

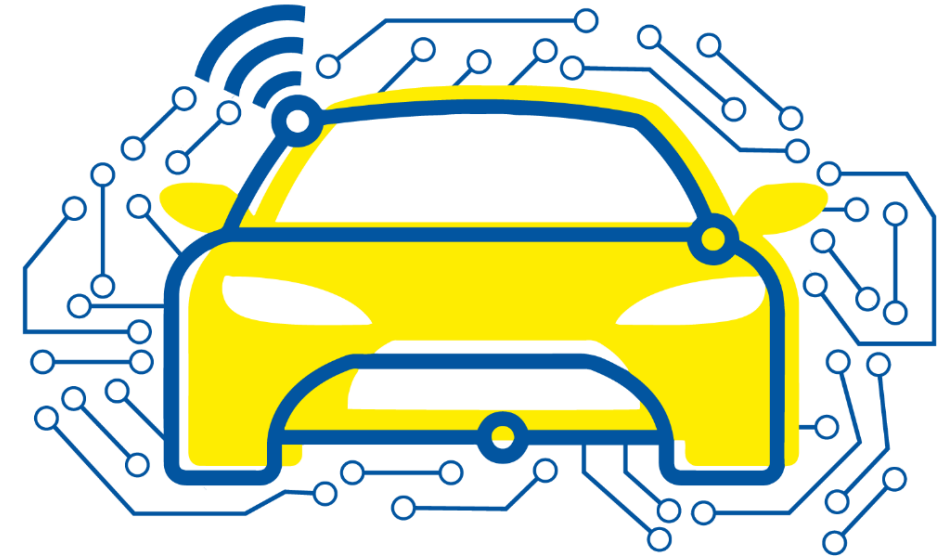
# Automated and Connected Driving Challenges

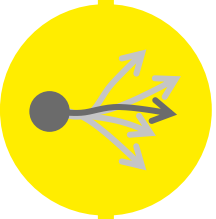
Section 4 – Vehicle Guidance

## Introduction Challenges

Prof. Dr.-Ing. Lutz Eckstein

Institute for Automotive Engineering





# Vehicle Guidance

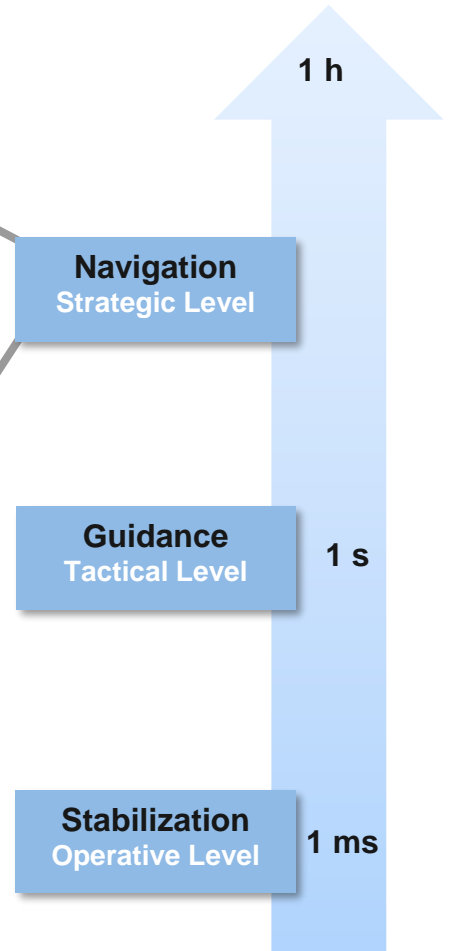
## *Challenges*

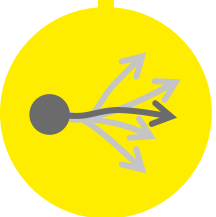
### Navigation-Level:

#### Objective:

Optimal Route finding under constraints

Time Horizon





# Vehicle Guidance

## Challenges

### Navigation-Level:

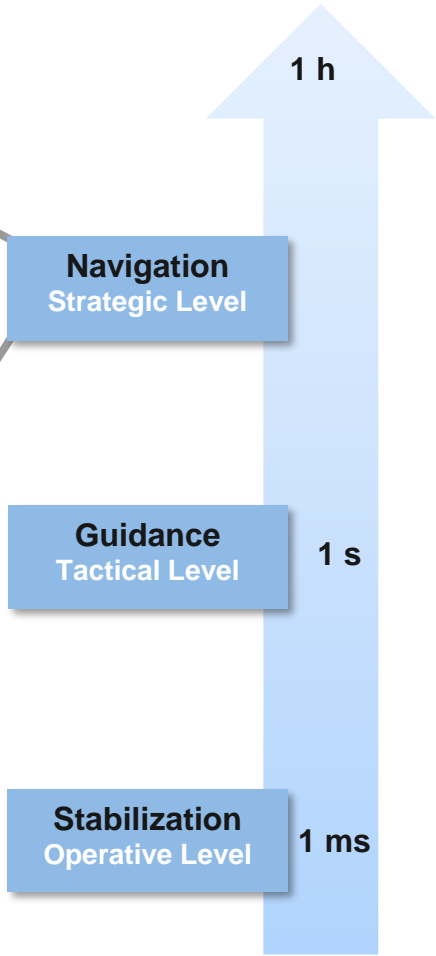
**Objective:**

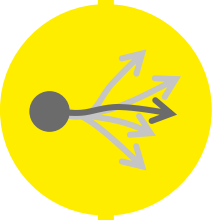
Optimal Route finding under constraints

**Challenges:**

- Efficient but detailed representation of the road network
- Optimization with horizon of several hours

Time Horizon





# Vehicle Guidance

## Challenges

### Navigation-Level:

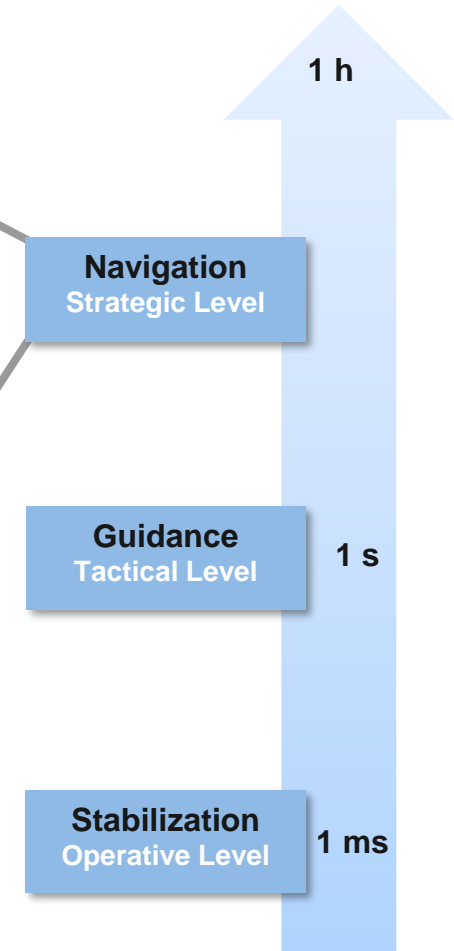
#### Objective:

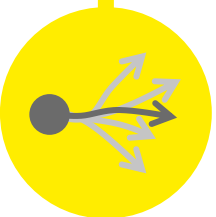
Optimal Route finding under constraints

#### Challenges:

- Efficient but detailed representation of the road network
- Optimization with horizon of several hours
- Include real-time information like road blockings or traffic jams
- Consider ODD of the automated vehicle
- ...

Time Horizon

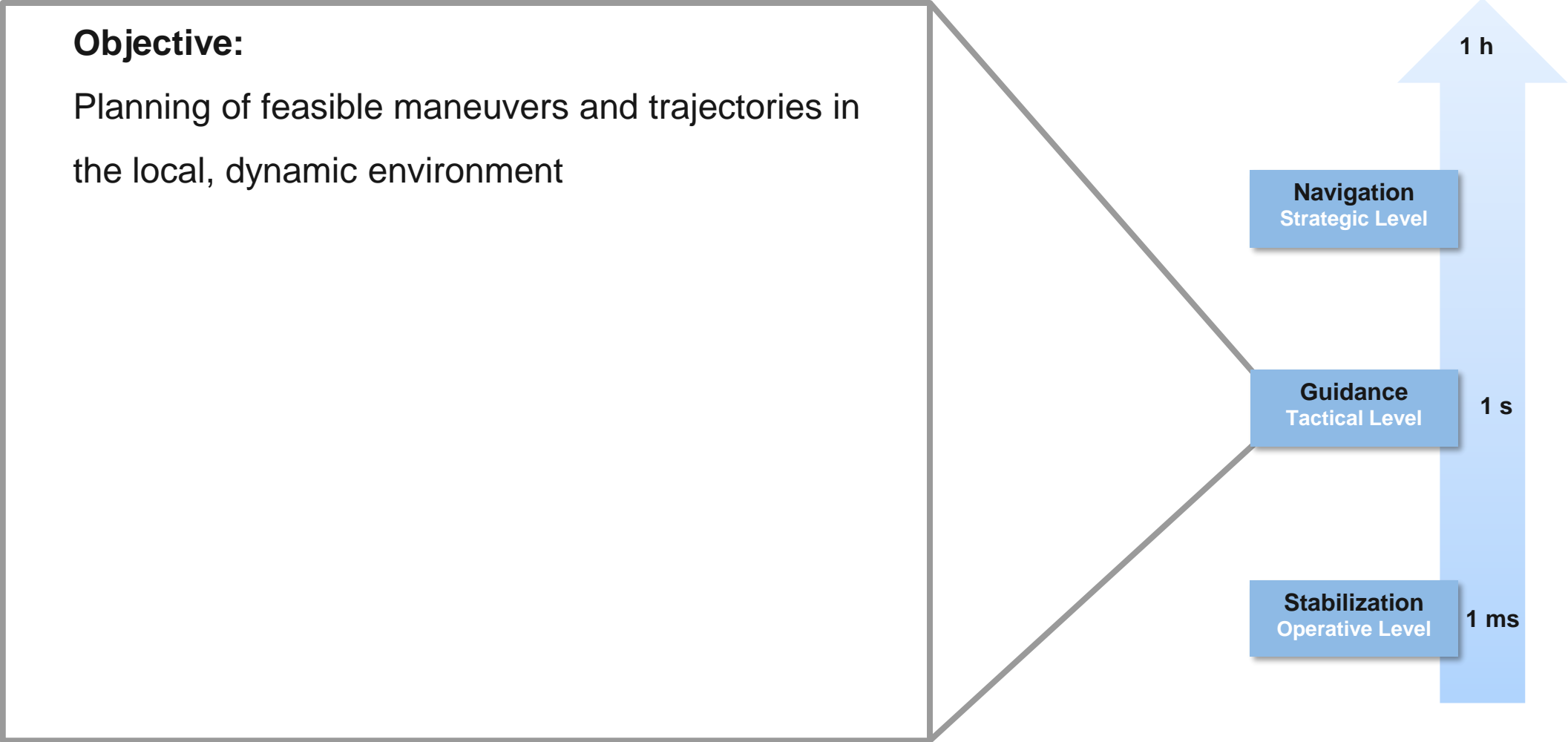


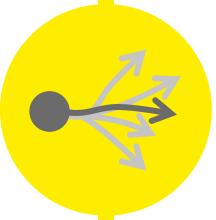


# Vehicle Guidance

## Challenges

### Guidance-Level:





# Vehicle Guidance

## Challenges

### Guidance-Level:

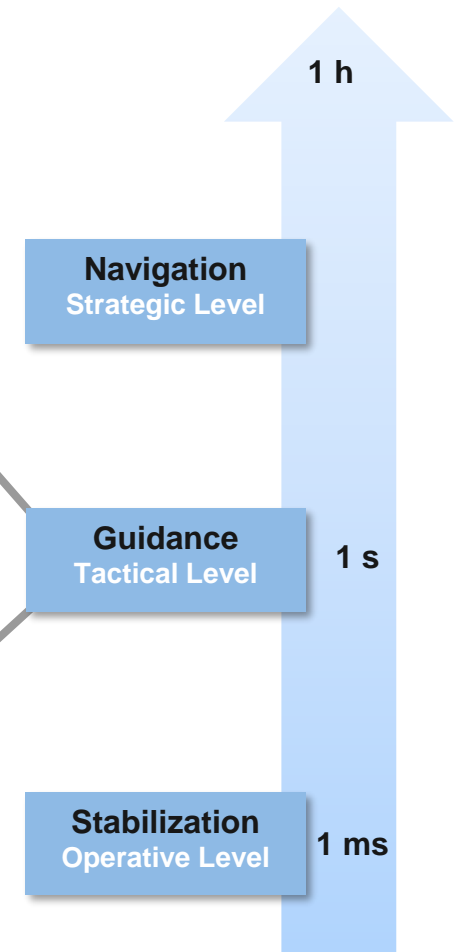
#### Objective:

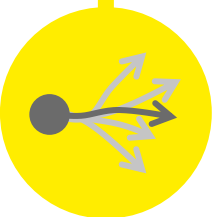
Planning of feasible maneuvers and trajectories in the local, dynamic environment

#### Challenges:

- Enable a safe, comfortable and efficient driving behavior

### Time Horizon





# Vehicle Guidance

## Challenges

### Guidance-Level:

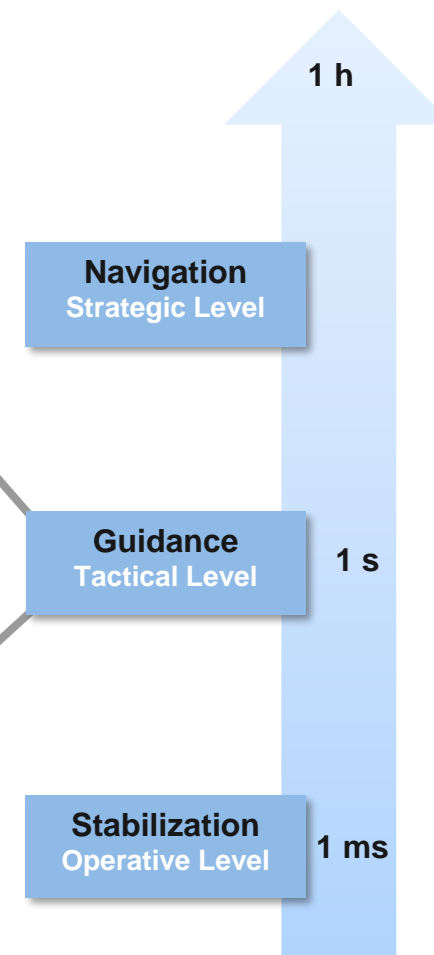
#### Objective:

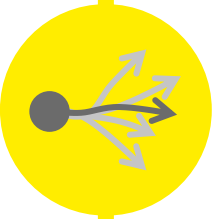
Planning of feasible maneuvers and trajectories in the local, dynamic environment

#### Challenges:

- Enable a safe, comfortable and efficient driving behavior
- Accounting for uncertainties in all measurement data and in the traffic participants behavior
- Low frequency, cyclic re-planning
- ...

### Time Horizon





# Vehicle Guidance

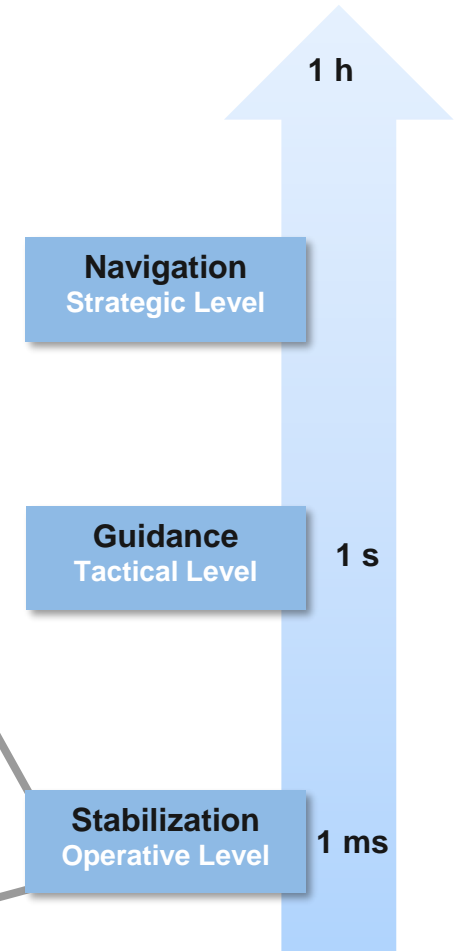
## *Challenges*

### Stabilization-Level:

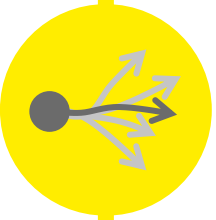
#### Objective:

Control the vehicle movement with respect to a given trajectory

### Time Horizon







# Vehicle Guidance

## Challenges

### Stabilization-Level:

#### Objective:

Control the vehicle movement with respect to a given trajectory

#### Challenges:

- React to unforeseen disturbances
- Enable a minimum deviation from the given trajectory
- Compensate modelling errors of the trajectory planning process
- ...

### Time Horizon

