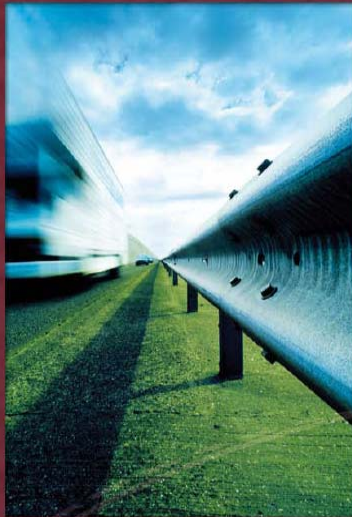


## Advancing Sustainable Safety



National Road Safety Outlook  
for 2005-2020

SWOV Institute for Road Safety Research

## Theoretical backgrounds

Letty Aarts

# Goals of Sustainably Safe reviewed

1. Preventing serious crashes and severe injuries
2. More or less excluding severe injury unless crash is unavoidable



## *Proactive approach: preventing **LATENT ERRORS***

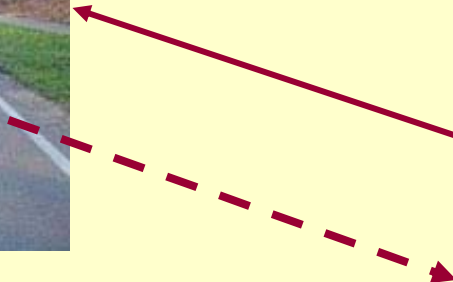
- Interventions: as early as possible in the chain of system design → traffic behaviour

### Who is guilty?



## Proactive approach: preventing **LATENT ERRORS**

- Interventions: as early as possible in the chain of system design → traffic behaviour

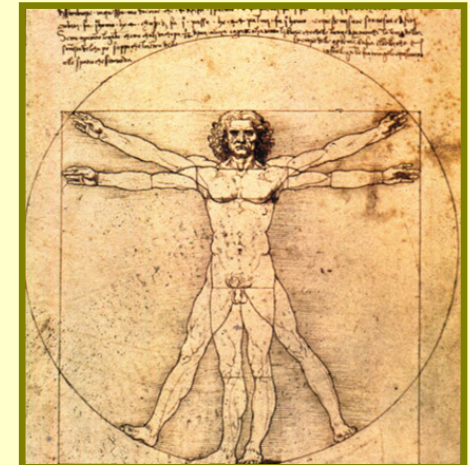


**How could this happen?**

- Unsafe actions: make them less dependant on choices of individual road users

## Man as the measure of all things

- Physical features
  - People are vulnerable
- Psychological characteristics
  - Sometimes people **can't** → errors
  - Sometimes people don't **want to** → offences



- **INFRASTRUCTURE**
  - Tune design to human capacities and limitations
- **VEHICLES**
  - Support the driving task
  - Offer protection
- **HUMAN**
  - Well informed and well practiced
  - Control where necessary



## The principles in the updated vision

### Sustainable Safety principles

**Functionality** of roads

**Homogeneity** of masses and/of speed and direction en richting

**Recognizability** of the road design and the predictability of road course and road user behaviour

**State awareness** of the road user

**Forgivingness** of the surroundings and between road users

## FUNCTIONALITY

- **Functional division of roads:**

Flow



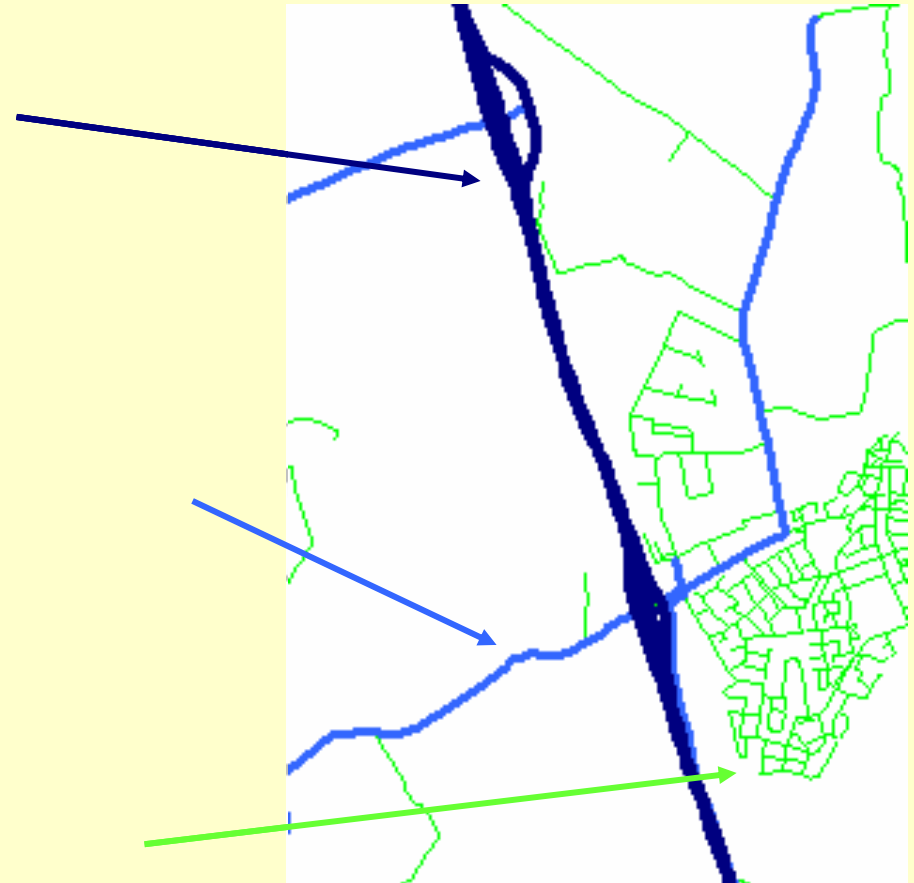
Acces



- **Sustainable Safety: monofunctionality of roads**
- **Hierarchically composed road network**

## Functional road categories

- **Through roads (ThR)**
  - Enable traffic flow
  
- **Distributor roads (DR)**
  - Connect through roads and access roads
  
- **Access roads (AR)**
  - Provide access to destinations



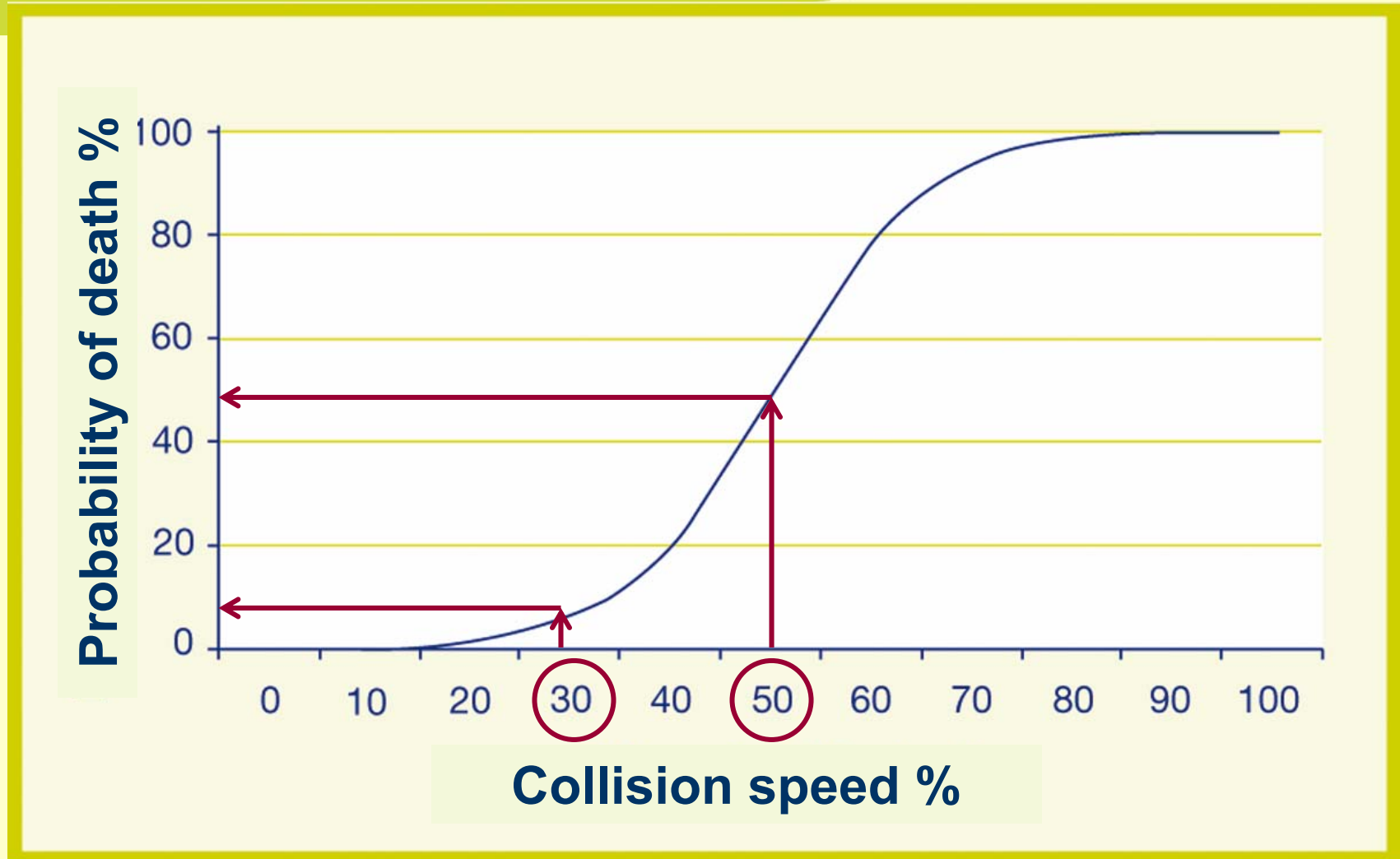
## HOMOGENITY

### Serious crashes

- Large differences in speed and/or mass
- Single vehicle crash against obstacle
- Intersection crashes
- Car – pedestrian



## Car-pedestrian crashes



## HOMOGENETY

- **Therefor:**

- Avoid conflicts
- Separate infrastructures for vehicles with different mass and speed
- Physical carriageway separation between fast traffic travelling in opposite directions
- Where conflicts occur: speed reduction
- Lower speed limit
- Speed reducing measures at intersections (e.g. roundabout)



- **Basis of errors → division of task realization**
  - First: trial and/or reasoning
  - Next: discovering the rules (routine)
  - After lots of practice: automatic behaviour
  
- **Preventing errors by:**
  - Making situations recognizable
  - Making road course predictable
  
- **Consequence:**
  - Driving task more by routine → fewer errors
  - Others' behaviour more predictable

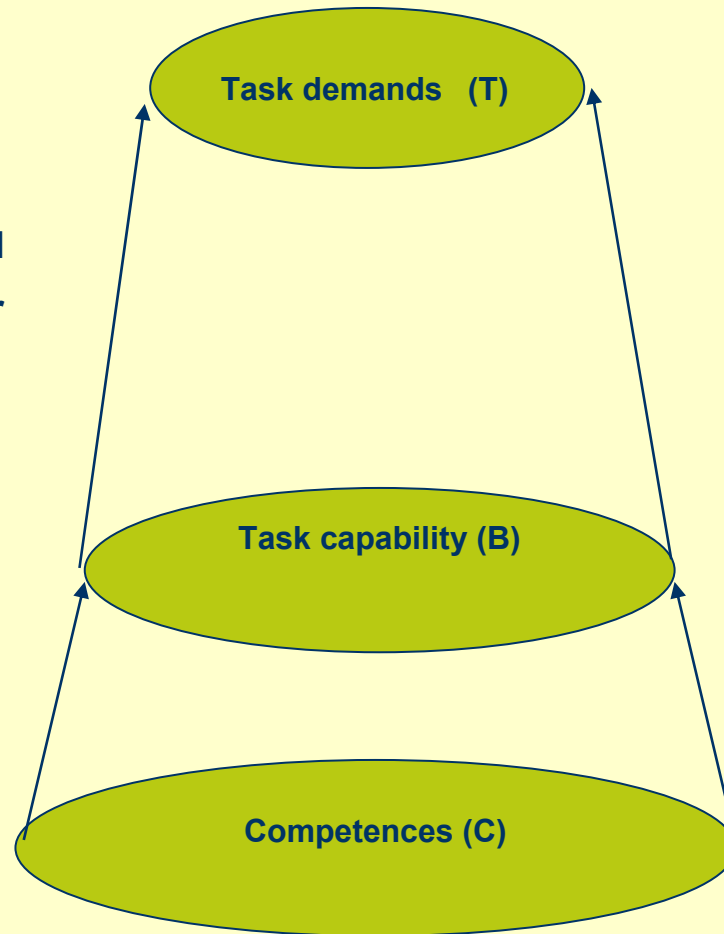
## STATE AWARENESS

- Man as measure, but: differences in their driving competence
  - novices, elderly
  - Sleep, alcohol, stress



## Task competence model

$B \geq T \rightarrow$  control  
 $B < T \rightarrow$  danger

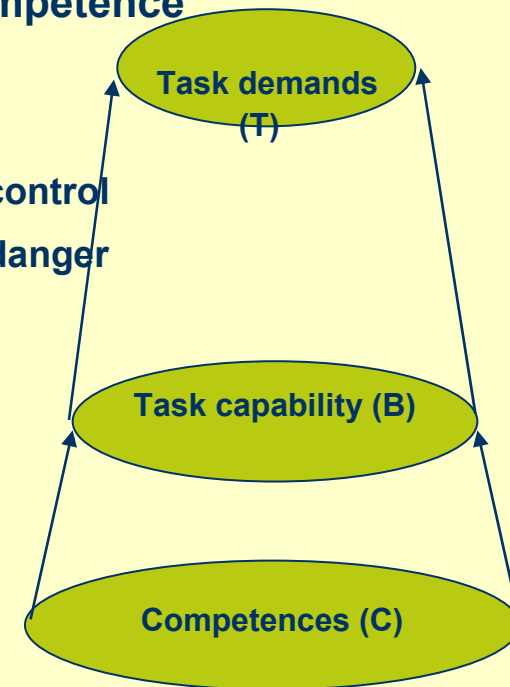


## STATE AWARENESS

- Therefore:
  - Generic measures → everybody
  - Specific measures → supplement for lower task competence

Aimed at state awareness

$B \geq T \rightarrow$  control  
 $B < T \rightarrow$  danger

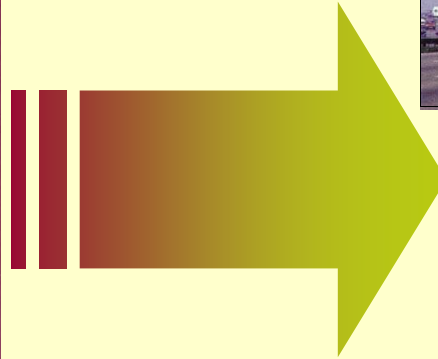


# ***FORGIVINGNESS***

- **Social elaboration:**
  - Preventing crashes
  - Anticipating behaviour of less capable fellow road users
  
- **Physical elaboration:**
  - Preventing serious consequences of crashes
  - Forgiving surroundings



# Finally



- Integral approach: do not work from separate measures but from *principles*: more effective and more efficient!

