

IMPACT ASSESSMENT

SIP-ADUS WORKSHOP



EG-342 | 16th November 2016



IMPACT ASSESSMENT. OVERVIEW.

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Traffic, accidents
and traffic safety.

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Methodology.

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Tool.

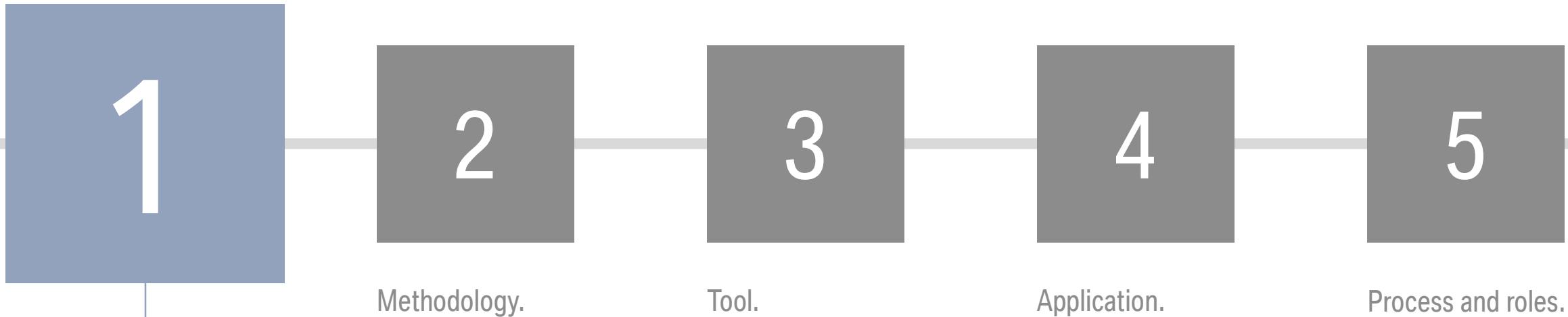
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Application.

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Process and roles.

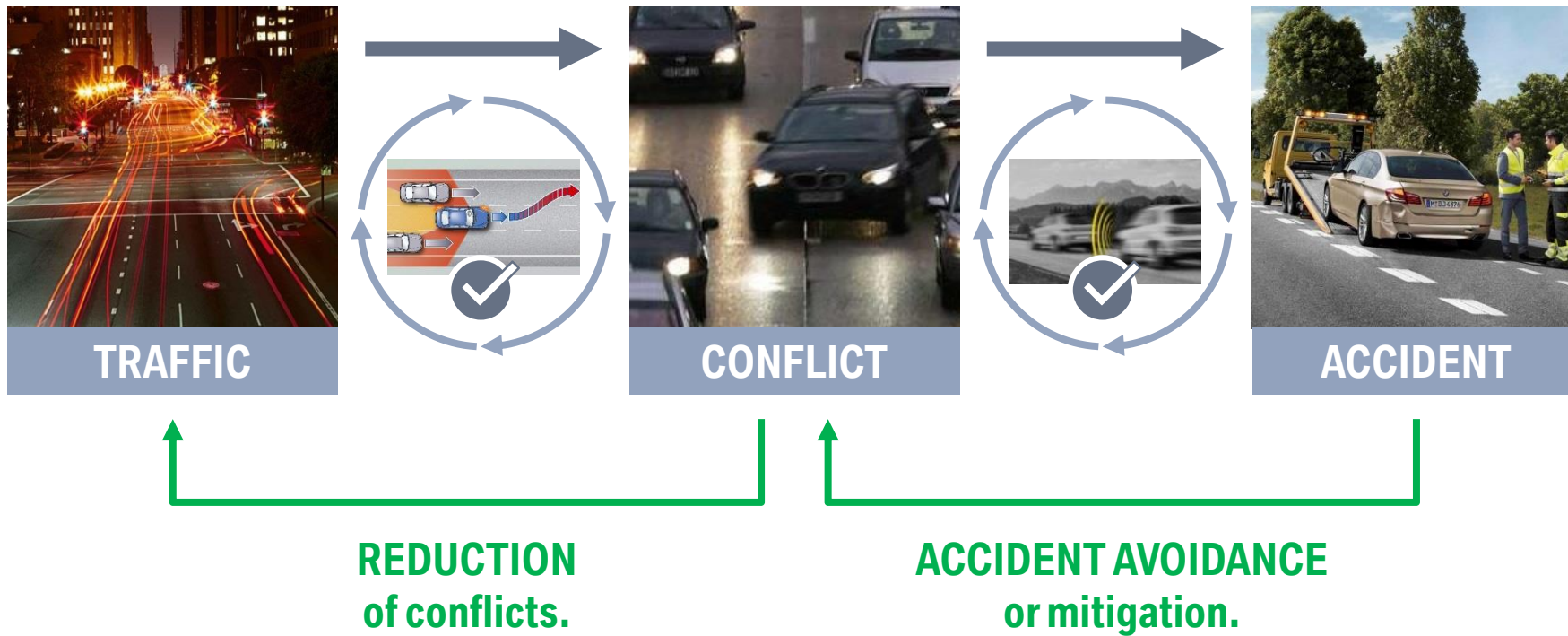
IMPACT ASSESSMENT. OVERVIEW.



Traffic, accidents, and traffic safety.

TRAFFIC, ACCIDENTS AND TRAFFIC SAFETY. UNDERSTANDING TRAFFIC AND ACCIDENTS.

Accident as a process of interacting factors



- Accident is a result of **multiple interacting factors** in traffic.
- The safety performance of Assistance Systems must be evaluated by taking these **complex interactions** into account.

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Tool.



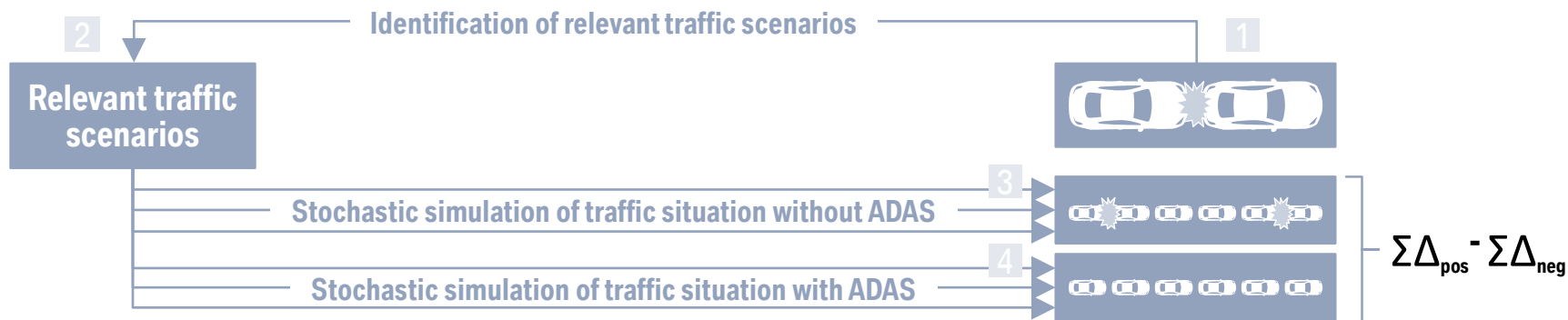
Application.



Process and roles.

METHODOLOGY. ACCIDENT- VS. TRAFFIC-BASED APPROACH

Accident-based





Traffic-based

Effectiveness result cannot be generalized!



- How does the system work in a realistic distribution of (highly) critical non-accident situations?
- What is the consequence of a system reaction for the surrounding traffic (e.g., depending on traffic density)?
- What would a false-positive system reaction induce into traffic?

METHODOLOGY. ACCIDENT- VS. TRAFFIC-BASED APPROACH.

Accident-based approach

SYSTEM ACTION			OBJECTIVE RISK
Yes	No		
True Positive Correct action 	False Negative Conflict not detected (no action)	Yes	OBJECTIVE RISK
Near Miss Almost MISSING ASSESSMENT False Positive Unnecessary action	True Negative Correct "non-action" 	No	

Traffic-based approach

SYSTEM ACTION			OBJECTIVE RISK
Yes	No		
True Positive Correct action 	False Negative Conflict not detected (no action)	Yes	OBJECTIVE RISK
Near Miss Almost False Positive Unnecessary action	True Negative Correct "non-action" 	No	

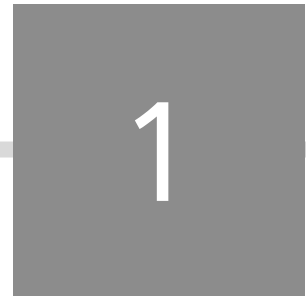
METHODOLOGY. PROSPECTIVE EFFECTIVENESS ASSESSMENT OF ROAD SAFETY.



- Representative assessment of **active safety** requires **harmonized methods**.
- Harmonization enables **comparable** and **comprehensible** assessments.
- For simulation: **methods, processes, and models** for prospective assessment have to be **harmonized**.
- **Objective** of this open working platform is the **creation of a worldwide standard** for the **evaluation of systems within the pre-crash phase**, which is **created, discussed, and finally accepted by all relevant stakeholders**.

- **Worldwide harmonization/standardization** as primary objective.
- **Open harmonization** initiative was very well received and supported by all stakeholders (OEMs, suppliers, research institutes, insurances, consumer protection, and governmental institutions).
- So far over 30 organizations are participating and contributing to P.E.A.R.S.
 - Audi, Daimler, BMW, FCA, Renault, Volvo, VW, Toyota,...

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Methodology



Tool.



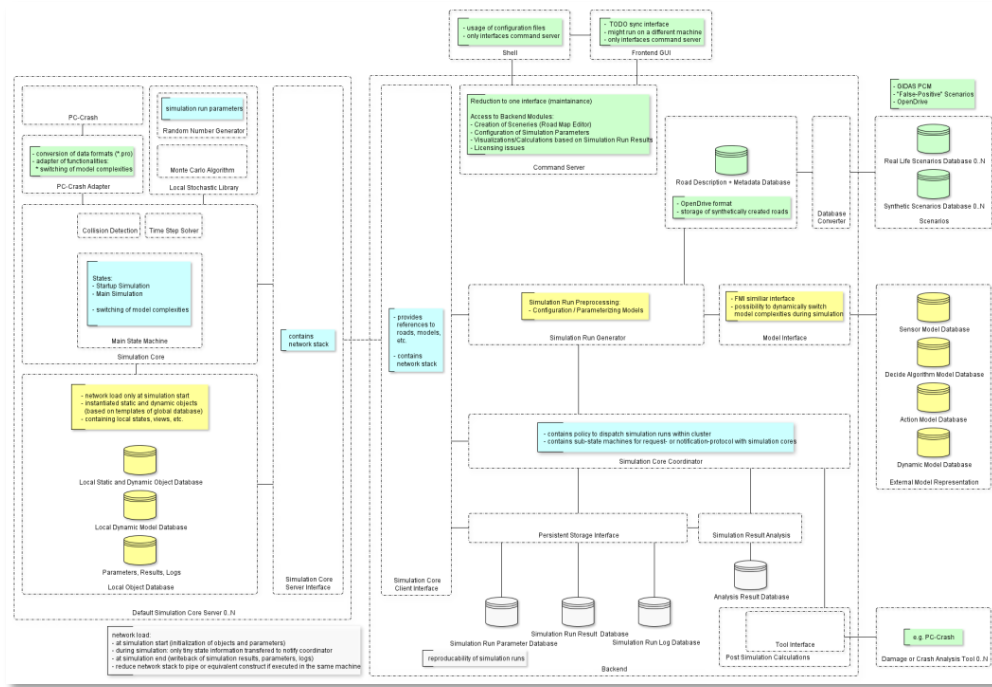
Application.



Process and roles.

TOOL. OPENPASS.

- OpenPASS is a **new software framework** for simulation and evaluation of ADAS and automated driving
- **Joint initiative of OEMs** (Daimler, VW and BMW) with scope of harmonization of simulation tools
- **Open-Source approach** under the umbrella of the eclipse foundation (project: sim@openpass)



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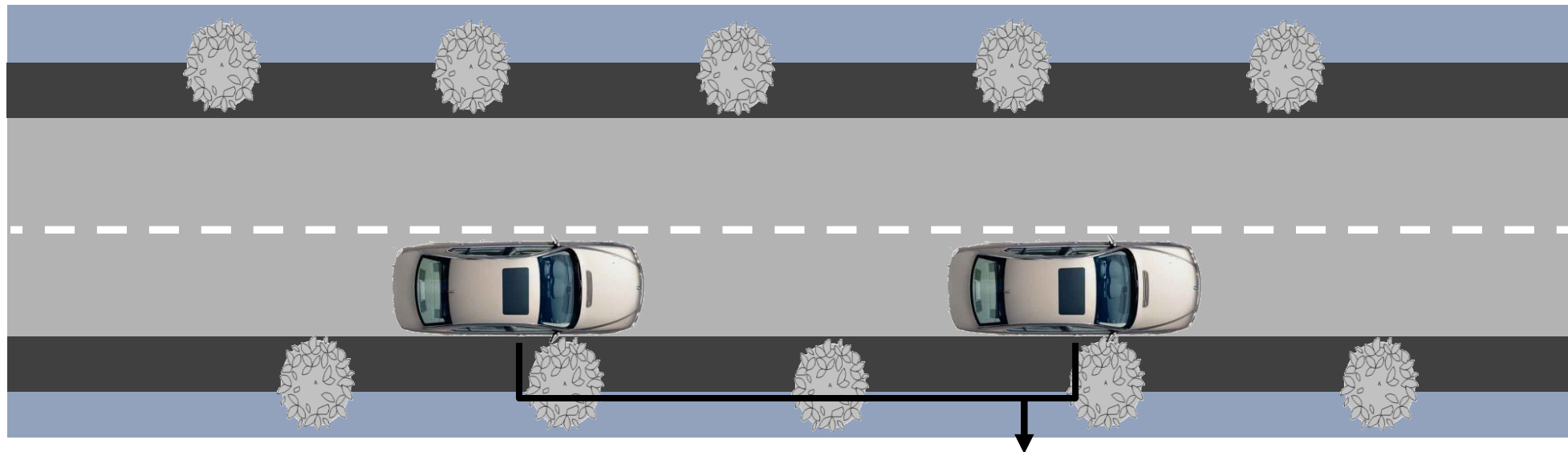


Application.



Process and roles.

APPLICATION. EXAMPLE: REAR-END CONFLICT - INFLUENCING FACTORS.



Scenario factors

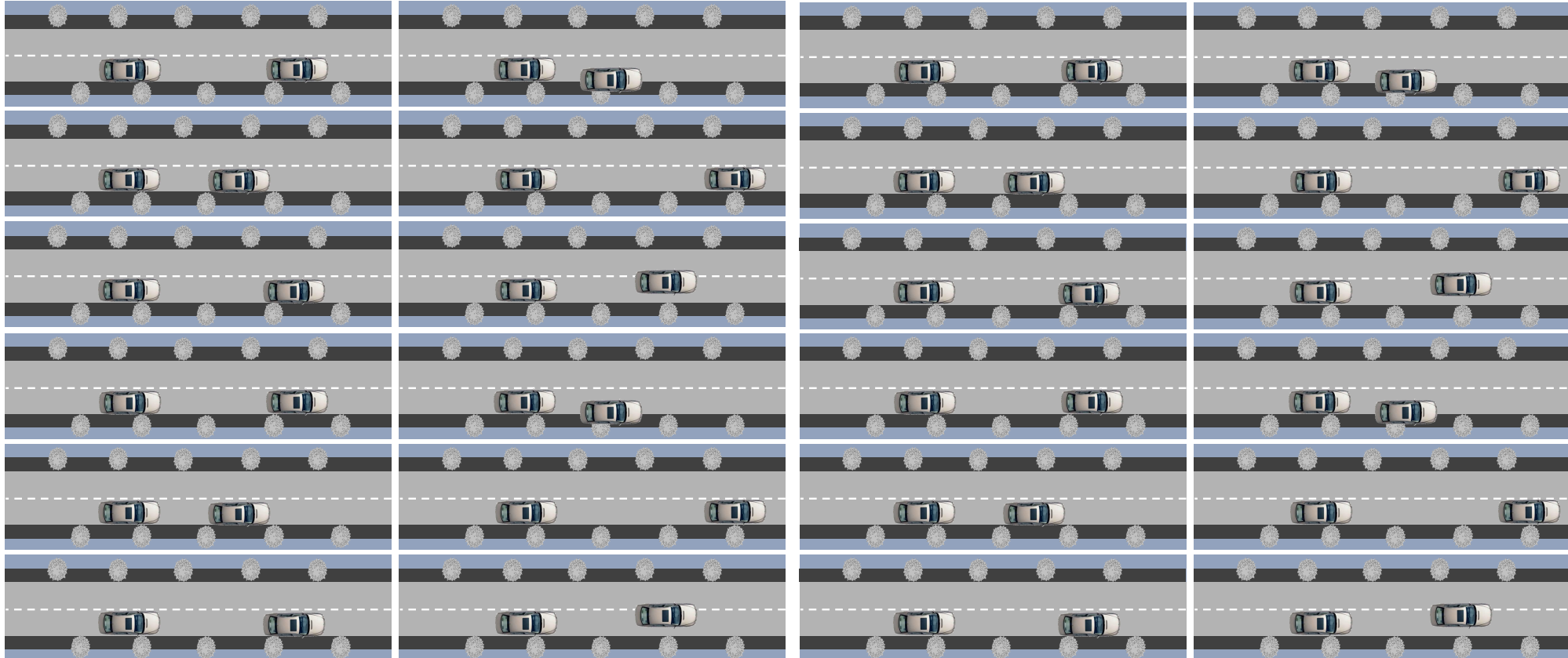
- Driving speed (rear vehicle / front vehicle).
- Relative distance.
- Acceleration (rear vehicle / front vehicle).
- Offset.
- Road friction.
- Traffic.
- ...

Driver related factors

- Driving speed.
- Mental Fitness.
- Visually distracted.
- Current mental activation.
- Seating position.
- Field of view.
- ...

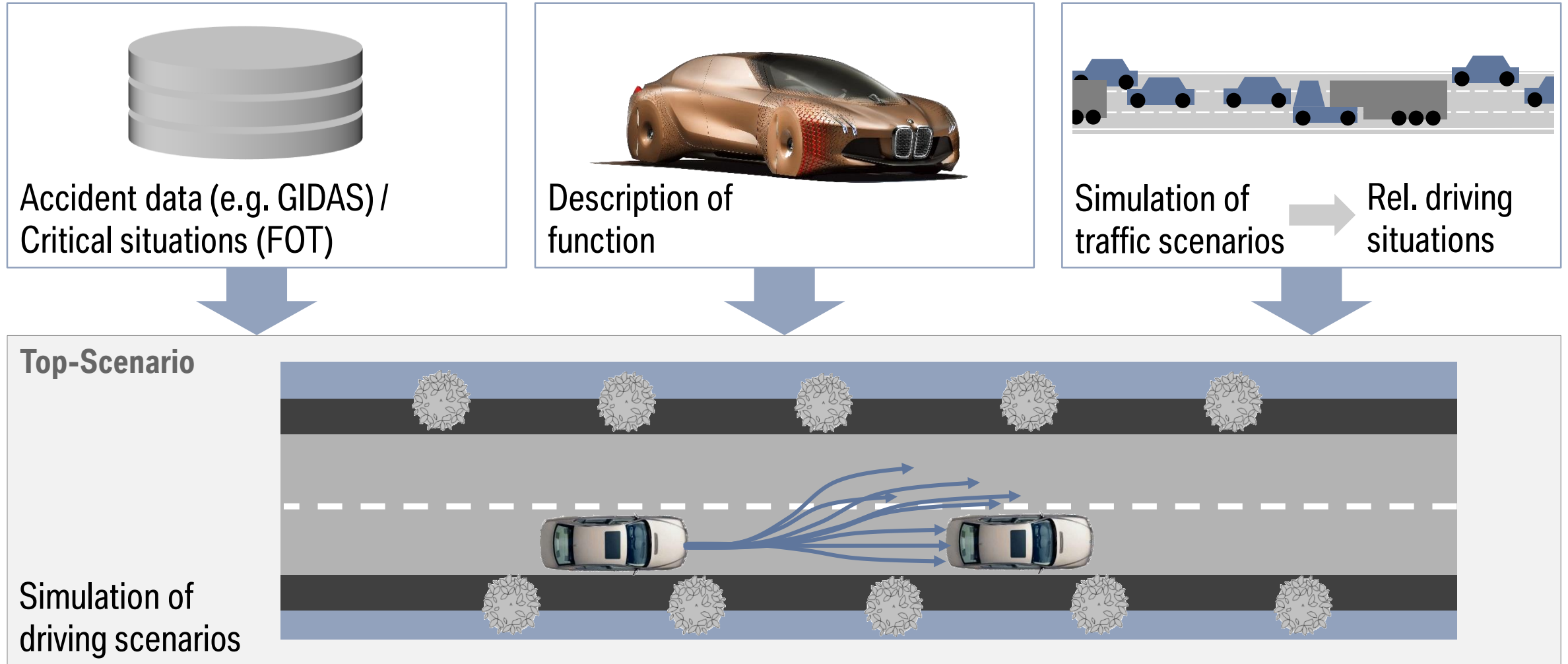
Traffic-based simulation with stochastic variation is theoretically capable to cover all variations of a traffic scenario.

APPLICATION. EXAMPLE: REAR-END CONFLICT – STOCHASTIC VARIATION.

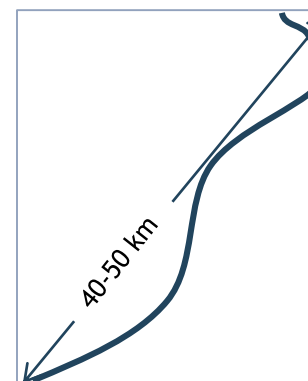
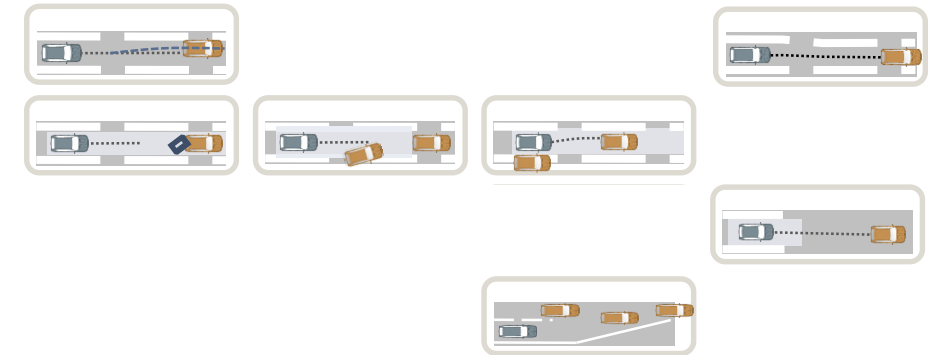
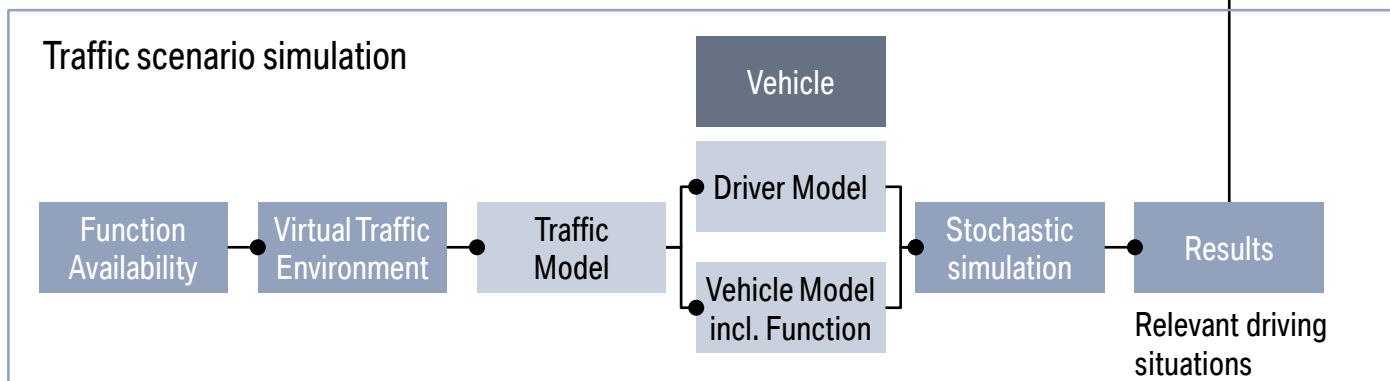
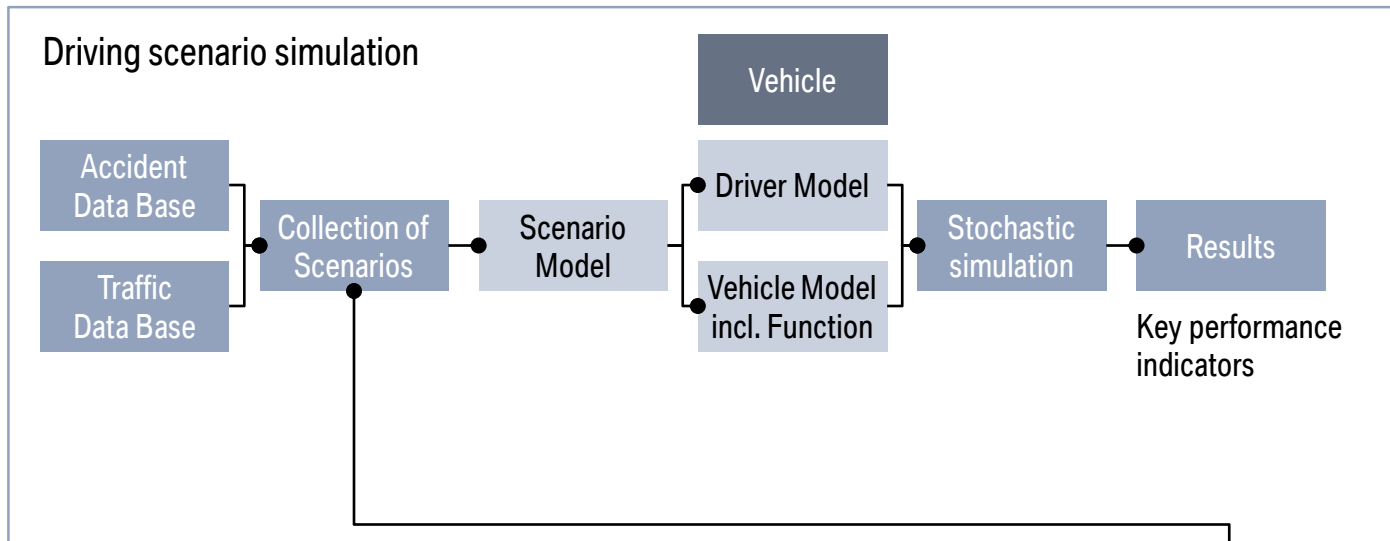


Traffic-based simulation with stochastic variation is theoretically capable to cover all variations of a traffic scenario.

APPLICATION. IDENTIFICATION OF TOP-SCENARIOS FOR AUTOMATED DRIVING.



APPLICATION. FROM AEB TO HIGH/FULL AUTONOMOUS DRIVING FUNCTIONS.



- Virtual traffic environment including naturalistic stochastic variations:**
- Road geometry (curvature, number of lanes).
 - Traffic state (traffic volume, traffic density).
 - Traffic signs.
 - Weather condition (visibility, road surface).
 - ...

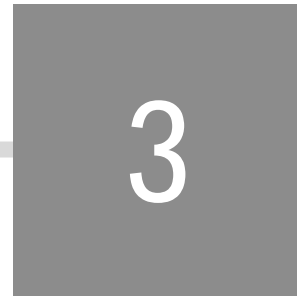
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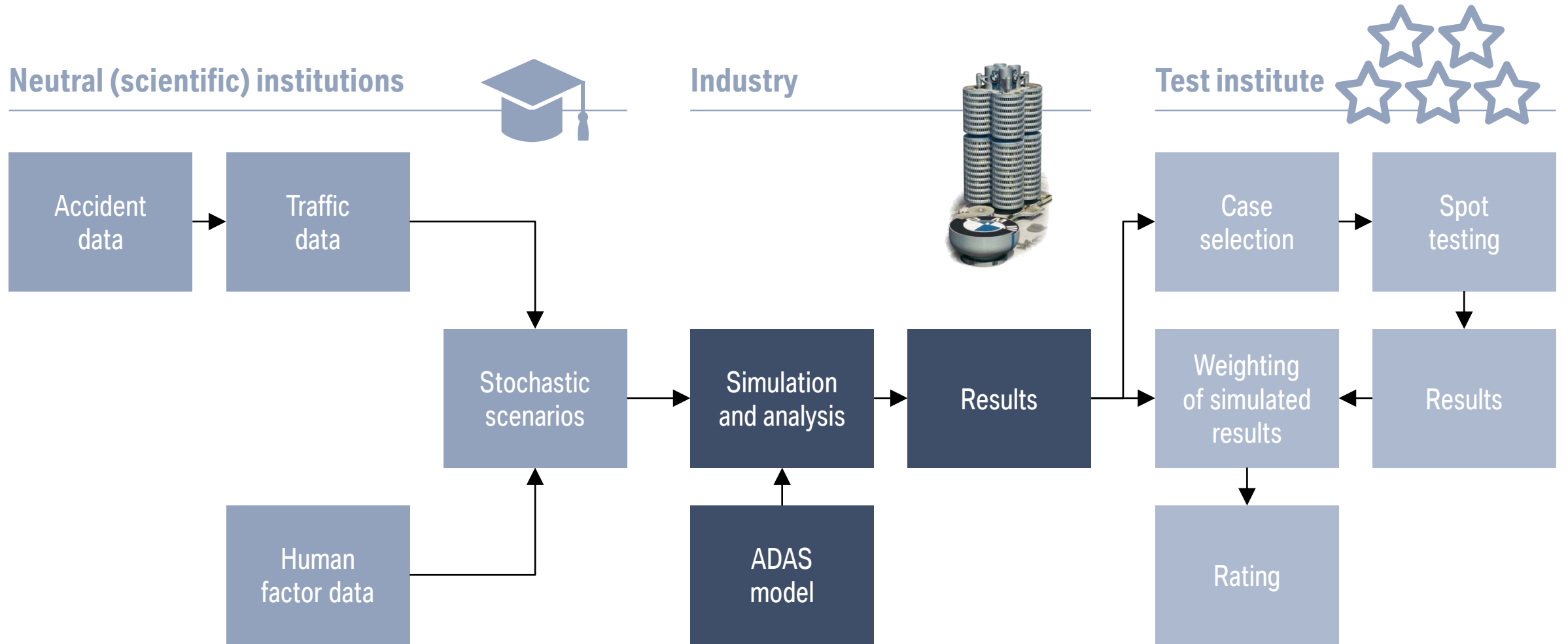


Application.



Process and roles.

PROCESS AND ROLES. VISION OF ACTIVE SAFETY EVALUATION.



THANK YOU FOR YOUR ATTENTION.