

Effective Safety Management Systems: A key need for current and future CAV safety

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Making CAVs safe does not end with defining how "good" they are at driving, detecting pedestrians, or avoiding incidents – the processes in which they are designed, built, tested, deployed, and monitored needs to continually promote, improve, and remain focussed on the safety of all affected parties. A safety management system (SMS) has an important role to play for the employees of organisations designing, building, and operating CAVs. An effective SMS is a better way to approach this challenge than the current focus on safety cases for specific vehicles and ODDs.

What is an SMS?

An SMS is a framework of documentation that describes safety procedures and practices within an organisation (AVSC, 2021). It needs to be specific to the organisation and for the CAV services or activities they operate. An SMS is a dynamic and evolving set of documentation requiring input from incidents, consultations, and reviews. For example, if a CAV service operator is providing hospital patient transport, the SMS needs to focus on implementing and maintaining patient safety. Given members of the public are already concerned about CAV safety, SMSs are extremely important in evidencing

an organisations' commitment and ability in CAV safety and in demonstrating a strong "safety culture".

SMSs include a range of documents that work together to implement, monitor, assess and promote safety in tandem. When compiling an SMS, current safety processes are documented, gaps identified, and new/improved practices integrated. Clear, achievable safety objectives (SOs) are established to drive an organisation's aims for improving safety – SOs need to be measurable and time-specific, with safety performance indicators (SPIs) used to evidence progression. SOs and SPIs need to be specific to be effective.

Who needs to use an SMS?

An ASDE's (authorised self-driving entity's) employees – at all levels – need to know about the SMS and safety practices; but this needs to be proportionate, not everyone needs to know everything. Appropriate, relevant knowledge is needed. Do employees know their responsibilities in keeping themselves and the public safe? Can technicians and Safety Drivers report safety incidents? Are employees consulted on how the SMS is working for them?

Who says an SMS is needed?

SMSs are not just a "nice to have" but underpinned by regulation and guidance. The requirement for risk assessment, provision of safety information to employees, which are part of an SMS, is required by The Management of Health and Safety at Work Regulations (1999) and the Health and Safety at Work Act (1974). Specific guidance for SMSs related to CAV activities is described in BSI PAS 1881:2022¹ which requires "documented safety processes" and "a robust, proactive but proportionate approach" to safety. ISO 45001:2018² also provides guidance for evidence and suggests a straightforward 4-stage process

for SMS's: **Plan, Do, Check, Act**. Obviously, this is a much more complex process in reality, but it does help to conceptualise these key stages. Firstly, organisation's need to **plan** how the SMS will look, **do** what is required to create and record the associated documentation, **check** it frequently, and **act** upon safety objectives. Evidencing this process may be an opportunity for ASDE's to leverage public trust and acceptance of CAVs as it can be a very simple way to communicate that safety, particularly public safety, is a key focus.

Why is an effective SMS important for CAV deployments?

It is expected that an evaluation of an ASDE's SMS will be a requirement of the UK Government's approval scheme for the deployment of CAVs on public roads in Great Britain. Evidence to demonstrate an effective, robust SMS will need to be provided. This evidence will be important for approval authorities to review, but it will also be fundamental to the development of safety cases for organisations seeking to deploy CAVs across a variety of operational domains. In this scenario, an organisation could be assessed against the SMS's processes rather than operational domain-specific safety case content.

A key part of an SMS is safety risk management, particularly risk assessment encompassing all road users, not just CAV passengers/users. Risk assessment is required by UK health and safety law but in the context of CAV deployments it, and relevant parts of an SMS itself, should seek alignment with the safe systems approach. However, integrating an SMS for CAV deployments with this approach is not straightforward, not least how will the safety requirements for CAV deployments affect requirements for the rest of the transport system, and the public who will encounter them?

¹BSI PAS 1881:2022 Assuring the operational safety of automated vehicles – Specification.

²BS ISO 45001:2018 Occupational health and safety management systems – Requirements with guidance for use.

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