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Transport

Energy Infrastructure

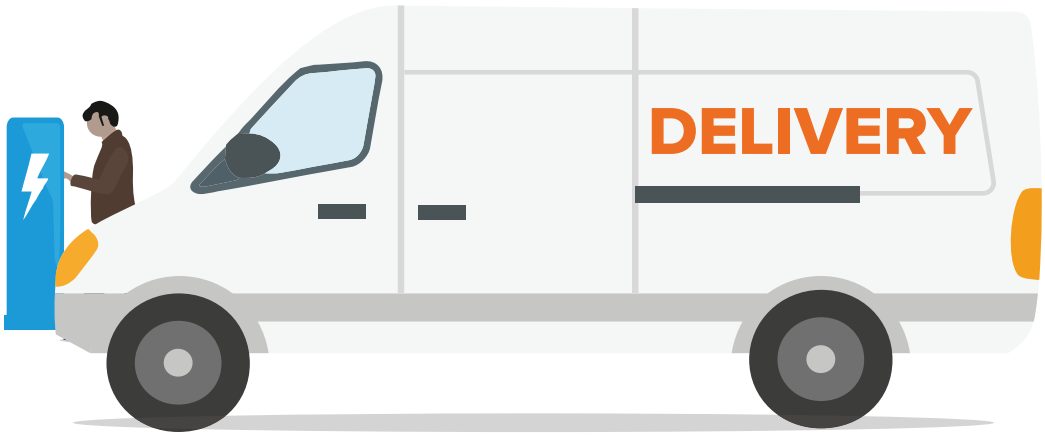
Knowledge & Enterprise

Developing Smarter Logistics through Collaboration

Opportunities and barriers for increasing data use and sharing in urban logistics

APRIL 2025

Contents



1. Executive Summary

Project SLICED, Smarter Logistics through In-vehicle, City and Energy Data was a feasibility study, funded by InnovateUK, focused on enhancing data-driven decision-making within urban logistics environments.

The aim of the project was to explore how integration of fleet and city data can help improve the safety, efficiency and environmental performance of logistics fleets.

Key challenges, concerns, opportunities and barriers fed back to Cenex from interviews with seven fleets and five regional city representatives are summarised below.

Fleet

Challenges Operating Fleet Vehicles in Cities

- Congestion
- Routing
- Parking and fines
- City design
- Noise and time-base restrictions

Safety Concerns in Cities

- Operating in poor weather conditions
- Driver fatigue and distraction
- Low speed vehicle manoeuvring incidents
- Blind spots

Opportunities for More Data Use

- Intelligent & dynamic city access restrictions
- Charge point sharing and booking
- EV home vehicle charging needs optimisation
- Improved driver compliance monitoring
- More sophisticated route planning
- Crowdsourcing city issues
- Automatic notification of accidents & incidents
- Predictive maintenance

Barriers to Data Use

- Consolidating data sources and devices
- System providing dynamic insights rather than data and reports
- Prioritisation of tasks
- Resources and knowledge
- Privacy concerns

Cities

City Priorities

- Management of the transport network
- Monitoring and evaluating the network to feed into future planning
- Public transport and public transport innovation
- Preparation for autonomous vehicles

Traffic Innovation Network Activity

- Traffic light prioritisation for bus and emergency vehicles
- Data collation for network management
- Event planning and management
- Trialling of autonomous and connected vehicles
- Traffic modelling and prediction models
- Smart bus service usage prediction and planning
- Mobility management and smart ticketing
- Autonomous delivery pods
- In vehicle messaging
- Loading bay booking
- Sensor and IOT installation and data collection
- Traffic light time to green

Opportunities for Collaboration

- Assimilating data from city systems (e.g. road works, weather events, road constraints, bridge limited, major events planning) to improve logistic routing
- Optimising energy asset use across the city
- Sharing data on road condition, risks, areas of driver distraction and poor driving habits
- Kerbside booking
- Dynamic and intelligent access restrictions
- Crowdsourcing driver feedback on city infrastructure issues
- Vulnerable and emergency vehicle road user alerts
- In-cab displays for traffic light timings

2. Introduction

Project SLICED, Smarter Logistics through In-vehicle, City and Energy Data was a feasibility study, funded by InnovateUK, focused on enhancing data-driven decision-making within urban logistics environments.

Aim and Purpose

The aim of the project was to explore how integration of fleet and city data can help improve the safety, efficiency and environmental performance of logistics fleets to achieve the overall purpose of identifying potential use cases for a real-world demonstration.

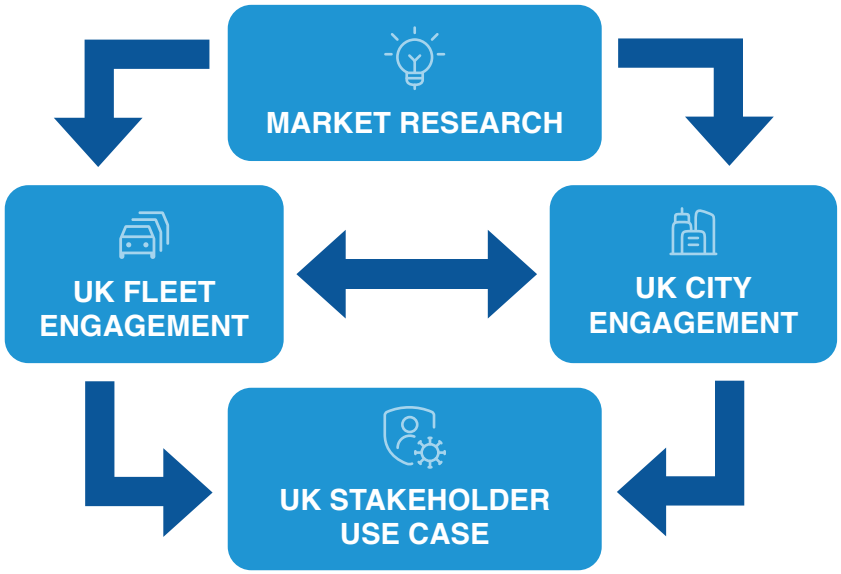
Project research engaged with commercial fleet operators as well as cities and regions using smart city technology. The project sought to understand the challenges that fleets face operating in cities and how data can be incorporated into fleet management systems to improve their safety, efficiency and environmental performance.

Project Partners

Cenex, a non-for-profit research and technology organization focused on accelerating the shift to low emission vehicles, assessed the industry status as well as the benefits of, and barriers to, incorporating more data into logistics operations.

FPS is an organisation providing end-to-end digital fleet management systems for electric commercial vehicle planning and charging. FPS supported the study with access to fleet customers. They plan to exploit the learnings through enhancing their system functionality to incorporate a wider set of data inputs resulting in improved safety, efficiency and environmental performance of their logistics fleet customers.

Study Methodology



Fleet Research

The research asked:

- What are the inefficiencies and safety concerns that cities introduce to logistic operations and how can these be reduced by access to more data?
- What are the concerns of fleets as we move to the electrification of vehicles?
- What data and information are commonly used now?
- What are the opportunities and barriers for increasing data use and increasing data sharing with cities?

City Research

The research asked:

- What types of data driven innovations are happening in our cities now which affect urban logistics?
- What are the priorities of cities in their transport system innovations?
- Where could cities collaborate further with logistics?

3. Fleets: Challenges Operating in Cities

Cenex interviewed 5 logistics and 2 emergency response fleets collectively responsible for operating over 15,000 vehicles, with all fleets beginning but at various stages of their transition to EVs.

Delays due to congestion and vehicle routing are the key sources of fleet inefficiency.

Safety and compliance are a top priority. Fleets were positive about any systems which would help reduce accidents and improve safety and driver welfare.

Fleets already started on the electrification journey see power availability, charger availability and grid upgrades being the major barriers to electrification.

3.1. What are the causes of fleet inefficiency in cities?

Logistics

- **Congestion:** Generally, congestion was cited as the main efficiency issue operating both in cities and on motorways. One operator suggested that 30% of their deliveries are late, with congestion being the key issue.
- **Routing:** Fleets generally felt that accurate traffic data (predictive and live) are not available to them. Live data, such as on flooding or roadworks were given as examples. It was also felt that routing of journeys during could be better such as navigation systems routing vehicles through unsuitable areas (e.g. low bridges, restricted access, unsuitable roads). Regular satnav units are commonly used in home delivery vans. Companies operating the largest HGVs do not allow drivers to deviate from routes, even in heavy traffic as it is felt that satnav can't be relied on.
- **Noise restrictions:** Access restrictions reduce the delivery window available to fleets which in turn forces deliveries to working (and peak) hours, increasing congestion and the number of vehicles that fleets need to procure.
- **Timed access restrictions:** Time-based access restrictions are in place in many cities to reduce the number of HGVs operating in city centres and on pedestrianised areas.

- **City design:** Physical restrictions due to urban street design prevent safe manoeuvring of larger vehicles. Height restrictions also lead to sub-optimal delivery routes being undertaken.

- **Parking and fines:** Delivery companies are issued with a large amount of parking fines due to parking restrictions near delivery sites. Fleets also report contesting a large amount of wrongly issued fines where they have been legally parked on double yellow lines to load/unload. Parking for dot-com delivery vehicles was highlighted as a specific issue.

Emergency Response

- **Predicting drivers' reactions** when blue lights are on is difficult which means vehicles need to proceed slowly and cautiously when moving through traffic.

- **Road closures, road works, coning down** of lanes and traffic lights are also major causes of delays for emergency response vehicles trying to progress through traffic and cities.

3.2. What are the causes of fleet inefficiency in cities?

- Fleets reported their drivers are well trained professionals who experience few serious accidents. Most accidents reported are caused through **low-speed vehicle manoeuvring**. Key safety concerns highlighted were **blind-spot accidents**, concerns for **vulnerable road users**, driving in **bad weather**. Some fleets suffer from vehicle roll aways when drivers frequently jump in and out of the cab with deliveries.

Emergency services

- Again, **low speed manoeuvrers** are a key cause of accidents. Emergency service fleets also reported issues with low frequency but high-profile accidents that occur when in blue light mode. These are normally at junctions.

3.3. What will be the key barriers to city fleet electrification?

Logistics

- **Depot power requirements** are a key concern as fleets increase their proportion of EVs. Many already need power upgrades to support the low number of electric vehicles on their fleet.

- **Lost time to charge:** Fleets who take vans home (and are unable to charge at home) reported driver down time whilst charging as a key inefficiency.

- **High cost of public charging:** The high cost of public charging is an issue for fleets. This can be 5 – 10 time more expensive than charging at their depot.

- **Mature charge point booking and sharing** market offerings were not available. Many fleets are considering, or trialling, sharing infrastructure with partner organisations. These are ad-hoc arrangements without a supporting software system (for booking and charging). Fleets interviewed were not aware of commercially available systems available to support private or booking infrastructure networks.

Emergency Services

- **Depot power requirements** are a key concern as fleets increase their proportion of EVs. Many already need power upgrades to support the low number of electric vehicles on their fleet.

4. Fleets: The Use of Data in Decision Making

We examined the types of information fleets incorporated into their operations now, how the use of more data could play a role in improving their city operations and examined the barriers to further data use in fleets.

Automatic driving style monitoring is commonplace across fleets, with most fleets working towards gaining permission for the use of in-cab camera systems.

Fleets desire data to help them to minimise time spent in city congestion, monitor driver safety and compliance and assist with predictive maintenance.

Fleets agreed that more data use was beneficial but key barriers include the complexity and costs of incorporating multiple systems and hardware devices on vehicles and the additional resource needed to interpret and act on insights.

4.1. What data and information do you use in fleet operations?

Logistics

The majority of fleets use the following:

- **Scheduling systems and routing systems.**
- **Driving style monitoring systems** are very popular with key metrics being harsh breaking, rapid acceleration/ deceleration, harsh cornering, harsh lane changing, sharp left/right/u- turn and long idle periods. Fleets typically provide driver feedback at the end of shift. This is preferred over systems that provide instant in-cab feedback on poor driving.
- **External camera systems** with forward, back and side views.
- **Dynamic data** is generally not used by fleets, meaning the routes and schedules are typically fixed at the start of the shift and not updated. There was one exception of a fleet operating on the pallet network who constantly look to maximise vehicle loading, rescheduling as new delivery opportunities appear throughout the day.
- **Compliance data** is collected by fleets (e.g. dispatched on time, arrival time, unauthorised stops and drivers break adherence).

- **In-cab camera systems** are being looked at by most fleets, however only a few have managed to work through the privacy and union negotiations to enable installation. Fleets noted distraction and drowsiness to be key concerns with some citing specific incidents. There is a preference for integrating distraction and drowsiness monitoring with other functionality, such as monitoring seat belt and handbrake use and smart activity interpretation to identify behaviours such as smoking, drinking, phone use etc. Fleets prefer automated activity detection (to address some privacy concerns) and a mixture of in-cab alert and fleet management system logging of violations depending on their severity and frequency.

Emergency Services

- **Satnav** is available but thought to be rarely used as drivers know their patches well.
- **In-vehicle comms and data systems** are often integrated into the OEM screen displays, but if this is not possible then separate screens are retrofitted to vehicles.
- **Despatch systems** are used to plan activities during the day and (in some instances) provide route data.

4.2. What is the role of data in providing solutions?

A range of uses for data to support more efficient city operation were suggested by fleets.

Logistics

- **Access restrictions:** Cities could introduce and monitor noise level limits, rather than time-based restrictions.
- **Charge management:** Fleets want charge point booking capability for public charge points and managed charge point sharing with other organisations (private infrastructure networks).
- **Managing home vehicles:** Where drivers take vehicles home but are unable to charge, fleets requested solutions that allow them to minimise time lost to charging. Examples include planning systems able to minimise home kept vehicles mileage or scheduling of charging during breaks and other downtime.
- **Logistics management and dispatching:** Generally, this seems to have high levels of manual intervention with some fleets suggesting or beginning to look into the use of AI for automating back-office functions.
- **Driver compliance:** Fleets desire system that monitor drivers and automatically detect non-compliance issues (e.g. seat belt, phone use, eating/drinking etc.). One fleet has such systems installed already with a few others starting to look at system capabilities.

- **Crowdsourcing data:** Fleets feel that drivers should be able highlight specific city issues which are causing inefficiencies. Examples are hazardous junctions, potholes and faulty (or perceived faulty) set up and operation of city infrastructure, such as delays or frequent traffic disruptions on specific pedestrian crossings.

- **Accident and incident information:** Getting real-time data and alerts (including internal/external camera footage) when accidents occurred is considered a significant benefit for both vehicle condition monitoring and driver safety. Most fleets experience issues with minor bumps and damage to vehicles and trailers not being reported to them by drivers. A system able to provide alerts and images during both minor and major collisions would enable fleets to better support drivers in emergency situations. Drivers are lone workers, if fleets were alerted to accidents, they could ensure drivers were receiving support.

> *Real time data on collision, and alerts would be very useful. This would help us identify the cause of damage to vehicles and could also save lives. Drivers are lone workers, and especially vulnerable at night on dark roads.*

- **Intelligent route planning:** There does not seem to be an established method to select a preferred route when two or more potential routes have similar destination times. Fleets suggested optimisation based on areas of road risk, road condition etc. could be used to select a preferred route.

- **Improved vehicle condition data:** Systems that can collect a variety of data directly from the vehicle's information system (CAN-bus) to provide insights to fleet managers on vehicle condition were desired. Most fleets welcomed the introduction of a wider variety of data into their fleet management systems. Specific examples given were understanding when/if the driver's door is left open while driving, when the hand brake has been left off while the driver is parked, or when the driver is sat on the seat. Fleets also cited examples of maintenance information which would be useful such as oil level, water temperature, and low 12v battery.

> *More data is better, around safety, compliance, reductive maintenance, we don't pick up warning lights on the dash, drivers need to tell us.*

Emergency Services

- Some police fleets highlighted the opportunity for more intelligent dispatch and vehicle allocation systems. Currently a vehicle is commonly dispatched based on open discussions with officers over the radio. Officers also tend to be allocated vehicles throughout their shift, independent of whether they are working in the station for most of the day.
- There are processes in place to facilitate shared use of charge points by requiring officers to rotate vehicles, however there is no technology in place to manage charge point allocation.

4.3. What are the challenges with using more data in fleets?

- **Consolidating data sources and devices:** The majority of fleets highlighted that multiple systems and hardware devices on vehicles are a barrier to increasing data use.
- **Insights not data:** Many fleets are investigating methods of consolidating data and automating reporting. Most fleets feel systems should be used to automatically provide insights rather than fleets needing to analyse data themselves or produce and review regular reports.
- **Getting data to drivers:** One fleet commented that providing data to drivers was challenging and relied on the drivers downloading an app onto their personal phones.
- **In-cab cameras:** Two fleets are already using in-cab cameras whilst many of the others were making the case to have them installed in vehicles. The preference is for AI to monitor the drivers and report incidents, which is considered more palatable by drivers than having humans monitor their behaviour.
- **Prioritisation:** Fleets understand the value of data and are keen to incorporate more but often have limited resources for the additional complexity and staff time needed to interpret and manage this. This includes the time needed to evaluate the cost/benefit of the systems.

> *‘Consolidating data sources and devices: The majority of fleets highlighted that multiple systems and hardware devices on vehicles are a barrier to increasing data use.’*

5. Cities: Smart City Priorities and Opportunities for Fleet Collaboration

Cenex interviewed two Combined Authorities and two City Local Authorities as well as a Highways Authority. These interviews provided insights into the activities around smart city and data collection as well as opportunities for city and fleet data collaboration.

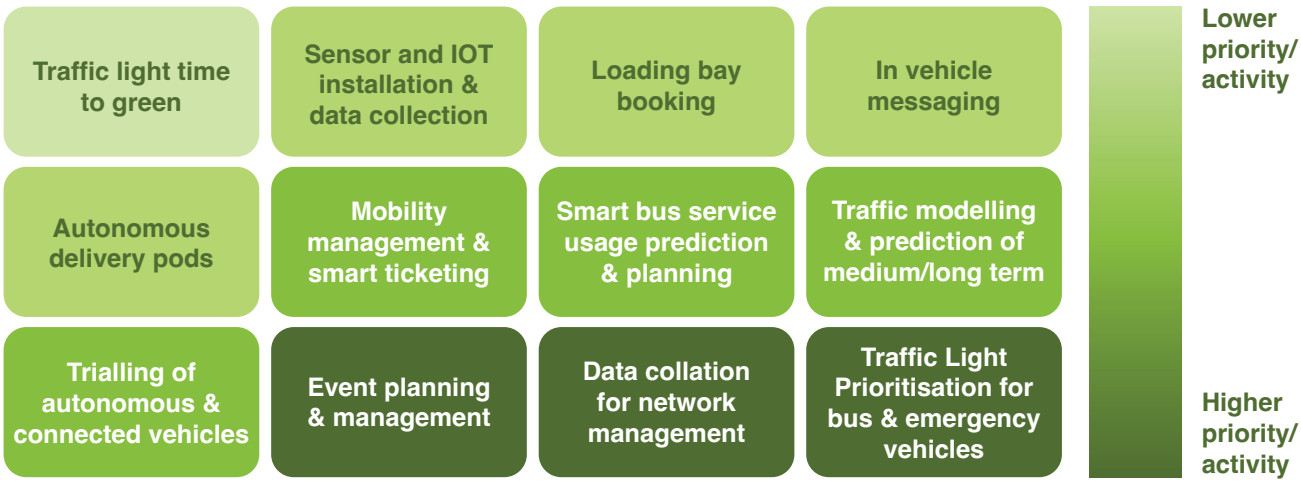
City focus is mostly on monitoring the road network to maximise safety and efficiency as well as improving passenger transport. Cities are now looking at the role of increasing autonomy in vehicles and smart infrastructure role out.

Cities highlighted limited interactions with fleets historically and welcomed the opportunity for further assessment of benefits and open dialogue in this space.

Joint areas of interest are strongest when considering the efficiency and safety of the city road network.

5.1. What transport efficiency innovations are taking place in cities?

The diagram below highlights the range of activities reported across the interviewed cities. Lighter green activities are either in early feasibility stage or have limited activities taking place. Darker green activities highlight priority areas with greater levels of activity.



For the higher priority areas:

- **Traffic light prioritisation** for buses is commonplace, helping to ensure adherence to schedules and optimised movement of people. Cities are looking to increase the intelligence and functionality of these systems to allow additional layers of identification such as tailoring prioritisation actions based on individual route timings and bus occupancy. Authorities are also looking at expanding traffic light prioritisation into other transport modes and operations, which could include logistics.
- **Data collection and collation** is an area of key activity which all public authorities are working on to enhance network understanding, management, decision making and design. Combined authorities have a pivotal role to play in collating data across regions to enhance joined up traffic management and overall reduced congestion.
- **Proactive event planning** has proven benefits, such as in the recent Commonwealth Games where pre-emptive traffic flow management, behavioural change interventions (through providing information on and promoting preferred transport modes) were combined with active monitoring and live intervention on the network. Information on events (concerts, sports activities, carnivals etc) is used by local transport planning and could also be shared with logistics operations.

5.2. What are the cities' priorities?

Cities highlighted the following areas as priorities:

- Management of the transport network
- Monitoring and evaluating the network to feed into future planning
- Public transport and public transport innovation
- Preparation for autonomous vehicles

Cities noted limited interactions with fleets historically and welcomed the opportunity for further assessment of benefits and open dialogue in this space. They are keen to understand how they can work with logistics companies to develop smart systems and future transport solutions.

Interest for the cities and public sector to make data available to fleets is high. Historically their focus has mostly been on monitoring the road network to maximise safety and efficiency as well as monitoring and improving passenger transport within their area. Cities are now looking at the role of increasing autonomy in vehicles and smart infrastructure role out.

5.3. What are the opportunities for cities to collaborate with Logistics?

Cities see the value in sharing data with fleets to help them move more safely and efficiently through their area. Areas highlighted by cities include:

- **Traffic light management:** All of those we spoke to have a high interest in optimising traffic lights for fleets and emergency vehicles. Some are already exploring projects to test the potential of dynamically managing traffic lights. The priority for some has been their public transport fleet, but they are keen to explore other applications.

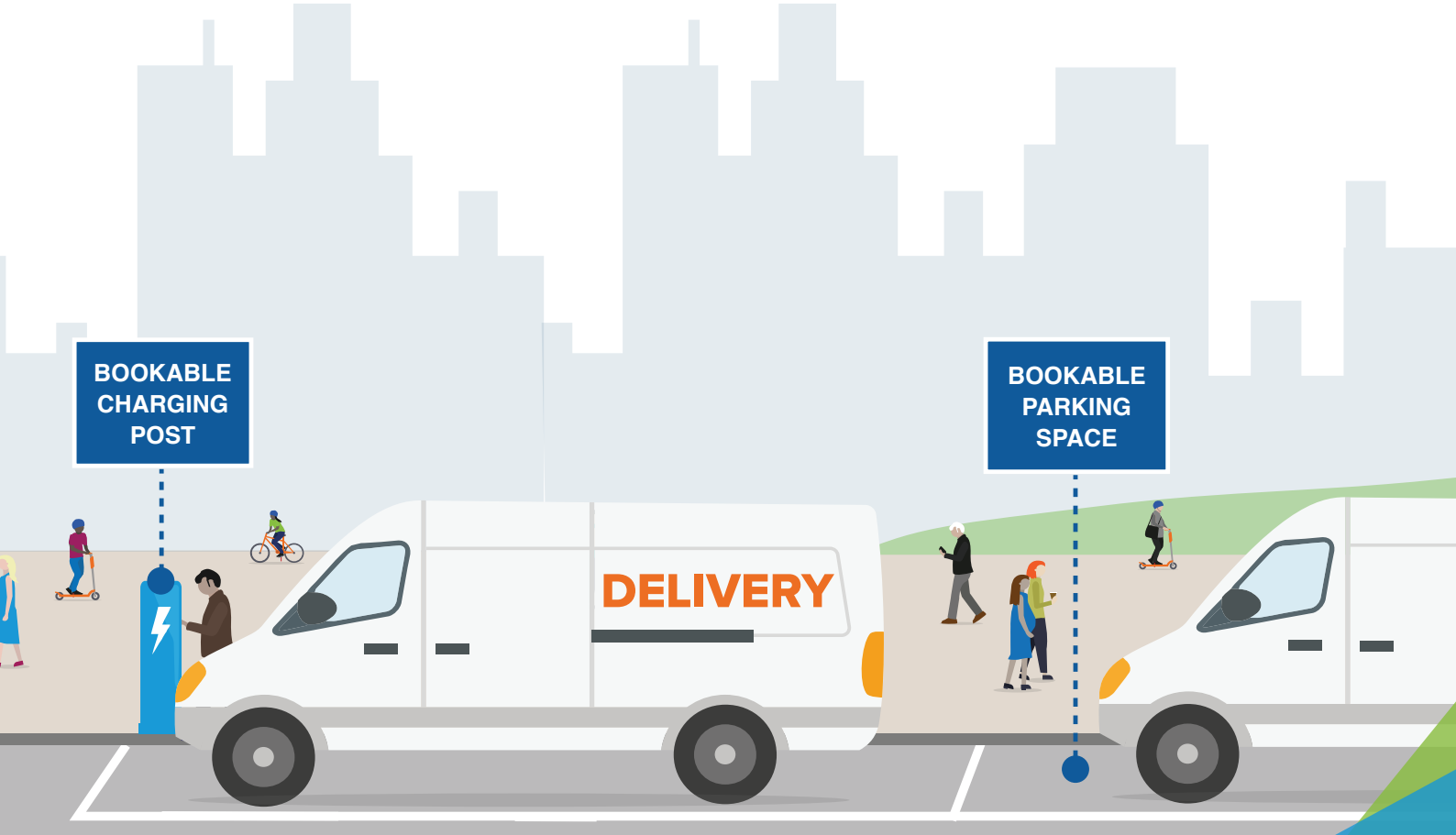
- **Traffic disruption and congestion reduction:** Reducing congestion and better management of travel networks is important to all the cities and regions. There are different levels of control depending on the organisation type and they also must work closely with National Highways. The application of real time information, better data on road networks and alternative routes is being developed by all the public sector organisations that we spoke to. There is variation in the quality and collection of data, and this makes it challenging to have a consistent national offering. Overtime as data collection is improved and standardised the opportunity for fleets to work with cities on this will improve.

- **Kerbside booking:** The public sector has a high interest in kerbside booking systems with trials underway in some areas. However, it is acknowledged that to achieve this successfully requires local knowledge and consideration of various elements. High streets can be complex environments and booking of space is reliant on good enforcement, understanding of existing use and relationships with all stakeholders.

- **Driving style and driver status monitoring:** There is some interest in understanding how this data from fleets could help them evaluate and assess the network more intelligently, however the value of this use case needs to be proven. Whilst in theory, driver-style monitoring might provide insight into difficult junctions or dangerous road conditions, none of the organisations we spoke to have tested whether the cost of collecting, sharing and analysing this data would be higher than the potential benefit ; this needs further investigation.

- **Road condition monitoring:** The historic process for road condition monitoring is for a specialist vehicle to drive the network biannually to collect data. Three of the organisations we spoke to are considering or trialling new ways to collect this data that would provide information at more frequent intervals. One authority fitted their highway vehicles with technology that gathers road condition data. There is also interest in predictive analysis that can highlight where there are problems and identify areas at risk of developing potholes in the future. Whilst the cities we spoke to are interested in the potential for more up-to-date data on road conditions, they are keen not to receive raw data; their preference is for analysed information to be provided to them to act on.

- **Accident data:** Some cities that we spoke to do currently receive e-call information on accidents, however their ability to use the data provided is limited. They are interested in location data, as this can aid them in helping to manage disruption to the network, although they do not have a use case for detailed information on the vehicle or occupants' status, post-crash.



6. Bringing Fleets and Cities Together

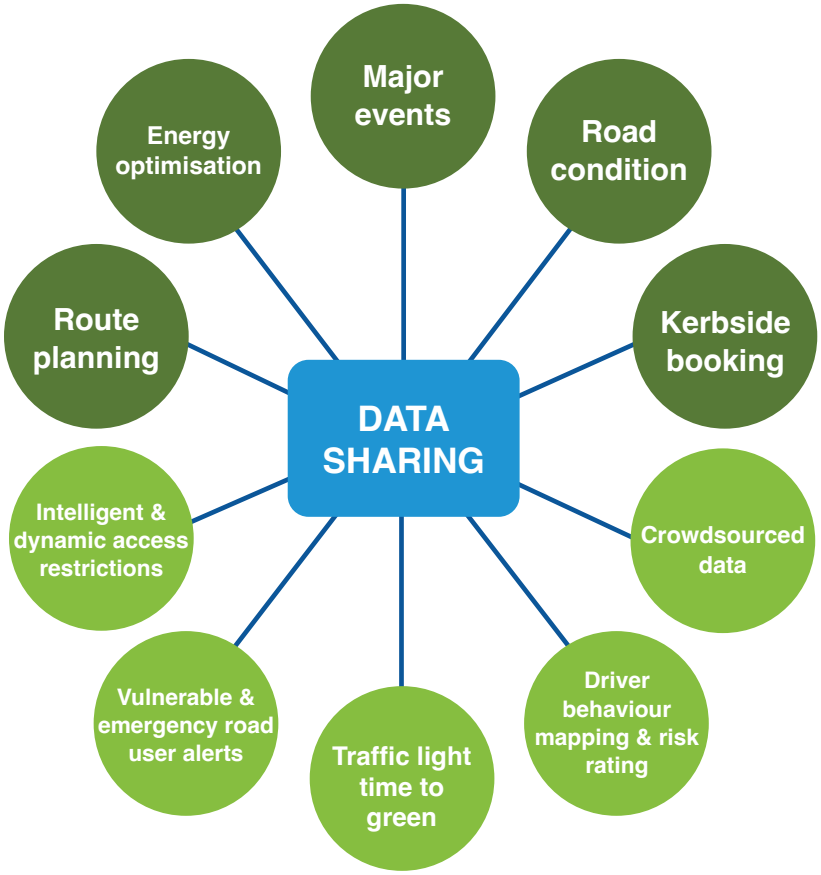
This study highlighted many areas that could be optimised through fleets and cities working together and sharing data.

Fleet and city priorities did not always align with cities looking to prioritise public transport, citizen safety and traffic control measures with fleets looking to improve on vehicle and driver monitoring and performance and vehicle routing.

There was common ground when it came to improving safety and transport efficiency, with cities interested to understand how fleet data could be of use to them in the transition to smart cities.

The study highlighted that fleets and cities rarely engage in collaborative discussions, it demonstrated the value in facilitating dialogue between the stakeholders, and recommends that fleet and city decision makers expand areas of data co-operation, research and demonstration activities.

The top part of the diagram below shows areas in dark green which were highlighted as having clear benefits by both fleets and cities. The areas in light green towards the bottom of the diagram are of longer-term interest, but require more development or research to identify or prove benefit.



If you are a fleet or a city interested in developing co-operation further and potentially taking part in follow-on demonstration projects to prove some of the benefits highlighted in this document, please get in touch with steve.carroll@cenex.co.uk.

Cenex

Cenex lowers emissions through innovation in transport & associated energy infrastructure and operates as an independent, not-for-profit research and technology organisation (RTO) and consultancy, specialising in the project delivery, innovation support and market development. As trusted advisors with expert knowledge, Cenex are the go-to source of guidance and support for public and private sector organisations along their transition to a zero-carbon future and will always provide you with the insights and solutions that reduce pollution, increase efficiency and lower costs.

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FPS

Flexible Power Systems (FPS) is a UK based SME, founded in 2018 on the principle that smart use of energy and vehicle data can dramatically reduce the costs and risk of commercial fleet electrification. FPS has developed an automated EV and charge management platform that delivers clarity, efficiency and resilience for van, truck and bus fleets. The company has grown to a headcount of 20 and is working with some of the UK's largest fleet operators including Sainsburys, John Lewis, First Bus and South Western Railway. Our offering supports every stage of a fleet operator's EV transition from planning to deployment to fleet operation. Core to our service is our innovative real time EV and charger management platform, 'FPS Operate' that integrates delivery scheduling and routing with vehicle and charging availability. The platform is cloud based and has demonstrated real world savings reducing fleet size, charging infrastructure costs and fleet energy consumption.

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