



Project sAFE

After-Market eCall for Buses and Coaches

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- Findings from the sAFE study into buses and coaches
- Implications for aftermarket eCall



sAFE Study

- **Particular focus upon passenger counts and passenger risk**
- **Investigate the use of sensor data from the vehicle and the possible access to other databases to allow increased reliability and accuracy of metrics**
- **Analysis of the types of accidents and incidents involving buses and coaches in EU MS to inform potential triggering algorithms**

MT1

Vehicle Category Variance



OEM and Aftermarket Sensors



ADAS Feature	Automatic Cruise Control (ACC)
Supporting Connectivity	3G, 4G, Wi-Fi, GPS
Functional Safety Standard	ISO 26262 Part 2 for Commercial Vehicles SAE J1939
Safety Rating	ASIL B
Technical Solution (Product)	Radar and camera
Technical capabilities of product	
Cost per unit as extra	
Legislation	Mandatory from Nov 2015 EU Regulation 661/2009/EC
Purpose	Crash avoidance
Required Interfaces	V2I Ethernet BASE-T1 Radar sensors ACC application interfaces

5

Projekt sAFE | Activity 5 & 6

Images courtesy of Pixabay.com, Shuttlecock.com,





- Links to ticketing
- Seat/seat belt sensors
- Facial recognition
- CCTV
- Infrared beams
- Ultrasonic detectors
- Laser scanners
- Switching mats
- Piezoelectric mats
- Radar
- Weighing equipment
- Stereoscopic cameras



Automatic Passenger Counting Technology

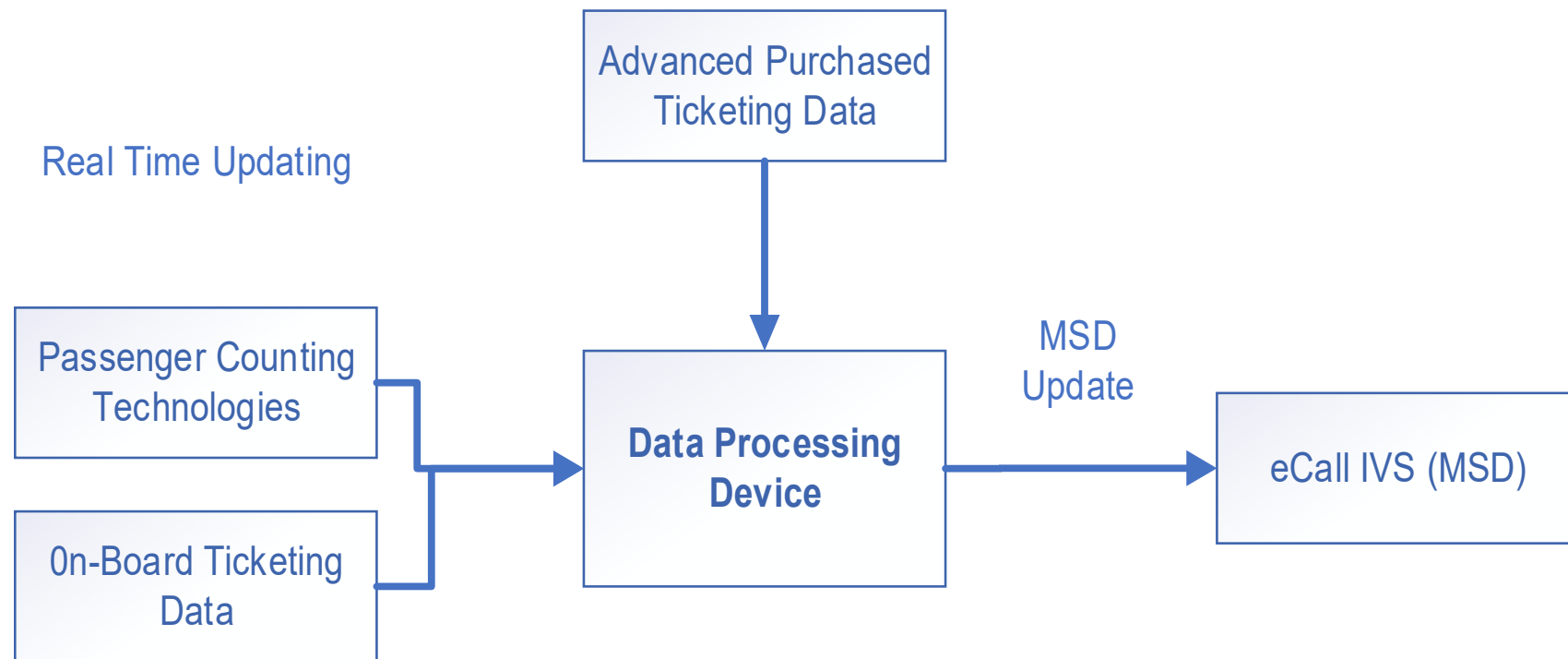


Diagram Courtesy of: CUT, Cyprus





- **Manual input of Data into MSD**
- **Automatic dynamic updating of passenger numbers**





Triggering of an automatic eCall



Collisions



- Collisions
- 2-3% of fatalities involve a bus or coach over the last 10 years
 - Of that small number, 17% involve a fatality to a bus or coach occupant
- Driver fatalities appear rarer still, unless you are a large vehicle driver
- No statistics on passengers in these vehicles, but these pose a significant risk



Of the 2-3% of fatalities involving a bus or coach ONLY 17% of this small number involve a fatality to a bus or coach occupant

	2007	2008	2009	2010	2011	2012
Heavy Goods Vehicles	16%	16%	14%	15%	14%	14%
Buses or Coaches	3%	3%	3%	3%	3%	2%

Source: CARE database, data available in May 2012

Member State	% of total fatalities over 10 years (1353)	Fleet size	% of overall EU fleet (770,000)
Denmark	11.45%	23,955	3.1%
Spain	10.56%	119,471	15.5%
UK	10.40%	92,498	12%
Spain	10.05%	64,915	8.4%
UK	9.2%	84,391	11%
Denmark	123	8,905	1.1%

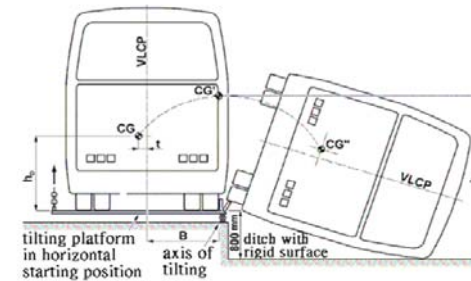
Table Error! No text of specified style in document. of bus and coach fatalities versus Member State fleet size



Rollovers and other Incidents



- Little statistical information available regarding bus and coach rollovers.
- Clear that risk to passengers is high



- Other Incidents:
 - Crime: Analysis of Major EU City
 - Illness

Crime Type	2015-16	2016-17	2017-18
Burglary	33	29	36
Criminal Damage	1121	1137	880
Drugs	292	190	176
Fraud	4	9	1
Other offences	288	242	192
Robbery	867	853	1170
Sexual offences	762	866	724
Thefts and associated offences	7089	6948	6421
Assaults	6412	6455	6157
Total	16,868	16,729	15,757



Summary



- **Passenger counting vital to the Emergency Service initial response**
 - Static Versus Integrated
- **Variable types of vehicles and uses making automatic collision parameters very difficult to calculate**
- **No natural on-board sensors for aftermarket eCall to link to, without OEM support.**
 - No airbag sensors
- **Issues with accurate automatic collision detection**
 - Risk to passengers inside a Bus and Coach relatively low

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- **Bus and coach occupant fatalities account for <1% of the overall total of road fatalities.**



- **Aftermarket eCall for Buses and Coaches**
 - Automatic Rollover Detection included
 - No automatic collision detection for aftermarket systems
 - Manual eCall functionality for both driver and passengers
 - Passenger numbers to form part of the MSD
- **Additional Elements**
 - Fuel type as part of MSD: Risk to Emergency Responders
 - Potential for fire detection linked to an automatic eCall: High Risk to Passengers

Thank you!



Questions?

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