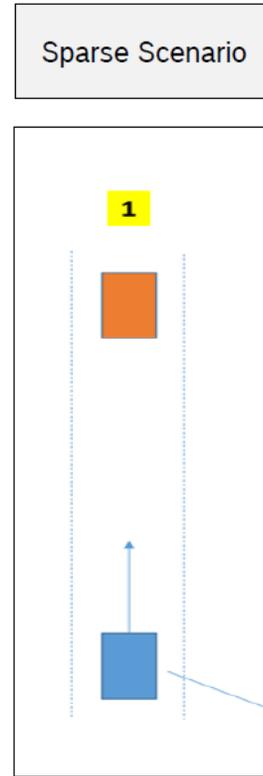


# Runtime Influence on AEB Performance

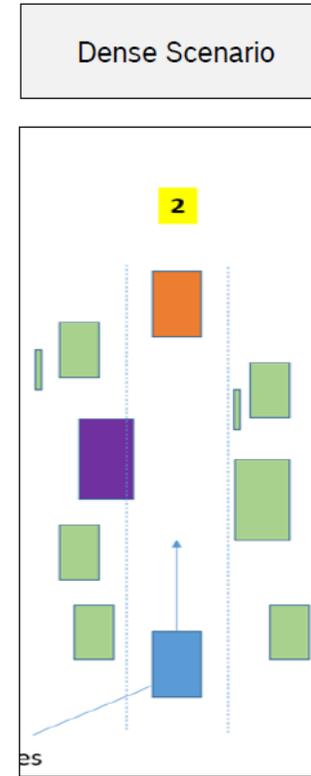
## Comparison with Human Being

### Simple /sparse scenario:

- Low mental stress 
- Low distraction 
- Risk of missing something low 
- Rapid assessment 
- Rapid reaction



vs.



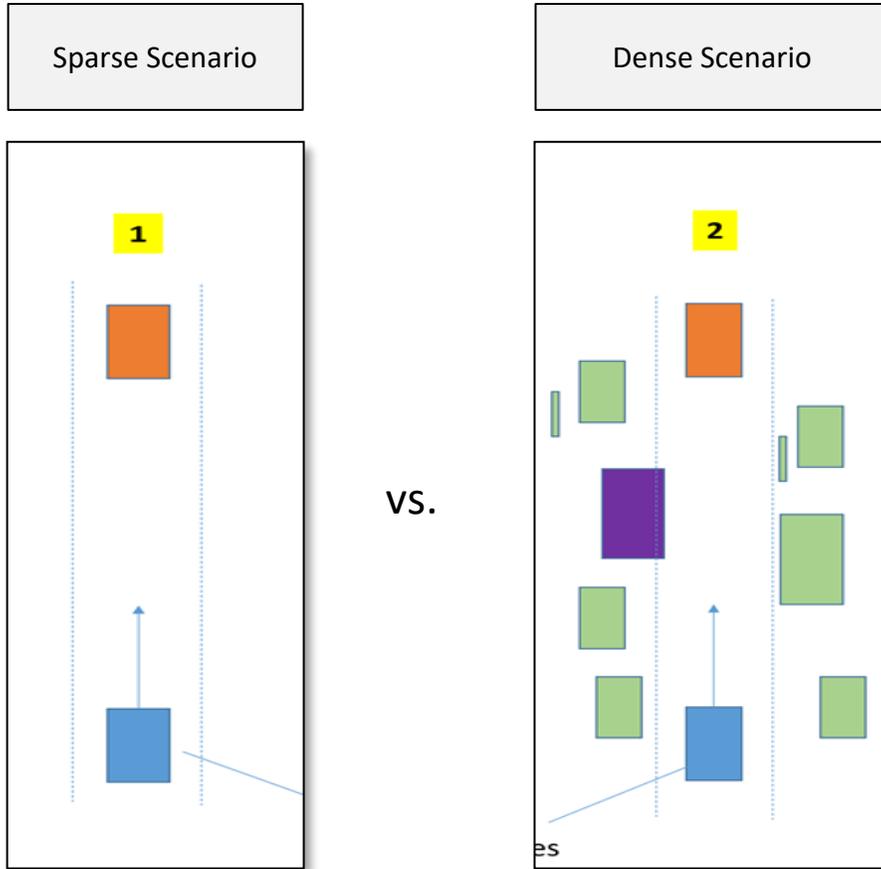
### Complex / dense scenario:

- High mental stress 
- Increased distraction 
- Risk of missing something high 
- Slowed down assessment 
- Slowed reaction

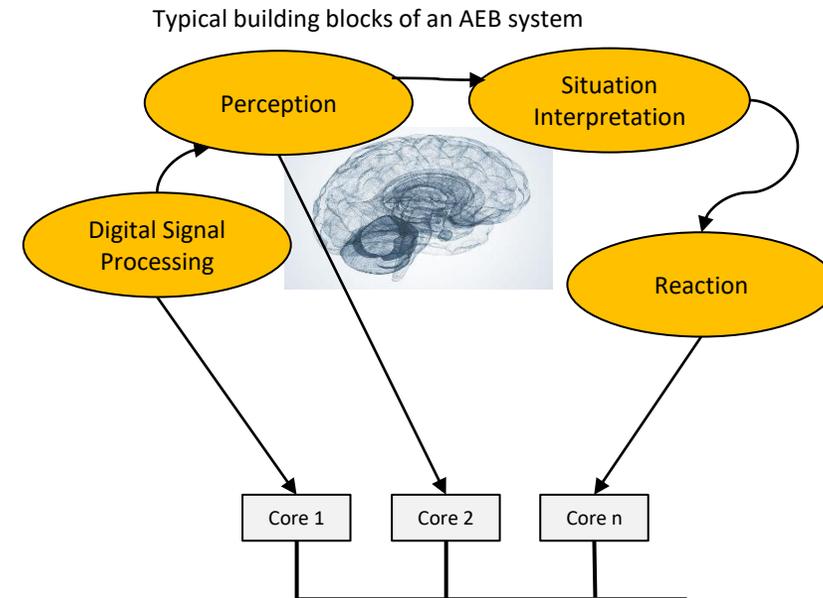
 Depending on the situation and complexity, this can affect the response time

# Runtime Influence on AEB Performance

## Problem Description



- ▶ The traffic scenario is influencing the performance of an Automatic Emergency Brake Function
- ▶ Clinical test track scenarios contain a lot of open space and few objects
- ▶ In contrast, real world scenarios on public roads can contain a lot of objects



# Runtime Influence on AEB Performance

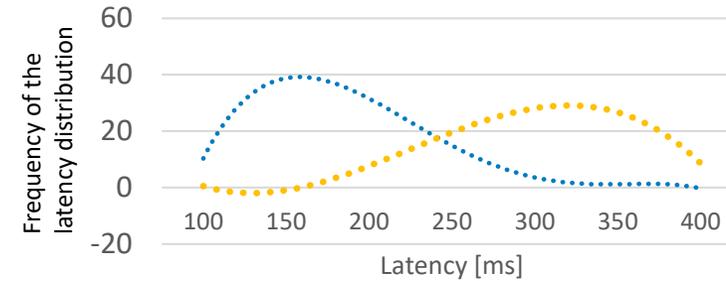
## Effect Cause

- ▶ Dense Scenarios increase the **Computation Time** in AEB building blocks:
  - ▶ Perception – more sensor input / more object hypothesis
  - ▶ Situation Interpretation – more agents / more complex scenario

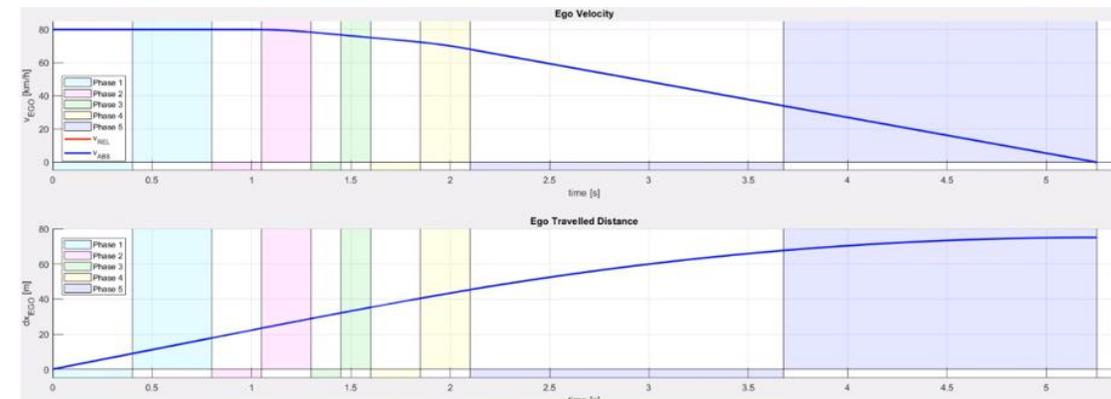
- ▶ State-of-the-Art ADAS systems are running on Multi-Core ECUs with **Asynchronous Communication**

- ▶ Multi-Sensor Systems may increase latency until AEB ECU receives sensor input

- ▶ Sensor limitations can lead to wrong environment hypothesis in dense scenarios more likely, i.e. in far range → later scene understanding



..... Poly. (sparse)    ..... Poly. (dense)



→ 50ms triggering delay could lead to up to 10kph increased impact velocity\*

\* depending on many factors, incl. predictability of the scenario (higher impact in unsteady scenarios like braking preceding vehicle expected)



▶ Real world data confirm the theoretical considerations and suggest an AEB performance degradation due to the technical system boundaries