

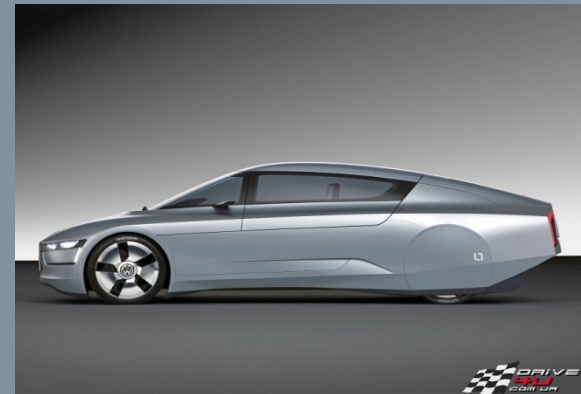
Overview: Are safety and environmental aims for vehicles more compatible than conflicting?

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To be covered

- ◆ Clarifying the premise
 - ◆ From the Simple to the Complex
 - ◆ Drivers for change
 - ◆ From Policy to industry and consumers
- ◆ Indications of responses
 - ◆ Past to Present
 - ◆ Future implications
 - ◆ Concepts to Roadmaps
- ◆ Questions



Initial thoughts

- ◆ This question is complex! And multi-dimensional
 - ◆ It has both past, present and future aspects
 - ◆ It seems to implicate **society** goals
 - ◆ Low Carbon Futures, not just transport
 - ◆ And possibly **policy** objectives and interventions
 - ◆ Regulations (Vehicles) and road use (people) and economics
 - ◆ And by inference **industry** responses
 - ◆ Vehicle OEMs and many others
 - ◆ And potentially **consumer** behaviour

Clarifying the premise

- ◆ Safety aims vs Environmental aims
 - ◆ *Safety aims* = Road “safety” accident and injury risk reduction
 - ◆ *Environmental aims* = Reduction in tailpipe emissions and fossil fuel use by road transport
- ◆ “Safety” concerns **have been** a major influence on vehicle design evolution
- ◆ “Environmental” concerns **are becoming** a major influence on vehicle design evolution

Clarifying the premise - Simple

“SAFE” vehicles are

- ◆ Capable of managing the forces in an impact (2ndary)
- ◆ Designed to minimise the injury causing mechanisms to occupants/other road users (2ndary)
 - ◆ Providing capabilities that increase the likelihood of avoiding an accident (Primary)
- ◆ Therefore an efficient mechanical structure is required
 - ◆ Supported by occupant restraint mechanisms
 - ◆ Potentially increases vehicle weight

“Environmental” vehicles are

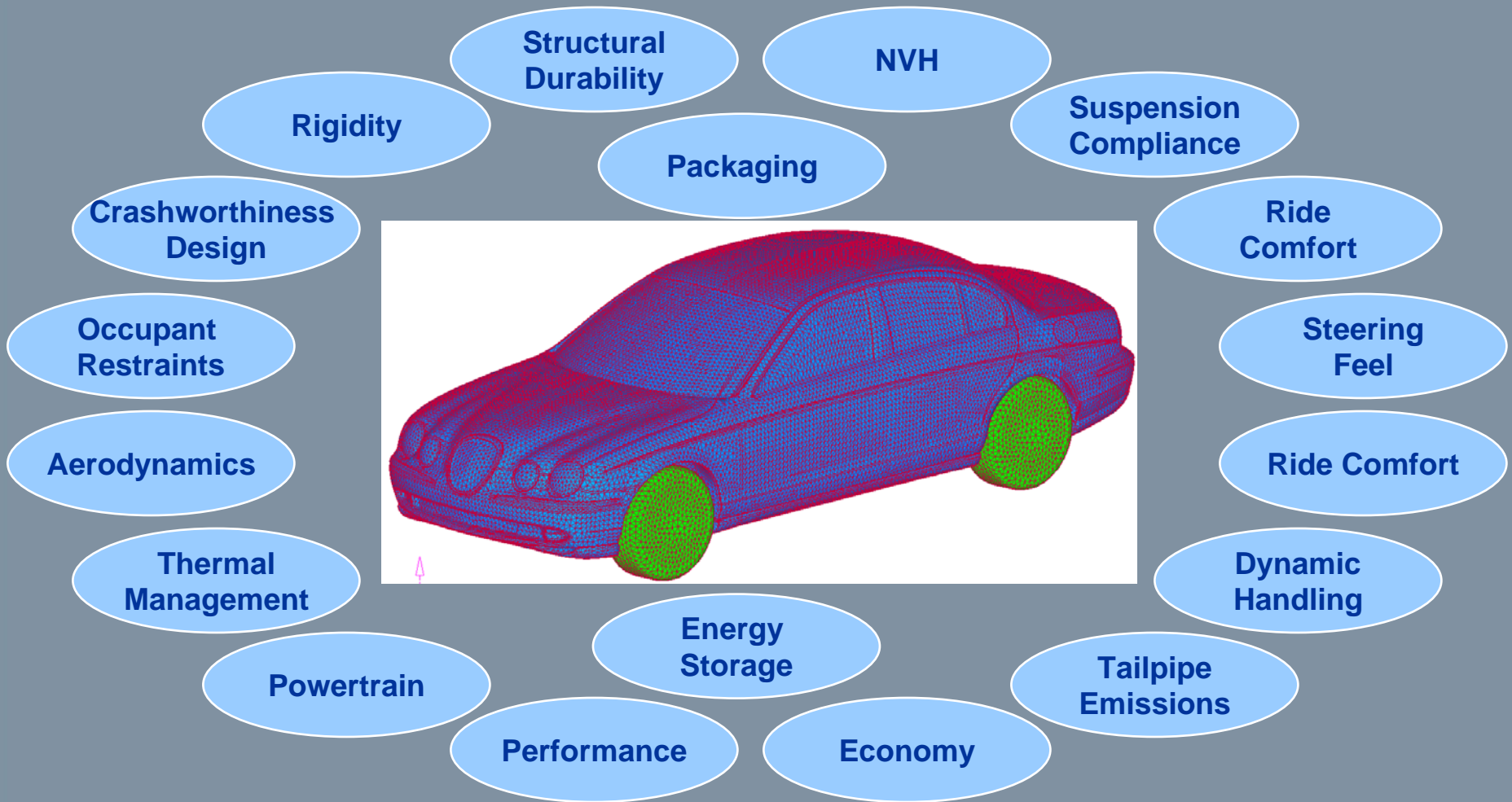
- ◆ Capable of maximising the efficiency of fuel used in travelling
- ◆ Designed to reduce tailpipe emissions
 - ◆ Providing support for better mobility management
- ◆ Therefore an increasingly more efficient powertrain design is required
 - ◆ Alternative fuels and engine types
 - ◆ Ideally decreasing weight of vehicle?

Designing Vehicles

- ◆ So environmentally weight is “bad”?
- ◆ However vehicle weight/structure impacts onto many other target areas of vehicle design
- ◆ Current Body-in-White designs are already seeking to satisfy many goals
- ◆ These can impact upon....



Vehicle Design Safety v Env't*



Means and 'Cost' of improvement*

Structural Improvements

Material strength	Percentage of different grades of steel used			
	Vehicle A 'B' class 00MY	Vehicle A 'B' class 07MY	Vehicle B 'D' class 02MY	Vehicle B 'D' class 07MY
'Mild'	59 %	33 %	69 %	40 %
>200 Mpa	23 %	18 %	17 %	22 %
>300 Mpa	18 %	34 %	14 %	14 %
>500 Mpa		11 %		18 %
>800 Mpa		4 %		6 %
Mass BIW inc closures	292 kg	343 kg	395 kg	421 kg

Restraints Improvements

- ◆ Dual stage airbags
- ◆ Seatbelt pretensioners
- ◆ Load limiters
- ◆ Inflatable knee bolsters
- ◆ Head, thorax & curtain side airbags

Maturity in Design – An example*

- ◆ VW Polo has evolved
- ◆ 2009MY Polo mk5 is
 - ◆ 36mm longer
 - ◆ 32mm wider
 - ◆ same “safety” standards
 - ◆ *but 8% lighter*



than Polo mk4

- ◆ *129-96 g/km CO2*
- ◆ *Future 87 g/km CO2*

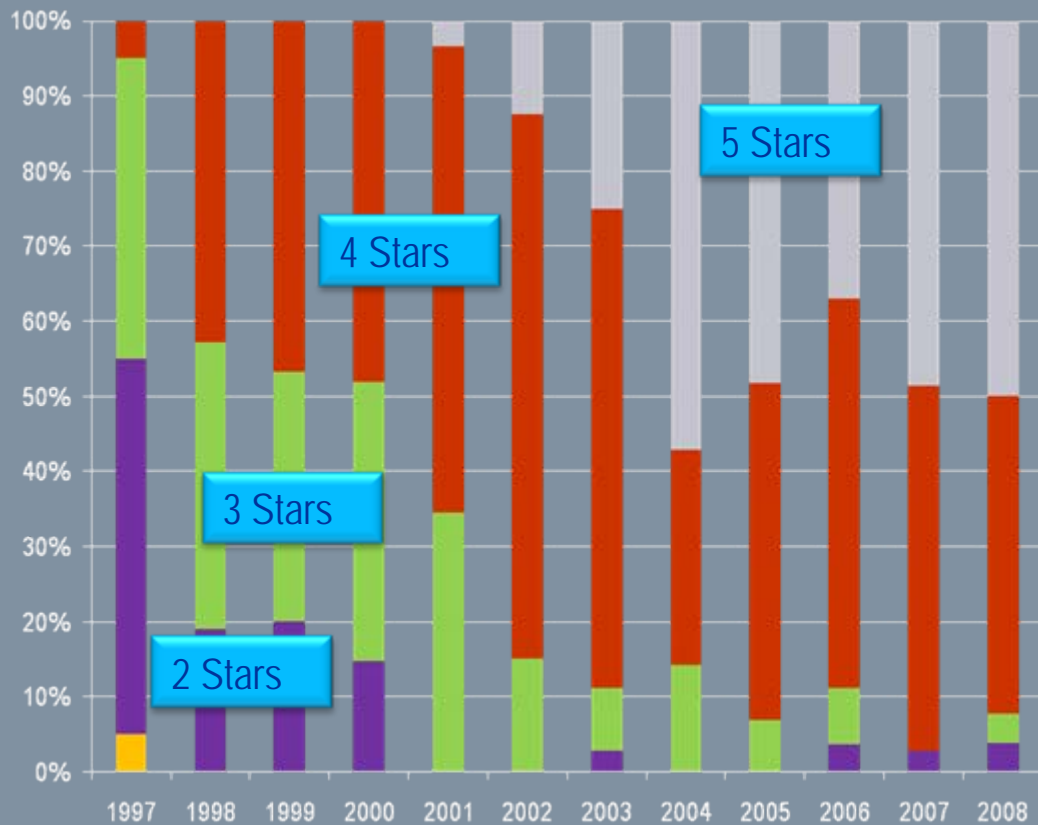
Design Evolution

- ◆ However it's not just about weight
 - ◆ Full emphasis on maintaining "safety"
 - ◆ Current Regulatory Frameworks
 - ◆ Increasing "environmental" performance
 - ◆ Current Regulatory Frameworks
 - ◆ Increasing use of electronics
 - ◆ Aiding primary and 2ndary safety & powertrain
- ◆ Driven by market place, society, customer demand and regulation (EuroNCAP)
- ◆ And will continue to evolve

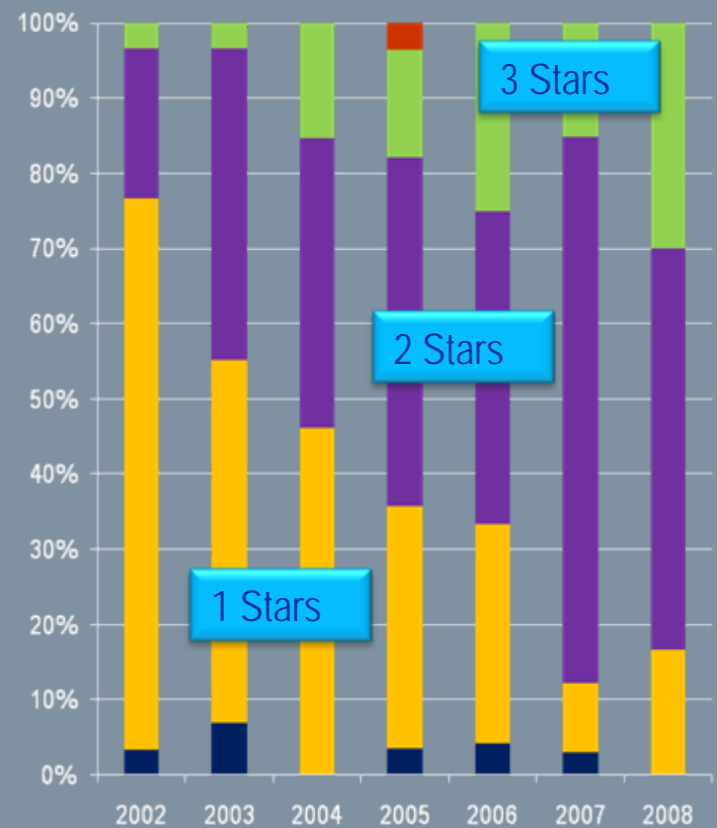
EuroNCAP

Increasing expectation for safety*

Adult Ratings



Pedestrian



Next Generation of Safety*

Active Safety
(Primary)

Pre Crash

Passive Safety
(Secondary)

Driver Warning and
Info Systems

- Tyre Pressure Monitoring
- Lane Deviation warning
- Blind Spot warning
- Driver Drowsiness
- Seatbelt Warning
- Speed Recognition, warning and Control
- Vehicle Diagnostics
- Traffic Sign Recognition
- Collision Warning System
- Automatic Crash notification
- V2V & V2I

Collision Avoidance
Systems

- Adaptive Cruise Control Systems
- Lane change assistance system
- Lane keeping System
- Further sensing of roadway and traffic
- Collision trajectory prediction

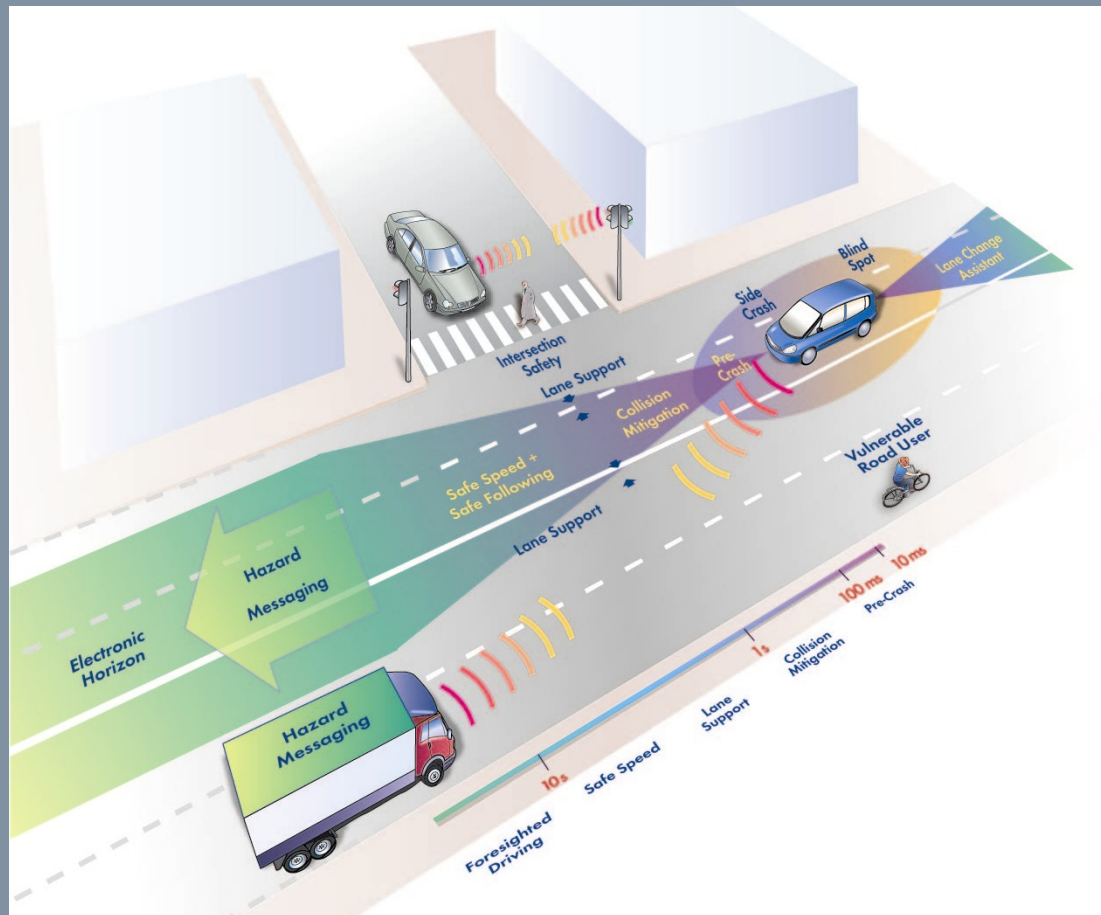
Vehicle Stability
Systems

- Anti-lock braking systems
- Electronic Stability Control Systems
- Emergency Braking Assistance
- Active Steering

Occupant Protection
Systems

- Front airbags
- Side airbags
- Curtain Airbags
- Anti-submarining Airbags
- Knee airbags
- Feet airbags
- Whiplash protection
- Occupant classification and detection systems
- Rear seat Passengers protection

E.g. PREVENT (EC)



Next Generation of Environment

- ◆ Drive to future structures
 - ◆ Reduced weight, alternative materials
- ◆ Drive to future powertrains
 - ◆ Micro/Mild Hybrid - Full Hybrid - Plug-in Hybrid
 - ◆ Mass market EV - Fuel Cell
 - ◆ 2010-2030 (Ultra Low Carbon – DfT/Berr/Dius 09)
- ◆ Alternative Fuels
- ◆ Reduction of energy losses
 - ◆ Aerodynamics, Rolling Resistance, Transmission

Next Generation of Roads!

- ◆ Further attention to managing vehicle and Road Use (?)
 - ◆ RUC, Tolling, Access control, PAYD Insurance
 - ◆ Road Law enforcement and control
 - ◆ Roadside or autonomous (E.g. ISA)
- ◆ To target safety, environmental aims AND network efficiency

Other “Safety” Issues to note

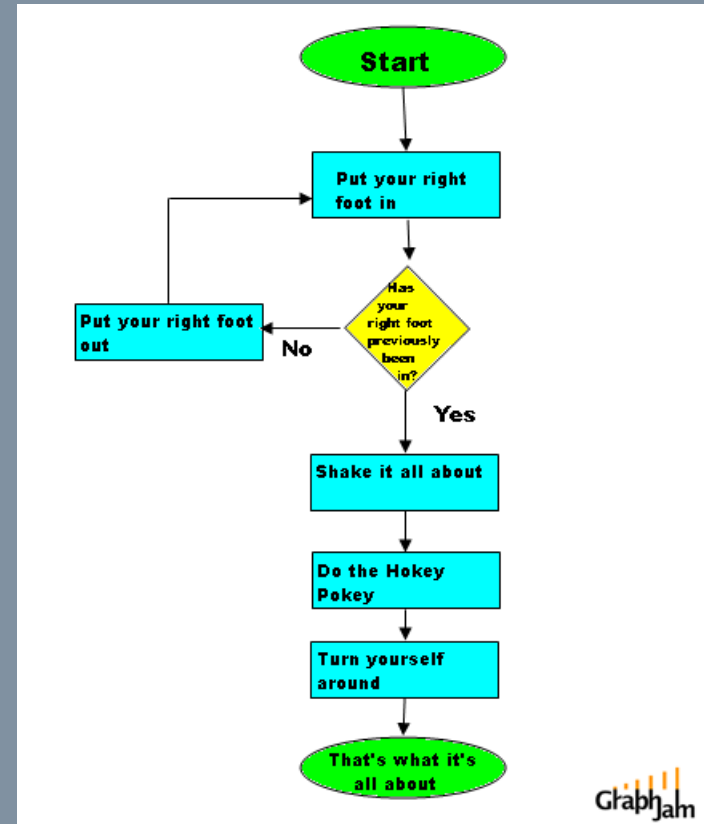
- ◆ Power source containment
- ◆ Power source maintenance (Professional)
- ◆ Power source maintenance (User)
 - ◆ Fuel Tanks – Battery Packs – Fuel Cells
- ◆ Infrastructure “fuelling” design
- ◆ Changing accident type
 - ◆ E.g. Low Noise and pedestrians
- ◆ Emergency Services response

Crash Mitigation – Tradeoffs?*

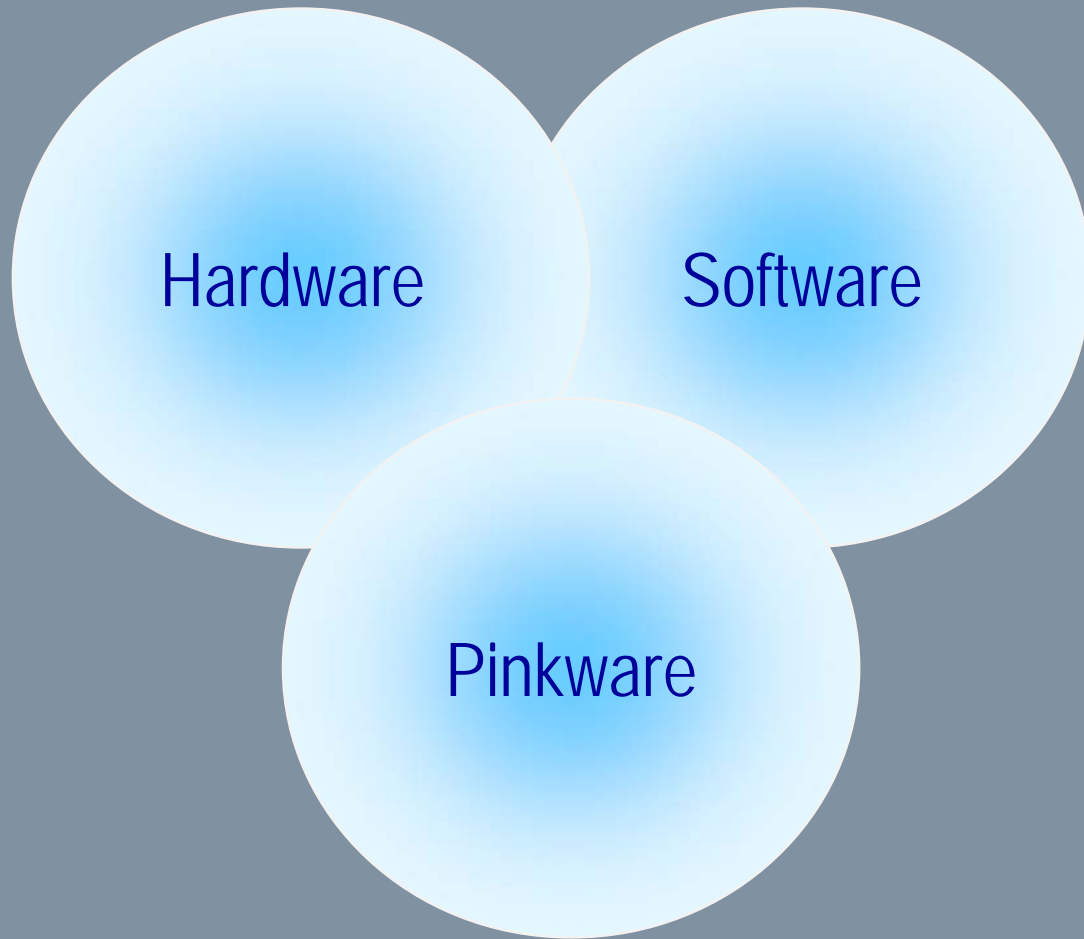
- ◆ Various Driver Assistance Systems are beginning to emerge
 - ◆ Electronic stability control (ESC) is reducing the number of rollover type accidents
 - ◆ Active braking assist (ABA) will reduce the severity of impact
 - ◆ As these vehicle proportions increase in the vehicle parc perhaps the need to meet a full 64km/h ODB crash test will reduce.
 - ◆ Emissions benefit will only come when it is acceptable to reduce the structural resistance of the vehicle

So do we have a way forward?

- ◆ So better vehicles are possible
- ◆ Optimised to maintain safety AND environmental goals (AND Efficiency)
- ◆ Continuing evolution of design
- ◆ Continuing emphasis on other support measures
- ◆ However.....



Future transport development depends on



Other “Pinkware” concerns

- ◆ Individually

- ◆ Can we influence driver behaviour with “technology”
- ◆ How we users respond to “control”?
- ◆ Can we carry the users with us?

- ◆ Strategically

- ◆ Are “we” going to
 - ◆ be able to put in place multi-factored interventions in enough time?
 - ◆ have to take measures to introduce better mobility options that are radical?
 - ◆ be able consider how we can adopt such strategies to address the above?
- ◆ When does the optimised LowCV become the **only** option?

Conclusion

- ◆ Are safety and environmental aims for vehicles more compatible than conflicting?
 - ◆ They can be made compatible if we choose to do so
 - ◆ This will potentially require a mindset change
 - ◆ For ALL parties
 - ◆ Including perhaps
 - ◆ New models for mobility
 - ◆ More regulation on mobility
 - ◆ When do petrolheads become voltheads?
 - ◆ And when do they become mature mobility consumers?



Questions

- ◆ **Julian** – What do we know from current RTA investigation work that can inform us for our future strategies
 - ◆ (and do we need to start examining now anything specifically that is new?)
- ◆ **Richard** – What are the particular compromises that near term hybrid and EV designs will have on safety/environmental aims?
- ◆ **Steve** - What are the particular compromises that new generation tyres will have on safety/environmental aims?
 - ◆ And what do we need to investigate.....

Questions

- ◆ **Jason** – What is the magic ingredient that will attract users to adopting Safe-Eco driving?
 - ◆ What are the user motivators?
- ◆ **Oliver** – Is ISA, as a single intervention, ever likely to appear?
 - ◆ And if not why not?
- ◆ **Timo** – Are speed enforcement measures going to realise significant CO2 reductions across a wide network?
 - ◆ Compare with the ISA approach
- ◆ **And Panel.....Duncan/Ian** – Are current mechanisms for regulation going to stimulate engineering innovations?