

FI-07-03



## European Comision frontal impact accident analysis study - Initial results and way forward

David Richards on behalf of TRL, BAST,  
and LAB

Monday 7<sup>th</sup> December 2009



# Overview

- 1 Overview of project
- 2 Initial results – Task 1
- 3 Future work – Tasks 2, 3 & 4

# Objectives

- To perform an analysis of European accident data to ascertain the taxonomy of frontal impacts and quantify casualty target populations for potential changes to frontal impact legislation
- To perform an analysis of the performance of vehicles involved in impacts similar to Regulation 94 test to help understand how well this test represents real world accidents
- To perform an analysis of car to other vehicle impacts to help understand the nature of the compatibility problem, in particular the distribution of the mass ratio of different weight cars involved in vehicle-to-vehicle crashes

# Accident Databases

- European
  - Eurostat, CARE
- National
  - Great Britain (STATS19)
  - Germany
  - France (ONISR)
- Detailed
  - Great Britain: Co-operative Crash Injury Study (CCIS), Heavy Vehicle Crash Injury Study (HVCIS)
  - Germany: German In Depth Accident Study (GIDAS)
  - France: LAB in-depth accident database

# Tasks

1

Task 1: Determination of frontal impact taxonomy using European and national databases

2

Task 2: Determination of detailed frontal impact taxonomy using detailed accident databases

3

Task 3: Detailed case analysis to determine performance of current regulation 94 test

4

Task 4: Compatibility

# Task 1 breakdown

1

Changes over time

2

Identification of target populations

3

Severity proportions by vehicle registration year (drivers only)



## Data sources

- Eurostat
- CARE
- GB national data (STATS19)
- German national data
- French national data (ONISR)

# Limitations of Task 1

## Limitations of data sources

- There are a number of limitations of using these European and national datasets for this type of analysis
- European datasets
  - Eurostat
    - Only gives the total number of road traffic fatalities
  - CARE
    - Does not include German data
    - Only includes data for certain countries for certain years
    - Cannot identify object hit, or frontal impacts



# Limitations of Task 1

## Limitations of data sources

- There are a number of limitations of using these European and national datasets for this type of analysis
- National datasets
  - STATS19
    - Frontal impacts identified by first point of impact
    - Only contains accidents reported to the Police
  - German national data
    - Can only identify front-front and front-rear accidents
    - Can only identify object hit in accidents involving less than 3 vehicles
    - Requires vehicle mass to distinguish between LGVs and HGVs
  - French national data
    - First point of impact to the front includes areas of the side of the car
    - No consistent recording of LGVs
    - Can only identify object hit in accidents involving less than 3 vehicles

# Breakdown of Task 1

1

Changes over time

2

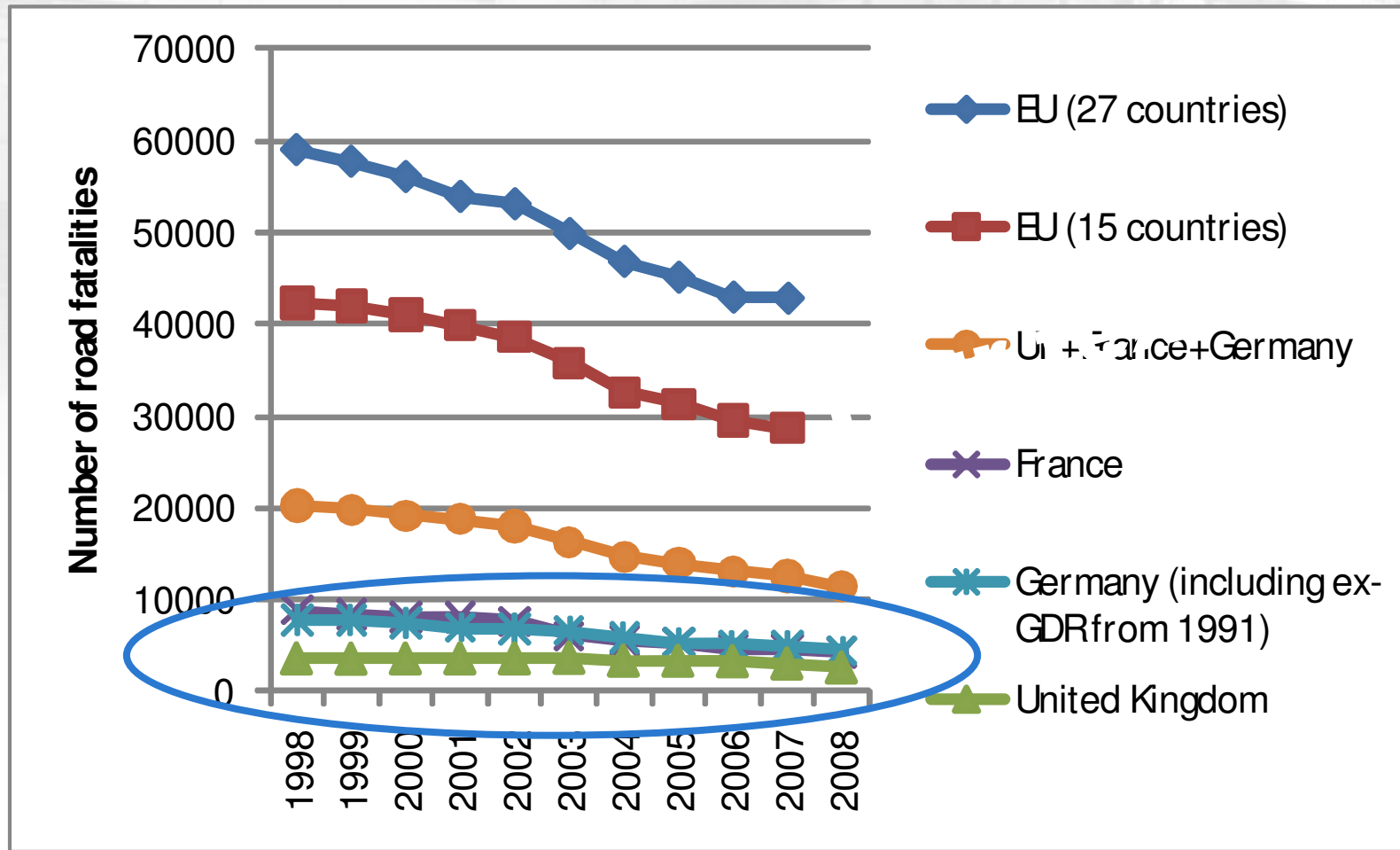
Identification of target populations

3

Severity proportions by vehicle registration year (drivers only)

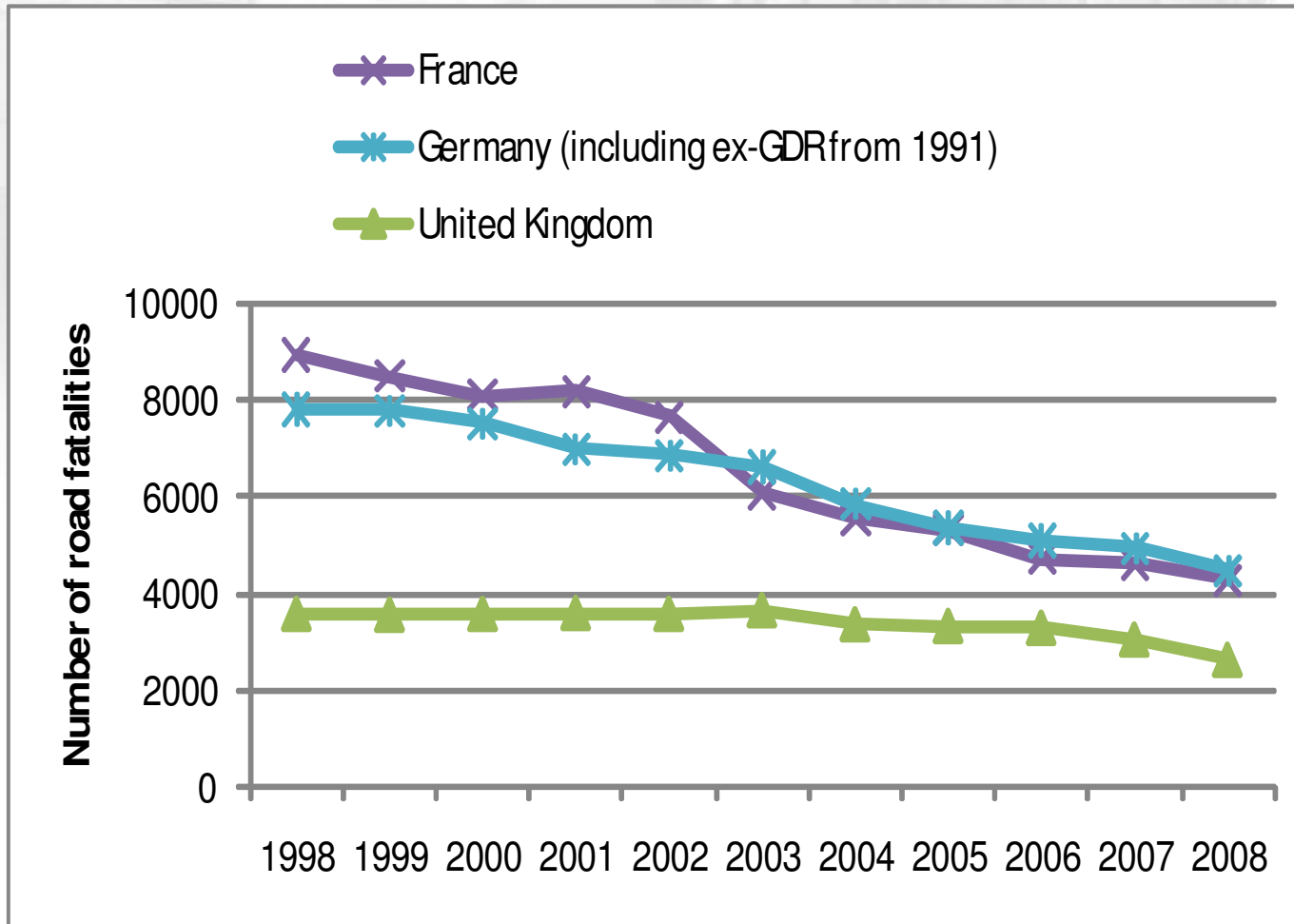
# Changes over time

Road casualties in EU 1998-2008 (Eurostat and national data)



# Changes over time

Road casualties in Germany, France, UK, 1998-2008  
(Eurostat and national data)



Populations  
(2008):

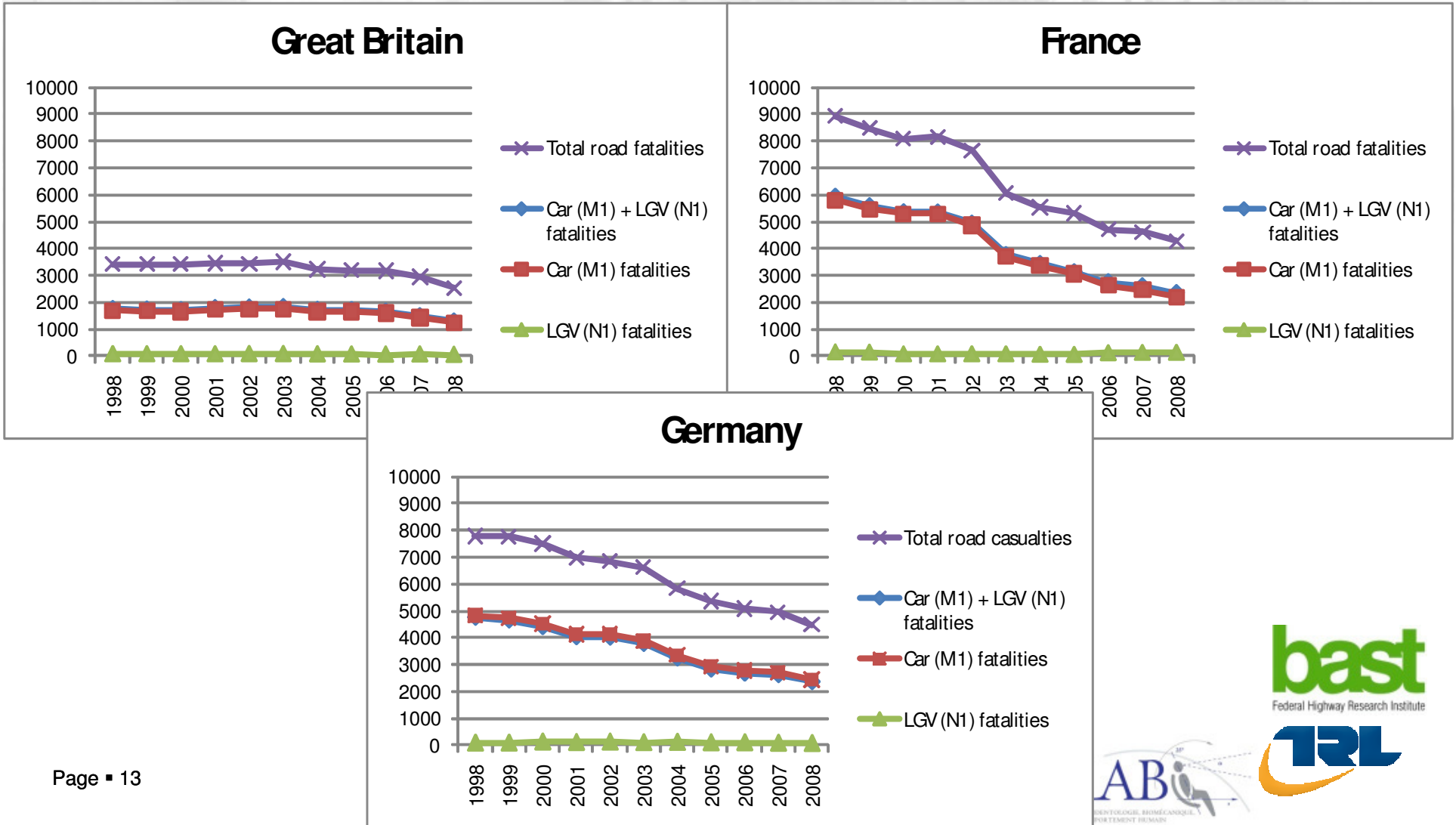
FR: 64 mil

DE: 82 mil

UK: 61 mil

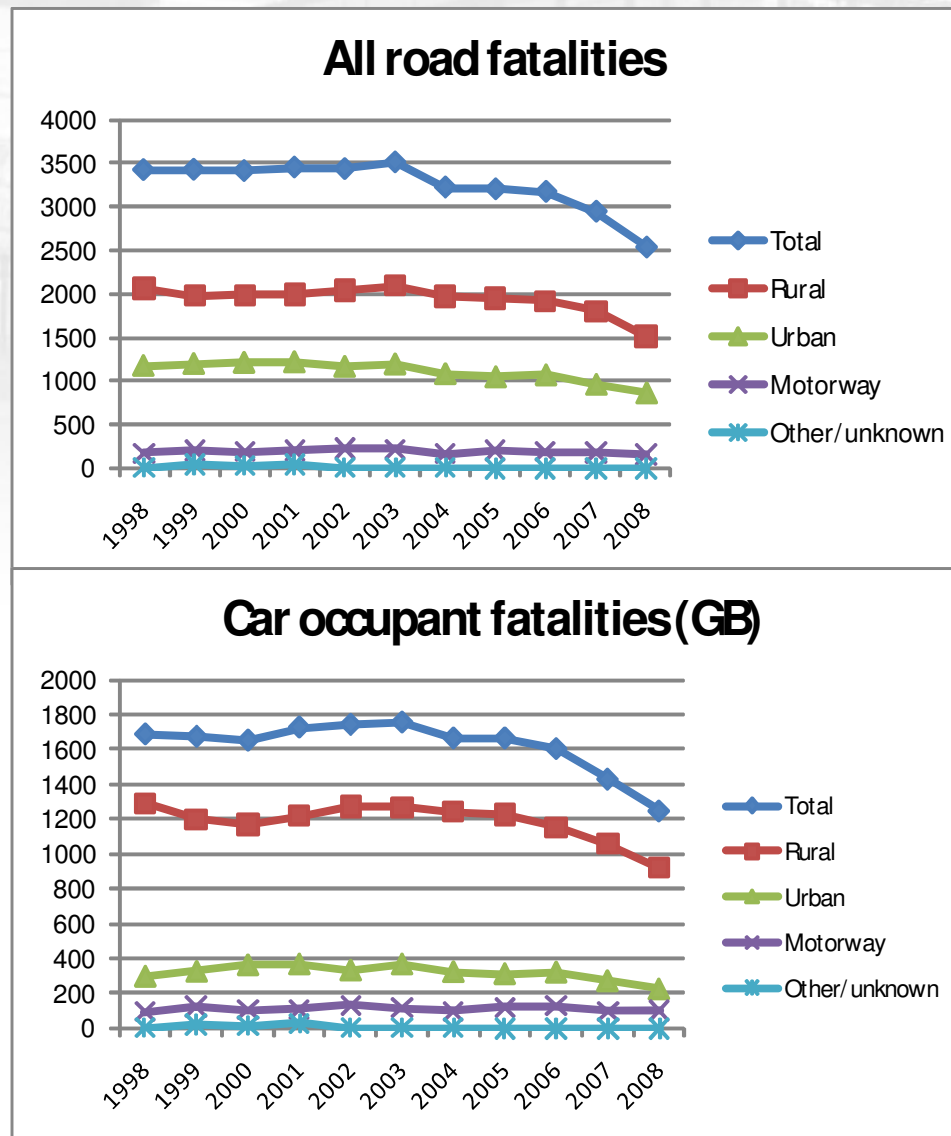
# Changes over time

Car (M1) and LGV (N1) occupant fatalities 1998-2008  
(CARE and national data)



# Changes over time

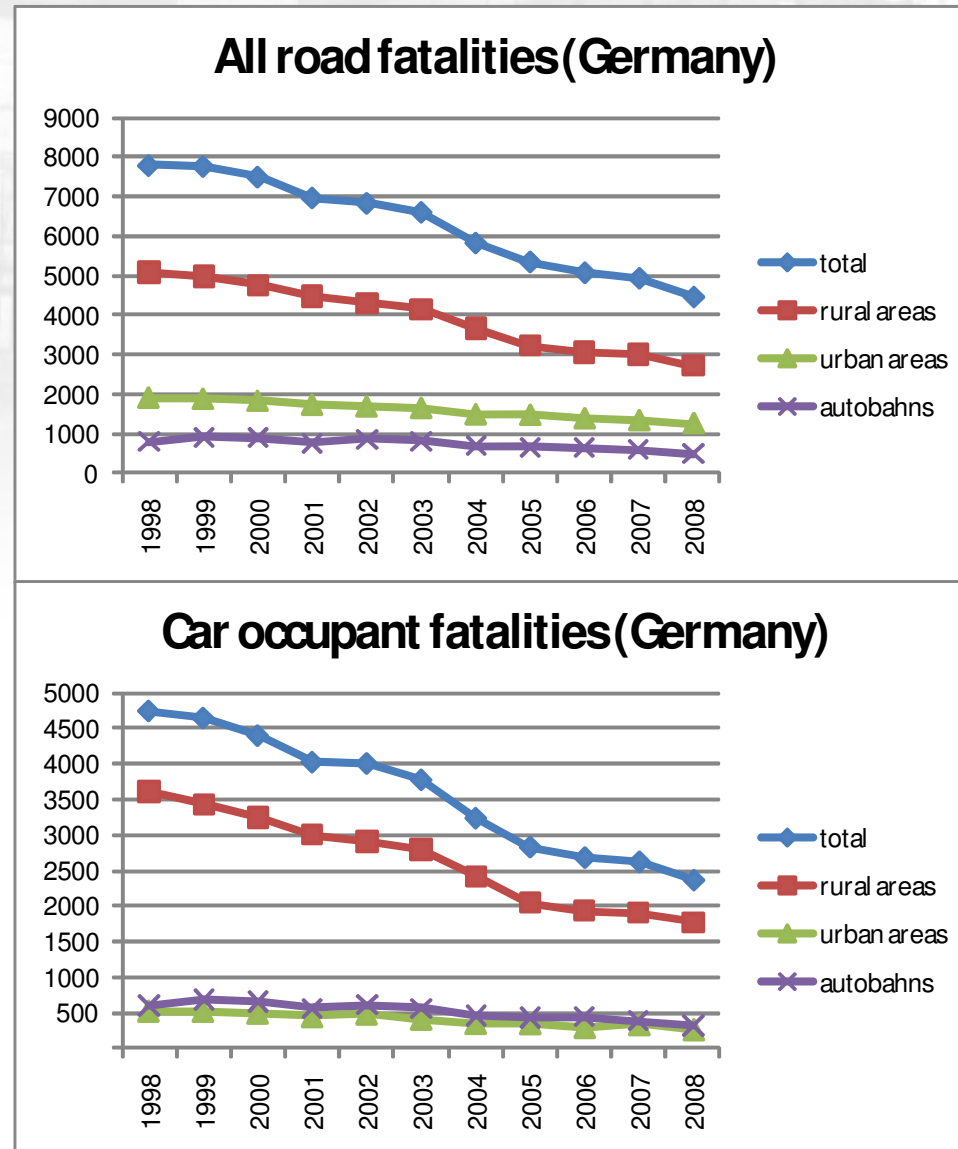
Urban / rural / motorway split – Great Britain 1998-2008  
(national data)





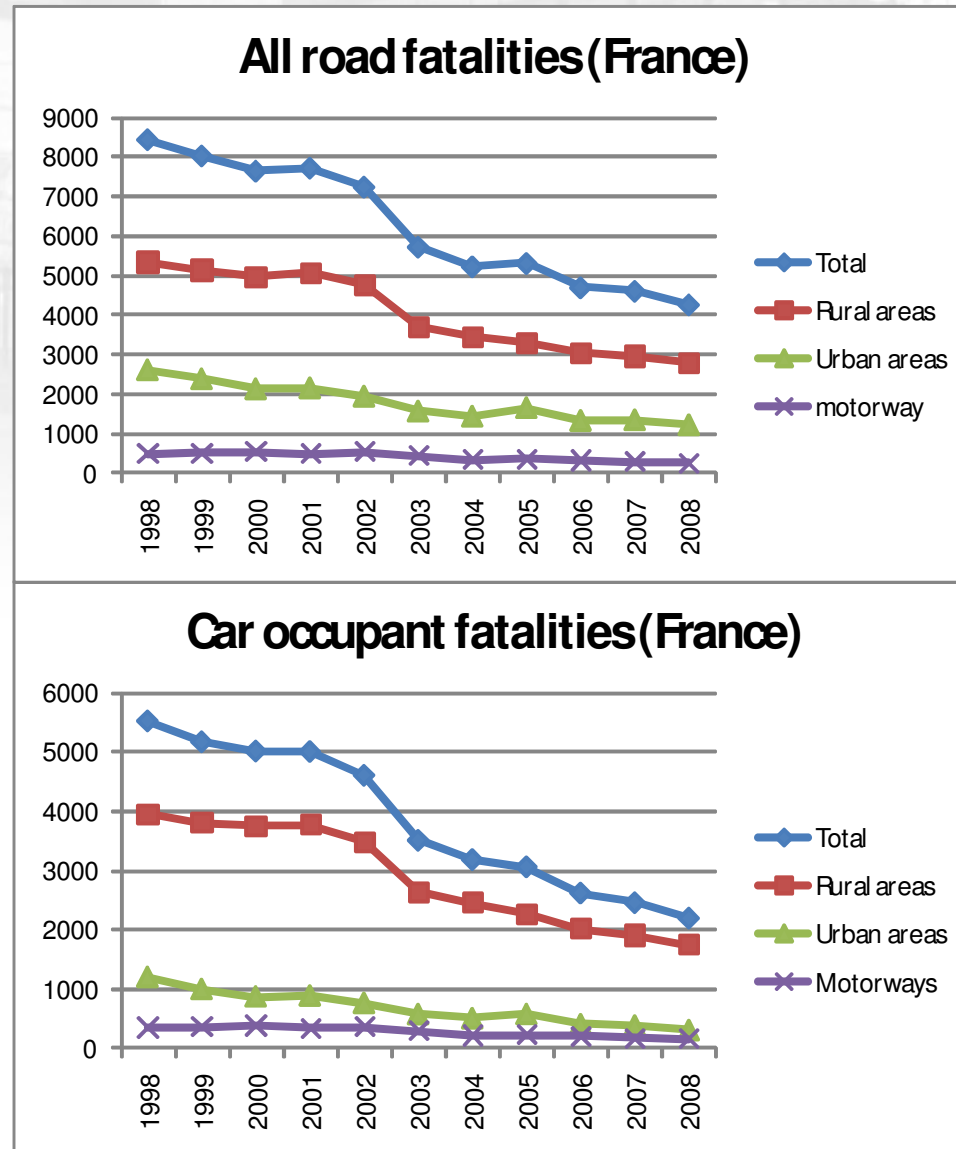
# Changes over time

Urban / rural / motorway split – Germany 1998-2008  
(national data)



# Changes over time

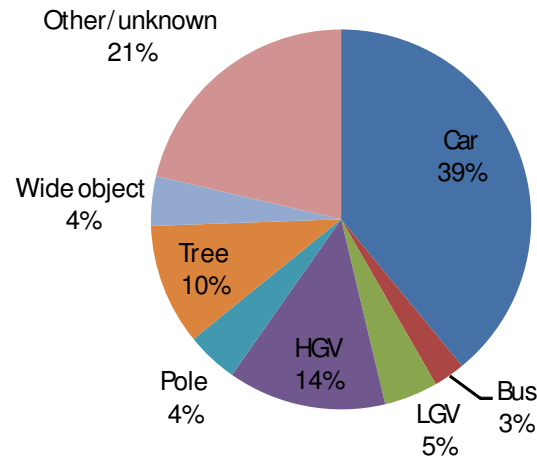
Urban / rural / motorway split – France 1998-2008  
(national data)



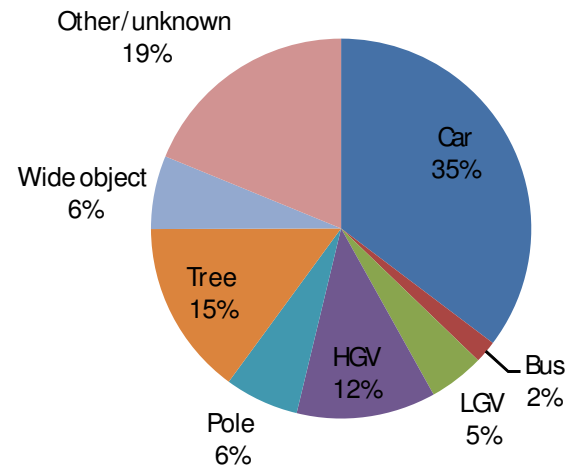
# Changes over time

Object hit – Great Britain 1998 and 2008  
(national data)

**Car occupant fatalities GB 1998 (N = 1686)**



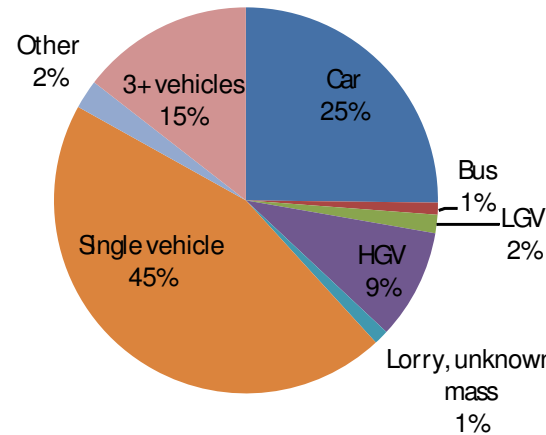
**Car occupant fatalities GB 2008 (N = 1250)**



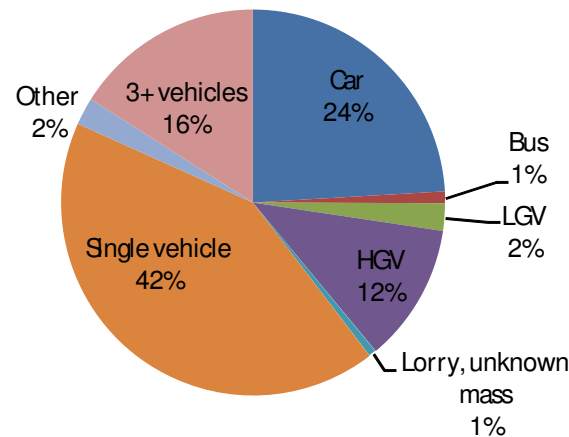
# Changes over time

Object hit – Germany 1998 and 2008  
(national data)

Car occupant fatalities Germany 1998 (N = 4741)

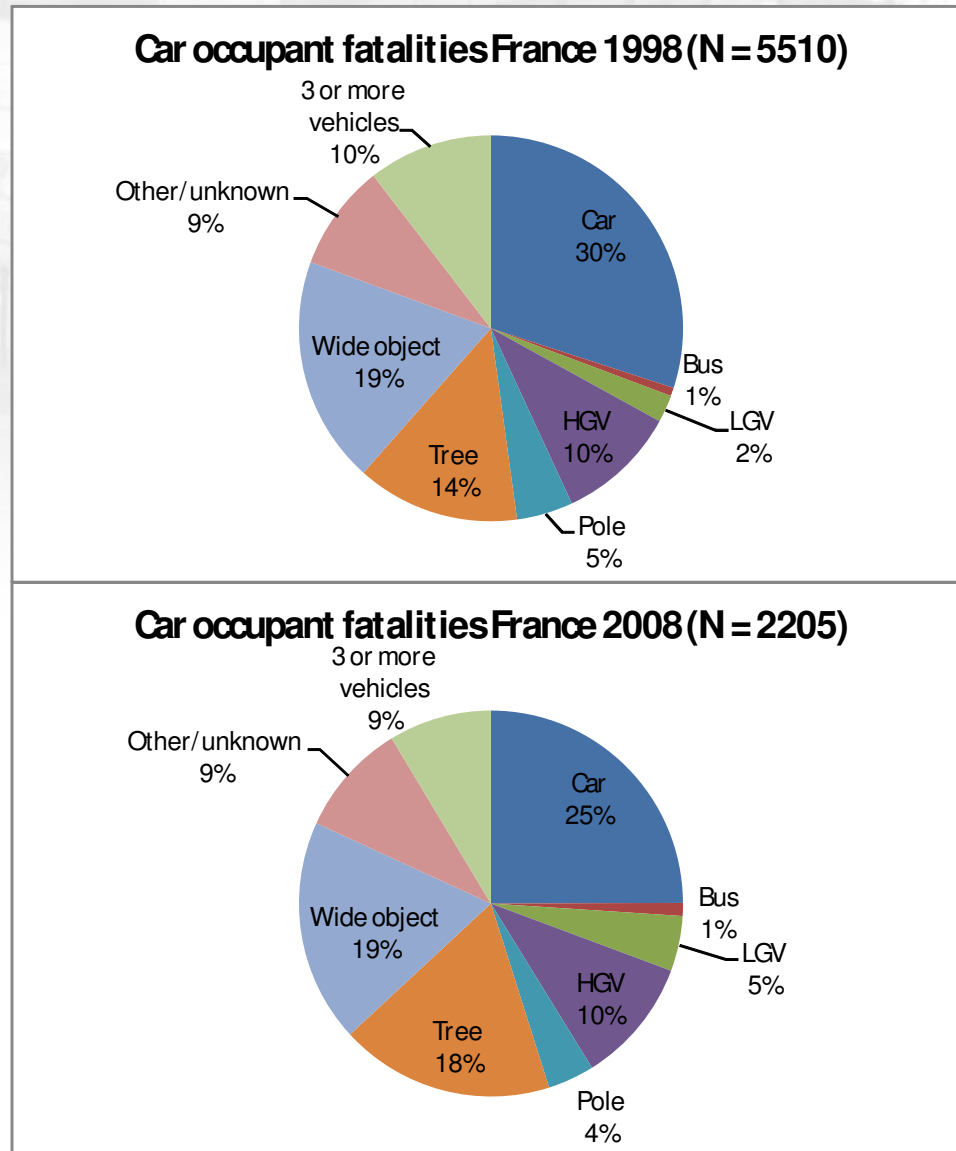


Car occupant fatalities Germany 2008 (N = 2368)



# Changes over time

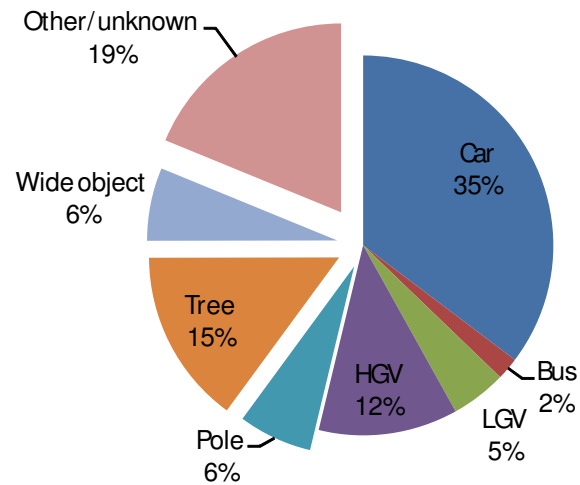
Object hit – France 1998 and 2008  
(national data)



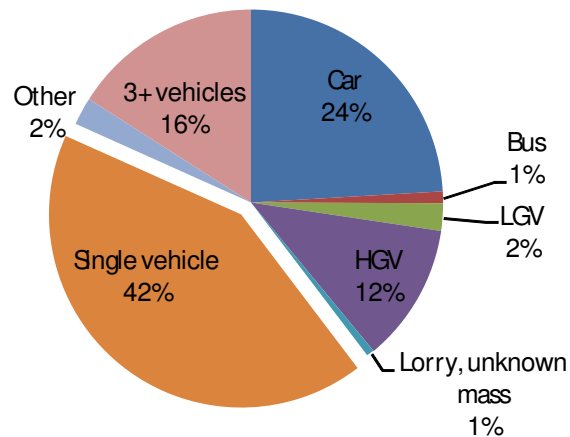
# Changes over time

## Object hit – GB, Germany, France (2008)

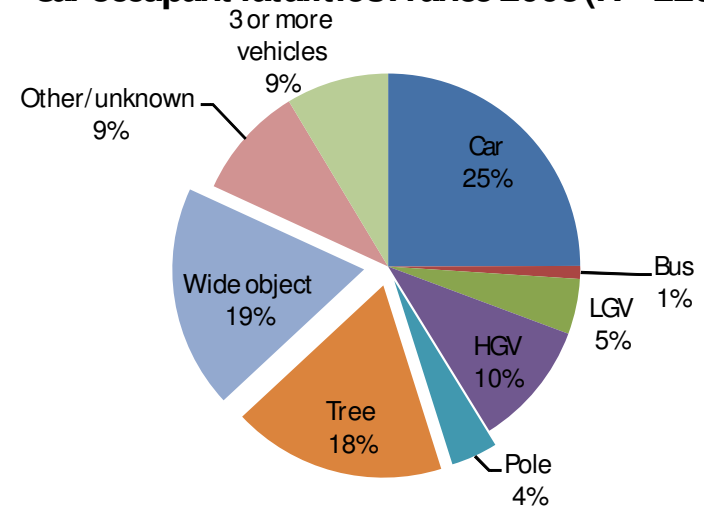
### Car occupant fatalities GB 2008 (N = 1250)



### Car occupant fatalities Germany 2008 (N = 2368)



### Car occupant fatalities France 2008 (N = 2205)





## Summary of findings

### ■ European data 1998-2007

- Over period 1998 – 2007 since frontal impact legislation was enforced, road accident fatalities in the EU27 have reduced by approximately 30%

### ■ National data 1998-2008

- GB, German and French data indicate that car occupant fatalities form approximately 49-53 % of all road accident fatalities and have reduced roughly in proportion with all road accident fatalities
- Fatality reduction in Germany and France is substantially higher than in GB over 1998-2008 period (26% in GB, 50% in Germany, 62% in France), however GB has fewest number of fatalities both absolute and per head of population
  - Road accident fatalities (2008): GB - 2538, France – 4275, Germany - 4477
  - Car occupant fatalities (2008): GB – 1250, France – 2205, Germany - 2368
- Number of N1 (LGV) fatalities are low compared with M1 fatalities (43 cf 1250 in GB, 135 cf 2205 in FR, 76 cf 2368 in DE)
- Majority (74-79%) of car occupant fatalities occur in accidents on rural roads
- Proportion of single vehicle accidents similar in the three countries (42%-46% of car fatalities)

# Task 1 results

1

Changes over time

2

Identification of target populations

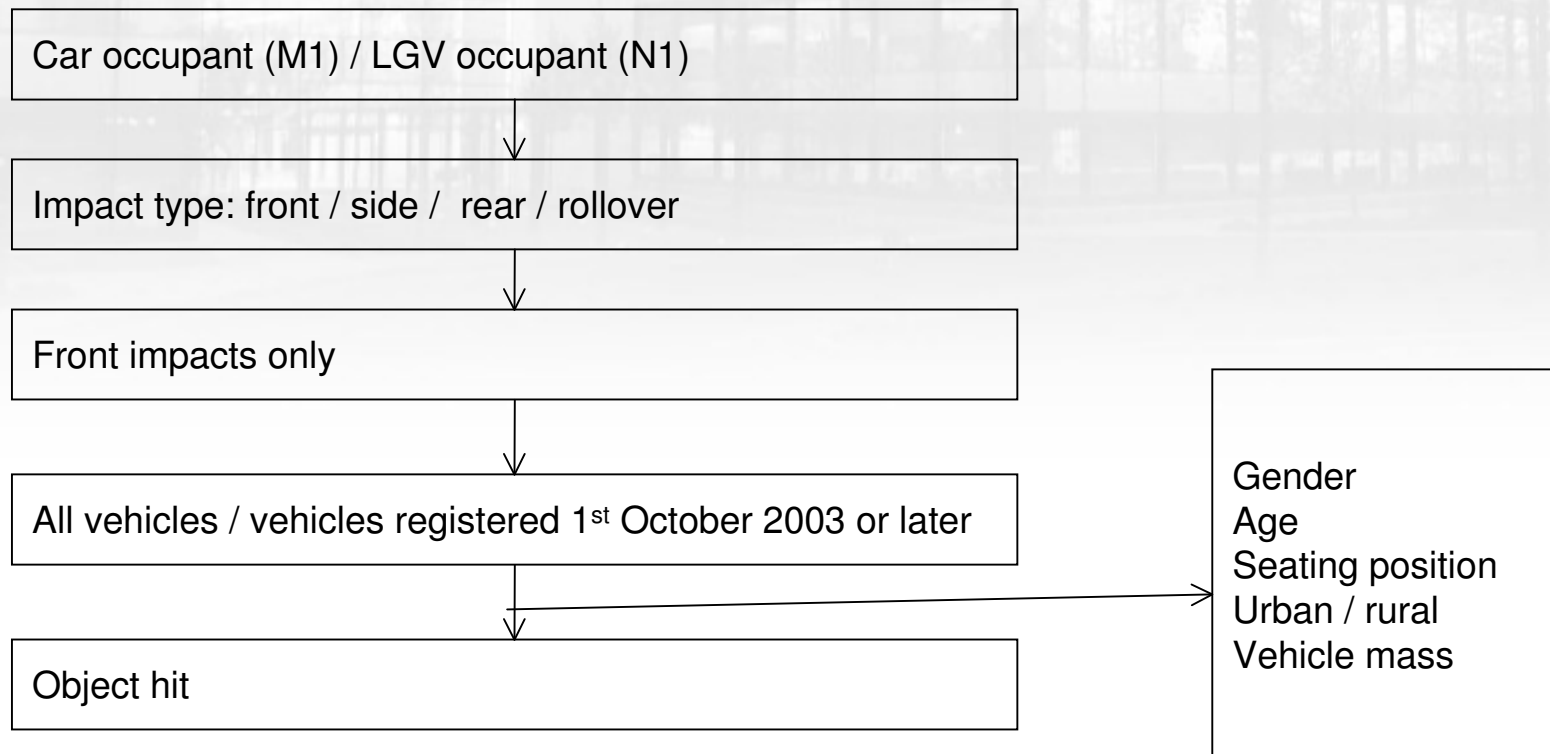
3

Severity proportions by vehicle registration year (drivers only)

# Identification of target populations

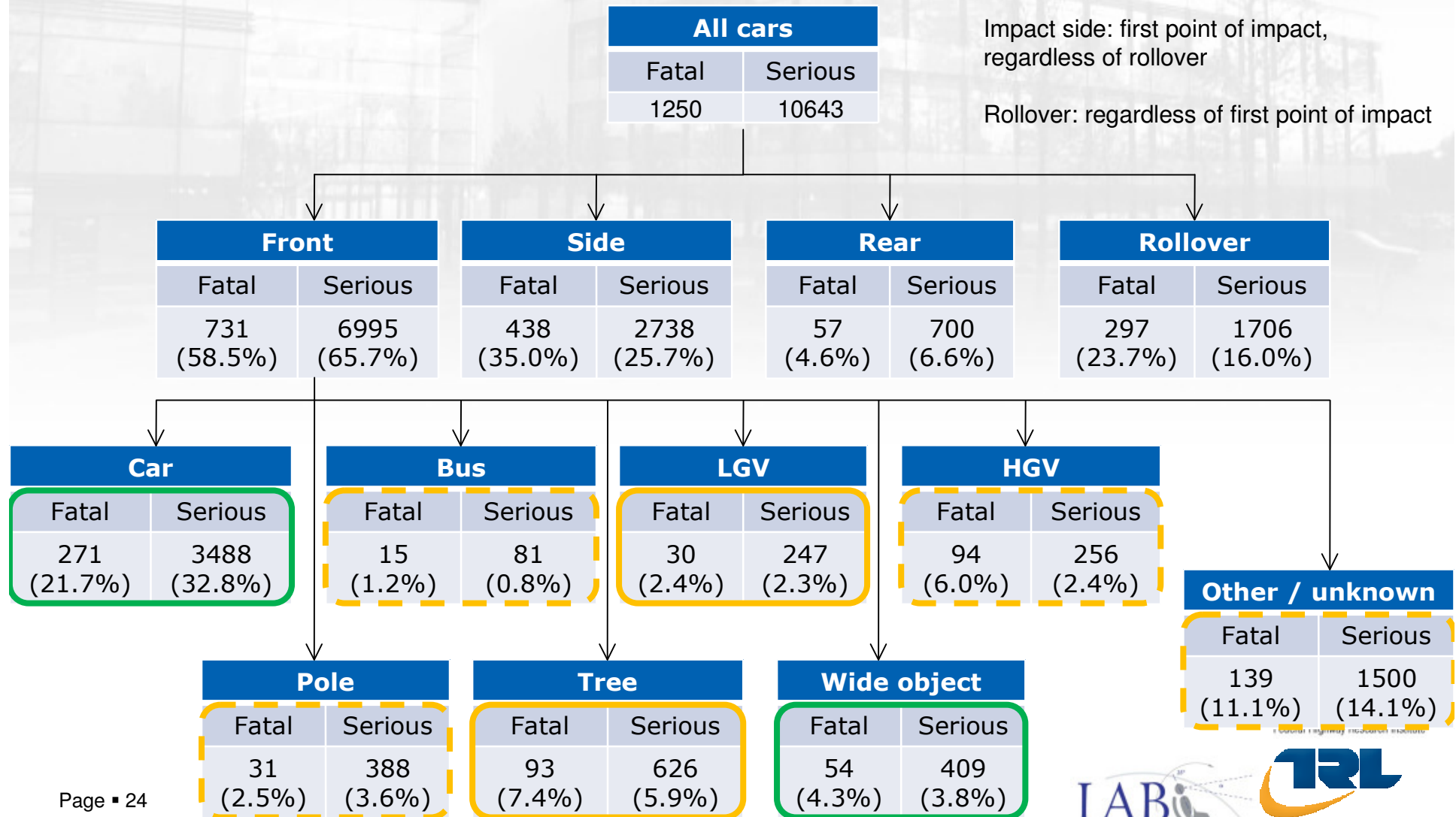
## Breakdown of casualty numbers

- Overview of breakdown. Each level gives number of fatal, serious, slight, and non-injured occupants



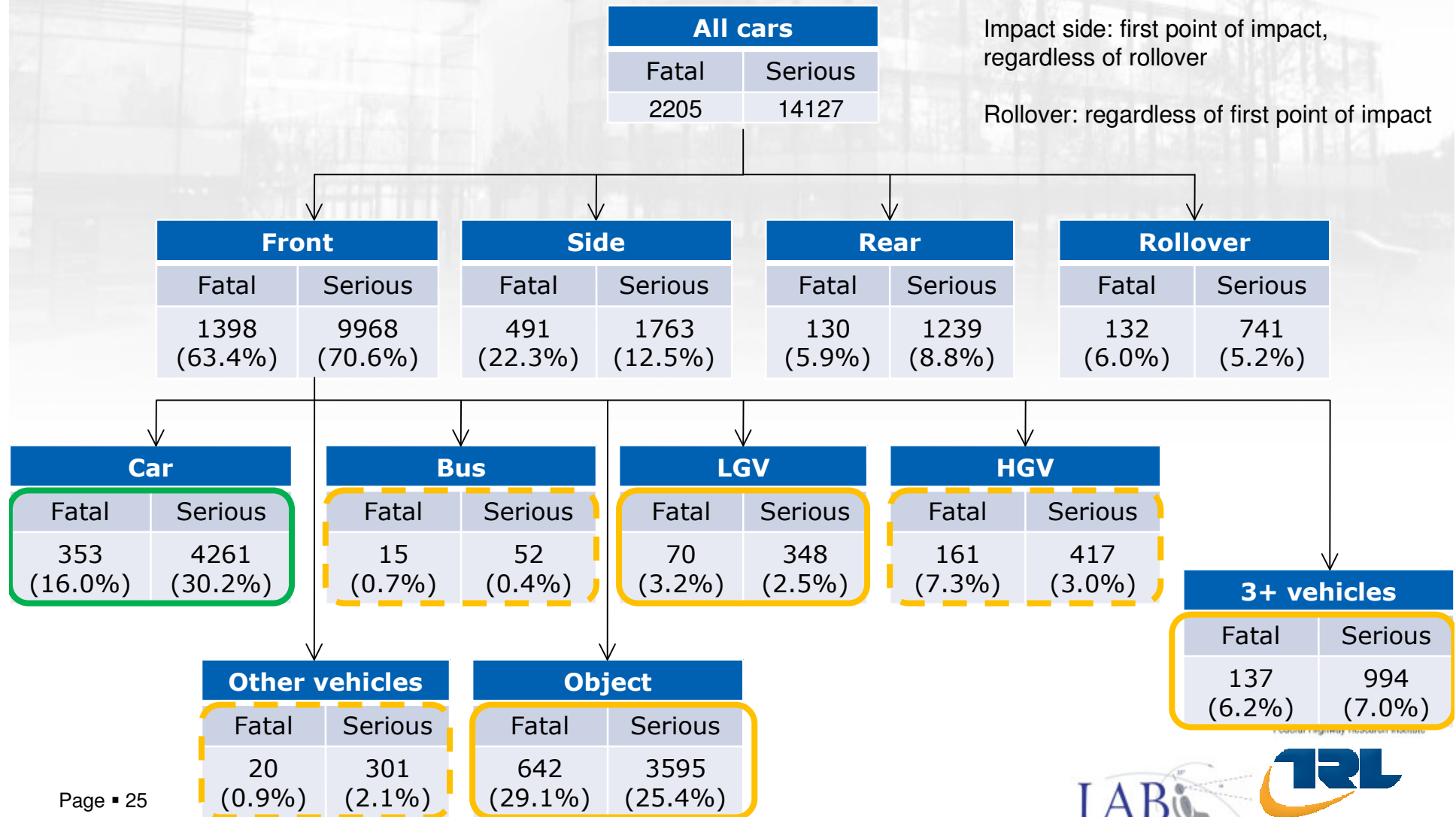
# Identification of target populations

Breakdown of casualty numbers, Great Britain, 2008, cars



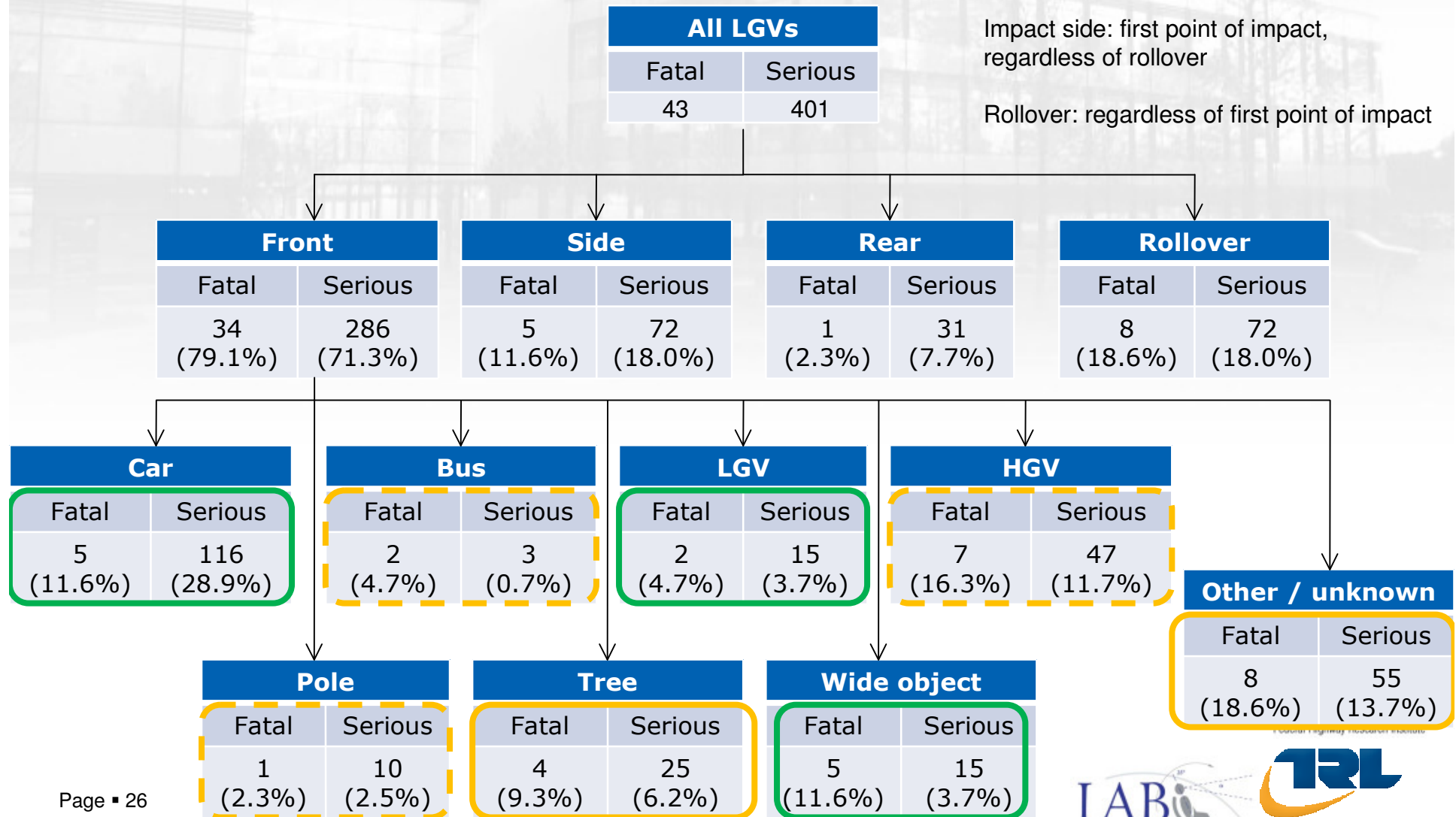
# Identification of target populations

Breakdown of casualty numbers, France, 2008, cars



# Identification of target populations

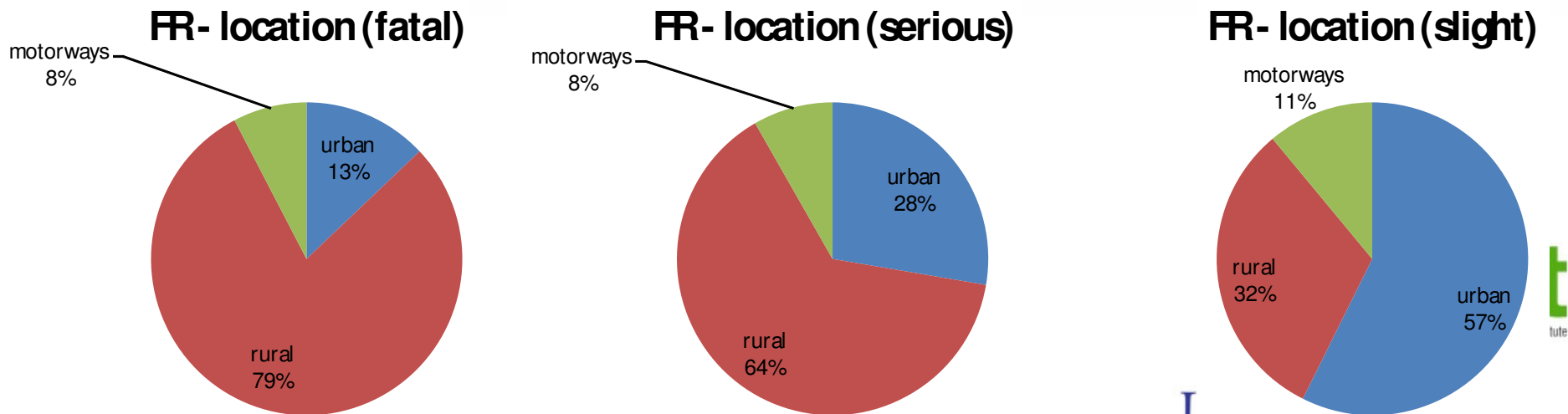
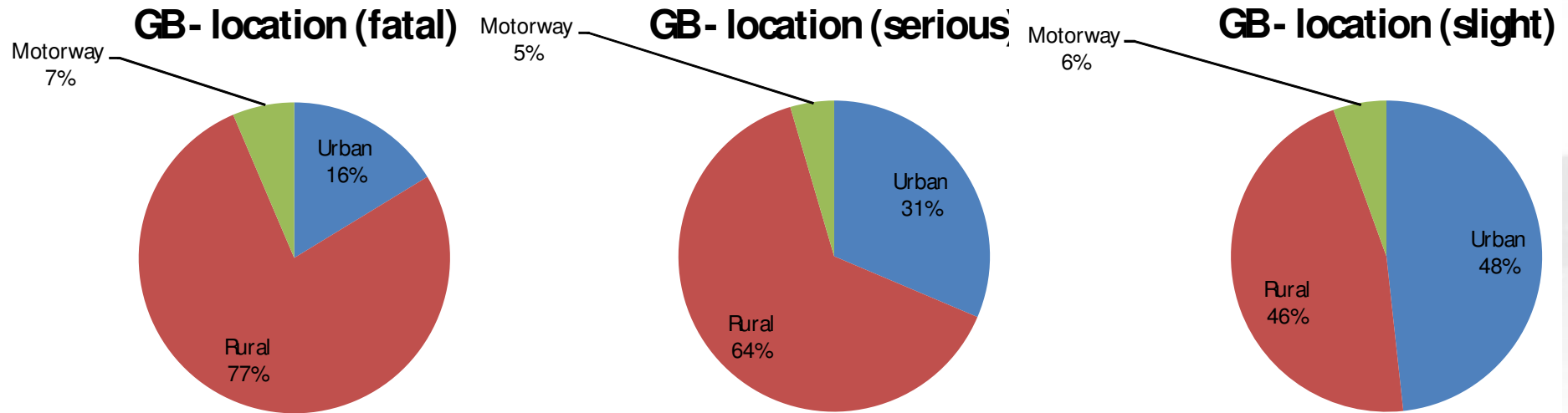
## Breakdown of casualty numbers, Great Britain, 2008, LGVs





# Identification of target populations

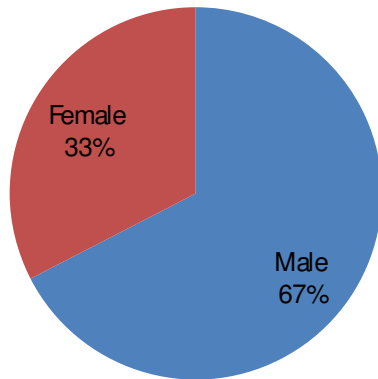
## Overview of Frontal impact dataset (2008)



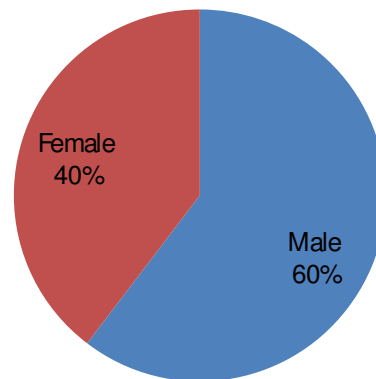
# Identification of target populations

## Overview of Frontal impact dataset (2008)

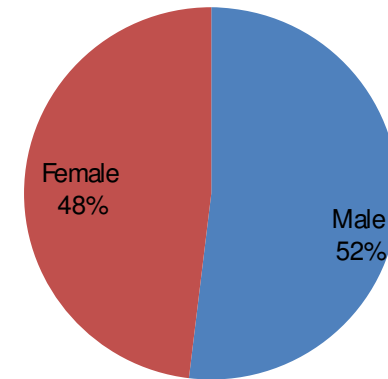
**GB- gender (fatal)**



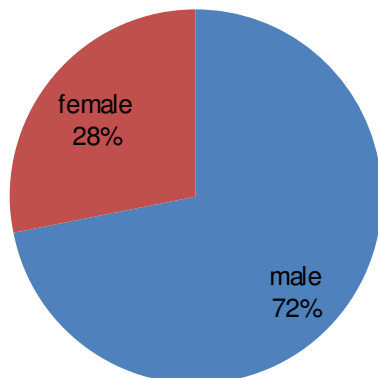
**GB- gender (serious)**



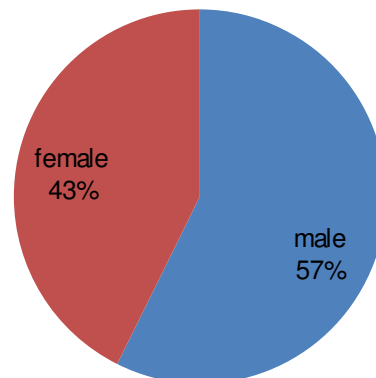
**GB- gender (slight)**



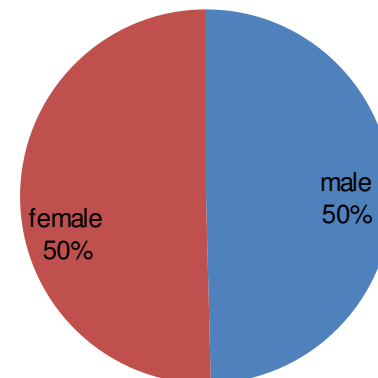
**FR- gender (fatal)**



**FR- gender (serious)**

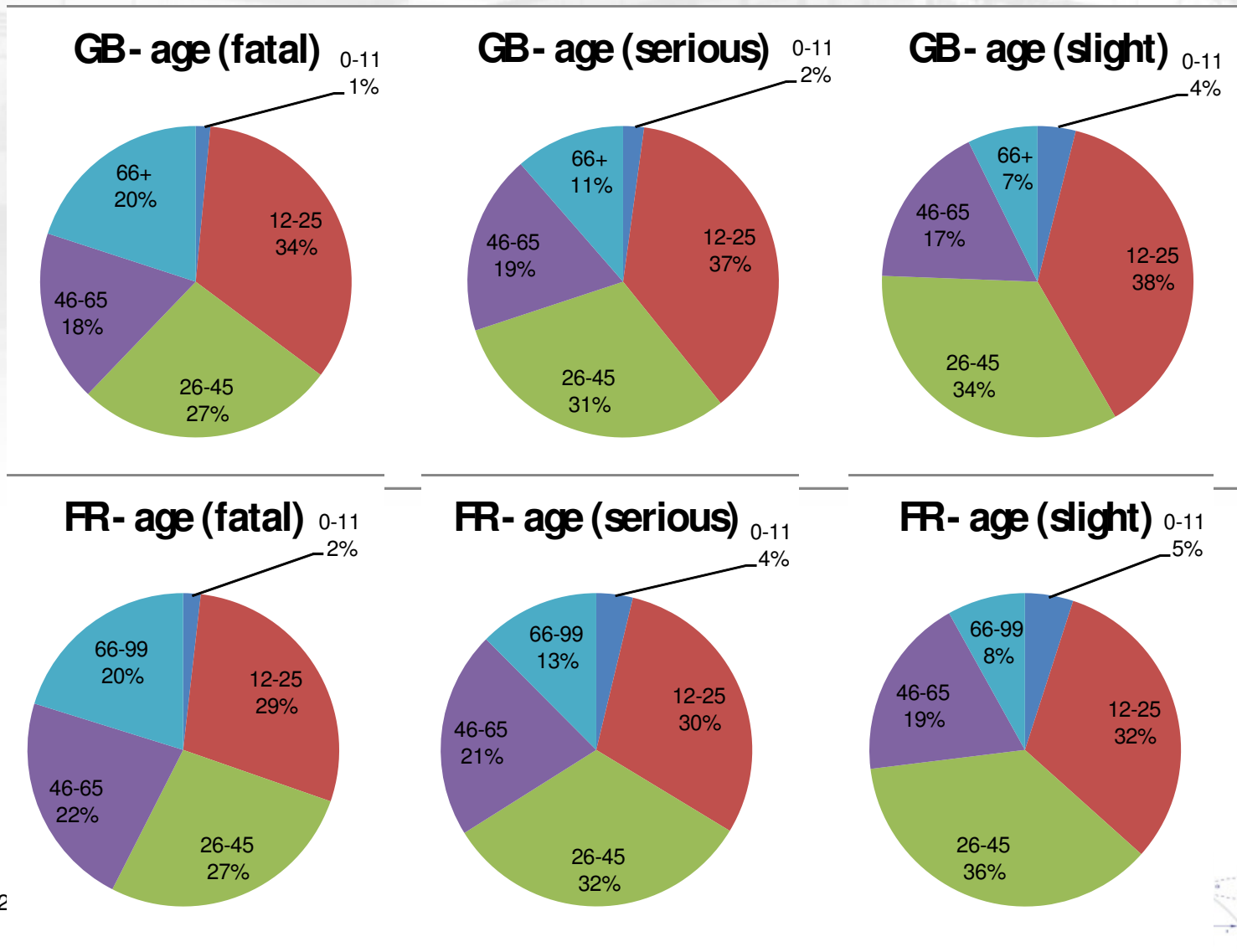


**FR- gender (slight)**



# Identification of target populations

## Overview of Frontal impact dataset (2008)



# Identification of target populations

Rear seat occupant

GB

FR

Position	All		
	Fatal	Serious	Slight
Driver	526 (72%)	4730 (67.6%)	43467 (67.7%)
FSP	142 (19.4%)	1458 (20.8%)	13307 (20.7%)
RSP	63 (8.6%)	807 (11.5%)	7386 (11.5%)

Position	All		
	Fatal	Serious	Slight
Driver	1064 (76%)	6826 (69%)	10397 (68%)
FSP	198 (14%)	1983 (20%)	3000 (20%)
RSP	136 (10%)	1146 (12%)	1824 (12%)

# Identification of target populations

Extension of scope  $2.5 \text{ t} < M1 < 3.5 \text{ t}$

GB

FR

Mass	All			Mass	All		
	Fatal	Serious	slight		Fatal	Serious	Slight
>2.5T	5 (13.2%)	29 (7.8%)	330 (9.9%)	>2.5T	0 (0%)	0 (0%)	0 (0%)
<=2.5T	33 (86.8%)	341 (92.2%)	3012 (90.1%)	<=2.5T	1056 (100%)	7454 (100%)	11574 (100%)
Unknown	693	6625	60834	Jnknown	342	2514	3704

# Identification of target populations

Frontal impacts target population, Great Britain

2008	All cars		Cars registered after 1 <sup>st</sup> October 2003	
	Number	Proportion	Number	Proportion
Fatal	731	1.0%	242	1.0%
Serious	6995	9.7%	2134	8.8%
Slight	64176	89.3%	21870	90.2%

- Estimating target population
  - Fatal and serious casualty numbers from 2008
- Adjusting target population
  - Estimate of number of casualties once all cars in the fleet are R94 compliant
    - Assumes total number of casualties doesn't change
    - Assumes severity proportion is the same as for cars registered after 1<sup>st</sup> October 2003

# Identification of target populations

Adjustment of target population for non-compliant R94 vehicles, Great Britain

2008	All cars		Cars registered after 1 <sup>st</sup> October 2003	
	Number	Proportion	Number	Proportion
Fatal	731	1.0%	242	1.0%
Serious	6995	9.7%	2134	8.8%
Slight	64176	89.3%	21870	90.2%

	Target population	
	Adjusted	2008
Fatal	718 (98% of 2008)	731
Serious	6328 (90% of 2008)	6995

# Identification of target populations

Adjustment of target population for non-compliant R94 vehicles, France

2008	All cars		Cars registered after 1 <sup>st</sup> October 2003	
	Number	Proportion	Number	Proportion
Fatal	1398	5.2%	270	4.2%
Serious	9968	37.4%	2143	33.3%
Slight	15278	57.3%	4013	62.4%

	Target population	
	Adjusted	2008
Fatal	1119 (80% of 2008)	1398
Serious	8885 (89% of 2008)	9968



# Identification of target populations

Target populations

Frontal impacts, car occupants, Great Britain

Fatal			Serious		
Object hit	Adjusted	2008	Object hit	Adjusted	2008
Car	266	271	Car	3139	3488
Bus	15	15	Bus	73	81
LGV	29	30	LGV	222	247
HGV	92	94	HGV	230	256
Pole	30	31	Pole	349	388
Tree	91	93	Tree	563	626
Wide object	53	54	Wide object	368	409
Other/unknown	136	139	Other/unknown	1350	1500

# Identification of target populations

Target populations  
Frontal impacts, car occupants, France

Fatal			Serious		
Object hit	Adjusted	2008	Object hit	Adjusted	2008
Car	282	353	Car	3792	4261
Bus	12	15	Bus	46	52
LGV	56	70	LGV	310	348
HGV	129	161	HGV	371	417
Other vehicles	16	20	Other vehicles	268	301
3+ vehicles	110	137	3+ vehicles	885	994
Object	514	642	Object	3200	3595

# Identification of target populations

Target populations as % of all car casualties

## Great Britain

Severity	2008			Adjusted		
	Min	Max1	Max2	Min	Max1	Max2
Fatal	325 (26%)	448 (36%)	727 (58%)	319	439	712
Serious	3897 (37%)	4770 (45%)	6995 (66%)	3507	4293	6296

## France

Severity	2008			Adjusted		
	Min	Max1	Max2	Min	Max1	Max2
Fatal	353 (16%)	1202 (55%)	1398 (63%)	282	962	1118
Serious	4261 (30%)	9198 (65%)	9968 (71%)	3792	8186	8872

Min =

Max1 =  +

Max2 =  +  +



# Summary of findings

- Identification of target populations
  - Only very approximate indications of target population can be obtained from national data
  - Size of LGV (N1) population relatively small (<2% of road fatalities) compared to cars (M1) (~50% of road fatalities)
  - Front impacts 59-63% of car fatalities (731 in GB, 1398 in FR)
  - Car-car frontal impacts 16-22% of car fatalities (271 in GB, 353 in FR)
  - Rear seat occupants 9-10% of fatalities in frontal impacts
  - 2.5 t <M1< 3.5 t 13% of fatalities for GB
  - Adjustment for non-compliant R94 vehicles
    - GB: 98% of fatalities, 90% of serious
    - FR: 80% of fatalities, 89% of serious

# Task 1 results

1

Changes over time

2

Identification of target populations

3

Severity proportions by vehicle registration year (drivers only)

# Methodology

- “Fatal proportion” is defined as the proportion of fatally injured car drivers, to the total number of car driver casualties

$$fatal\ proportion = \frac{fatal}{fatal + serious + slight}$$

- “KSI proportion” is defined as the proportion of killed and seriously injured drivers, to the total number of car driver casualties

$$KSI\ proportion = \frac{fatal + serious}{fatal + serious + slight}$$

- Limitations

- Results cannot be compared directly between different countries because of various reasons, e.g. recording of slight and serious casualties by Police forces differs
- Does not take account of confounding factors
  - Type of driver, mass of vehicle, type of vehicle, driver age and gender, impact severity

# Severity proportion

## Fatal proportion of car drivers, 2005-2008

### Front impacts, car drivers only

	GB	DE	FR - all	FR - belted
Pre Oct 1994	0.017	-		
Oct 1994 – Sep 1998	0.012	-	0.058	0.047
Oct 1998 – Sep 2003	0.010	-	0.048	0.038
Oct 2003 or later	0.009	-	0.044	0.038*
Unknown	0.009	-		

### Front-front, car-car impacts, car drivers only

	GB	DE	FR - all	FR - belted
Pre Oct 1994	0.021	0.039		
Oct 1994 – Sep 1998	0.010	0.028	0.042	0.037
Oct 1998 – Sep 2003	0.008	0.021	0.025	0.022
Oct 2003 or later	0.006	0.013	0.022*	0.021*
Unknown	0.007	0.031		

# Severity proportion

## KSI proportion of car drivers, 2005-2008

### Front impacts, car drivers only

	GB	DE	FR - all	FR - belted
Pre Oct 1994	0.136	-		
Oct 1994 – Sep 1998	0.109	-	0.432	0.416
Oct 1998 – Sep 2003	0.097	-	0.390	0.378
Oct 2003 or later	0.099	-	0.394*	0.389
Unknown	0.118	-		

### Front-front, car-car impacts, car drivers only

	GB	DE	FR - all	FR - belted
Pre Oct 1994	0.159	0.336		
Oct 1994 – Sep 1998	0.115	0.292	0.423	0.420
Oct 1998 – Sep 2003	0.100	0.265	0.347	0.347
Oct 2003 or later	0.096*	0.228	0.368	0.371
Unknown	0.131	0.285		



# Severity proportion

Severity proportion of car drivers, Front-front car impacts, 2005-2008, Great Britain

Fatal proportion (fatal / all casualties)		Car hit			
Car containing casualty	Pre Oct 1994	Oct 1994 – Sep 1998	Oct 1998 – Sep 2003	Oct 2003 or later	Unknown
Pre Oct 1994	0.009*	0.018	0.018	0.031	0.026
Oct 1994 – Sep 1998	0.008	0.007*	0.010	0.019	0.007
Oct 1998 – Sep 2003	0.007	0.008	0.009*	0.010	0.006
Oct 2003 or later	0.006	0.005	0.003	0.008*	0.007
Unknown	0.006	0.006	0.007	0.009	0.008

KSI proportion (KSI / all casualties)		Car hit			
Car containing casualty	Pre Oct 1994	Oct 1994 – Sep 1998	Oct 1998 – Sep 2003	Oct 2003 or later	Unknown
Pre Oct 1994	0.136	0.161	0.155	0.195	0.154
Oct 1994 – Sep 1998	0.099	0.095	0.121	0.142	0.111
Oct 1998 – Sep 2003	0.085	0.091	0.103*	0.118	0.097
Oct 2003 or later	0.084	0.095	0.087	0.114	0.096
Unknown	0.113	0.122	0.123	0.153	0.135

# Severity proportion

Severity proportion of car drivers, Front-front car impacts, 2005-2008, Germany

		Fatal proportion (fatal / all casualties)				Car hit
		Pre Oct 1994	Oct 1994 – Sep 1998	Oct 1998 – Sep 2003	Oct 2003 or later	Unknown
Car containing casualty	Pre Oct 1994	0.028	0.034	0.048	0.055	
	Oct 1994 – Sep 1998	0.013	0.022	0.037	0.047	
	Oct 1998 – Sep 2003	0.013	0.016	0.027	0.031	
	Oct 2003 or later	0.003	0.009	0.012	0.033	
	Unknown					

		KSI proportion (KSI / all casualties)				Car hit
		Pre Oct 1994	Oct 1994 – Sep 1998	Oct 1998 – Sep 2003	Oct 2003 or later	Unknown
Car containing casualty	Pre Oct 1994					
	Oct 1994 – Sep 1998		0.280*	0.324	0.355	
	Oct 1998 – Sep 2003		0.255	0.289	0.304	
	Oct 2003 or later		0.234	0.246	0.272	
	Unknown					

# Severity proportion

Severity proportion of car drivers, Front-front car impacts, 2005-2008, France

		Fatal proportion (fatal / all casualties)				Car hit	
		Pre Oct 1994	Oct 1994 – Sep 1998	Oct 1998 – Sep 2003	Oct 2003 or later	Unknown	
Car containing casualty	Pre Oct 1994	0.033*	0.062	0.062	0.071		
	Oct 1994 – Sep 1998	0.031	0.032*	0.049	0.060		
	Oct 1998 – Sep 2003	0.017	0.019	0.029*	0.039		
	Oct 2003 or later	0.012	0.015	0.024	0.032*		
	Unknown	0.028	0.053	0.068	0.105		

		KSI proportion (KSI / all casualties)				Car hit	
		Pre Oct 1994	Oct 1994 – Sep 1998	Oct 1998 – Sep 2003	Oct 2003 or later	Unknown	
Car containing casualty	Pre Oct 1994	0.432*	0.468	0.471	0.491		
	Oct 1994 – Sep 1998	0.373	0.414	0.436	0.471		
	Oct 1998 – Sep 2003	0.314	0.345	0.338	0.389		
	Oct 2003 or later	0.315	0.355	0.362	0.417		
	Unknown	0.500	0.579	0.551	0.632		

# Severity proportion

Severity proportion of car drivers, Front-front car impacts, 2005-2008, France (belted only)

		Fatal proportion (fatal / all casualties)				Car hit	
		Pre Oct 1994	Oct 1994 – Sep 1998	Oct 1998 – Sep 2003	Oct 2003 or later	Unknown	
Car containing casualty	Pre Oct 1994	0.028*	0.057	0.052	0.061		
	Oct 1994 – Sep 1998	0.028	0.025*	0.045	0.052		
	Oct 1998 – Sep 2003	0.014	0.019	0.024	0.036		
	Oct 2003 or later	0.011	0.016	0.022	0.032		
	Unknown	0.025	0.060	0.065	0.075		

		KSI proportion (KSI / all casualties)				Car hit	
		Pre Oct 1994	Oct 1994 – Sep 1998	Oct 1998 – Sep 2003	Oct 2003 or later	Unknown	
Car containing casualty	Pre Oct 1994	0.425*	0.461	0.460	0.480		
	Oct 1994 – Sep 1998	0.365	0.413	0.436	0.465		
	Oct 1998 – Sep 2003	0.311	0.350	0.335	0.391		
	Oct 2003 or later	0.317	0.368	0.366	0.414		
	Unknown	0.471	0.583	0.553	0.625		

## Summary of findings

- For all frontal impacts and the subset of frontal car-to-car impacts when the age of the partner car is not taken into account the severity proportion for fatalities and KSI is significantly lower for new cars (1<sup>st</sup> Oct 2003+) compared to old cars (1994-1998) indicating that newer cars are safer than older cars
  - However, significant increase in KSI proportion between new cars (1<sup>st</sup> Oct 2003+) and mid-age cars (1998-2003) in GB for all frontal impacts and France for all frontal and car-to-car for belted occupants
- For car-to-car frontal impacts when age of partner vehicle taken into account, there are some significant increases in severity proportion for new-new (1<sup>st</sup> Oct 2003+) cars compared to old-old cars (1994-1998)
  - Possible indication that safety in car-to-car impacts has not improved; however many limitations to study, e.g. confounding factors

## Task 2 – Determination of detailed frontal impact taxonomy using detailed accident databases

- Continue development of frontal impact taxonomy and identification of target populations for M1 and N1
  - Belt use, impact configuration (e.g. overlap) and severity, vehicle intrusion
  - Determine injuries and injury mechanisms of casualties and relationship to impact type, e.g. are restraint induced injuries more prevalent in full-width type impacts

Note: Analysis with use vehicles registered 2000+ to ensure results valid of Regulation 94 compliant vehicles

## Task 3 – Detailed case analysis to determine performance of current regulation 94 test

- Detailed case analysis of vehicles which were in impacts similar to the Regulation 94 test to determine how well Regulation 94 represents real-world accidents
  - Select accidents with a similar configuration to the Regulation 94 test
  - Review the structural performance of the vehicle and injuries received by the occupants against that expected from test experience

Note: This analysis will only be performed for GB data



## Task 4 - Compatibility

- Perform analysis to determine the importance of compatibility in frontal impacts, e.g. help quantify possible benefit of equalising test severity
  - National data
    - Determine partner protection (aggressivity) ratio for different classes of impact partners (e.g. SUVs, small cars, etc) by comparison of severity of casualties in two vehicles
    - Determine severity proportion for vehicles by vehicle weight as performed by LAB
  - Detailed data
    - Produce cumulative frequency curves of mass ratio of vehicles involved in car-to-car impacts for all vehicles and by mass category (e.g. < 1000 kg, 1000 - 1200 kg, etc.
    - Determine effect of closing speed on above curves
    - Identify which mass ratios and closing speeds cover majority of frontal impacts



# Do You Have Any Questions?

# Thank you

David Richards, TRL ([drichards@trl.co.uk](mailto:drichards@trl.co.uk) +44 1344 770438)  
Mervyn Edwards, TRL ([medwards@trl.co.uk](mailto:medwards@trl.co.uk) +44 1344 880723)  
Cyril Chauvel, LAB ([cyril.chauvel@lab-france.com](mailto:cyril.chauvel@lab-france.com) +33 176873526)  
Claus Pastor, BAST ([Pastor@bast.de](mailto:Pastor@bast.de) +49 2204 43 – 657)

Monday 7<sup>th</sup> December

Additional slides

# Identification of target populations

Overview of Frontal impact dataset (Great Britain, 2008)

Gender	All			After 2003		
	Fatal	Serious	Slight	Fatal	Serious	Slight
Male	493 (67.4%)	4222 (60.4%)	33281 (51.9%)	163 (67.4%)	1221 (57.3%)	10775 (49.3%)
Female	238 (32.6%)	2771 (39.6%)	30842 (48.1%)	79 (32.6%)	911 (42.7%)	11079 (50.7%)

Age	All			After 2003		
	Fatal	Serious	Slight	Fatal	Serious	Slight
0-11	11 (1.5%)	150 (2.2%)	2484 (3.9%)	3 (1.2%)	48 (2.3%)	886 (4.1%)
12-25	246 (33.7%)	2554 (37.1%)	23762 (37.8%)	93 (38.4%)	825 (38.9%)	8492 (39.3%)
26-45	197 (27%)	2115 (30.7%)	21325 (33.9%)	55 (22.7%)	630 (29.7%)	7336 (34%)
46-65	130 (17.8%)	1288 (18.7%)	10756 (17.1%)	40 (16.5%)	384 (18.1%)	3389 (15.7%)
66+	146 (20%)	786 (11.4%)	4598 (7.3%)	51 (21.1%)	232 (10.9%)	1497 (6.9%)

# Identification of target populations

Overview of Frontal impact dataset (France, 2008)

Gender	All			After 2003		
	Fatal	Serious	Slight	Fatal	Serious	Slight
Male	393 (28%)	4255 (43%)	7702 (50%)	83 (31%)	955 (45%)	2024 (50%)
Female	1005 (72%)	5713 (57%)	7576 (50%)	187 (69%)	1188 (55%)	1989 (50%)

Age	All			After 2003		
	Fatal	Serious	Slight	Fatal	Serious	Slight
0-11	25 (2%)	374 (4%)	759 (5%)	8 (3%)	93 (4%)	190 (5%)
12-25	399 (29%)	2984 (30%)	4839 (32%)	57 (21%)	507 (24%)	1062 (26%)
26-45	379 (27%)	3224 (32%)	5560 (36%)	67 (25%)	712 (33%)	1590 (40%)
46-65	312 (22%)	2138 (21%)	2885 (19%)	76 (28%)	539 (25%)	836 (21%)
66+	282 (20%)	1244 (12%)	1233 (8%)	62 (23%)	291 (14%)	335 (8%)

# Identification of target populations

Overview of Frontal impact dataset (Great Britain, 2008)

Location	All			After 2003		
	Fatal	Serious	Slight	Fatal	Serious	Slight
Urban	119 (16.3%)	2196 (31.4%)	30996 (48.3%)	47 (19.4%)	667 (31.3%)	10936 (50%)
Rural	565 (77.3%)	4480 (64.1%)	29627 (46.2%)	183 (75.6%)	1367 (64.1%)	9687 (44.3%)
Motorway	47 (6.4%)	318 (4.5%)	3551 (5.5%)	12 (5%)	100 (4.7%)	1247 (5.7%)

# Identification of target populations

Overview of Frontal impact dataset (France, 2008)

Location	All			After 2003		
	Fatal	Serious	Slight	Fatal	Serious	Slight
Urban	180 (13%)	2759 (28%)	8761 (57%)	29 (11%)	558 (26%)	2203 (55%)
Rural	1111 (79%)	6387 (64%)	4834 (32%)	210 (78%)	1316 (61%)	1273 (32%)
Motorway	107 (8%)	822 (8%)	1683 (11%)	31 (11%)	269 (13%)	537 (13%)

# Identification of target populations

Overview of Frontal impact dataset (Great Britain, 2008)

Position	All			After 2003		
	Fatal	Serious	Slight	Fatal	Serious	Slight
Driver	526 (72%)	4730 (67.6%)	43467 (67.7%)	175 (72.3%)	1423 (66.7%)	14836 (67.9%)
FSP	142 (19.4%)	1458 (20.8%)	13307 (20.7%)	47 (19.4%)	449 (21%)	4518 (20.7%)
RSP	63 (8.6%)	807 (11.5%)	7386 (11.5%)	20 (8.3%)	262 (12.3%)	2510 (11.5%)

Mass	All			After 2003		
	Fatal	Serious	slight	Fatal	Serious	slight
>2.5T	5 (13.2%)	29 (7.8%)	330 (9.9%)	2 (18.2%)	13 (8.3%)	110 (8.3%)
<=2.5T	33 (86.8%)	341 (92.2%)	3012 (90.1%)	9 (81.8%)	143 (91.7%)	1219 (91.7%)
Unknown	693	6625	60834	231	1978	20541



Federal Highway Research Institute





# Identification of target populations

Overview of Frontal impact dataset (France, 2008)

Position	All			After 2003		
	Fatal	Serious	Slight	Fatal	Serious	Slight
Driver	1064 (76%)	6826 (69%)	10397 (68%)	197 (73%)	1467 (68%)	2766 (69%)
FSP	198 (14%)	1983 (20%)	3000 (20%)	38 (14%)	430 (20%)	787 (20%)
RSP	136 (10%)	1146 (12%)	1824 (12%)	35 (13%)	246 (11%)	460 (11%)

Mass	All			After 2003		
	Fatal	Serious	Slight	Fatal	Serious	Slight
>2.5T	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
<=2.5T	1056 (100%)	7454 (100%)	11574 (100%)	201 (100%)	1566 (100%)	2944 (100%)
Unknown	342	2514	3704	69	577	1069



Federal Highway Research Institute