

Real-world trials to gather the objective evidence necessary to understand what is required to put a HGV platoon on UK roads



We are embarking on the **world's first** platooning trials to take place in a live **operating environment** to quantify **real-world** benefits.

This is not a demonstration.



The Profile

This is an **ambitious programme** to **collaborate** with industry, our partners and the general public in **evaluating** how we can positively influence the UK's transport operations.



Government Green Lights Platooning Trial £8.1m Investment



“ We are investing in technology that will improve people's lives. Advances such as lorry platooning could benefit businesses through cheaper fuel bills and other road users thanks to lower emissions and less congestion. But first we must make sure the technology is safe and works well on our roads, and that's why we are investing in these trials. ”

Paul Maynard, Transport Minister

Project Objectives

Deliver Safety & Cyber Security Evidence



- For platooning drivers
- For other road users
- Cyber security V2V control systems
- Platooning risk rated Strategic Road Network map

Quantify Environmental Benefits



- Fuel consumption
- Emissions

Determine Commercial Viability



- Effects on logistics schedules
- Vehicle maintenance
- Driver workload

Evaluate & Assess Impact



- Infrastructure
- Traffic management
- Platooning operators
- Human factors & behaviour

Acceptance of Technology & Standards



- Engage and educate general public
- Inform industry bodies
- Influence standards & regulations

To Collect and Analyse Data in Real Operational Conditions

The Partners

Under the technical leadership of Highways England and policy direction from the Department for Transport, the **project partners bring a powerful combination** of vehicle system innovation, operational experience, robust trial design, coupled with a proven **understanding** of road safety issues.

Project Sponsors



Consortium Lead



Consortium Partners



Advisory Board



International Experts



Road Freight Community



Road Operators



OEMs



Road User Groups



Infrastructure Providers



Road Safety Groups



Emergency Services



Communications & Electronic Security



The Phases

Practical and technical **knowledge** gained from working on **collaborative** and platooning projects means we understand what is required to put a **'live'** platoon on **UK roads**.

Timeline: A Phased Approach



Phase 1

Detailed Planning,
Risk Mapping &
Track Testing



Phase 2

Initial Road Trial



Phase 3

Operator Trial



Phase 4

Analysis &
Reporting

12 Months

4 Months

8 Months

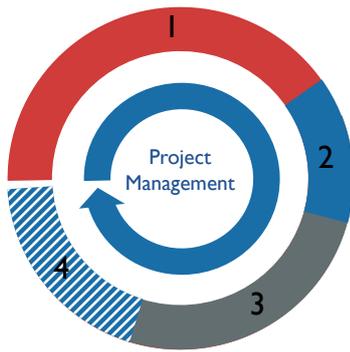
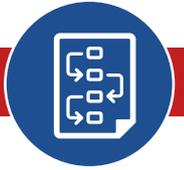
Q2 2019

April 2020



Phase 1

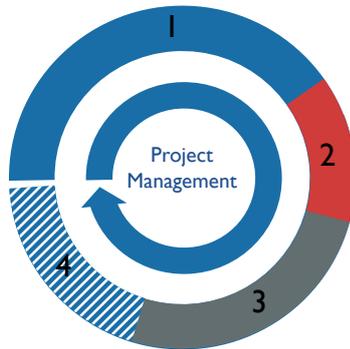
Detailed Planning, Risk Mapping & Track Testing



- Install / update systems
- Check system safety
- Measure fuel economy baseline
- Fit monitoring equipment
- Train drivers
- Strategic Road Network (SRN) route risk assessment

Phase 2

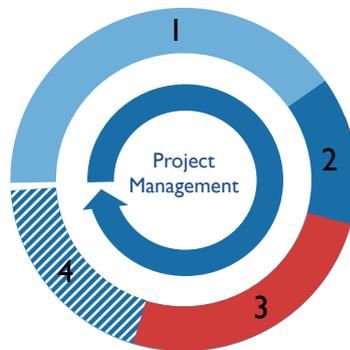
Initial Road Trial



- Verify platooning procedures
- Driver workload
- Other vehicle behaviour
- Fuel economy on the road
- Effect on infrastructure

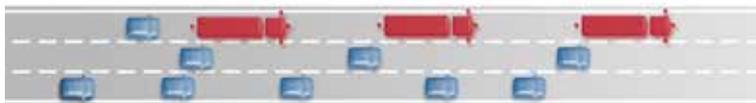
Phase 3

Operator Trial



- Data capture
- Fuel economy 'in operation'
- Driver acceptance
- Safety proxies
- Other vehicle behaviour

140 journeys in platooning configurations



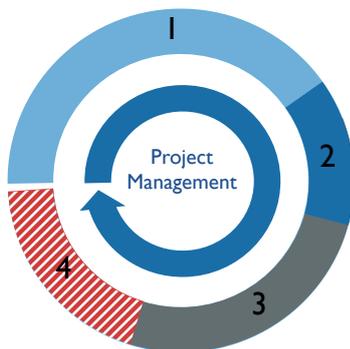
140 journeys in non-platooning configurations



140 journeys in both platooning and non-platooning configurations (280 in total) are required to detect statistically significant differences of 5% fuel consumption. Only by running a trial of 280 journeys will enough data be captured to robustly provide the input measures for the Impact Assessment.

Phase 4

Analysis & Reporting



- Data analysis
- Safety case for platooning
- Impact Assessment
- Business case for Platooning Service Provider
- Future Road Map
- Active and full engagement of stakeholders
- Independent and robust findings

The Planning

Safety and risk management are **paramount** and are at the centre of **every aspect** of the platooning trials.

Key elements of the Safety Case



- Route (SRN assessment)
- Vehicle and software (ACS)
- Literature review
- Safety acceptance testing



- Driver training and behavioural analysis
- Emergency response plan
- Cyber security



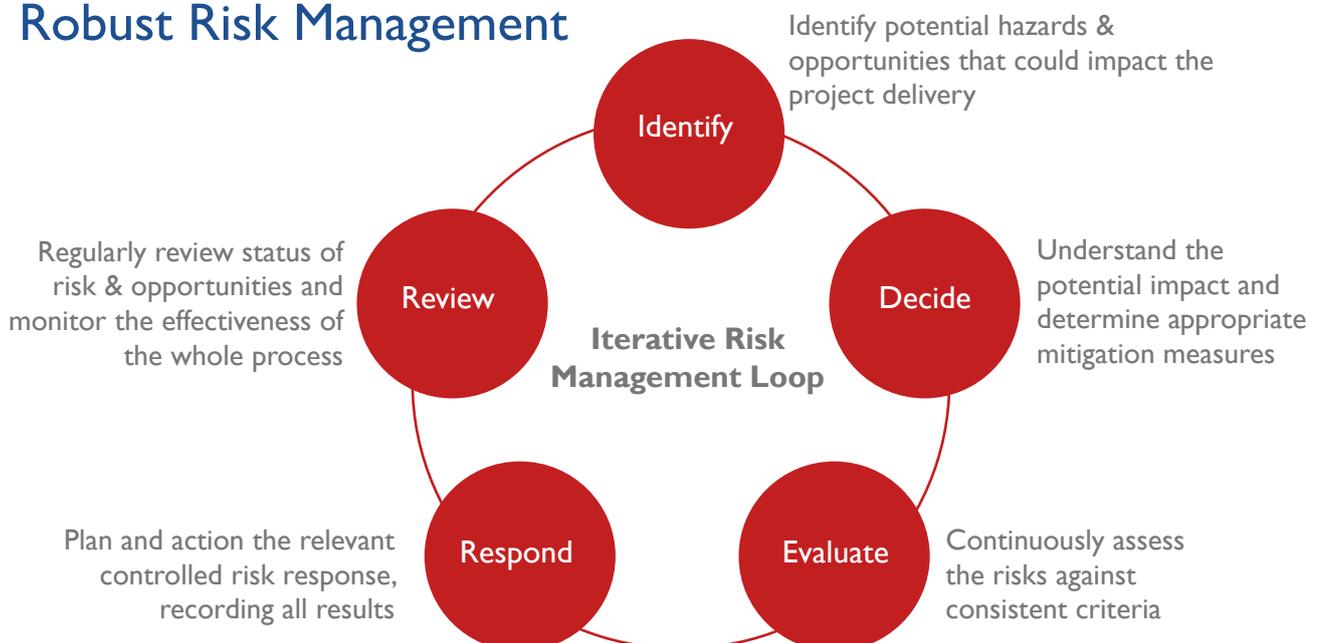
- Eligibility and abort criteria
- Data recording and monitoring
- Incident reporting
- Compliance with the CoP



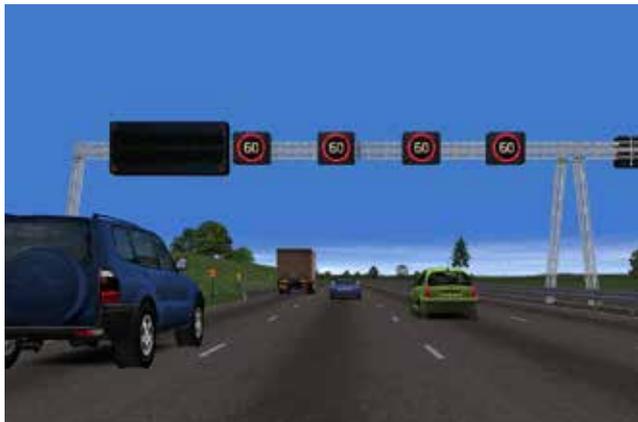
Risk Assessment		
Disaster	High	Medium
Critical	Critical	High
Critical	High	Med
Critical	High	Med
High	Medium	Med
	Medium	Med

- Risk assessment and mitigations
- Safe working practices
- Task-specific risk assessments and method statements

Robust Risk Management



Simulators Create Safe Environment



MiniDigiTruck

A bespoke, fully portable truck driving simulator which can be configured to any vehicle, will be used to:

- Reduce risk by training and assessing HGV drivers in a risk free environment
- Monitor drivers response to transition between manual and automatic
- De-risk the on-the-road components
- Provide HGV driver's with a safe first experience of emergency procedures in a controlled environment, rather than on a track or live road
- Measure how drivers perform during the training, with particular reference to emergencies
- Understand the impact of driving in platoon formation on HGV drivers

DigiCar

TRL's advanced driving simulator delivering highly realistic driving experience using detailed graphics and sophisticated motion system, will be used to:

- Monitor attitudes and behaviour of other (car) road users
- Simulate scenarios which may be potentially dangerous to investigate in on-road conditions including
- Measure the effects on other road users of marked or unmarked platoons
- Present lengthy platoons and measure how other road users respond
- Expose car drivers to unexpected, emergency events caused by the platoon and measure their reactions and subjective experience.



The Possibilities

An extensive road trial, underpinned by risk management, is the only way to gather the **objective evidence** required to understand issues relating to fuel efficiency, driver behaviour and **safety**.



1. Improved Safety

- System is always 'on'
- No distraction
- Doesn't get tired
- Always alert
- Safety & reliability
- Robust components
- ISO 26262



2. Fuel Economy

- Vehicles following in close proximity reduces the aerodynamic drag resistance for all vehicles in the platoon
- Reduces fuel consumption (and tail pipe emissions)
- Lead vehicle benefits from a reduction in the rear low pressure area when another vehicle follows closely
- Studies have consistently found that the fuel economy benefits generally increase as the following distance reduces



3. Reduced Emissions

- Heavy vehicle platooning has been consistently shown to deliver measurable benefits of reducing emissions
- Aerodynamic improvements lead to reductions in tail pipe emissions
- All tailpipe emissions (CO₂, NO_x, particulates, etc.) reduce in proportion to the reduction in fuel use



4. Improved Traffic Flow & Capacity

- SARTRE and other studies have proven that controlling the following distances between vehicles helps maintain free-running traffic
- In higher density traffic, automatic control reduces unnecessary acceleration and braking, leading to a more efficient, safer use of the road

Fuel Economy Potential



The PATH Project

The PATH project predicted fuel economy savings of 20% for four or more vehicles, and up to 30% for "many vehicles".

The SARTRE project demonstrated benefits of up to 8% for the lead vehicle and up to 16% for following vehicles.



The SARTRE Project

The Energy ITS project showed benefits of up to 9% for the lead vehicle and up to 22% for the second truck.

The UK Platooning Trial will quantify these benefits in a live operating environment



The Future



The UK has an unprecedented opportunity to take the lead in trialling platoons in real-world operations. We are taking the next step in the journey.

helmuk@trl.co.uk

© Copyright 2018 TRL /v7

