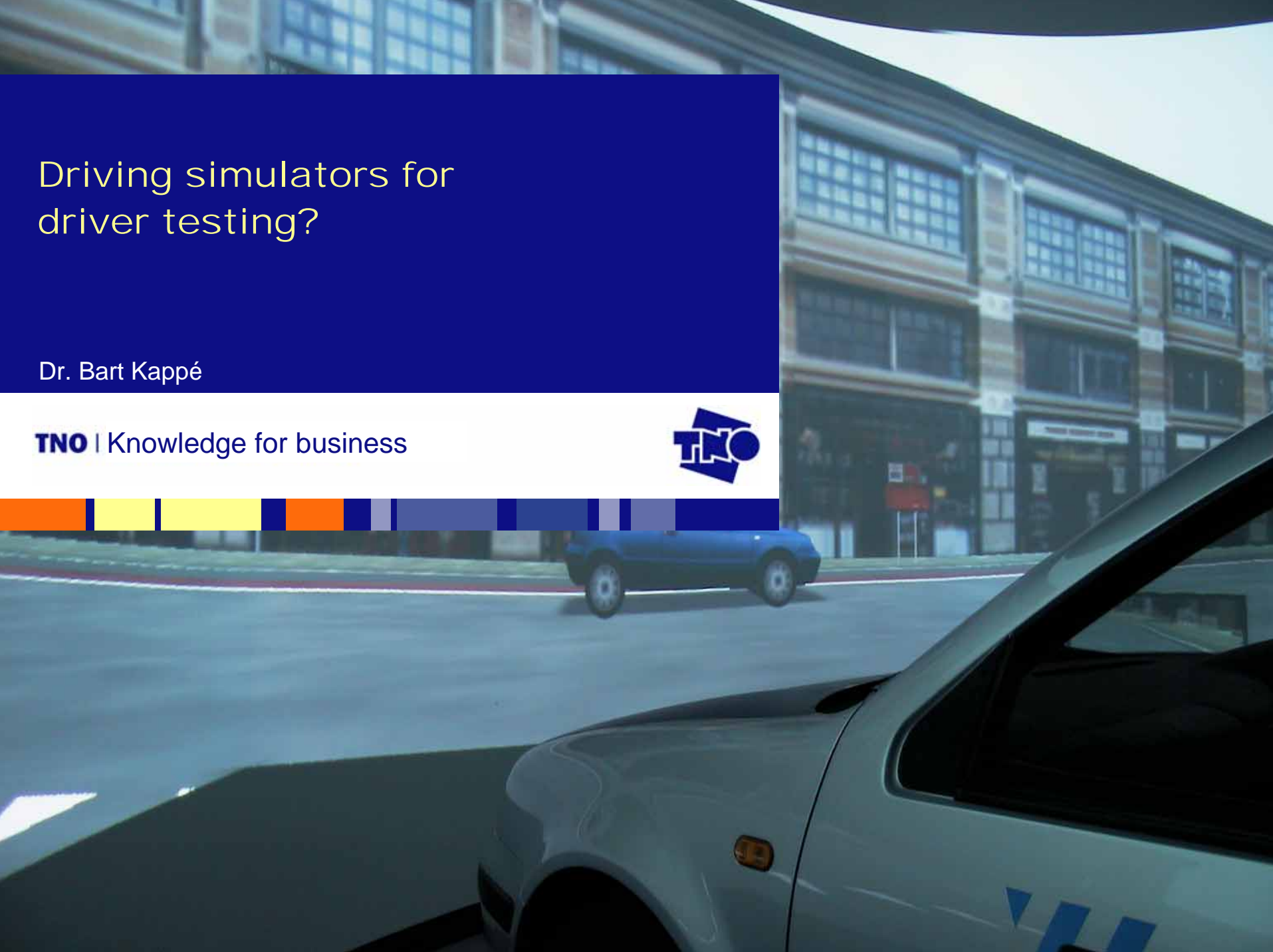


# Driving simulators for driver testing?

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**TNO** | Knowledge for business



# Driving simulators for driver testing

- Why?
  - Why not
- What?
  - What not
- How?
  - How not
- Conclusions



# Driving simulators for driver testing

## Why?

- Simulators are 'ideal' for testing
  - Valid
    - Very close to operational environment
    - Operator in the loop
  - Objective
    - 'Mathematical precision'
  - Reliable
    - Identical situations
    - Comparable test for all candidates
  - High exposure
    - Difficult situation at *each* intersection
  - Standardized
    - Each candidate similar test
  - Adaptive
    - Adapt test to progress of candidate



# Driving simulators for driver testing

## Why not?

- Validity
  - Not the entire task can be simulated
- Flexibility
  - Fixed routes will not work
- Performance
  - Can be difficult (e.g. scanning)
  - No high-order variables (e.g. 'safe')
- Standards
  - To large extent unknown
  - Gray areas
  - Biased perception of distance and speed



# Driving simulators for driver testing

## Why not?

- Motion sickness
  - Experienced drivers
- Cost
  - (Much) more expensive
- Effect of simulator experience?
  - Experience may help!
- Such tests do not exist
  - More problems may exist. . .

# Driving simulators for driver testing

## What?

- If you can train it, you can test it (?)
  - Basic vehicle handling
  - Traffic participation
  - High order skills
- A test is a series of traffic scenarios
  - Standardized performance measurement
  - Randomized
  - Camouflaged

# Driving simulators for driver testing

## What not?

- Expensive
  - Should be a low-cost solution
  - Simple solution causes less motion sickness? (at a cost!)
- Include 'grey' situations
  - Only present black or white situations
- Function stand-alone or with examiner?
  - Some aspects are difficult to measure
  - Higher order skills, scanning

# Driving simulators for driver testing

## How?

- We do not know!
- Interactive theory test?
  - simple 3 channel system, high res, wide field of view
  - 'CBT like'
- Scripted traffic (black/white)
  - carefully designed test items
- Performance measurement
  - stand-alone test?
  - automatic + examiner?
- Standards
  - simple / statistical
- Not an end test
  - half way the curriculum?
  - integration with hazard perception?

# Driving simulators for driver testing

## How?

- Statistical approach for higher order measures
- Simulator based 'INTEST'
  - Assesses number of lessons (in a package)
  - Set of simple tasks in simulator / many performance measures
  - Sim-instructor & practical driving instructor judge # lessons
- Statistical analysis
  - Multiple regression correlating measures & judgements
  - High correlations (.99 sim, .84 practical)
- Not a straightforward method
  - Large group & long test period
  - What about changes (simulator, scenario, target group)?

# Driving simulators for testing

## Conclusions

- Many advantages
  - Objective / valid / reliable / high exposure
  - In theory!
- Problems need to be solved
  - Sickness
  - Validity, reliability etc. need to be established
  - Cost / configuration
  - Performance measurement & standardization
  - Route
- Is more CBT than simulator like?
- Is it a stand-alone test?
  - Scanning, high-order skills
- Not an end-test