Safety Impact Assessment: How to calculate the impact of the interactIVe functions

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interactIVe Final Event

20th-21st November 2013

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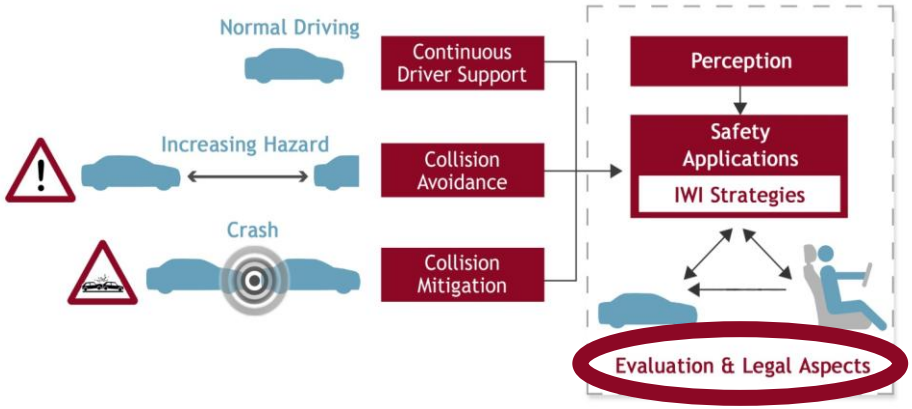


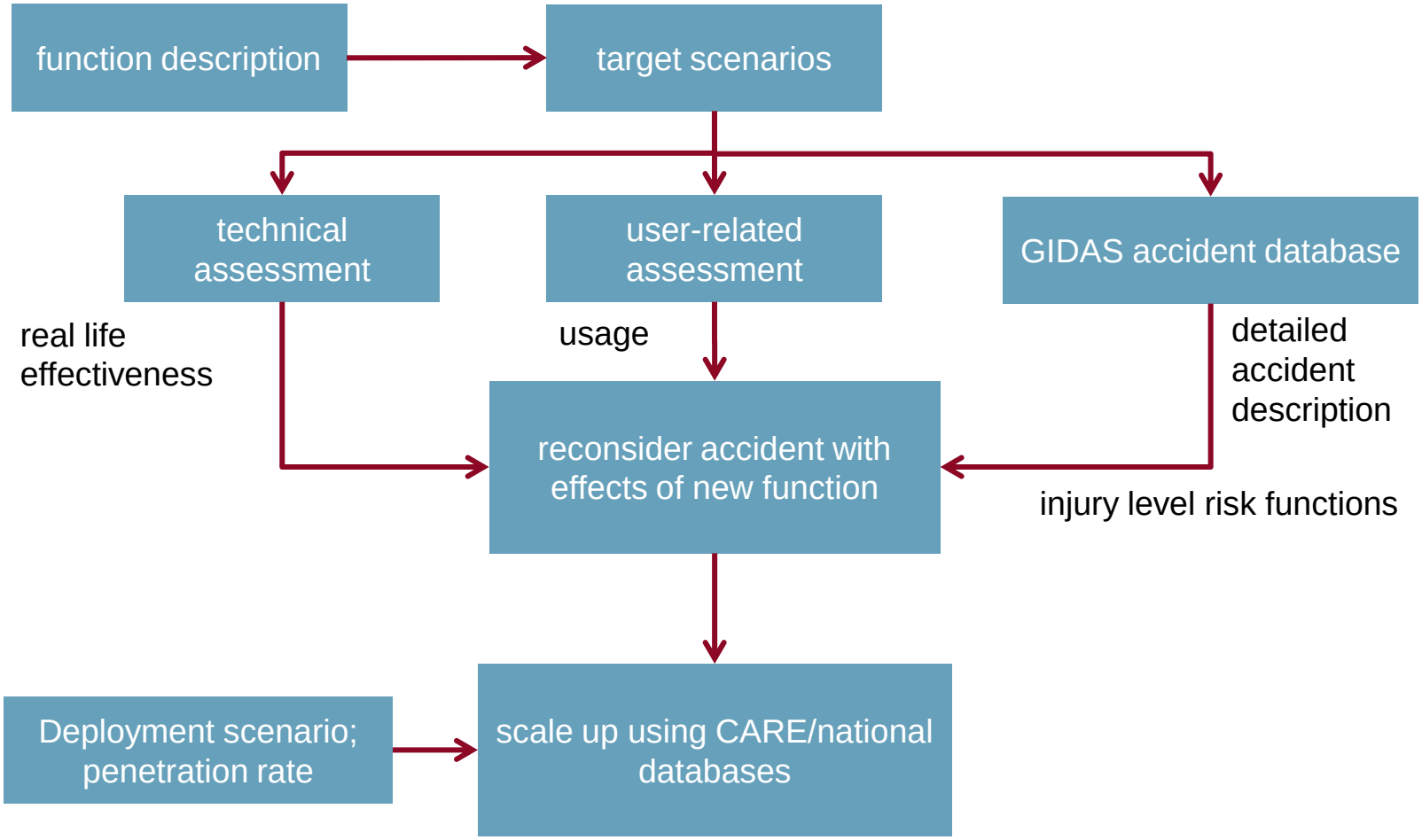
Safety impact assessment

- What would be the effect of interactIVe functions on the number of fatalities and injuries if they were deployed in Europe?

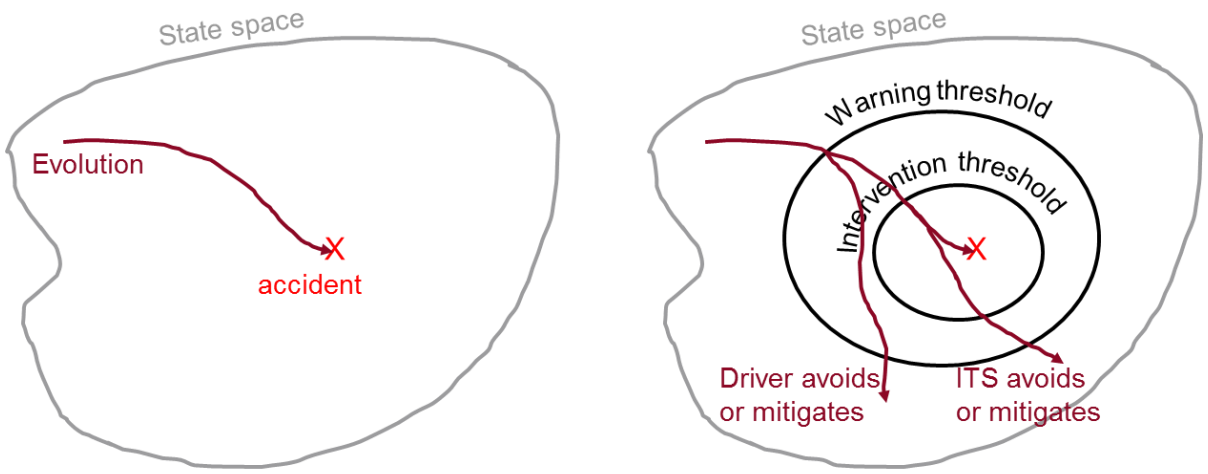
Soruce: http://files.coloribus.com

- Characteristics
  - Prototype systems → Limited amount of test results available on technical performance and user behaviour → ex ante evaluation
  - Many different functions, combinations of functions, and demonstrators → evaluation of the functions
  - Need in-depth accident data to define accident scenarios, but not available on EU level
  - Most of the functions address
    - Rear end
    - Road departure
    - Lane change

Approach


function description
target scenarios
technical assessment
user-related assessment
GIDAS accident database
real life effectiveness
usage
detailed accident description
reconsider accident with effects of new function
injury level risk functions
Deployment scenario; penetration rate
scale up using CARE/national databases

Accident re-simulation



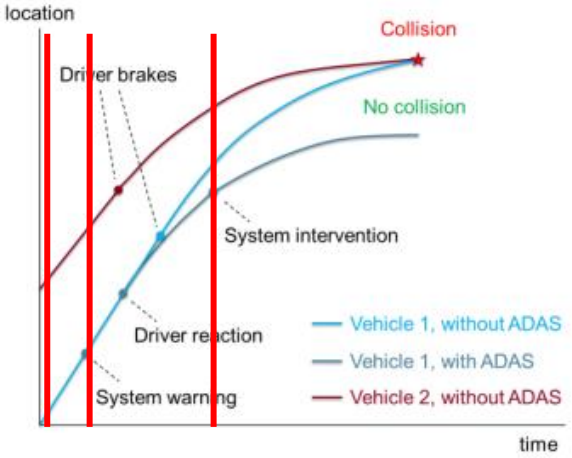
Reference case

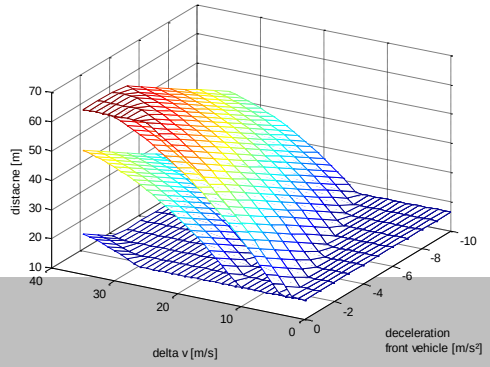
Equipped case

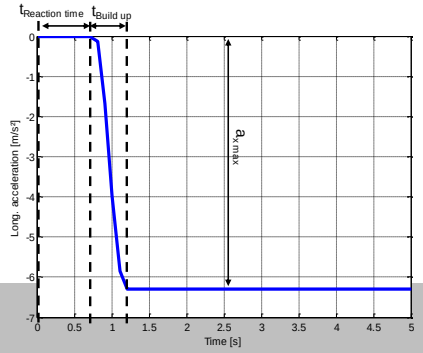
- Function may warn or intervene. Examples:
  - Continuous Support (CS): only warning
  - Collision Mitigation System (CMS): only intervening
  - Rear-End Collision Avoidance (RECA): both
- Driver may react to warning

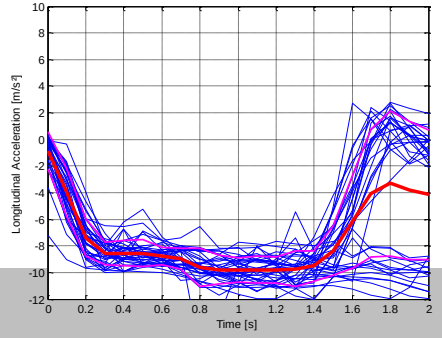
Rear-end scenario (Braking)

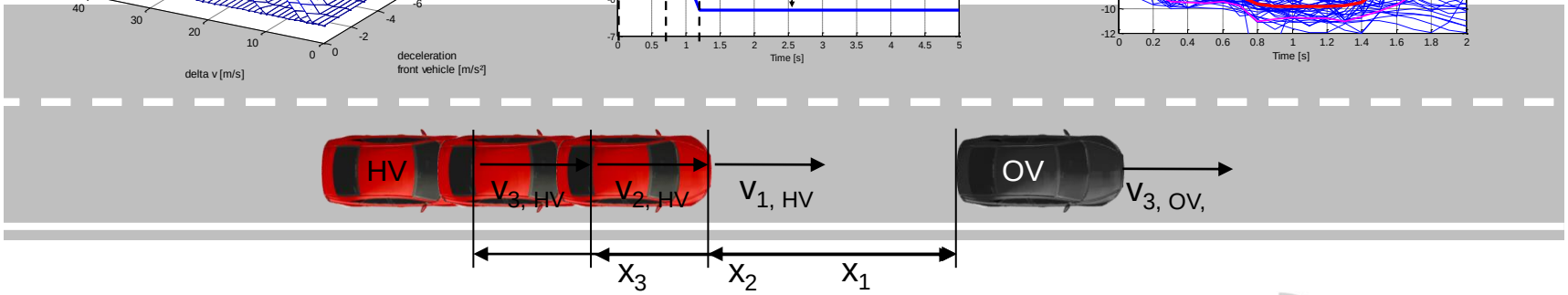
- Initial condition (in-depth accident database)





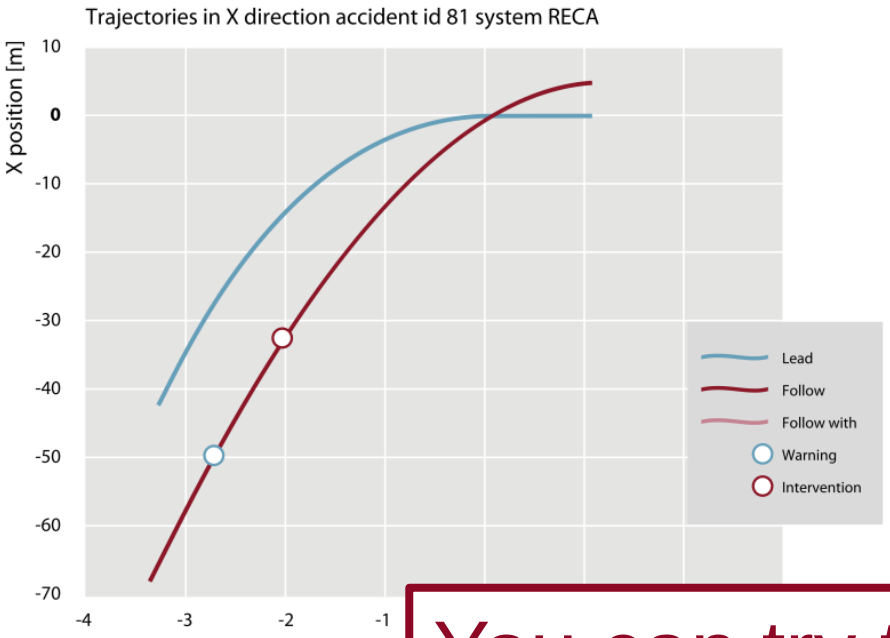


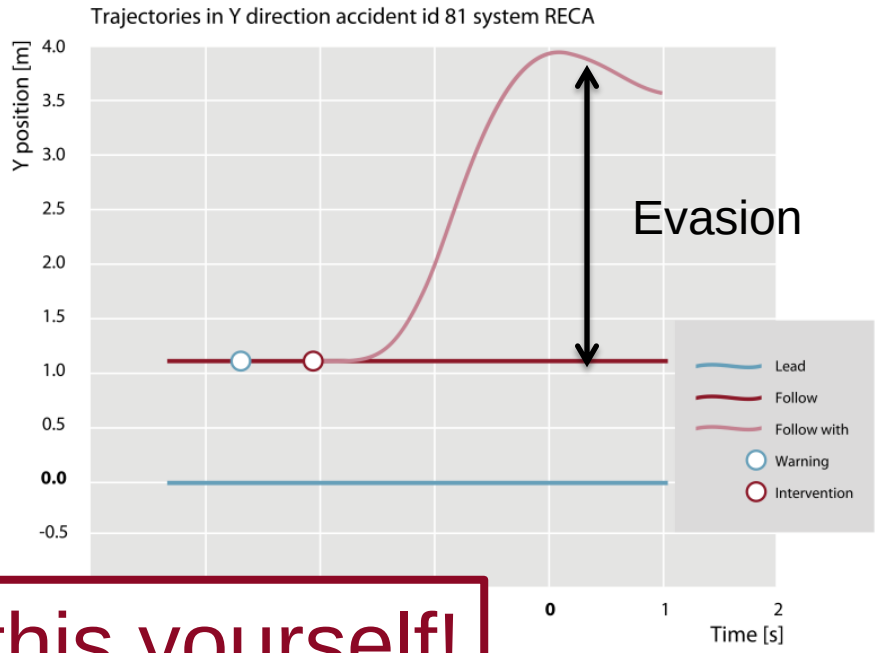




Accident re-simulation for rear end

- Example rear end accident scenario
- With Rear-End Collision Avoidance (RECA) function

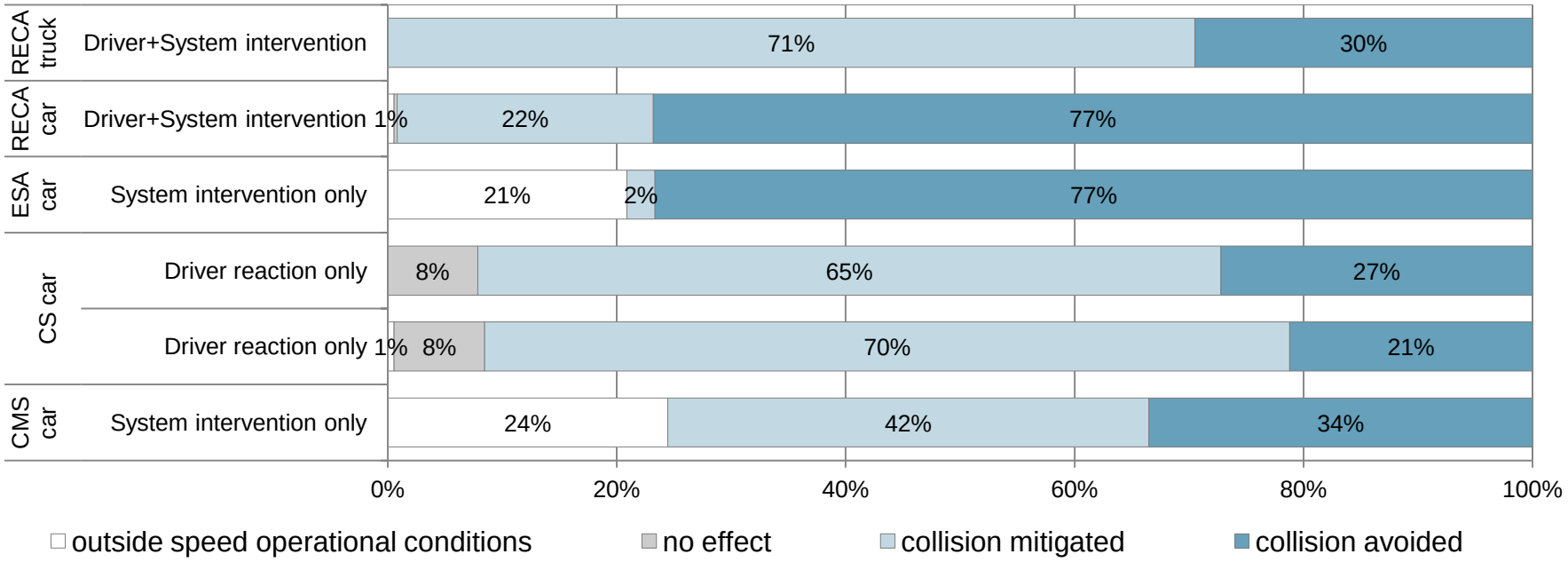




You can try this yourself!

(At the exhibition)

Re-simulation results for rear end

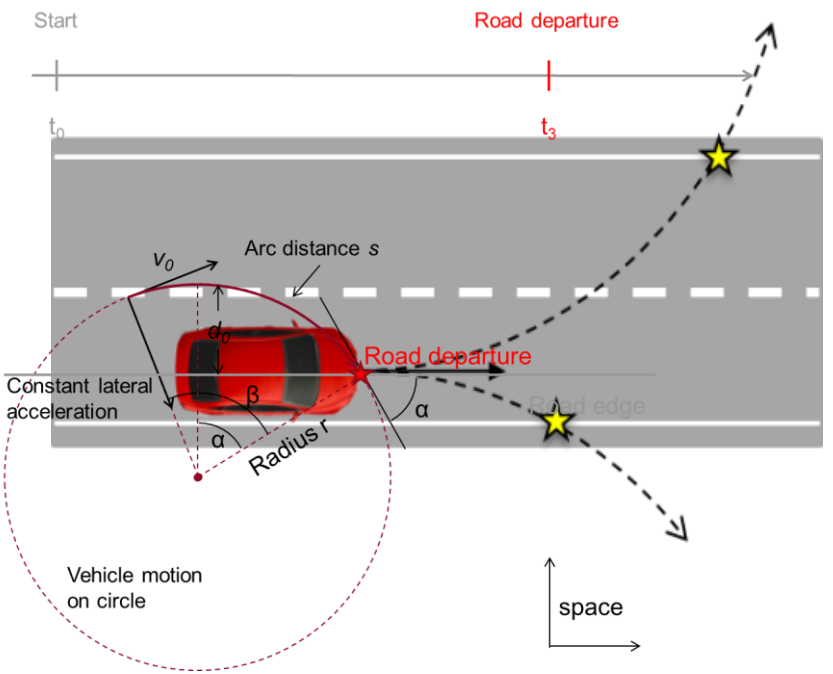


- 364 in-depth accident cases analysed
- Relevant for 4 functions
- Varying results: 21% - 77% rear ends *potentially* avoided, others mitigated
- This holds for selection of GIDAS scenarios

Road departure

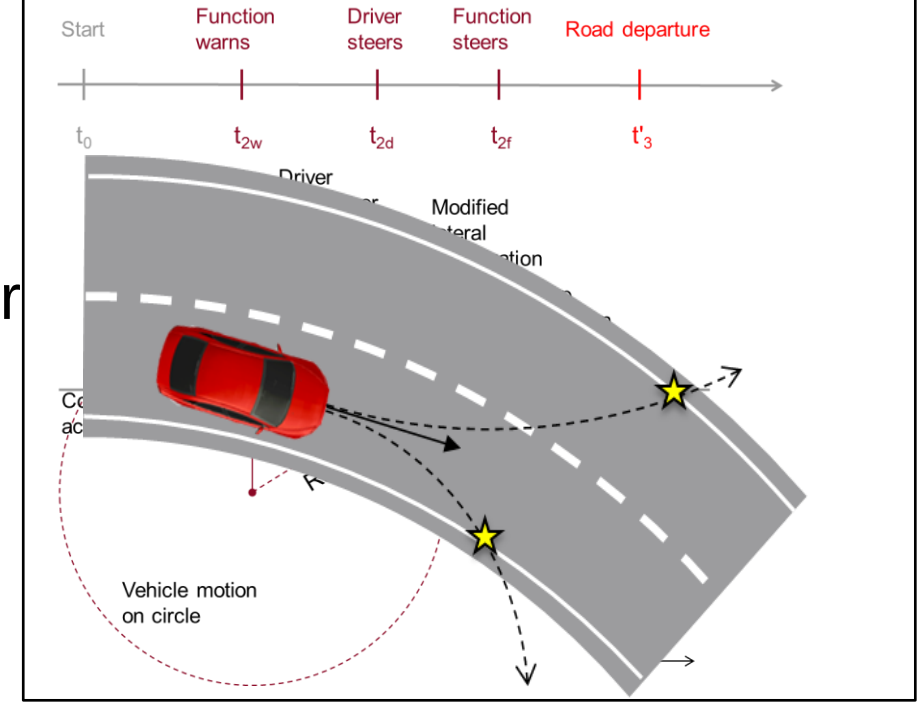
- Only avoidance
- Only steering
- Similar for curved roads

Reference

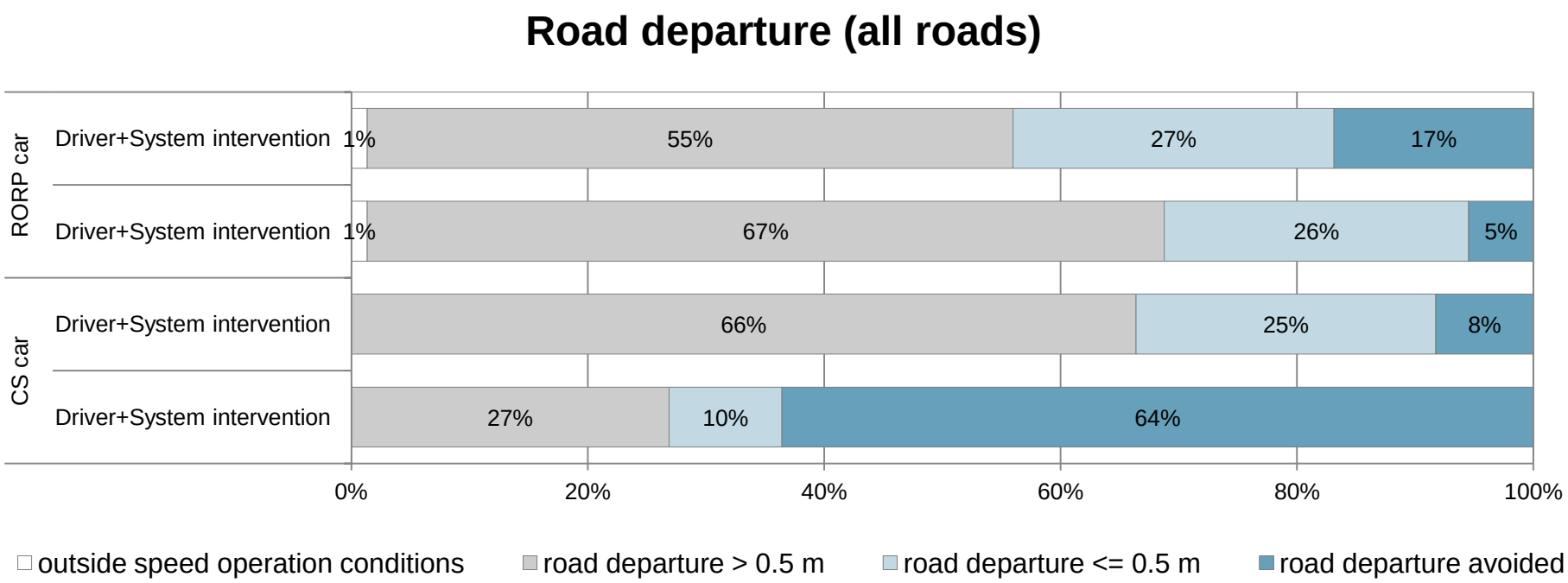


or

Equipped case

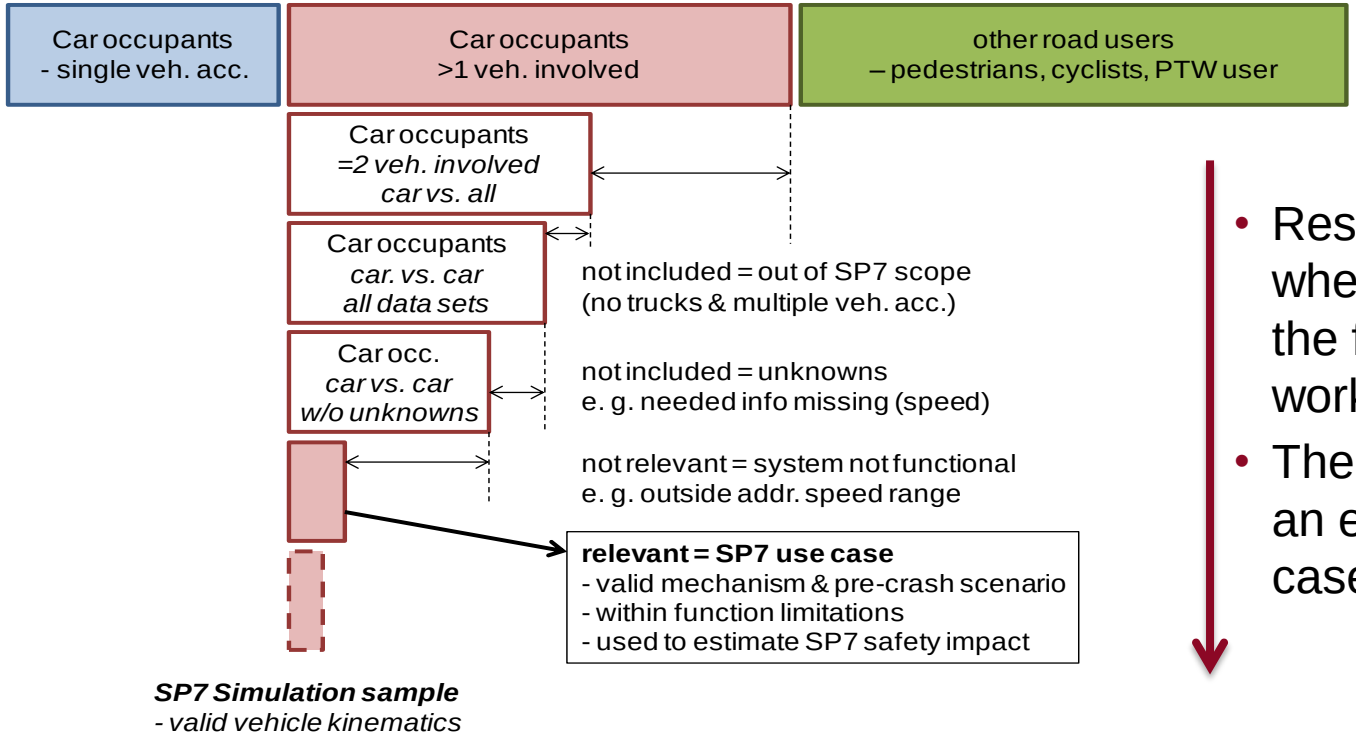


Re-simulation results for road departure



- 150 in-depth accident cases analysed, relevant for 2 functions
- Departure (over lane marking): 5 - 64% *potentially* avoided
- Departure 50 cm outside lane marking: 31 - 74%
- Trade-off between effectiveness and acceptance

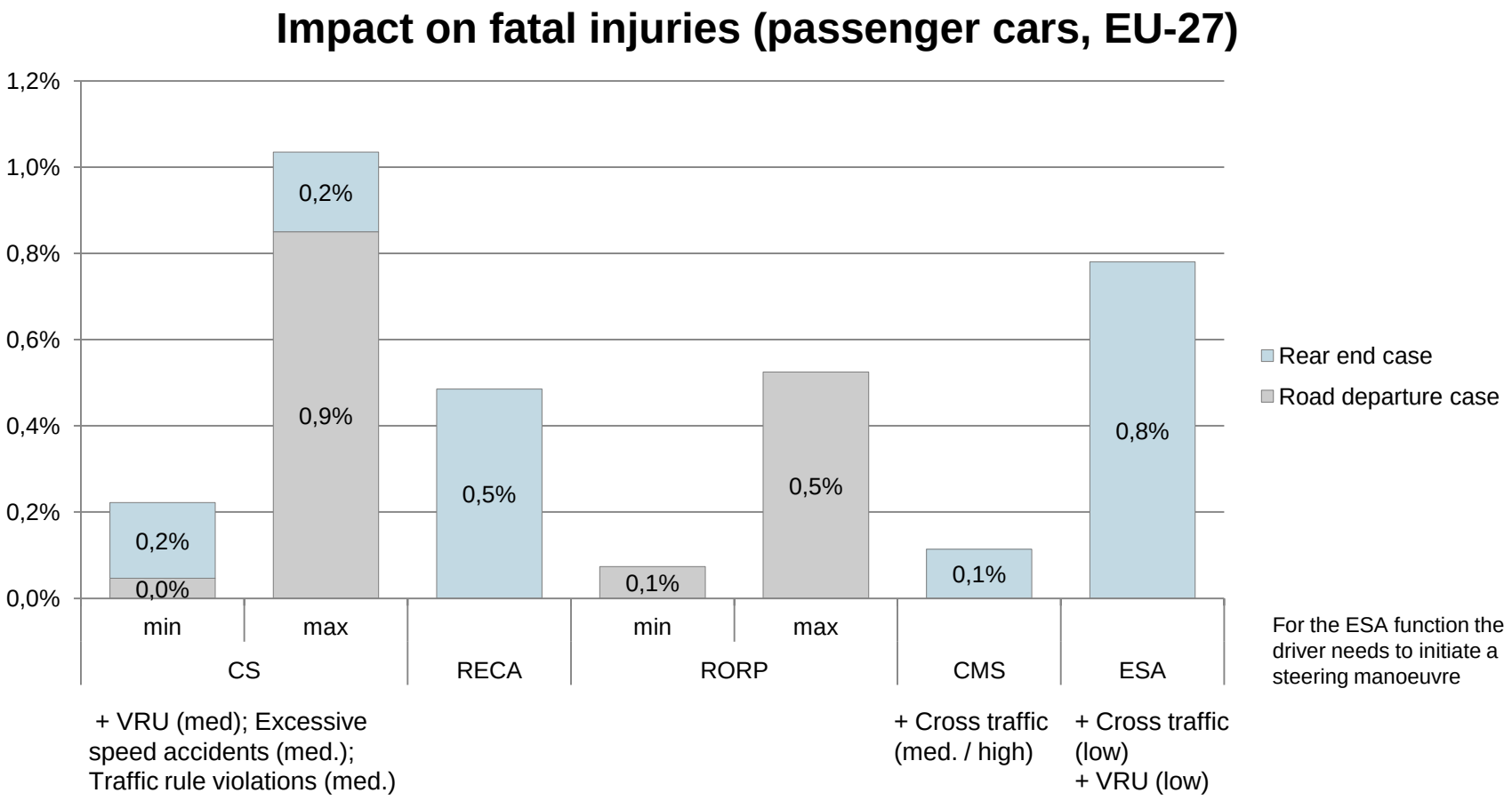
Scaling up on the EU level



- Restrict to cases where we *know* the function will work
- There might be an effect in other cases

Relevant EU accident population (% on all EU casualties)		
	severely inj.	fatally inj.
Road departure case	3.14%	5.14%
Rear end case	2.33%	0.78%

EU level results for rear end and road departure



Conclusions

- interactIVe safety functions have significant potential to improve safety by avoiding or mitigating accidents
- Results are widely varying between functions. For the GIDAS data:
  - 21%-77% rear ends potentially avoided, many others mitigated
  - 5%-74% road departures potentially avoided
- At EU level: ~1% of all fatalities saved in some rear end & road departure cases (5% of all cases)
  - Additional savings for other accident types and scenarios
- Accident reconstruction method is suitable for ex ante study. Limitations:
  - Re-simulation is first approximation, adapted to available data.
  - Modelling of realistic driver reactions needs more data.
  - GIDAS accident scenarios are for a specific region
  - Nr of fatal accidents in GIDAS is low, especially for rear end
- Thus, method provides safety *potential* rather than "real" safety impact.
- Acknowledgement: interactIVe "Evaluation and Legal Aspects" team

Thank you.

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SEVENTH FRAMEWORK PROGRAMME