

# VERONICA

Vehicles Event Recording based  
on Intelligent Crash Assessment

*The VERONICA Projects  
EDR for Europe - EDR for the Future  
European Traffic Law Days - Trier VIII  
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# The driving force for European EDR

- *"One of the means that the Commission has continuously pointed out in its policy for cutting down the number of fatalities by 50% until 2010 is a broader **implementation of vehicle accident-event data technology**".*
- *" [devices ]... which help **explain the causes of accidents**, will make motorists more responsible, speed up court proceedings following accidents, lower the cost of court proceedings and enable more effective prevention measures to be taken."*

*Sources: European Transport Policy for 2010, EC Commission White Paper, 2001 and Road Safety Action Programme, 2003*

**⇒ European EDR is Road Safety Policy oriented**

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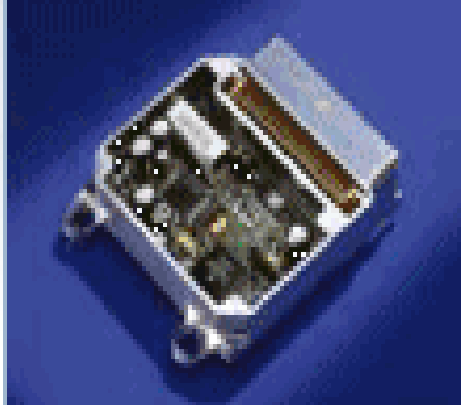
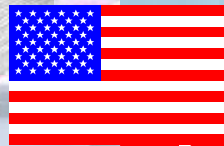
15 years of ADR experience in Europe



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15 years of EDR experience in North America:  
No standardization



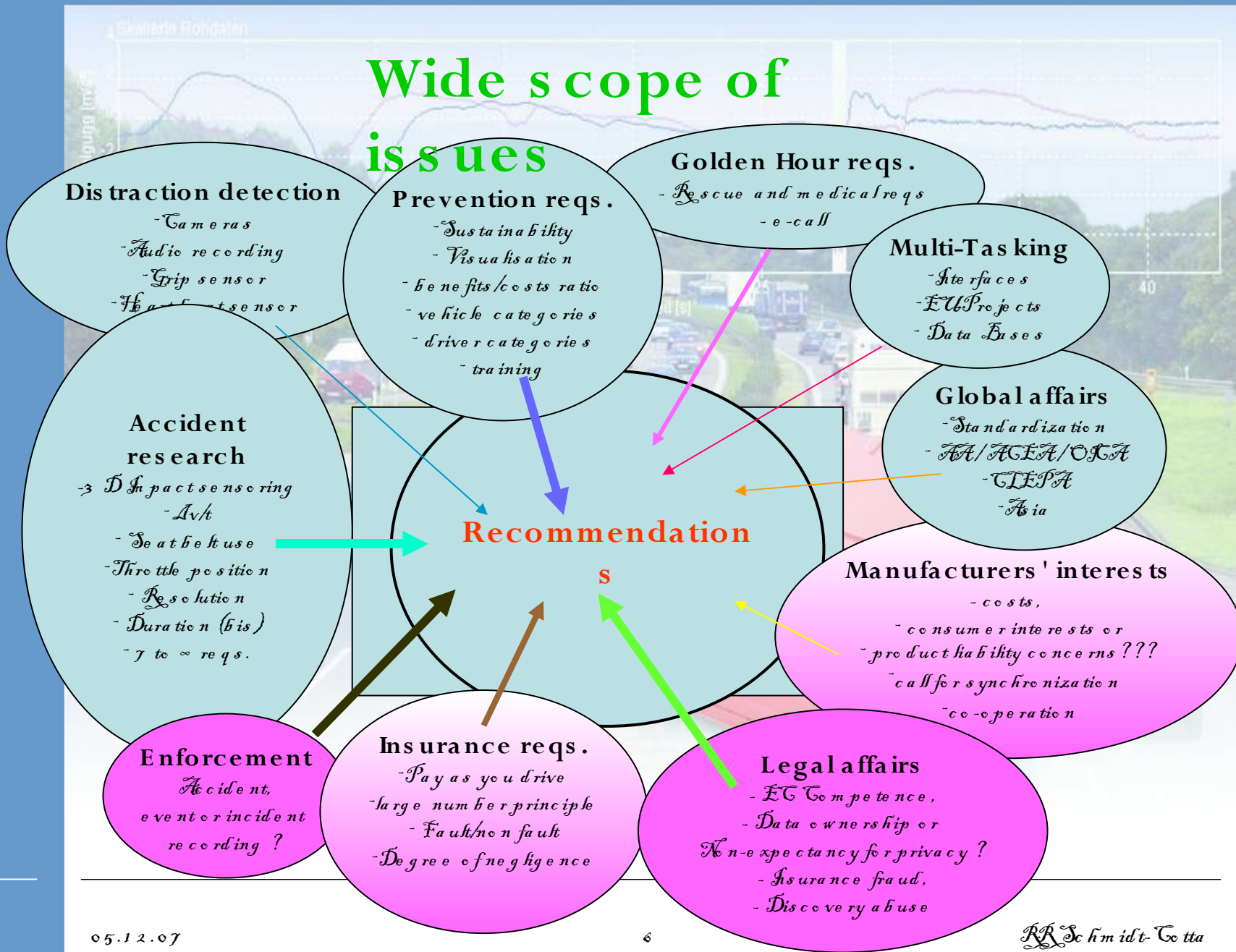
Central airbag control unit for front and side airbag and seat belt pretensioner





⇒ European EDR approach is comprehensive

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# Consent on Purposes of European EDRs

- ◇ **Road safety and preventive actions**  
Data based causation research for active and passive vehicle safety, infrastructure and for prevention training
- ◇ **Legal justice and victims' rights**  
Individual accident causation investigation
- ◇ **Crime fighting**  
Hit-and-run-collisions, manslaughter, provoked collisions, fraudulent vehicle thefts and vehicle manipulations, international criminal vehicle movement and fraud



## Agreed information requirements

No	Information Requirements	Remarks
1	Collision Speed	Speed at moment of impact
2	Initial Speed	Speed at start of recording a/o braking
3	Speed Profile	Pre- and Post crash
4	d v	$\Delta v = \text{Delta-v} = \text{Change in velocity due to a collision}$
5	Longitudinal acceleration. (IP)	Impact phase (high resolution)
6	Transverse acceleration(IP)	Impact phase (high resolution)
7	Longitudinal acceleration	Pre- and Post crash (low resolution)
8	Transverse acceleration	Pre- and Post crash (low resolution)
9	Yawing	Pre crash yawing
10	Tracking	Relative path
11	Position	Absolute position
12	Status Signals	Brake light, indicator, lights, blue light, horn ...
13	Trigger Date Time	Convertible into real time after down load
14	User Action	Throttle, brake, steering, horn, clutch ...
15	Monitoring Restraint Systems	Airbags, Seat Belts
16	Monitoring ASD	Active Safety Devices (ESP, brake assistant, ABS)
17	Monitoring Error Messages	Faults of ABS Systems etc.
18	VIN/VRD	Vehicle Identification No/Vehicle Registration No
19	Driver-ID	Key, Smart Card, Code ...
20	Monitoring Driver	Visual Monitoring





## Agreed Target Groups

### I. Professional Drivers

- 4. Hazardous goods transports, buses and coaches
- 6. Commercial fleets and in particular vans
- 8. Emergency service vehicles

### II. Private Drivers

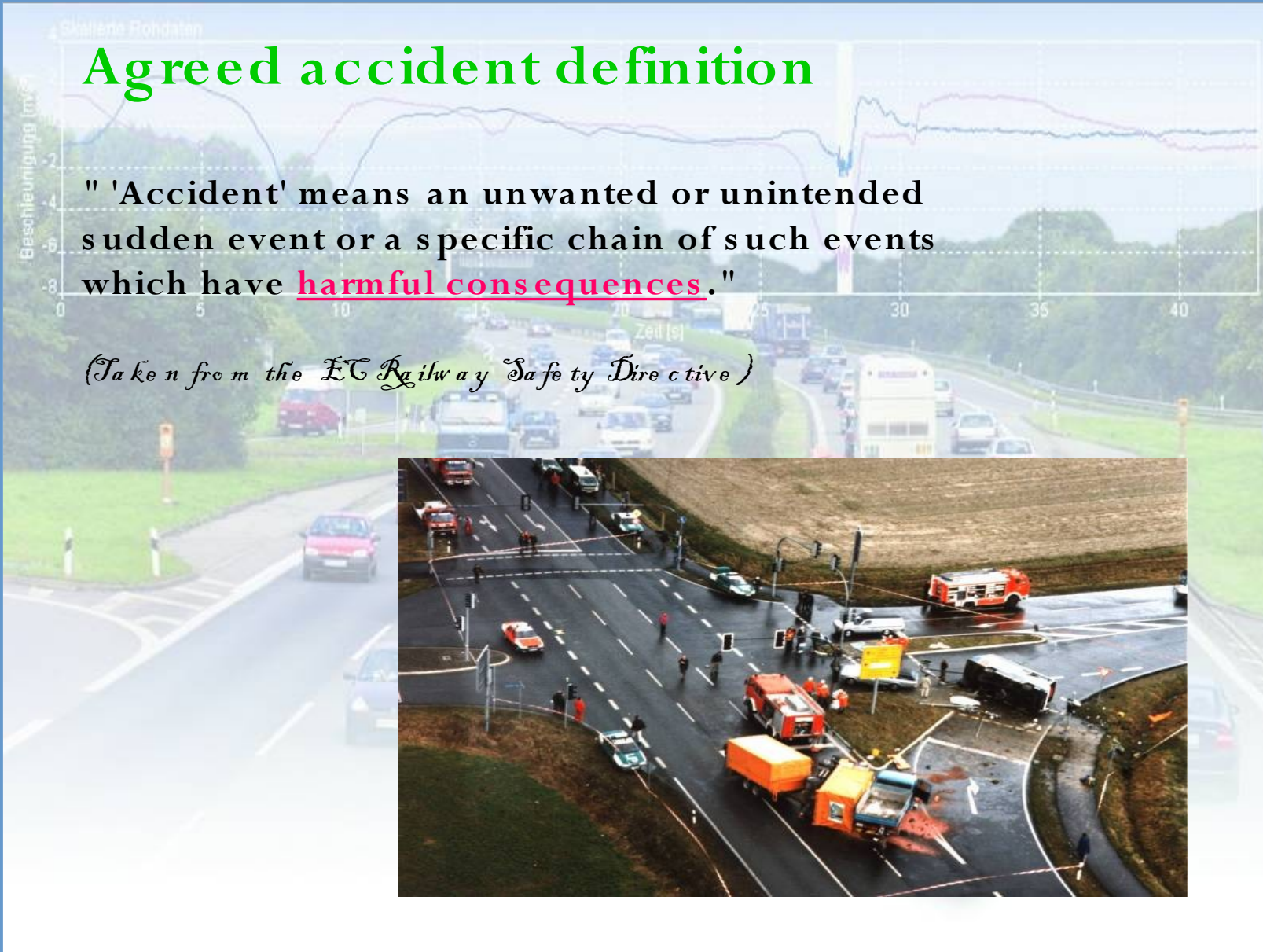
- 12. Motorcyclists
- 14. Young drivers

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Agreed accident definition

" 'Accident' means an unwanted or unintended sudden event or a specific chain of such events which have harmful consequences."

*(Taken from the EC Railway Safety Directive)*



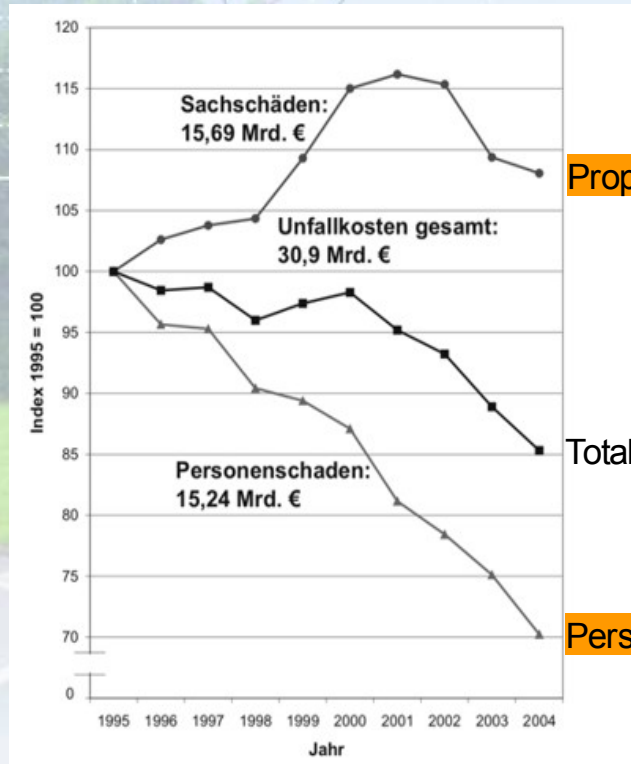
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**Socio-economic costs of road traffic accidents**

1995-2004 for Germany



Property damages 21,6 bil US \$

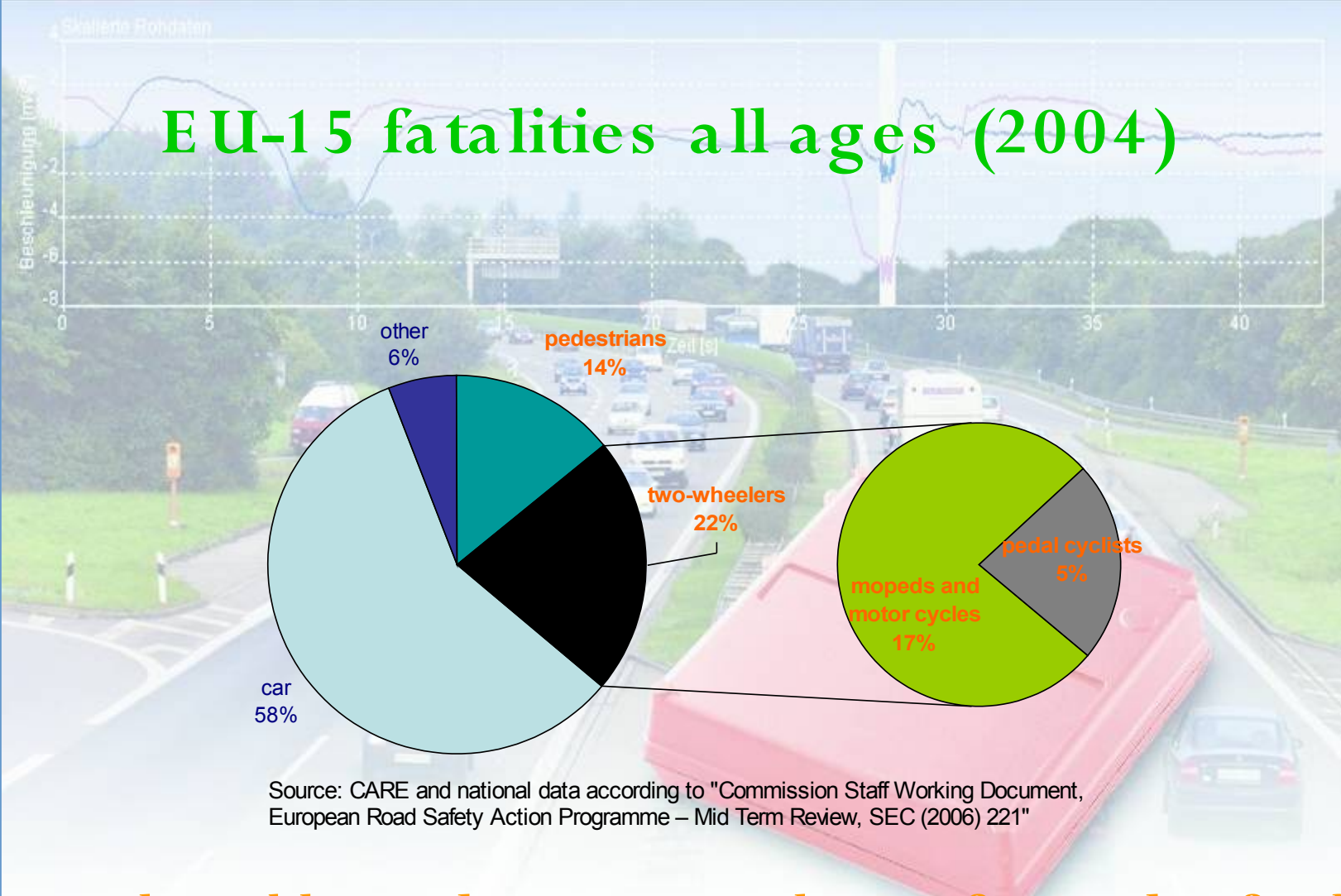
Total accident costs 42,6 bil US \$

Personal damage 21,0 bil US \$

Source: BfL St 02/06  
read Md. = bil  
1 € = 1,38 \$

⇒ Property damage can be as relevant as personal damage!

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Source: CARE and national data according to "Commission Staff Working Document, European Road Safety Action Programme – Mid Term Review, SEC (2006) 221"

⇒ Vulnerable road users are relevant for road safety!

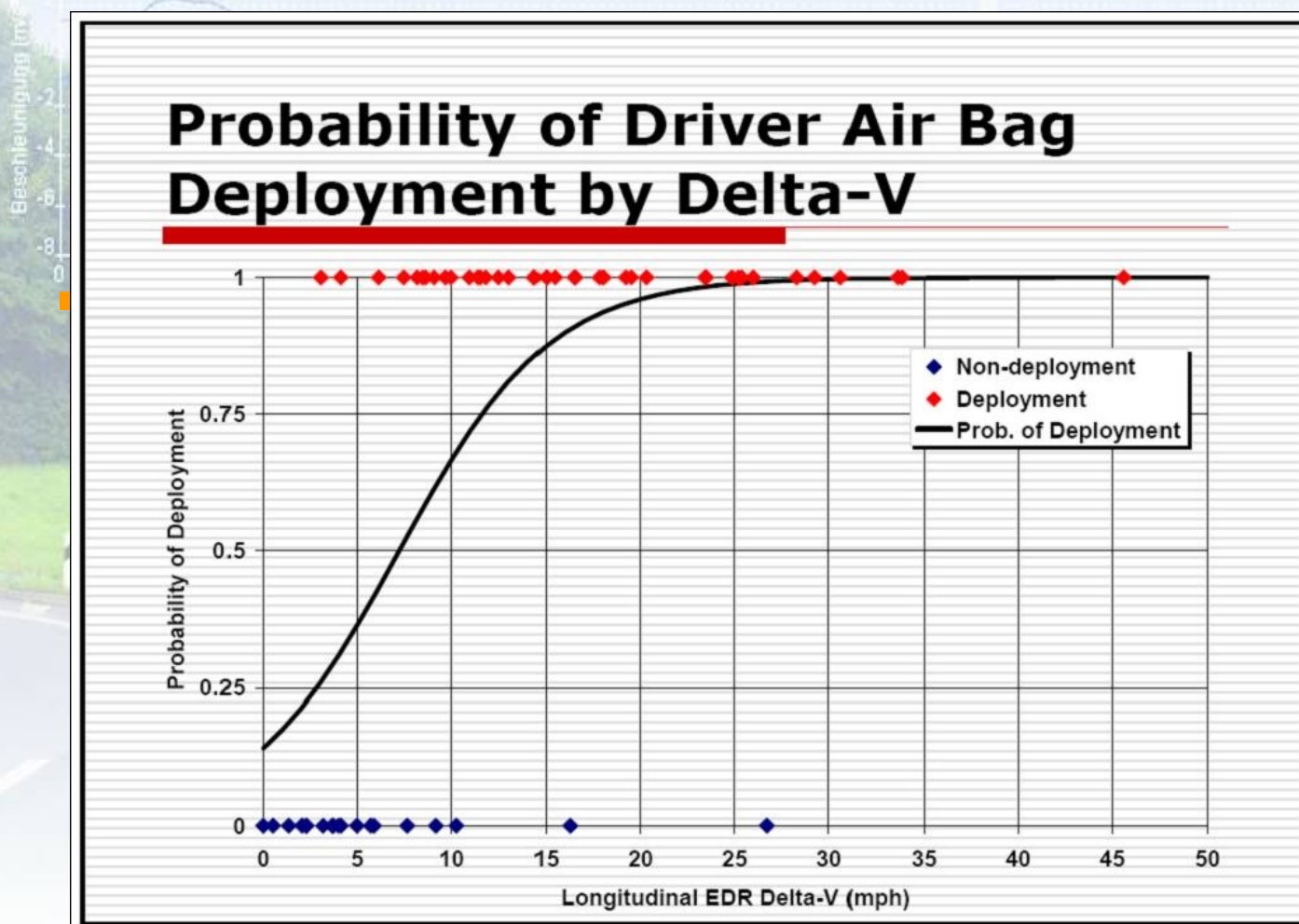
Trigger requirements in the light of the Veronica-II mission



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Trigger requirements in the light of the Veronica-II mission

**Results from US Research on EDR**



Source: Clay Gabriel/John Hinch, SAE EDR Symposium, Sept. 05/06, 2007, Ashburn, VA USA

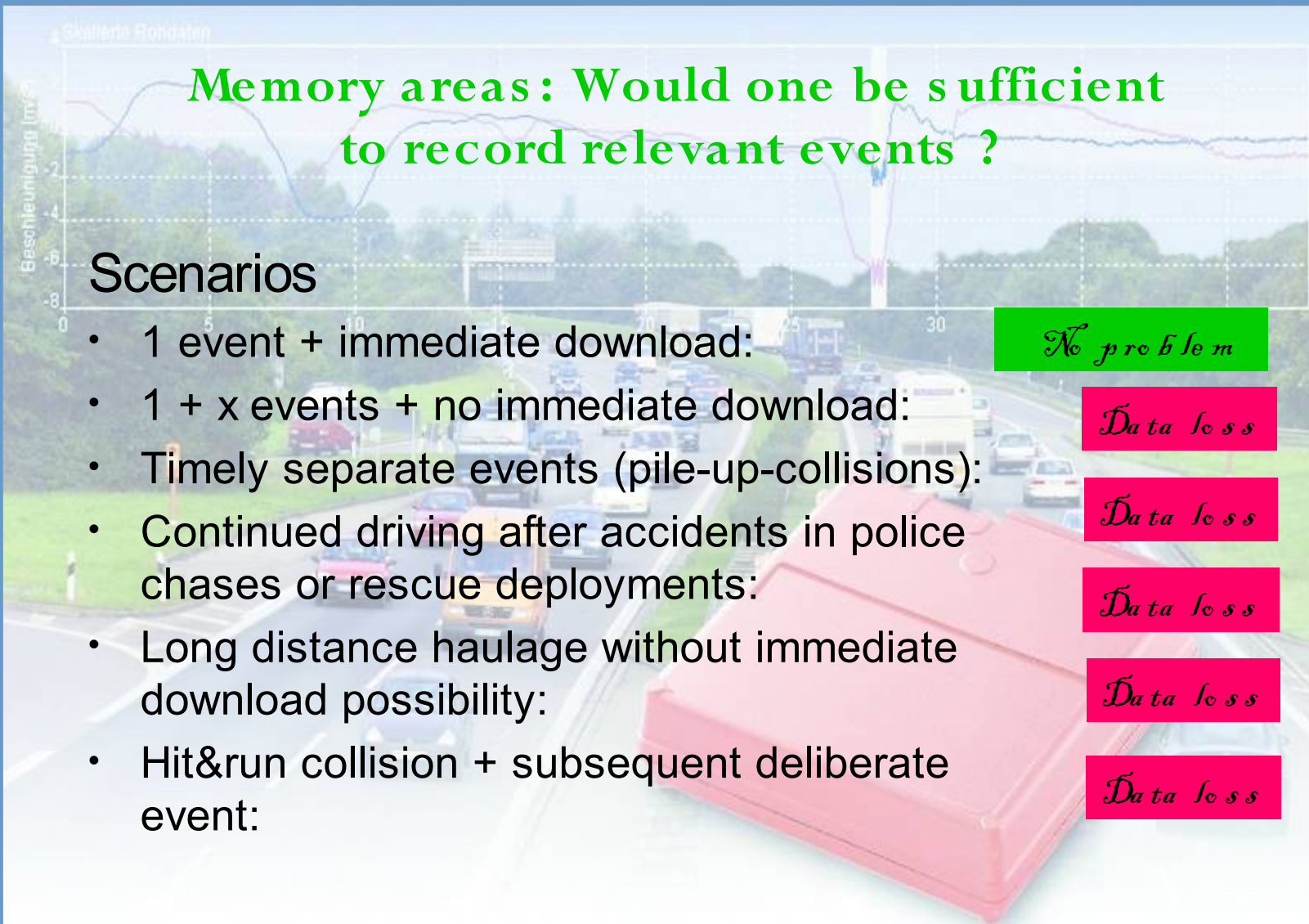
Trigger & other requirements in the light of the Veronica-II mission

## Results from US Research on EDRs

- Large uncertainties in lower crash severity collisions (some)
- Large uncertainties in higher severity and longer collisions (others)
- Inherent uncertainty of accelerometers
- No sufficient length of recording
- No lateral accelerometers
- No recording of rotation or angle movements
  
- Large uncertainties about pre-crash phase because wheel speed is read from the wheels (Hard braking and other wheel slippage events)
  
- Large uncertainties in the investigation of the pre-crash phase because data streams (vehicle speed, engine speed, brake switch and throttle) are:
  - not synchronized,
  - not collected at a constant frequency,
  - not linked to the impact.

*Extract from: Craig Wilkinson, SAE EDR Symposium, Sept. 05/06, 2007, Ashburn, VA USA*





Memory areas: Would one be sufficient to record relevant events ?

### Scenarios

- 1 event + immediate download:
- 1 + x events + no immediate download:
- Timely separate events (pile-up-collisions):
- Continued driving after accidents in police chases or rescue deployments:
- Long distance haulage without immediate download possibility:
- Hit&run collision + subsequent deliberate event:

No problem

Data loss

Data loss

Data loss

Data loss

Data loss

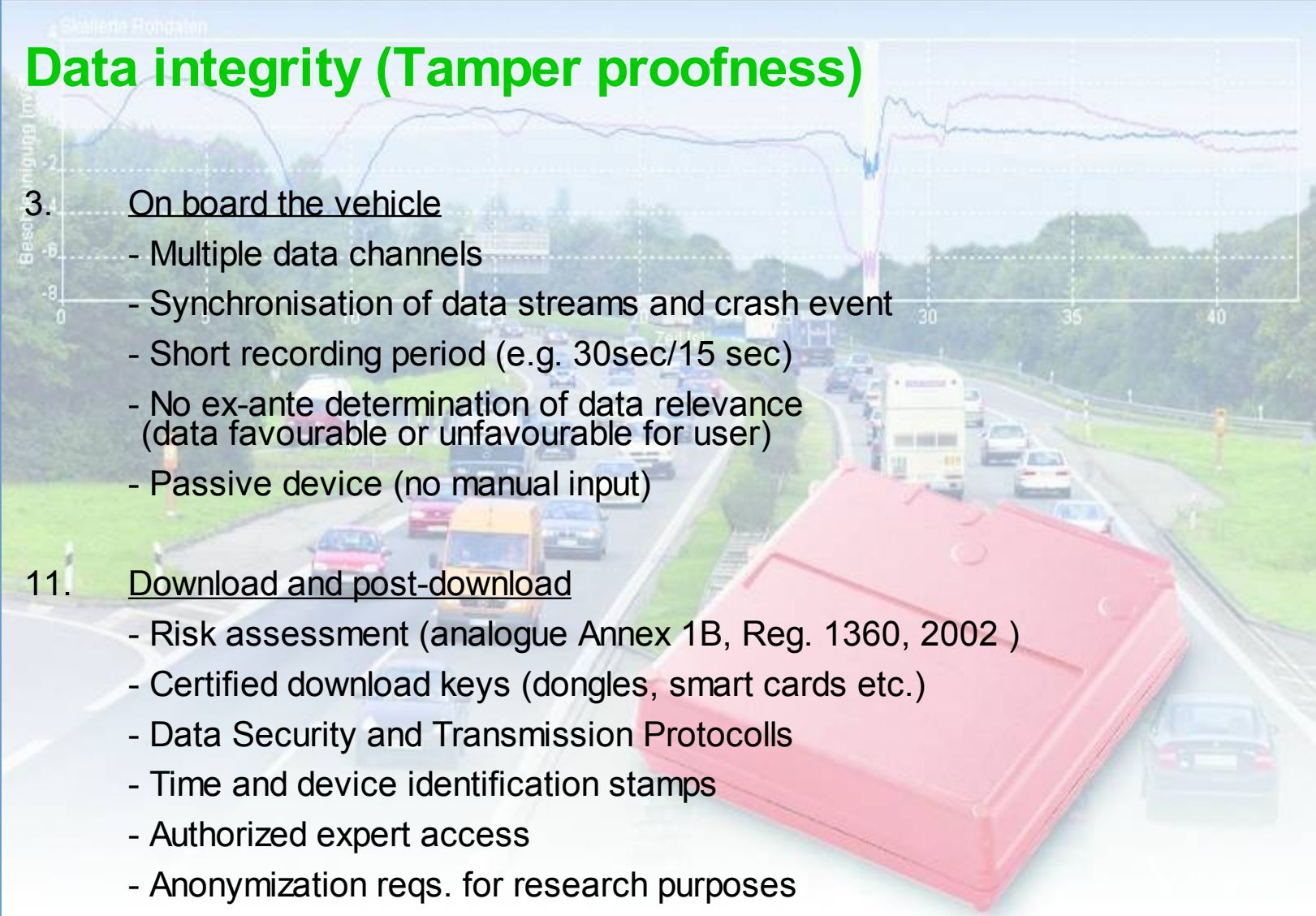
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## Conclusions from data privacy provisions

- No total surveillance (No behaviour recording)
- Data only immediately before and after trigger moment; that means, data related to damage occurrence
- High level of interface security and data integrity
- Download access qualification
- Transparency for the driver (Manual)

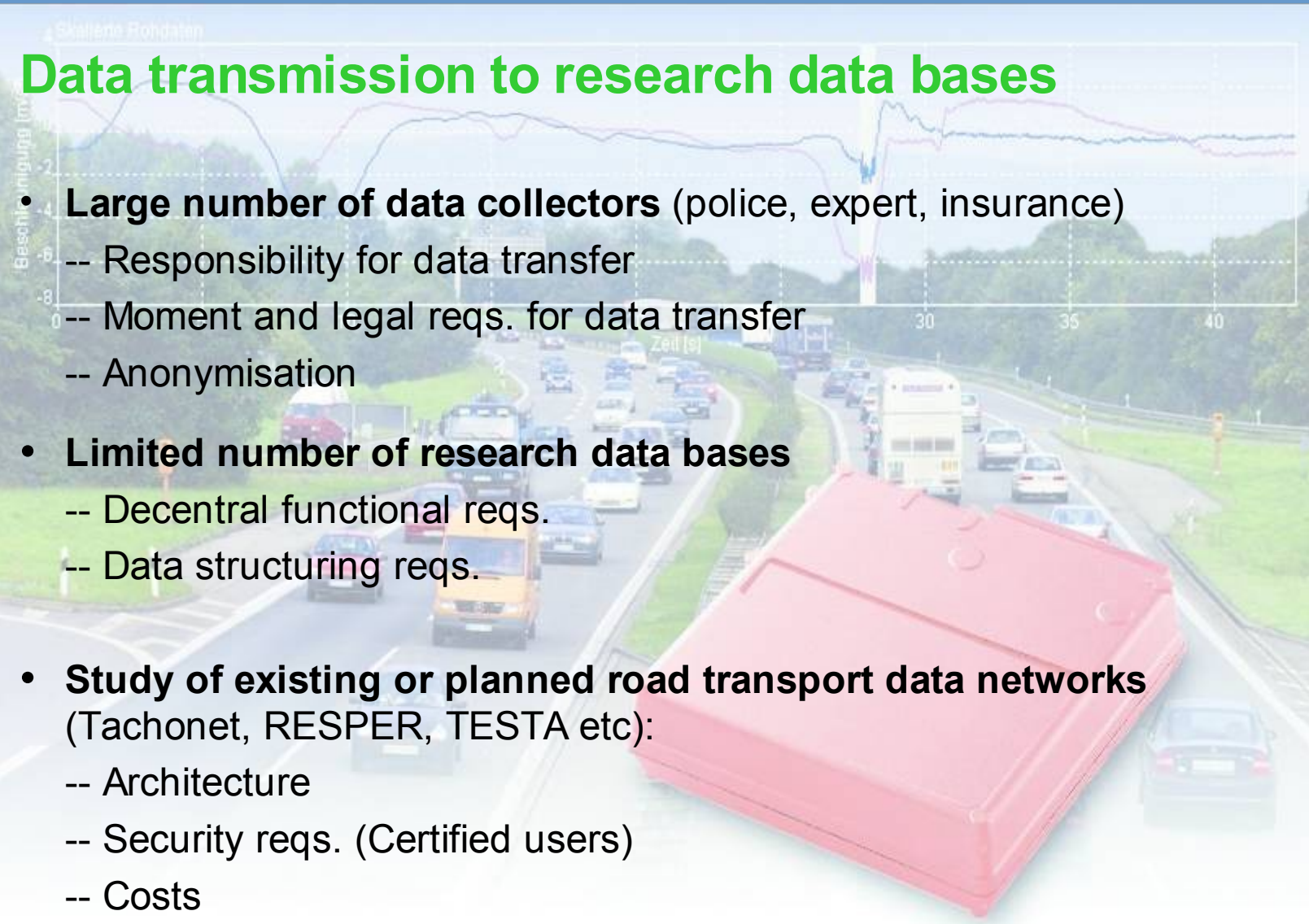
## Data integrity (Tamper proofness)

- 
3. On board the vehicle
- Multiple data channels
  - Synchronisation of data streams and crash event
  - Short recording period (e.g. 30sec/15 sec)
  - No ex-ante determination of data relevance (data favourable or unfavourable for user)
  - Passive device (no manual input)
11. Download and post-download
- Risk assessment (analogue Annex 1B, Reg. 1360, 2002 )
  - Certified download keys (dongles, smart cards etc.)
  - Data Security and Transmission Protocols
  - Time and device identification stamps
  - Authorized expert access
  - Anonymization reqs. for research purposes



## Data transmission to research data bases

- **Large number of data collectors** (police, expert, insurance)
  - Responsibility for data transfer
  - Moment and legal reqs. for data transfer
  - Anonymisation
- **Limited number of research data bases**
  - Decentral functional reqs.
  - Data structuring reqs.
- **Study of existing or planned road transport data networks** (Tachonet, RESPER, TESTA etc):
  - Architecture
  - Security reqs. (Certified users)
  - Costs



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*Thank you for your attention!*

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