HEADSTART Methodology in a nutshell

Nicolas Wagener, ika

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Overview

- ✓ Motivation for the need of a combined methodology
- ✓ HEADSTART‘s Overall methodology in a nutshell
- ✓ Safety argumentation for various stakeholders
- ✓ Insights to key topics within the methodology

Motivation

Where does the HEADSTART Methodology come from?

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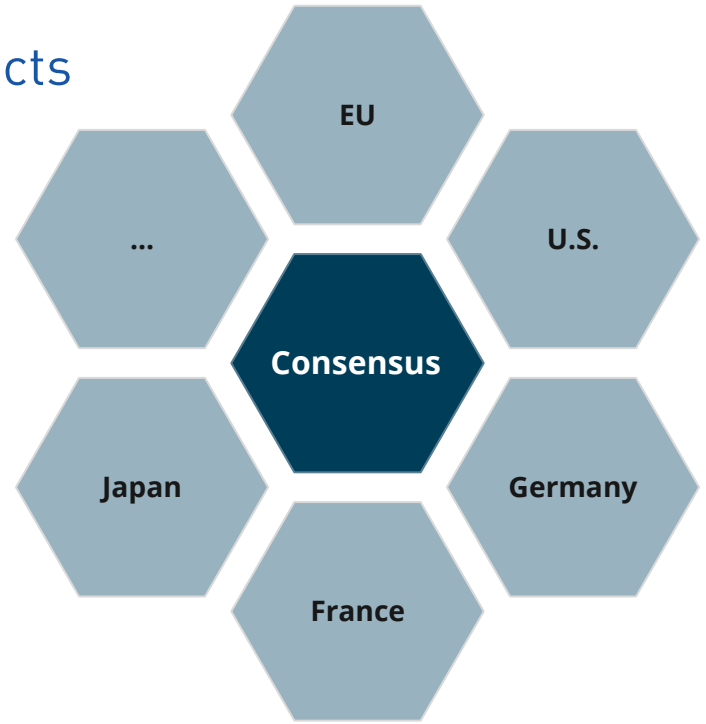
- ✓ State of the art analysis of international and national projects
- ✓ **Harmonization** of present and past projects
- ✓ Utilizing **common databases** to analyse data
- ✓ Testing of selected **relevant scenarios**



Motivation

Why do we need a scenario-based safety assurance?

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Safety assurance by test drives?

- Sample calculations ranging **up to billions** of kilometers

➔ Not feasible

Safety assurance by expert knowledge?

- **No evaluation methodology available** for automated driving (L3+)

➔ Not available

Overall Methodology

How can such a methodology look like?

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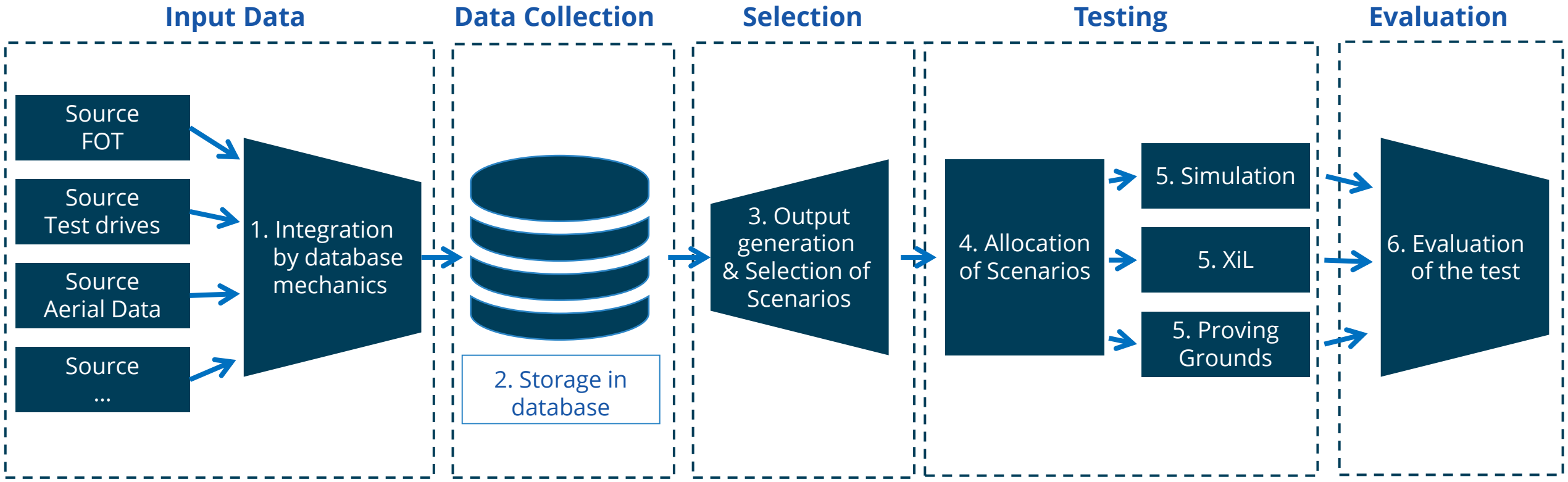

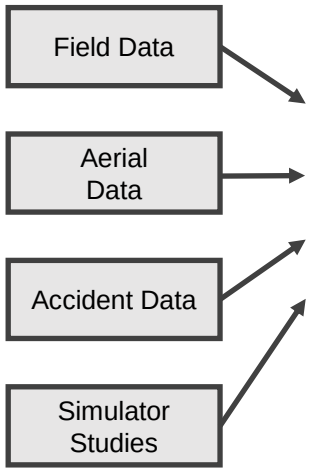
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Aerial Data
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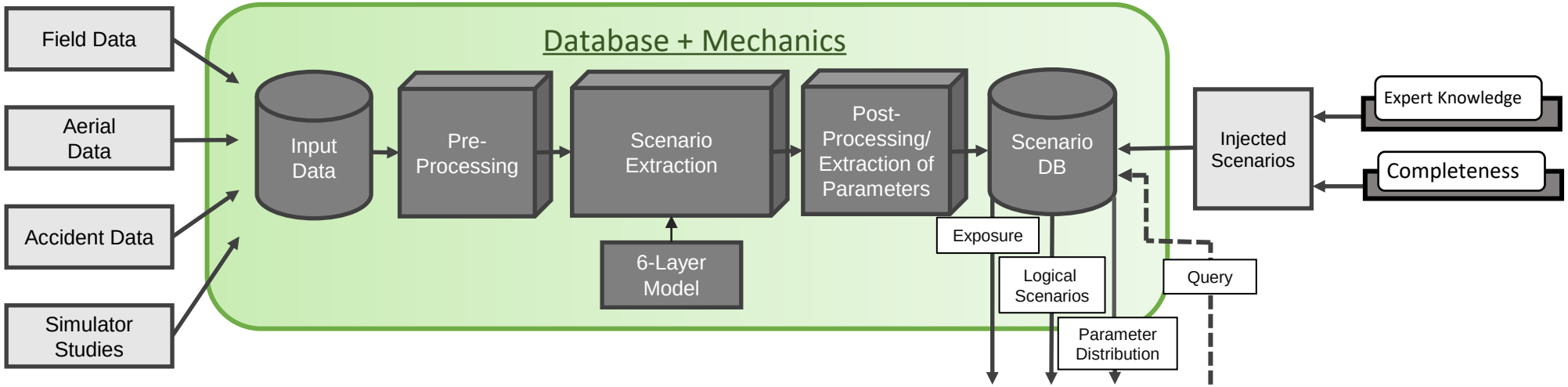
Simulator Studies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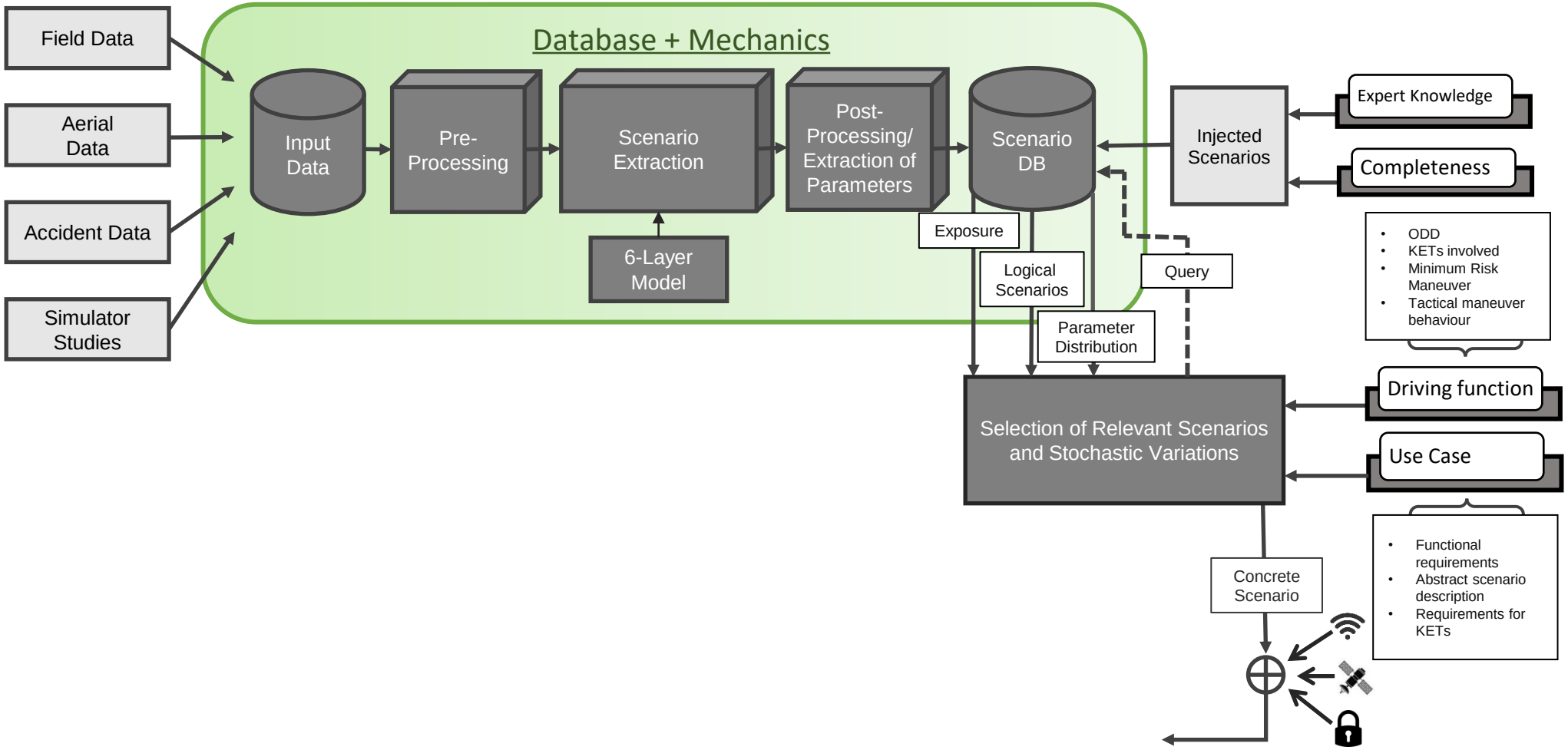
Pre-Processing
Scenario Extraction
6-Layer Model
Post-Processing/ Extraction of Parameters
Scenario DB
Exposure
Logical Scenarios
Parameter Distribution
Query
Injected Scenarios
Expert Knowledge
Completeness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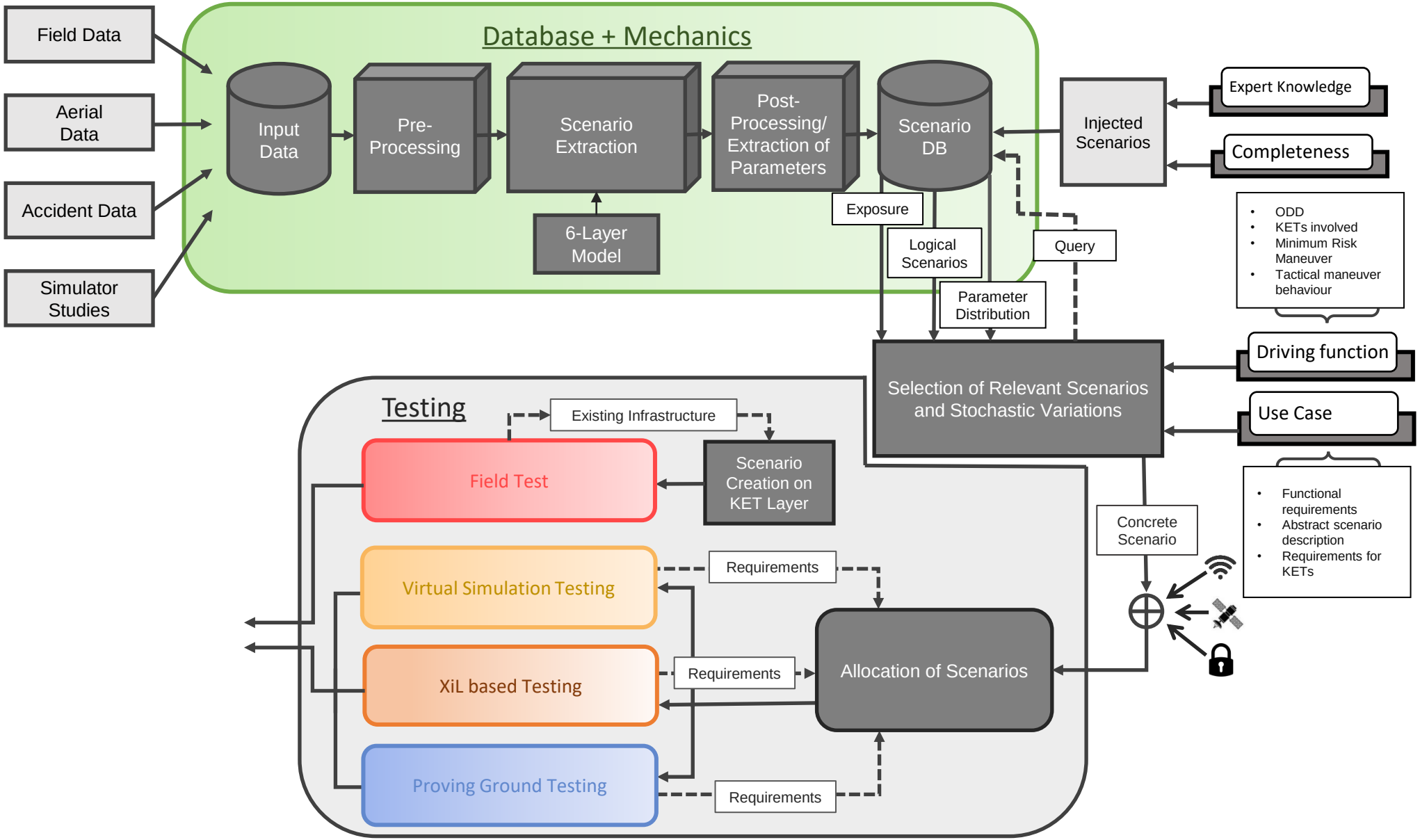
ODD
KETs involved
Minimum Risk Maneuver
Tactical maneuver behaviour
Driving function
Use Case
Selection of Relevant Scenarios and Stochastic Variations
Concrete Scenario
Functional requirements
Abstract scenario description
Requirements for KETs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XiL based Testing
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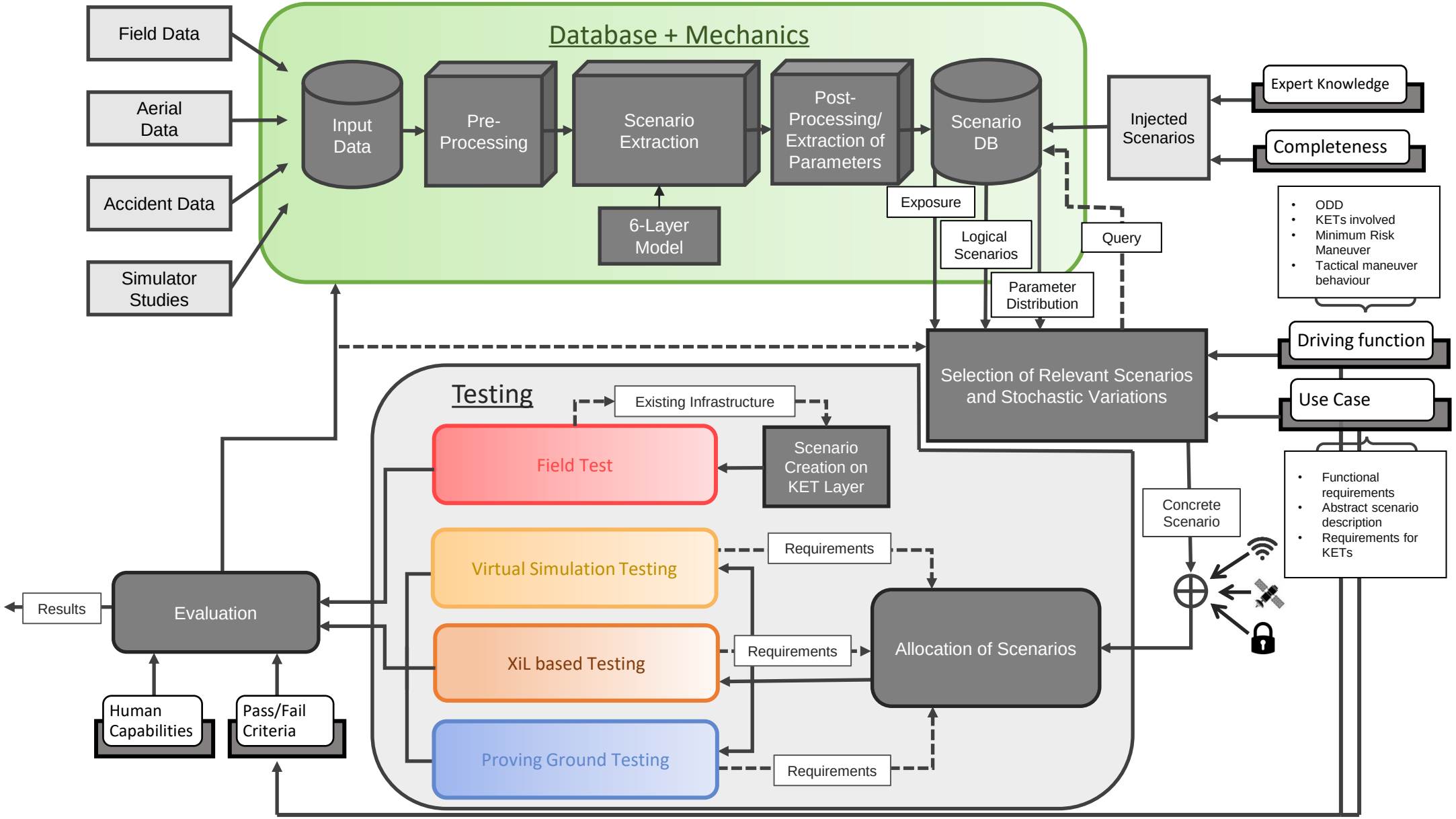
Allocation of Scenarios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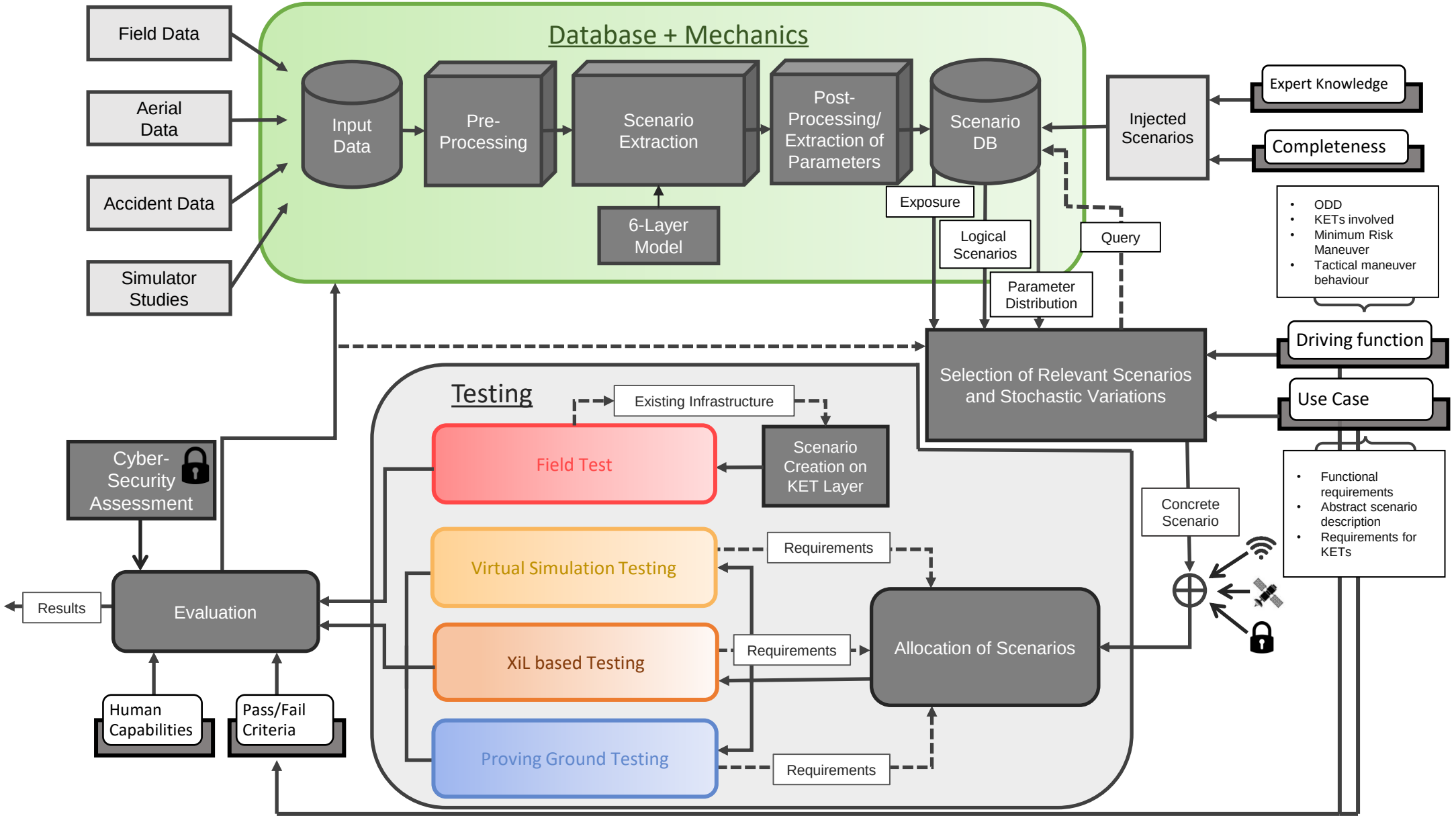
Results
Evaluation
Human Capabilities
Pass/Fail Criteria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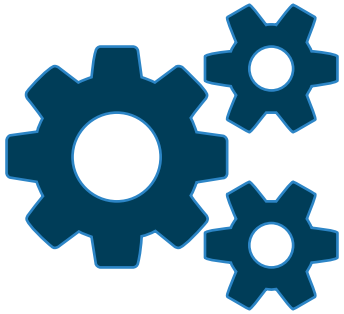
Safety Argumentation

Coverage of Scenarios

Is there enough input data?
Is the database content complete?
➔ Completeness

Coverage of Concept

Is the concept able to include all relevant aspects?



Coverage of Tests

Is the selection from the parameter space enough to cover the whole space?

Safety Argumentation

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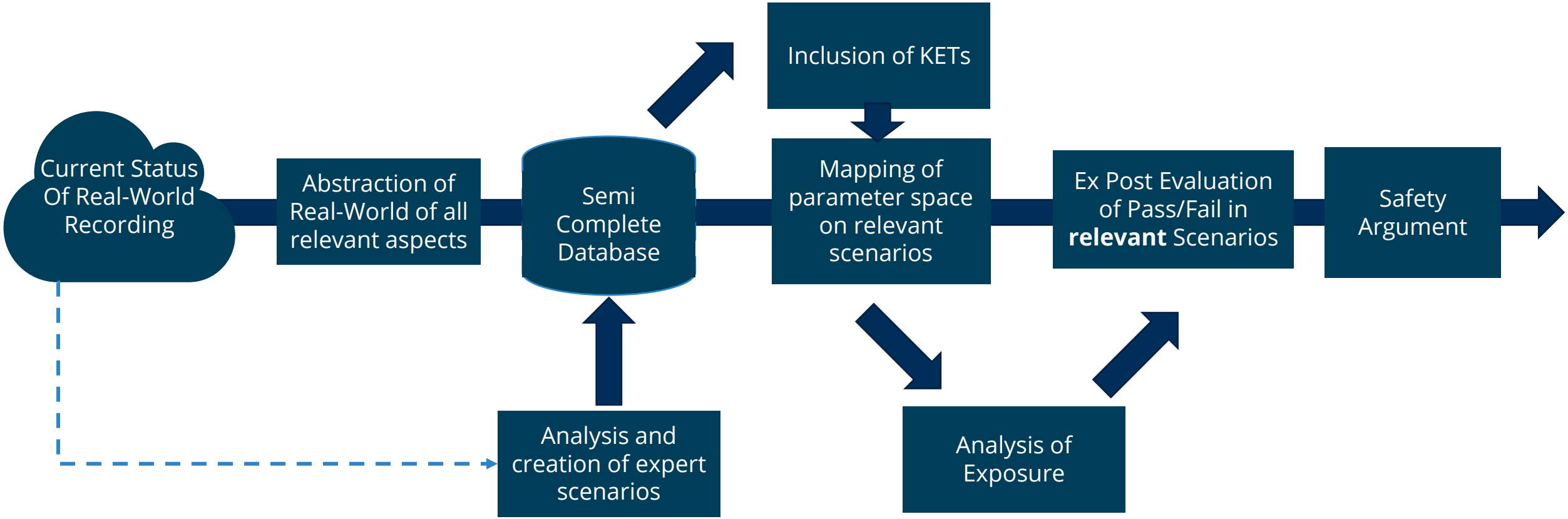

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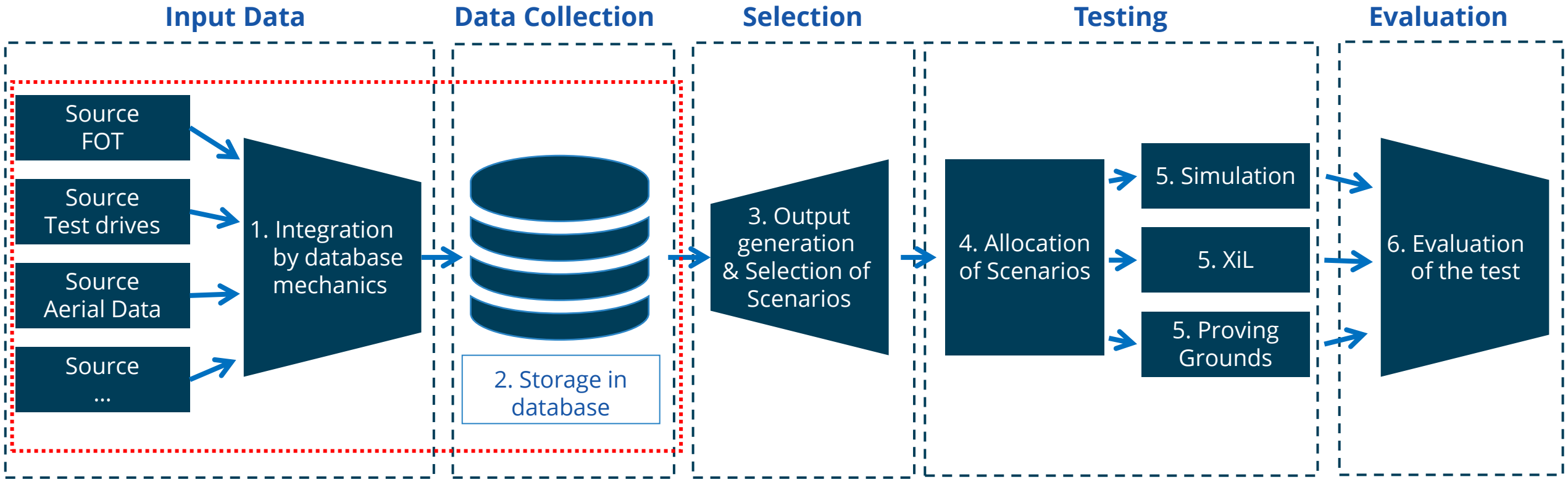


Scenario Layers

Layer 6

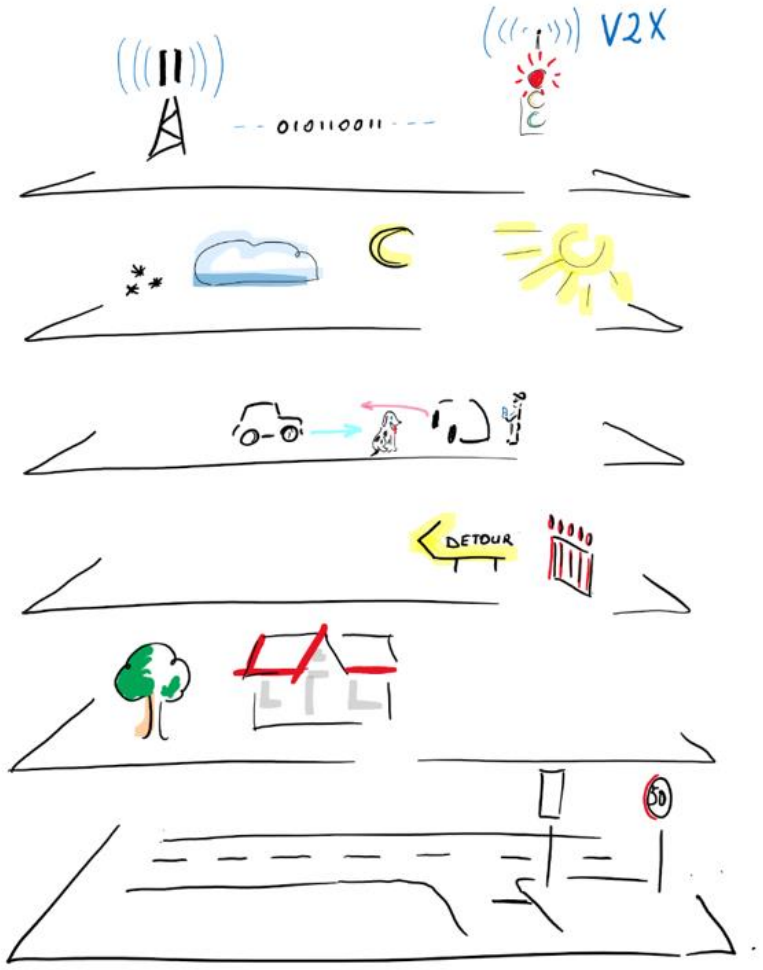
Layer 5

Layer 4

Layer 3

Layer 2

Layer 1



Digital information
e.g. V2X information on traffic signals, digital map data

Environmental Conditions
e.g. Light situation, weather (rain, snow, fog)

Dynamic Objects
e.g. Vehicles, pedestrians, other moving objects

Temporary modifications of L1 and L2
e.g. Road construction, traffic cones

Roadside Structures
e.g. Railguards, Trees, Buildings

Road Network and Traffic Guidance
e.g. Road geometry, traffic signs, road logic

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