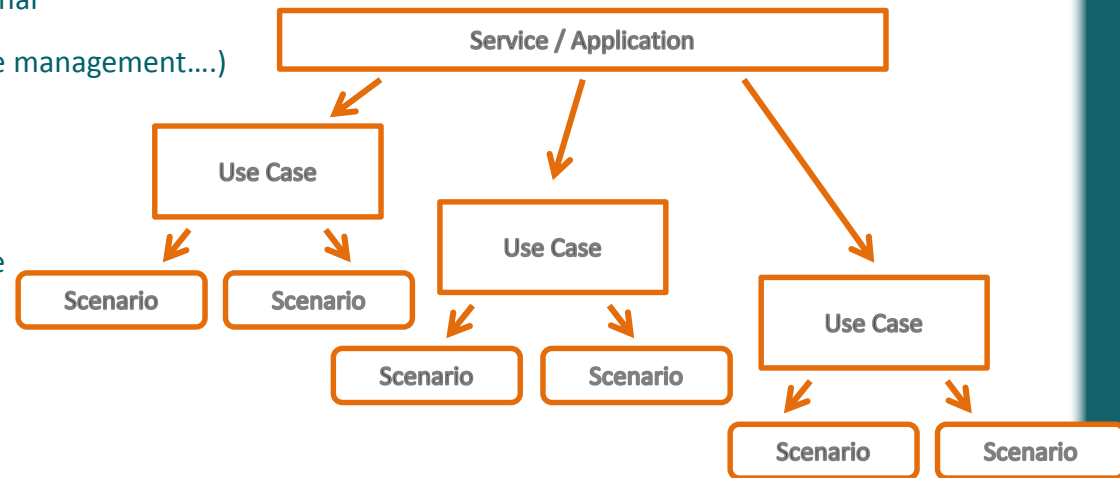




## Service/Applications

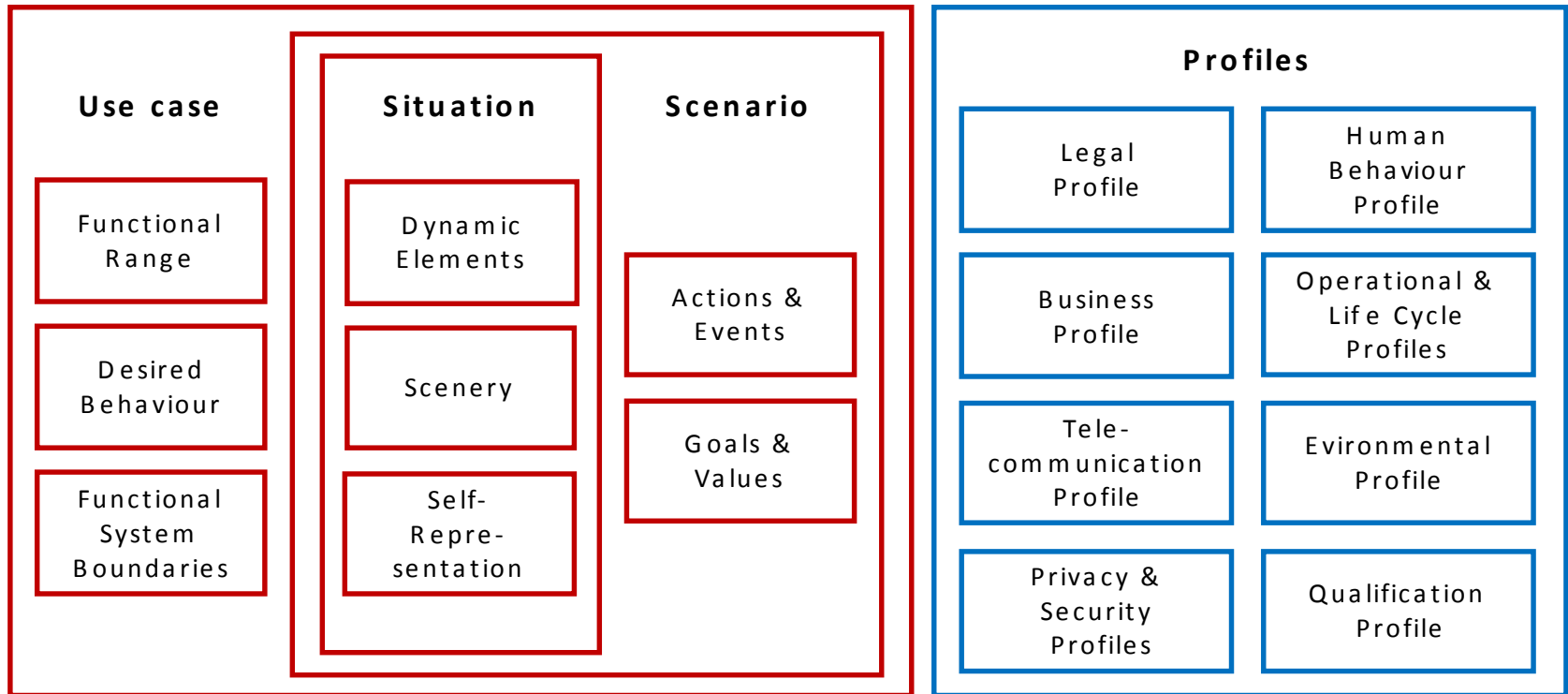
### •Service/Application

- Group of Use Cases generally realized within one Eco-System
- General description including
  - General objectives and rational
  - General conditions (life cycle management....)
- Specific Conditions
  - Business Conditions
  - Which technical architecture
  - Which interoperable Communication profile



Example: Road Works Warning

# Requirements



CODECS developed template for the use cases, used for discussion in other projects and C-Roads

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# Current Templates



- Service high level description

- Service introduction
- List of use-cases



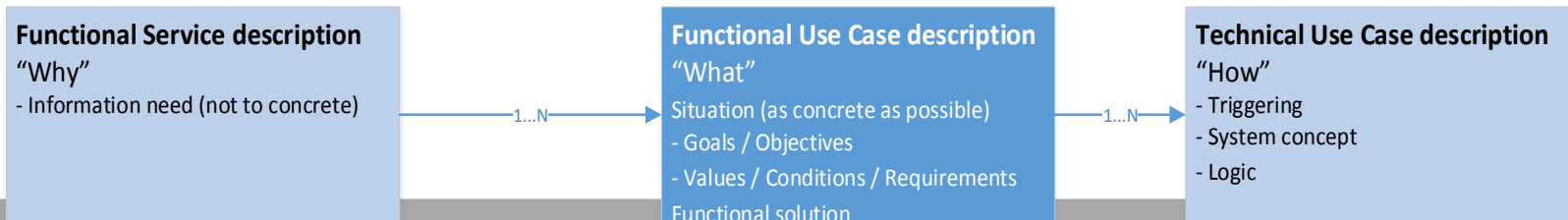
- Use case functional descriptions

- Use case introduction
- Use case description



- Use case high level technical description

- Use case implementation
- Functional and non-functional requirements



# Templates



## Service high level description

Service introduction	
Summary	Here we provide a summary of the service (one or two lines)
Background	Here we describe the motivation/rationale of the service
Objective	Here we describe the intended outcome of the service
Expected benefits	Here we describe the added value and actor benefits of the service
Use Cases	Here we give a list use cases – for each listed use case a use case table needs to be provided

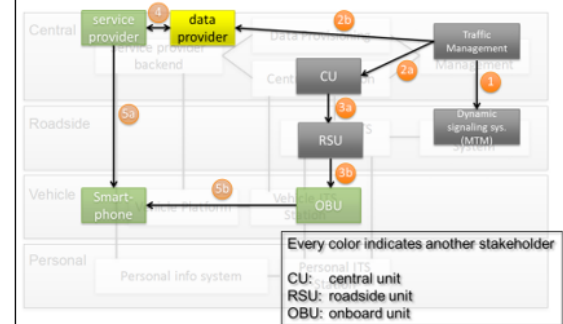
## Use case functional description

Use case introduction	
Summary	Here we provide a summary of the use cases (one or two lines)
Background	Here we describe the motivation/rationale of the use case
Objective	Here we describe the intended outcome of the use case
Desired behaviour	Here we describe the behaviour of the system and the intended behaviour of users
Expected benefits	Here we described the added value and actor benefits

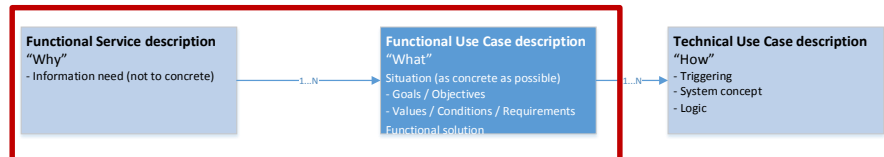
Use case description	
Situation	Here we describe one or more situations relevant to the use case
Actors and relations	Here we list all relevant actors and their relation/interaction to the system and their role in the use case (incl. sender and receiver). The actors are: vehicle driver, road operator, service provider, end user, vulnerable road user and other.
Scenario	Here we describe the story of the use case based on a sequence of situations (e.g. initial and after), events and actions. With illustration. Sender and End-received should be addressed, in stakeholder neutral manner.
Display / alert principle	Here we describe triggering conditions and what is displayed to the user when.
Functional Constraints / dependencies	Here we describe functional constraints and dependencies that are requirements (if any) related to e.g. business, security, telecommunications, privacy, legal, human behaviour, etc.

## Use case high level technical description

Use case implementation	
Model implementation	Here we provide a functional description of a typical implementation of the use cases
Logic of transmission	Here we describe the transmission logic (I2V, V2V, V2I, V2I2V... + broadcast / unicast / multicast)
Reference architecture	Here we provide a high-level architecture (as in act2.1b) to illustrate the main components, interfaces, data flows and display principles (see example below).



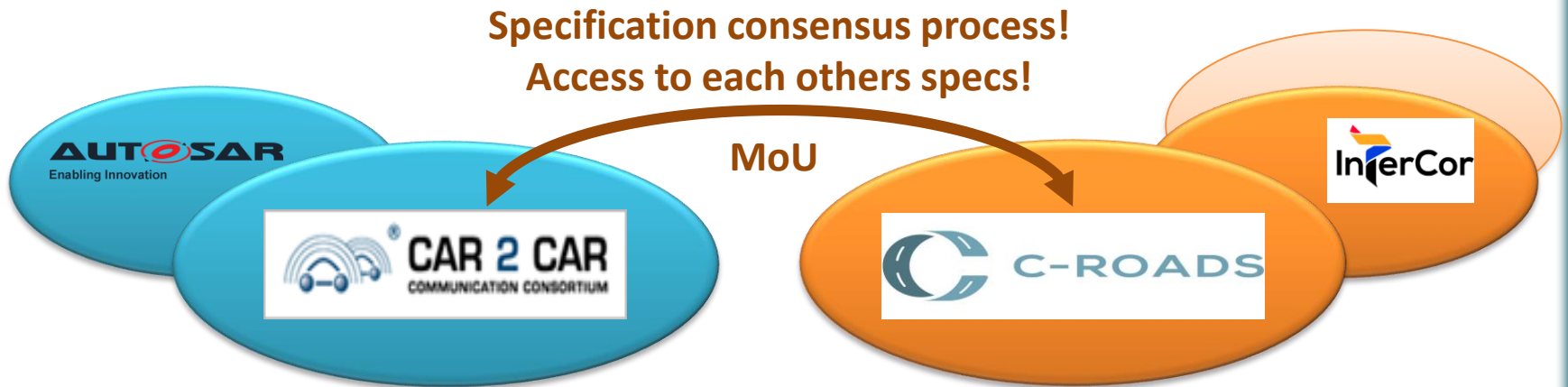
Functional and non-functional requirements	
Sources of information	Here we describe the necessary data
Standards	Here we list relevant standards
Technical Constraints / dependencies	Here we describe technical constraints and dependencies that are requirements (if any) related to e.g. business, security, telecommunications, privacy, legal, human behaviour, etc.



# European Interoperability



## Where Which specifications?

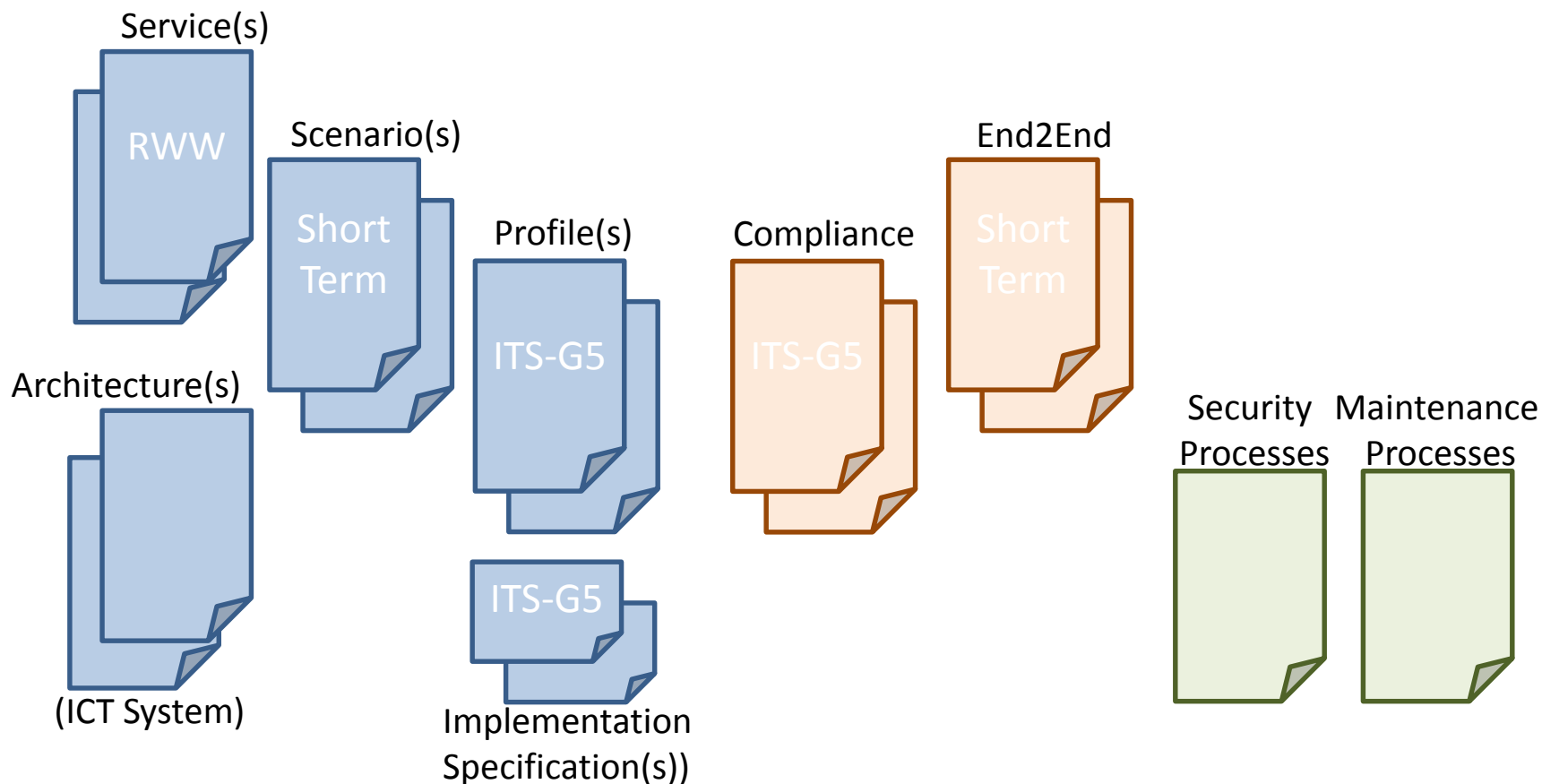


- Both Transmitting and Receiving
- Common Security and certificates politicizes
- Agree service roadmap and responsibilities
- V2V service white papers
- V2V and V2I trigger conditions
- ITS-G5 Technical Interface Profile
- New V2V, V2I and I2V Interface technical Profiles
- I2V and I2I services and use cases
- I2V and I2I trigger conditions
- Memberstate Traffic centre interchange and service provider I2I Technical interface Profiles

# European Interoperable



## Possible common document structure



# THANK YOU!

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