HUMAN CONSIDERATIONS IN THE DEVELOPMENT & DEPLOYMENT OF SELF-DRIVING VEHICLES

SMART MOBILITY LIVING LAB: PUBLIC ROAD TESTBED ENVIRONMENT

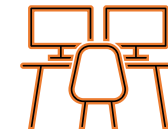**24** km of routes, **200+** monitored locations in London

Queen Elizabeth Olympic Park routes

Royal Borough of Greenwich routes

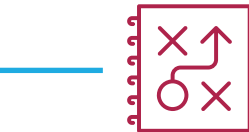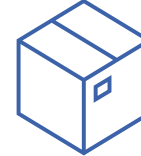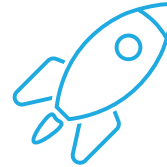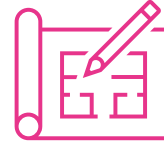Extensive connectivity

Instrumented & monitored network

Digital twin and tools

Workshops & control centre

WE SUPPORT A BROAD SECTOR.

WHO DO WE WORK WITH IN THE SECTOR?

Technology developers

Sensor providers;
Data providers;
Vehicle developers etc.
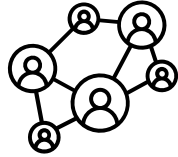
Service providers

Fleet operators;
Insurers etc.
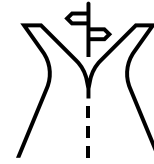
Infrastructure owners

Highway authorities;
telecoms providers etc.
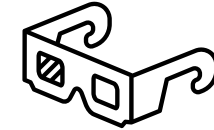
Regulators

Policy owners;
legislators etc.

HOW DO WE HELP?

- Accelerate the development and validation of their products
- Provide access to real-world data

- Provide evidence to support regulation
- Trial solutions in the real-world

Human considerations:
Who are we talking about?

AUTOMATION CAN TAKE MANY FORMS…

Source: Oxa

Source: Caterpillar

Source: Starship

LOTS OF POSSIBLE OPERATING ENVIRONMENTS

THE 'TEAM' OF PEOPLE INVOLVED IS LARGE

Human considerations: inputs to the design stage

THE REAL-WORLD CAN BE MESSY

UNDERSTANDING ENVIRONMENTS, MOVEMENT & BEHAVIOURS

SAFETY ASSURANCE: REAL-WORLD SCENARIOS

Building confidence in safety assurance process

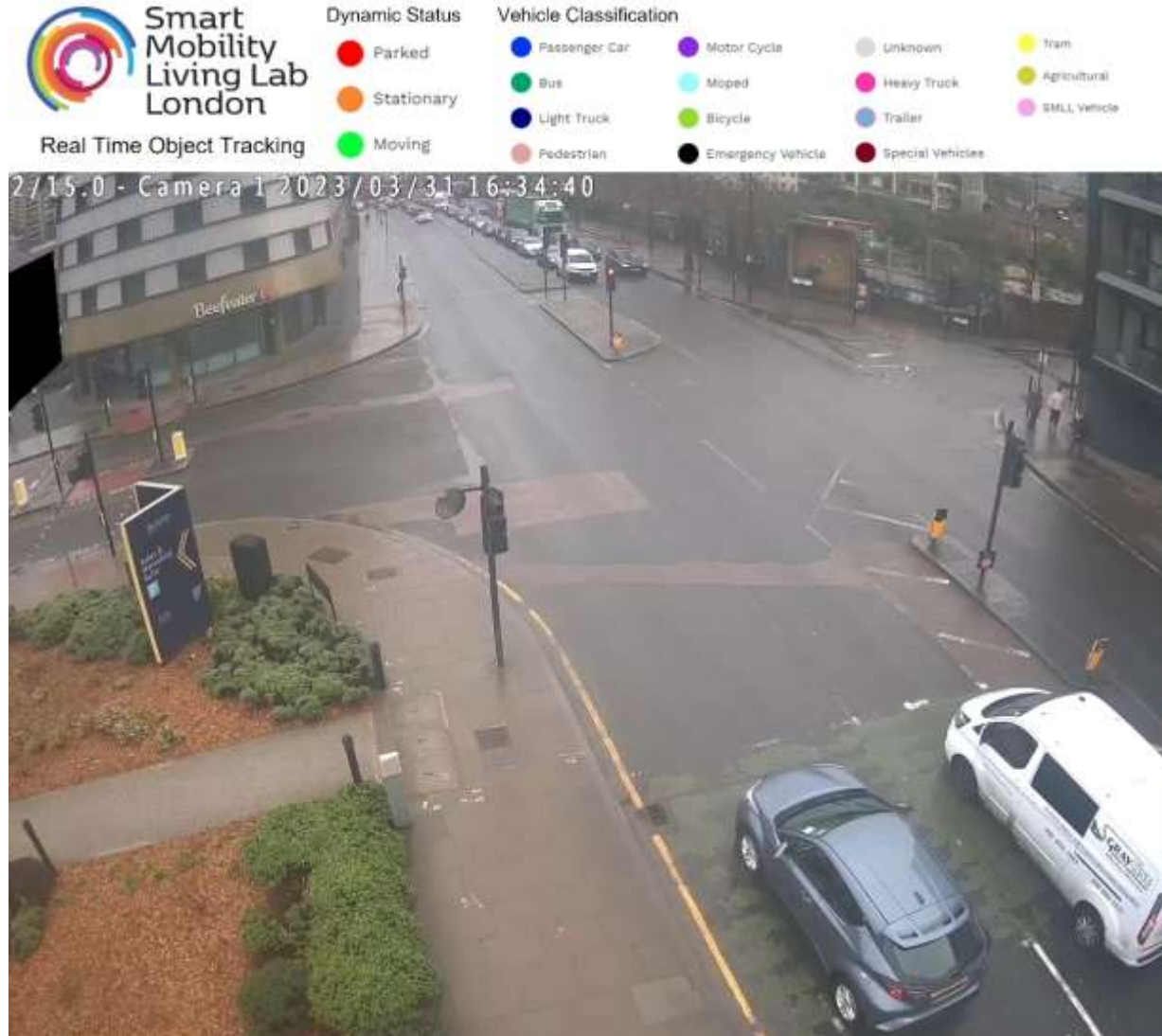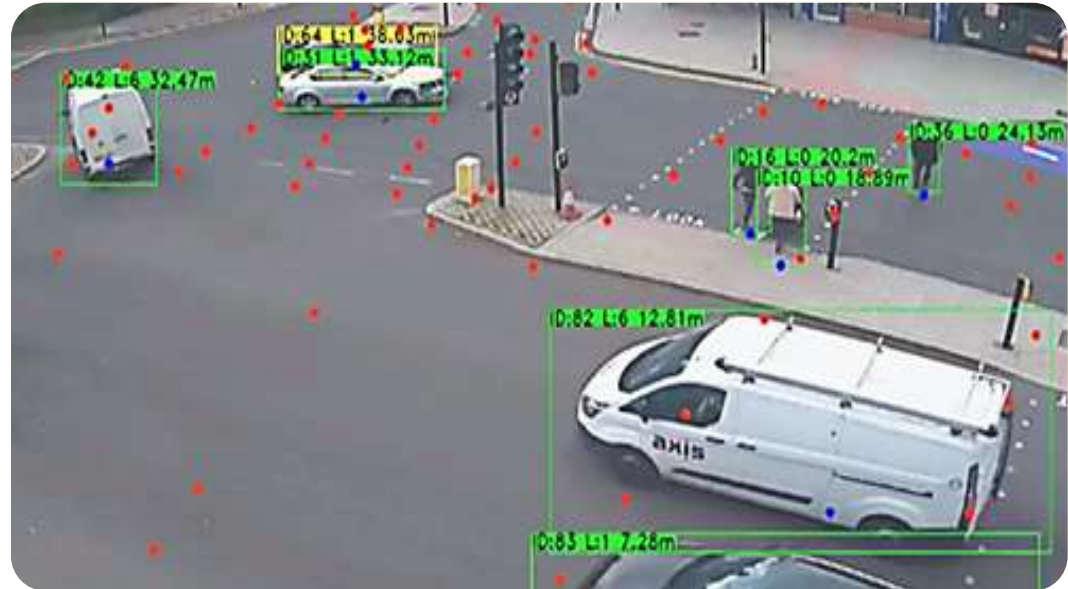## GROUND TRUTHING THE EVIDENCE USED TO ASSURE SAFETY AND SUPPORT SYSTEM DEVELOPMENT

Navigating the shift from development to deployment

CAM DEPLOYMENT – PLENTY TO CONSIDER
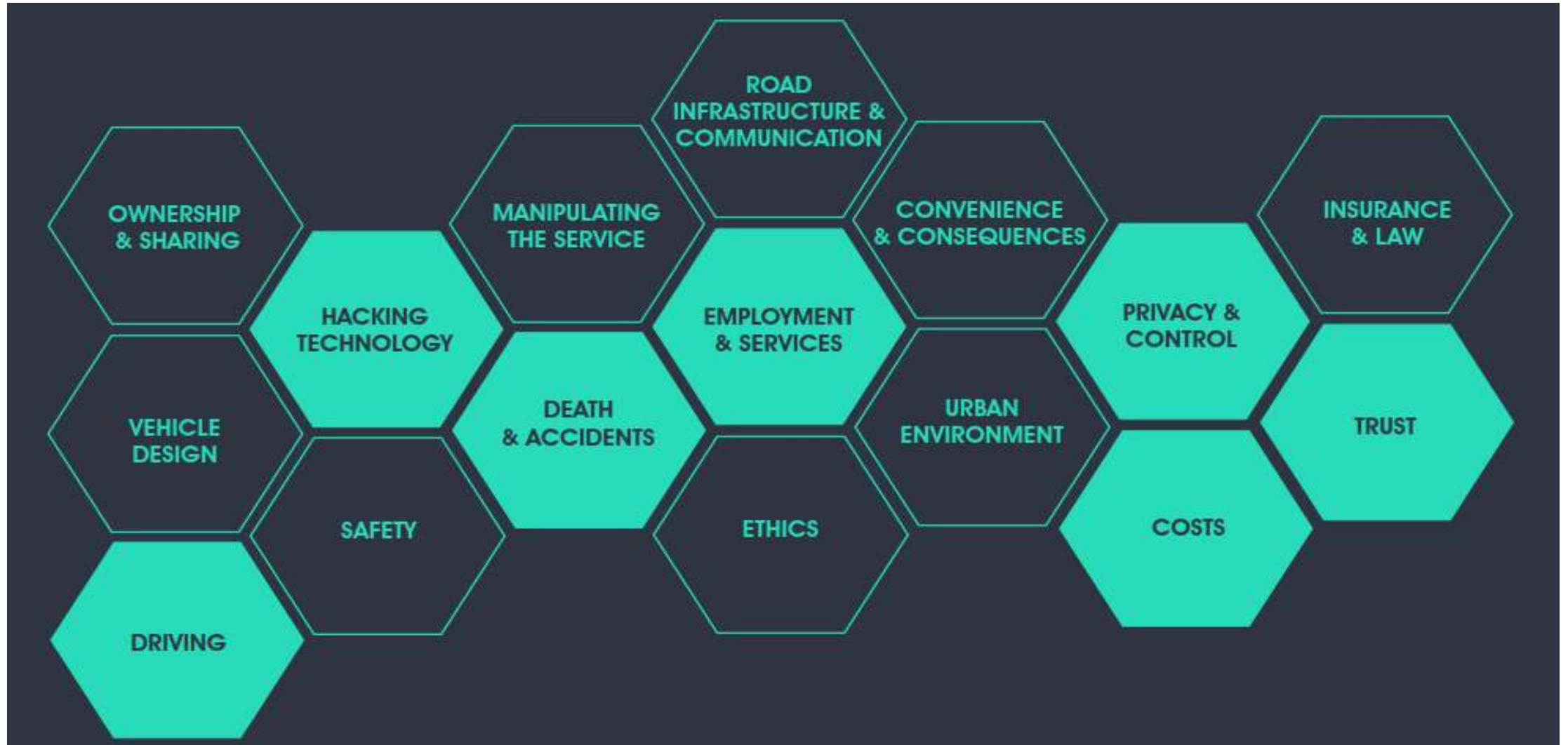
Exploring how to ensure future automated passenger services are accessible

- What challenges might disabled people face in interacting with new automated transport technologies?

- What are the potential benefits of automated transport for disabled people?

- To what extent is accessibility currently being considered in the design and development of automated transport technologies and services? How does this align with the needs of disabled people, and what can be done to improve the approach?

- What examples of good practice are emerging in this area to guide future developments?
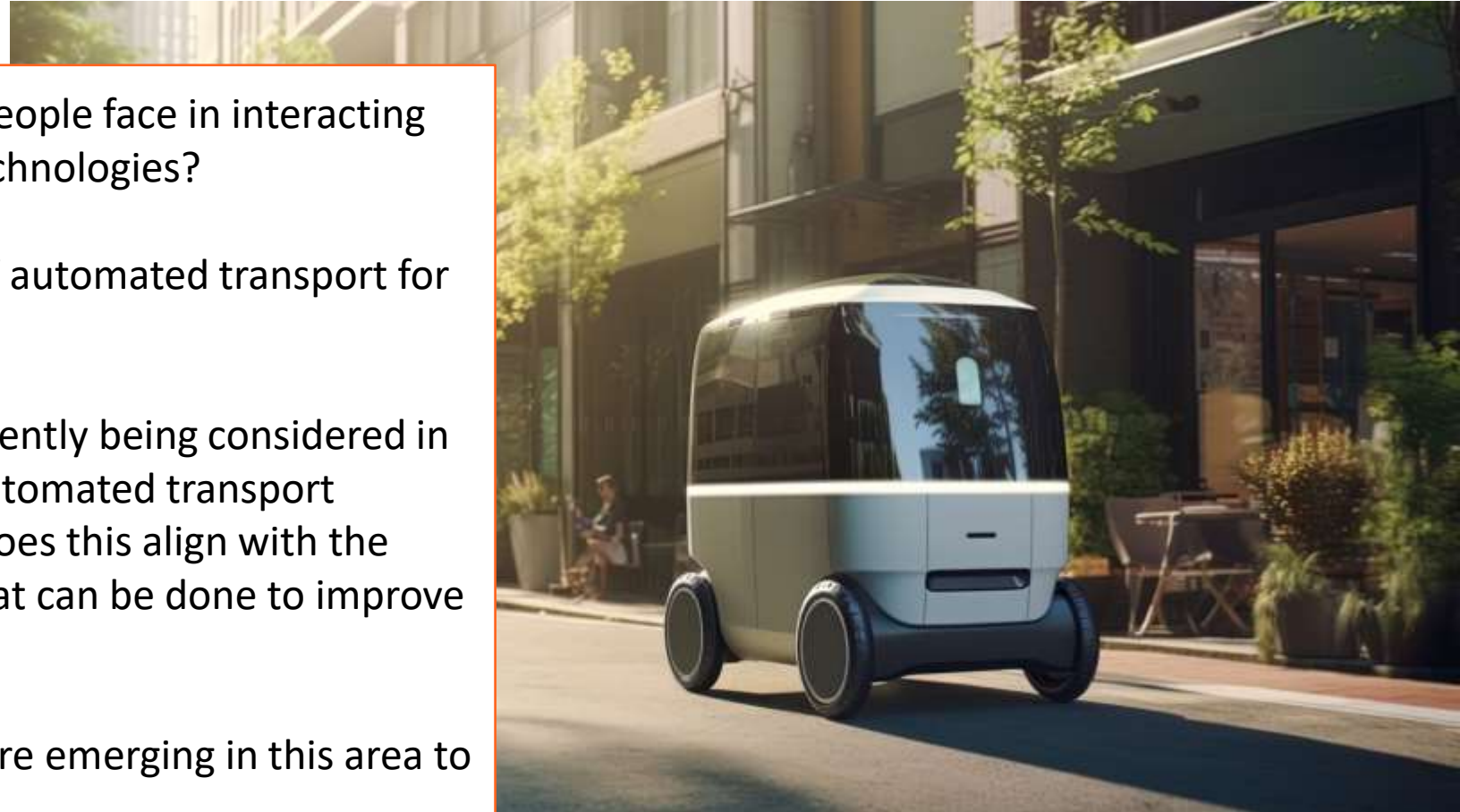
Evidence review – findings

- Disabled people experience obstacles across all stages of the journey when using non-automated transport
  - Likely to be the same with automated transport services too
- Vast majority of the evidence reviewed related to visually and mobility impaired participants
- Many of the papers did not fully investigate how to make automated vehicles accessible for disabled people.

Journey stage	Existing transport issues faced by disabled people (I = Individual, S = Social, M = Material)
Journey planning (info finding)	• Lack of knowledge and experience travelling alone adds anxiety to and prevents individuals from making independent journeys. (I) • Format of information is not accessible. (M) • Uncertainty about routes, schedules, walking distances, crowding levels and facilities. (M) • No single platform for all information. (M) • Poor public transport options in rural areas. (M)
Booking journey	• Limited accessible private hire vehicles available for booking. (M) • Limited services available on paratransit options. (M) • Having to pay more for a journey due to need to travel with a carer. (M) • Inconsistency in required payment methods, ticket validity and pricing. (M) • Difficulty arranging assistance. (M/S)
Getting to the station, stop or vehicle	• Poor design of physical infrastructure on footpaths (e.g., dropped kerbs, tactile paving, construction works blocking pavement). (M) • Lack of step-free routes. (M)
Arriving at station or stop	• Limited stops or stations that are designed to accommodate wheelchair user or mobility aid user. (M) • The process of booking assistance or adapted service at stations is poor. (M) • Lack of disabled parking. (M)

Finding the correct service	• Lack of consistency across the terminals makes:
	  ○ it harder to navigate the terminal. (M)
	  ○ users feel insecure or fearful for personal safety. (I)
	• Technologies and accessibility solutions that are supposed to make public transport more accessible are often not used properly, or are broken (for example elevators, escalators, screen readers or audio announcements on buses). (M)

Waiting	• Paratransit options are unreliable (for example often late). (M) • Lack of shelters at bus stops. (M) • Insufficient space at bus stops for wheelchair users. (M) • Lack of facilities (e.g. toilets, waiting areas with heating, relief areas for assistance dogs) available, or in working order (M) • Inaccessible ticket vending machines. (M)
Boarding vehicle	• Lack of step free access onto vehicle, including mechanical faults with ramps. (M) • Drivers not 'kneeling' vehicles or deploying ramps correctly. (S) • Having to wait for a bus that will enable them to board / have space for their mobility aids. (M) • Risk of mobility aids being caught in gaps. (M) • Narrow entranceways and access corridors, and a lack of insufficient space to manoeuvre a wheelchair or other mobility aids. (M) • Difficulties communicating directly with the drivers or when paying the fare in the ticket window. (S)

On the journey	• Priority seating not available / not clearly defined / not given up by others (M/S)
	• Few seats that are aptly positioned for disabled people. (M)
	• Overcrowding is a practical barrier:
	  ○ limited space reserved for wheelchair users. (M)
	  ○ persons with mental health issues may experience sensory overstimulation or invasion of personal space in crowded vehicles. (M)

Alighting the vehicle	• Placement of stop buttons / intercoms not user-friendly. (M) • Lack of step free access onto vehicle, including mechanical faults with ramps. (M) • Drivers not 'kneeling' vehicles or deploying ramps correctly. (S)
Getting to desired destination	• Poor design of physical infrastructure on footpaths. (M)

Interviews – emerging thoughts

- Accessible vehicles will improve journeys for all, not just those who consider themselves to have a disability.

- Some assumptions that any guidance will copy existing guidance, e.g., PSVAR regulations – but is there any opportunity to make better guidance?

- Some developers are seeing an opportunity to design the 'form factor' from scratch to improve accessibility – but for others, the focus is less on accessibility and more on getting the autonomous technology to work.

- Debate about whether it's possible to have one-size-fits-all vehicle solutions, or whether there needs to be a range.

PUBLIC PERCEPTION: EXPECTATIONS & 'WHAT IFS'

- The right and agency to ask questions
- The right to know that the technology that they are using in that vehicle has been tested.
- They will assume the vehicle is safe, fully compliant to "whatever regulations", roadworthy and legal.

- They will assume that private information collected such as where they are travelling to and from is protected.
- They will assume that their data such as payment method is secure from hackers.

These are basic expectations.

Will it pass the "grandma test?"

What role will vehicle users play?

News

Child killed by robovan

When the first person is killed or seriously injured in a collision on UK roads involving a self-driving vehicle - how will the Government defend its policy?

MONITORING THE DEPLOYMENT OF NEW MODES.
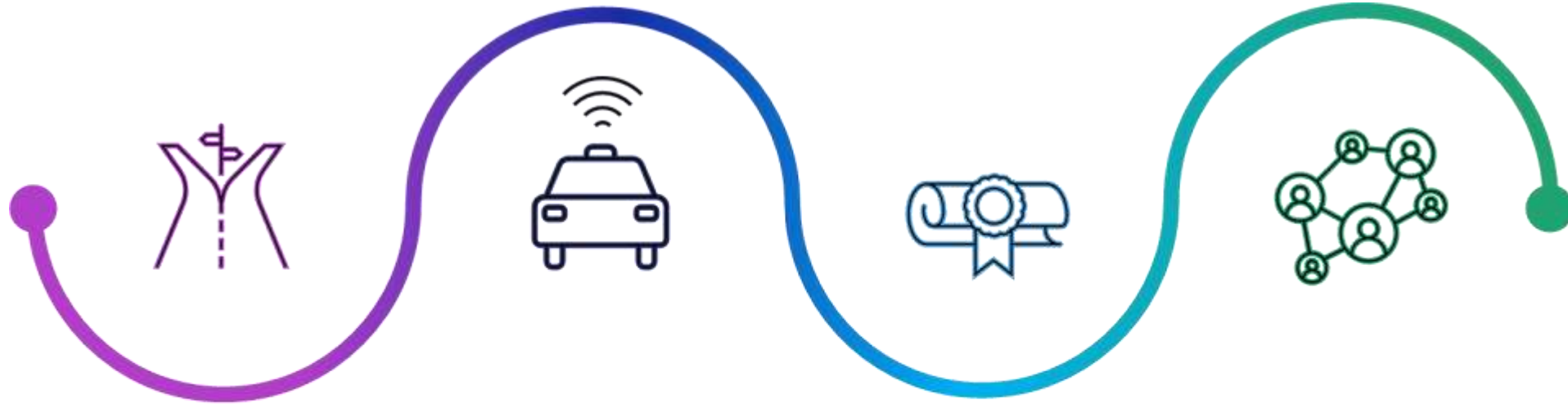

DATA GENERATED BY THE USERS...

AND EXTERNAL INPUTS...

...TO BUILD AN UNDERSTANDING OF PERFORMANCE, ADHERENCE TO DRIVING RULES & RISK

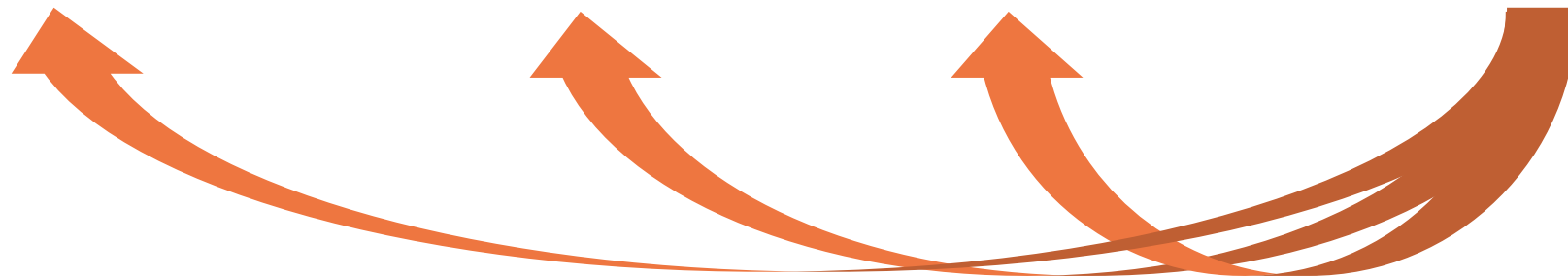# BUILDING A PICTURE OF ONGOING ASSURANCE

TRIALS & REGULATORY RESEARCH

PRODUCT ASSURANCE

APPROVALS & CERTIFICATION

IN-USE MONITORING

EVIDENCE. ITERATE. EVOLVE.

THANK YOU FOR LISTENING!

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