

Dr Nick Reed – Founder of Reed Mobility, Chief Road Safety Advisor to National Highways

Simon: Welcome to Let's Talk Fleet Risk – a podcast for those who manage drivers and vehicles and want to reduce road risk in their organization.

In this episode I'm talking to Nick Reed, Founder of Reed Mobility and Chief Road Safety Adviser to National Highways about the active vehicle safety technologies known as Advanced Driver Assistance Systems. We'll be discussing:

- How the latest driver assistance technology is keeping drivers safer
- Why fleet managers need to pay attention to vehicle safety ratings
- How telematics systems fit in to the vehicle safety technology suite
- Whether drivers could struggle with any of this technology
- The issue of maintaining driver concentration when these systems are doing some of the driving
- And finally, a quick look at where we are now with fully self-driving vehicles.

Simon: Hello everyone, and welcome to this edition of Let's Talk Fleet Risk. My guest today is Nick Reed – a chartered scientist who, for the last twenty years, has worked consistently at the cutting edge of mobility research with a focus on road safety and transport technologies. Welcome to the podcast Nick.

Nick: Hi Simon, great to be here.

Simon: Nick, first could you tell us what that means – what is mobility research? And what sort of projects you've been working on?

Nick: Yeah sure. So, it started back in my PhD – I was studying psychology and visual perception. And I was looking at where I could apply that in something I was really passionate about, and that took me to TRL (Transport Research Laboratory), specifically actually on a project I had seen in a magazine about advanced headlights, and headlights that swivelled as the car steered. I thought, 'that sounds fascinating, where could I go and work on that' – it sounded like an interesting perception study. So, yeah, I found out about TRL, and was fortunate to get a job there in 2004. I worked there for 13 years and that was all related to driving behaviour, road safety, new technologies, and ultimately automation of the driving task – it was something that I really pushed for.

And since working at TRL I worked at Bosch, and now independently. That's been a theme, the interaction between driver technology, road safety and human behaviours – I think I bring an interesting perspective to that.

Simon: Yes, it's a fascinating topic, and I remember the swivelling headlights – we used to do a lot of work with Volvo and a lot of their cars had that technology on it. So especially going down a country lane at night, the headlights go where you were steering – which I thought was a fascinating and very valuable bit of safety kit.

I invited you on the show because I'd seen a fascinating presentation you gave on the current situation regarding self-driving cars. That was obviously a look at what the future has to hold but I really want to talk on this episode about the ADAS technology that's here and now. ADAS stands for Advanced Driver Assistance Systems and encompasses the various 'active' collision-avoidance systems that can be fitted to current cars and vans. To provide some context, the British road safety strategy is based around something called the Safe System. Perhaps you could start by explaining briefly what the Safe System is and why ADAS technology plays a vital part?

Nick: Of course. And this plays into my other role, a part-time role for National Highways as the Chief Road Safety advisor, applying the Safe System in that context. So, the Safety System has four key principles. Firstly that it is unacceptable that there should be any death or serious injury from people using the roads. But it also accepts that people make mistakes – that could be drivers making mistakes, it could be designers making mistakes in the way vehicles are created, it could be regulators that have made mistakes. But ultimately, there is human error involved and that will result in crashes happening.

The important thing there is that when these crashes happen, they should be of a severity that prevents serious injury or fatalities from happening. We want to eliminate crashes ideally, but we accept that they will happen, and when they do, they should be suitably less severe to prevent those serious injuries.

But you need to take a multi-disciplinary approach to preventing crashes. There needs to be a systematic approach – and that's where this Safe System comes in so that if there is a failing in one area, the other areas can compensate and make sure that that injury is minimalised. And so there are five categories of area that people look at when thinking about the Safe System:

- Safe roads
- Safe vehicles
- Safe road users
- Safe speeds
- Post-crash care

And there are different elements related to ADAS systems, these driver assistance systems, that I think are relevant to all of those categories. Particularly safe vehicles, but we think about safe users – do they support better driving behaviours. So ADAS fits across many areas of the Safe System.

Simon: And there are lots of different systems available, aren't there? You can pick any modern car and there's a huge range of ADAS technology available – some fitted as standard, some as optional extras. A lot of it is called different things from manufacturer to manufacturer. But what are the key systems available – and what do they do? How do they work?

Nick: Two of the key systems that have been really impactful in improving safety have been ABS and ESP – anti-lock braking systems and then the stability control, electronic stability control systems. So they only work when loss of control is about to happen, or emergency braking is happening. What we're starting to see, what has been emerging and becoming more commonplace, are these driver assistance systems which work in everyday driving.

So the likes of adaptive cruise-control, the likes of lane departure warnings, parking assist. They have a comfort function, but also a safety function as well. They use a combination of different sensors, some use alerts to the drivers – so they're informing the driver of a particular set of circumstances that have occurred and are advising the driver to make a change. Or they actually directly work on the steering or the speed itself – so more direct control over the vehicle.

And that is starting to blur the lines between automation and human-driven vehicles – and that's another human-factors challenge that we have to address.

Simon: Yeah, and we'll come on to that in a few minutes time. But you mentioned speed there – and one of the systems that I'm hearing a lot about is called Intelligent Speed Assistance, or ISA. Can you talk to us about what that is and why it's a current hot topic?

Nick: So ISA is a system – it can be advisory, or it can act on the speed of the vehicle itself – where the vehicle is aware of the speed limit that is applying at the time. That could be through a map, or cameras, or a combination... the cameras that are looking out for speed limit signs. And that can then advise the driver when they are above the speed limit and the driver can then take action to be compliant with the speed limit that applies.

Or the system can reduce the speed of the vehicle to be compliant with the speed limit that applies. Now, that system – as an advisory system – is part of general safety regulation updates from the European Commission. So vehicles sold in Europe, in the European Union, have to have this system fitted. The UK hasn't signed up to that general safety regulation yet, but a lot of the vehicles that will be supplied to the UK will tend to have this system fitted anyway – so it's likely to be in place.

It's an optional system, so it can be turned off – but I think it's very helpful to drivers to have that in place. Especially in the context of speeds that are changing across

our cities for very good safety reasons. And variable speed limits on motorways as well – if we can use systems that help drivers to be compliant, I think that's what drivers would like to see.

Simon: I've got a system on my car which is a speed limiter – so I can set that to the speed on the Sat-Nav – the map will normally tell me what the speed limit on the road – and I can manually set a speed limiter, so that I don't go over that speed. It's especially useful when there are average speed cameras and stuff.

How are those systems different? What's the difference between them?

Nick: A speed limiter is set by the user – the user can choose to set the speed limit to whatever they'd like for the current driving conditions, and then the vehicle won't exceed that speed unless the driver actively chooses to exceed it. The ISA system is constantly updating depending on the speed limit that applies – so it adjusts to the changing from national speed limit to 50 to 40 to 30... it will update the speed limiting that applies. Or at least, advises the driver of that speed limit and then the driver can take action in response.

So it's slightly different in that it's user-controlled for a speed limiter function, whereas Intelligent Speed Adaptation which is dynamic in response to the speed limits that apply.

Simon: Excellent. Now, Euro NCAP – the organisation that arranges all of the crash testing of new cars and gives safety ratings based on the results of crash testing – they require a lot of these ADAS systems to be fitted as standard in order to score highly in their safety ratings, and the bar raises each year as new cars come out – they demand a higher level of technology, and new systems to be fitted as standard.

How important should these ratings be when making fleet procurement decisions for new vehicles?

Nick: It's very important. Employers have a duty of care to their employees – people who are on the road day after day, doing a lot of driving in sometimes challenging circumstances... we want the vehicles to do as much as possible to help protect those employees and ensure that if they have incidents which may not be their own fault – it could be the fault of other drivers – we want them to be as protected as possible.

And so, yes, some of these systems which can help avoid incidents from happening ensure that that duty of care is fulfilled, I think.

Simon: And there are lots of incidents where maybe the manufacturers haven't fitted a full range of systems onto their car – one of the most common ones is the emergency braking systems. But some of the others, like lane-keep assist and

adaptive cruise-control quite often are an additional cost option. So is there anything we can do to encourage people to take up those options, rather than other systems?

Nick: I alluded to them being a comfort function and a safety function. So, I don't think we should overlook the fact that driver comfort is actually quite an important part of safety – that a driver can feel comfortable for long distances, especially in the fleet context. Some of these comfort functions actually help the drivers to stay alert, and relaxed, and attentive for long periods of time. Obviously, abiding by driver regulations and taking breaks and so on.

But if that means that a driver can do more driving safely and comfortably, I think that's an important part of safety. So, reflecting on how it supports driver welfare, as well as safety, is an important aspect on supporting the uptake of these systems.

Simon: And I guess to encourage that, really drivers have got to be familiar with what all of these systems are, and what they do – don't they? Which quite often, they're not.

Nick: It's a really difficult one. There's a really good website in the US – and I think there will be something similar over here – called 'My Car Does What?'. And you can type in your numberplate and it will go to what model of car you've got. And then you can see which systems are typically fitted to that vehicle. And it has some really nice, very accessible videos that explain how that system works.

I think there's a lot more that dealers can do at handover, to explain what systems are fitted to the vehicle and how they work. But something I'd be really keen on is that most cars – I think every car you buy today – would have a screen, and a great stereo system in it... that screen could be used when the vehicle is static to have really nice explainer videos to explain how a system works in that vehicle, so that drivers are aware that the system is fitted, how it works, what it will do if it intervenes, if it's going to intervene in any driving context like a lane-keeping assistance system. And this will help inform drivers about how that system works to then get the best out of it.

Simon: That website in America sounds like a brilliant idea. I'll have a look to see if there is something similar in the UK, and if I can find it, I'll put a link to that in the show notes.

Individual safety ratings, and how they're calculated, for different cars and vans are available on the Euro NCAP website. You'll find links to both the car and van safety the show notes.

Simon: So just going back to the ADAS systems fitted to cars – vans are starting to see a lot more of these systems fitted as well, but traditionally have been lagging behind cars over the last few years.

There are a lot of specific challenges with fitting ADAS technology to vans – could you talk us through a few of those?

Nick: A lot of it comes down to cost – these are very functional vehicles that operate on their day-to-day running costs, and the inclusion of these systems does add somewhat to the purchase price. So that has to be factored into the running costs of these vehicles.

They're also very hard-working vehicles. So these systems might be fitted in locations that make it damaged or dented – you then lose the functionality, or it's a costly repair. So I think there are some factors around that.

But the evidence is there about the value that these systems bring in terms of safety and driver comfort – so ultimately, it's going to be helpful in terms of achieving that Vision Zero, the goal of the Safe System.

Simon: Vans in larger fleets will often be fitted with telematics systems – most of the fleet operators looking for good practice driver safety management will fit a telematics system. And while it's not an ADAS system, it can help control driver behaviour, so that the improvement in safer driving means there is less chance the actual ADAS systems might be called into operation.

What are your thoughts on how Telematics fits in to the topic of vehicle safety technology?

Nick: In terms of gaining that understanding of how the fleet is being operated, and some of the safety aspects, I think it's incredibly powerful. I think about it influencing rather than controlling driver behaviour – it's there as a tool to understand how the vehicle is being used, and then a company can apply management procedures to help improve and influence driving behaviour.

So in that sense, the system is only really as good as the management around it. You can have all the most insightful data in the world, but if you haven't got the management structures around to ensure that those insights are applied, and they influence driving behaviour in the right ways, then it's not useful. So that's a really important aspect of telematics.

The other is making sure the data that you're using is genuinely delivering the insights that you believe it is. We've seen many companies making promises – we need to scratch beneath the surface of that and make sure that the data they're providing from the vehicles fitted with the systems genuinely provides the insight that you think it is, and it's not just the company selling the stuff.

Simon: I mentioned earlier that a lot of the new cars don't have all of the systems fitted – some are fitted with a basic range; others are extra-cost options. But one thing I've noticed with the electric vehicles I have driven is that they seem to be much more commonly equipped with lots of this technology – many have a full suite of driver assistance systems.

With the transition to fully electrified fleets, are there any particular groups of drivers that might struggle with this technology? I'm thinking based on age or experience?

Nick: I think it's a great opportunity. With the rush to switch to EVs, particularly in the fleet market – to get people into vehicles that have all of these ADAS systems fitted. I think it comes back to that activity on handover of the vehicle – is there that explanation of what systems are fitted and how they work? It isn't just a 'here's the key, off you go' – there's more to it than that to make sure that these systems are used appropriately.

Of course, older drivers who may not have been used to these systems in the first place, or they certainly weren't there when they got their licence, may have more difficulty. But I think it applies to all age groups, actually. If you've not experienced the system, and you're not familiar with how it works, there's a real human-factors challenge there to make sure that these systems work in an intuitive way. I think it's on the manufacturers to make sure that these systems – when they're fitted – work in a way that is intuitive to the driver, and that is the control system, the graphics used on the screen, the sounds that are heard – that all of that works in a way that the driver understands, to make sure they get best value from it.

Because, a system that is fitted to a car, but then switched off because the driver doesn't like it, is useless. It's extra weight on the vehicle that's serving no purpose – and we clearly don't want that to happen.

Simon: I just wanted to talk also about the issue of bringing back the driver's attention. One of the things we commonly hear about autonomous vehicles is that the driver still needs to be able to take back control – and obviously that brings its own challenges if the car has been driving itself.

Things like lane-keeping systems and adaptive cruise control can mimic elements of autonomous driving but, of course, the driver always needs to be able to take over fully again. Is that not problematic if the driver hasn't been paying 100% attention, if some of these elements lull the driver into a sense of false security?

Nick: Yes. It is. The systems that are on sale today require the driver to be alert and attentive. Even the Ford Mustang Mach-E that came out this year – that was sold with a hands-free cruise control system, and the driver still needs to be alert and attentive, and there are cameras in the vehicle to make sure that is the case. And if the driver isn't paying attention, there are alerts to make sure they do face forward and are suitably alert and attentive to the driving situation.

But you're absolutely right – if the vehicle is doing some of the driving for you, in terms of speed control, lane guidance... there is clearly that temptation that the driver can actually divert their attention to something else for a short period of time. The challenge there is that that short period of time might be the exact moment that their attention is required in order to prevent or mitigate the worst of a particular incident.

So, I think what we're going to see more of in the vehicles that come out in the next few years will be more of that driver monitoring. We will have to get used to vehicles that are fitted with cameras looking at the driver and monitoring their attention, to make sure they are suitably alert. The technology is fantastic, and it can definitely support safer driving, but it's a two-way process – and there needs to be involvement from the driver. Until we get to the point when the vehicle can do it all! And at that stage, the game is very different – and liability shifts to the manufacturer while the vehicle is being controlled in an automated manner.

But we're not there yet. And so this driver monitoring is going to be ever more important.

Simon: And that takes us back full circle to why I invited you on the podcast, because of the presentation you gave recently to members of the Association for Road Risk Management entitled 'Where are we with self-driving cars?'. That was fascinating.

There are lots of trials going on around the world on public roads – so my final question is really just where are we with that? How far away are they? Is it a realistic thing that's going to happen in the future?

Nick: Yes. So how far away are they? If you travel 5500 miles to San Francisco, you can see vehicles with no driver being controlled and operating in busy urban environments. So it is happening. There are commercially deployed automated vehicles, driverless vehicles, working on the streets of San Francisco and other US cities today.

In the UK we do have trials happening in lots of places, not least the CAVForth bus trials in Scotland – there's a number of different trials kicking off across the UK. And in the King's Speech a couple of weeks ago there was the Automated Vehicles Bill – and that has accelerated what is achievable in the UK. So as that bill comes to fruition, we will be able to get to the stage of commercially deploying automated vehicles in the UK.

Now, the major challenge I see here – and it's something most of my work relates to – is how do we prove that they're operating safely? How can we collect data from these vehicles to give us the confidence that they're operating in the ways we expect them to? Are they behaving to the standard of a careful and competent driver? That's the language that's used in the bill.

I think we could be doing more to inform the public around the benefits and risks of introducing this technology, and that's something that's not gone on in the US and it's why Cruise – a particular company I talked about in the presentation – has had some challenges recently with an incident that occurred. I think they haven't sold the technology well enough to the public, and that's caused some of the tensions that they've been experiencing over there.

So there's lots of work to be done about being able to improve safety. Lots of work to do around proving their value to society. But ultimately, massive potential in terms of safety, efficiency and accessibility of transport – it's really exciting.

Simon: Thanks Nick – it's been a really fascinating discussion. Thanks for sharing your insight and experience in all of this. Do you have any advice that you could share with business about how to raise awareness of these systems and what they do amongst the drivers they employ?

Nick: I'm sure the audience will be very aware that for the majority of people who drive for work, that driving aspect is probably the riskiest aspect of their day. There are people doing thousands of miles, it's a very important aspect of their role. So, I think it's very important that people are informed about the latest systems that can support delivering that role as safely and as efficiently as possible. These ADAS systems coming through do give us the opportunity to improve the safety and comfort of driving, and make the experience better for both the driver and the company whose fleet is out there on the road.

So, it's the manufacturers doing better in terms of informing the customers of the way these systems work and what they deliver. And then the fleets themselves being aware of those systems – and understanding what their drivers are seeking from these systems as well so that it all works together seamlessly and safely.

Simon: Fantastic advice to end on.
