Briefing:

Traffic Law Enforcement Technology in the UK

A short guide to current practice, policy options, and related approaches to using enforcement technology in the UK

February 2009

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Enforcement Technology

This briefing offers ITS (UK)'s informed opinion on how current enforcement technology solutions supplement existing road safety and compliance measures. In addition, the briefing document aims to dispel a number of inaccuracies and simultaneously address some of the controversies that have accompanied their deployment.

Overview

Recent changes in the way that fixed-point Safety Cameras are funded has prompted local authorities to consider whether or not they are little more than 'cash cows' aimed at inflicting a 'stealth tax' on motorists or a significant contributor to the reducing the numbers of people who have been killed or injured on the UK's roads. Current Department for Transport (DfT) 2007 statistics suggest that the UK is achieving EU2010 road safety casualty statistics targets in most areas. However, the increases in collisions involving pedestrians, motorcyclists and young drivers (particularly males) detract from the wider achievements and give considerable cause for concern. Inappropriate speed is a recurring factor and a major contributor in road deaths and serious injury casualties. Other contributory factors such as driving while under the influence of drink or drugs, reduced use of mandatory safety devices such as seatbelts, and dangerous or inappropriate driving behaviour, mean that the environment within which road safety professionals have to operate is both complex and diverse. Further to the associated costs incurred through trauma treatment and recovery, there are significant cost implications to UK PLC through traffic disruptions and congestion.

Improving road safety has traditionally focused on three fundamental areas - 'education', 'engineering' and 'enforcement' therefore this appears to be an opportune moment to present an objective assessment on a range of available enforcement technologies. Whilst ITS (UK) appreciates it has minimal skills in the first area and that other organisations are better placed to act in this area, it can comment authoritatively on the other two areas, i.e. enforcement and the technology-related aspects of engineering. The report 'Towards Better Transport' published by the think-tank 'Policy Exchange', in association with Serco and Bevan Brittan LLP, identifies that the UK has the most crowded and congested roads, the fewest motorways and some of the worst public transport amongst the leading industrialised countries. Each year, more than 1.6M person kilometres are travelled on each kilometre of Britain's road network; more than twice the European average. Increased traffic flows require efficient and robust procedures to cope with the 'engineering' and 'enforcement' demands that ITS (UK) considers are critical to aiding casualty reduction targets. It is also clear that technological solutions are not the only tool to achieve the Government's targets; to be most effective they need to be integrated within a broader package of road safety improvement measures.

There has been a continuous escalation in the numbers of vehicles occupying the finite road network (approximately 33 million UK registered vehicles) further complicated by the added frequency of their use (15% increase since 1994-98 baseline average by road type). Significantly this increase coincided with a commensurate 11% reduction throughout the UK police service of dedicated roads policing resources. This reduction came about as a consequence of a realignment of core policing functions, and although this is being redressed it has necessitated an increased reliance on the Highways Agency's Traffic Officer Service. The traditional definition of 'engineering' is naturally linked to improving the road infrastructure itself. However ITS (UK) proposes this definition can be broadened to include the 'technological' aspects of engineering encompassing both roadside and in-vehicle safety devices.

'Enforcement' as the reactive response to offences being committed is increasingly reliant on camera-based technology that records the evidential details of what has taken place. This sequentially involves the accurate detection and interpretation of a vehicle's registration mark and consultation with the DVLA database to determine the identities of offending drivers and/or passengers. Whilst the threat of prosecution remains a deterrent for the majority of drivers, an increasing minority consider themselves to be effectively immune. If this is considered in conjunction with reduced roads policing resources, the need for ITS enforcement technologies becomes ever more important. Minor offences which remain undetected 'open the door' to a whole myriad of other, more serious offences such as reckless/dangerous/ careless driving, disqualified driving, no driving licence, no insurance, no MOT test certificate, etc. Individually these are important offences however this is aggravated by anecdotal evidence that suggests that persistent criminals commit numerous road traffic offences as a matter of

routine. Automatic Number Plate Recognition is a proven technology and has been used to great effect however the Public Accounts Committee report (2007) suggests that there is increasing Vehicle Excise Duty evasion through deliberately misrepresented plates that undermine the technology's effectiveness. DVLA records are currently insufficiently accurate to identify and prosecute all offenders; a situation exacerbated by substantial increases in foreign registered vehicles of all types using the UK's roads. At the present time, there are no effective enforcement mechanisms for the drivers/operators of these vehicles other than police officers initiating interviews at the roadside.

Figure 1 - Kapsch / Combitech solution to Road User Charging enforcement during on-road trials in Leeds (photo TRL)

Current situation

This briefing document outlines the current and future technology options that will assist achieving casualty reduction targets. Irrespective of statements to the contrary 'speed kills' if only because drivers' response times to an emerging problem are reduced proportionate to the increased speed involved. In particular ITS (UK) would like to address certain specific issues as follows:

To what extent have targets for casualty reduction been a useful tool for focusing professional activity?

Casualty reduction targets provide important guidelines on the requirements to reduce death and serious injury collisions; in addition, they provide an insight into the impact of changing trends and allow road safety improvement efforts to be better targeted. 'Tomorrow's Roads - Safer for Everyone' published in March 2000 show that a quarter of all accidental deaths are the result of road crashes rising to 80% of accidental deaths among young people aged 15-19. This may be attributed to those drivers, mainly male, who are driving vehicles beyond either their own personal or the vehicle's capabilities, or both. DfT road casualty statistics (2007) reinforces this trend whilst simultaneously highlighting the vulnerability of motor cyclists and pedestrians. If deployed correctly, technology can be used to collate safety-related data which is invaluable to road safety professionals. For example, the findings of the EU-funded 'Project Veronica' recommend that on-board 'black-box' recorders be fitted to vehicles as standard equipment. They provide real data to allow road safety experts to have a greater understanding of collisions and to help target their responses to address the real risks and the real risk-takers.

What further measures need to be adopted to reduce deaths and injuries arising from drinking and driving?

Fitting commercially-available 'alcolock' devices that require a driver to undertake a breath test are a means to prevent drink/drive offences. Whilst this is a step in the right direction, these devices can be circumvented by determined offenders. More sophisticated in-vehicle sensors that can detect drink, drugs and physical actions or responses, (such as pupil dilation, drooping eyelid and head movements, restlessness or inertia in the driving position) are preferable as they have the potential to override human intervention. Roadside drink/drug testing devices are being developed with a pilot study being undertaken in a small number of police forces; they are in their infancy but will prove more objective that the current subjective Field Impairment Test. However roadside drugs testing does bring its own challenges as drivers may have taken prohibited (i.e. illegal) substances and/or legally prescribed medication and/or alcohol. During recent research a large number of volunteers, who were known to have consumed alcohol, admitted consuming a 'cocktail' of drugs; one respondent admitted taking six drug types within 48 hours. Bringing a successful prosecution without being able to identify the substances allegedly taken can be difficult. Although this is a sweeping generality, prohibited substances are more likely to be taken by younger age groups whereas prescribed drugs are more likely to be taken by older drivers. The latter medication groups may cause impairment without the drivers themselves being aware or advised of the impact.

Figure 2 - AGD / Redflex portable safety camera

How does Great Britain compare with other EU countries in its approach to reducing deaths and injuries?

The UK has always taken a proactive approach to the reduction of deaths and serious injuries on UK roads and has been at the forefront of initiatives to reduce road casualties. However, this position has changed in recent years and the UK now lies 'fourth in the league table'. The UK needs to be aware of the road safety strategies of other nations, and be prepared to examine and where appropriate, adopt proven technological solutions. As an example, from a technological, operational and procurement perspective, the network-wide roll-out of Section Control in the Netherlands may have a beneficial influence on the expansion of Active Traffic Management schemes across strategic sections of the UK's motorways.

It is also important to recognise two emerging 'international' themes. First, the requirement and marketplace for ITS technologies is becoming increasingly global. Second, the UK's road safety problems are not unique. Considered together, this means that other nations are likely to have

experienced similar problems to the UK and may have deployed technological solutions to help address them. Continuity in international co-operation will help UK PLC learn from others' experiences and where necessary, influence the development of legislation and agreements that could ultimately enhance the effectiveness of technology as a road safety enabler.

How do approaches to reductions in risk on the roads compare to those adopted in other modes of transport?

Provided they have no personal involvement in a collision the general public attitude towards road collisions and casualties is that "they are one of those things that happen". Contrast this perception with the publicity surrounding air and rail collisions such as the crash landing of the BA flight from Beijing at Heathrow in 2008, and the Virgin Pendolino train crash in Cumbria in 2007. The former collision caused 17 minor injuries and in the latter one person was killed and five were seriously injured. For very obvious and correct reasons, rail and air collisions and incidents are subject to considerably more stringent investigations than road collisions. However when comparisons are drawn with the road deaths daily average of eight persons killed and seventy six severely injured consideration should be given to a similar approach being used for all fatal transport accidents. The ACPO Road Death Investigation Manual has proved invaluable in ensuring that all road deaths are fully investigated to determine the cause of the collision. The Corporate Manslaughter Act may have an influence on how organisations respond to the implications of being prosecuted for actions that cause collisions.

Are there specific blockages caused by shortages of appropriately trained and skilled staff?

As previously mentioned there has been an 11% reduction of roads policing officers in recent years through the reallocation of resources to other core-policing roles. The lack of roads policing resource presence, associated with a prosecution potential, has resulted in a general diminution of driving standards. The introduction of the Highway Agency Traffic Officers Service has assisted with road management issues. The Traffic Officers have limited powers and anecdotal evidence suggests there is a lack of public compliance to their directions. A recent court case highlighted this problem and set a precedent when a driver was prosecuted, and fined heavily, for failing to conform to the directions of a Traffic Officer. Shortages of appropriately trained and skilled staff are being supplemented by network monitoring of CCTV and ANPR systems at the Highways Agency's national and regional Traffic Control Centres by private sector staff, releasing public sector employees to concentrate on their core duties and responsibilities to minimise road casualties.

What further policies, not already widely used, might be considered for adoption and what evidence is there for their success?

Various engineering and enforcement technologies options, such as Intelligent Speed Adaptation (ISA) and Electronic Vehicle Identification (EVI) can assist in reducing road casualties however their deployment has to be assessed in conjunction with the public support / antipathy / opposition that they may reasonably be expected to incur. Enforcement is achieved through a diverse range of technologies and methodologies. Deployments range from local, isolated safety camera installations through to route- or city-wide deployments and large-scale back office operations. From an organisational perspective, much has been gained through the establishment of Road Safety Camera Partnerships. £110 million a year has been allocated to the new road safety camera funding arrangements to provide financial stability and facilitate long term planning over the period 2007/08 to 2010/11. However the degree to which these arrangements will allow this progress to continue, whereby the current 'ring-fencing' of road safety camera funding has been terminated in favour of investing greater flexibility and accountability to local authorities, police and the other agencies involved in improving road safety, remains to be seen. Local strategies and decisions need to be well-founded and have taken account of the combined knowledge and expertise of all the agencies concerned.

Throughout the UK road safety cameras provoke emotive responses and animosity from road users who, in general terms, feel they are unfairly targeted. This has resulted in some drivers perceiving themselves as being persecuted by the police service whom they accuse of "seeking out 'soft' performance indicator targets". This is an important issue as enforcement technologies are established roadside fixtures; there is scope therefore for a proactive education of road users about the purposes of enforcement rather than merely relying on responses to media challenges. This whole debate needs to be considered within the context of enforcement methodologies, equipment,

standards and techniques currently employed by various law enforcement agencies including those technologies deployed by and for the private sector industry. This issue is of fundamental importance to the ongoing use and public-acceptability of enforcement technology which now constitutes a permanent feature of the roads network infrastructure.

Reliable and volume enforcement capabilities are essential and current and future technologies, such as ANPR and EVI, are providing a greater automated enforcement capability. The DBERR Technology Strategy Board has recently funded a project that will provide the necessary research and development that will allow the integration of enforcement technology into the existing traffic signal infrastructure. This will potentially provide a more cost effective platform and 'lock in' the value of existing investment. Stringent evidential recording requirements defined through Home Office guidance has enabled the acceptance of images and associated data from digital road safety camera equipment as evidence in the prosecution of road traffic law offences, greatly assisting criminal enforcement in the process. This is being increasingly supplemented by demands from Local Traffic Authorities (LTA) for civil enforcement that will meet the expectations of the Traffic Management Act to regulate traffic flow in urban bus lanes, red routes, box junction and 'red light' camera sites. Enforcement by LTAs is supported by commercial sector organisations; all of which contribute positively in reducing road casualties.

Figure 3 - SPECS cameras on the 50km A77 route management scheme

Enforcement has to be fair to all road users, regardless of where they live, work or where their vehicle is registered. The VERA Projects funded by the European Commission have shown that attempts to impose and enforce penalties on non-resident violators raise many legal, organisational and operational issues. Even where non-resident violators are prosecuted through a formal legal process, penalties can rarely be enforced. This is not just a UK problem – it is an issue all EU Member States have to address. In addition to the negative impacts on traffic safety, this contradicts the principles of equitable treatment of all European citizens as enshrined in the Treaty and is not sustainable in the long-term. Government support will be required for the pan-EU legislation necessary to address this.

DfT intends to consult key stakeholders in developing a data schema for a national database of speed limits and will be testing the recommended approach through trials in 2009/10. Publication of the data schema would then follow successful trials of its use. However it is difficult to keep pace with regular changes through new road building programmes, and the re-designation of certain urban 30 mph speed limits to 20, 40 and 50 mph variations. Nevertheless completion of the database is crucial to emerging technologies such as ISA which provides road speed limit information to drivers thereby enabling them to modify their speed. Even in its simplest form ISA offers advice to drivers so that they have the opportunity to adjust their behaviour accordingly. Given the potential impact this kind of technology could have, the recently published results of the DfT ISA trial have been greeted with interest.

Essential road repairs and maintenance have to be undertaken in extremely hazardous circumstances therefore the balance between road workers safety and traffic free-flow has to be accurately judged. Prolonged road works require speed control to be managed and enforced to minimise the dangers and prevent deaths and injuries occurring. However motorists' common complaint is that "no work is being done" which leads to a general lack of compliance. Rigorous enforcement is seen to be disproportionate and unfair therefore one of the means to reduce the dangers whilst managing the motorists 'goodwill' is to encourage all vehicles to reduce their speeds in those areas. 'Spot' camera prosecution is regarded as 'unfair' and akin to persecution of motorists

whereas more intelligent camera deployment, using 'average speed' cameras and responsive 'signing' has proven to be effective whilst also being acceptable to motorists. Unlike 'spot' camera sites motorists recognise that they must moderate their speeds over a distance and 'go with the flow' literally and metaphorically. These installations are often supported by speed awareness signs that reinforce and advise offering a blend of enforcement and education. In much the same way 'vehicle activated signs' and 'variable speed limits' have proved their worth. For example there is a general recognition that slower but free-flowing travel on the M25 controlled sections and the M42 Active Traffic Management locations prevents frustration, avoids motorists 'taking chances' that frequently result in tragic consequences whilst simultaneously ensuring that travellers can expect unhindered journeys through those areas.

The UK's adoption of the 'eCall' capability, currently under review by DfT, would enable on-board sensors to detect a substantial impact whereby the occupants may be rendered unconscious, and automatically summons assistance from the emergency services. Medical evidence proves that prompt trauma treatment in, what is referred to as the 'golden hour', has significant impact on reducing injury severity.

<u>What should be the priorities for Government in considering further targets for casualty reduction beyond 2010?</u>

Technological developments will continue apace and the Government should be invited to consider the impact that ITS technologies can have to aid casualty reduction targets. One of the major areas under consideration is the on-going education of all road users. The lack of post-driving test education means that 'bad habits' acquired through driving experience are not addressed; in turn this results in a general deterioration of driving standards. Drivers, particularly young drivers, exhibit poor driving manners and a lack of adherence to the principles of the Highway Code. A general malaise of driving standards and skills may be attributed to an attitude of "It's my road – I pay for it and I can do as I like" and any perceived interference through enforcement is seen as an intrusion into the inalienable 'right' to drive as one wishes. However there are technical means that can detect poor driving standards and attitudes. Vehicles can be equipped with sophisticated sensors that determine differences in driving styles that can be detected, stored and then relayed to the relevant body – e.g. a poor or aggressive driving style could be reflected in 'pay as you drive' insurance premiums. Motor manufacturers routinely download stored driving information or receive this data in 'real-time'. Inappropriate driving behaviour can be readily identified and attributed to individual driving styles and the potential development of 'intelligent' sensors that could detect drivers making illegal mobile telephone calls or sending text messages would further aid the potential to reduce collisions and subsequent casualties. It can be seen that these developments could only be a short step to determining the drivers' identities; a useful function when young drivers may be subject to an insurance curfew, thus enabling education and/or enforcement solutions.

Summary

Not all drivers have intuitive or instinctive motoring skills nor possess a ready understanding, acceptance and adoption of technological complexities that may be demanded on rare occasions under exceptional situations. Considerable studies have been conducted into the 'Human-Machine Interface' to investigate and avoid driver 'information overload'. As a consequence the introduction of any new system that enhances any contribution to safer journeys should be supported. However the previously registered concerns and reservations must acknowledge there is a limited human interest, enthusiasm and intention to maintain, upgrade and monitor 'on-board' equipment to its highest standard and therefore compliance regimes are required.

The recent EU 'PReVENT' project exhibition showcased a range of intelligent technologies to enhance journey safety and security and capitalised on the cumulative expertise and comprehensive capabilities needed to help achieve the EU's 2010 casualty reduction targets. Generically these technologies incorporated lane deviation, vehicle proximity, collision avoidance and ADAS, and in certain instances these systems were sufficiently 'intelligent' to prioritise and provoke the vehicle to respond to the most significant threat. As its title suggests the PReVENT technologies anticipate road conditions and circumstances as well as monitoring driver actions and reactions and advise on impending incidents. In critical situations, the systems can 'assume vehicle control' and take avoiding and/or mitigating action. 'Assuming vehicle control' at certain critical times presents an interesting proposition as this could enable a driver to offer a legitimate defence in any court proceedings by

arguing that control was 'wrested' from him/her thereby preventing a wholly different and deliberate reaction. Furthermore there are concerns that sophisticated technologies may further insulate drivers from the 'driving experience' and compound driver inattention 'behind the wheel' through increased distraction from a variety of 'infotainment' devices. Current indemnities may prove inadequate, especially where a particular technology assumes a 'guardian angel' role, such as the one that a particular PReVENT technology proposes. A balance has to be struck between the roles and responsibilities of vehicle manufacturing/OEM industry and what Government agencies can achieve. For example is it reasonable to legislate which safety equipment should be fitted as standard equipment to new vehicles, or should it solely left to market forces?

In terms of the safety of commercial vehicle transport, there are technological measures that can ensure road user safety such as a further roll-out of WASP/VIPER 'weigh-in-motion' systems, enforcement of driving and resting times using digital tachograph systems, and ensuring that 'haulier offences' that are committed in one Member State can be taken into account in the 'home' country when issuing, renewing or revoking operator licenses, etc. The latter is currently being examined in a new EU-funded project called TUNER. Such measures would reduce the numbers of unqualified drivers and disreputable operators on the road and would have a marked impact on the numbers of unroadworthy vehicles on the UK's road network.

Conclusion

Enforcement is traditionally unpopular and technologies that aim to impose driver moderation through 'spot camera' enforcement at specific locations are particularly resented. However the siting of those fixed and mobile cameras has been based purely upon a proven excess speed history associated with fatal or serious injury casualty statistics. This data renders those locations as prime locations for enforcement and as permanent staffing of those locations is not sustainable remote technological interventions have been introduced to considerable effect to reduce collisions and injuries. In conclusion compliance through enforcement has traditionally fallen within the police service's remit however the sheer scale of road usage means that the requirement to detect the vast majority of offences must fall upon the use of modern electronic technologies that are inherently more efficient than previous methods of road traffic offence enforcement.

This briefing note seeks to highlight existing road safety problems and dilemmas whilst proposing current and future technological solutions that may assist. ITS (UK), through its Interest Groups, Members and industry links, is ideally placed to provide independent expert advice into the effectiveness of ITS technologies for enforcement.

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