Association of British Insurers and Thatcham Research response to the Department for Transport's call for evidence on the Safe use of Automated Lane Keeping System on GB motorways.

About the Association of British Insurers

1. The Association of British Insurers (ABI) is the voice of the UK's world-leading insurance and long-term savings industry. A productive, inclusive and thriving sector, our industry is helping Britain thrive with a balanced and innovative economy, employing over 300,000 individuals in high-skilled lifelong careers, two-thirds of which are outside of London.

2. The UK insurance industry manages investments of over £1.7 trillion, pays nearly £12bn in taxes to the Government and powers growth across the UK by enabling trade, risk-taking, investment and innovation. We are also a global success story, the largest in Europe and the fourth largest in the world.

3. Founded in 1985, the ABI represents over 200 member companies providing peace of mind to households and businesses across the UK, including most household names and specialist providers.

4. The ABI's role is to:
    - Get the right people together to help inform public policy debates, engaging with politicians, policymakers and regulators at home and abroad;
    - Be the public voice of the sector, promoting the value of its products and highlighting its importance to the wider economy and society;
    - Help encourage consumer understanding of the sector's products and practices; and
    - Support a competitive insurance industry, in the UK and overseas.

About Thatcham Research

5. Thatcham Research is the motor insurers' automotive research centre. Established by the motor insurance industry in 1969, the centre's main aim is to contain or reduce the cost of motor insurance claims whilst maintaining safety standards.

6. A founding member of the international 'Research Council for Automobile Repairs' (RCAR), Thatcham Research has also been a member of the European New Car Assessment Programme (Euro NCAP) since 2004.

Executive Summary

7. The ABI and Thatcham wholeheartedly support the development of autonomous vehicles. We recognise the transformative impact that these technologies can have on safety and productivity, and we are equally excited about the prosperity that it could bring to the UK. However, it is imperative that we consider all challenges related to Automated Lane Keeping Systems (ALKS), and only progress them when public safety and trust are sufficiently established. Therefore, the ABI and Thatcham share serious concerns regarding the safe use of ALKS and its relation to the Autonomous and Electric Vehicles Act 2018 (AEVA).

8. It has become abundantly clear that ALKS cannot be considered as 'Automated' as it is not possible for the system to operate safely within the specified design domains without the need to be controlled or monitored by an individual. ALKS should therefore be considered as 'Assisted' as the driver is required to be engaged at all times. We strongly

recommend that the Government do not classify ALKS as automated until the safety issues identified in this call for evidence have been fully addressed.

9. The safety case is clearly set out via the 2019 report "Designing Safe Automated Driving" in which Thatcham and the Insurance Industry clearly outlined 12 key principles that must be met to ensure a safe transition towards an automated driving future. ALKS meets only two of these 12 principles. In addition, we know that current ALKS technology is limited, and we have identified several instances where the use of ALKS will result in serious injury or harm. We have identified, in a non-exhaustive list, several cases in which ALKS performs worse than a capable and attentive human driver.

10. In addition to the safety issues, in its present form, there are several concerns pertaining to data privacy and data storage, which make ALKS unoptimized for integration with current legal and insurance systems.

11. We urge the Government to review its execution timelines to ensure that ALKS and future autonomous technologies are implemented in a safe and prudent manner. We strongly caution that an overzealous timeline, without addressing these serious safety issues, could cause significant loss of public and industry trust in the development of safe automated vehicles in the future. This is a real concern should ALKS be permitted to be on the road as set out in the current proposals and end up causing significant and high-profile injury to road users. This may result in fundamentally undermining the excellent progress that the UK has made on the viability of autonomous vehicles to date and significantly delay the realisation of the safety and wider societal benefits of automation.

12. Lastly, we hope that the Government continues to have meaningful and positive engagement with the insurance industry and other stakeholders to help develop a safe automated driving future for the United Kingdom.

Questions 1-6 are about the organisation submitting the response.

Q7. Do you foresee any legal barriers to the policy accessing data for incident investigation?

Q8. What are those barriers?

13. Yes.

14. Thatcham and the ABI perceive there to be a number of technical and practical barriers which have not yet been resolved in the ALKS regulation or the Government's proposed approach to this consultation, which are set out below.

15. A key issue is that the data storage system for automated driving (DSSAD) will be used to assist in reviewing traffic offences (as set out in para 2.19), but use in the assessment of civil liability in insurance claims is not mentioned and does not appear to have been considered.

DSSAD police training

16. In the case of a fatal or near fatal collision, a police officer trained in collision investigation and suitably equipped with the necessary specialist equipment will attend the incident and can download the data from the vehicle and interpret it. However, in the majority of accidents when a non-fatal collision occurs a specialist collision investigator does not attend the scene. To use DSSAD to investigate traffic offences, will require all traffic police

to be trained and equipped to download and interpret the data, which could be a strain on police resource.

DSSAD storage

17. In cases of civil liability, insurers may not be notified of a claim until some substantial period of time after a collision. The vast majority of cases will involve incidents of below the severity level that would trigger the system and hence not result in the completion of a police investigators report. Collision investigator's reports remain absent from many civil claims relating to severe life changing injuries**.** To ensure that data from the DSSAD *is* accessible to civil claims, it must be stored for a substantial period of time. However, the ALKS regulation allows data to be over-written once the storage limits of the DSSAD are reached and does not control what those storage limits must be as a minimum. It is therefore highly likely that where an event is recorded it may be over-written.

Definition of a detectable collision

18. Currently, we do not think that the requirements for determining a 'detectable collision' are sufficient to identify, nor record, the vast majority of crashes, even those that lead to severe injuries or fatalities. Likewise, the clear likelihood of losing data essential to proving ultimate civil liability for collisions will be very problematic for motor insurers and ultimately detrimental to private motorists seeking rightful indemnification.

19. A detectable collision will currently be defined as a crash of such severity that it deploys Safety Restraint Systems (Airbags and Pre-Tensioners). These crashes represent less than 10% of *all* motorway crashes. These systems are for instance unlikely to identify typical pedestrian strikes that are mostly fatal. Hence **90% of ALKS crashes will be undetectable** and may include many fatal or life changing crashes.

Access to a neutral server

20. Insurers have made clear the need for reliable and timely access to data and have proposed both a core set of data to identify system status at the time of an event and also to ensure that data is transmittable via a neutral server ensuring physical access to the vehicle is not necessary. These requests are **not** addressed in the ALKS regulations and are key to allowing insurers to make prompt liability decisions enabling them to provide the best possible service to the parties involved. Without open fair and equitable access to the data required by the DSSAD, insurers **cannot** fulfil their obligations under the AEVA.

Q9. How do you think the driver should be:

Educated to understand the abilities and limitations of the system?

21. Thatcham and the ABI view it as extremely important that the user is educated and informed not only of how any automated system works, but also in how it differs from assisted driving systems that may offer similar functional control in different circumstances. It is also important that the driver is aware of both what these systems can and cannot do. Evidence demonstrates that UK consumers are unsure of the current performance capabilities of vehicles. In a 2018 study 53% of UK drivers (71% drivers globally) suggested that they could already buy and use an automated vehicle[1].

[1] Automated Driving hype is dangerously confusing drivers, https://www.thatcham.org/automated-driving-hype-is-dangerously-confusing-drivers-study-reveals/

22. An ALKS system will be implemented alongside a range of other driver assistance systems operating across a range from SAE level 0 to 2. In particular, a level 2 'Driver-Assist' system could appear almost identical to the consumer in terms of the control it exerts on the vehicle while having very different requirements for the 'monitoring' part.

Informed to understand the abilities and limitations of the system?

23. Thatcham and the ABI published the document **"Defining Safe Automated Driving[2]".** In it were cited 12 key principles required for the safe adoption of automated driving. The first principle addresses driver/user education - it identifies the need for system training and recommends that all users watch and verify system operation and functionality prior to being allowed to use the system. This driver training would be undertaken off-line. Driver monitoring systems could register the driver's knowledge of the systems via the training and allow the system to be operated. In doing this they will be aware of their obligations and system limitations and promote safe and responsible use.

Q10. What Role do you think manufacturers selling this system should play in providing this?

24. Thatcham and the ABI consider that manufacturers must support the driver to understand different systems. This begins with the marketing and naming of systems and is highlighted as the first requirement in the 12 principles of safe automation.

Clarity and consistency in marketing materials

25. There needs to be clarity and consistency in how manufacturers name and market these systems, both internally in their product ranges and across the industry as a whole. Consistent naming is a core principle highlighted in the insurers 12 principle document to avoid misuse and driver confusion. For example, the difference between a Traffic Jam Assist and Traffic Jam Pilot may go almost unnoticed by many consumers but implies a significant difference in what the driver may be able to do if the Governments proposals are implemented.

User Interface

26. The system must be designed so that when the vehicle is in automated mode the user interface is significantly different in appearance, in order to simply and intuitively inform the driver whether the vehicle is in manual, assisted or automated modes.

User training and verification

27. Formal classroom or vehicle-based training for all vehicle purchasers would be very expensive and time consuming for manufacturers and would not cover subsequent drivers hiring vehicles or purchasing in the second-hand market. Therefore, the proposed video training either in vehicle prior to use (whilst stationary), or remotely, with a verification function should address the safety issue whilst allowing updates and system developments to be recorded.

Q11. What role do you think government and its agencies should play in providing this?

28. The requirement for a different appearance in automated mode is partially covered by the ALKS regulation, which requires clear unambiguous indications that it is in Automated

[2] Defining Safe Automated Driving, Thatcham Research and ABI, 2019 https://www.thatcham.org/wp-content/uploads/2019/09/Defining-Safe-Automation-technical-document-September-2019.pdf

mode that will clearly differ from when the system is deactivated. These requirements are not prescriptive and the extent of the difference in appearance is not specified. It will, therefore, be up to the relevant type approval authorities to interpret the regulations and the effectiveness of the changes may depend strongly on that interpretation.

29. Were the UK Government to proceed with the ALKS proposals there will be no mechanism to ensure that industry provide the user support that Thatcham and the ABI deem necessary. We believe the Government must, as a minimum, take action to ensure the industry does the right thing. For example, by ensuring that Automated Vehicles are a key focus of extensive Market Surveillance activity under new type approval regulations, so these systems properly accommodate local road laws and follow the 12-principle safe-system approach. Since insurers intend to independently assess the safety performance of all ALKS systems, these results could be integrated into a local UK Type Approval scheme.

30. Clear public communication will be required to highlight changes to the Highway Code with a comprehensive public information campaign to ensure drivers and enforcement bodies clearly understand these changes. This could usefully extend into the driving test with a dedicated part of the theory test on assisted and automated driving, perhaps supported by a simulation element similar to the hazard perception test. However, it should be noted that the driving test may be a long-term solution but will not mitigate the **immediate** risk. It is also worth noting that the first vehicles to be equipped with these systems will be expensive, high-end vehicles (e.g. Mercedes S class) and unlikely to be driven by young people who have recently passed their driving test.

Q12. Subject to the outcome of this call for evidence and subsequent consultation, would you have concerns about a scenario where any vehicle approved to the ALKS regulation would be automatically considered to be an automated vehicle under AEVA?

Q13. Why?

31. Yes

32. Thatcham and the ABI do not believe that a vehicle with ALKS approval should be classed as Automated under the AEVA. We do not consider that the ALKS regulation demands a system of sufficient competence to be considered capable of avoiding all collisions that are avoidable by a careful and competent human driver, or of avoiding situations where it would be at least a contributory cause of a collision. Therefore, in our opinion, ALKS **fails the Government's own test** of whether it should be regarded as automated under the definition of the AEVA. Of the 12 key requirements for safe automated driving set out by the insurance industry in 2019, only 2 (Location Specific and Starting Automation) are clearly and unambiguously met (further detail on this is available in the 'other comments' at the end of this document).

33. ALKS systems require the driver to take back control to maintain safety and cannot emulate a safe and competent driver. The technology may have benefits but only as an extension of todays *Assisted* driving technologies. If the Government choose to proceed with considering these vehicles to be Automated, then insurers would still advise against using ALKS approval as the only element needed to qualify for inclusion on the Secretary of State's list.

34. The UK will be obliged to accept all vehicles approved to ALKS for sale but is not obliged to consider them automated under the AEVA. It would be possible to only consider as automated, vehicles that significantly exceeded the ALKS standards and those that follow (at least to a much greater degree) the insurance industries 12 Key principles. For example, by meeting more stringent human machine interface (HMI) requirements such as direct driver monitoring or being capable of detecting hazards within the braking distance of the vehicle using realistic take back times. Lane changing, is a fundamental part of a human driver's event mitigation control - human drivers can swerve out of lane to avoid a collision. This capability must be considered a pre-requisite for Automated driving. In addition, having the ability to find safe harbour where an unresponsive driver is identified is essential in describing a vehicle as Automated. The ALKS regulation currently **does not permit these behaviours**.

Q14. Do you agree that the criteria in the monitoring and control tests provide a reasonable framework for testing compliance with the AEVA definition of automation?

35. No. Any high-level approach that simplifies a highly complex task into 7 principles is going to be open to a large degree of interpretation. Thatcham and the ABI strongly disagree with the interpretation of how ALKS meets these criteria.

36. We believe that the extent of subjective interpretation possible with the monitoring test in particular means that it is not a reasonable framework for testing compliance with the definition. Although the insurance industry also proposed judgement of safe automation by 12 high level principles, these were backed with **significant additional** technical details that could be used to substantially reduce the room for local interpretation. These details appear to be entirely lacking from the UK Government proposal.

Q15. Do you agree with our preliminary assessment of how ALKS meets the criteria set out in Annex A?

37. No.

38. The ABI and Thatcham do not agree with the preliminary assessment of how ALKS meets the criteria set out in Annex A. While we agree that this is required by the ALKS regulation, the only independent test of compliance with this requirement is a demonstration where the approval authority witnesses a real-world test of unspecified duration and unspecified driving content, to demonstrate compliance.

Demonstration Drive will be inadequate

39. In practice, this is likely to be a short test in an area local to the manufacturer, approval authority or technical service and is unlikely to be comprehensively representative of all of the road sections or traffic scenarios that it will encounter in service in that country, and not all countries that are signatures to the UN 1958 agreement.

40. The principle of mutual recognition of type approval is that it is approved in one country, then it is accepted in all countries. Therefore, an ALKS approval could take place within any UNECE contracting party (approaching 60 countries) and will be accepted by all. A demonstration drive in Russia, Australia or Thailand, for example, does little to demonstrate that a vehicle will comply with traffic rules in the UK.

Compliance will not consider local traffic rules

41. Thus, compliance with this requirement is assured only by the approval authority's audit of the safety case provided by the manufacturer, and a manufacturer's declaration that it is compliant, and that it will continue to be responsible for safe performance in the real world. Effectively, compliance with the road traffic rules in each country is to be self-certified by the manufacturer. One example of how this wouldn't be an approach that would work in the UK the need to include the "Red X" above smart motorways lanes – a system unique to the UK.

42. The insurance industry broadly supports the principle of self-certification in approval regulation and consider it to be a necessary part of the process (there are already elements of self-certification in many type approval regulations). However, the ALKS regulation represents a significant increase in the degree of self-certification involved and the extent to which technical compliance relies on the manufacturer rather than independent testing.

43. *Case Study: Approval System in the USA - In the USA, the approval system is based entirely on self-certification. This works in the USA because it is backed by strong legislation that allows punitive civil penalties[3] to be applied if a self-certification is incorrect, and further penalties if the initial declaration was shown to be deliberately false or misleading. It is also backed by a strong system of market surveillance that will undertake random or targeted testing of vehicles to assess compliance and identify any wrong doing.*

Self-certification in UK market

44. The new EU type approval regulation coming into force (**Regulation** (**EU**) 2018/858) will introduce requirements for member states to undertake market surveillance of in-service compliance with the regulations at a rate of one vehicle for every 40,000 new vehicles sold. At this point in time, the government have proposed that this will be transposed into UK law as the road vehicles approval regulations (2020) and strong penalties are possible, including the ability to withdraw non-compliant or seriously unsafe vehicles from the UK market. However, no proposals have been set out to show the details of how this will be applied in the UK and, in particular, how it will be applied to the increasingly self-certified aspects of automated vehicle safety.

45. For the insurance industry to consider that this test is met will require a comprehensive proposal from the government describing the rate of testing they will apply to ALKS equipped vehicles, the methods that will be used to identify compliance and evidence that the levels of penalties that will be applied to manufacturers of non-compliant vehicles is sufficient to mean that the self-assessment can be considered at least as robust as that applied in the USA.

Monitoring test criterion: Avoid collisions which a competent and careful driver could avoid.

46. While a fair principle, the insurance industry consider that the ALKS regulation does not adequately address key safety strategies. This principle can be divided into two subcategories:

Avoidance of an imminent critical collision

[3] According to NHTSA handbook this can be as high as $105million dollars where sufficient vehicle numbers are involved

47. An imminent collision situation can be described as a rapidly evolving scenario where a collision will occur if the driver takes no action in the following few seconds.

48. *Example: A pedestrian steps out into the road in front of an approaching car at a time when a collision would occur within one second (independent of vehicle speed) if the driver took no action. In this sort of circumstance, a driver reaction time of up to around 1.5 or even 2 seconds could be considered reasonable by a court for a careful and competent human driver. As such, this could be classified as an unavoidable collision that the ALKS would also not need to avoid. However, 50% of new cars on the market in 2021 will be equipped with Autonomous Emergency Braking (AEB). A human driver in an AEB equipped vehicle may be able to react much more quickly than the human alone. Thus, it may be possible to avoid or mitigate this collision in a human driven vehicle without automation.*

49. We believe that ALKS should also be able to react to this collision and avoid or mitigate the effect as todays AEB vehicles are able to do. Against the current benchmark as written ALKS is not required to meet this level of critical collision mitigation performance. In practice vehicles equipped with ALKS will likely have a well-developed collision mitigation system (AEB) by default but this requirement should be formalised and specified.

50. The ALKS Regulation only requires the same avoidance potential as a careful and competent driver as a general requirement for circumstances not specifically addressed by the requirements. The example given above, where a pedestrian steps out at such a short time before collision, could be considered as a pedestrian crossing the road, which is specifically defined in the regulatory requirements. In these circumstances, it is only a pedestrian crossing at 5 km/h where the impact point (in the absence of avoiding action by the ALKS equipped vehicle) would be in the centreline of the vehicle that must be avoided from the maximum 60 km/h speed. It explicitly acknowledges that this may not be possible in other circumstances. It simply requires that manufacturers do not unjustifiably change their control strategy outside of this condition. Thus, this leaves it open to substantial interpretation as to whether an ALKS needs to meet the 'careful, competent' driver test in pedestrian crossing situations outside of these narrow conditions.

51. According to UK accident statistics, most pedestrian crashes that lead to fatalities occur near the edges of the vehicle. Stats19 for 2018 identified 20 such fatalities where an ALKS system as described might fail to respond, neither warning the driver to take back control nor avoid or even mitigate collisions Thatcham and the ABI therefore expect that such fatalities could **increase** on the UK Motorway network.

52. It is also worth noting that insurers do not consider a real world demonstration drive as required by annex 5 to offer any meaningful evidence that vehicles comply with the collision avoidance test. This is because the odds are so heavily stacked against a collision situation arising in any short public road test. Millions of miles would be needed for such a road test to have any realistic chance of demonstrating any capability in this respect.

53. In general, the ways in which a driver can avoid an imminent collision are by braking or by steering (or by a combination of both). At lower speeds braking tend to be the most effective strategy as the vehicle can be brought to a stop more quickly than it can steer onto a path that avoids the collision. At higher speeds however, steering tends to be more effective than braking. Humans tend to favour braking as an emergency response over swerving but both are observed in the real world. The extent to which an ALKS equipped

vehicle can swerve to avoid a collision is limited (by the ALKS regulation) to a manoeuvre within the lane boundary. Because of this, its avoidance options are fundamentally more limited than the human it is replacing. It is therefore the conclusion that in this aspect an ALKS equipped vehicle will have an **inferior safety** performance than a competent and engaged driver.

Avoidance of a collision by foresight and anticipation.

54. The second aspect of avoiding a collision by anticipation and foresight does not appear to be **considered** in the ALKS regulation. Take the above pedestrian example and expand it to consider that the reason the pedestrian has stepped into the live lane of the motorway, thus causing an imminent collision risk, is that he or she is repairing a broken down vehicle on the hard shoulder and has momentarily lost balance, been distracted or become disorientated so that they briefly step into the adjacent lane maybe by just a metre. A competent human driver could observe the situation at 500m or more. On detecting a clear hazard they should follow general guidance in the Highway Code and hazard perception tests and slow down and /or changing lane. A driver that takes those actions may effectively avoid the collision risk ever becoming imminent in the first place.

55. An ALKS is prohibited by regulation from changing lane. It is therefore impossible for it to avoid this collision by all means the human driver can. In theory, it could detect the hazard and slow down but there is nothing explicit in the ALKS regulation that would require it to do so. It could also choose to mitigate this risk by requesting the human driver's intervention with a transition request. However, the reason that the ALKS must be capable of continuing to operate for at least 10 seconds after it detects an exit of its ODD is to allow sufficient time for the driver to be brought back to a sufficient state of situational awareness that he or she is capable of sophisticated and reliable control tasks such as changing lane. Thus, it will be necessary for the ALKS to issue a transition request at least 10 seconds before a lane change must be initiated in order to avoid the potential collision by anticipation in the way a human driver of a manual vehicle could. At 60 km/h this would require a minimum of around 12 seconds and 200m distance ahead of the vehicle. The minimum distance at which a vehicle must be detected according to the ALKS regulation is 46m. Thus, the regulation as it stands does nothing to ensure that systems have this capability.

56. As such, Thatcham and the ABI consider that the inability of an ALKS to execute a lane change prevents it, at a fundamental level, from being considered capable of avoiding every collision in a motorway environment that a careful and competent human driver could.

57. Discussion with vehicle manufacturers suggest the possibility of another different interpretation of this requirement. Not that the ALKS must avoid every collision scenario that a careful competent driver could avoid, but that on aggregate, across all scenarios, it must perform better than a careful, competent driver. Such an interpretation could allow a vehicle that performed significantly worse than a careful competent driver in some specific circumstances if it was much better than a human in others (which is likely given the reaction time advantage the system will have over a human). If vehicles following this interpretation were permitted, then this could create significant difficulties in subsequent civil claims where the insurers subrogated right of recovery against a manufacturer runs up against the manufacturer's evidence that it met required safety standards. An interpretation of the careful competent test as applying in each individual case would be a

great deal easier for courts to deal with and provide fairer and quicker compensation to victims.

58. In summary, the proposed interpretation that the ALKS regulation will avoid all collisions that a careful competent driver would is too narrow. It has been well documented scientifically that developing safe automation not only requires the system to perform **better** than a human in the situations where humans regularly fail (imminent collision situations), but it also needs to at least match human performance in the far greater number of situations where human drivers perform well. Avoiding collisions by foresight and anticipation in this way happens all the time in normal driving but goes undocumented because it is successful and no 'critical situation' occurs.

59. An ALKS equipped vehicle (with the system active) cannot emulate an engaged human driver, particularly in the area of anticipation and foresight, and as such cannot be regarded as being automated.

Treat other road users with reasonable consideration.

60. In the UK Highway Code, rule 126 recommends that you SHOULD allow at least a 2 second gap between you and the vehicle in front on higher speed roads. This is not a law so the test requiring compliance presumably does not apply. The ALKS regulation requires only a time gap of 1.6 seconds (maximum, less at slower speeds). Depending on the interpretation of higher speed roads in the context of a system limited to 37 mph, then this could be considered by other road users to be excessively close or unfair differential treatment of human drivers and automated vehicles.

Monitoring test criterion: Avoid putting itself in a position where it would be the cause of a collision

61. In appendix A the government interpretation is that this is met because the ALKS requires that it shall not cause any collisions that are reasonably foreseeable and preventable. In the opinion of Thatcham and the ABI, there are reasonably foreseeable situations in which an ALKS vehicle could become a contributory cause of a collision, for example:
    - A driver misuses the system by falling asleep or by continuing with an 'important' secondary task and failing to respond to a transition request despite the escalating warnings. In this situation the vehicle will stop in lane. This creates a substantial risk of collision from behind. In this situation, primary liability will rest with the driver of the vehicle that fails to see the slowing/stationary vehicle ahead and collides with it. However, if a human driver made an unnecessary stop in lane this would be considered contributory negligence. Although it may be argued that the driver remains liable in this case, because it is their failure to respond to their duty that caused the stop in lane, it could also be argued that the characteristics of the system as a whole foreseeably encouraged this situation.
    - A driver misuses the system when little traffic is present, perhaps after heavy traffic has cleared. This may leave a vehicle travelling 37 mph in the outside lane of a motorway in free flowing traffic conditions, again creating a clear risk of collision from behind. An ALKS system may be able to detect such a situation and activate a transition request but this is not clearly and unambiguously required by the regulations. Driving in an outer lane while an inner lane is empty 'or middle lane hogging' is illegal in the UK so proper enforcement of generic requirements may mitigate this risk.

62. Each of these situations would be entirely preventable if the system was to be capable of changing lane. In the former, the vehicle could move over to the hard shoulder rather than

stopping in lane. In the latter situation, the risk could be minimised by changing lane to the inside lane or pulling over to the hard shoulder or finding safe harbour. Again pre-requisites of the Thatcham ABI" Defining Safe Automation" 12 principles.

Monitoring test criterion: recognise when it is operating outside of its operational design domain

63. In relation to this criterion we agree with the Government's interpretation that the ALKS regulation does adequately demonstrate that compliant systems will pass this test.

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Q16. How do you think ALKS will detect and respond to a police or other enforcement vehicle approaching from behind signalling for the vehicle to pull over?

65. It is a legal requirement in the UK for drivers to stop when requested by law enforcement. The ALKS requirement is that the system complies with all traffic laws in the country it is sold in and only requires the driver's attention to a transition request. However, without a requirement for rear facing sensors, the vehicle would not be able to request a transition demand to alert the driver of the need to take control and pull over following the enforcement vehicles request to do so. It should therefore be clear that the vehicle must at least trigger a transition request in response to an instruction from an enforcement vehicle. It is the manufacturers concern as to what technology they use to ensure the vehicle is robustly compliant with UK law.

66. An effective independent test of the vehicle's ability to respond to enforcement actions, either within the ALKS regulation or as part of any process to approve that a vehicle is deemed automated under the AEVA would be beneficial in resolving uncertainty. Until that is put in place, we do not believe that the vehicle should be deemed automated under the AEVA.

Q17. Do you think that 10 seconds is fast enough in the foreseeable circumstances to comply with the rules on responding to enforcement vehicles?

Q18. If not, why?

67. No.

68. Thatcham and the ABI do not see that a 10 second take back time is adequate for any scenario, whether emergency vehicle or safety critical event. Shortening it further to allow for quicker responses to emergency vehicles would carry significant risk. If speed of response is required then systems not capable of automated lane change must be considered assisted driving and the driver required to remain fully engaged in the driving task.

69. Published research from bodies such as Leeds University (Merat et al 2014), Volvo Cars (Eriksson 2017) GDV –German Insurance Association (Kuhn et al 2017) all highlight the

difference in take over time (typically just a few seconds) and the time at which a driver is mentally and cognitively aware of the traffic conditions and can make a correct evasive decision, typically 15 – 40 seconds. Therefore the 10 second take back time appears completely insufficient to enable a driver to avoid a collision.

70. The constraint that underlies the 10 seconds in the ALKS regulation is the time it takes for a driver to be brought back to the driving task with sufficient situational awareness to be able to undertake more sophisticated control tasks such as changing lane. Thus, the 10 seconds is aimed at ensuring the system can continue to competently operate the vehicle for long enough for the driver to safely resume control before it has to undertake a minimum risk manoeuvre. Asking a driver that is legally disengaged during automated driving to resume control and execute potentially several lane changes to move to the hard shoulder with less than 10 seconds to reengage and achieve situational awareness would be potentially dangerous. As such, if a response within 10 seconds is not sufficient to comply with the law as a response to enforcement vehicles, then the vehicle cannot be considered to be automated under the AEVA and the driver must remain engaged.

Q19. How will ALKS detect a minor or low-energy collision, in order to come to a stop and alert the driver?

71. Thatcham and the ABI consider it a certainty that despite the requirement to comply with all applicable laws, there will be collisions which an ALKS equipped vehicle cannot detect and thus will neither stop post collision, or issue a transition request to the driver.

72. The ALKS regulation requires that the system complies with all traffic laws in the country it is sold in and only requires the driver's attention to a transition request. It should then be clear that the vehicle must be capable of at least triggering a transition request in the event of any collision, no matter how minor. The manufacturer must ensure that an ALKS vehicle incorporates the appropriate technology to make the vehicle consistently and effectively comply with UK law.

Q20. Do you foresee any risks should ALKS vehicles not stop for low-energy impacts?

73. Yes.

Q21. If yes, what are these risks?

74. Thatcham and the ABI consider it a certainty that despite the requirement to comply with all applicable laws, there will be collisions which an ALKS equipped vehicle cannot detect and thus will neither stop post collision, or issue a transition request to the driver. Until it can be demonstrated that all collision types can be detected down to a suitably low severity level, then a vehicle cannot be considered automated. The risk of causing additional injury or other harm as a consequence of failing to stop following a collision is too great. For insurers to properly discharge their obligations under the AEVA this needs to cover the vast majority of even very minor collisions.

75. The ALKS regulation requires only that the vehicle be brought to a standstill in the event of a ***detectable*** collision. However, there is no further definition of what is meant by 'detectable'. In our opinion a minimum collision detection threshold should have been defined in the ALKS regulation such that a clear benchmark was set to ensure only very minor collisions would not be detected.

76. Vehicle manufacturers have suggested that the collision detection criteria for sending DSSAD records to insurers should be based on the collision detection thresholds set by the proposed EDR regulation, because that is all that is feasible in the short term. In our opinion, if this is feasible, then it should be possible for identifying a 'detectable collision' as well.

77. The threshold applied for EDR is that a permanent event record is only made in the event of an airbag deployment. An event record must be made if a change in velocity in excess of 5 mph is experienced by the equipped vehicle. However, this lower threshold event does not need to be permanent and can be overwritten. If this standard were to be implemented for a 'detectable' collision, then it would likely miss a large volume of minor collisions with other vehicles, particularly where the other vehicle is lighter than the equipped, and that it would miss almost all collisions with vulnerable road users.

78. Current collision detection technology for EDR relies principally on acceleration measurement to trigger restraint systems such as airbags and pre-tensioners. Pedestrian fatalities on motorways are rare but not insignificant and are growing with the use of smart motorways. Pedestrians are typically impacted to one side (partial overlap at less than 25%). Careful competent drivers will always brake in such collisions, but it will usually be too late to avoid the collision and may only be after impact. There is no obligation on ALKS to avoid this common scenario. There is also no obligation on the ALKS to mitigate the severity of the collision to the greatest possible extent. As such, there is no obligation on it to react to the pedestrian so it may take no action at all. In many cases the car could continue without recording any accident data. Questions remain on the legal liability of this regarding part 170 of the RTA requiring drivers to stop and report collisions.

79. There are also public messaging risks. Allowing automated vehicles to fail to stop at collisions without penalties undermines the message to human drivers that it is essential to stop after a collision.

Q22. How will manufacturers ensure that ALKS vehicles deployed in the UK are able to recognise signage located above the road that may be unique to the GB?

80. It is illegal for a UK driver to pass under a red X on a motorway gantry or to exceed variable speed limits shown on gantry signs. The ALKS regulation clearly requires all equipped vehicles to comply with all traffic laws in the country in which it is sold and only requires the driver's attention be paid to a transition request. It should then be clear that the vehicle must be capable of recognising signage above the road in order to comply with the ALKS regulation.

81. It should not be difficult for manufacturers to detect a variable speed limit or red X, if it is clear to them that they must do so in order to sell the vehicle in the UK. The vertical field of view required to see an overhead gantry at the minimum detection distance of 46m is only around 6 degrees up from horizontal. It may be much more challenging to ensure that the vehicle does not pass underneath a red X. To guarantee this, the system would need to issue a transition request with enough time available to allow at least 10 seconds transition duration and enough time for the minimum risk manoeuvre in case the driver did not respond. Assuming an MRM deceleration of 4 m/s^2 and an initial speed of 37 mph, then this requires a transition request to be issued at least 200m before the gantry is

reached. Correctly 'reading' signs at that distance will be fundamentally much more challenging. As a minimum it requires detection range much greater than the 46m minimum and may require much higher resolution camera sensors than some manufacturers plan to use.

82. The maximum range at which current radar systems can make decisions is about 100m. At 60 km/h the stopping distance at the maximum deceleration for MRM is about 35m. Thus, the vehicle must commence MRM 65m after the transition request is issued if it is to avoid passing under the red X. At 60 km/h this equates to allowing the driver only around 3.9 seconds to take control before commencing an MRM. This may mean drivers attempting a lane change while lacking situational awareness and with the system decelerating as an MRM commences with a clear risk of poor execution or panic.

83. It may be possible to amend the UK law such that the legal requirement is that vehicles must have stopped or change lane within an appropriate distance of passing under a red X. If this is considered acceptable, it should be applied equally to both human and automatically driven vehicles.

84. Although intended for heavy traffic situations at maximum 37mph, the activation criteria in the ALKS regulation (para 6.2.3) do not require the presence of any given level of traffic in order to activate. Neither does it require it to be in any given lane. An easily foreseeable misuse case is then for a driver to activate the system in slow moving motorway traffic and to continue in automated mode when traffic flow improves. Even in slow traffic, there may be gaps on inside lanes that a compliant driver would move over into to avoid middle lane hogging. If the automated vehicle is in the middle lane and continues in automated mode once traffic flow eases then it will inevitably become a middle lane-hogger because the system is prohibited from changing lane. Such behaviour is illegal in the UK. The vehicle could comply with UK law by detecting that it should be changing lane and issuing a transition request so that the driver can execute that lane change. Alternatively, it could comply by only activating in Lane 1. Both approaches are restrictive on the system usability.

Q23. Do manufacturers intend to offer automation as an optional package for customers at the point of purchase?

85. Yes.

86. Thatcham and the ABI would expect all new innovations such as ALKS are offered as high-cost options at least to begin with. Most current Assisted Driving systems (level 2) are optional as driver assistance packages typically costing £1-2k.

Q24. Do you have concerns about vehicles that are registered as AVs on the DVLA database but the keeper has chosen to have the functionality disabled so they are not capable of operating as an AV?

87. Yes.

Q25. What are they?

88. This could exacerbate unsafe situations. It is presumed that law enforcement will use the DVLA database to check whether a vehicle is automated when they see an apparently distracted driver before they choose to stop that vehicle. If so, and that database is not accurate, then the police may fail to stop a distracted driver travelling in a vehicle without automation. Essentially such a situation could give drivers of vehicles capable of automation but who have not selected the option an almost free pass to undertake non-driving tasks, provided their driving is not obviously dangerous at the time.

89. Secondly, if the DVLA database does not accurately record whether a vehicle is automated, insurers cannot accurately price that risk.

Q26. Do you agree that it is appropriate to exempt the driver from prosecution – if the vehicle comes to an unjustified stop when ALKS is engaged – by creating a further exception in the Motorway Traffic Regulations?

Q27. If not, why not?

90. Neither agree nor disagree

91. We agree that it would be appropriate to exempt the driver from prosecution in this case, because the vehicle will be undertaking the driving at that point. However, we do not agree that there should be no prosecution in such a case because this would treat automated vehicles more leniently than we treat human drivers when they transgress. The Automated Driving System Entity should be liable for at least an equivalent penalty in this case, which may require the creation of new offences. It should also be clear that such a situation could be construed as contributory negligence on behalf of the ADSE in any civil claim following a collision in such a situation.

Q28. Do you agree that amending Rule 150 is sufficient to clarify that the driver may rely on the ALKS?

92. Neither agree nor disagree

Q29. Why?

93. Insurers do not believe that ALKS should be considered Automated and in this case the Highway Code will not need such amendments.

94. If ALKS is considered automated, then insurers consider amending the highway code is sufficient to communicate the new advantages they can take from ALKS but not to communicate any continuing or new safety duties. There are already strong incentives for drivers of all kinds of vehicle to distract themselves with secondary tasks. In the case of a vehicle automated under AEVA, all that is needed is to enable that to take place without risk of prosecution. As such, amendment to the Highway Code and any regulations required to give that force of law is sufficient. There is no need to take other action to make it clear that the driver can rely on ALKS, the manufacturers' literature and advertising will do that very effectively. More clarification may be needed to ensure that they understand how they identify an ALKS compared with other motorway assist modes that are not automated.

Q30. Do you agree that not changing the Motorway Traffic Regulations, except for unjustified stops, ensures the driver is suitably incentivised to take back control when requested?

95. No.

Q31. Why?

96. We do not consider the proposal to limit the scope of the exemption from the Motorway Traffic Regulations to cover only unjustified stops while the system is activated is sufficient incentive to ensure drivers take back control.

97. Currently there is no ambiguity in the law, drivers must be in control of the vehicle at all times even when an SAE level 2 driving system is active. Despite this lack of ambiguity in law and the highway code, stories of abuse of assisted driving systems abound in countries all around the world.

98. When the first automated vehicle is permitted, we will be introducing a new distinction in the law. Drivers will be told that it is ok not to pay attention in certain situations. It appears inevitable that some drivers will fail to understand the distinctions or will choose to abuse it despite what the law says. The risk that is created if a driver does fail to take back control and a vehicle becomes stationary in a live lane is clear and stark. The number of reported incidents in relation to smart motorways without hard shoulders and the media and public reaction to such incidents are a very clear indicator of what will happen as soon as the first fatality in this situation occurs.

99. If such situations were unavoidable in a system that, despite this risk, clearly reduced overall collision numbers then it may be justifiable. However, in this case it would be entirely avoidable in all places where a hard shoulder existed if the system were capable of changing lane and moving to the hard shoulder if the driver failed to respond.

100. This may mean delaying the arrival of the first vehicles to be considered automated in the UK, but would provide for a much lower risk introduction both in terms of safety and in terms of public acceptance of the technology.

Q32. Do you agree that The Highway Code should be changed so that drivers of ALKS must be alert to a transition demand?

101. No.

Q33. If not, why?

102. Insurers do not consider that ALKS should be considered Automated and in this case the Highway Code will not need such amendments.

103. However, if ALKS is deemed to be automated, then it is essential that the Highway Code be amended to require them to be alert to a transition demand.

Q34. Do you think that amending The Highway Code is sufficient to communicate to drivers their responsibility?

104. No.

105. In the event that the government do choose to consider ALKS as automated, insurers do not believe that amendments to the Highway Code are enough to communicate safety responsibilities to drivers. A major information campaign may be needed to communicate the details of what will be a step change in driving rules and responsibilities and which will apply in only a small proportion of the driving circumstances most people will experience on a daily basis.

106. This technology will arrive first on high end expensive vehicles, probably as an expensive cost option, and will likely be driven by older drivers. We consider it unlikely that older drivers regularly read the Highway Code or are aware if it has changed. The Highway Code has most influence in training new drivers but new drivers tend to be young and thus it will have a positive influence over time.

Q35. Do you think the driver should be allowed to perform other activities when ALKS is activated if they must only be ready to respond to a transition demand, with particular reference to any implications for road safety?

107. No.

Q36. Why?

108. For the reasons discussed in responses to other questions, we do not consider an ALKS minimally compliant to the regulation to be sufficiently competent to be considered automated. As such, they should be considered assisted driving systems **without** any permission for the driver to undertake secondary tasks.

109. Insurers are in favour of a very clear delineation of the rules for drivers and secondary tasks. For assisted driving **no secondary task**s should be permitted. For automated driving, the driver should be free to undertake a wide range of secondary tasks.

Q37. What other activities do you think are safe when ALKS is activated?

110. ALKS should be regarded as an assisted system and as such no secondary tasks should be allowed. AN engaged driver is always required to take back control to maintain safety.

Q38. Do you think that the driver should be allowed to undertake other activities if ALKS is not listed under AEVA?

111. No.

Q39. Why?

112. As mentioned above, it is essential to retain clarity for the driving public that secondary tasks are not permissible until a vehicle is considered automated. Failing to do this will only increase the confusion and misuse already very evident in relation to assisted driving systems.

Q40. What activities could they safely perform?

113. No other activities

Q41. Do you agree that an exception should be added to enable the use of the infotainment system for activities other than driving?

114. No.

Q42. Why?

115. We do not consider that an exception should be added to enable the use of the infotainment system for activities other than driving for ALKS as currently proposed because we do not consider the system sufficiently competent and robust to qualify as automated.

116. However, we agree that this should be added for any vehicle deemed automated under the AEVA if it might require the driver to intervene at moments that were not pre-planned.

Q43. Are there any activities you consider unsafe to perform through the infotainment system?

117. No.

Q44. What are they?

118. N/A

Q45. Do you agree with this approach (use of ALKS up to 70mph)

119. No.

120. We disagree with the idea of an automated driving system for motorways that cannot change lane.

121. However, when it is restricted to conditions of low speed, heavy traffic there is at least some rationale for lane changing being unnecessary. For example, managed motorways may encourage no lane changing in heavy traffic. We consider that this would be open to abuse and that it still falls a long way short of the government's own tests in terms of 'at least as safe as a human driver', but we acknowledge that some limited justification exists.

122. No such justification exists when a system is capable of 70 mph - most of the serious safety risks identified will be greatly exacerbated for the following reasons:

1. **The distance that the system must be able to 'see' and detect relevant signs or hazards in time to issue a transition request will increase dramatically.** For example, to stop before passing under a red X when the driver is unresponsive will need a transition request around 435m before reaching the sign. Even with a responsive driver that takes control after 10 seconds, the distance might be 350 to 400m. As a minimum sensor decision range would need to be increased significantly and the full distance may well be impossible to achieve without vehicle to infrastructure communication. Similar risks would exist at roadworks. The main issue with the above situation is the 10 seconds required to ensure safe transition to the driver. If the vehicle automation was capable of lane change then the decision distances would return to levels where on-board sensors could be sufficient to meet range requirements. Assisted driving systems capable of driver confirmed lane change have existed for several years already and are improving. Systems capable of lane change could also execute a far safer minimum risk manoeuvre in most motorway circumstances than current ALKS.

2. **The frequency of vehicles stopped in a live lane may be greater with a 70 mile/h system.** Systems capable of 70 mile/h will have a much less limited operational design domain than those limited to 37 mile/h, and will operate in free-flowing traffic conditions for longer durations. This increases the likelihood of the driver becoming more substantially disengaged from the driving task. The monitoring system should detect this, but if the driver cannot be brought back into the loop, the system will implement a minimum risk manoeuvre. In addition to this, in light traffic at 70 mile/h the consequences of a stop in lane may also be higher on average (higher probability of the impacting vehicle travelling at maximum speeds).
3. **Accepting ALKS as automated at 70 mile/h would likely result in a significant increase in lane hogging.** In the UK 'middle lane hogging' is a criminal offence punishable with on the spot fines. The law says the middle and outside lane are to be used for overtaking only. To comply with the law when traffic is light, an ALKS incapable of lane change would either need to travel with HGVs in lane 1 (56 mile/h) or would need to detect when lane changes were needed to overtake and move back to the inside lane and issue a transition request to get the driver to execute those lane changes. This would offer few benefits over an existing assisted driving system. As long as the transition procedure was followed, it is even possible that the lane change itself could be executed by an assisted driving system compliant with Regulation 79, which would further blur the boundaries between assisted and automated driving. This risk exists at a max speed of 37 mile/h but will be much more significant at 70 mile/h. This is frequently cited as one of the most frustrating and annoying behaviours in other human drivers and would build resentment towards automated driving technologies.

123. The ALKS regulation for a maximum speed of 37 mile/h sets a minimum headway time of 1.6 seconds, 0.4 seconds less than the two second rule recommended by the highway code for 'higher speed roads'. This is already creating the potential for differential treatment of human and machine and is likely to be more clearly a consideration at 70 mile/h.

Q46. Any final comments?

124. The insurance industry is strongly supportive of Automated vehicles and the AEVA. However, because we support the transformative potential of this technology and the productivity, jobs and prosperity it could bring to the UK, we consider it critical that it is **implemented only once sufficiently safe and to avoid immature developments that undermine public trust.**

125. While we sympathise with the position of the vehicle industry in trying to shrink the technical challenge of automation into something that can be managed quickly with current technology (and hence sold profitably to help finance further development) we consider that any motorway system incapable of lane change cannot be considered to be automated for the following reasons:

- **The ability to change lane on a motorway is an essential component of the driving behaviours of a careful and competent driver**. Would we consider a human driver careful and competent if they failed to avoid a preventable collision because they were not sufficiently confident to change lane and told us that they had indeed never changed lane on a motorway in their entire driving career?
- **A system that is unable to change lane is fundamentally incompatible with the highly relevant test that any automated system must be able to avoid all collisions that a human driver can avoid.**

- **A vehicle that, in the event of an unresponsive driver, stops in a live lane on a high speed road cannot be considered to meet the definition of avoiding being a cause of a preventable collision**. We also believe that
- **The ability to change lane is of fundamental importance in complying with UK law**, particularly in managed motorways and in light traffic conditions and/or at higher speeds.

126. We do not consider that attempting to sidestep the problems by issuing a transition request and holding the driver liable if anything goes wrong to be an acceptable solution to these difficult issues. It is not sufficiently safe, the operational design domain is simply too small and limited and it risks exacerbating public confusion over drivers roles and responsibilities. Any resulting serious collisions will risk undermining public confidence in future, more robust, automation systems.

127. Over and above these fundamental concerns, we do have concerns about details of the implementation of the ALKS regulation in terms of, for example
- The lack of definition of a 'detectable collision' and the requirements for collision reporting through DSSAD, which are essential for safety and for legally compliant operation. These systems cannot identify nor respond nor respond to potentially fatal collisions with pedestrians
- The very large burden it places on type approval authorities to interpret requirements that are in many cases not very specific. There is no local TA control proposed. Insurers could help that knowledge base.
- Drivers will assume automated driving allows them to sleep and use mobile devices. This misuse will potentially **increase** and not decrease UK KSI.

128. In support of the AEVA the insurance industry identified 12 key principles to ensure the safe adoption of automated technology. A summary of these 12 principles and our assessment of the compliance of the ALKS proposition as it stands, is shown below:
1. User Support: Partial compliance. No requirements for training, system HMI requirements to distinguish between manual, assisted and automated modes is not intuitive or unambiguous.
2. Location Specific: Fully compliant
3. Safe Driving: Not compliant. Not clear that ALKS will detect all listed hazards, cannot execute all foreseeable driving tasks necessary (no lane change), degree to which critical safety requirements are boiled down to one requirement that is be free of unreasonable risks and left to an approval authority to interpret. Significantly worse if permitted at 70 km/h
4. User Monitoring: Not compliant. HF research has shown that eyes on the road and hands on the wheel is insufficient to demonstrate sufficient situational awareness to avoid collision. This is all the regulation required.
5. Secondary Tasks: Not compliant. Unplanned transitions are required and ALKS is not capable of lane changes so will require regular and urgent transitions
6. Starting Automation: Fully compliant
7. Using Automation: Not compliant. Transition requires min 10 s not 15 s defined. ALSK not required to detect non permitted secondary tasks (e.g. mobile phone use)
8. Ending Automation: Not compliant. Stop in lane is unsafe. Requirement was for lane change to hard shoulder/safe refuge. This is worse if 70 km/h is permitted
9. Collision Protection: Compliance partly ambiguous. Pedestrian avoidance only explicitly required in central impacts with 5 km/h pedestrians and may be excepted from careful competent driver test. Physical tests very ambiguously defined.

10. Cyber Resilience: Not compliant. Does not comply with ISO
11. Collision Data: Not compliant. ALKS regulation does not provide insurers a right or mechanism to access the data, 'detectable collision' undefined and likely vehicle industry interpretation is data only in the event of EDR trigger (>8 km/h delta V or firing of deployable pedestrian restraints, where fitted). Many collisions, including some serious, will not be captured. Those captured may be overwritten and lost before insurers can capture data in claims received later than a few months from collision date
12. Sustainability: Not compliant. No requirement for self-aligning/calibrating sensors.

ALKS only satisfies 2 of these 12 without ambiguity.

129. Thatcham and the ABI firmly believe that ALKS **must** be regarded as an **Assistance** system- as planned, **ALKS requires an engaged driver** to maintain safety of their car occupants and other road users.

130. Thatcham Research has developed a short video on how Automated Driving Threatens Road Safety[4] to summarise the key safety concerns set out in this response. We would encourage those involved in this call for evidence to watch.

Association of British Insurers & Thatcham Research
October 2020

[4] Automated Driving Threatens Road Safety, October 2020 (https://www.youtube.com/watch?v=HJNZASkmV1w&t=4s)