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Call to action: towards a practice of inclusive road safety

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Abstract

Road safety in the UK is of a checkered history. Originating from an age of free motoring and wide-open roads of adventure, its practices and processes have often been preventative to walking and cycling. UK road safety resorts to uttering warning words rather than a combination approach of engineering, education and enforcement, and so regularly blames and restricts the active travel modes. This is to active travel's exclusion and reduction in participation when walking and cycling should be promoted and prioritised in environmentally, socially and economically ailing UK cities. A new approach to road safety will be discussed in this article, using principles of engineering risk assessment and sustainability. Countries like the Netherlands have road safety systems that are more holistic, take into account road design as well as promotion campaigns. By example of three case studies this article seeks to describe current practices of UK road safety, then continues to outline how a system of "Sustainable Safety" can be applied in the UK. A revised road-safety approach would include engineers and planners becoming more interactive on the political plane and employing wider assessment boundaries to road-safety analyses.

Keywords chosen from ICE Publishing list

Engineering ethics, Codes of practice & standards, Education & training, Design methods & aids, Government, Health & safety, Infrastructure planning, Local government, Management, Pavement design, Planning & scheduling, Project management, Risk & probability analysis, Roads & highways, Safety & hazards, Social impact, Sustainability, Town & city planning, Traffic engineering, Transport management, Transport planning, Urban regeneration

1 Introduction

The effect of an exclusively car-based transport system has come at the expense of high costs for public health, the environment and societal degradation (Becker et al, 2012; Hopkinson, 2012; Kay et al, 2011, amongst others). A socio-technical standpoint towards a car-based system is also coupled with a rationalisation processes in standards and norms (Urry, 2004) which resulted in professional practices that are now conceptualising and assessing risk in only a partial manner (Hillman et al, 1990; Spotswood, 2016). Yet health costs for our automobile-based transport system alone run into the billions (Petrokofsky & Davis, 2016), coinciding with a political time of "big society" and a "greenest government ever" implementing "austerity measures". Due to systemic rationalisation, now including normalisation, budgetary and departmental structures at national government level prevent cross-linking of issues and result in disintegration (for example see Banister, 1994; Docherty, 2008) rather than an integration of

This is an example created from parts of other articles, it is not designed to be read for sense.

engineering, enforcement and education efforts. The systemic fragmentation continues at the local government level of transport authorities evidenced as I intend to demonstrate by examining three cases of current road safety practices. Disintegration and rationalisation of processes and practices (Flyvbjerg, 1998) both challenge the practices of highway engineering and transport planning, and produce deficits in the approach to road safety which I will endeavour to illuminate further here.

Our transport system results in about 1,800 deaths a year and leaves over 20,000 persons critically injured (DfT, 2015) with life-changing alterations reverberating in society and running into billions (DfT, 2011). The Department for Transport (DfT) reports customarily foreground that the number of people killed has continually reduced over the decades. This is true up until recently where it has started climbing again.

However, and more importantly, the casualty reduction also came at a cost. Justice is not always spoken in a system that has become compliant to automobility (Voelcker, 2007) and may exhibit biases routinely running through the legal system (Kang et al, 2012). In the UK, walking and cycling (active travel) levels have plummeted over the decades (Pooley et al, 2005), sometimes now rising again, but always from a very low base. A rather exclusively car-based system had been built that now physically disallowed active travel. In addition it made active travel feel and look unsafe and uncomfortable, and prioritised the exclusive comfort of driving (for those who manage to afford a car). We can combine this with the fact that people rather make short-term local decisions, over long-term ones - this being true in transport too (Gärbling, 2015). Putting all this together, it effects the situation that the UK and many of its English-speaking cousin countries now find themselves in: persistently low levels of cycling, "victim blaming" the vulnerable road user and leaving the structural root of the problem unaddressed (Spotswood et al, 2015). The gulf is particularly stark in comparison to our neighbouring countries in Europe, notably the Netherlands on the whole, but also select cities in Denmark, and Germany (for example Pucher & Buehler, 2008).

We can also do some historical wayfinding and ask questions about the road safety lobby and their original motivations (Davis, 1992). The histories of road safety and motoring are closely linked (Hamer, 1987; Moran, 2010; Norton 2011) and road-safety contradictions have converted into simple human habits (Vanderbuilt, 2009) often leaving a value-action gap. Perhaps these developments are not surprising. The introduction of motor vehicles to our roads caused a new situation on our hitherto more human-scaled less technology-based transport system. As a result of embracing the motor car, higher speeds and greater mass were also introduced onto the streets and roads of our neighbourhoods, towns and cities. Together with the change in kinetic energy came also a shift in power and the emergence of new privileges, politics and practices (Urry, 2004). Flowing from there, this situation ultimately resulted in a new order for our roads and eventually society.

This is where the second story of road safety starts. It is a less technical story, but certainly a story so fundamentally implanted in our modern minds, that it has become a simple lived reality for all. Automobility and motor traffic flow now feel so natural, that they and their effects are often left unquestioned by society at large, but also politics and relevant professions in particular. Here, as many before me (see above references), I am critically examining the side effects of this automobile storyline. In particular I will be focussing on the linkage between road safety's technical practices and their wider nestling in the system of automobility. Expressly as an engineer, I make the connection to our special professional skills and tools that we can bring to bear to re-civilise urban streets and reintroduce liveability, vitality and human-based principles into towns and cities. In essence I am writing a plea to our ethical responsibilities by giving three illustrative examples of current road-safety practices.

From a purely technical point of view, road safety is a system that warrants a risk-based approach. The management of such a technical system would logically and practically be rooted in the use of risk assessment techniques. Yet the story of road safety is historically infused and entangled with car-marketing and road-lobbying ideas from a bygone era of motoring freedom (Norton, 2011). This resulted in a road safety system that is not just a technical one, but has permeated into our sociological urban ecology too. We have closely connected the design of our roads with societal advancement, wealth creation and economic progress and have developed tools to advance and progress into, as well as justify, that direction. These tools, such as for example "predict and provide" (Vigar, 2002) and "journey time savings" (Metz, 2014), have been extensively debated and widely discredited as a sustainable way forward (for example Knoflach, 2009). Yet the socio-technical system of automobility holds strong on many levels through a multitude of transport engineering and planning tools that are still officially endorsed to perpetuate the current planning and design trajectory. Through the focus of these professional tools on automobility the current system can only, if at all, offer some nods to walking and cycling at best, and results in the prohibition of walking and cycling at worst.

The approach to road safety is a by-product of that car-conjoined transport system, but an important one. If viewed alternatively, it can present us with a risk-assessment lever to technically and professionally contest the automobile system in favour of a more diverse transport system. Hence, I argue in the following that the current approach to road safety stands in the way of progress towards liveable cities and towns, and it is the technical practices surrounding road safety that, if revisited, could support economic, environmental and social good, contribute to advancing a new mobility paradigm and improve design and planning practices on the whole.

Other countries have addressed road safety concerns in more holistic ways. The cycling nations and cities circumvented many road safety issues by diversifying their transport systems and

building in alternatives to driving into their city- and general landscapes. More recent efforts also include a reframing of the debate, culminating in the Vision Zero approach led by Sweden, advocating professional responsibility in road safety, see Holzapfel (2003) and official Vision Zero website (Sweden, accessed 2016). The Dutch, over many decades and building on routine backcasting and evaluation, have assumed a holistic road-safety process called Sustainable Safety, thereby combining mode share targets (more people walking and cycling, fewer driving) with safety targets (Twisk et al, 2013). Operationally worldwide, the Organisation for Economic Co-operation and Development (OECD) asks for a safe-system approach to road safety (OECD, 2013). We should perhaps note that for quite a while the OECD has keenly highlighted the link between economics and mobility, road safety and risk (for example OECD, 1999).

Each one of these safety systems asks for human fallibility to be taken into consideration. It is worth noting that human risk perception and risk cognition is not a logical or a linear process (BMA, 1987; Kahnemann, 2011; Slovic, 1987; Tversky & Kahnman, 1974) and requires management, vigilance, education, training and expert knowledge brought to bear. On a much more global scale, Beck (1986) argues that the distribution of the risks we seek to manage today have wholly changed our modern society and left it wanting. Risk management comes in various sizes and guises.

Returning to the practical professional level, a structured approach to risk management sounds eminently relatable to engineering practices. In UK engineering we teach, learn and extensively use risk-assessment principles that follow a Safe Systems approach, for example through using the risk management technique ERIC. ERIC stands for Eliminate, Reduce, Isolate, Control. The risk-reduction hierarchy starts with giving serious consideration to eliminating risk, only then to proceed to reducing, before isolating and as last measure to consider controlling. These structured approaches can hold firm on road safety assessments, as I will attempt to explain and hope to successfully outline in more detail below.

A methodology based on case studies has been employed for this project. Case studies are real-life examples helping to illustrate an investigation. Case-study based research has limitations related to qualitative methods of interviews, document analysis and observational elements. However this is, at least in part, mediated by the author's professional position: I have compiled the case studies as a Chartered Engineer who is trained and experienced in project management and risk assessment techniques. I am also a member of a local advocacy group involved in road safety projects.

The focus on education in UK road safety and the strength of the professional practices of automobility have happened to the detriment of material and structural approaches. The gap this article attempts to illuminate is the lack of detailed technical critique of UK road safety

practice. The article further seeks to open up a wider debate about the current practices of road safety in the UK.

2 Three case studies

My own operational ground is Newcastle-upon-Tyne in Northeast England, UK – this is where I live and work. The examples and description I will give here, I do not believe to be specific to that city however; they are rather more likely to be the normalised *modus operandi* of road safety in the UK. I speak as a Chartered Engineer, as well as someone who has been actively involved with a local advocacy group, Newcastle Cycling Campaign, lobbying for inclusive highway-engineering and transport-planning practices. In that capacity since 2010 I have closely observed and interacted with the local authority responsible for road safety.

Newcastle is the regional capital of the Northeast. With its nearly 300,000 inhabitants it is a medium sized UK city. Its density is one of relative compactness. The topography is moderately flat. Hilliness is only confined to certain locations mostly owing to the River Tyne banks and Arthur's Hill in the West end. Local journeys can hence be made on a relatively even topography. Weather patterns hold no unusual features in precipitation, humidity, wind or other meteorological aspects. Manifestly in fact Newcastle has great potential to shift its current transport system away from driving: 42% of households not having access to a motor vehicle and 41% of commutes being under 5 kilometres (20,000 commutes), both figures have been extracted from Census 2011 datasets. It offers tantalising glimpses towards a different transport future for Tyneside. It seems that Newcastle, in particular, would stand to benefit from embracing a transition in its transport system, as interrelated problems of deprivation, unemployment and obesity keep haunting its budgets and overall progression.

Furthermore, Newcastle has laudable transport policies to that transition effect. For stated reasons of climate change pressures, carbon reduction and urban environment the city, together with its cross-river partner Gateshead Metropolitan Borough Council, critically interrogated its planning direction through the Local Plan 2010-2030 adopted, after local protests and state examination, in 2015 (NCC & GBMC, 2015). The policy mandates planning and engineering the city's transport system more sustainably. For example, the policy document states that it wants fewer people to drive, control car parking and it wants to build a cycle network.

Yet tracing back these transition aims, it becomes clear that these are only re-emergent. The aim to construct a cycle network dates back to policy in the early 1990s, and possibly even before. Earlier efforts have remained unsuccessful as shown in the notably low cycle mode share of under 3% according to two relevant data sets, the census (commuting) (ONS, 2011)

and the local household travel survey (all trips) (Newcastle City Council, unpublished). The citywide average of 3% is particularly small when compared to Newcastle's Dutch twin city Groningen that boasts a cycle mode share of nearly 60%.

In Newcastle, we can again observe the strength of automobility on city planning and engineering. Whilst policies are amenable to the need for change and even make plans for it, professional practices amongst other things move to oppose it. The approach of the local transport authority (city council) facilitates the upkeep of the auto-centred status quo as amply demonstrated by the persistently low cycle mode share.

Each of the following three sections contains a case study highlighting a common practice of UK road safety. The case studies were chosen for their representativeness judged by my seven years of continuous observation. Further, the cases were also selected to cover a breadth of road-safety applications. After the description of each case study, a brief discussion is offered to put each case into its wider context.

2.1 Case Study 1 - RTA 1988 Section 39

An application for information was made to Newcastle City Council, the transport authority, in 2014 under the Freedom of Information (FoI) Act. The request, made by the author on the behalf of a local advocacy group, sought details on the level of analysis carried out under obligation of the Road Traffic Act 1988, with special regard to Section 39. Section 39 mandates transport authorities to assess road crashes, carry out retrospective analysis with a forward and proactive view to arrange for preventative future action to be taken. Road safety is often used as a motivation to make changes to roads. In that regard, a process of analysis of past incidents, as such failures of road safety, carried out in a holistic and geographical manner seems a valuable risk-management practice to employ. For example, identifying patterns and isolating danger spots helps extract learning points and can be used to improve future plans and schemes – hence using preventative methods of risk management to eliminate and reduce risk in the future. Indeed the reply from the authority explained that it had complied with Section 39 (a crash map had been created). To the surprise of the advocacy group however, the reply further stated that training to pedestrians and cyclists were available. The reference to training was wholly unsolicited; it was not included in the original FoI request or in clear relation to Section 39 stipulations.

As such, the reply received on the Section 39 Freedom of Information (FoI) request was revealing a seeming focus on individual responsibility. The authority's offer and advertising of available training for pedestrians and cyclists was spontaneous and especially peculiar when the overall FoI query centred on strategic use of data as per Section 39. However, due to the implied importance or relevance of the training by the authority, it could give some insight into

how road safety is conceptualised at that authority. It presents the possibility that road safety may have shifted to the lowest level of risk management. Using the ERIC approach of risk management, road safety is here managed by means of Control only. By doing so it put the responsibility on the individual to stay safe, and get the training deemed appropriate, irrespective of their potential to harm or the exposure level the individual pedestrian or cyclist was subject(ed) to. In an absence of the preceding risk management steps of Eliminate, Reduce and Isolate, this would plausibly result in a partial system of safety. It is unclear, of course, to determine from the FoI reply alone if measures of risk Elimination, Reduction and Isolation had also been carried out in Newcastle. Nonetheless given the stubbornly low cycling levels at that location, road safety may not have been approached in a sustainable or holistic manner as that would have necessitated cycling level showing a sustained upward trend.

2.2 Case Study 2 - Changes to the carriageway

In 2015 cycling infrastructure was to be included in a highway scheme on Newcastle's Great North Road in the form of soft separation of a cycle lane on the carriageway. The scheme had created new dangers - for example introduction of a new right-turn for motor traffic crossing a cycle lane which meant complicating driving, cycling and pedestrian interactions (near a school entrance). The scheme design also left old dangers squarely unaddressed, for instance the wide radius of a fast-turn slip road putting cyclists into the path of fast turning drivers. On the whole a post-construction risk assessment carried out by the author on behalf of a local advocacy group concluded that it was questionable if it could be confidently claimed that the scheme was an overall improvement to cycling. Furthermore, pedestrian movements were made complex and unwieldy by the introduction of traffic lights with multiple pedestrian islands and separate light phases. Given the concerns of the advocacy group about the scheme, a Freedom of Information request to Newcastle City Council, the transport authority, sought to obtain road safety assessments that had been carried out for that highway scheme. This was in an attempt to understand the risk conceptualisation that took place at the design stages of the scheme. Carrying out road safety assessments seems commendable, if not a critical part of project and risk management. In fact this process is mandated and a compulsory process under the relevant national standard (Design Manual of Roads and Bridges, part HD19/03). The analysis of the road safety assessment carried out by the consultant Capita, contracted by the authority, showed disregard of the overall scheme risks. The road-safety advocacy group was disconcerted that the report had failed to identify the new and old risks.

This case shows risk obfuscation, manifested here by the absence of certain risks on the risk register. New and old danger situations had not been identified and subsequently not been assessed by the independent consultant. It is impossible to tell from this one example alone if this should leave us to question the process of road safety assessments on the whole. It may have been an unfocussed project brief from the authority to the consultant. Perhaps,

additionally, it could have been the suitability of the consultant to carry out such an assessment or the consultant's lack of rigour in their process. Be it as it may, the clinch point here is the unidentified risk items which leave a hole in the overall risk analysis, render it incomplete and leave behind a dangerous design. This is to the detriment of people walking and cycling in the newly designed area, an activity the local policy claims it wants to make easier and safer.

2.3 Case Study 3 - Planning a cycle event

Under the umbrella of a national programme of bike rides raising awareness of the lack of protected cycling space in English cities, a Newcastle advocacy group already had organised two such events in 2014. The group set about organising a third event in 2015, only this time decided to engage with Newcastle City Council, when previously it had been deemed sufficient to simply speak to the police for informal assistance and general information exchange. By voluntarily seeking comment from the council for the third ride, the group also hoped to form and strengthen cooperative working practices with the council and improve appreciation of campaigning activities. Having shared event-planning information with council officials, the group was directed to the Safety Advisory Group (SAG), a multi-agency assemblage hosted by the council. The SAG met and from then on spoke strongly against the event on road safety grounds. This came much to the surprise to the advocacy group. Moreover and to the further disappointment of the advocacy group, the SAG did not offer any practical assistance or theoretical help to run the event. (It may be of interest to note, that after some deliberation within the advocacy group, the gathering went ahead regardless of the exchange with the council. In fact the ride was led by a sympathetic local Councillor. The ride, consisting of hundreds of participants, was completed safely and without any such road safety problems anticipated by the SAG.)

In this case, the road safety label was used to supposedly safeguard civic activity. Concerns expressed on road-safety grounds were used by the authority to disclaim civic congregation on the public highway. The advocacy group trying to organise the event said it found this advice rather ironic; the authority could claim it unsafe for hundreds of people to cycle through Newcastle when cycling on an individual basis would otherwise on a day to day basis be deemed acceptable by the same local authority. It is hard to argue differently than that there was an institutional blind spot or selective view: road safety could be used as a concept by the authority to prevent an event from happening whilst the everyday activity of cycling that the individual may undertake would not (need to) be addressed. Levels of authoritative responsibility were blurred or distorted. There also is apparent an element of risk adversity on the side of the authority, as demonstrated by the non-negotiability of the decision.

3 Discussion

As mentioned in the introduction, professional practices, including road safety, once established are socially embedded and typically carried out unquestioned: the approach to managing road safety has largely become an automatic, subconscious and habitual process.

The three illustrative, if also real, cases help to illuminate, at least in part, the current situation that practices of road safety follow. We see that road safety concepts have penetrated into different strands of local government responsibility; the examples outlined here are for road safety in relation to future planning (case study 1), assessment of highway engineering schemes (case study 2) and event management on the carriageway (case study 3). On closer inspection appears also a contrast between the city's transport policies of favouring walking and cycling over private car journeys and the execution of the road safety practices.

These three case studies also allow some extrapolation to the practices of traditional UK road safety and the conceptualisation employed by traditional UK road safety.

3.1 Road safety as a technical practice

Concepts and mental constructs of road safety are in wide use and circulate in society, polity and professions. However some of these concepts may have become knotty ones. While a transport authority truly wants more people to walk and cycle and even proclaims that wish in policy, the road safety label can often prove preventative rather than supportive to that aim. Road safety all too often seems to brush aside the road environments that we have created through car-centred urban design, and now concentrates on rather more secondary issues. Road safety practices deal in risk derivatives. Offering training to individuals to overcome fast heavy traffic and get more comfortable around motor vehicles seems a failing strategy. In fact educational methods have been tried for many years to very little avail (Spotswood et al, 2015). Assessing the success of schemes, by backcasting and analysing data and plans is vital to any well-managed progress yet must be carried out in a comprehensive manner to avoid creating holes in the assessment and vis-a-vis the law of unintended consequences too. Good intentions can otherwise boomerang to give results which weren't envisaged; and leaving out problematic items can result in risks not being fully managed.

Road safety is a technical system and, naturally, is an evolved system. When systems evolve they change gradually, take on 'ideas of the time' and adapt in response to trends, pressures and events. For today's approach to road safety a coherent argument can be made that the origin and history of this trajectory sits in a time of aspirational mass motorisation (see

references in the introduction section). The position towards the automobile and its predicted good to the society would have influenced and shaped the practice of road safety today. It would be a system centred on the private car and subordinating other transport aspects. This seems evident in the three case studies where risk assessment boundaries have been set tightly resulting in the omission of a wider view. Road safety continues on the trajectory set by the continuation of automobility, leaving mass motoring and its consequences for cities and towns unquestioned and intact. Road safety, as yet, often operates largely outside new directions such as the new mobility turn (Sheller & Urry, 2006), zero-carbon transport (Whitelegg et al, 2010) new realism (Godwin et al, 1991; Vigar & Pemberton, 1998), Liveable Cities and urbanism, Sustainable Safety or Vision Zero.

Some concepts of road safety seem to have a low-aiming perspective and have become problematic, as shown by the three practical case studies. If so, what can engineers and planners do? After all if there are structural deficiencies, these could be eliminated by professionals acting to resolve collective issues on a structural-technical level. Maybe on the occasion the management level at which road safety takes place is currently inadequate or the training of the road safety official left incomplete. Operating in a political sphere, perhaps the engineers' communication skills need honing. Above all, road safety deserves respect owing to its vitally important mission to create safe road environments for all. Its dealt-in currency of human lives means road safety per se deserves a high status. A wider outlook at the practices of engineering and planning may be necessary to integrate sustainability into road safety and make it dovetail with agendas of liveability, transport transition and mode shift. Suggestions how this could be achieved are given in the conclusions.

4 Conclusions

The three case studies underline the discrepancy between the desire to get more people cycling and walking and the way the road-safety practice is currently carried out and managed. These three cases are unlikely to be isolated instances or only valid in the study location, but rather part of a pattern that has been emerging in UK road-safety practice over many decades.

The obfuscation of road safety has been reported for many decades. It appears wider highway engineering and transport planning practices may also fall short. A critical look beyond road safety could be fruitful to show progression on sustainability and resilience. In the process we could examine our own traditional paradigms, for instance "smoothing traffic" and "improving junction capacity" to name a couple of those. For the reason of road safety and highway engineering operating within an historically grown practice, we, engineers and planners, preferably and traditionally see and design through a motoring lens. Little doubt there is invisible

pressures on our practice, including the preservational pressures of maintaining the status quo, which prevent us from moving onto more equitable ground. Yet, we, whether working in the public or the private sector, also have to acknowledge our professional responsibility towards shaping the world with wider issues and agendas, sustainability and resilience, in mind.

In urban areas we now have a risk-pushing transport system due to the lack of appropriate infrastructure for walking and cycling. A driver, often by virtue of road design, pushes the risk onto the cyclist, who then may decide to cycle on the pavement which creates an uncomfortable situation for the pedestrian. Or people may entirely opt out of cycling when it feels unsafe and uncomfortable, as evidenced in UK's low level of cycling (Pooley et al, 2005). As Pucher & Buehler (2012) explain in their empirical documentation and analysis, a cycle network is the basic requirement if cycling is to be enabled and cycling levels to be increased. However, the creation of such a network pits cycling against automobility.

An emancipation effort is hence needed for road safety. Like a well-stocked haberdashery we engineers and planners also have a well-stocked kit box full of tools, concepts and practices we can draw on and utilise for common good to facilitate social change. We only need to rummage around and locate these practices or refashion old ones to use them more appropriately, widely and extensively, to sew the threadbare patchwork of transport and road safety back together.

Engineers and planners shape the social, through shaping the built environment, and hold responsibility towards society (Banister, 1994). Given the distinct nature of the challenge, engineers and planners ought to also use their special skills and knowledge with foresight and get involved on the political plain, as informants, educators and discussion partners to elected officials. Professional institutions could play a role here too, to sustainably steer road safety to a fairer and a more deserving place.

Like a prehensile monkey's tail, we should stretch out and strongly grasp the challenge to claim road safety for a human-sized mobility. Clearly, a road-safety risk assessment always starts with seeing the danger created by motor traffic – we eliminate, reduce and isolate, before we control. If we fail to manage it adequately at the higher level, the danger would get passed on to the more vulnerable users of the road: walking, cycling, the older and younger, frequently ending in inaccessibility and exclusion. How much we want to accept road danger, discomfort and its overall toll on our society and urban environment remains perhaps a moral question. We must answer it, so we can honestly conduct the business of road safety, holistically, fully, inclusively on an ethical, sound and lucid basis. Engineers have the knowledge and the tools to make a difference here, create a better transport system and save lives.

Using three case studies as examples of incomplete applications of road safety I made concrete recommendations to engineers and planners how to remedy shortfalls in the UK road safety

system. I wish that one outcome of this study was a professional debate on the suitability of the current practices of UK road safety, including a continuation of the collection of case studies, their implications on collective risk as well as a general discussion over the future direction of UK road safety,

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