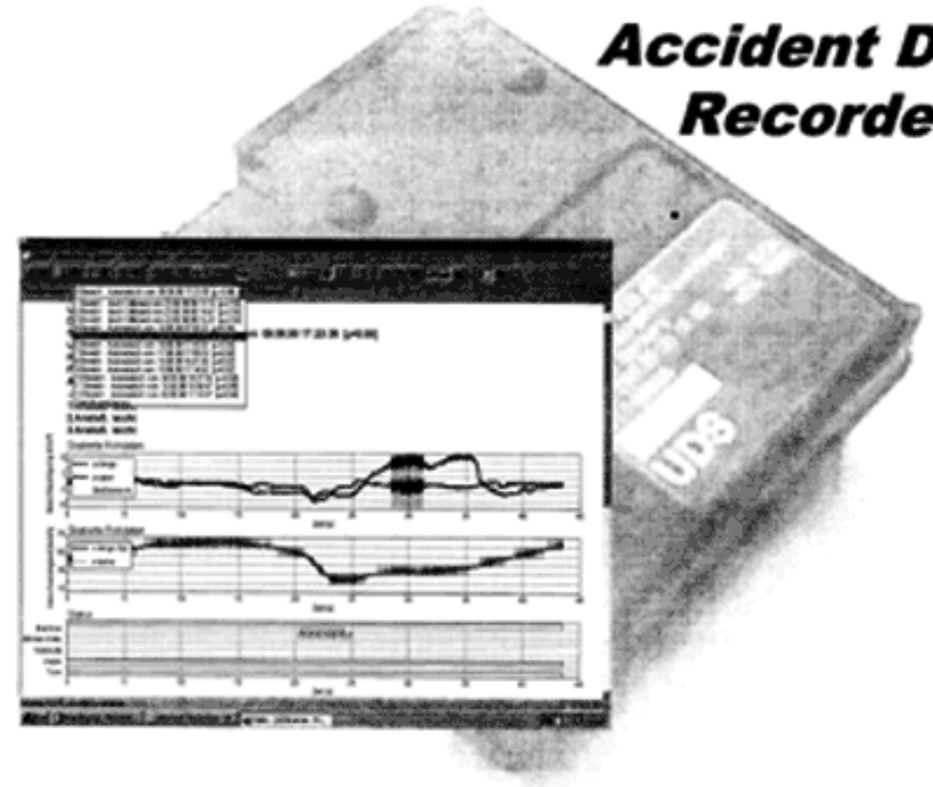
VDO Crash Recorder
Tony Reynolds
VDO North America



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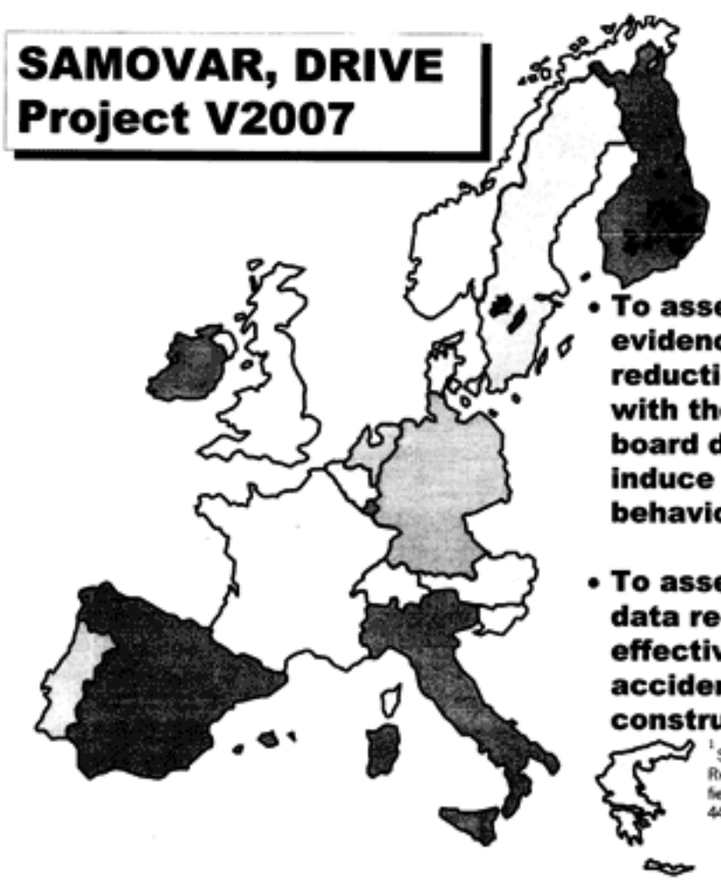
SAMOVAR, DRIVE
Project V2007



- To assess whether there is evidence of any collision reduction potential associated with the introduction of on-board data recorders used to induce changes in driver behaviour.
- To assess the use of on-board data recorders to improve the effectiveness and accuracy of accident investigation and construction.

[1] Safety Assement Monitoring on Vehicle with Automatic Recordung, Deliverable D10, October 1995 One-year field trial in UK, Netherlands, and Belgium. 7 fleets with 443 vehicles participated.

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SAMOVAR, DRIVE
Project V2007

- Collision reduction of approx. 28 %
- Accident reconstruction with IDR in comparison with traditional method could be carried out with greater accuracy and in a shorter period of time.

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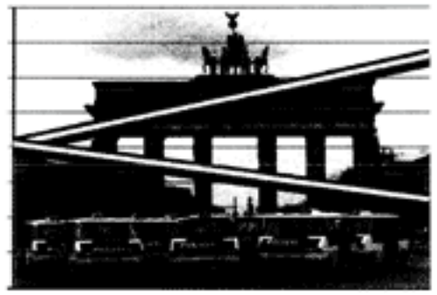
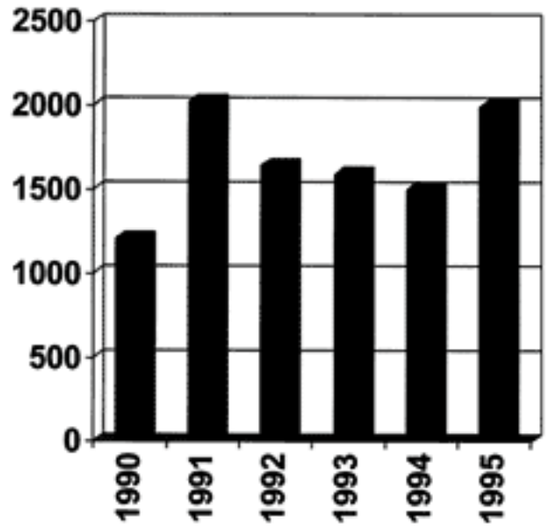
The Berlin Police Project





* Source: Final report of Pilot Phase II by Prof. Dr. Rau, Office for Accident Reconstruction

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The Berlin Police Project - Project History

Phase	Year	Details	
Phase II	1996	Number of vehicles:	62 Police cars
		Type of vehicles:	All VW Buses and civil cars of one department
		Location of vehicles:	Police Department 7 in Berlin-Marzahn
Phase III	04/97 - 03/98	Number of vehicles:	417 Police cars
		Type of vehicles:	All 380 VW Buses T2/T4 of Berlin and 37 civil cars of one department
		Location of vehicles:	All Police Departments (1 to 7) in Berlin

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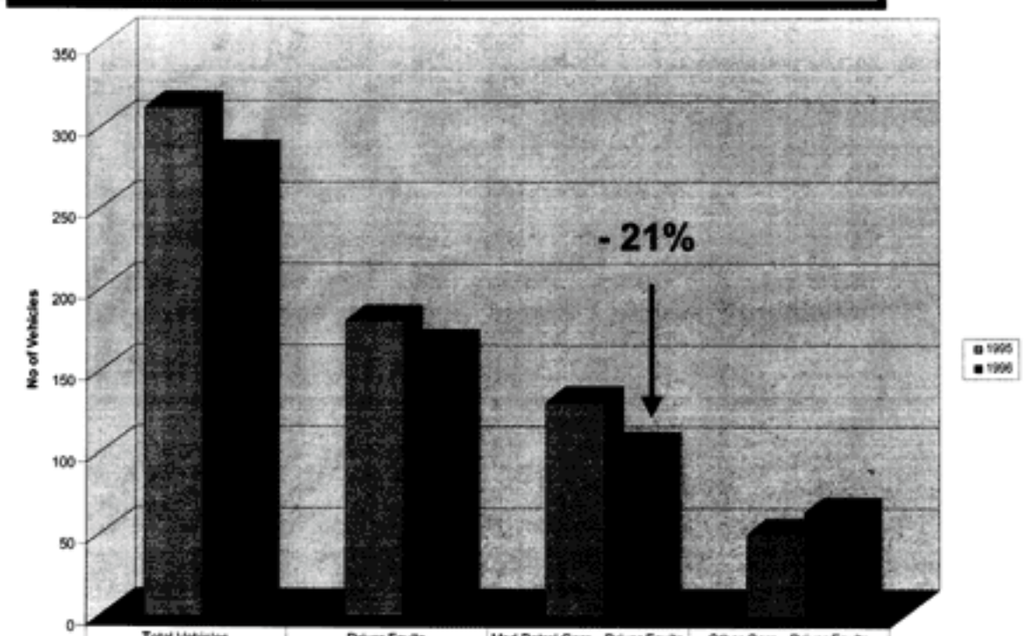
The Berlin Police Project - No of Traffic Collisions Berlin Police (Precinct 7)



	Total Vehicles	Driver Faults	Med Patrol Cars - Driver Faults	Other Cars - Driver Faults
1995	312	181	131	50
1996	282	166	103	63

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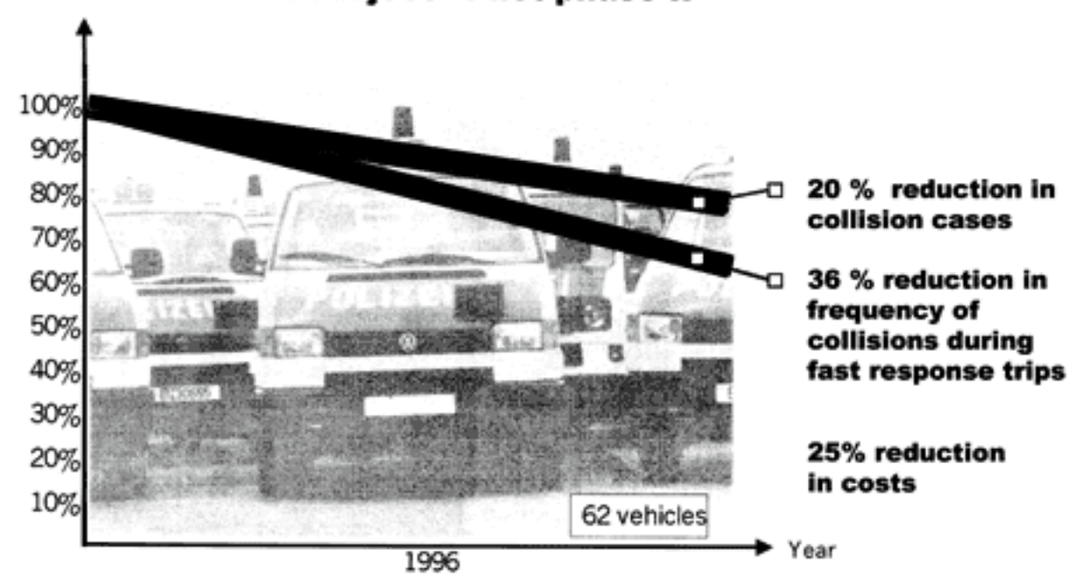
Background

The Berlin Police Project - Pilot phase II



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Software Products - UDShow

Status Inputs

UDS

20/09/00

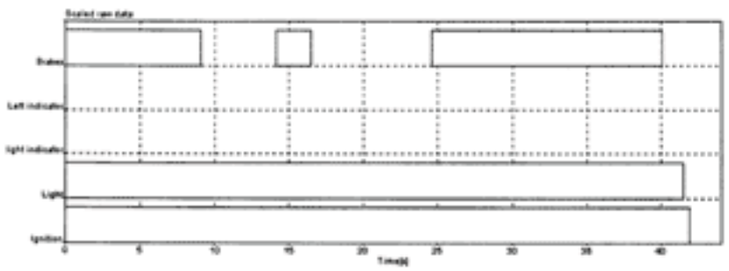
UDS serial number: 2000
Storage: 1.Area - 1.Automatic - from02/02/94 08:05:03
Corrected event time: 02/02/94 08:05:45

Licence number: Beispiel 1
Chassis number

Vehicle type:
Distance pulse count[pulses/km]: 6090

Impetus areas:

Time	Shock description	Situation directly before onset of shock
29.0 s	LightFrom behind(13 m/s²)	Acceleration/delay(-4 m/s²)/Straight ahead
29.5 s	LightFrom the front(15 m/s²)	Acceleration/delay(-2 m/s²)/Left turn(+3 m/s²)



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Software Products - UDShow

Distance/Time graph

UDS

20/09/00

UDS serial number: 2000
Storage: 1.Area - 1.Automatic - from02/02/94 08:05:03
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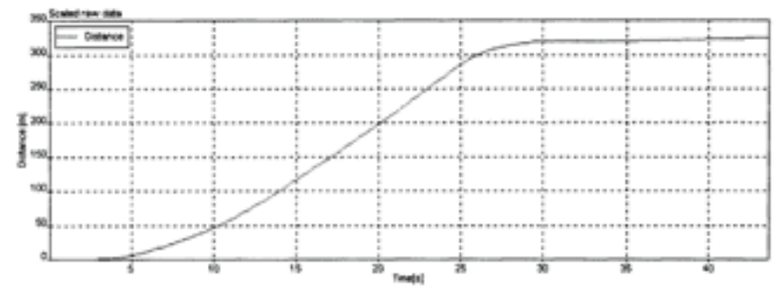

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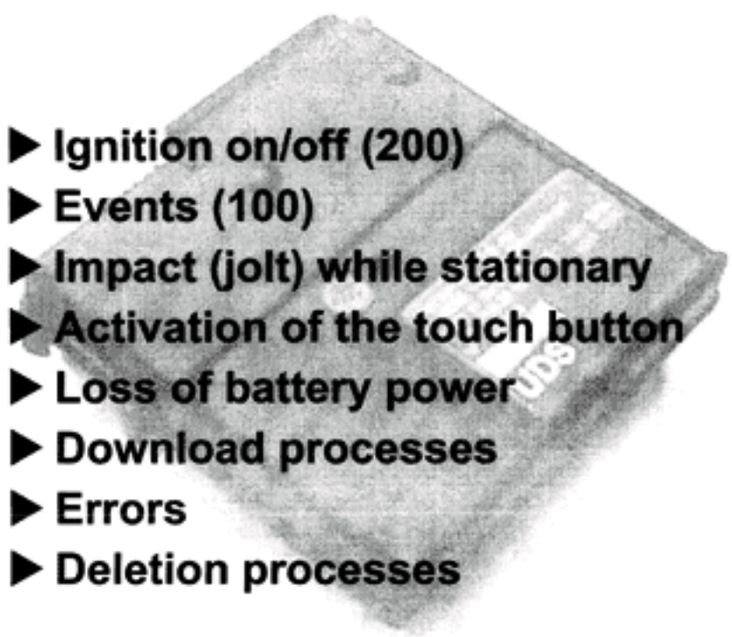
UDShow - Statistical Data



- Ignition on/off (200)
- Events (100)
- Impact (jolt) while stationary
- Activation of the touch button
- Loss of battery power
- Download processes
- Errors
- Deletion processes

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UDShow - Statistical Data

Statistical Data - Change in ignition status

Date/Time	dt[h:m:s]	s[km]	ds[km]	Ignition
26.06.1999 10:50		5247,8		ON
26.06.1999 10:53	00:02:39	5248,8	0,973	OFF
26.06.1999 17:54	07:00:59	5248,8	0	ON
26.06.1999 18:05	00:10:37	5259,4	10,597	OFF
26.06.1999 18:10	00:05:14	5259,4	0	ON
26.06.1999 18:44	00:33:51	5286,7	27,372	OFF
27.06.1999 09:20	14:35:34	5286,7	0	ON
27.06.1999 09:23	00:03:01	5287,8	1,089	OFF
27.06.1999 09:29	00:06:21	5287,8	0	ON
27.06.1999 09:31	00:02:25	5288,9	1,091	OFF
27.06.1999 10:43	01:11:52	5288,9	0	ON
27.06.1999 10:51	00:07:35	5295,8	6,879	OFF
27.06.1999 10:54	00:03:26	5295,8	0	ON
27.06.1999 11:09	00:14:29	5305,8	10,009	OFF

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Software Products - UDShow

- Event time and date
- Archiving of IDR-data
- Allows first inspection of data:

Speed versus time graph

Speed versus distance graph

Operation of the status inputs

- Erasure of the stored data possible

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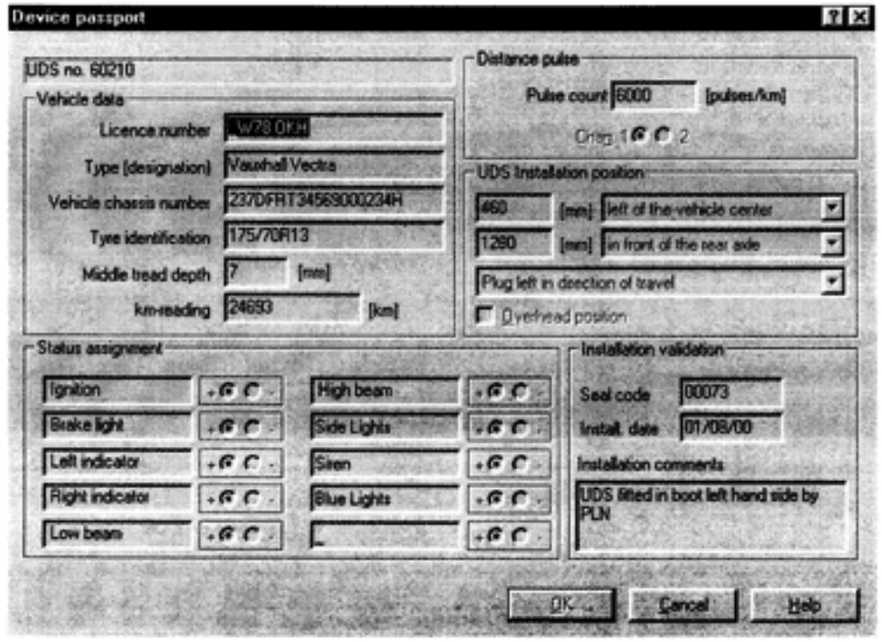
Software Products - UDShow

Equipment passport



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Software Products - UDShow

UDS

20/08/00

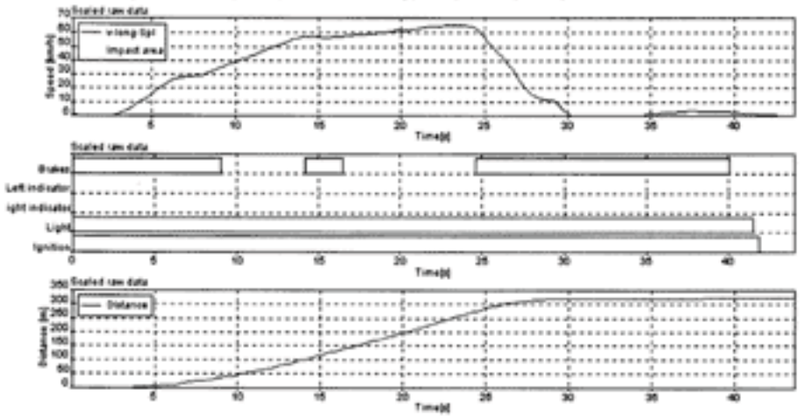
UDS serial number: 2000
Storage: 1.Area - 1.Automatic - from02/02/94 08:05:03
Corrected event time: 02/02/94 08:05:45

Licence number: Beispiel 1
Chassis number

Vehicle type:
Distance pulse count[pulses/km]: 6090

Impetus areas:

Time	Shock description	Situation directly before onset of shock
29.0 s	LightFrom behind(1.3 m/s²)	Acceleration/delay(-4 m/s²)/Straight ahead
29.5 s	LightFrom the front(1.5 m/s²)	Acceleration/delay(-2 m/s²)/Left turn(+3 m/s²)



VDO KIENZLE

Software Products - UDShow

Speed/Time graph

UDS

20/08/00

UDS serial number: 2000
Storage: 1.Area - 1.Automatic - from02/02/94 08:05:03
Corrected event time: 02/02/94 08:05:45

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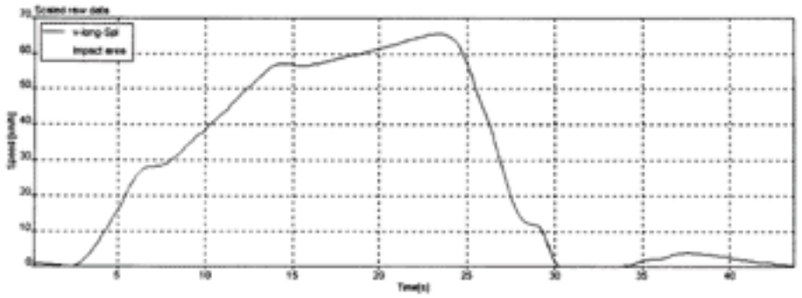

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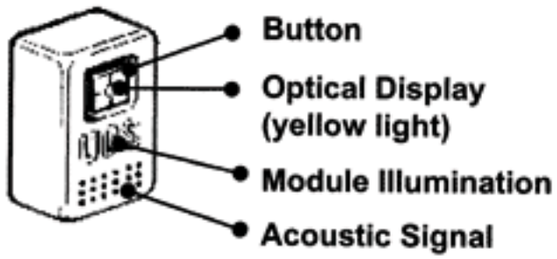
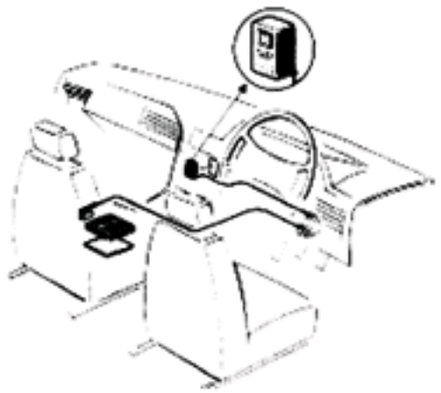
ADR System Technology

Acoustic & Visual Signals

Touch button





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ADR System Technology

Touch Button Operating Signals - ignition switched on

	1 x short bleep	The IDR is OK, no events stored
	illuminates & 1 x short bleep	At least one event is stored The IDR is OK
	4 long bleeps	IDR recognised a parking jolt The IDR is OK
	illuminates & 8 x short bleeps	The storage capacity of the IDR is nearly full
	10 x short bleeps or	The IDR has a fault!
?	no signal	

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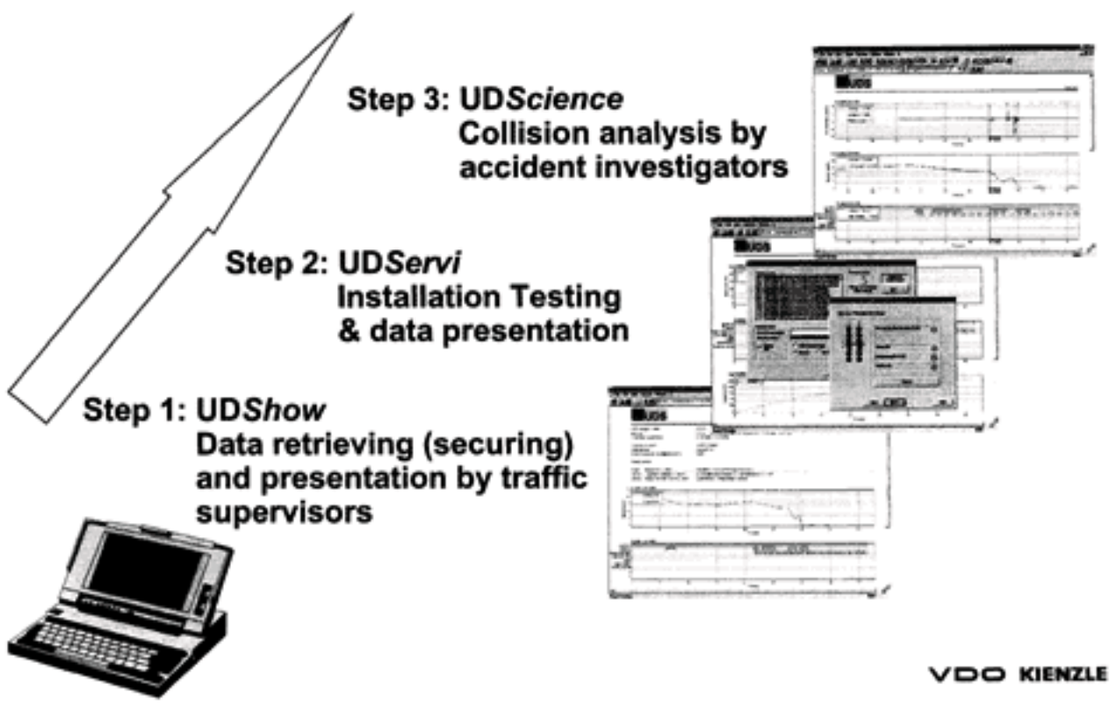
ADR Software Products



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Software Products - UDShow

Communication Lead for data downloading

Communication with the IDR:

- mobile in the vehicle or
- stationary in the office

To be able to:

- read out and display data

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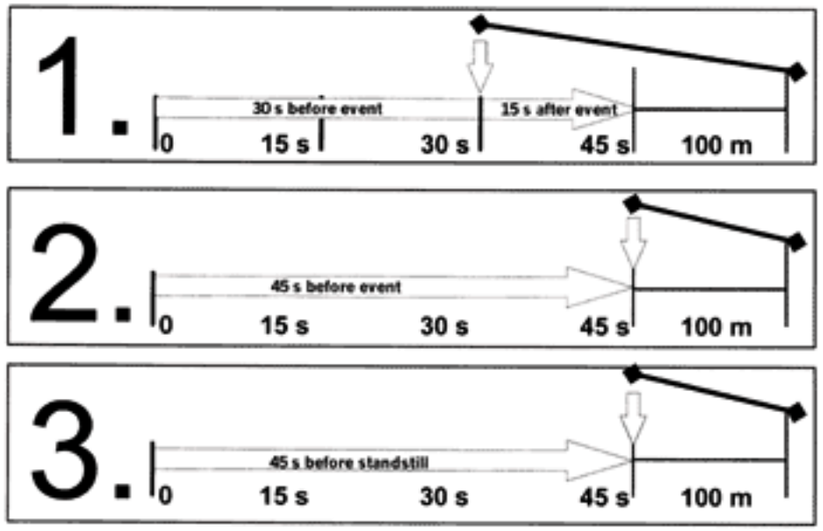
ADR System Technology

Data Recording Storage



Storage initiated by the collision

Manual temporary storage by operating a touch button

Stationary Storage

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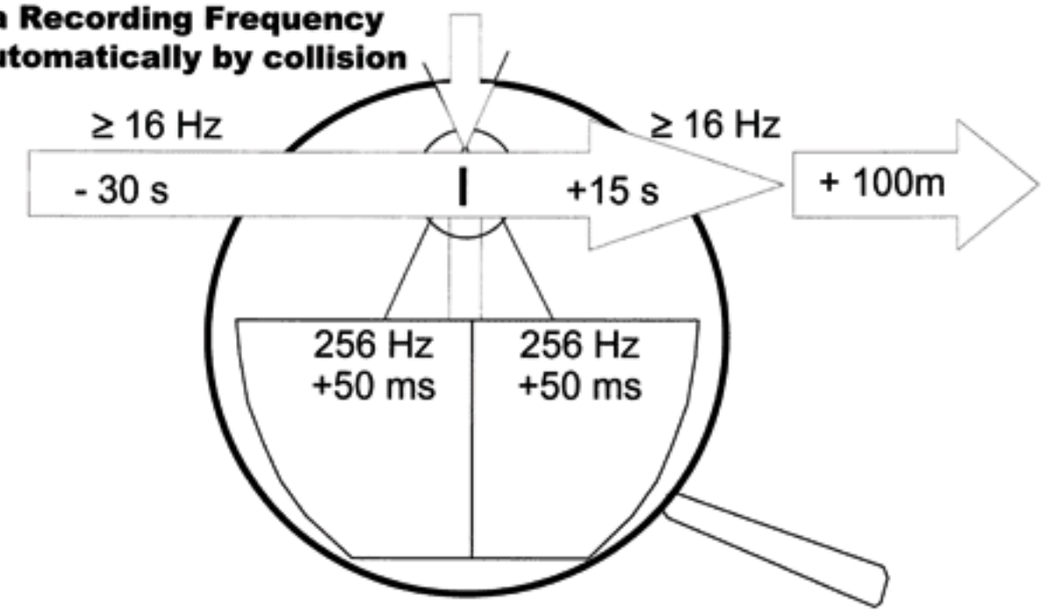
ADR System Technology

Data Recording Frequency

- **automatically by collision**



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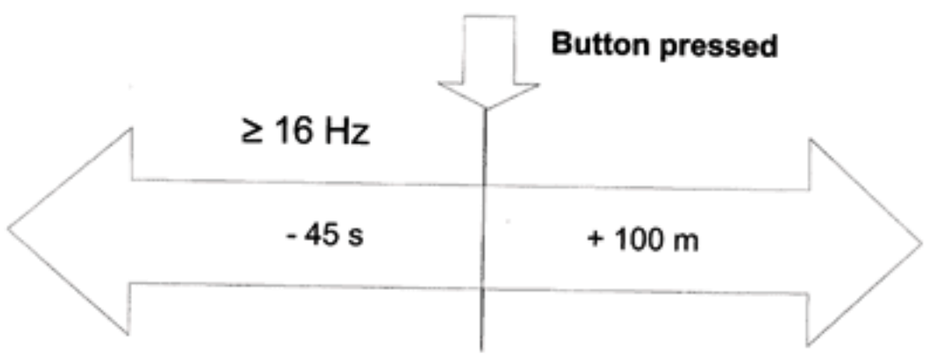
ADR System Technology

- **by using the touch button**



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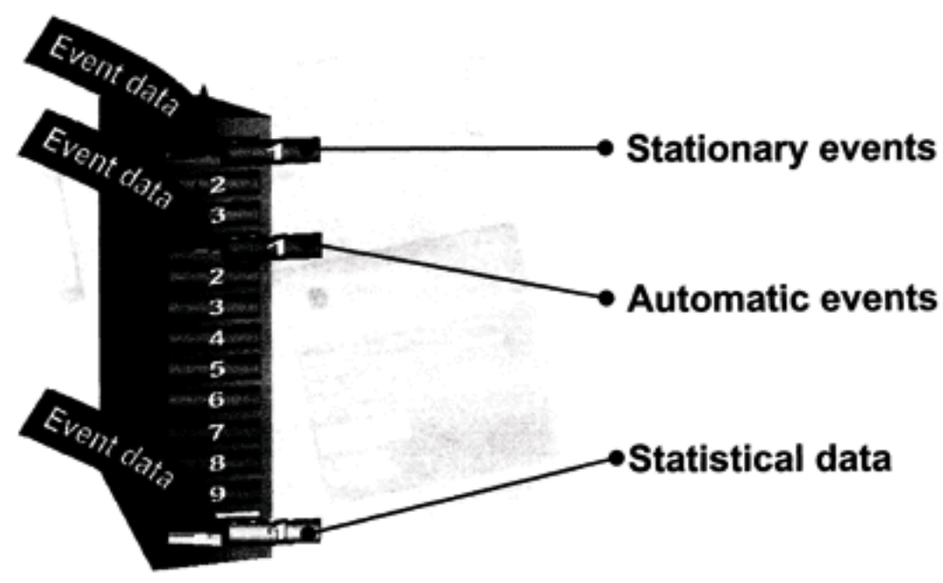
ADR System Technology

Number of possibilities for storing events



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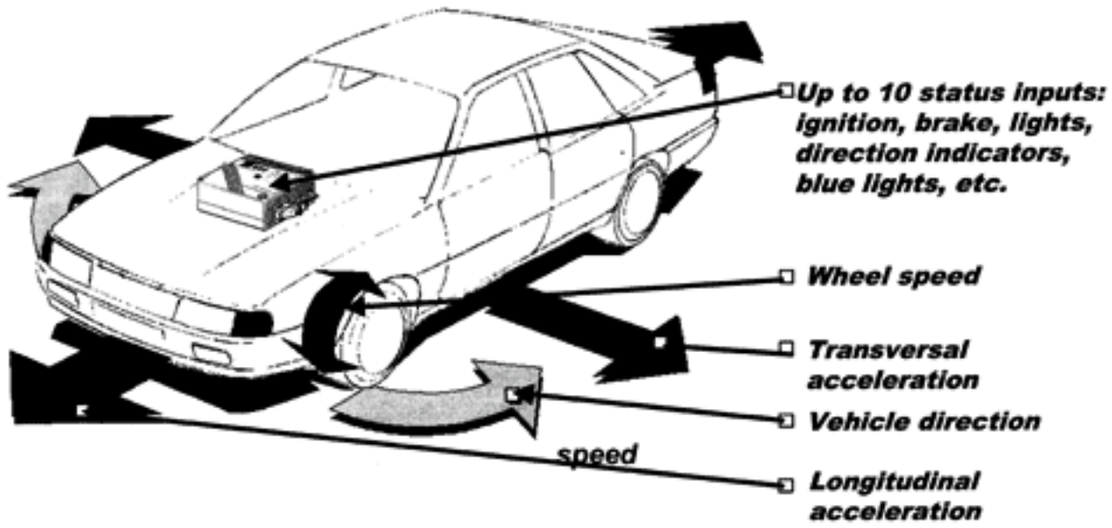
Accident Data Recorder Functions

Sensors and Status Inputs



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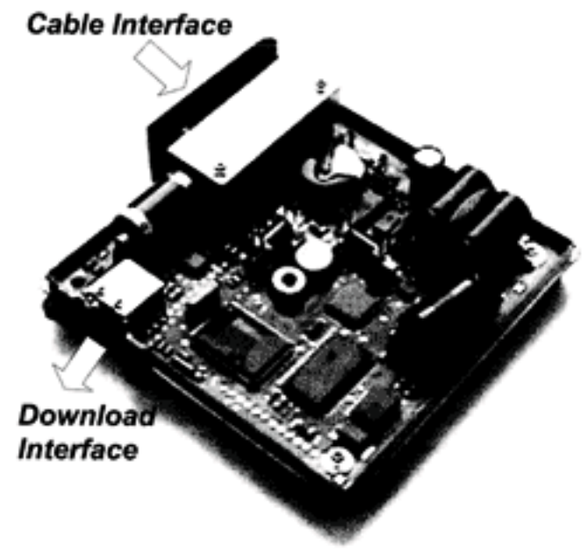
ADR System Technology



- Sensor system
- Battery
- Emergency power supply
- Compass
- Clock
- Processor

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ADR System Technology Operating Modes

Driving Mode

Normal operating mode when the vehicle is driven

Parking Mode

Approx. 5 mins after the ignition is switched off the IDR is more sensitive

Sleep Mode

If the ignition remains off for more than 3 days, the IDR reverts from parking mode to sleep mode and switches off

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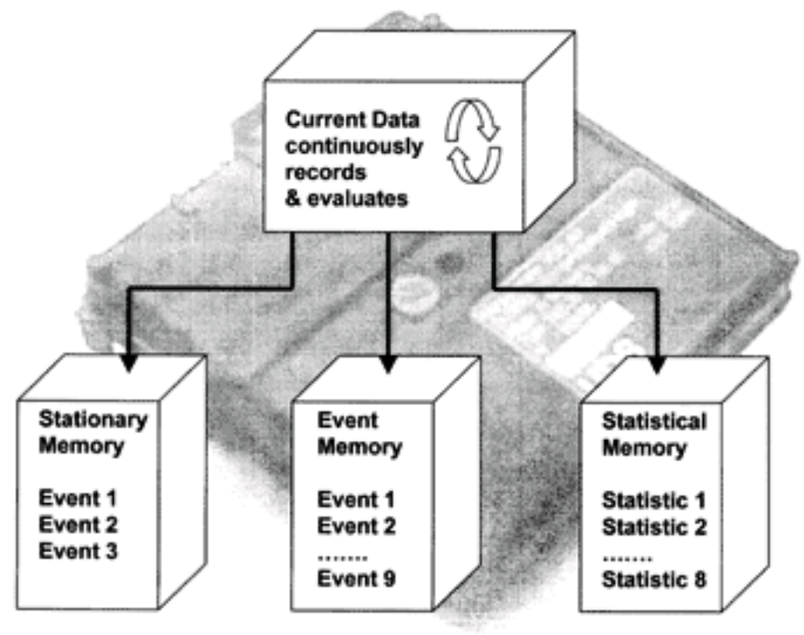
ADR System Technology



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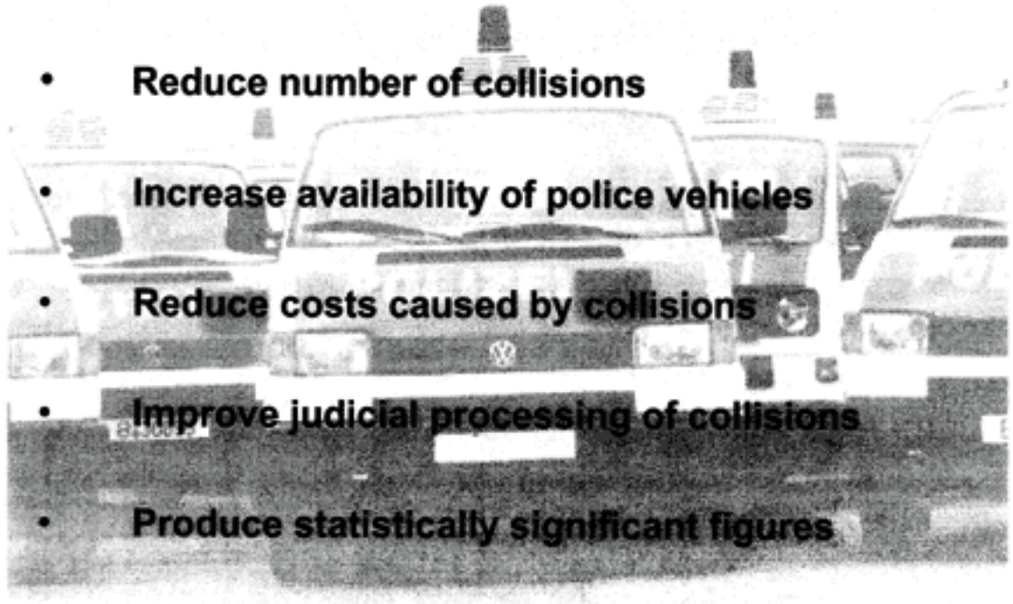
The Berlin Police Project - Objectives of Phase III



- Reduce number of collisions
- Increase availability of police vehicles
- Reduce costs caused by collisions
- Improve judicial processing of collisions
- Produce statistically significant figures

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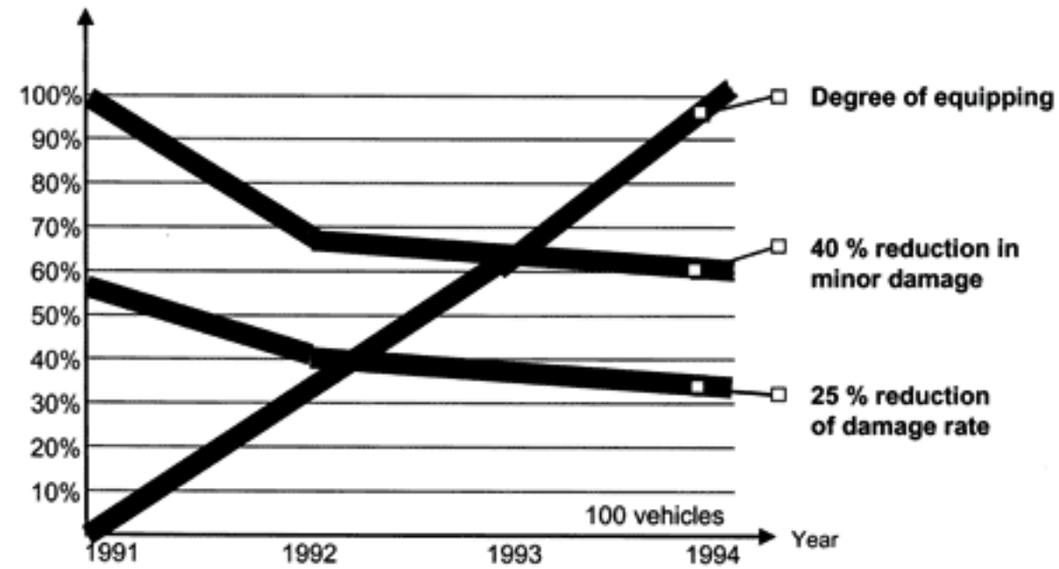
WKD Pinkerton Security, Bisingen, Germany



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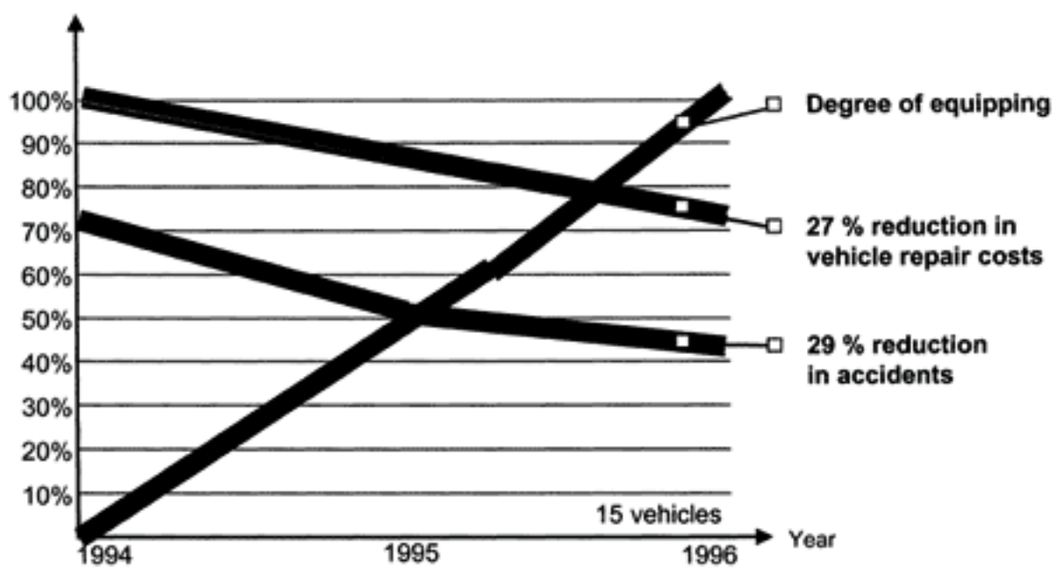
Hatscher Taxi Company, Oldenburg, Germany



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Accident Data Recorder Functions

- ***Recording of vehicle-specific data***
- ***High-resolution representation of an incident***
- ***Determines collision and initial speeds***
- ***Follow-up collisions recorded***
- ***Automatic and manual event recording***
- ***Up to 10 status inputs***
- ***Changes in vehicle direction***
- ***Speed and course of the vehicle, even under wheel lock***
- ***Stores exact time of incident***

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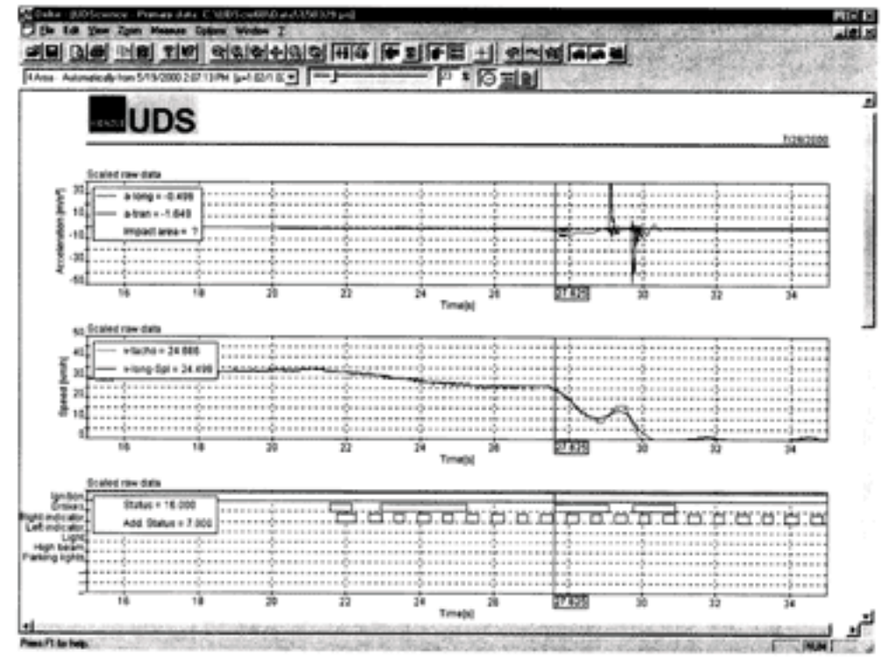
UDShow - Statistical Data

Statistical Data - Events

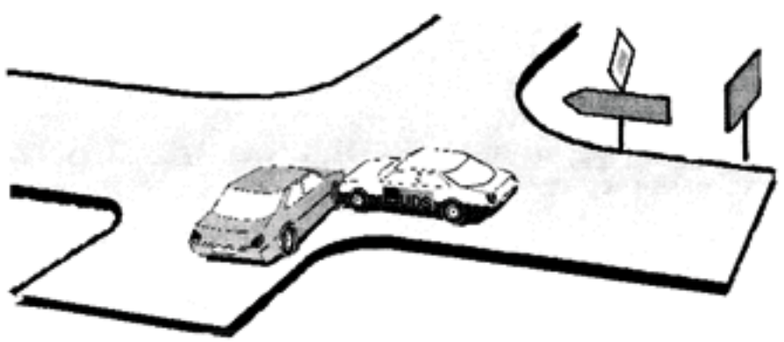
Date/Time	s[km]	ds[km]	v[kph]	μ-max
17.05.1999 20:05	3278,093		25	**0,03**
17.05.1999 21:21	3381,454	103,361	112	**0,02**
18.05.1999 08:03	3398,061	16,607	25	**0,02**
18.05.1999 08:07	3402,636	4,575	61	**0,05**
21.05.1999 19:23	3415,862	13,226	25	**0,01**
23.05.1999 16:52	3461,595	45,733	68	**0,07**
23.05.1999 17:19	3474,828	13,233	29	**0,01**
23.05.1999 17:22	3475,895	1,067	22	**0,01**
24.05.1999 09:30	3492,561	16,666	29	**0,01**
24.05.1999 18:37	3493,351	0,790	29	**0,05**
24.05.1999 19:14	3503,413	10,062	36	**0,01**
24.05.1999 19:15	3504,292	0,879	47	**0,08**
24.05.1999 20:12	3538,873	34,581	58	**0,02**
25.05.1999 16:07	3549,717	10,844	40	**0,10**

ADR Software - UDScience

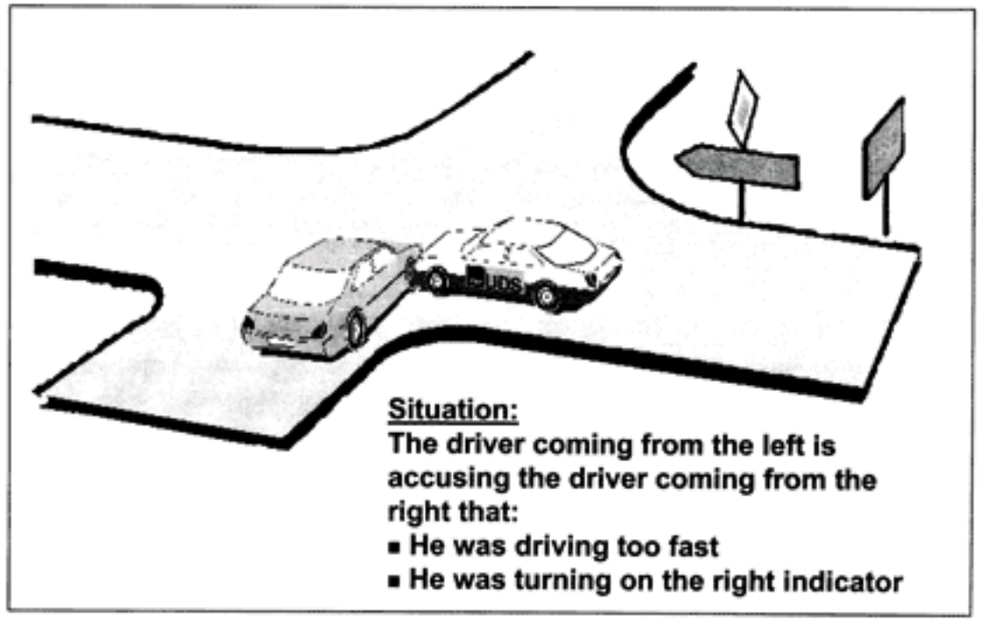


Example of a Collision Analysis

Intersection Collision



Intersection Collision



Questions - Intersection Collision

What was the initial speed?

What was the collision speed?

Did the driver Brake?

Was the approach speed excessive?

Did the driver have the right indicator on?

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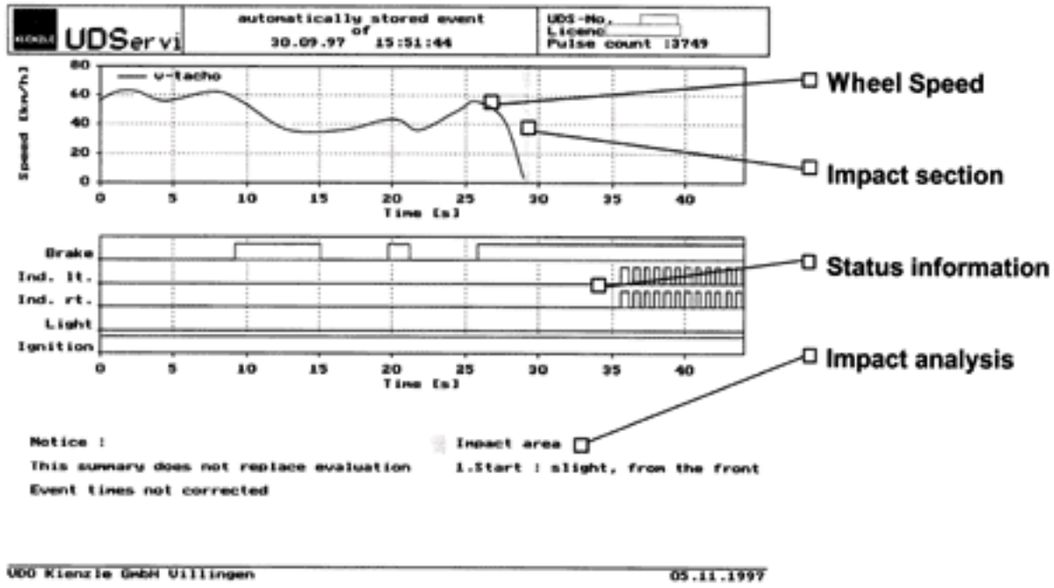
Intersection Collision
Immediate Information via UDShow



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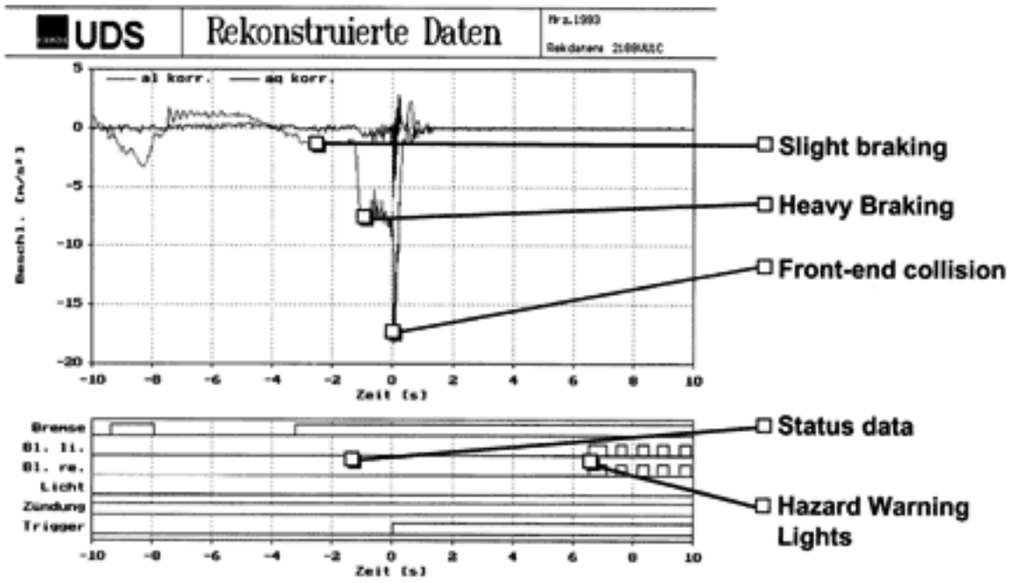
Intersection Collision
Detailed information



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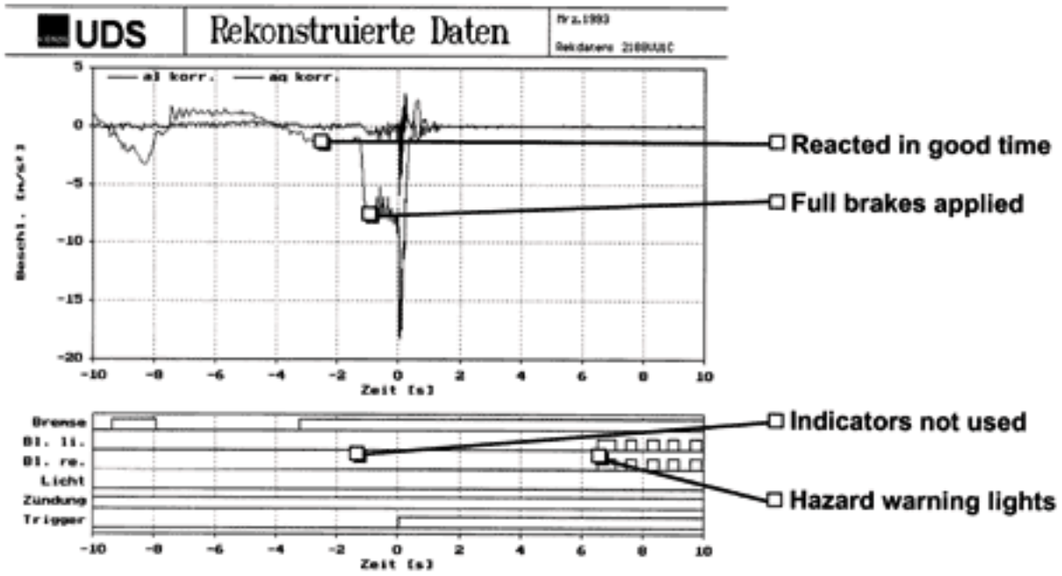
Intersection Collision
The Results



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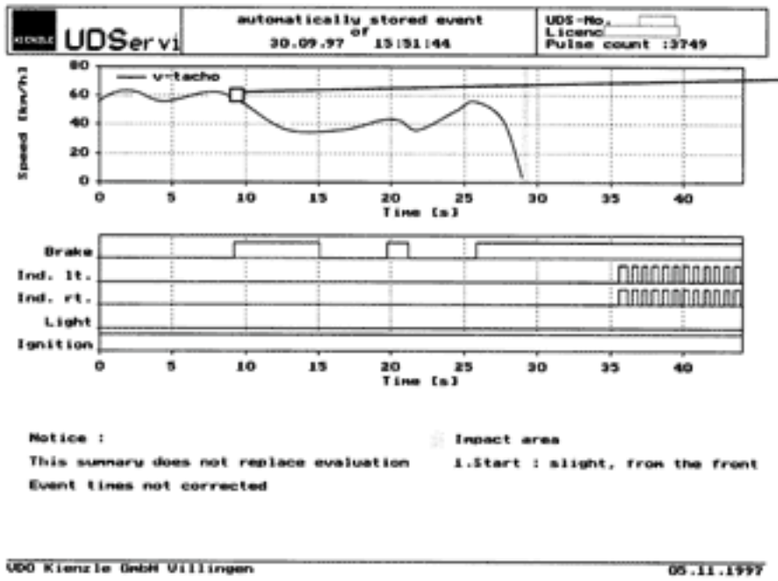
Intersection Collision
The Results



Approach speed not too fast

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Benefits to the Accident Investigator

- If there are no skid marks due to wet road or the operation of ABS
- Where no other objective evidence is available
- Manner of driving shown immediately before a collision
- Cost benefits (reduced costs of reconstruction)
- The availability of evidence which would be difficult to dispute

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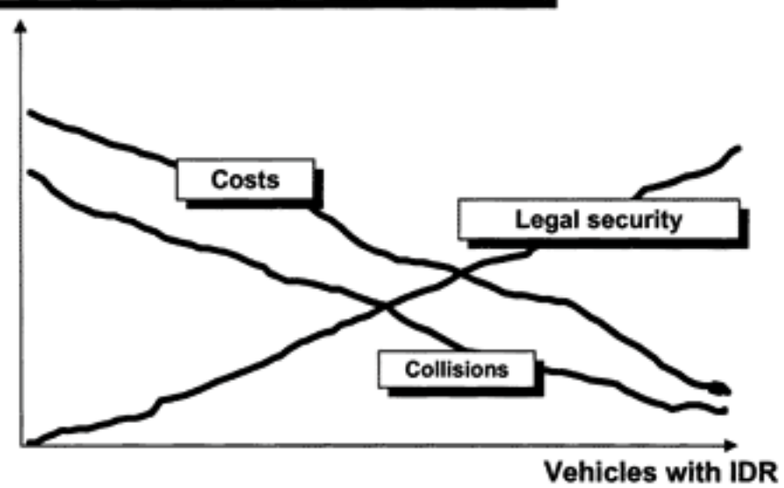
Contribution to Road Safety



- IDR's provide reliable objective information
- Reduction in collisions and severity of collisions

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Benefits to Fleets

- Improved driver behaviour (drivers knowing their actions would be accurately recorded)
- A reduction in and severity of accidents
- Reduction in operating costs
- Advantages to insurance companies and reduced premiums.
- Driver accountability improved. (the recording of status inputs such as horns, lights, brakes etc.)

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