



# *Forensic Collision Reconstruction: A Road Map*

Dealing with the objective evidence in a road traffic collision case

Gavin Dunn

**Hawkins**  
Leaders in forensic investigation

# Overview



- **Introduction**
- **Types of evidence**
- **General approach**
- **Some examples**
- **Summary**
- **Questions**

# Office Locations



# Road Traffic Collisions

- 14 RTC experts
- Range of expertise
- Vehicle examination, full reconstruction, CCTV analysis...
- Covering any area including NI

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We are industry leaders with proven expertise and practical experience, together with a real awareness of our clients' needs.

Our team consists of over 100 forensic engineers and scientists who offer a rapid response, attending the scene immediately if required. Our experts can investigate a wide range of incidents with specialisms spanning across more than 50 different core disciplines.

FOUND 14 RESULTS

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	EURLING CHRIS BOTHAM PRINCIPAL ASSOCIATE	Lifting Operations, Vehicle Examinations, Escapes of Water, Oil & Gas, ...	+44 161 463 1860 +44 3380 700 178 Email me	Manchester Office
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	DR JOHN CAMPBELL PRINCIPAL ASSOCIATE			
	MR JOHN HOLLAND PRINCIPAL ASSOCIATE			
	DR JOHN HORSFALL PRINCIPAL ASSOCIATE			

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**LOCATION:**

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**EXPERTISE:**

- BUILD ENVIRONMENT
- CRIME & TRAFFIC
- CYBER, DIGITAL & TECHNOLOGY
- ENGINEERING
- FIRE & EXPLOSIONS
- MARINE
- MATERIALS, CHEMISTRY & BIOLOGY
- PERSONAL INJURY
- ROAD TRAFFIC COLLISIONS

**CLEAR FILTERS**

# My Background



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**QUEEN'S  
UNIVERSITY  
BELFAST**

**Institution of  
MECHANICAL  
ENGINEERS**



THE INSTITUTE  
OF  
TRAFFIC ACCIDENT INVESTIGATORS

- **MEng degree from Queen's University Belfast**
- **12 years with Forensic Science NI dealing with serious RTCs**
- **From the scene to the court room**
- **Joined Hawkins in August 2022**
- **Chartered Mechanical Engineer**
- **Full Member of IMechE & ITAI**

A faint, light blue world map is centered in the background of the slide, showing the continents of North America, South America, Europe, Africa, Asia, and Australia.

# *Types of evidence*

# From the scene



**Vehicle positions**

**Weather conditions**

**Road topography**

**Marks/damage to the road etc**

**Debris**

**Marks/damage to the vehicles**

**Pedestrian/cyclist position**

# From the scene





# From the scene

## We need to rely on...

- *Photographs*
  - *Video*
  - *Sketch or map\**
  - *Reports/statements\**
- (\*objective?)

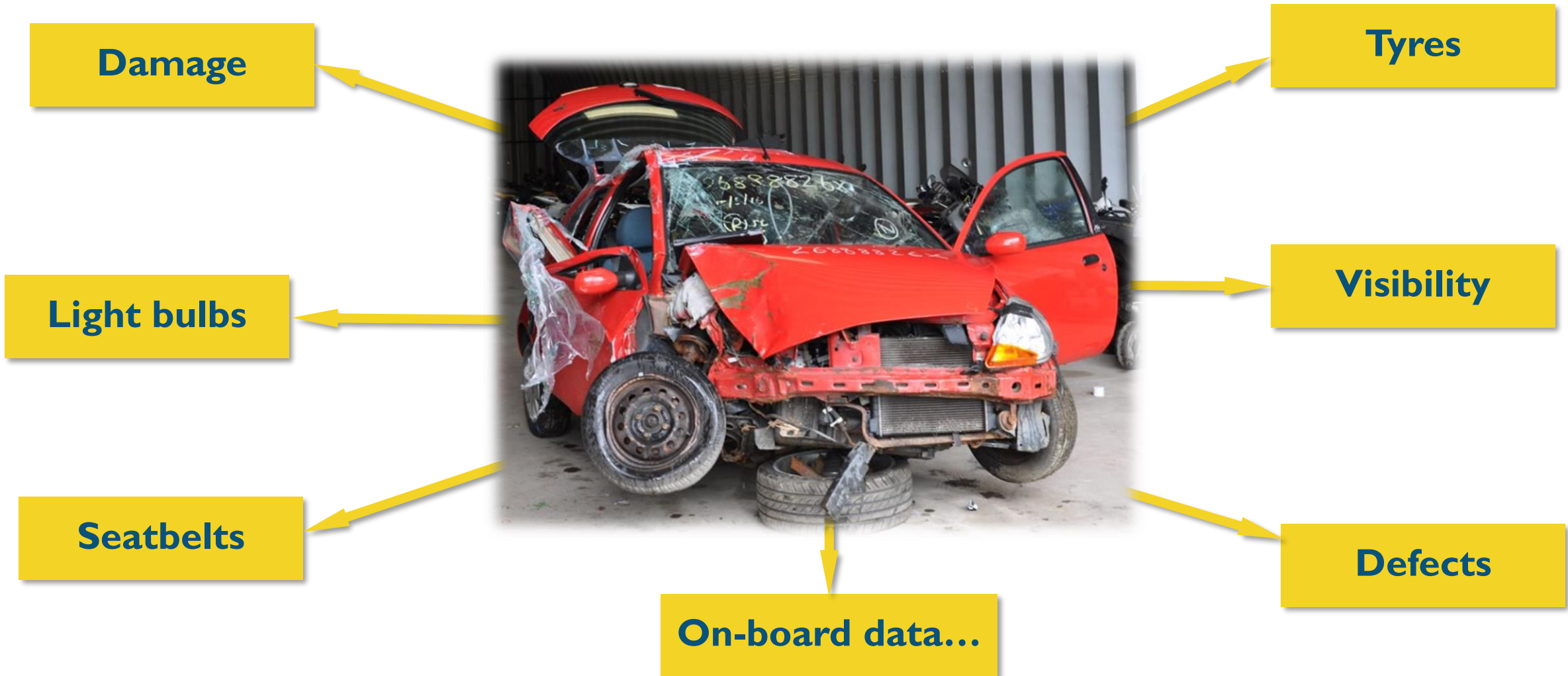
## But...

- *Often wrong place*
- *Variable Quality*
- *Potential for human error*

- Fixed or dashcam
- Original CCTV files are crucial
- Can deal with short time periods



# From the vehicle



# On-board data

## Airbag (or restraint) control module

- Bosch CDR tool or manufacturer



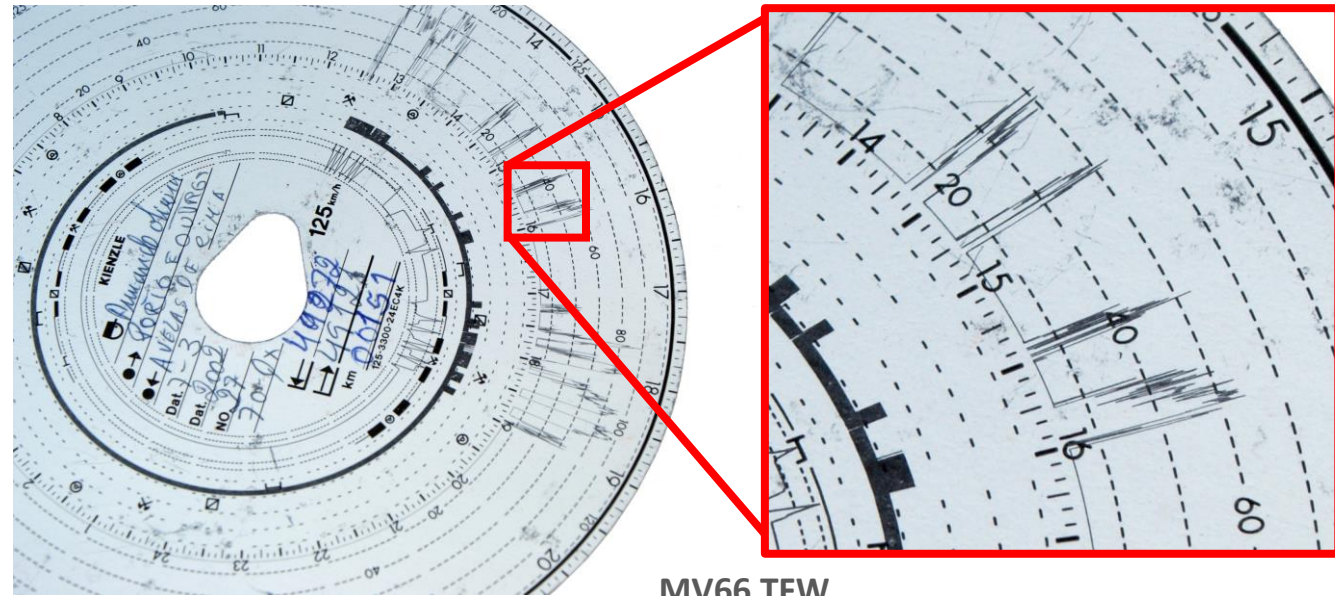
Pre-Crash Data -5 to 0 sec [2samples/sec] (Event Record 1)

Time Stamp (sec)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal, % full	Engine RPM	Service Brake (On, Off)	ABS activity (engaged, not-engaged)	Steering Input (deg)
-5.0	91 [146]	21	3500	Off	not-engaged	5
-4.5	86 [139]	5	3250	Off	not-engaged	8
-4.0	80 [129]	0	3050	Off	not-engaged	-4
-3.5	74 [119]	0	2950	Off	not-engaged	-10
-3.0	65 [105]	0	2500	On	not-engaged	12
-2.5	58 [94]	0	2450	On	engaged	38
-2.0	51 [82]	0	2100	On	engaged	92
-1.5	43 [70]	0	1500	On	engaged	155
-1.0	34 [55]	0	1150	On	engaged	255
-0.5	26 [42]	0	800	On	engaged	255
0.0	29 [46]	0	750	On	engaged	255

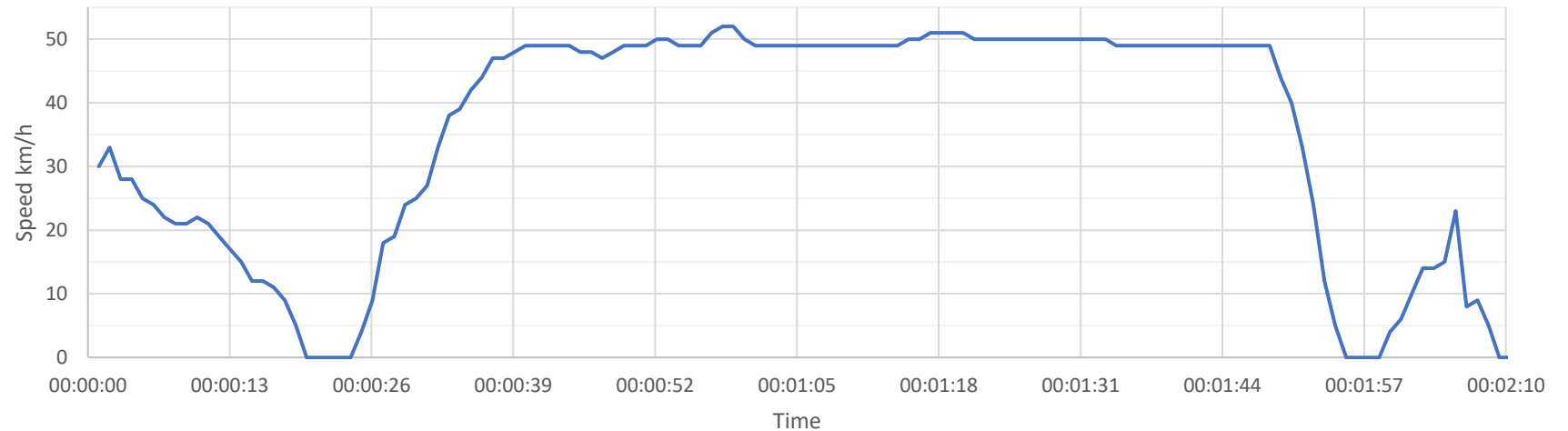
# On-board data

## Tachographs

- Larger vehicles (usually)
- Speed graph
- Analogue or digital



MV66 TFW



# On-board data

## Other sources?



Infotainment



Fleet tracking

# Pedestrian/cyclist clothing

## Assess for:

- Appearance & conspicuity
- Damage & orientation

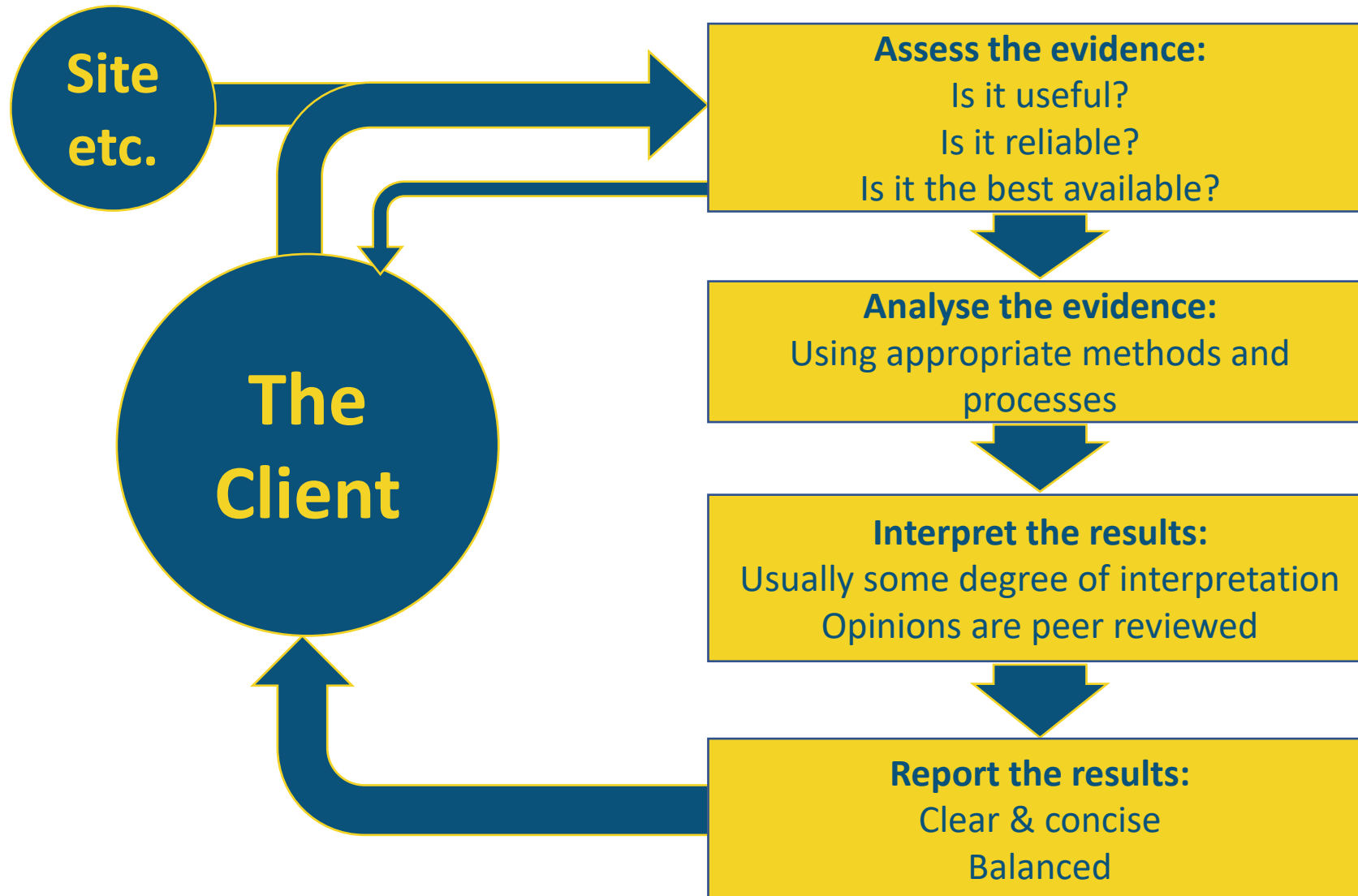


A faint, dark blue world map is centered in the background of the slide.

# *General approach*



# General approach



A faint, light blue world map is centered in the background of the slide, showing the continents of North America, South America, Europe, Africa, Asia, and Australia.

# *Some examples*

# Armoured vehicle

## Background:

- Armoured vehicle, weight increased by about 25% from the base vehicle
- Involved in a collision where the speed and stopping distance was of interest

## The question:

- Wouldn't the vehicle have required a longer distance to stop and been unstable due to being armoured?



# Armoured vehicle

## The objective evidence:

- Friction force increases with weight and a heavier vehicle will broadly stop in the same distance as if it were lighter
- Confirmed with testing
- Further evidence of stability testing
- The collision involved straight line braking

## The outcome:

- The increased weight of the vehicle had no significant effect on the speed or stopping distance



# Tachograph

## Background:

- A lorry was turning when a passing vehicle lost control and crashed
- There were conflicting accounts of whether the lorry contributed to the loss of control
- The road layout required the lorry driver to slow down or stop to gain a suitable view

## The question:

- Was the manner in which the lorry was driven a factor in the collision?



# Tachograph

## The objective evidence:

- The road layout required the lorry to stop, or almost stop, to safely negotiate a bend where the loss of control occurred
- The tachograph from the lorry showed the speed of the lorry at that location

## The outcome:

- The speed of the lorry from the tachograph, when compared to a suitable speed for the road, led the lorry driver to admit that his driving was not of a suitable standard



# Speed from tyre marks

## Background:

- A car was being shown off on a 'test drive' when the driver lost control
- There was a suspicion of speed but conflicting accounts from the occupants, and no other witnesses

## The question:

- What was the speed of the car when the driver lost control?



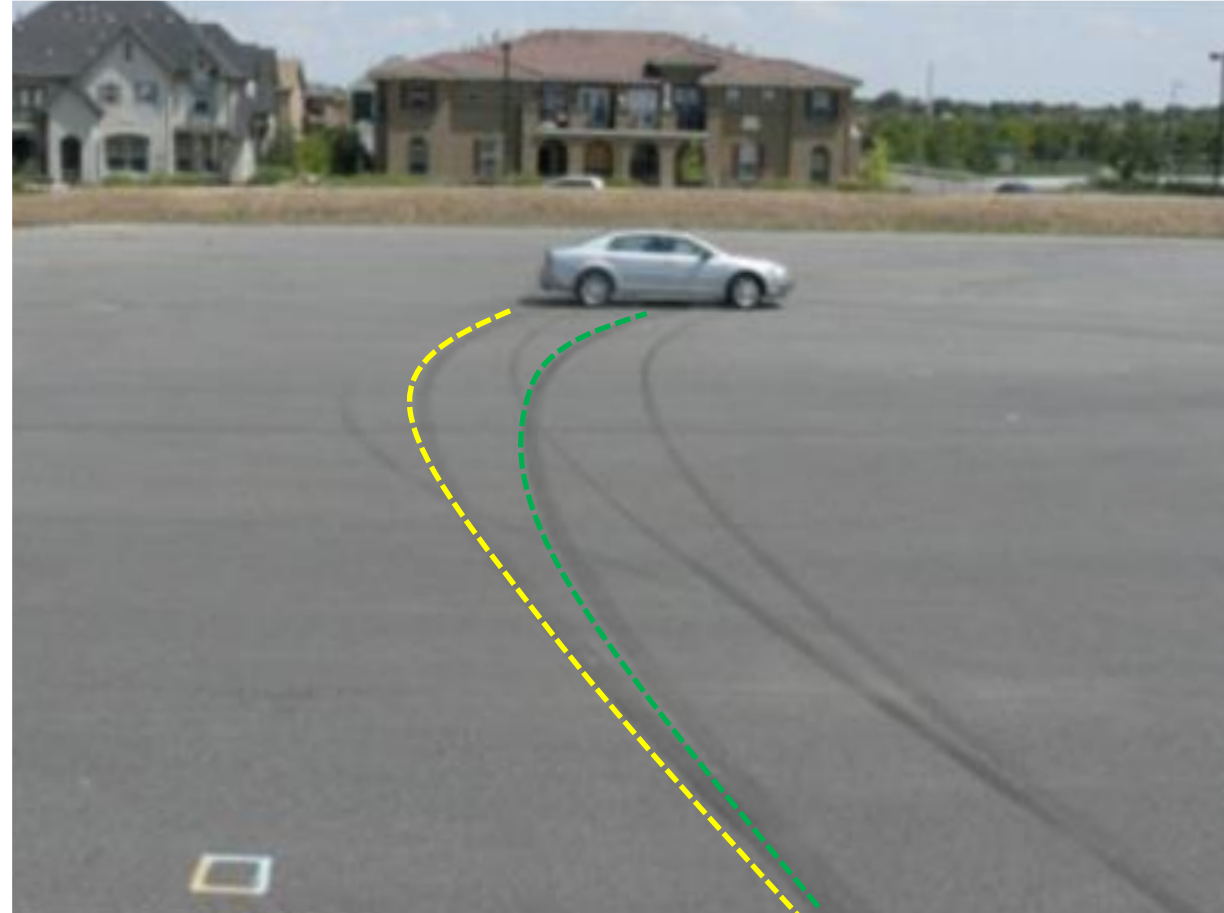
# Speed from tyre marks

## The objective evidence:

- There were distinctive 'critical speed' tyre marks which allow the speed of the car to be calculated
- The rest position of the car and its damage were well recorded

## The outcome:

- Analysis of the tyre marks showed the speed of the car was about 100 mph, and this was consistent with the rest position and damage to the car



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# Summary

- **Various types of objective evidence**
- **Assessment, analysis, interpretation**
- **Clear, concise reporting**
- **Some evidence is better than others**
- **More information is better**



# Any Questions?



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