

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
18-10-2007
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Siemens VDO Automotive AG*

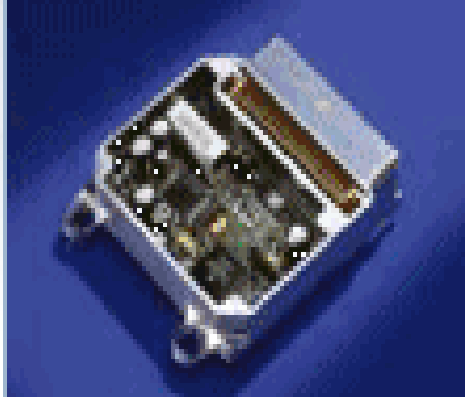
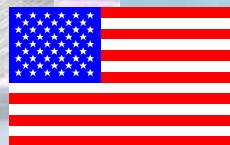


EDR for Europe – EDR for the Future

15 years of ADR experience in Europe



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





Veronica I, 2004-2006

Financing: 47% EU-Com, 53% Partners

Main Contractor: SIEMENS VDO

Partners: Aprox. 30

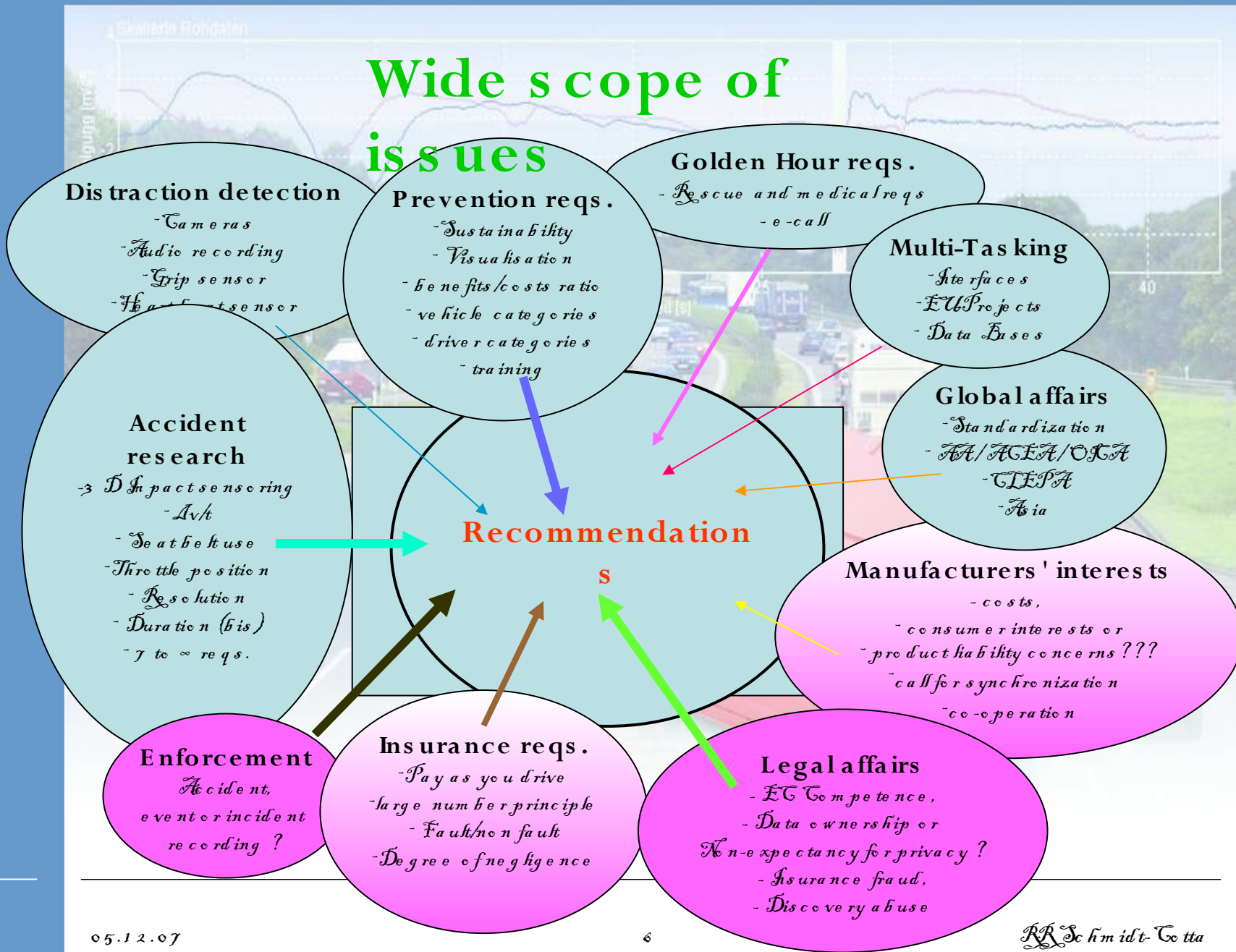
- Categories:
- Accident reconstruction & medical experts
 - Road Safety Experts
 - Vehicle Manufacturers (passenger cars, CV, busses)
 - Telematic suppliers
 - Insurance companies
 - Road authorities
 - Law application and tuition

From: A, AUS, B, CAN, CH, CZ, D, DK, E, F, GB, I, IRL, JAP, NL, PL, PRC, S, USA

3 WGs: Technical – Legal – Prevention

⇒ 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

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)

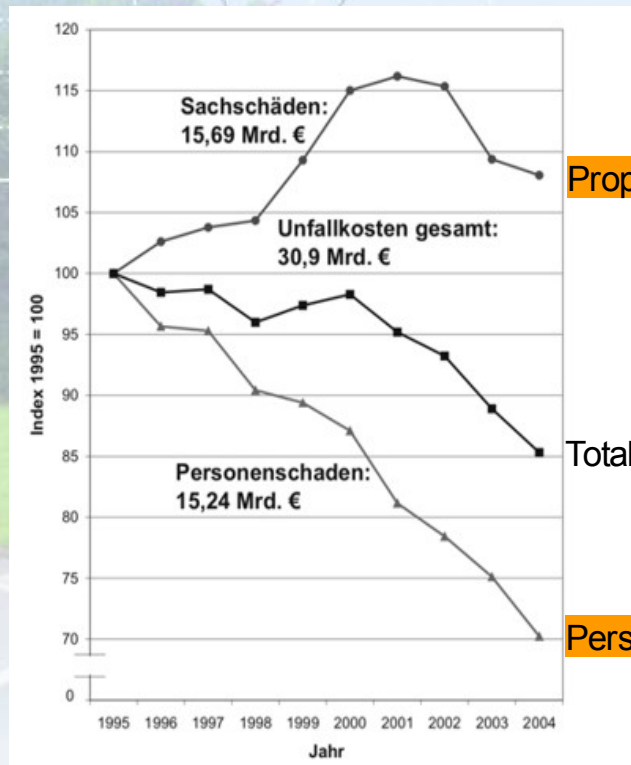




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Socio-economic costs of road traffic accidents

1995-2004 for Germany



Property damages 21,6 bil US \$

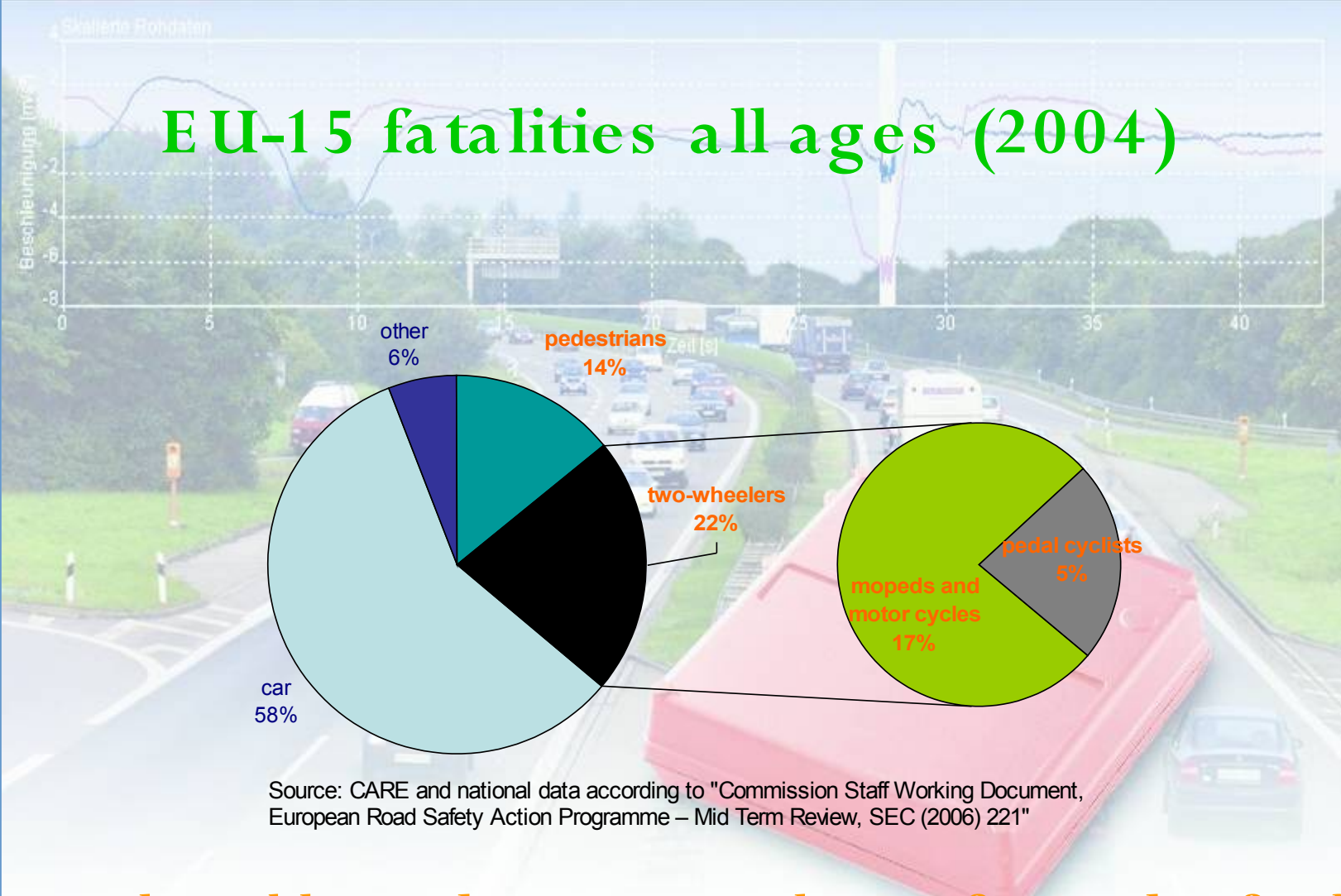
Total accident costs 42,6 bil US \$

Personal damage 21,0 bil US \$

Source: BfL St Jf 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!

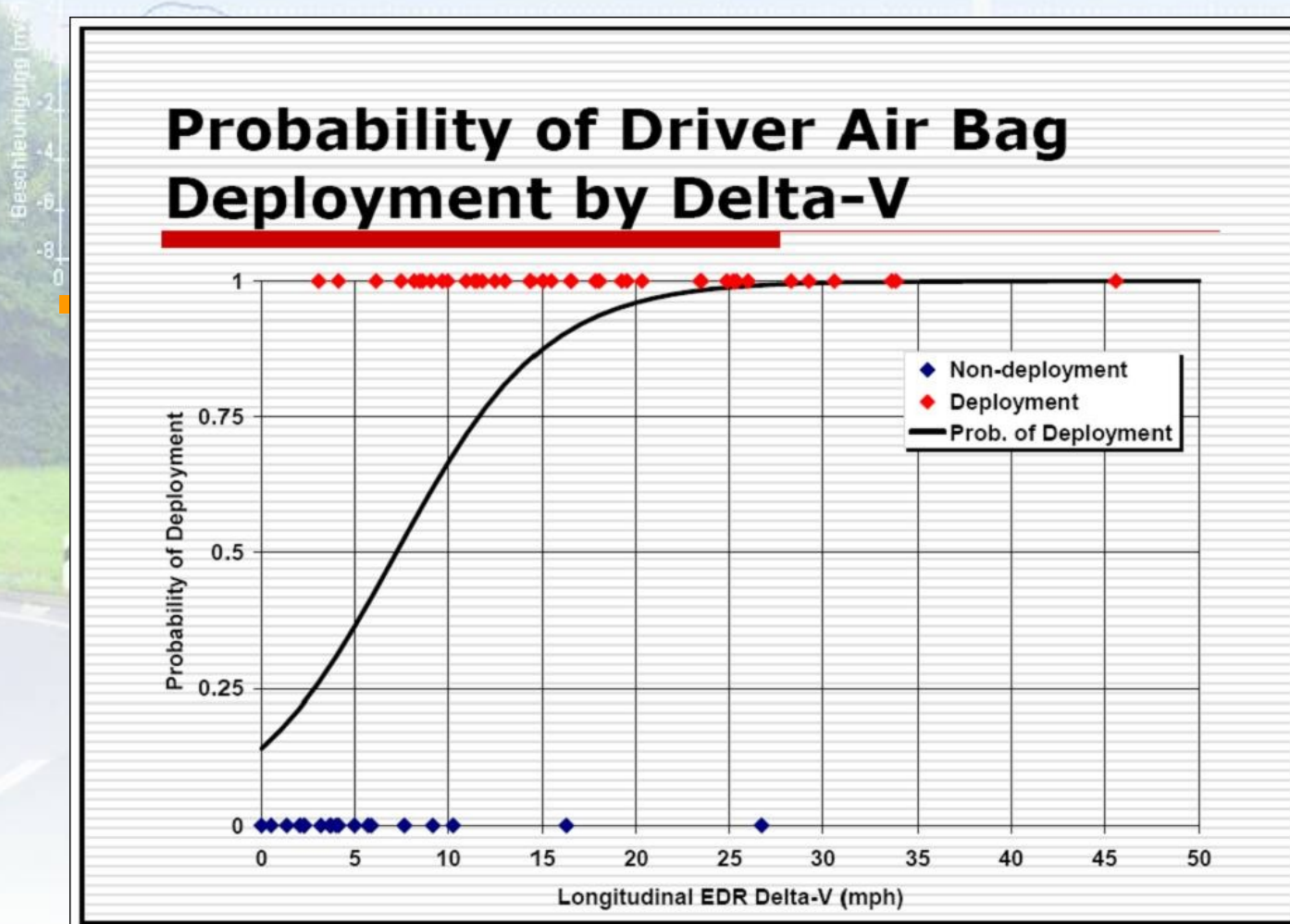
Trigger requirements
in the light of the
Veronica-II mission



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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

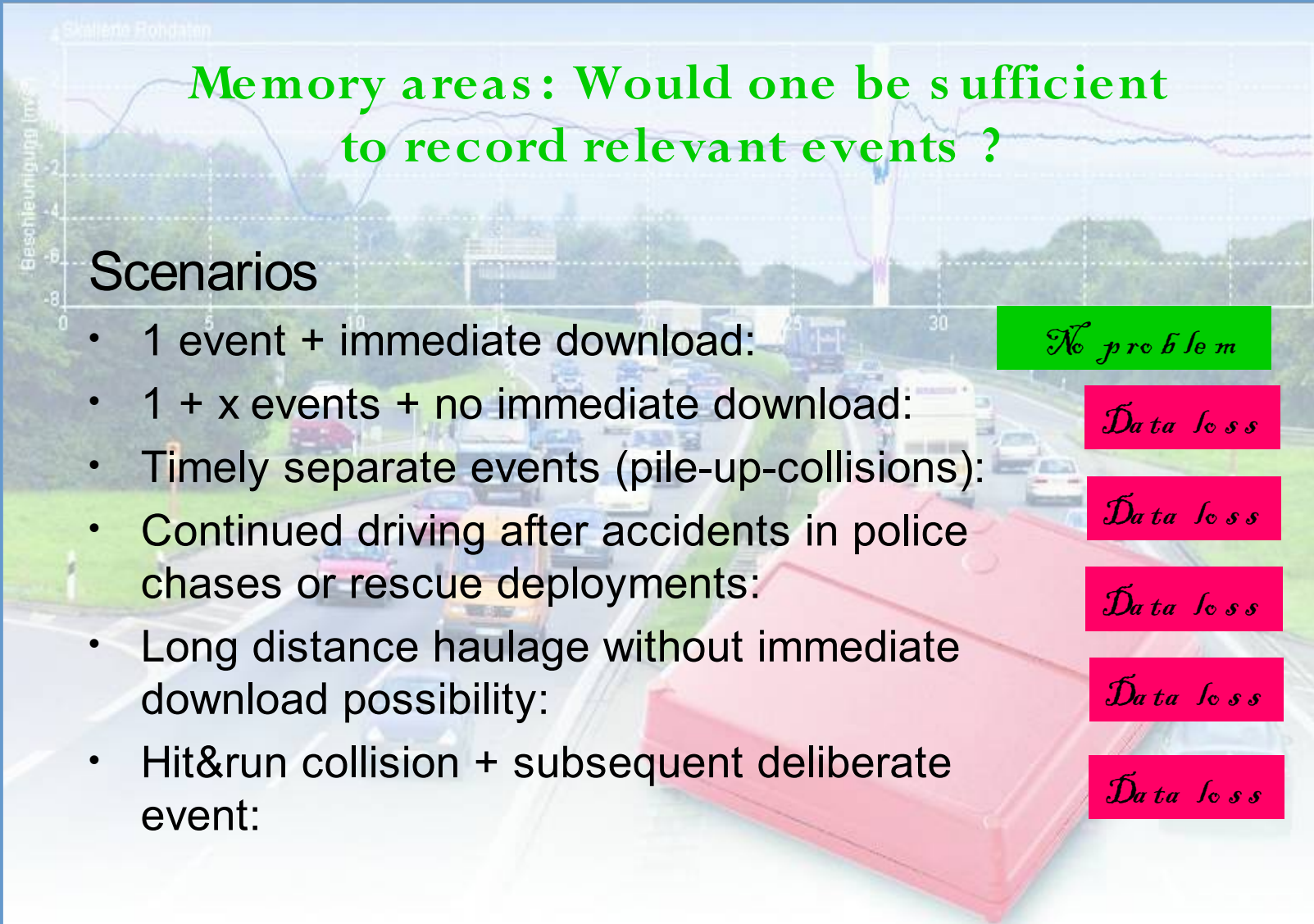
- Large uncertainties in lower crash severity collisions (some)
- Large uncertainties in higher severity and longer collisions (others)
- Inherent uncertainty of accelerometers
- No sufficient length of recording
- No lateral accelerometers
- No recording of rotation or angle movements

- 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

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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



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)

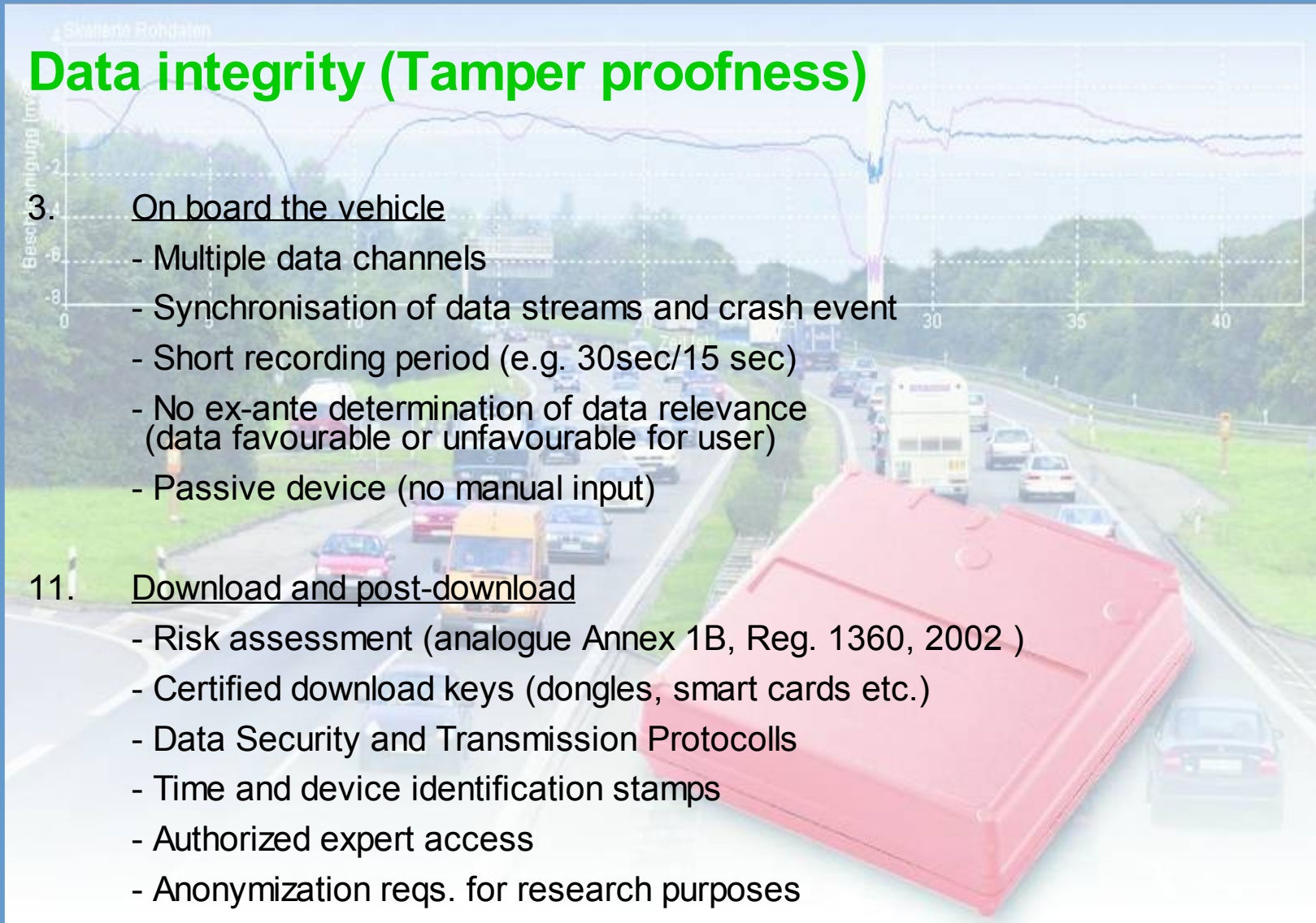
Data integrity (Tamper proofness)

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



Recommended levels of access rights

3. **Driver:** Full access rights (≠ technical access!)
5. **Contractual partners** (Insurance Companies, Rental car companies): According to contract
7. **Police:** in the framework of their legal duties to prosecute crimes
9. **Third parties** in litigation: (Plaintiff/defendant, manufacturer and their representatives): Court warrant
11. **Testing, research** (databases): anonymised with no names of driver and holder, no VIN/VRN



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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