



Centre for Connected
& Autonomous Vehicles

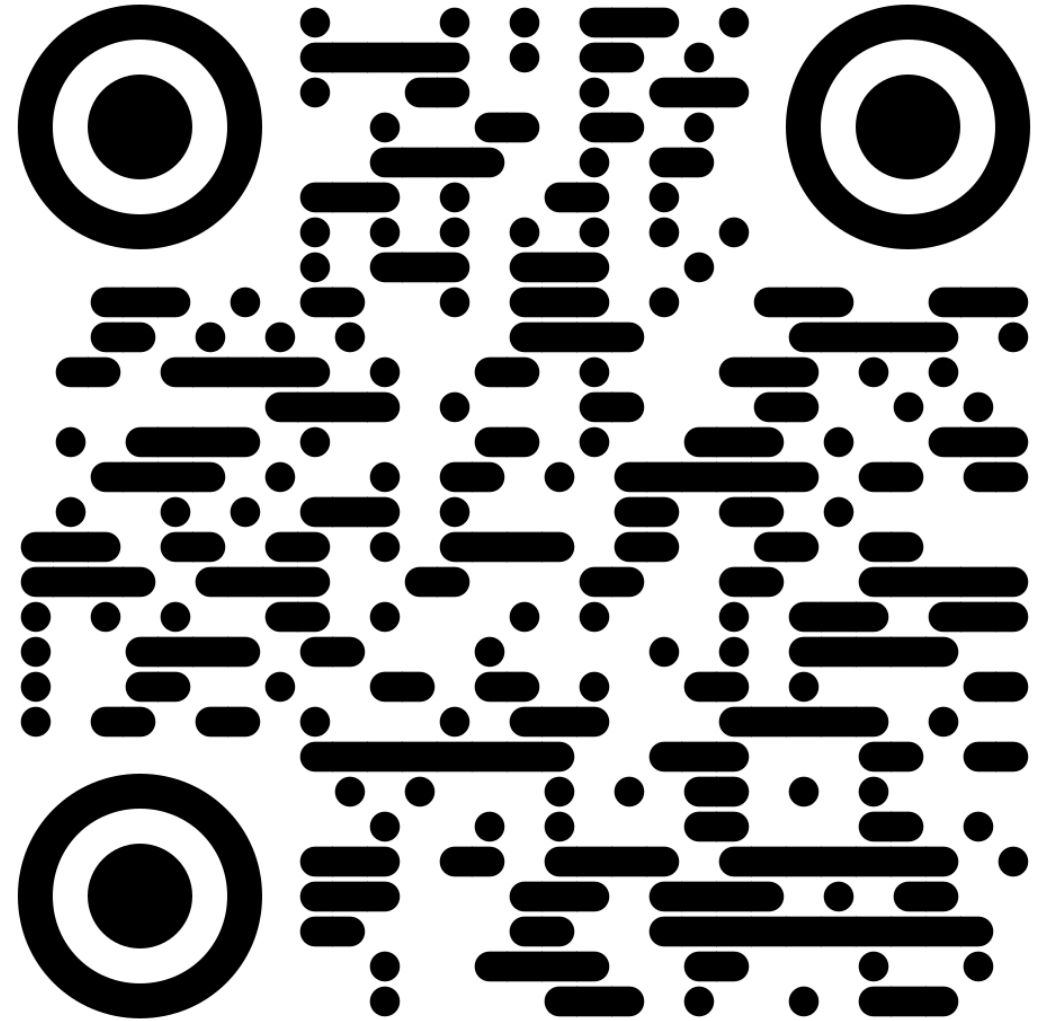
CAM Cohort

Welcome & Intro

David W – Head of Innovation

Contents

- ▶ Welcome
- ▶ CCAV Update
 - ▶ General
 - ▶ The Automated Vehicles Bill (Bruno)
 - ▶ Mass Transit Feasibility Studies (Lily)
- ▶ Oxford Brookes Introduction
- ▶ Lunch / Networking
- ▶ British Business Bank
- ▶ Break Outs
 - ▶ Supply Chain (Zenzic)
 - ▶ CAM: Highs and Lows (CCAV)



Code of Practise

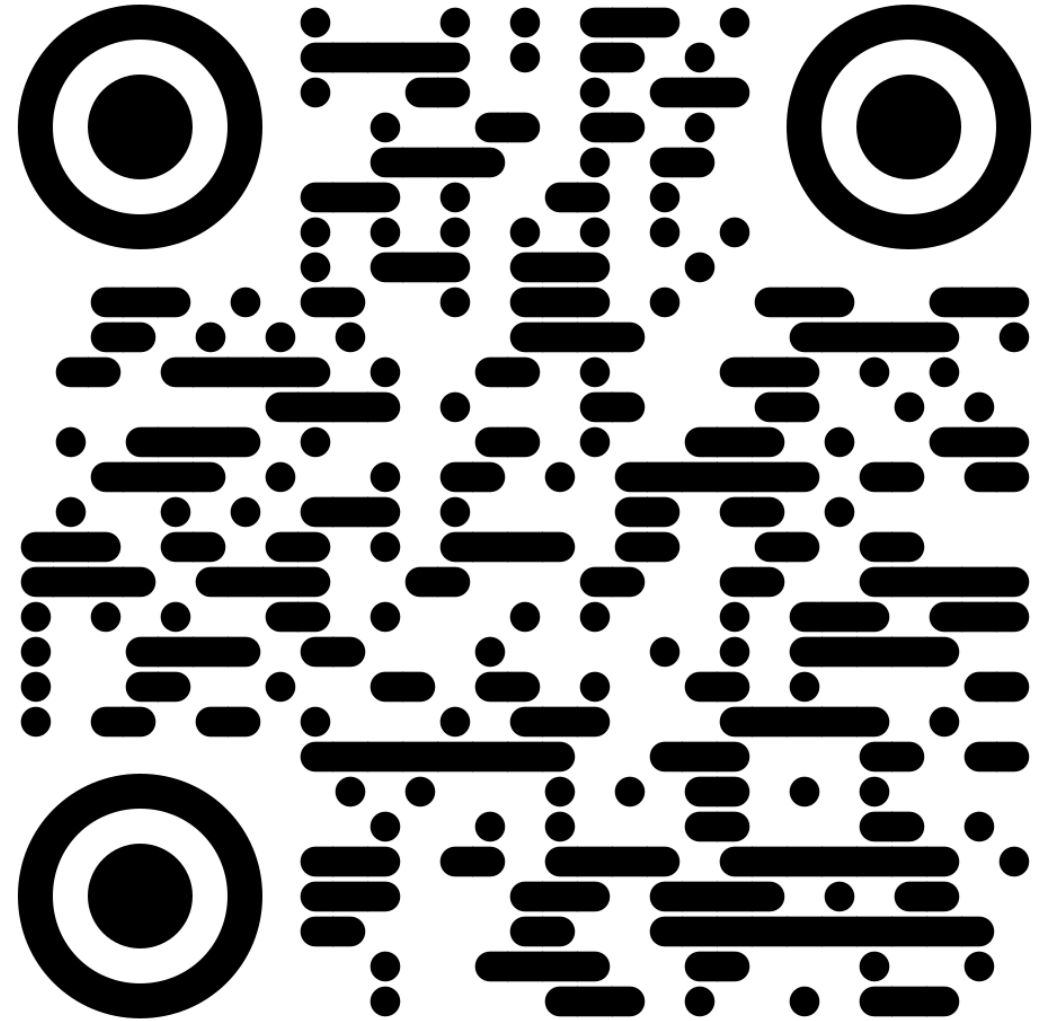
Updates

- ▶ King's Speech announces the Automated Vehicle Bill
- ▶ HMT Announce funding for the Advanced Manufacturing Plan inc. (up to) £150m for CCAV to 2030
 - ▶ CAM Pathfinder
- ▶ CCAV growth – Some new roles, names & faces over the next few months. We'll organise a “who's who” as soon as we can!
- ▶ Two new Ministers (DfT)
 - ▶ Anthony Brown (MP)
 - ▶ Lord Davies of Gower (Lord)



Code of Practice: Automated Vehicle Trialling

- ▶ The Code of Practice supports the development of automated vehicle trials in the UK, providing guidance on how to conduct trials safely and responsibly, engage with the relevant authorities and obtain vehicle authorisations and exemptions.
- ▶ Latest update (Nov 23) provides helpful additional clarifications on the guidance within the Code of Practice, as well as updating relevant information throughout.
- ▶ This includes the addition of further information on GB Type Approval schemes, MOT requirements for trial vehicles, Special Type General Order provisions and importing vehicles for trialling.



Code of Practise

Code of Practice: Notification of Trials taking place in the UK

- ▶ Trialling organisations should inform CCAV before conducting any public trials.
 - ▶ enquiries@ccav.gov.uk



Department
for Transport



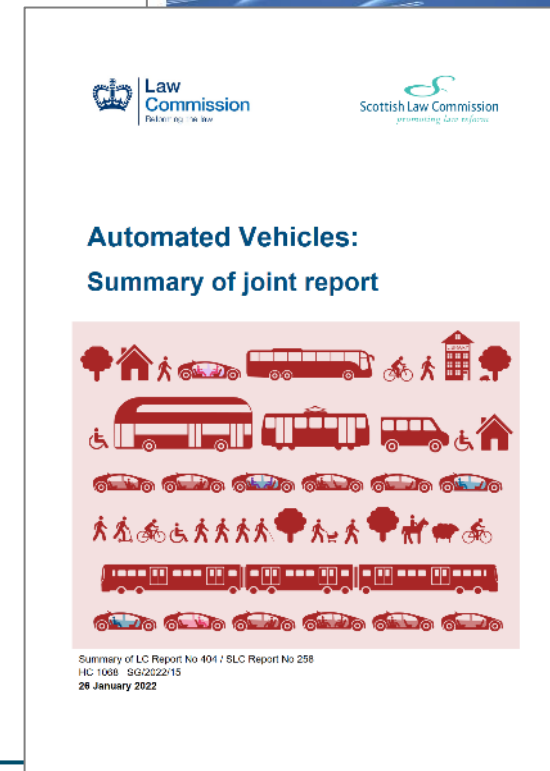
Automated Vehicles Bill

Introduction and overview

Reader note: *These slides offer a high-level, plain English overview of the policy context and key provisions of the Automated Vehicles Bill. Please refer to the Bill draft and Explanatory Notes for further detail and clarifications.*

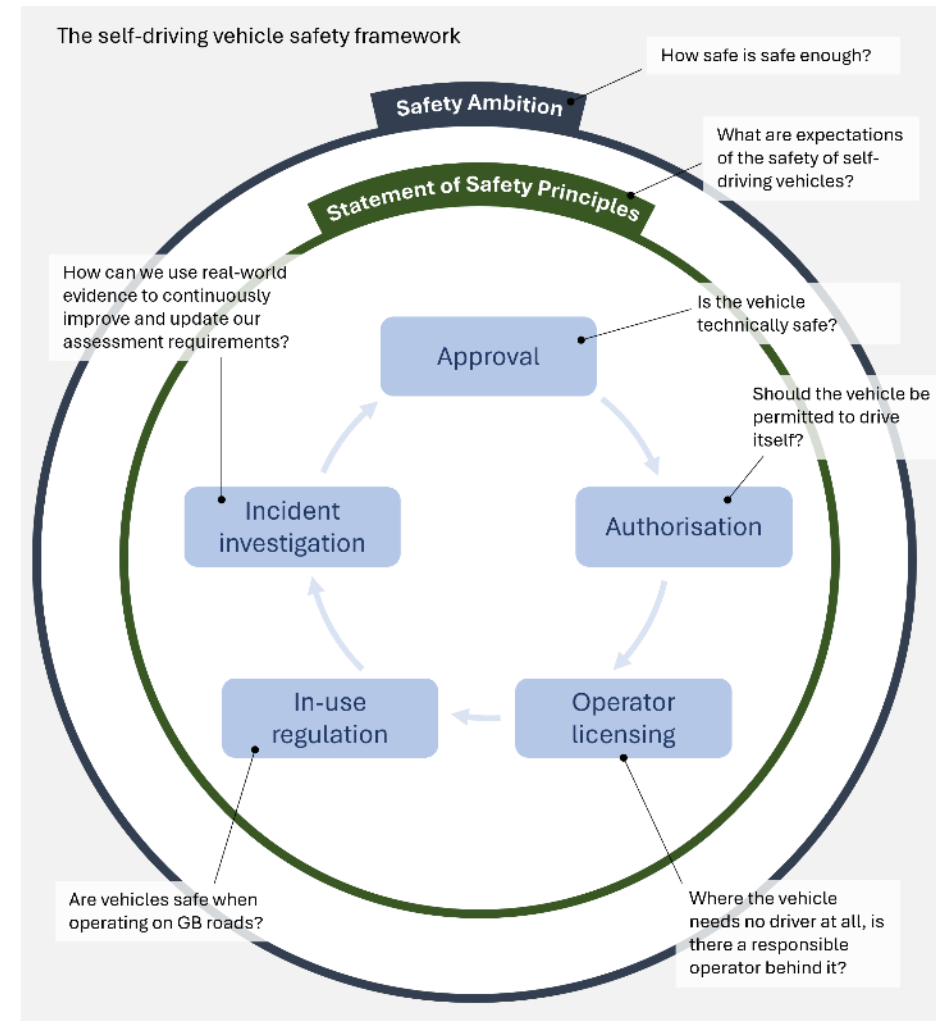
Foundations

- ▶ Law Commissions' joint report published 2022, recommending new AV legislation
- ▶ Brought together four years of legal review, three consultations, and hundreds of responses from the public and organisations
- ▶ 75 recommendations setting out shape of new legal framework for safe deployment of self-driving vehicles
- ▶ Government's CAM2025 report accepted and committed to future legislation
- ▶ Legislation called for by industry, stakeholder groups, and Transport Select Committee



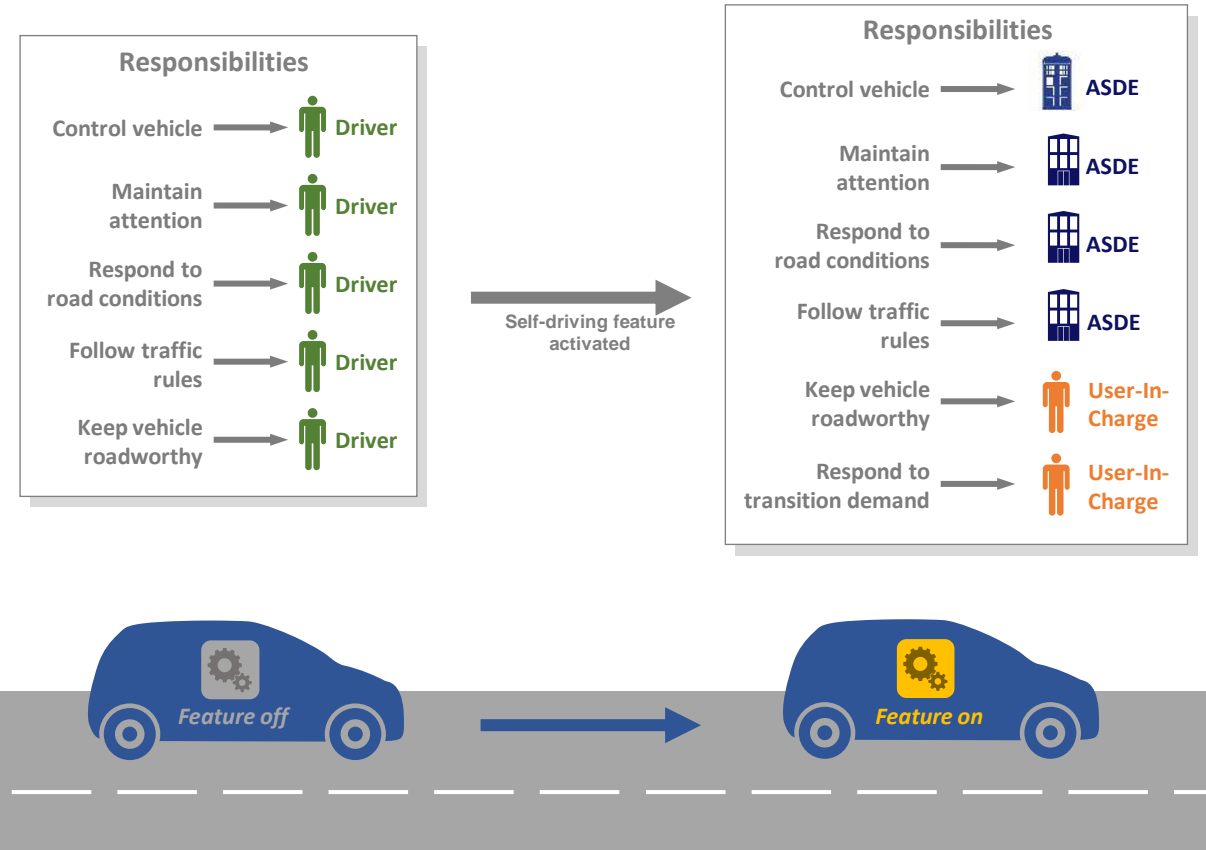
A new safety framework

- Government to publish a *Statement of Safety Principles* defining safety expectations of self-driving vehicles – informed by Safety Ambition
- Authorisation process will test self-driving capability and identify a corporation to be held accountable for a vehicle's behaviour
- Ongoing regulation with powers to monitor safety data and enforce compliance
- New Incident Investigation function to foster culture of safety and continuous learning



New concepts: ASDE and User-In-Charge

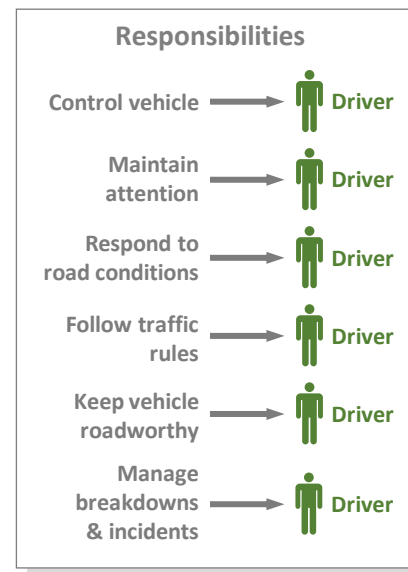
- Every self-driving vehicle authorisation will have a corresponding *Authorised Self-Driving Entity (ASDE)* – e.g. the manufacturer
- ASDE assumes responsibility for behaviour of the vehicle when self-driving
- Early self-driving features will not work in all contexts – e.g. some may be motorway only and need to be able to ‘hand back’ to a human.
- Human in driving seat becomes the *User-In-Charge* when self-driving feature is active
- User-In-Charge is immune from most driving offences – but must retake control if instructed



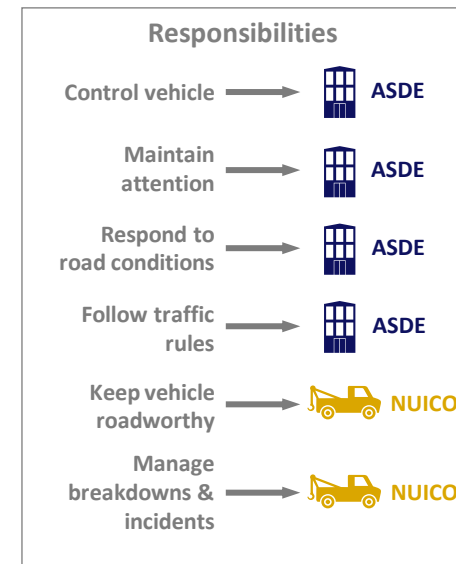
New concept: No-User-In-Charge (NUIC)

- Some vehicles will be able to self-drive and complete a journey without a User-In-Charge
- They will require a No-User-In-Charge Operator (NUICO) to oversee them. The NUICO role will vary, but will be comparable to a fleet operator.

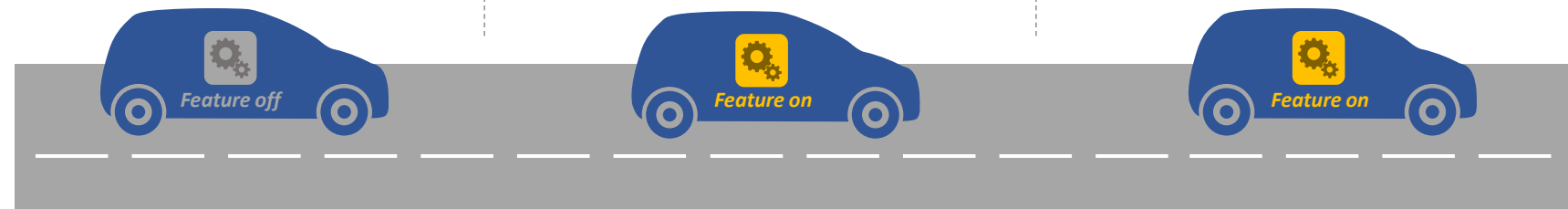
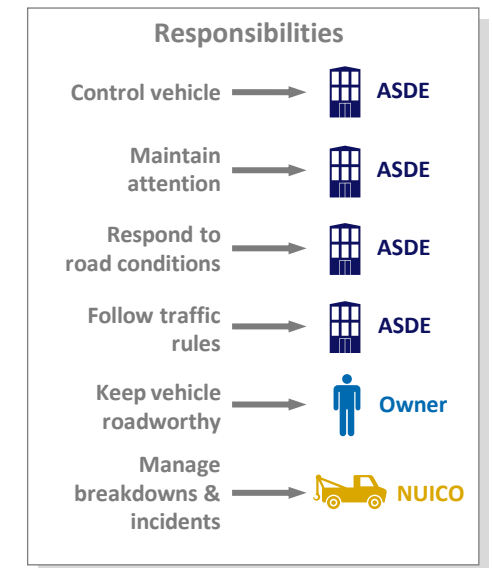
No self-driving features activated
Driver is responsible for all elements as normal



NUIC feature activated - vehicle owned and operated as part of a fleet
NUICO responsible for upkeep and responding to incidents



NUIC feature activated - vehicle privately owned
Owner may retain some responsibilities eg upkeep



Additional provisions

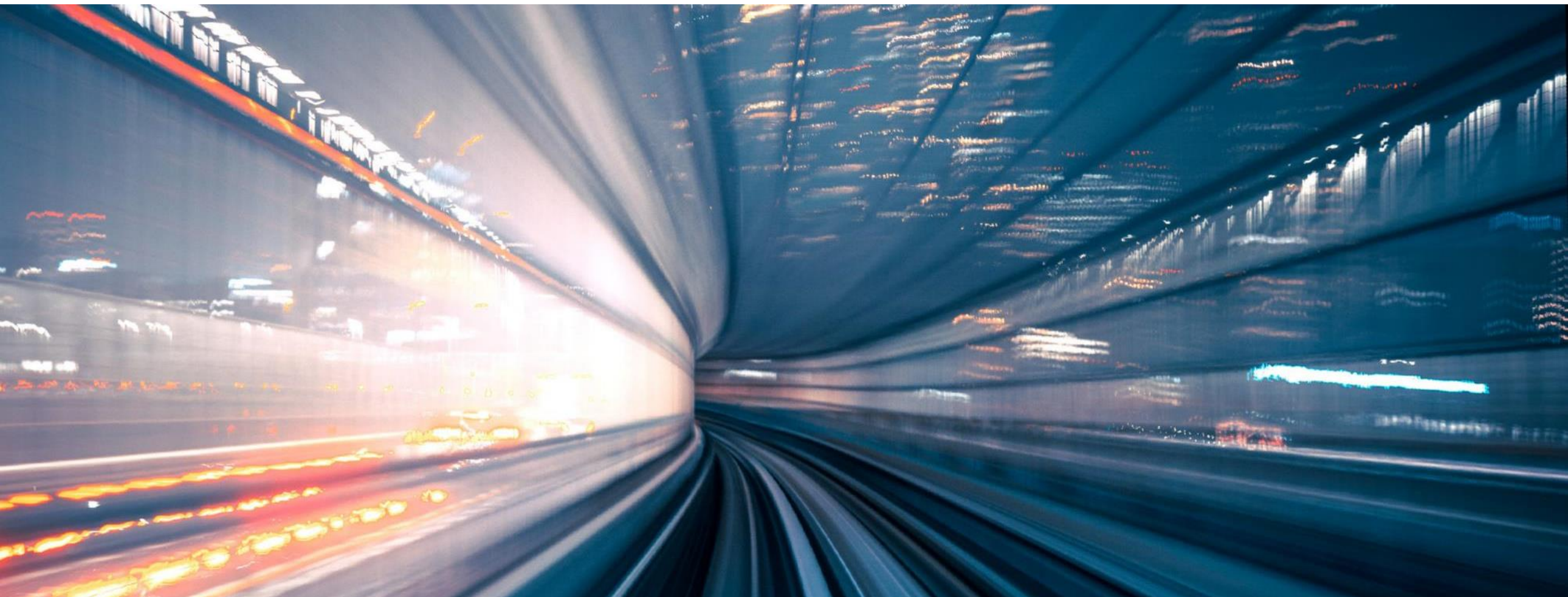
- **Misleading marketing** – New offences to ensure only vehicles that are authorised for self-driving can be marketed as such.
 - **Foundations for Automated Passenger Services** – Establishing a new permitting route for operators looking to deploy self-driving taxi style services. Will stand alongside and provide an alternative route to traditional taxi, private hire, and bus licensing.
 - **Amending Type Approval** – Grants powers to amend existing Type Approval regulations to accommodate self-driving vehicles (e.g. vehicles which have no driver's seating position).
 - **Clarification of existing offences** - The Bill makes amendments to bring software within existing offences under the Road Traffic Act 1988 around tampering, and the fitting and supply of defective or unsuitable parts.
 - **Digitising TROs** – Grants powers to require traffic authorities to provide Traffic Regulation Order in line with electronic data standards. This will allow self-driving vehicles to draw on up-to-date information about eg road closures.
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Connected and Automated Mobility as a Mass Transit Solution

Lily Wong Le, Commercialisation policy



Commercialising CAM: mass transit studies

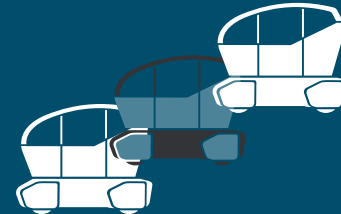
£66m Commercialising Connected and Automated Mobility



Deployments
£41m



Supply Chain
£18m



Mass transit
£1.5m

More!

By the end you will know about CAM mass transit

1. **Why** there is a need for UK government to do something?
2. **What** do we mean by CAM mass transit?
3. **How** are we understanding the costs and benefits of CAM mass transit compared to other mass transit modes?
4. **Who** is involved? **Where** are the studies?
5. **When** will projects conclude?



Why

The rationale for Government intervention

Context

1. Improve connectivity across the UK

- Transport network

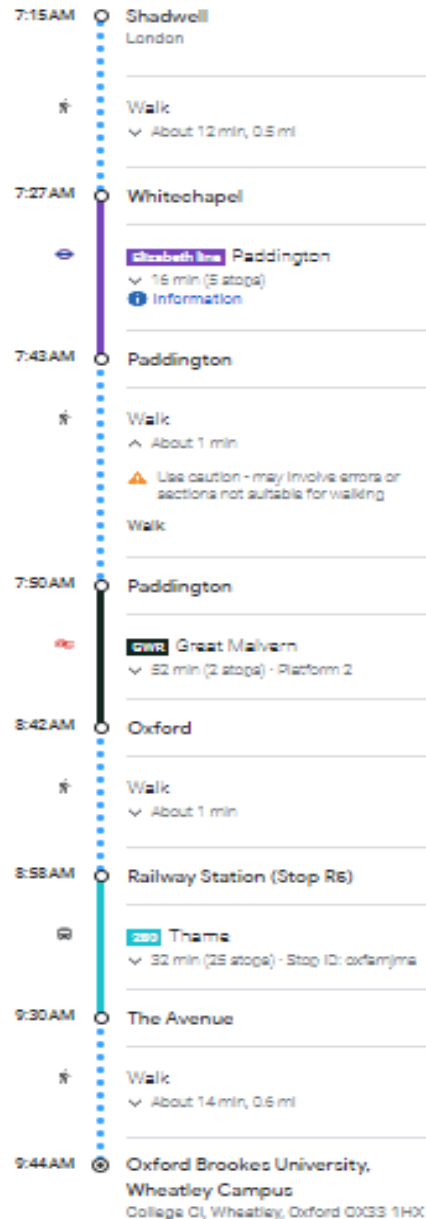
2. Build confidence in the transport network

- Users' experience
- Safe, reliable, inclusive

3. Decarbonise transport


- Climate change
- Air quality

4. Support British businesses



Great Self-Driving Exploration:

Public and shared applications of self-driving vehicles were seen to deliver most benefit, as well as offering user choice.

On-road sectors			
 <p>On-road passenger services This refers to the use of vehicles, including buses, private hires and taxis, for transporting people on public roads. SIC Code – 49-53 (a)</p>	Estimated UK CAM market size p.a.		
	Sector	by 2030	by 2035
On-road passenger services	£100m	£1,250m	£3,650m

REFERENCE

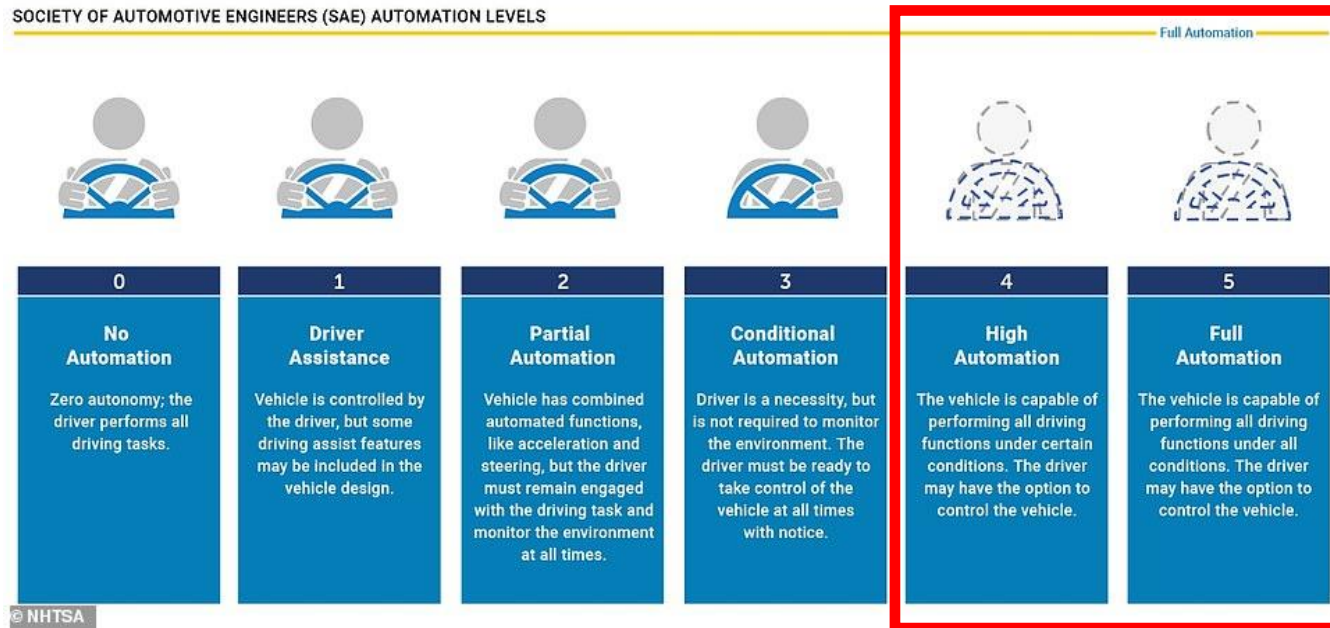


What

What is CAM mass transit?

What do we mean by CAM mass transit?

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS



Mass transit:

- Shared public transportation system
- A large number of people are carried from one place to another
- Within a single vehicle or combination of vehicles
- On a defined route.



How

How are we understanding the costs and benefits of CAM mass transit compared to other modes in the UK?

Is CAM feasible as a mass transit solution in the UK?



Operational cases for a CAM mass transit service

UK route underserved by public transport



Solve real-life transport problems



Service delivery and operation as part of a transport network



Encourage active transport and public journeys
(acceptability, accessibility, inclusivity)

Better outcomes than traditional modes (costs, benefits)



Meet safety, security, cyber security, and legal requirements



Who and Where?

Who is involved? Where are the studies?

Projects 1 – segregated routes



East Birmingham North Solihull Automated Shuttle Service:
East Birmingham and 'The Hub' North Solihull (airport, HS2, National Exhibition Centre)



Milton Keynes Advanced Very Rapid Transport:
Corridors extending out to a radius of 25-30 km around Milton Keynes



Cambridge Autonomous Rapid Transport:
Newmarket park and ride to airport

Dedicated Driverless Spaces for Integrated Mass Transit:
St Albans Abbey Line Conversion, Hatfield - Hertford

Competition 1 – Cambridge Autonomous Rapid Transit

► Newmarket Road park and ride in eastern Cambridge to the repurposed airport site

ID	Assumptions	Existing (2021)	Full build
A	Homes	0	10,000
B	Car ratio	Aiming for decrease	
C	Bus	8%	40%
D	Train	2%	8%
E	Vehicle	47%	10%
F	Passenger	5%	3%
G	Bicycle	28%	28%
H	On-foot	11%	11%
I	AM Peak-trips (two-way)	8%	5830
J	CART mode share %	0	28%
K	CART trips (two-way)	0	1,631
L	CART trips (one-way)	0	816

CART interim report, 2023

ZF



Dromos

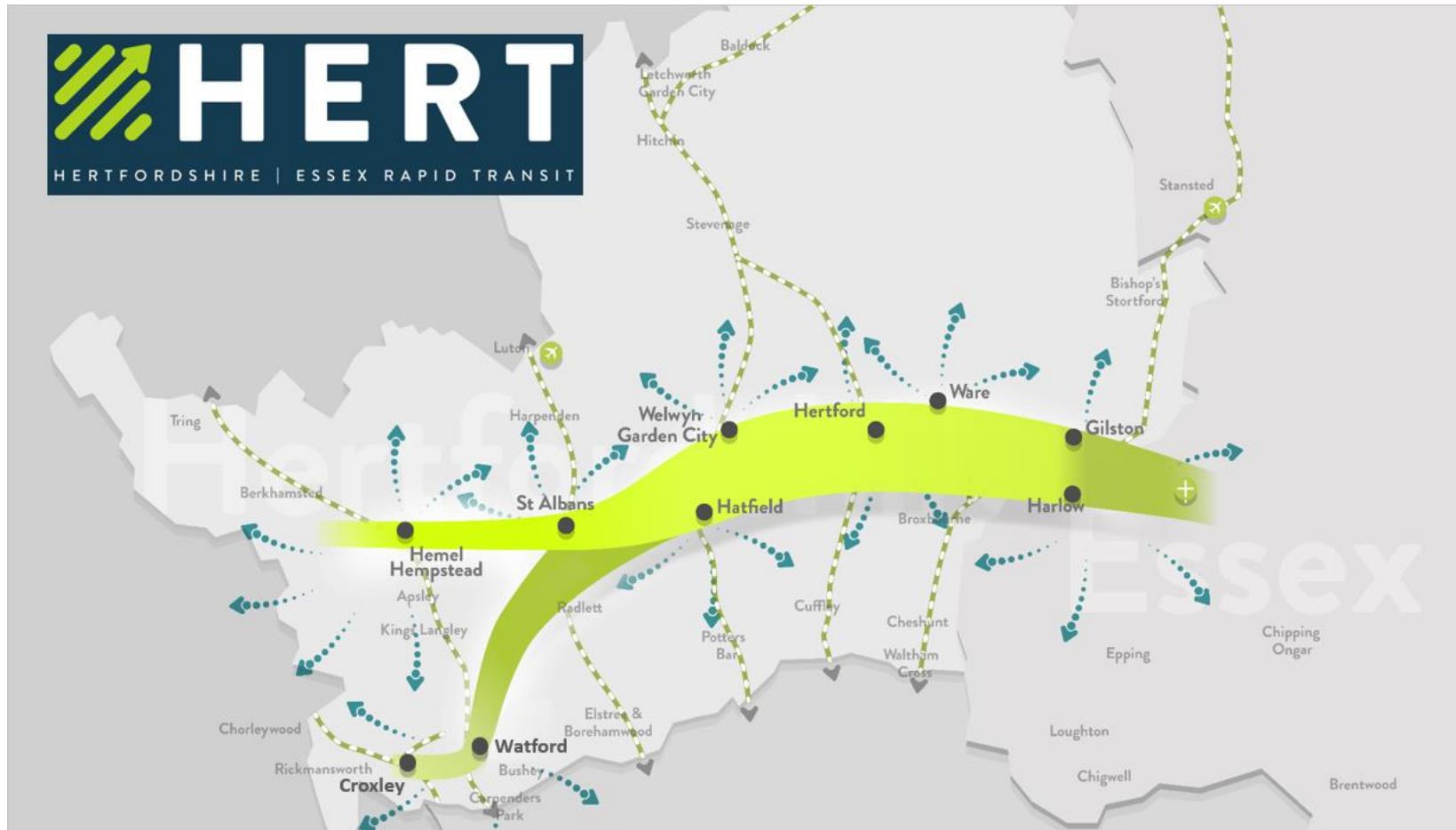


Fusion

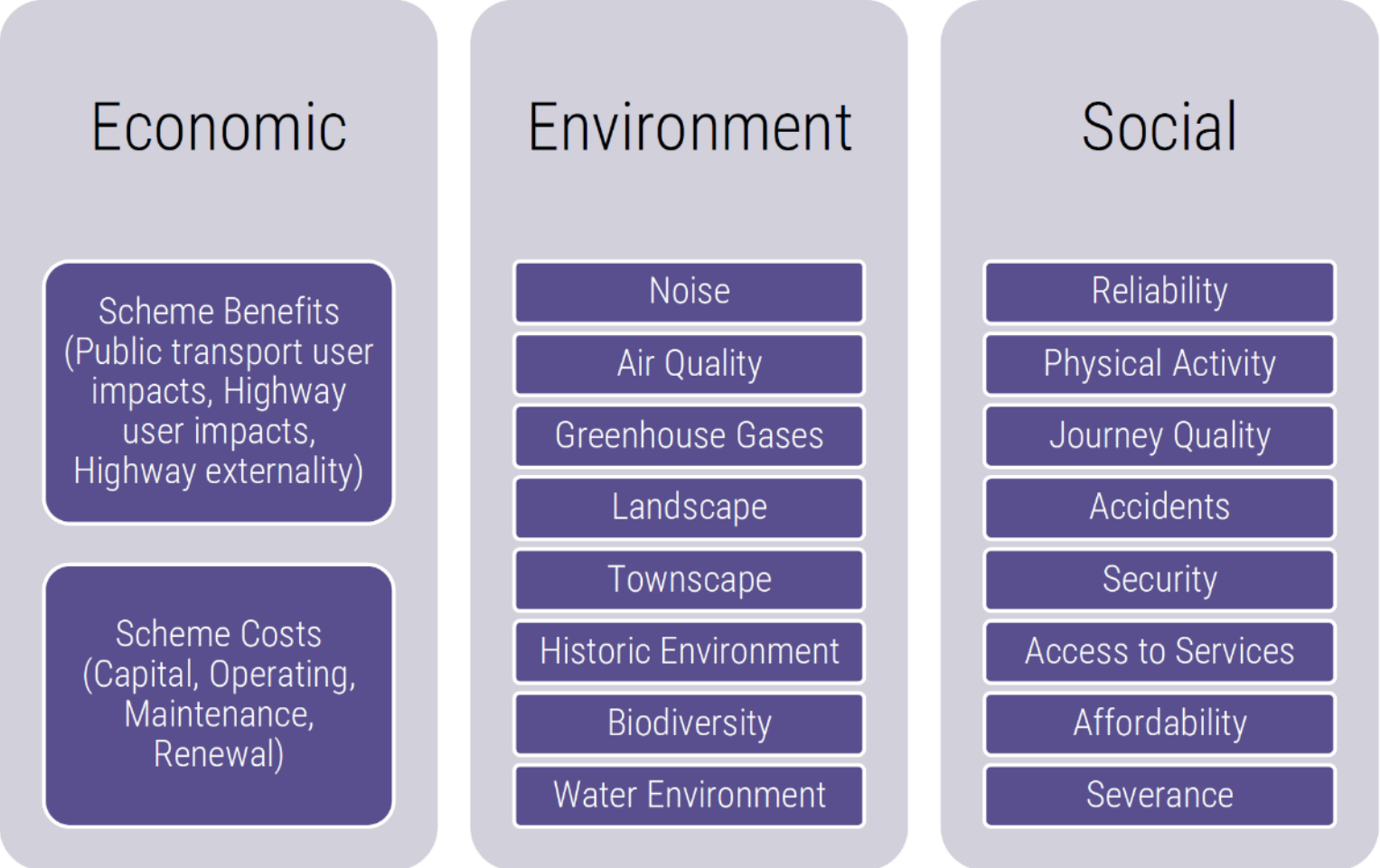


Competition 1 - Dedicated Driverless Spaces for Integrated Mass Transit (Hertfordshire)

- ▶ St Albans Abbey train line conversion and Hatfield – Hertford (east-west route)



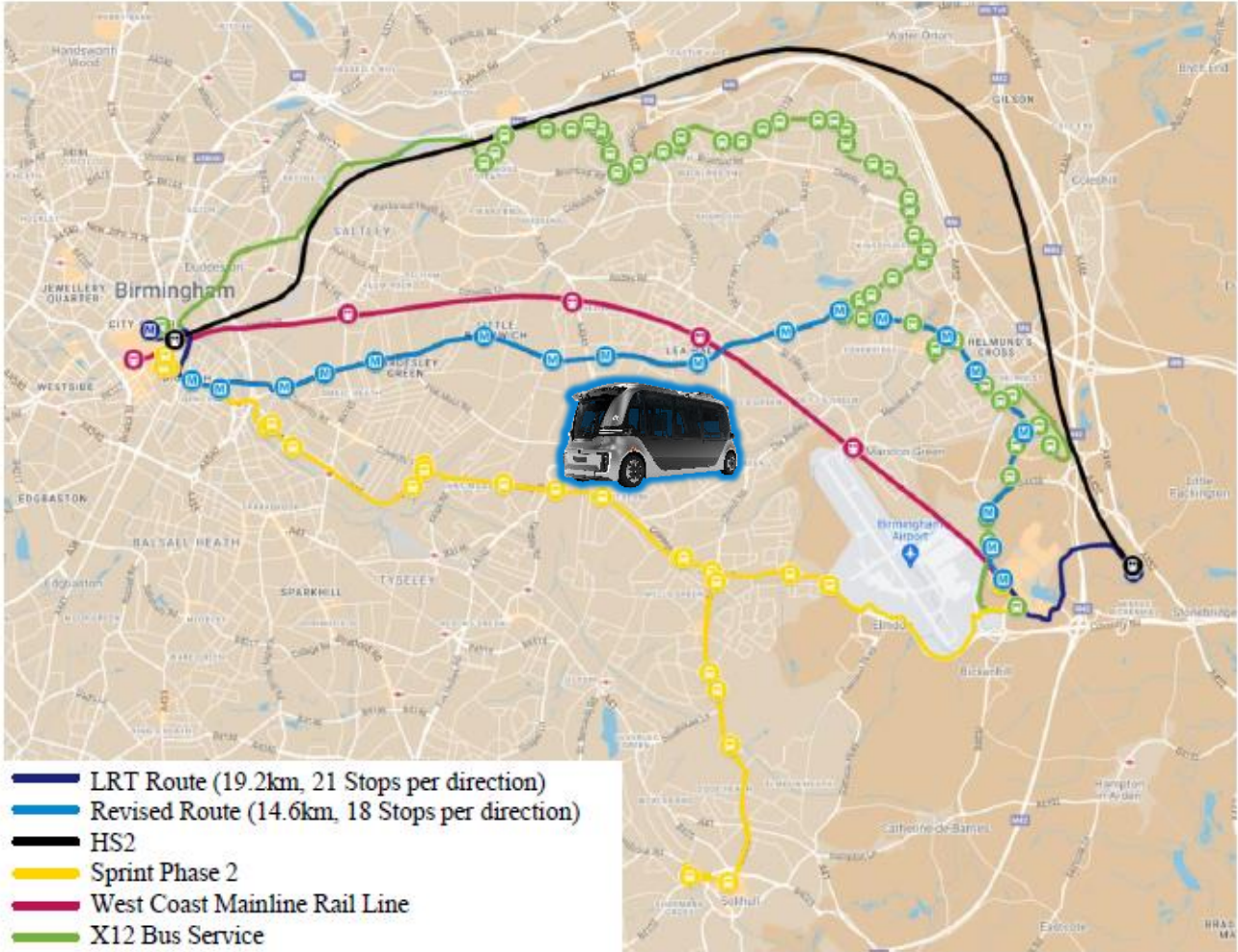
Competition 1 - Dedicated Driverless Spaces for Integrated Mass Transit (Hertfordshire)



Dedicated Driverless Spaces interim report, 2023

Competition 1 - East Birmingham North Solihull Automated Shuttle Service

Comparison of the originally proposed metro extension route and the revised route considered in this study



East Birmingham North Solihull Automated Shuttle Service draft report, 2023

Competition 1 - East Birmingham North Solihull Automated Shuttle Service

Critical success factors:



Travel to commercial, entertainment, and residential areas



Comparable / improved service to bus, rail, tram



Supplement existing services in network



↓ congestion



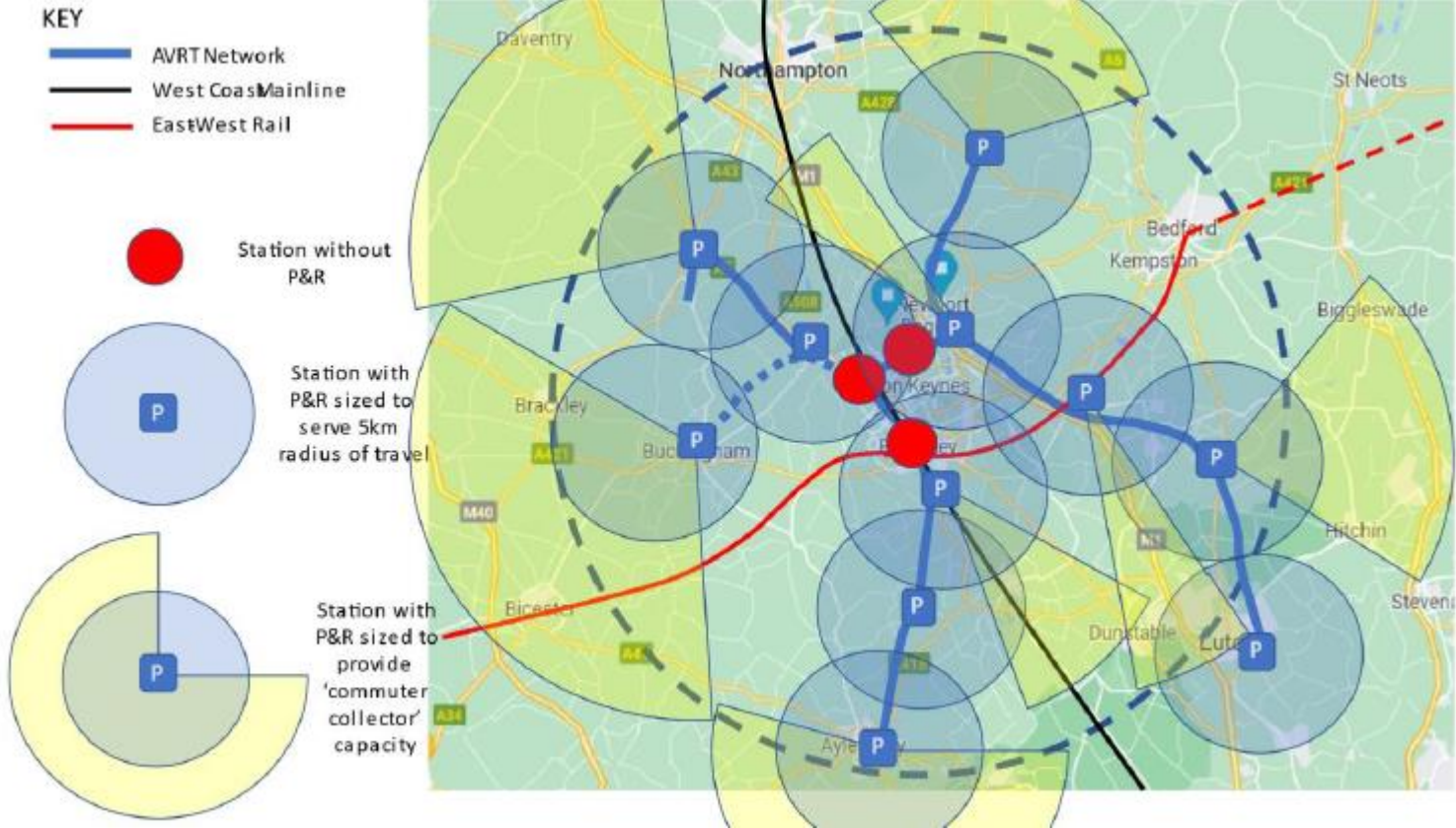
↓ road traffic collisions



↓ pollution

	Capital expenditure (per km)	Operational expenditure (annual)
CAM *early costings	£19.7m*	£2.7-7.7m* *range depends on vehicle size & demand
Bus	£19.7m	£2.7m
Light rail	£37.9m	£6.3m

Competition 1 – Milton Keynes Advanced Very Rapid Transit



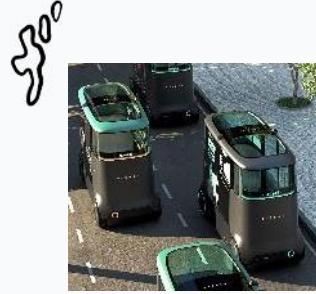
Milton Keynes Advanced Very Rapid Transport interim report, 2023



Projects 2 – segregated and public routes

Commercialising Connected and Automated Vehicle Services in the Scottish Highlands and Islands (Inverness and Isle of Skye):

Inverness College University of the Highlands and Islands Campus to key locations in Inverness; connect ferry passengers to public transport at Uig Pier, Isle of Skye



Autonomous Healthlink (Northumberland):

Segregated route between Seaton Delaval Station to the Northumbria Specialist Emergency Care Hospital in Cramlington, may explore logistics too

Dromos Connected and Automated System (Bolton):

Decommissioned railway corridor connecting the Bolton Transport Interchange to the Royal Bolton Hospital



HertsLynx Connected and Automated Mobility On-Demand:

Maylands to Harpenden Station and St Albans

Blythe Rural Automated Vehicle Operations (West Midlands):

Shuttle service on M42 from Blythe Valley Business Park to the UK Central Hub

Integrated Mixed Traffic Mobility for Hertfordshire Essex Rapid Transit:

Watford and St Albans town centres





When

When will projects conclude?

Timeframes

	Competition 1 projects	Competition 2 projects
Start date	Spring 2023	January 2024
End date	January 2024	November 2024



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CAM: Pathfinder

David Webb, Head of Innovation





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CAM: Pathfinder

Recognising the early opportunities for CAM in the UK (& wider) and supporting the sector to overcome barriers to those opportunities



CAM Pathfinder – (up to) £150m by 2030

- ▶ Alongside the announcement of the AV Bill in the King's speech and the £4.5 billion of investment for British manufacturing to boost economic growth (The Advanced Manufacturing Plan)
 - ▶ CCAV secured (upto) £150m funding to cement the UK's place among world leaders for designing, developing, deploying, and manufacturing self-driving technologies, products, and services
-

CAM: Pathfinder - Outcomes

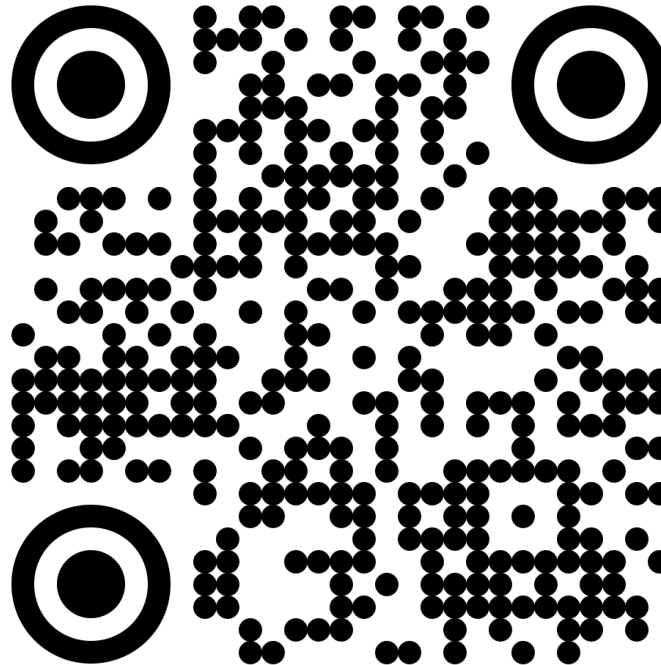
- ▶ Domestic Utilisation
- ▶ Comparative Capabilities
 - ▶ UK, Euro, Global
- ▶ Stronger, companies

Objectives for today

- ▶ To support the continuing development of the Pathfinder programme CCAV
 - ▶ Initial Overview of CAM Pathfinder (subject to confirmation)
 - ▶ Q&A - Help us identify
 - the good and bad of previous CCAV interventions
 - Challenges to CAM
 - Challenges to your business' success
 - the 'right' foci for CAM Pathfinder

Mentimeter Questions

- ▶ Ask CCAV Anything (Q&A Slide)
- ▶ What were the **SUCCESSSES** from previous CCAV interventions? (Open Ended)
 - ▶ IMF, CAMTB, Commercialising CAM
- ▶ What were the **FAILURES** from previous CCAV interventions? (Open Ended)
 - ▶ IMF, CAM TB UK, Commercialising CAM



- ▶ What **CHALLENGES** exist for CAM in the UK? (Open Ended)
 - ▶ Now to 2030
 - ▶ 2030?
- ▶ What **OPPORTUNITIES** exist for CAM in the UK? (Open Ended)
 - ▶ Now to 2030
 - ▶ 2030?

▶ **Challenges (...)**

- ▶ CCAV believes there is early commercialisation opportunities in
 - **Airside / Secure Site Operations**
 - **“hub to hub” logistics**
- ▶ CCAV believes there is significant potential societal impact in
 - **Shared Passenger Services**

▶ **These focussed Challenges will help us identify key interventions during the CAM: Pathfinder timelines**

▶ From each of these challenges we expect to identify key areas for further **focus, engagement and intervention**

- ▶ Some of these are / will be identified by the ongoing supply chain work with Zenzic / Auto Council (inc. the other workshop)
 - Hardware, Software, Services etc
- ▶ Some will be more overarching
 - Data
 - Safety
 - Business Models
 - Public Engagement

Early Feasibility Studies

▶ Automated Vehicles

- ▶ Availability of
 - Suitable Vehicles
 - ZEV
 - Drive by Wire
 - Redundant Systems
- ▶ Requirements for
 - Safety
 - Accessibility & Equitability
 - Software Access (CAN)

▶ Logistics

- ▶ Hub 2 Hub (Concept)
 - ODD requirements
 - Safety requirements
 - Business model options & opportunities
- ▶ Controlled Environment / Secure Site Operations
 - ODD requirements
 - Safety requirements
 - Business model options & opportunities

▶ Advanced Trials

- ▶ ALKS – Automated Lane Keeping System
 - Are you ready?
 - What is required?
 - OEM
 - ‘ASDE’
 - Vehicle



What's Missing

▶ FY24/25

- ▶ Small bridging funding from CCAM to CAM: Pathfinder
- ▶ Feasibility Studies
 - Vehicle Requirements
 - Logistics Business Models
- ▶ Quick Wins
 - Accessibility
 - Data & Connectivity
 - Drive By Wire

▶ FY25/26

- ▶ Second round of CAM: Pathfinder

▶ FY26/27

- ▶ Third Round of CAM: Pathfinder

Why is CAM important?



**Reduction in harm
arising from road
traffic collisions**

**Economic
opportunity**

**Improving access to
transport**

**Reduction in carbon
emissions**



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Questions?



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