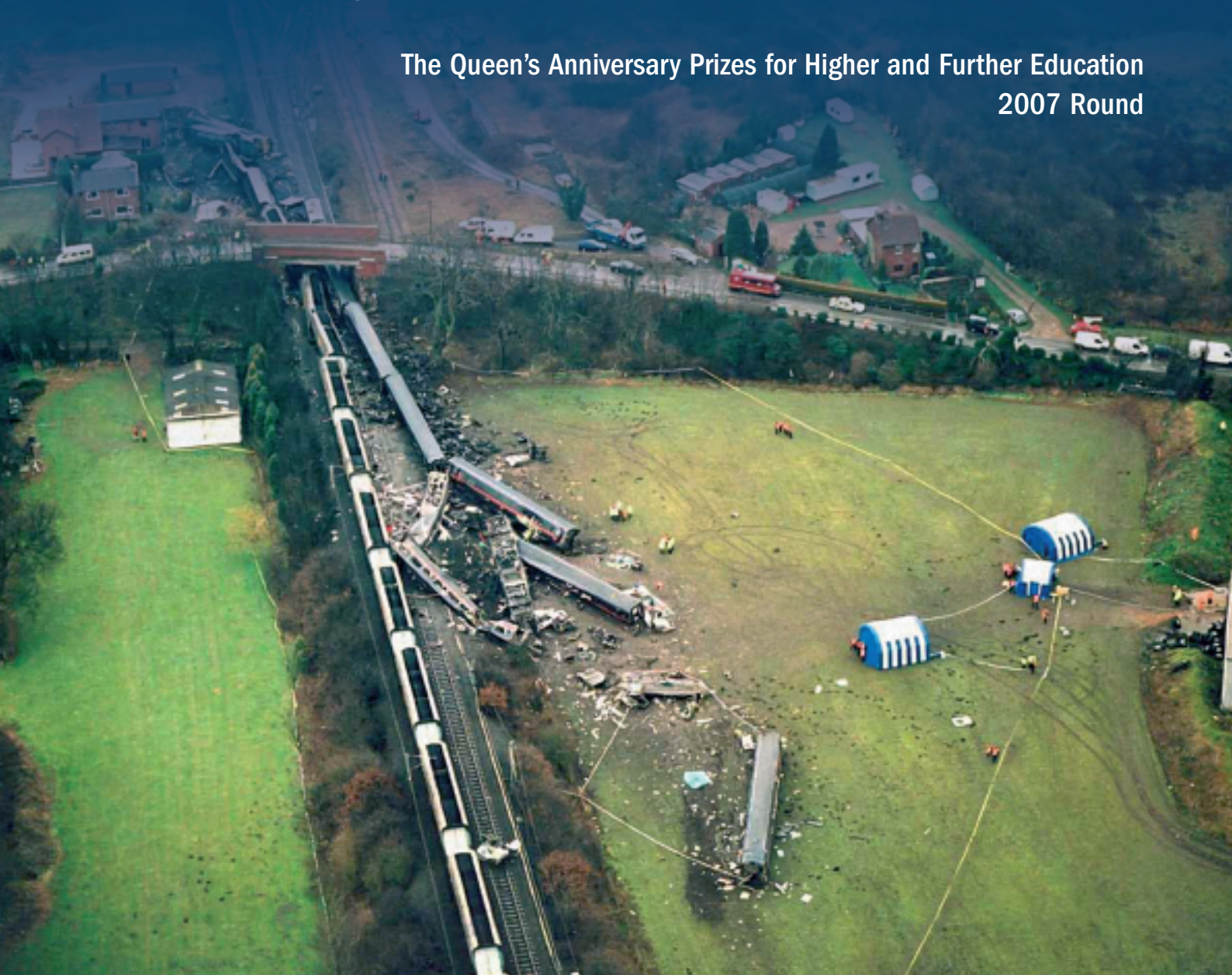


Road death reduction through vehicle safety and driver sleepiness research

The Queen's Anniversary Prizes for Higher and Further Education
2007 Round



THE QUEEN'S ANNIVERSARY PRIZES

FOR HIGHER AND FURTHER EDUCATION

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Title of Entry: – *maximum 10 words*

Road death reduction through vehicle safety and driver sleepiness research

Synopsis: – *maximum 300 words*

The University submits its lifesaving research in vehicle safety and driver sleepiness for a Queen's Anniversary Prize. Reducing death and serious injury to road users is paramount. The disastrous impact of road accidents can be seen in the widespread misery and negative economic effect they engender. Road safety improvement is a global overarching goal for governments, rescue services, car manufacturers, highway engineers and road safety campaigners. It is vital that effective road safety policy and best practice in the delivery of safety measures is underpinned by high quality research-based evidence. Vehicle safety and driver sleepiness research at the University contributes significantly to this process through work that is excellent in its academic and intellectual rigour and that also demonstrates wider benefit with substantial international impact.

The excellence of the research is evidenced in the progressive development of a body of knowledge and specialist expertise that allows theories to be rigorously and independently tested and verified before implementation. The knowledge base is exceptional in its breadth and depth. The University's successful management of large scale international projects is balanced with the skill to focus intensively on specific issues, such as driver sleepiness, where maximum gains in safety are achievable.

Changing policy, practice and behaviour is a dominant theme. Strong emphasis is placed on dissemination and the development of practical measures to protect road users. Dissemination extends beyond traditional academic routes and into mass media, modifying driver behaviour and raising awareness. As road safety is a primary concern of so many agencies, the University frequently takes a leadership role structuring international networks of expertise to address leading research issues.

The University's contribution to saving lives and reducing serious injuries is undisputed. A seamless link has been created between research of the highest quality and direct relevance and impact in real world scenarios.

Signed: _____ Date: _____

Head of Institution

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Cover photography credits

Main photograph: P.A. Photos; Selby rail crash – one of the most infamous incidents caused by a driver falling asleep at the wheel

Middle photograph: Department for Transport;

Left & right photographs: On the Spot (OTS) Accident Research

Road death reduction through vehicle safety and driver sleepiness research

1. Achievements of Excellence

1.1 Our submission and its selection

1.26 million men, women and children were estimated to have been killed in road traffic accidents in 2000 alone. The World Health Organisation (WHO)¹ calculated the economic cost of these tragic deaths at \$518 billion; the cost in human misery is incalculable. WHO believe that by 2020 “road traffic injuries could rank third among causes of death and disability, ahead of such other health problems as malaria, tuberculosis and HIV/AIDS.”² Road, vehicle and driver safety are high on government agendas and affect every strata of society worldwide. The University plays a leading role in applying excellent academic research to tackling this issue. Our submission explores both the outstanding quality of the University’s scientific research in this area and its direct and substantial impact in reducing road deaths and serious injuries through researching, informing and motivating changes in policy and practice and raising public awareness. The research is concentrated in two main areas:

- The Vehicle Safety Research Centre (VSRC), established in 1982 within the Ergonomics & Safety Research Institute
- The Driver Sleepiness Research Group (DSRG), established in 1993 within the Sleep Research Centre, part of the Department of Human Sciences

This area was selected for submission after several possible areas of activity were considered and evaluated against the criteria laid down for the awards. Particular emphasis was placed on selecting an activity that achieved both the highest standards of excellence and also had wide and significant impact. From the areas that met these exacting criteria it was clear the researchers in this field had exemplary working partnerships with numerous external organisations and individuals, and that the research was having a direct and positive influence on the policy and practice relating to road, vehicle and driver safety. The chosen areas had also developed innovative approaches to their work which had helped to create unique repositories of detailed and carefully analysed data relating to the frequency, causes and consequences of road traffic accidents. After a consultation process with the relevant research leaders, the Vice-Chancellor and Executive Management Group selected these areas for our submission and a team was established to collate the evidence and craft our entry.

“The University makes an outstanding contribution to reducing road casualties.”

John Dawson, Chairman, European Road Assessment Programme

1.2 Characteristics of Excellence

The University’s work in this area is significant, comprehensive and undoubtedly influential. It can be characterised by several distinguishing features which underpin the value of the research and ensure that its influence on road death and serious injury reduction is significant.

Impact is an important measure of excellence as it reflects the value placed upon the research by the road safety community. Both groups engage with a wide variety of organisations ranging from commercial car manufacturers, through to policy makers and organisations representing road accident victims. Particularly valued by policy makers, the scientific research provides the reliable evidence essential to support arguments for changes to improve road safety and to underpin effective policy. For example, research from the Driver Sleepiness Research Group has attracted the interest of politicians since it first began to explore the issue of driver sleepiness in the 1990s. In February 2001 an Early Day Motion citing the research was endorsed by 62 Members of Parliament asking the government to maintain momentum in promoting awareness of driver sleepiness and the countermeasures devised by the DSRG. Since then further research by the DSRG has been regularly cited in parliamentary debates on road safety.³ A further example of the extent to which the research excellence is valued by all stakeholders in road safety is the work carried out by the Vehicle Safety Research

¹ This claim was made in April 2004.

² Taken from the World Health Day 2004: Road Safety Press Release.

³ A recent substantial example of this was a House of Commons Road Accidents debate in June 2005 that heavily cited the research of DSRG and pressed the government to maintain public awareness of the dangers of driving whilst sleepy.

Centre for the major car manufacturers. In an extremely competitive industry, improving safety is a prime concern both for road user welfare and to gain critical commercial advantage in a sector where reputations for safety and reliability are highly prized. It is extremely important for this industry that their in-car safety enhancements are rigorously tested and validated by an independent centre of expertise. The majority of the world's major car manufacturers work with the VSRC, recognising the exceptional standard of the research.⁴ As a result, car safety features have been substantially improved.⁵

"I have worked with the VSRC accident investigation team... for the past several years... My experience of working collaboratively with them has been brilliant."

Tomosaburo Okabe, Chief Safety Engineer, Nissan Advanced Technology Centre, Japan

The University's researchers in this field regularly publish in quality journals such as the *British Medical Journal* and *Accident Analysis & Prevention* and contribute to the editorial boards of a number of publications.⁶ Indeed Professor Jim Horne is the founder and Editor-in-Chief of the lead journal of his field, *The Journal of Sleep Research*.⁷ Uncommonly for academic research the work also attracts unusually high rates of mainstream media interest. Cooperation with the mass media is crucial as it enables safety messages to reach beyond the academic community to the widest possible audiences, maximising its impact. Researchers from both groups have a strong personal commitment to reducing road deaths and serious injuries and often participate in awareness raising campaigns such as the RAC's *Sleepy Heads*⁸ campaign in addition to their research activities.

The galvanising of international networks is one of the most effective weapons against the global problem of road safety. The University sits at the centre of a large dynamic international network of colleagues working within this arena. Specialist mechanisms have been developed, such as the *SafetyNet Integrated Project*,⁹ to enable constructive cooperation. The *SafetyNet Integrated Project* is a Europe wide research initiative led by the VSRC, the outcomes of which will inform new government policy across Europe. Both research groups function as interchanges for knowledge in this field and help to pool and understand information arising from the numerous professions with an enduring interest in road safety. These include the police and rescue services, fellow academics, the judiciary, charities, policy makers, medical professionals, road users and victims of road accidents, and the media.¹⁰ The network is unique in its diversity, complexity and scale meaning that the two groups are unusually well placed to understand the issues of road, vehicle and driver safety from a number of perspectives.

Multidisciplinary approaches to the complexities surrounding road, vehicle and driver safety have enabled the groups to approach research issues from several angles. Unusually the DSRG explore driver sleepiness from a sleep science rather than an engineering perspective, taking advantage of their considerable experience in this field. By utilising both psychological and physiological analysis they have developed unique insight into even the earliest signs of driver sleepiness and their consequences for the driver and other road users. Working with their police networks the DSRG was well placed to publish a definitive guide to the characteristics of a sleep related crash.¹¹ This information was welcomed by police throughout the UK at a land mark conference organised by the DSRG and adopted as the standard against which a sleep related crash could be defined. Prior to this, whilst suspicious of the influence of sleepiness on drivers, the police had no way of establishing sleep as a primary cause of crashes. The DSRG now estimate that at least 1 in 10 of all crashes are sleep related, 25% of crashes on monotonous roads such as motorways are caused by sleepiness and that this can rise to 33% in certain road conditions. These statistics have been endorsed by the *Department for Transport* and are widely used in government and non-government safety campaigns to support safety messages. Ultimately the research has meant that the police can now hold sleepy drivers fully accountable for their actions and pursue prosecutions for more serious offences than may previously have been the case. It was this innovative, comprehensive approach to the research that has revealed the true extent of the problem and triggered such an effective response from government and the police in tackling sleep related crashes.

I have been aware of [the Driver Sleepiness Research Group] for almost twenty years and throughout that time they have combined world leading academic research with a firm and unwavering commitment to ensure that the research has a measurable impact to the lives and well being of the people of the United Kingdom and beyond. This commitment, to what is known as the knowledge transfer agenda, has been undertaken in a broad set of areas and to the same brilliant standard as the research itself.

Professor Ian Diamond FBA AcSS, Chief Executive, Economic and Social Research Council

⁴ For a full list of collaborators see the Supplementary Evidence.

⁵ Examples of specific projects are given in the Supplementary Evidence.

⁶ Listed in the Supplementary Evidence.

⁷ Published by Blackwells Scientific.

⁸ 2006.

⁹ As described in section 1.3.

¹⁰ An indicative list of partner organisations can be found in the Supplementary Evidence.

¹¹ Published in *The British Medical Journal* in March, 1995 as *Sleep Related Vehicle Accidents*.

Similarly in VSRC, the approach to crash investigation and analysis involves expert staff from several disciplines including, engineers, mathematicians, human factors specialists, experienced crash investigators and those with medical training. Their approach is notable for its responsiveness and comprehensiveness. This can be attributed partly to the establishment of one of only two UK *On the Spot (OTS) Accident Research*¹² teams funded by the *Department for Transport* and *The Highways Agency*. The OTS Team comprises experienced VSRC accident investigators and psychologists, together with police officers from *Nottinghamshire Police* working co-operatively to provide a 24 hour immediate response to crash incidents across Nottinghamshire. Often one of the first responders to arrive at a crash scene, the OTS Team is well placed to gather forensic data and information that is both qualitative and quantitative, working alongside the emergency services to assess the causes of an incident. This invaluable and detailed data is then analysed by researchers and used in several ways to support ongoing research into improving safety. OTS research can determine the critical factors in a crash leading to changes in vehicle design, driver information systems and road infrastructure improvements. The research data is added to the ESRI Accident Database System¹³ to continue to expand an information resource that is unequalled in the world in scale and detail. Interrogation of the data is used to support ongoing research projects by providing up to date real life crash related evidence.

“Mira regard the VSRC as a world leader in accident investigation. Of particular note is the renowned expertise in examining causes of crashes, both through retrospective analysis by experts and by a specialised team attending crash scenes as part of one of the world’s largest studies in to car occupant injury causation.

I have no doubt that the information and know-how provided by such work has contributed to a reduction in injuries, an improvement in the safety design methodology of vehicle and restraint system manufacturers and informed policy decision in this area by government departments.”

Dr Anthony J Baxendale, Manager, Advanced Engineering & Research, Motor Industry Research Association (MIRA)

The quality and scale of data underpinning research in both these key areas is remarkable and distinguishes them from other road safety research organisations enabling the groups to provide irrefutable evidence to support research claims. This is of particular value to policy makers who need convincing evidence to justify policy development. The ESRI Accident Database System has been collecting crash related data for over 25 years and has well over 10,000 unique records. Operating in a more specialist area, the Driver Sleepiness Research Group has collated a unique and detailed archive of information specifically pertaining to sleep related crashes. Stretching back over many years this data has played a fundamental role in the research programme to widen the understanding of driver sleepiness and how it might be managed. Often the data captured is of a sensitive nature and relates to fatal crash incidents. This requires tact when dealing with the bereaved to gain permission to record crash information and has prompted the DSRG to develop special relationships with police forces. The resource continues to grow with information gathered from police road audit exercises and experimental work carried out by the research group. Analysing the data has helped the DSRG to understand when sleepy drivers are most vulnerable and the particular circumstances that can trigger sleep related crashes; information that has been key to developing effective countermeasures and public information.¹⁴ For example, a recent project¹⁵ examined the relationship between sleep related crashes and the location of motorway service stations utilising data from real life incidents previously collected by the group and augmented by new data from the police. Further work is now underway to ascertain how service stations can adapt to provide a better service to motorists and make a real contribution to a reduction in sleep related accidents.

1.3 Exceptional achievements of national and international significance

This section highlights only a selection of outstanding achievements from both research areas. The examples have been chosen to illustrate the pioneering nature of the work the groups have undertaken and its significant impact in the global movement to improve road safety.

The Driver Sleepiness Research Group was one of the first organisations to recognise the problem of driver sleepiness. More importantly they had already developed the expertise in sleep science to enable them to effectively investigate the problem and to devise practical countermeasures. The importance of their work is perhaps best viewed under two headings reflecting the main areas of their impact:

Driver Safety Measures

In the 1990s, working closely with police forces, the DSRG gathered data on the characteristics of sleep related crashes and successfully lobbied to secure the backing of the *Department for Transport* for a series of major experimental studies of the problem. The experimental data, drawn from the group’s exclusive car simulator facility, was complemented by statistical data from police forces that had previously been under utilised. As the research evolved it revealed the complexities of the problem and significant contributory factors such as those presented by so called ‘dull

¹² OTS Team, established in 2000.

¹³ A family of databases populated by a number of research projects to create an internationally significant unrivalled information resource of accident related data.

¹⁴ See Section 1.3.

¹⁵ Funded by the *Department for Transport* as the precursor to a wider consultation exercise.

and boring roads'. Policy makers began to take note and use the research to reassess policies and guidance for drivers and its influence began to inform accident countermeasures. For example, Humberside Police contacted the DSRG in 1994 concerned at the high number of road accidents occurring on a long straight A-road under their jurisdiction. Sleepy drivers were veering off the road and hitting motorists who had stopped in lay bys to take a break. DSRG's investigation caused the lay bys to be closed and the road modified, significantly reducing the number of incidents. The DSRG continue to assist police forces to identify similar problem roads.

As a direct result of the research and lobbying carried out by the DSRG the risks of driving whilst sleepy are now as well known as the risks of drink driving. Working with the *Department for Transport* the DSRG has made a considerable contribution to the government's ongoing *Think Road Safety*¹⁶ campaign which has widely promoted the DSRG's guidelines on avoiding sleepiness. This has led to national advertising campaigns in the printed media, and on the radio, TV, cinema and internet. The campaign was one of the first to make use of the Motorway Variable Message Signs (MVMS) that warn drivers 'Don't Drive Tired – Take a Break'. The use of MVMS at high risk periods such as Bank Holidays followed a successful trial in 1995 by *Leicestershire Police* and the DSRG. The DSRG obtained sponsorship from *The AA* and *Welcome Break* to erect permanent road side signs on each approach road, including the M1, in a five mile radius of Leicester Forest East motorway services. The first version of these signs stated 'Tiredness can kill – take a break' but as the research of the Group developed and the issue became more widely recognised the signs were amended to the higher impact statement 'Tiredness Kills – take a break'. Subsequently the DSRG has been continually evaluating the effectiveness of these and other countermeasures. Perhaps most significantly for especially vulnerable new drivers, the DSPG has rewritten the guidance on driving tired published in *The Highway Code*¹⁷ incorporating their findings that a caffeine drink and a short nap are the best way to overcome driver tiredness.

The [Driver Sleepiness Research Group], have carried out pioneering work on driver sleepiness and fatigue. They have identified driver fatigue as a major cause of accidents. Their work has produced important results not only on the human and environmental factors that cause sleepiness, but also on remedies for driver fatigue and in particular the practical advice of drinking coffee and taking a short subsequent nap. This advice and other outcomes from the research have the potential to save hundreds of lives.'

Oliver Carsten, Professor of Transport Safety, University of Leeds

Changing the legal framework

The work of the DSRG has been particularly influential on the approach of police to suspected sleep related car accidents and the work of the *Crown Prosecution Service* in pursuing drivers who cause fatal accidents by falling asleep at the wheel. The Group provided the police with the analytical tools needed to identify sleep as a primary cause of crashes. Using the Group's substantial research to back up these assessment criteria has assisted the *Crown Prosecution Service* to successfully prosecute drivers who knowingly drive whilst sleepy, often calling upon the expertise of Professor Jim Horne as an expert witness. Professor Horne has been able to provide expert advice in over forty court cases to date. This take up of the research by the legal profession has led to several landmark cases that illustrate the influence of the Group's work. In 1995 a coach driver fell asleep at the wheel and veered off the M4 killing a number of people. He was only convicted of the lesser charge of careless driving despite the severity of the incident. The consistent lobbying by the DSRG and an increased awareness of driver sleepiness means today that similar fatal accidents are likely to result in a more serious conviction for 'causing death by dangerous driving'. Public awareness means that prosecutors and jury members are now more likely to know that sleepy drivers are culpable for their actions and sentencing guidelines for judges have been amended to include sleepiness as an aggravating factor when defining a perpetrator's sentence. The best illustration of this is the landmark case of the Selby Train Crash in 2001¹⁸ at which Professor Horne was called as an expert witness and DSRG research was used in evidence. The accused, Gary Hart was convicted of 'causing death by dangerous driving' after falling asleep at the wheel following 23 hours without any sleep. He veered off the motorway and into the path of an oncoming train. Ten people were killed and 70 injured. The case demonstrated that driving whilst tired was now a serious crime. Gary Hart was awarded a five year sentence after the judge described his actions as the moral equivalent of drink driving.

The work carried out at [the University] led to ensuring proper accountability at the trial, and the sleep-deprived driver was convicted and imprisoned. Professor Horne was able to establish that the driver knew that he was at risk of falling asleep, yet he chose to continue driving regardless of the inherent dangers. Professor Horne's expertise greatly helped secure this conviction. He explained to the Crown Court that sleep-deprivation can be identified and prevented.

Mrs Margitta Needham, Widow of Barry Needham, a victim of the Selby Train Crash

¹⁶ www.thinkroadsafety.gov.uk

¹⁷ Published in 2004.

¹⁸ Pictured on the front cover.

The research of the DSRG has further changed the application of the law to sleep related crashes by helping to prove that employers who encourage their employees to drive whilst sleepy should also share the blame of any subsequent crashes. In 1999, Stephen and Julie Bowles both Directors of *Roy Bowles Transport Ltd* were convicted of the manslaughter of two men who were killed after a lorry driver, working for the company, fell asleep at the wheel. The lorry driver was convicted of 'causing death by dangerous driving'. Similar prosecutions have followed and this landmark case, involving testimony from Professor Horne, has prompted fleet managers and employers across the country to reassess their policies with regard to driving at work. In recognition of their world-leading expertise in this area, the DSRG is often called upon to advise global companies such as *Shell* and *BP* on devising policies relating to driver fatigue for their employees. The training programme developed for *BP* has been translated into 18 languages and implemented across the world. The Group's research has also contributed to guidance on this issue drawn up by such influential organisations as *The Royal Society for the Prevention of Accidents*, *BRAKE*, *The Freight Transport Association* and *The Occupational Road Safety Alliance*.

The Vehicle Safety Research Centre is committed to advancing the knowledge required to improve quality of life, to ensure technology meets the needs of its users and to reduce the burden of deaths and injuries. Whilst always maintaining the highest research standards VSRC places particular emphasis on understanding the needs of its partners and sponsors and working closely with them to provide effective research solutions. All of the research of VSRC is intended to be applied and to have a high relevance in terms of safe transport. Most of its research is collaborative with national or international organisations ensuring the transfer of knowledge is maximised. The achievements of VSRC are best considered under two central themes:

Design and Implementation of Accident Data Systems for Safety Policy

VSRC has been responsible for developing a number of accident and safety information systems that are central to UK and European road and vehicle policy making. They are the coordinators of the large-scale *Safety Net Integrated Project*, funded by the *European Commission* through the *DG Transport and Energy*. This project, with a total budget of €13M involves 21 partners from 17 countries. The project is developing the *European Road Safety Observatory* (ERSO) that will be used to inform and direct road safety policy at European level and across all the member states.¹⁹ It will extend the existing *Community Road Accident Database* (CARE) to incorporate the new EU Member States and will develop new fatal and in-depth accident causation data resources.²⁰ The project provides a powerful tool to identify and quantify road safety problems throughout Europe, evaluate the efficiency of road safety measures, determine the relevance of Community actions, and facilitate the exchange of experience in this field. The project is also developing new statistical methods that can be used to analyse combined macroscopic and other data to maximise its usefulness. The project will be completed in 2008 at which stage its web based resources will be incorporated into the Commission's website. Plans for a similarly large scale follow on project, extending the work of *Safety Net*, are already underway.

The *Pan-European Co-ordinated Accident and Injuries Databases* (PENDANT) project is also led by the Vehicle Safety Research Centre. Funded by the EU, PENDANT provides new levels of crash and injury data to support EU vehicle and road safety policy making by developing two new integrated information resources. The first contains in-depth crash and injury data relating to over 1,100 injured car occupants and pedestrians from eight countries. The second utilises hospital injury data relating to all road user types that already exists in three EU countries. These databases link to a range of police, vehicle registration and driver licensing databases using new statistical procedures developed during the project. Together with other projects including CARE, these datasets provide a comprehensive picture of all the key aspects of accident and injury causation in the EU. There is a qualitative and quantitative level of co-ordination between CARE and the two new data systems; together they will provide a powerful and complementary data resource for vehicle safety policy that is missing from existing systems.

The Centre's outstanding record in recording and interpreting high quality crash related data is long standing. The *Co-operative Crash Injury Study* (CCIS), funded by the *Department for Transport* and some of the leading vehicle manufacturers, recently entered its eighth phase and has been running continuously since 1983. It is one of the world's largest studies of car occupant injury causation and each year it investigates more than twelve hundred crashes. Focusing on the crash worthiness of vehicles and their performance in preventing fatalities and serious injury, the data is used to support the development of safer vehicles, more accurate crash test tools and policy to ensure that manufacturers design vehicles to exceed minimum safety standards. This allows manufacturers and the developers of safety standards to understand the subtle differences between simulated and real life crashes and to ensure that vehicles meet the highest possible safety standards. The *On The Spot Project* funded by the *Department for Transport* and *The Highways Agency* has made a step change in the quality of data that the Centre has been able to collect and helps to ensure that real world accident data remains one of the key tools used to develop UK government road safety policies.

¹⁹ This is the realisation of a goal specified in the EC Road Safety Action Plan 2003.

²⁰ Currently contains over 20 million accident records.

"I strongly appreciate working with Prof. Pete Thomas of the Vehicle Safety Research Centre and his staff. Their highly professional behaviour and their ability to maintain a constructive atmosphere among the consortia were decisive factors in the success of both projects which have provided essential contributions to the development of the European Road Safety Policy. In particular, SafetyNet has raised a very high profile, not only at European level, among the Road Safety Community (scientists, policy makers and the automotive industry).

Against this background, the University plays a key role in improving the level of road safety in Europe."

Jean-Paul Repussard, Principal Administrator, EC Directorate-General for Energy and Transport

The Design of Safer Vehicles, Roads and Child Safety Systems

The technical data collected by VSRC when collating the ESRI Accident Data Systems has also created the ideal knowledge base to enable VSRC to effectively address the design of safer vehicles. The recently concluded EU funded *Proposed Reduction of Car Crash Injuries through Improved Smart Restraint Development Technologies Project (PRISM)* provided a framework within which VSRC could share its expertise with a number of other European research institutes and automotive Tier 1 suppliers to develop restraint systems that were more effective in a wider range of crash circumstances. The findings of PRISM helped European car manufacturers to gain ground in a competitive market place and ultimately to make vehicles safer.

VSRC also looked at the way certain driver groups, such as shorter stature, senior and female drivers are protected in crash situations. For example, a *Department for Transport* funded study led to the development of a range of design criteria to ensure that safety levels for shorter stature drivers were improved. Other recent design focused projects have evaluated accident avoidance technologies, the effectiveness of airbags, vehicle design for pedestrian protection, roll over protection and motorcycle safety. Many of these projects involved car manufacturers and the project findings have led directly to changes in the design and manufacture of new vehicles. Enhanced foot well rigidity, softer steering wheels and collapsible pedals are just a few examples of the safety enhancements to cars that this research has stimulated.

Improving the safety of roads is a key part of national and international casualty reduction strategies and the Centre is building upon substantial contributions to this field to expand its research in this area. Whilst traditional approaches of speed enforcement and driver training have made good contributions to fatalities on the road, the road safety community is increasingly looking towards new technological methods to improve road safety. As part of the European funded *Roadside Infrastructure for Safer European Roads Project (RISER)*, VSRC proposed new performance requirements for roads and safety barriers to ensure lower impact forces following a collision. Under a special agreement with the *Highways Agency*, VSRC is conducting a wide variety of special investigations to improve road and infrastructure design. In collaboration with the *Wolfson School of Mechanical and Manufacturing Engineering* at the University, VSRC is also working to develop new simulation methods to support the design of future roads.

A particular focus for VSRC has been the safety of child car occupants. Since 1996 VSRC has been assessing the performance of child car seats. Recently the European Union funded an extension to the successful CREST project²¹ to develop improved child test dummies and restraints systems. Working with the *Transport Research Laboratory (TRL)*, VSRC are designing a new testing procedure to evaluate the protection offered by child restraints. TRL have also funded VSRC to examine the seatbelt requirements for minibuses and coaches. This body of research resulted in the recent implementation of a new EC Directive,²² requiring all children in cars to be restrained using an appropriate restraint, regardless of their seating position.

As vehicle design and technology advances at a rapid rate in response to ever growing consumer demand VSRC are increasingly called upon to assess the impact of new trends and technologies on the safety of road users. This has broadened the diversity of their research portfolio. This includes issues ranging from the development of optimal liveries for police and *Highways Agency* staff to differentiate them from other organisations who have 'appropriated' the traditional hi-visibility uniforms,²³ to the assessment of driver vision from vehicles, lighting and the ergonomics of controls.

1.4 Looking to the future

The University is committed to the ongoing challenge of reducing road deaths and is diversifying and extending existing research knowledge to explore new aspects of road, vehicle and driver safety.

Building upon its strong body of research the Driver Sleepiness Research Group has identified a number of key research areas for the future. The Group will address why driving for work is one of the most common causes of death in the workplace and the consequences this can have both for the driver and employer. Interestingly, sleep related accidents are now believed to be more common than drink related accidents. The DSRG want to examine the reasons behind this

²¹ Child Restraint System for Cars (CREST) – completed in 2000.

²² EC Directive 2003/20/EC.

²³ Funded by the *Home Office Scientific Development Branch*.

and how they might influence the further development of effectiveness countermeasures to driver sleepiness. Taking a long view, the DSRG is uniquely placed to revisit police road audit²⁴ information that they have previously examined to assess how the occurrence of sleep related accidents may have changed over time. The driver vehicle interface is also an area of increasing interest as the Group begins to question how sleepy drivers might interact with the growing number of hi-tech in car devices such as satellite navigation systems. An important focus for the future is the influence of pre-existing medical conditions on drivers, concentrating in particular on obstructive sleep apnoea. Obstructive sleep apnoea is one of the most common sleep disorders in the UK, affecting approximately 700,000 people. Sufferer's breathing may be interrupted up to 300 times a night leading to broken sleep and excessive daytime sleepiness. It is particularly prevalent in middle aged, over weight men with thicker than average necks and sufferers are seven times more likely to have a car crash. Currently the DVLA prevent diagnosed sufferers from driving unless their condition is medically controlled. This has discouraged sufferers from coming forward for assessment meaning that undiagnosed drivers are putting themselves and others at risk. The DSRG is collaborating with the *Leicester University Hospitals Trust* on a project to assess the extent of this problem and the effectiveness of current treatments. The research will launch a new debate on the consequences of an accident being caused by someone made sleepy by a condition that either they have not been aware of or that they have chosen to ignore.

Research on the effectiveness of Motorway Service Stations,²⁵ assessing their positioning and the usefulness of the services they offer to a sleepy driver is a growing focus for the DSRG and is capturing the interest of the industry. Alongside the developing research, discussions are taking place with service station industry leader *Road Chef* to develop effective strategies to assist sleepy drivers. The original research was commissioned by the *Department for Transport* to gather evidence in advance of a wider consultation initiative on the future of motorway service stations.²⁶ This consultation process was recently concluded and it will define government guidance on future service stations. Already guidance is changing on the positioning of service areas from the traditional thirty mile intervals to locations chosen for their ability to meet the needs of drivers based on evidence gathered during the planning process.

Now through to second stage assessment, the DSRG is a key academic partner in a multi-million Euro EU research proposal that is likely to involve 5 member states. If funded, the project will investigate the health aspects of driver sleepiness; the impact on public health caused by road deaths, and examine a complex range of issues relating to driver sleepiness across Europe. This will be a major project for the DSRG and will enable significant investment in further research and provide the group with the ideal platform to share their existing expertise across Europe.

Similarly the Vehicle Safety Research Centre is addressing some of the emerging research issues in road safety. Many major projects are continuing such as the highly valued *Cooperative Crash Injury Study* and the information resources they evolve are constantly being used in different ways to support new research projects. The VSRC is already developing plans for a project to succeed the highly successful *SafetyNet* to ensure that the influence of the project benefits all the EU member states.

The VSRC continues to drive safety improvements in the car manufacturing industry supplying applied research of the highest quality to assess the effectiveness of new safety technologies. The Centre is currently engaged in developing new methods and procedures for evaluating the likely impact of emerging in-vehicle safety systems to ensure that the technology of the future has a clear benefit for all. Recognising that road safety is of paramount importance to all sections of society, the VSRC is also focusing on segmenting the driving population and examining the particular needs of specific sub groups such as child car occupants, older road users and those with impaired mobility.

2. Value and Benefit to the Institution

Both research groups are integral to larger centres of research excellence. They have played their part in the University gaining 6th place in The Times' Good Universities Guide 2007. The take up of the University's research in these areas by policy makers and practitioners has strengthened the University's overall reputation for research that is relevant and timely. This is a valued and distinctive characteristic of the institution. In a similar way the extensive global networks both areas sustain reinforce the University's reputation as an institution of international significance aiding student recruitment and further international collaborations.

Integrating well with the wider University, the research groups share their expertise through teaching and collaborative research. VSRC staff collaborate with the *Centre for Research in Social Policy*, the *Wolfson School of Mechanical and Manufacturing Engineering*, and the *Department for Design & Technology* on a number of projects. For example, the vehicle safety researchers are currently working with colleagues from *Mechanical & Manufacturing Engineering* on new techniques to identify the differences between real life driving situations and simulated crashes in an effort to improve the accuracy of crash simulations. Staff from VSRC also teach the UK's only undergraduate module on *Automotive Crash*

²⁴ Road audits are police records of accidents on particular roads.

²⁵ 'Effectiveness of motorway service areas in reducing fatigue related and other incidents', April 2006.

²⁶ 'Consultation on Policy for Service Areas & Other Roadside Facilities on Motorways & All Purpose Trunk Roads in England', Department for Transport, concluded 8th February 2007.

Protection for the Institute of Polymer Technology & Material Sciences. Professor Jim Horne and Dr Louise Reyner in the Driver Sleepiness Research Group both have teaching portfolios within the *Department of Human Sciences*. Dr Reyner has also developed a successful teaching link with *Warwick University Medical School*. These collaborations enable staff to extend their experience and greatly enrich the academic environment for both staff and students. Importantly both research groups are able to draw upon case study examples of real events encountered during their investigative work effectively exploiting the critical relationship between exemplary research and quality teaching.

More recently an informal cross campus network emerged linking individual researchers and research groups with an interest in road, vehicle and driver safety. Dr Memis Acar in *Mechanical & Manufacturing Engineering*, who specialises in biomechanical modelling techniques and effectiveness of design for injury prevention in car crashes, has recently begun a dialogue with both research groups on future collaborations, sharing of expertise and the use of specialist equipment such as the DSRG's driving simulator. Other researchers across campus have developed areas of more specific expertise. Dr Serpil Acar from the *Research School of Informatics* in the *Department of Computer Sciences*, for example, is a respected specialist on the specific driving needs of pregnant women collaborating with a number of major car manufacturers and the *Motor Industry Research Association (MIRA)*.

Publicity is important to the University as it raises the international profile of our research and supports student recruitment. Both groups publish widely in high quality journals and champion their research through attendance at conferences and public speaking on behalf of public awareness campaigns. As road safety is a concern for us all, the research attracts the attention of the mass media generating an enormous amount of positive PR for the University with experts from the Centres regularly appearing on radio and TV and being cited in newspaper and popular magazines. This high profile ensures that the University is rightly perceived as a centre of expertise and a reliable source of high quality relevant research. It also helps to generate new contacts for the research groups and to raise public awareness of road safety issues.

The University's vehicle safety research portfolio has grown steadily for a number of years both in scale and diversity. In the last financial year the University benefited from research income of nearly £2 million into this area and this is likely to be exceeded in the coming year. This accounts for over 6% of the University's grants and contract research income for the year 2005 – 2006.

The University has an excellent track record in research exploitation, knowledge transfer and commercialisation. This entrepreneurial approach to research dissemination is reflected in the Driver Sleepiness Research Group. In 2001, Dr Louise Reyner incorporated *Awake Ltd* to meet a growing demand from the commercial sector for training and advice on the prevention of sleep related accidents. *Awake Ltd* converts the research findings of Group into practical solutions for companies wishing to reduce risk to their workforce. The company offers a range of services from the delivery of driver training through to the development of fleet management policies. In 2003, *Awake Ltd* and DSRG were jointly awarded a *Prince Michael of Kent International Road Safety Award* in recognition of their outstanding achievement and innovation and as a public recognition of the improvements they have made to international road safety. This commercial activity adds to the perceived value of the research, aids its real world credibility and brings a new income stream to support future activities.

3. Value and Benefit to the Wider Community

The UK Government is aiming to reduce road deaths and serious injuries by 40 per cent (50 per cent for children) by the year 2010. Currently around 3,500 people are killed and 40,000 seriously injured on the UK roads each year.²⁷ The work of the University contributes significantly to this goal and the wider ambition to reduce the global problem of road death. The impact of the University's work in this area can be seen in the way it has transformed policy and practice, and changed road user behaviour.

Developing Policy and Practice

When the Driver Sleepiness Research Group first began to raise the issue of driver sleepiness in 1990s they initially encountered scepticism that the problem even existed in any significant way. Police officers who witnessed the horrific consequences of fatal traffic accidents harboured suspicions that sleep was a contributory factor but lacked the resources to gather evidence to support their theories. Many road safety professionals and policy makers refused to believe that sleep could be a major factor. Through sustained lobbying backed up by their initial research the DSRG quickly gained the confidence and support of the *Department for Transport* and the cooperation of numerous police forces to build up a body of evidence to illustrate the extent of the issue. Their cause was championed by a number of prominent politicians concerned to reduce road fatalities. The research has featured in a number of parliamentary debates on road safety and was the subject of an Early Day Motion calling for the government to maintain momentum in tackling driver sleepiness.²⁸

²⁷ Taken from *Tomorrow's Road: Safer for Everyone*, March 2000.

²⁸ Details of this are given in Section 1.2.

Police forces are now able to use criteria published by the DSRG to assess the likelihood of sleep being a contributory factor in a road incident. This has enabled them, in conjunction with organisations responsible for the maintenance of highways to move for changes in road infrastructure to improve road safety, particularly for places with high accident rates. This has been especially useful when tackling the particular problems posed by 'long and boring' roads that are a known contributory factor to driver sleepiness.

Once the extent of the problem had been realised and accepted, the DSRG turned its focus to providing evidence based guidance for drivers on the risks of driving whilst sleepy and effective counter-measures. These guidelines are incorporated into the government's high profile and effective *Think! Road Safety campaign* and are promoted widely by driving associations, charities and the transport industry. The DSRG continues to work with government and non government agencies across the country to raise awareness of risks and the mitigating actions that can be taken. The risks of driving whilst sleepy are now as well known as the risks of drink driving and perpetrators suffer the same social stigma. The approved guidelines on avoiding driver sleepiness were incorporated in 2004 into *The Highway Code*, which remains the definite statement of legal and reasonable expectations on drivers.

The shift in public awareness was accompanied by a change in the way sleepy drivers were regarded by the law and examples of this change are given in Section 1.3. Perhaps the best indicator of the change in perception of sleepy drivers can be found in the 2003 *Sentencing Guidelines* associated with the *Road Traffic Act 1991*²⁹ issued by the *Sentencing Advisory Panel*. These now include driving whilst knowingly deprived of adequate sleep or rest as an aggravating factor in the offences of dangerous driving and causing death by dangerous driving. Perpetrators can expect a more severe sentence than previously.

The Vehicle Safety Research Centre has long standing relationships with both the UK government and the EC, directly influencing policy development and legislation at national and European levels through research projects like *Safety Net*. The VSRC appreciate the potential value of their knowledge base to strategic decision makers in government and have developed methodologies to interrogate the data to meet the specific needs of this important group. The Centre is often called upon to provide assessments of new technologies and policies to ascertain their potential to impact upon casualty reduction figures. They can provide detailed cost benefit calculations to give an overall economic assessment of a proposed policy change or adoption of a new standard safety system. This information is invaluable to policy makers and has been used to inform a number of EC Directives raising standards in road safety. For example, the *Department for Transport* funded the *Safety Priorities Project*³⁰ to review the existing legal performance criteria for cars and evaluate where both safety improvements would be most effective in reducing casualties and injuries and where research should be prioritised. In a similar project the Department also commissioned a review of the effectiveness of its previous policies on vehicle safety. The *Department for Transport* places great value on its relationship with the Centre and VSRC Director, Professor Pete Thomas is one of the Department's External Research Advisors assisting in the commissioning of new research.

'A further area of activity for the Centre has been a fundamental review of vehicle safety priorities. This work is a key aspect in determining how the Department moves forward both in terms of our future research programme and the policy areas which will present the biggest casualty savings at the least cost to industry and consumers.'

Mr Ian Yarnold, Department for Transport

Several members of the VSRC belong to the influential *Parliamentary Advisory Group on Transport Safety (PACTS)*,³¹ an associate Parliamentary group and registered charity, advising and informing MPs and Peers on road, rail and air safety issues. Researchers from the DSRG have also been invited to present research findings to this group on a number of occasions.

A significant proportion of the Vehicle Safety Research Centre's research focuses on improving car design and the effectiveness of in-car safety innovations. Much of this work is carried out in conjunction with major car manufacturers and is used to inform future vehicle development. The Centre is able to provide rigorous independent assessment of the potential impact of new innovations in car design on road casualties and to help car manufacturers to ensure that new technologies are of benefit to all road users. Working with policy makers, the VSRC have contributed to the development of accepted safety standards in car manufacture and they are well placed to help manufacturers to understand and exceed these standards. Alongside this important work, the VSRC use their extensive accident data resources to identify the subtle differences between crash test data and real life crash data. This information is used to refine crash test procedures and equipment to ensure that simulated incidents replicate real life crashes as accurately as possible. For example, VSRC research helped to redesign crash test dummies to more accurately measure the risks of driver leg injury in crashes. Interrogating their accident data resources also allows the VSRC to share with highway agencies possible road infrastructure improvements that may prevent future accidents.

²⁹ An amended version of this Act was given Royal Assent in November 2006.

³⁰ Original phase completed in 2005, 2nd phase ongoing.

³¹ Founded in 1982.

'I greatly value their contribution to the debate on road safety in the UK together with the understanding of causal factors which their work is bringing. Without extensive research led by high class academic institutions, the arguments in respect of road safety are all too often based on emotion and historic practice. VSRC represents a significant asset in the drive to bring down the levels of killed and seriously injured people through road collisions – not only in the UK but across Europe.'

Chief Constable Meredydd J Hughes, South Yorkshire Police

Changing Behaviour

In 2005, the UK had over 33million licensed drivers and just under 33million registered road vehicles.³² Since the beginning of car travel public awareness campaigns have been an important aspect of reducing risk for road users. Today, the *Think! Road Safety* government campaign aims to change driver behaviour through raising awareness of the risks associated with such actions as driving under the influence or drink or drugs, or driving when sleepy. It is a long running, wide-ranging campaign that carefully targets vulnerable groups such as new drivers or people who drive for work with safety messages across the media. The information used in the sleep aspects of the campaign material originates from the research of the DSRG. *The Highway Code* is essential reading for all drivers and especially vulnerable newly qualified drivers. The countermeasures for driver sleepiness devised by the DSRG are now included in the Code and are helping to raise awareness of the issue among drivers. The University has attracted the support and cooperation of industry organisations targeted at improving safety standards. For example, the DSRG has a strong relationship with the *Freight Transport Association* who represent 13,000 member companies. The Association commissioned the DSRG to provide a full portfolio of advice and information to be disseminated to its members and to provide additional training.

The information is valued because it is derived from first-hand research based on conditions experienced in the real world. This is the crucial link often missed by academic research but the success of the project demonstrated the relevance and topicality of the [Driver Sleepiness Research Group's] work and its ability to make a meaningful contribution to those challenged with the job of managing these issues in the workplace.

James Hookham, Policy Director & Deputy Chief Executive of the Freight Transport Association

Every piece of research carried out by the two research groups helps to 'chip away' at the number of fatalities and serious injuries on our roads. Nearly all the research carried out is applied and used to change either road infrastructure or vehicle design and to inform campaigns aimed at changing driver behaviour. No information is wasted, everything the research generates is utilised or stored to strengthen the important and growing library of data that will underpin future road safety policy.

"I believe that they are accomplishing a prodigious amount of quality work and making a really substantial contribution to the global real-world problem of vehicle and road safety."

Tomosaburo Okabe, Expert Leader, Chief Safety Engineer, Nissan Advanced Technology Center, Japan

Partnerships & Leadership

Strong collaborative links with other groups are a defining feature of the University's research and it values the sharing of ideas and skills. Many of the major advances made in safety design research have been made in partnerships with other organisations in which VSRC are frequently the lead partner. They are currently the lead partners on the international *SafetyNet Project* among several other European and UK based projects. VSRC is proactive in contributing to the wider understanding of road, vehicle and driver safety. In May 2006 the Centre successfully organised and led the first *Safety Net Conference and Workshop* in Prague to share with the wider road safety community the project's impressive progress at its midway point. The Centre is always keen to follow up on new collaborative opportunities and recently initiated discussions on a proposal to continue the work of Safety Net following its scheduled conclusion in 2008. Within the UK they work regularly with other specialists within their field of research, both academic partners such as the Universities of Birmingham, Nottingham, Leeds and Cranfield, other research based organisations such as the *Motor Industry Research Association (MIRA)* and *Transport Research Laboratory (TRL)*, and partners from the motor manufacturing industry and its supply chain.³³

'I would not hesitate to say that it is due to the sustained participation and commitment of the Vehicle Safety Research Centre and other leading road safety experts from across Europe that the European Transport Safety Council has been able to successfully advise EU policy makers on continuously improving EU regulations and policies in the field of road safety. I believe that it is fair to say that without the Vehicle Safety Research Centre Europe's roads today would be less safe.'

Dr Jörg Beckmann, Executive Director, European Transport Safety Council

³² Government National Statistics.

³³ An indicative list of partners is in the Supplementary Evidence.

To enable VSRC to deliver its research objectives it has developed exemplary working partnerships with practitioners who have to handle the issues surrounding road safety and the consequences of crash incidents every day. For example, the OTS investigation team, whilst managed by VSRC has members from the *Nottinghamshire Police* and works alongside the rescue services and medical professionals.

VSRC staff engage with a number of external organisations to share their knowledge and skills. For example, two members of staff are members of the US based international *Association for the Advancement of Automotive Medicine* taking on leadership roles in areas such as defining the scientific programme of the Association and its membership development.³⁴

The Driver Sleepiness Research Group was the first in the world to realise the extent of the problem of driver sleepiness and has established itself as the world leader in this field. Their perseverance to reveal the extent of the problem led them to develop long standing and productive relationships with the majority of police forces in England. As the Editor in Chief of *The Journal of Sleep Research* Professor Horne is raising the profile of sleep science among the international academic community. It has an international readership of over 2000 and many of its subscribers are libraries ensuring that the influence of the Journal is widespread. In the traditional measurement of academic impact the Journal is consistently one of the highest rated sleep publications.

4. New Developments and Different Approaches

The combination of breadth and depth that characterises the University's work in this area is unusual, especially when combined with a dynamic approach to using research findings to stimulate changes in road safety. Adopting a multidisciplinary approach to the issues surrounding road safety enables the University to assess the causes and consequences of road traffic accidents from every angle. The University has achieved this partly through the exceptional partnerships it has developed with such organisations as the police who allow researchers unprecedented access to real life crash incidents through such innovative projects as the OTS. What sets the researchers apart is an ability to investigate real life crash situations with a level of professionalism that allows them to sensitively set to one side the more harrowing aspects of a serious crash and to concentrate on the detailed analysis of its causes and consequences. Even more valuable is the academic rigour that the researchers bring to this process, assessing findings against a backdrop of research experience and further experimental research. Research data is never simply recorded but rather analysed, interpreted and shared to the overall benefit of the road safety community and ultimately all road users.

The early identification of the problem of driver sleepiness and a persistent pursuit of the truth surrounding its causes and consequences has established the Driver Sleepiness Research Group as a unique resource in this field. The Group has approached the problem using a unique combination of sleep science, psychological and physiological expertise and has been able to pin point the exact characteristics of a sleep related crash and to advise drivers how to spot the earliest signs of sleepiness and to take appropriate counter measures to avoid a crash. Their work in this area has made a significant impact on the awareness of road safety practitioners and the public of this problem. Importantly, DSRG has plans to expand upon their research to date and look at the specific problems of those with pre-existing sleep related disorders and how these may relate to their driving experience. The Group's experimental research is made possible by a unique car simulator that they built, incorporating specially commissioned software, to accurately reproduce the circumstances that might trigger a sleep related crash.

Knowledge dissemination is of great importance to both groups as it empowers its audiences to make changes contributing directly to reducing road deaths and improving safety standards. The groups use a variety of mediums to reach the widest possible audience and often this promotional work is done in addition to the individual's main duties and takes place at evenings and weekends:

- The Road Safety Community – by adopting a collaborative approach to projects, and publishing widely in relevant industry publications the groups are able to share their skills and knowledge widely across their partnerships helping to raise the standard of best practice across the world.
- The Legal Profession – co-operating with the judiciary and providing expert evidence has enabled the DSRG to highlight the problem of driver sleepiness within the legal arena.
- The General Public – both groups contribute to government and non-government road safety campaigns at local, regional and national levels, and frequently feature in the popular press and broadcast media.
- Employers – The DSRG has exemplary relationships with road transport trade associations through which they are able to communicate their guidance on avoiding sleep related crashes. The DSRG have set up Awake Ltd to assist them in the wider provision of information to the road transport industry.

³⁴ A list showing the external interests of members from both areas can be found in the Supplementary Evidence.

As the government moves towards its ambitious 2010 targets for reductions in road deaths and serious road injuries, the work of the University in this area is expanding. The value of the VSRC's European SafetyNet project and the resulting ERSO is already being felt across Europe. Feedback from the Commission is positive and a larger continuation project is already under discussion. It is anticipated that this follow on project will extend the remit of SafetyNet and increase the number of partners involved in its delivery. An initial estimation puts the value of this extension project at €10 million per annum. The Centre is also continuing to diversify its research portfolio to tackle issues that go beyond vehicle safety and look at roads and road users.

5. Validation

This submission has been subject to a comprehensive internal review where the evidence collated has been carefully weighed against the criteria for a Queen's Anniversary Prize. We feel confident that our case meets the demanding criteria. We have provided selected illustrations that we feel support our claims in all areas.

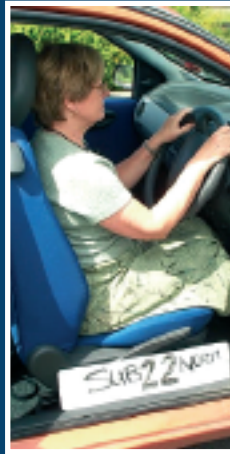
The work of the University in this area is widely recognised to be world leading in its comprehensive and detailed approach to driver safety. We have included examples of high profile projects with diverse groups such as car manufacturers, government departments and members of the rescue services. We have also been able to report on the esteem with which the research is held by the legal profession and traffic police who so often have to deal with the appalling consequences of road traffic accidents and understand better than anyone the importance of improving road, vehicle and driver safety.

Our publications, conference presentations and international collaborations allow us to present our research to a global audience and to stimulate debate within the policy making communities of governments across the world. The influence of the research can be found in guidelines for drivers and public information resources in many countries and increasingly drivers are hearing the safety message.

Time and again our researchers in this area are consulted for their expertise by such influential groups as the *Parliamentary Advisory Committee on Transport Safety* and the high profile charity BRAKE. Our research has been used in numerous court cases, presented by our staff as expert witnesses where it has stood up to rigorous legal scrutiny.

In the competitive motor industry where the economic stakes are high our work is highly regarded and we are often called upon to assess the effectiveness of new automotive technologies. Many of our research sponsors call upon our expertise for a number of different projects; proof that work we produce is of value and well received.

Both the groups are widely published in academic peer reviewed press and collaborate with similarly regarded academic institutions across the world. Unusually their work also attracts a high rate of popular press coverage which is an acknowledgement that the research is as much of relevance to every day drivers as it is to the highest policy makers. An internet search on 'vehicle safety' will return over 1.5 million 'hits' and the University's VSRC will be the first one returned; a similar search for the more specific 'driver sleepiness' returns over 15,000 'hits' and leading the returns is research from the DSRG. This simple exercise demonstrates the long reaching influence of both groups across the world.



Road death reduction through vehicle safety and driver sleepiness research

Supplementary Material



Academic and Senior Research Staff Interests

Sharon Cook

Conspicuity of road users, driver and rider vision, designing for road users with disabilities, simulation of the effects of aging and disability.

Dr Richard Frampton

Development of adaptive (SMART) restraint systems and the use of real world crash injury data in simulation. Crash prevention (Active Safety) including development of pre-crash warning systems and Electronic Stability Control systems on cars and motorcycles.

Rachael Grant

Safety of children, women and elderly people and people with disabilities as vehicle occupants and all vulnerable road users.

Julian Hill

Accident causation, road safety, vehicle safety and crashworthiness.

Professor James Horne

Sleep, sleep loss, sleep function, qualification and quantification of sleepiness, circadian rhythms. Driver sleepiness, accidents, neuropsychology of the frontal lobes, sleep need.

Alan Kirk

Bus and coach occupant safety, airbag performance, accident causation, rollover, secondary safety, in-car child safety.

James Lennard

In-depth investigation of road accidents, mathematics of impact severity, accident causation and accident reconstruction.

Dr Andrew Morris

Injury biomechanics, crash investigations, crash analysis, crash research.

Dr Louise Reyner

Sleep, sleepiness and applied sleep research, shift work patterns and sleepiness, sleepiness related vehicle accidents, circadian rhythms.

John Richardson

Driver behaviour, transport ergonomics, human factors of active safety systems, evaluation and assessment methodologies.

Professor Pete Thomas

Accident and injury causation, active safety systems, injury biomechanics and causation, crash test procedures and accident data analysis.

Ruth Welsh

Vehicle safety issues and the causation of occupant injuries.

External Links, Committees and Boards: an indicative selection

Sharon Cook

Reviewer for Society of Automotive Engineers on Human Factors in driving and Automotive telematics.
Reviewer for Institution of Electrical Engineers Proceedings on intelligent transport systems.
Member of Parliamentary Advisory Committee for Transport Safety.

Dr Richard Frampton

Chair of Scientific Programme Committee of the Association for Advanced Automotive Medicine (Oct '07).
Member of the Society of Automotive Engineers.
Member of Parliamentary Advisory Committee for Transport Safety.
Member of the International Injury Scaling Committee.
Member of the Scientific Programme Committee for the Canadian annual multidisciplinary road safety conferences.
Reviewer for the SAE Scientific Transactions Review Committee.
Invited Reviewer for the Journal of Thin Walled Structures 2007.
Ford Research Fellow at Loughborough University.

Rachael Grant

Technical and consumer representative on the British Standards Committee AUE/7 on Restraints in Vehicles.

Julian Hill

Member of the Association for the Advancement of Automotive Medicine.
Chairman of the Vehicle Design Working Party of the Parliamentary Advisory Council for Transport Safety.

Professor James Horne

Fellow of the British Psychological Society.
Fellow of the Institute of Biology.
Executive Board Member of the European Sleep Research Society.
Scientific Board Member of the World Federation of Sleep Research Societies.
Member of the British Society of Clinical Neurophysiology.
Member of the British Neuroscience Association.
Forensic investigator and expert witness for the Crown (over 40 cases).
Editor in Chief of the Journal of Sleep Research.

Alan Kirk

Consumer representative on child restraints for the British Standards Institute.
Member of Traffic Accident Causation in Europe 6FP EC project steering committee.
Associate Member of Institution of Mechanical Engineers.

James Lennard

ISO Working Group.
Member of the Association of German Engineers.
Member of the Parliamentary Advisory Council for Traffic Safety.

Dr Andrew Morris

Member of the Parliamentary Advisory Council for Traffic Safety.
Expert witness.
Paper reviewer for the Australian Medical Journal.
Member of the International Injury Scaling Committee.
Member of the CCIS Steering Committee.
Paper reviewer for the International Journal of Crashworthiness.
Member of PENDANT project steering committee (leader of 3 work packages).
Member of SafetyNet Project Steering Committee.
Member of the Safety Rating Advisory Committee.
Member of European Enhanced Vehicle Safety Committee Working Group 21.

Dr Louise Reyner

Member of the European Sleep Research Society.
Member of Sleep Research Society (US).
Member of the British Sleep Research Society.
Advisor to 'Brake' – road safety pressure group.
Guest lecturer at University of Warwick Medical School.
Paper reviewer for various journals including 'Sleep' and 'British Journal of Psychology'.

John Richardson

Fellow of the Ergonomics Society.
Member of the Human Factors and Ergonomics Society.
Secretary of the ITS-UK Automotive Users SIG.

Professor Pete Thomas

Chair of the European Enhanced Safety Vehicles Committee Working Group 21 on Accident Studies.
Member the Parliamentary Advisory Council for Traffic Safety.
Independent Expert Member of European Transport Safety Council.
Research Advisor to UK Department for Transport.
Chair and Co-ordinator SafetyNet 6FP Integrated Project.
Chair & Coordinator of Pendant (Pan-European coordinator Accident & Injury Databases) 5FP research project.

Ruth Welsh

Member of European Enhance Safety.
Member of Parliamentary Advisory Council for Traffic Safety.
Paper Reviewer for International Research Council on the Biomechanics of Impact.

Partnerships: funders, research partners and educational links

Abbott Mead Vickers
Accident Research Centre, Monash University, Australia
Accident Research, PSA Peugeot Citroen-Renault
ARU-MUH – Accident Research Unit, Medical University of Hannover
Association for the Advancement of Automotive Medicine
Autolive Development AB
Automobile Association (The AA)
Automobile Safety Lab, University of Virginia
Avon & Somerset Police
BBC
Bedfordshire Police
Birmingham Automotive Safety Centre
BRAKE
British Standards Institute
Central Motorway Group Police
Chalmers University, Sweden
Cranfield Impact Centre
Cumbria Police
Department for Transport
Department of Health
Department of Transportation Planning, National Technology University of Athens
Derbyshire Police
Devon & Cornwall Police
Director General for Energy and Transport, EU
Directorate E – Inland Transportation, EU
Driver and Vehicle Licensing Agency
Essex Police
EuroNCAP – European New Car Assessment Programme
European Transport Safety Council
EuroRAP – European Road Assessment Programme
Federal Highway Research Institute of Germany
Finnish Motor Insurers Centre, Finland
Ford Motor Company
GMB Union
Hampshire Police
Health and Safety Executive
Humberside Police
Idraulica Transporti e Strade, University of Rome
INRETS – Institut National de Recherche sur les Transports et leur Sécurité
Institut Belge pour la Sécurité Routière Asbi
Institute for Transport Sciences Ltd, Hungary
Institute of Transport Economics, Norway
Institute of Transport Safety
Israel Institute of Technology
Junior Hospital Doctors Association
Kent Police
Kuratorium für Verkehrssicherheit, Austria
Laboratório Nacional de Engenharia Civil, Portugal
Leicester General Hospital
Leicestershire Police
Lincolnshire Police
Machine & Vehicle Design
Medical Biomechanical Accident Analysis
Medical University of Hannover
Metropolitan Police
Motor Industry Research Association
Munich University
National Technical University of Athens
Netherlands Organisations for Applied Scientific Research
Norfolk Police
North Wales Police
North Yorkshire Police
Northamptonshire Police
Nottingham City Council
Nottingham University Hospitals
Nottinghamshire County Council
Nottinghamshire Police
Office of Crash Avoidance Research, National Highway Traffic Safety Administration, USA
Parliamentary Advisory Council on Transport Safety
Police Federation
Red Bull Ltd.
Road Directorate, Ministry of Transport, Denmark
Road User Safety Division, Department of Transport
Royal Society for the Prevention of Accidents
South Yorkshire Police
Staffordshire Police
Swedish National Road Administration
Swiss Council for Accident Prevention
SWOV Institute for Road Safety Research, Holland
Technischer Überwachungs-Verein South Group
Thames Valley Police
The Crown Prosecution Service
The Highways Agency
The Motor Insurance Repair Research Centre
The RAC
The Transport Research Laboratory
TMS Consultancy
TNO, The Netherlands
Toyota Motor Engineering & Manufacturing
Trades Union Congress
Transport Research Centre of the Czech Republic
Transport Technology & Standards, Department of Transport
TRW Automotive
University of Warwick
Vehicle Safety Engineering Nissan
Warwickshire Police
West Mercia Constabulary
Wiltshire Police
Worcestershire Police

Publications

Below is an indicative list of some of the most significant and recent publications produced by the University in the field of road, vehicle and driver safety.

Vehicle Safety Research Centre

Department for Transport 'Policy Evaluation Programme Vehicle Safety Standards: Improving Car Crashworthiness', Welsh, Frampton, Bradford, Roberts and Unell, 2006

International Research Council on Biomechanics of Impact 'Future Research Directions in Injury Biomechanics and Passive Safety Research', P.Thomas et al, 2006

Department for Transport 'A Review of Secondary Safety Priorities', Welsh, Morris, Frampton and Thomas, 2006

EC 'Roadside Infrastructure for Safer European Roads: D06 European Best Practice for Roadside Design: Guidelines for Roadside Infrastructure on New and Existing Roads', R Thomson et al, 2006

EC 'Roadside Infrastructure for Safer European Roads: D08 European Best Practice for Roadside Design: Guidelines for Maintenance and Operations of Roadside Infrastructure', J Andersson et al, 2006

EC 'Roadside Infrastructure for Safer European Roads: D04 Envelope of Vehicle and Driver Response Prior to Collisions', S De Ridder et al, 2006

EC 'Roadside Infrastructure for Safer European Roads: D03 Critical Vehicle and Infrastructure Interactions', R Thomson et al, 2006

EC 'Roadside Infrastructure for Safer European Roads: D02 Summary of Driver Behaviour and Driver Interactions with Roadside Infrastructure', W H Janssen et al, 2006

Department for Transport 'The Safety Benefit of Retro-Reflective Markings on HGVs and Buses: Partial RIA – Preliminary Report', Richardson R & Lawton C, 2005

Department for Transport 'Assessment of the Safety Benefit of Retor-Reflective Markings on HGVs and Buses', Lawton C, Richardson J & Welsh R, 2005

Department for Transport 'Development and Implementation of the UK On the Spot Accident Data Collection Study – Phase1', Hill J, Cuerden R, 2005

Welsh R, Morris A, Hassan A, 'Struck Side Crashes Involving Regulatory European Passenger Cars- Crash Characteristics and Injury Outcomes', International Journal of Vehicle Safety, 2007

Welsh R, Morris A, Hassan A, Charlton J & Fildes B, 'Crash Characteristics and Injury Outcomes for Older Passenger Car Occupants', Transportation Research, 2006

May A, Ross T, 'Presence & Quality of Navigational Landmarks: Effect on Driver Performance', Human Factors, 2005

May A, Ross T & Osman Z, 'The Design of Next Generation In-Vehicle Navigation Systems for the Older Driver', Interacting with Computers, 2005

Shi F, Gale A, Purdy K, 'Exploring Eye Responsive Control form a Head Mounted to a Remote System', Proceedings from the Ergonomics Society Annual Conference, 2007

Page Y, Thomas P, Herve V, Kirk A, 'The Effectiveness of Side Airbags in preventing Thoracic Injuries in Europe', Expert Symposium on Accident Research in Hannover, 2006

Driver Sleepiness Research Group

- Horne J.A. & Reyner L.A. 'Sleep related vehicle accidents', *British Medical Journal*, 1995
- Horne J.A. & Reyner L.A. 'Driver Sleepiness', *Journal of Sleep Research*, 1995
- Horne J.A. & Reyner L.A. 'Driver Sleepiness: comparisons of practical countermeasures – caffeine and nap', *Psychophysiology*, 1996
- Reyner L.A. & Horne J.A. 'Suppression of sleepiness in drivers: combination of caffeine with a short nap', *Psychophysiology*, 1997
- Reyner L.A. & Horne J.A. 'Falling asleep at the wheel: are drivers aware of prior sleepiness?', *International Journal of Legal Medicine*, 1998
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Extracts from Letters

TOYOTA

'The VSRC..is one of the leading accident investigating teams in Europe with unique experience examining ergonomic requirements for vehicles and vehicle equipment and the relation to injury outcome. This innovative integrated approach is increasingly important in the continuing drive to reduce and ultimately prevent casualties.'

Colin Hensley, General Manager, R & D External Affairs & Communication & Tjark Kreuzinger, Manager, Technical Communication Toyota Motor Europe

THE DAILY MAIL

"...I would like to endorse the work carried out by the University. Specifically Professor Jim Horne and his team gave generated a fund of robust studies carried in authoritative journals, which are regularly reported by myself and in other national media outlets.

The reputation of the University's work and the ability of Professor Horne to present the information in a meaningful way for lay readers has ensured wide, well-justified coverage.

In recent years the issue has widened from private drivers to the commercial field, along with increasing awareness of the risks of sleep apnoea to road users. This is another area in which I can rely on the University's expertise."

*Jenny Hope, Medical Correspondent
The Daily Mail*

FTA
FREIGHT TRANSPORT ASSOCIATION

"This is a crucial issue to the freight transport industry where operators and drivers are acutely conscious of the need for alertness and concentration under often difficult road conditions and unsocial hours. Much road freight transport takes place at night and, in particular in the early hours of the morning and this places additional stresses on drivers that employers need to be conscious of in planning their schedules.

...We first worked with Professor Jim Horne when he accepted out invitation to speak at our Annual Conference in 2001. This was at the time when the European Commission was prosing to extend working time controls to the road transport sector and an appreciation of the effects of work and rest patterns on drivers' sleep was a central issue in the protracted debate.

Professor Horne's exposition to our members of the science of sleep patterns and in the particular the ways that lifestyle and work patterns can influence them was a revelation. His analysis of driver behaviour and its relation to attentiveness struck a chord with our members both as employers of drivers and as business drivers in their own right.

Such was the success of this presentation, and the heightened awareness amongst delegates, that FTA commissioned a full portfolio of advice and information from [the University] for wider dissemination. This consisted of leaflets, posters and pocket cards that were distributed free to members to help convey the importance of lifestyle choices on driving behaviour and sleepiness.

These essential messages were subsequently conveyed first-hand by Professor Horne and Dr Louise Reyner to over 1000 of our members in the course of our annual Transport Manager seminar series during the autumn of 2001. These presentations supported by the documentation raised awareness of the issue and provided sound practical advice to fleet managers and transport operators in an easily understood, and at times, highly entertaining form. Delegate feedback at the time confirmed the value of this information.

A key ingredient for the success of this initiative was the provision of practical advice and guidance for employers, as well as elucidation of the challenge and risks of sleepiness in drivers. FTA continues to rely on this advice and has incorporated it into its Yearbook on Transport Law, its' Guide to Managing Drivers and its' Driver Handbook.

The information is valued because it is derived from first-hand research based on conditions experienced in the real-world. This is the crucial link often missed in academic research but the success of the project demonstrated the relevance and topicality of [the University's] work and its ability to make a meaningful contribution to those challenged with the job of managing these issues in the workplace.

*James Hookham, Policy & Deputy Chief Executive
The Freight Transport Association*

**U.S. Department of Transportation
National Highway Traffic Safety Administration**

"[The University's] expertise in accident investigations and road accident data collection has been well know for over three decades. Their involvement in safety research, biomechanics and intelligent safety technologies is also well recognised by others engaged in such activities... [The University] has done outstanding work in the field of vehicle and road safety."

*Joseph N Kaniyantra PhD
Associate Administrator for Vehicle Safety Research, US Department of Transportation*

“...Professor Horne, Dr Reyner and their colleagues at [the University], have made a huge impact on society’s awareness of the real and significant dangers of sleep-deprived driving, and this essential work must continue in order that deaths and injuries can be reduced on our roads.

....I will use my own experience as a case study in support of their work. On 27 February 2001, the man that would cause the Selby rail disaster the following morning was still a stranger, and our paths in life would never have crossed until I lost my husband, Barry Needham, in the crash.

On the night of 27 February, the man subsequently convicted of causing the deaths of 10 people, stayed awake all night on the internet, prior to driving a vehicle on a long journey the following morning. During the journey he fell asleep at the wheel of his vehicle, causing it to veer off the motorway and onto the adjacent railway lines. Almost immediately, a train struck his vehicle, causing the train to derail and collide with a freight train travelling in the opposite direction. Ten people died (including my husband), and another 70 were injured, many seriously, in what became known as the ‘Selby Train Crash’.

Having lost my husband in such a senseless way, it is not surprising that I feel that sleep-deprived driving should be a criminal offence, and I hope that further research will lead to changes in the law. The extent to which drivers are aware of being fatigued has significant implications for criminal prosecutions. However, the real benefit of research is not simply to convict the irresponsible, but to encourage a step-change in road safety, with a much better informed driving population.

The work carried out at [the University] led to ensuring proper accountability at the trial, and the sleep-deprived driver was convicted and imprisoned. Professor Horne was able to establish that the driver knew that he was at risk of falling asleep, yet he chose to continue driving regardless of the inherent dangers. Professor Horne’s expertise greatly helped secure this conviction. He explained to the Crown Court that sleep-deprivation can be identified and prevented.

I do hope that Professor Horne will receive support to do further research into the question of intention and accountability in relation to sleep-deprived driving. I have always felt that a sleep-deprived driver could have been expected to know that he or she risked harming others, and that driving when tired is extremely dangerous.

For me, a part of my healing is the hope that everything possible is done to reduce the risk of others encountering sleep-deprived drivers. We cannot drastically limit our journeys, but with continuous research into the danger of sleep deprivation our roads may become safer. The issue of fatigue touches all drivers, including truck drivers and foreign drivers coming to this country. I would hope that in time a device might be developed at [the University] or elsewhere, that will detect signs of fatigue. This might take the form of an instrument that might prevent a sleep deprived driver from starting up the vehicle. What is clear is that research is fundamental to the continued success of Professor Horne and his team. I fully support it and commend his achievements so far.”

Margitta Needham
Widow of Barry Needham, a victim of the Selby Rail Crash

“A further area of activity for the Centre has been a fundamental review of vehicle safety priorities. This work is a key aspect in determining how the Department moves forward both in terms of our future research programme and the policy areas which will present the biggest casualty savings at the least cost to industry and consumers.

We are currently developing new assessment protocols for advanced safety features on new vehicles. Professor Pete Thomas’ contribution to this new work has provided helpful scientific advice which moved the Department’s policies forward whilst ensuring the UK academic community remain engaged.”

Ian Yarnold
Deputy Divisional Manager
Transport Technology & Standards, Department for Transport

Department for
Transport

“I strongly appreciated working with

Professor Pete Thomas of the VSRC and his staff. Their highly professional behaviour and their ability to maintain a constructive atmosphere among the consortia were decisive factors in the success of both projects which have provided essential contributions to the development of the European Road Safety Policy. In particular, SafetyNet has raised a very high profile, not only at European level, among the Road Safety Community (scientists, policy makers and the automotive industry).”

Jean-Paul Repussard, Principal Administrator
Road Safety Unit
Directorate-General for Energy & Transport of the EC



EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR ENERGY AND TRANSPORT
Road Safety

“We are impressed by the quality and efficiency of the work accomplished by your team. We do experience our research collaboration with this team as excellent, and appreciate their organisational skills as well as their road safety expertise.”

Patric Derweduwen, Managing Director
Institut Belge pour la Sécurité Routière asbl, Belgium



CHALMERS

"In cooperation with Volvo Car Corporation, VSRC carried out high quality in-depth studies on car crashes in England in several projects. In 1987 the ISO WG 7 (Traffic accident analysis methodology) started, where I have served as Chairman until 2005. Experts from VSRC have been active in the work since the start, and have by their deep knowledge and long experience in the field of traffic accident research, given an outstanding contribution to the deliverables of the group.

Other activities of great importance are EU-projects, (PENDANT and SAFETYNET) which are initiated and coordinated by VSRC.... These projects have been led by VSRC in a very effective way where an important dialogue between experts in different countries has been established and encouraged. By this power of initiative and leadership capacity by VSRC, a basis for common European accident collection and accident analysis has been established, which is of vital importance for the future safety work in Europe.

The high competence and knowledge which VSRC has in the field of traffic accident research, in combination with strong engagement and extremely good ability to influence the safety work in the world make it easy for me to highly recommend [the University]..."

Hans Norin, Adjunct Professor in Vehicle Safety at Chalmers University of Technology and Manager of Safety Research at the Volvo Car Corporation



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"Our collaboration has proved excellent at all levels and we were able to ascertain that [the University] uses first-class research to solve 'real-world' problems by carrying out integrated interdisciplinary research into the vehicle and road safety field. Its expertise in accident investigation and special data systems development for monitoring and assisting vehicle and road safety analysis and improvements at international level is highly valued.

Scientific relevance, innovation and practical orientation are strengths of [the University] demonstrating thus how excellence in research can be applied with wide impact and benefit for the society. In addition, within the SafetyNet integrated project, [the University] experts proved very efficient and systematic and showed strong managerial competence in coordinating a vast and multinational consortium of research institutes."

Dr George Yannis, Assistant Professor National Technical University of Athens



"The relationship between Nottinghamshire Police and [the University] spans over six years and the project staff are highly regarded within our organisation.

Their research can be relied upon to be thorough and comprehensive with real practical applications.

The research team have clearly immersed themselves in their project and are personally committed to reducing collisions, injuries and deaths. In addition to the research they spend time in schools talking to children about road safety on a voluntary basis and periodically assist in the training of police officers in crash scene safety and the preservation of evidence.

The work of the [the University] is therefore directly contributing to reductions in the numbers of people killed or seriously injured on our roads each year..."

Stephen Green QPM MA Chief Constable of Nottinghamshire Police



"Within the ETSC, its members and the European and International road safety community the VSRC is highly reputed for the outstanding quality of its research on accidents, injury and safety.

I would not hesitate to say that it is due to the sustained participation and commitment of the VSRC and other leading road safety experts from across Europe that ETSC has been able to successfully advise EU policy makers on continuously improving EU regulations and policies in the field of road safety. I believe it is fair to say that without the VSRC Europe's roads today would be less safe."

Dr Jörd Beckmann Executive Director, European Transport Safety Council (ETSC)



"When I was a Member of the House of Commons 1962 - 2005, I represented the West Lothian area of the notorious A8/178 between Edinburgh and Glasgow, at first a three-lane road in both directions. Accident followed accident.

Professor Jim Horne, and his colleagues at [the University], offered their expertise in micro-sleep to the Lothian Police, and myself, to considerable beneficial effect. Professor Horne came to see me several times in the Commons."

Tam Dalyell, Rector, University of Edinburgh and former Member of Parliament.



"The contribution of the University has been significant in two main areas. We know that fatigue is a significant factor in road deaths at certain times of the day. The work of the Sleep Research Centre has helped to identify the times of day at which fatigue related accidents are likely to occur, the types of road that can exacerbate fatigue and potential counter-measures. All of these are significant to our understanding of this important issue.

The work of the Vehicle Safety Research Centre has also helped practitioners to identify counter-measures to improve secondary safety in vehicles. Car occupants remain a substantial element of those killed and injured on our roads. Detailed analysis of accidents and the resulting deformation within the vehicle have helped to explain what more can be done to improve the safety of car occupants. In addition, the current On the Spot study, undertaken by VSRC, is beginning to extend further our understanding of the factors leading to crashes on our roads."

Robert Gifford, Executive Director, Parliamentary Advisory Council for Transport Safety



"Rapidly it became obvious that VSRC were gaining more and more experience in the field of accident research. First, their involvement in accident data collection, i.e. especially the Cooperative Crash Injury Study (CCIS) and the On The Spot study (OTS), orientate towards primary and secondary safety, demonstrates the capacity of VSRC to identify the pertinent data needs for better crash and injury prevention. CCIS is still one of the most relevant European dataset that can provide useful insights into the magnitude and the nature of injuries and injury mechanisms sustained by car and light truck occupants in a crash. The OTS is also a very significant initiative leading to a better understanding of the complex accident mechanisms. It's becoming one the most complete and bigger crash investigation project in Europe.

Secondly, VSRC increased their experience, tools and techniques in accident analysis over the years. Scientific papers are addressing the relevant issues and often anticipate the real-world safety problems. They are generally of a high standard, very clear, thorough, well documented and as comprehensive as possible. The papers are regularly presented, and published in well known safety conference and journals, that enhance the reputation of the VSRC.

Thirdly, VSRC is very much proactive in accident research and committed its members in all the most important projects of networks in the UK and in Europe, in which accident data and accident analysis is required. STAIRS, PENDANT, PRISM, PASN, CHILD, RISER, TRACE and of course SAFETNET, are some examples of the research projects in which VSRC took the lead or played a major role. It becomes now obvious that no project of that kind could be set without VSRC participation.

Fourthly, VSRC is progressively setting excellent relationships with similar laboratories over Europe. These relationships consist of joint projects, joints activities or simply a network...

Finally VSRC is very much connected to the stakeholders in the UK and in Europe which makes their research outcomes usable for those who have to take decisions. It is of high importance that the research results are transferred, understood and put into operational policies for Europe can continue saving lives on the roads."

**Yves Page, Adjoint au Directeur
Laboratoire d'Accidentologie, de Biomécanique
et d'études du comportement humain
PSA Peugeot Citroën - Renault (LAB)**



"I have been aware of this team for almost twenty years and throughout that time they have combined world-leading academic research with a firm unwavering commitment to ensure that the research has a measurable impact on the lives and wellbeing of the people of the United Kingdom and beyond. This commitment, to what is known as the knowledge transfer agenda, has been undertaken in a broad set of areas and to the same brilliant standard as the research itself."

**Professor Ian Diamond FBA AcSS
Chief Executive, Economic & Social Research Council**

"The activity in vehicle and road safety is one of the most long-standing and important of all of the areas of work in the University. It brings together internationally-recognised activities drawing on a broad spectrum of disciplines. I hope it is appropriate if I mention two in particular.

The work of Professor Jim Horne and his group has been at the heart of addressing a problem which almost everyone has experienced at one time or another, that of drowsiness when driving. Jim has been at the forefront, not only in recognising and researching the issue, but just as importantly in driving the agenda of awareness and in bringing expert evidence to bear in the most serious of cases in court. His work has made a real difference.

The second area is in the work of the Vehicle Safety Group, and their long-standing programme with local police forces, to bring a rigorous scientific approach to the gruesome task of analysing causes and consequences of road accidents. This has involved them in attendance at accidents with the police. It is work of huge practical importance."

**Professor Sir David Wallace
Master, Churchill College Cambridge
Director, Isaac Newton Institute for Mathematical Sciences
Treasurer and Vice-President of The Royal Society**



"I have always been impressed with the multi-centre co-operational programmes designed by [the University], finding them to be projects that are well designed, focused and most importantly, producing results.....I have long been impressed with the work of the VSRC at [the University] and have no doubt that it has contributed to a decreased mortality and morbidity of road users not only in the UK but throughout the world."

**Mr Demas A Esberger, FRCS FFAEM
Consultant, Emergency Department,
Nottingham University Hospitals NHS Trust**

"I have worked with the Vehicle Safety Research Centre accident investigation team headed by Prof. Pete Thomas for the past several years in my role as one of industry sponsors to the UK Co-operative Crash Injury Study. My experience working collaboratively with them has been brilliant.

They are widely known on a global basis as leading pioneers in the field of scientific accident investigation and research. Their high-level research activities so far as typified by the papers published in the IRCOBI (International Research Council on the Biomechanics of Impact) Conference are of great value to seek the way how to reduce the number of fatality and casualty through road collisions – not only in the UK but across the world including here in Japan.

In addition to this I am impressed by the forward-looking research on human FE modeling for pregnant women and the fetus published in the ICrash (International Crash Worthiness Conference) 2006 by Dr. Serpil Acar, Department of Computer Science, Research School of Informatics, which predict the necessary safety trend of the future. Under a current road safety situation where the safety for male adults has been considerably improved and there is growing need to improve the safety levels of the elderly, children and pregnant women, this can be said to be one of the most attention-getting research from global automotive safety engineers who are always looking at every possible way to design safer-performance vehicles.

I have learned a great deal through such kind of academic activities in [the University] on how accurately based on facts to address the complicated road safety issue. I honestly believe that they are accomplishing the prodigious amount of quality work and making really substantial contribution to a global real-world vehicle and road safety."

Tomosaburo OKABE
Expert Leader, Chief Safety Engineer,
Nissan Advanced Technology Centre, Japan

"Through its participation, often as leader, in many international research projects, as well as through its own research projects (such as its fundamental work on driver behaviour and sleepiness) and members' publications, VSRC has shown clear evidence of established international leadership and reputation in transport safety. Through the SafetyNet project, as I have been privileged to see at close range, it has placed itself at the forefront of European safety research and actions. And through its commitment to the vital work VSRC is doing, [the University] is saving lives.



Professor Francesco Filippi, Director of the Centre for Transport & Logistics
University of Rome La Sapienza

"The University makes and outstanding contribution to reducing road casualties.....Professor Pete Thomas established the Centre's first team in 1982 and has built up a multi-disciplinary team of individuals with international reputations in crash investigation, biomechanics, vehicle impact performance and the contributory behavioural factors that lead to crashes. The Centre is a leader in European cooperation and development."



John Dawson
Chairman
European Road Assessment Programme (Euro RAP)

"I am the lead for the Association of Chief Police Officers in respect of all Roads Policing issues. In that role I have seen at close quarters the work of Professor Pete Thomas and his team in driving the SafetyNet project. This project will deliver much greater road safety by ensuring that collision data across Europe is comparable and accessible to all. Bringing together European nations in this way means that the data quality is to a far higher standard and can be analysed with a degree of confidence which is missing from national data alone.



This work...has made a significant contribution to the understanding of road safety issues in the United Kingdom and is directly leading to policy changes and improved regulation, through ensuring that the research is based upon an accurate understanding of collision factors and their frequency on differing types of roads.

...I greatly value their contribution to the debate on road safety in the UK together with the understanding of causal factors which their work is bringing. Without extensive research led by high class academic institutions, the arguments in respect of road safety are all too often based on emotion and historic practice. [The University] represents a significant asset in the drive to bring down the levels of killed and seriously injured people through road collisions – not only in the UK but across Europe."

Meredydd J Hughes QPM BSc
Chief Constable, South Yorkshire Police

"The University has made a substantial contribution to reducing casualties from road traffic accidents through its research. The VSRC is a world leader in work on injury causation from traffic crashes, and has in recent years further extended that work through the On The Spot study into the area of accident contributory factors and accident causation. The work has guided better vehicle design for occupant protection and this has been a contributor to the notably better performance of newer vehicles on occupant protection. Improved occupant protection has made a substantial contribution to casualty reduction in Great Britain and across Europe. In the future VSRC will be able to provide valuable insight into how crashes can be reduced through, for example, better road design.



...the Sleep Research Centre have carried out pioneering work on driver sleepiness and fatigue. They have defined driver fatigue as a major cause of accidents. Their work has produced important results not only on the human and environmental factors that cause sleepiness, but also on remedies for driver fatigue and in particular the practical advice of drinking coffee and taking a short subsequent nap. This advice and other outcomes from the research has the potential to save hundreds of lives."

Professor Oliver Carsten, Professor of Transport Safety, University of Leeds

"....A better understanding of the single vehicle collision has been gained. Individual countries have been able to see where their own impact protection standards have fallen short, and therefore where there is a potential to make improvements. Some of the big gains in safety could be made in new member states, where there is considerable road construction, and where standards in this area have hitherto been relatively low.



...It is my view therefore that [the University], through VSRC has made and continues to make a significant contribution to road safety research in the UK and Europe."

Steve Proctor, Director, TMS Consultancy

"MIRA regard the VSRC as a world leader in accident investigation. Of particular note is the renowned expertise in examining causes of crashes, both through retrospective analysis by experts and by a specialised team attending crash scenes as part of one of the world's largest studies in to car occupant injury causation.



I have no doubt that the information and know-how provided by such work has contributed to a reduction in injuries, an improvement in the safety design methodology of vehicle and restraint system manufacturers and informed policy decision in this area by government departments."

Dr Anthony J Baxendale, Manager, Advanced Engineering & Research Motor Industry Research Association (MIRA)

"University based research on traffic accident causation in the real world, injury mechanism and the crashworthiness of vehicles is not easy for two reasons. First it is interdisciplinary, cutting across engineering, medicine, psychology and economics. Secondly, it requires data and hence co-operation from the police, hospitals, highway departments and the public. Structuring good quality research therefore across university departments and dependant on the long term collaboration of various outside bodies requires patience, diplomacy and good experimental design,

With these factors in mind I believe that VSRC has contributed enormously to our knowledge of the subject and has influenced a number of key policies from the government and other bodies. For example, the greater level of public awareness of vehicle crashworthiness by the government, by industry and the public, and the increasing importance of the EuroNCAP car rating scheme have been driven largely by the real world studies of crashes at [the University] as part of a long term database established in the early 1980s. Without such a longitudinal database advances in vehicle design cannot be truly assessed. In comparison to conventional diseases, traffic injury control still piecemeal and uncoordinated, but the research at [the University] is slowly changing our views and replacing folklore with science.

The work at [the University] is recognised by its peers and many organisations around the world so that members of the VSRC are asked to contribute to the European Transport Safety Council, the European Commission, the International Research Council on Biomechanics of Injury and many others.

At this time particularly it is important the good independent research into traffic injuries is recognised and supported. In Europe the tide of power and money has flowed from nation states to Brussels, changing the relationships between sponsors and researchers. VSRC have successfully lived with the new, evolving structures, keeping its independence and yet contributing to a number of complicated European projects involving industry, governments and international agencies."

Professor Murray Mackay, Professor Emeritus of Transport Safety, Birmingham Accident Research Centre