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# BAST Contribution to EqOP VT Workshop

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3rd Workshop of the informal working group on  
Equitable Occupant Protection, EqOP

14 Nov 2023

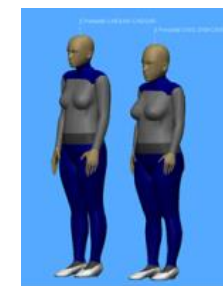
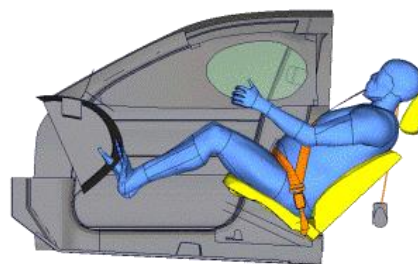
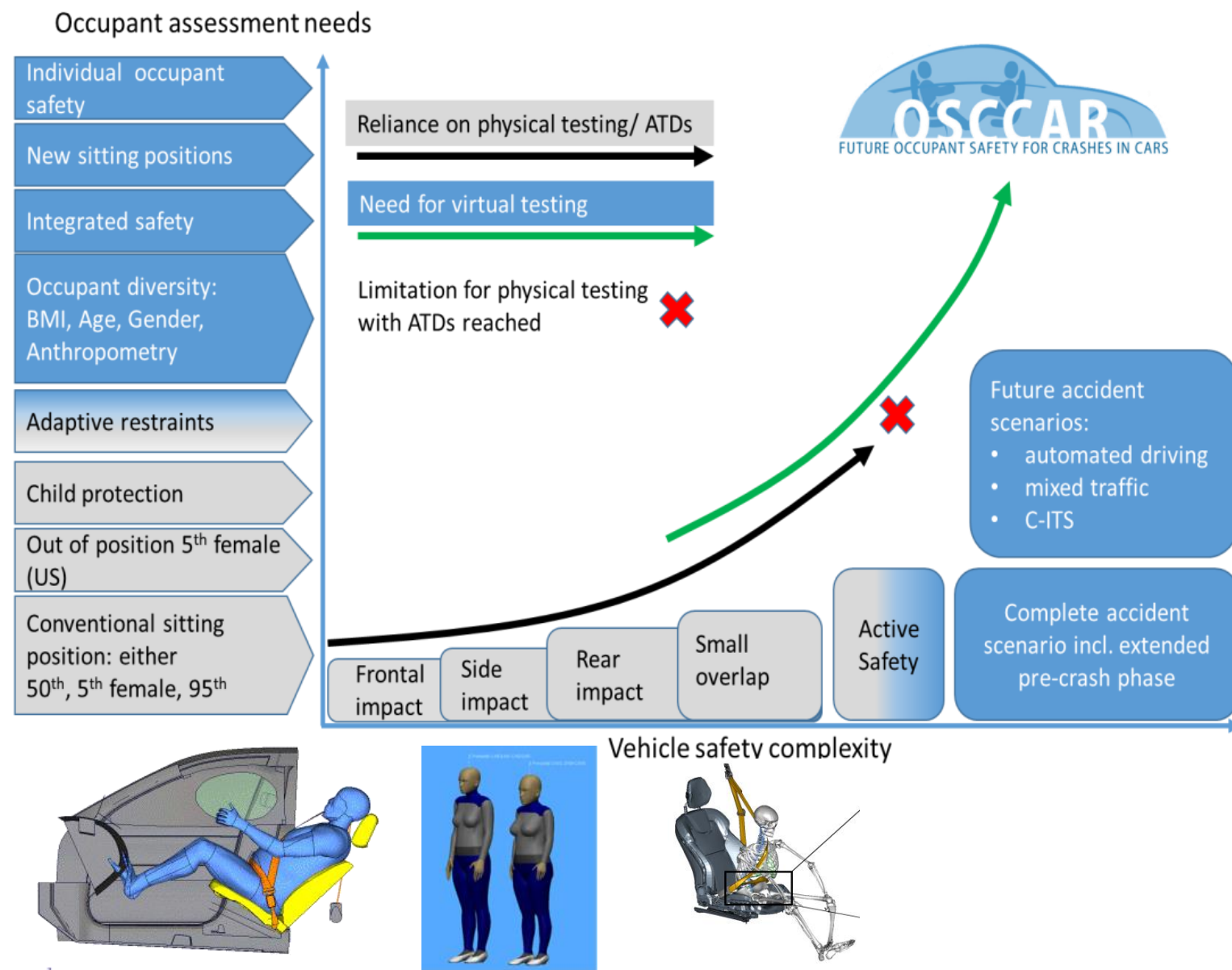
| Andre Eggers | BAST

# Motivation for Virtual Testing for Occupant Safety Assessment

1.) Replace existing RT (real testing) based procedures/ regulations by VT (virtual testing) → with focus on **saving costs and test effort** (no new tests/ requirements) → EU-project IMVITER, Regulation (EU) No 371/2010 Appendix 3 “Validation process”

2.) **Extent the scope of protection** by adding test conditions using existing test tools (ATDs) and procedures by combined real and virtual testing (hybrid approach/grid approach) → First Euro NCAP Far-Side Pilot

3.) Possibility of using **HBM**s in a VT process to address the limitation of ATDs → **EU-Project OSCCAR**: HBMs for new seating postures, user diversity (small vs. tall, male vs. female, Western vs. Asian), obesity,...



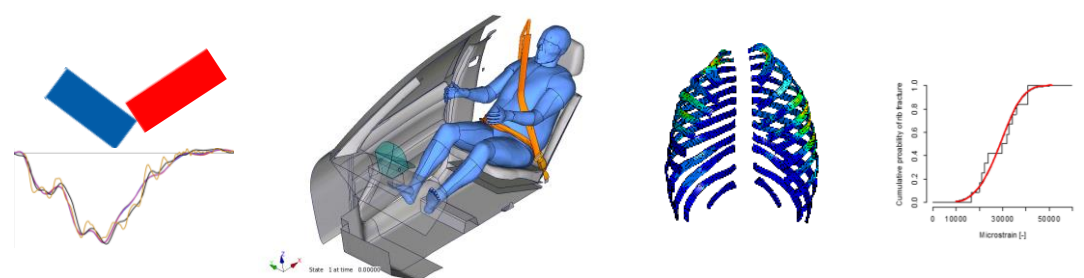
# What is needed for Virtual testing for Occupant Safety Assessment

ATD or Human Body Model  
representing the occupant of  
interest (qualified/certified for  
New Load cases)

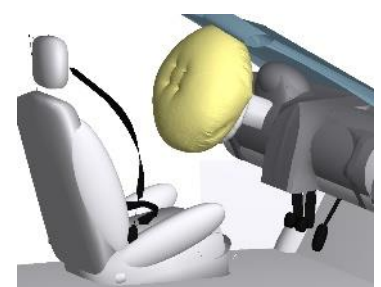


## VT based Safety Assessment Procedure

Virtual Testing based assessment procedure with ATD simulation model or HBM

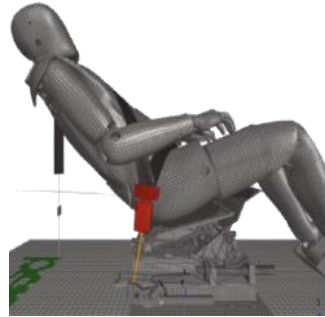


- Definition of assessment load cases (Occupant model, seating position, pulse,...)
- Standardised virtual test procedure (Occupant positioning, belt installation,...)
- Assessment criteria (kinematics criteria, HBM based injury criteria)



Vehicle Environment Model  
(Seat model, restraint  
model,...) qualified/certified  
for VT (based on validation)

## Qualification requirements for ATD simulation models or HBMs



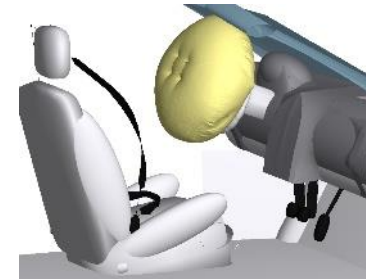
ATD or Human Body Model  
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- World-SID 50M dummy model qualification procedure was developed by Euro NCAP VTC WG → **TB 043-1**
- Similar work ongoing for Hybrid III dummies
- Several groups are working on validation based qualification requirements for HBMs (HBM4VT, TUC, GHBMC,....)

## Validation based qualification procedure for seat/restraint/sled model

Vehicle Environment Model  
(Seat model, restraint  
model,...) qualified/certified  
for VT (based on validation)

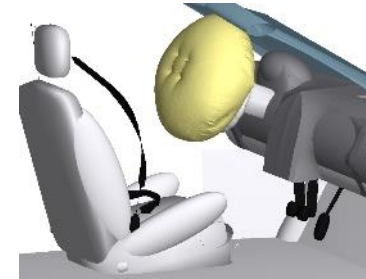


- Within the Euro NCAP VTC Far Side approach a validation based sled model qualification procedure was proposed
- The validation load cases include the WS-50M. The assessment load cases also include WS-50M. The load cases parameters, which are different between validation and assessment load cases are limited (seat position and impact angle)
- Euro NCAP VTC WG will work on a similar approach for frontal impact



## Validation based qualification procedure for seat/restraint/sled model

Vehicle Environment Model  
(Seat model, restraint  
model,...) qualified/certified  
for VT (based on validation)



- ▲ Questions to be addressed before introduction of HBM based virtual testing with focus on user diversity into safety regulations:
  - ▲ How can assure the validation of a sled model (or seat model) to be used in a VT process for a variation of occupants (different size, mass, age, gender,...)?
  - ▲ Will it be sufficient to use available ATD (representing standard occupants) as validation device → Do we need new validation devices?
  - ▲ Should a validation based sled model qualification procedure include load cases on component/subsystem level?