

# FROM CAPABILITIES TO SYSTEM ELEMENTS

The traditional requirements engineering approach is extended by the concept of capabilities and supported by GQM for metric definition.

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**System Capability** is a high-level description of a system's potential to produce a specific performance measurable outcome.

- Autonomous Driving
- Object Perception
  - Object Threat Assessment
  - Context Recognition

**Stakeholder Requirements** describe demands which contribute to system capabilities requested by stakeholders in a defined environment.

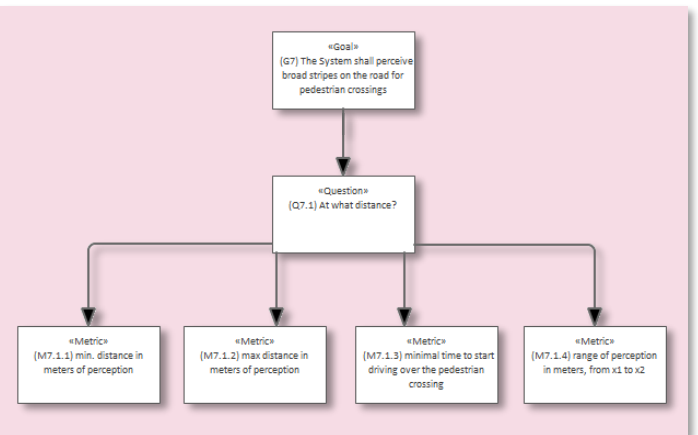
The vehicle shall be capable of driving autonomously in urban areas on public roads including crosswalks.

**System Requirements** specify the system characteristics, attributes, and performance that will meet the stakeholder needs.

The system shall be able to perceive road markings.  
The system shall be able to perceive traffic signs.  
The system shall calculate its trajectory in a way that all traffic rules are observed.

Functional requirements describe the behavior of the system.

**Goal – Question – Metric (GQM)** is used as approach to elaborate quality measurements for functional requirements. The tree structure may be modelled. The resulting quality measures may be expressed as performance requirements, refining the functional requirements.



**System Design** decomposes the system in system elements, which shall be implemented. Alternative design candidates have to be evaluated and rated.

The system consists of a vehicle and a backend infrastructure.  
The vehicle contains a perception system reporting the vehicle's current environment as a list of static and dynamic objects.

**System Element Requirements** specify the system element characteristics, attributes, and performance that will meet the system requirements based on the selected system design.

The perception system shall report broad stripes on the road for crosswalk markings as a single static object.  
The perception system shall report a traffic sign for crosswalks as a static object.

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## Projektpartner



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