Data: an open or shut case?

Individual and aggregated data are precious commodities in the transport eco-system, but the debate over how they are valued and shared is only just beginning, reports **Jonathan Manning**

A cursory glance at the world's most valuable companies reveals that the top five are all either built upon or focused upon data. Apple, Amazon, Alphabet (Google), Microsoft and Facebook are the early winners in today's technology-based industrial revolution. Their skill at harvesting, analysing and monetising data has created multi-billion dollar enterprises in which data is now a strategic asset rather than the by-product of the business.

A similar transformation is apparent in the transport sector where public and private operators are seizing the opportunities presented by data sources to develop new services and enhance the delivery of others.

Put simply, data is the new 'natural resource' upon which transport and mobility services will be built, the 21st century equivalent of coal or oil.

According to one observer, those seeking to implement Mobility as a Service (MaaS) will find that "data will underpin its success".

This is the opinion of Shwetha Surender, new mobility industry principal at market research company Frost & Sullivan.

She says the tipping point of the shift from private car use to shared transport and mobility services is now evident in urban centres, where the need to combat congestion and pollution is most acute.

"For cities as a whole the existing transport infrastructure is grossly inefficient," says Surender. "We need to find a more efficient way to move people around, and that solution appears to be shared transport. To move that on you need to adopt the whole concept of MaaS."

This MaaS data combines timetables, journey times and ticket prices, with the availability of 'floating' resources, such as shared cars and bikes, and external factors such as weather, time of day and the day of the week. All can have a significant bearing on the most efficient modes of transport for either people or goods.

"Data will dramatically improve the provision of services within a city, facilitating MaaS, which would be a gamechanger for urban transport. It would allow more effective movement of traffic in cities, and that would help with different issues that cities are facing with congestion and lack of infrastructure," says Surender.

As with other highly valued commodities, mining data reserves is far from straightforward. Questions of ownership, storage, sharing and privacy all need to be resolved for smart transport services to fulfil their potential.

Will open data sources become the norm, or will powerful businesses keep their data to themselves?

Will data be available in a standardised format to create an efficient and level playing field for rival transport operators?

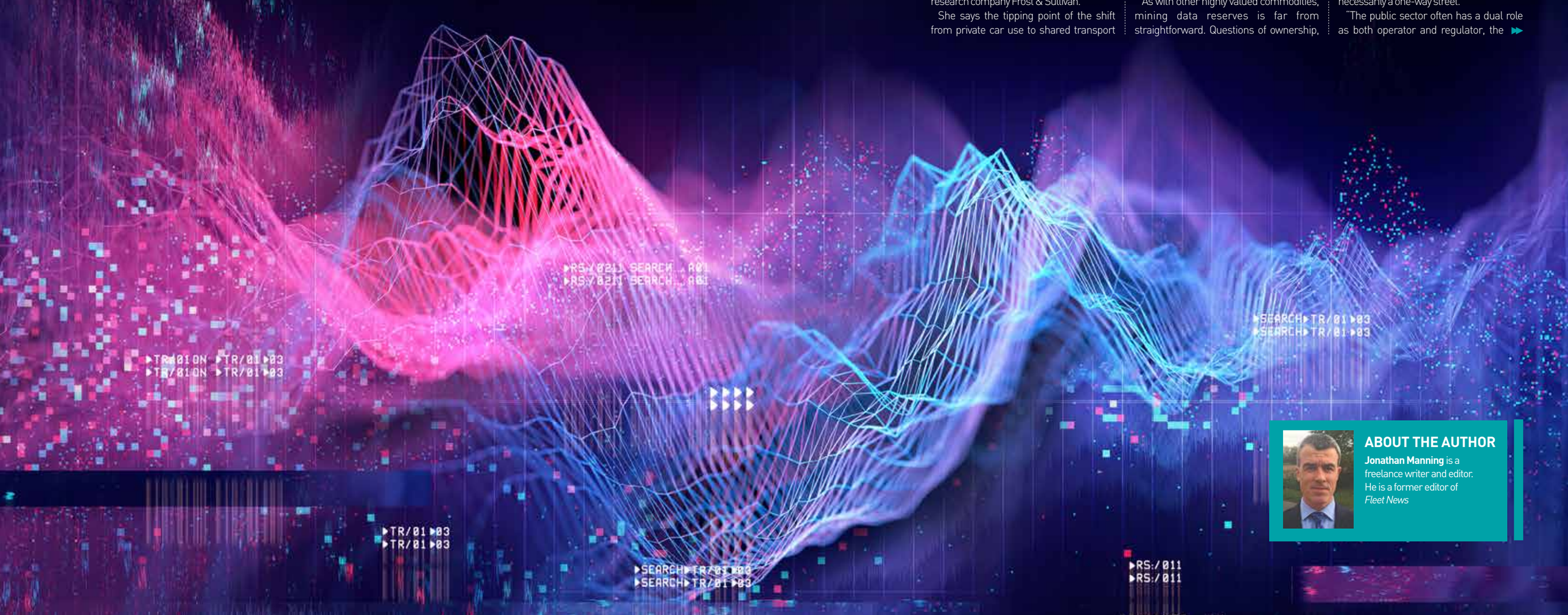
And which data will consumers be prepared to share and under what circumstances?

Transport sits at the nexus of the public and private sectors, which have different responsibilities and objectives. These are reflected in their attitudes toward data sharing, says Justine Bornstein, UK future of mobility programme manager at Deloitte.

"Public sector operators do consider data important, but are often tasked with providing transport as a public good and not necessarily as a commercial concern," she says. "Ideally, transport should pay for itself, but it's quite often subsidised and that government funding means there's often a mandate to be open and transparent."

But this does not mean the flow of data is necessarily a one-way street.

"The public sector often has a dual role as both operator and regulator, the ▶▶



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gatekeeper which controls who comes into the ecosystem to play," says Bornstein.

This is leading to 'pay to play' policies where regulators are mandating the sharing of data as a prerequisite for licensing transport operators.

In Finland, for example, a law introduced at the start of last year mandates that essential data on transport services must be made open to third parties via an open application programme interface (API).

The House of Commons Transport Committee's December 2018 report into MaaS singled out Finland's approach as a good example for encouraging data sharing, and recommended that the UK Government "works with local authorities towards a 'no data, no service' policy that would require all transport operators to share data if they want to provide a service in a given area".

Under the terms of the Bus Services Act the UK Government has already taken steps to give local authorities powers to enforce the release of data on bus routes, timetables, real-time service information and fares. Similar measures are underway for the rail industry via the Joint Rail Open Data Action Plan.

Transport for London (TfL) is an early exponent of the advantages of making data openly available, and currently provides in excess of 80 data feeds to more than 13,000 developers. The developers, in turn, have created 750 apps to facilitate travel in the capital, and TfL says 42% of Londoners now use at least one of these apps. Deloitte calculated that this open data approach delivers benefits to the city worth £130 million per year through saving time for passengers, supporting innovation and creating jobs.

"Providing data in an open, transparent and free-to-access way can be massively beneficial for both London and the wider economy," says Vernon Everitt, managing director of customers, communication and technology at TfL.

Open source data is particularly valuable to developers for its immediate usability, being trustworthy, robust and provided in a common format, says Cristoph Domke, director, Mobility 2030, Global Strategy Group, KPMG.

"It's free, you get free support, there's normally better security, it's devoid of bugs, and you can fix it faster," he says.

Open source data in a common format can serve the greater good of the transport industry and its customers, a philosophy which led Arriva Bus and Go-Ahead to make their real-time bus service information available to Google Maps. This data was previously accessible via the bus companies' own apps, but extending it to Google Maps means they can improve customer service to a wider audience of travellers.

However, other private sector operators remain reluctant to share. The Department for Transport (DfT) report, 'Future of Mobility: Urban Strategy', published in March, says that, "in too many cases it can still be disappointingly difficult for cities to obtain good quality, meaningful data from private sector providers."

Some private sector companies have read these runes and accepted that their strategic interests lie in some form of data sharing with city authorities. Ford, Uber and Lyft, for example, have announced plans to collaborate on a programme that will give urban powers greater insight into the demand and supply of ride-hailing services, as well as wider information about real-time traffic speeds.

John Zimmer, president of Lyft, says: "We are committed to partnering with cities to aid data-driven decision-making to design streets that provide safe and accessible transportation for everyone."

While the 'pay to play' approach is likely to persuade more transport operators to share their data with public authorities, it does not solve the issue of commercial companies sharing their data with other private operators.

The British Vehicle Rental & Leasing Association (BVRLA) 'Connected Vehicles and Data' report complains that "current competition law and regulation has not kept pace with the emergence of the data economy". It adds: "This has given OEMs almost complete control over how vehicle data is accessed and on what terms. This puts the rest of the automotive supply chain at a significant disadvantage."

This issue is becoming more important as an increasing number of vehicles become connected. Since March 31, 2018, the mandatory fitting of eCall (the emergency device that automatically alerts rescue services to car crashes) in all new models means the national car parc is increasingly equipped with modems to transmit granular vehicle performance data back to operators and manufacturers.

In many respects the proliferation of sensors within connected vehicles is building the foundations of a future where the private car is no longer the default mode of travel for most journeys. If, as many commentators expect, car ownership is superseded by car usership, no individual will be responsible for the location or condition of a shared bike, car or van.

In these circumstances, data will be critical for the effective maintenance, management and battery charge of those shared vehicles.

Vehicle manufacturers and fleet operators are already taking advantage of automated vehicle health checks, capturing diagnostic data transmitted remotely from the engine and tyres rather than relying on driver diligence to comply with regular vehicle inspections.

The automatic transmission of this data, during or after journeys, gives fleet owners the information required to ensure routine service work is carried out on schedule.

It can also identify component faults

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Case Study: EU City Data Solutions

Smart data could help city authorities get onto the front foot in terms of reducing the numbers of people killed or seriously injured on the road.

A project by Ford last year tracked the driving records of 160 Transit vans in London, and cross-referenced them with historic accident data.

Analysis of the data provided insights into five principal categories: road safety hotspots; car journeys that would be quicker by alternative modes of transport; the potential benefits of traffic retiming; the location of electric vehicle charge points; and traffic performance (assessed by comparing speed limits with actual speeds).

By comparing crash hotspots with evidence of 'near misses' (incidents of harsh braking), Ford was able to identify roads and junctions more likely to witness future crashes.

"We are now working with a civil engineering partner to do a study at these locations to make sure we really have found something that traditional civil engineering would say 'yes, you have found something that is potentially risky'," says Jon Scott, Ford's project lead, EU City Data Solutions.

The same programme also tracked the journeys of 43 Ford Fiesta cars and, by comparing their trip data with public transport timetables, enabled Ford to calculate how many of the car rides would have been quicker by public transport.

"We found that 22% of those journeys could have been quicker by public transport," said Scott. "We built up a heat map of the city to show which areas are generally faster or slower by car and the authorities can focus on areas where it's still faster to go by car and start to figure out what they can do with public transport and future investment to get people to get off the roads and into public transport.

"Rather than try to dive into data to find value, we learnt you need to have an idea of what you are trying to solve through data."

So, in trying to help van fleets avoid the lost productivity of rush-hour traffic, Ford used available data to calculate the potential time savings achievable by setting off two hours earlier. Its results revealed that one of its test vans could save up to 30 hours of driving time a week by starting the working day two hours earlier, and that the time saving potentially doubles by leaving a further half-hour earlier.

"If we could demonstrate a time saving, then, for a business, that probably saves money, too. So a fleet could assess the amount of money to be saved versus the logistic challenges of making that time shift," says Scott. "It would, hopefully, drive the conversation a bit further on rather than just saying please re-time."

He was also surprised at the granular level of detail available. "We could work it down to one particular depot that would benefit from a time shifting action, or even one particular route," he says.

Similar granularity could also help energy firms and city authorities to install electric vehicle chargepoints in optimum locations. By tracking the test fleet of vans, Ford could identify where they stopped for any

meaningful length of time (i.e. long enough to recharge EV batteries).

By cross-referencing this with the location of chargepoints, a readily available data set, the manufacturer found that only 1% of longer stops by the LCVs were within 100 metres of an existing chargepoint, and only 19 of 9,495 stops lasted longer than 30 minutes, the minimum time for a useful charge.

The fifth element, traffic performance, aimed to create a new baseline measure for traffic flow by comparing the actual speeds achieved by the vehicles that Ford was tracking against the respective speed limits on the roads where they were driving.

The granular nature of this vehicle data allowed the project to identify hold-ups on far shorter stretches of road than are typically measured. Armed with this information, city authorities could target any network or infrastructure improvements with much great precision, focusing on the junctions or bottlenecks that cause the greatest disruption.

Ford analysed the traffic flow data by both type of road and time of day, and sense-checked its results against traffic speeds during school summer holidays to see if roads are quieter during the peak summer season.

In reality, it found that the impact of the 'summer holiday effect' was inconclusive, with some roads being quieter but others suffering a marked slowdown – the M25 near Heathrow, for example, slowed down substantially, perhaps due to holidaymakers driving to the airport.

Reflecting on the project as a whole, Scott says: "This data has really opened our eyes to the potential of what we could do with other cities beyond London in the UK and globally.

"There is something powerful here. As we expand this analysis across more and more cities, more and more fleets and more and more vehicles we really think that we can start to address some of those bigger challenges in a city – air quality, congestion and road safety."

and impending failures so preventative maintenance can be conducted, avoiding breakdowns. Voltage fluctuations, for example, could indicate an impending alternator failure, or that the diesel particulate filter needs to be cleaned earlier than expected.

"Fleets can go beyond basic monitoring to proactively predict and prevent breakdowns," said Hoyoung Pak, head of transportation and logistics at Uptake, a specialist in industrial artificial intelligence which is working with telematics expert Geotab to provide fleet owners with insights into which parts will fail and when.

Leasing and rental firms have reported wide variations in the cost and availability of the data they request from vehicle manufacturers. BMW CarData has taken a lead by producing a price list which allows third parties, such as garages or insurers, to access telematics information with the driver's permission, paving the way for predictive maintenance services or insurance based on mileage and driver behaviour.

In this fledgling market, establishing a value or price for transport and travel data is still in its infancy. How should data generators differentiate between the value of public transport data, which can give an insight into aggregated consumer demand, and the value of individual data from a private connected car or taxi that delivers a door-to-door service?

From here, it does not require much extra data to triangulate a customer's lifestyle – where they live, work, shop and go out – which will be of immense value when autonomous vehicles arrive.

KPMG's Mobility 2030 analysis forecasts "huge downstream revenue streams" through "content, media and retail that consumers will purchase on journeys when they are freed up from actually driving".

With uncertainty over the current and future value of data, the private sector is maintaining protectionist attitudes to data, says Surender.

"Everyone is talking about data as the next oil or the next gold, but no one has a clear sense of the monetary value that can be associated with the data, the business model that can be used to measure it or whether it can be commercialised," she says. "The market is too nascent and a lot of this data is very rudimentary in format. It needs to mature."

The potential wins are so significant, however, that the gold rush is prompting alliances and "strategic collaborations among important stakeholders, both public and private, in terms of operating models, car usage, multimodal journey planning, and payment options, which will drive new mobility initiatives, particularly in cities", says Surender.

"From the public sector there will be a push for the open data, but there will be a lot of negotiation from the private sector. Every player in the transport value chain has a vested interest in retaining ownership of that data, simply because it could prove to be monetarily valuable in the future."

First, though, businesses will have to negotiate the hurdles of data protection regulations (GDPR) to capture, store and process personalised data. It is an issue that runs into national and generational cultural differences and which is creating new commercial opportunities for data cleansers and aggregators.

"Data is the new gold – people are hesitant to share it if they don't get anything in ▶▶

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Case Study: Goupil Industrie

Electric utility vehicle manufacturer, Goupil Industrie, is using telematics to track the performance of its battery-powered vehicles once they enter service.

The company makes zero-emission light commercial vehicles (LCVs), primarily for local authorities, hotels and amusement parks, where the LCVs are used for ground maintenance and waste management services.

Olivier Pelletier, general manager, Goupil Industrie, says the installation of the Geotab telematics system will give the company real-time access to both technical vehicle and battery management data.

Armed with this information, Goupil will be able to send vehicle and battery health maintenance-related alerts to its customers, and influence its fleet clients to encourage good eco driving habits among their drivers.

Predicting the demand for emergency services

In a study of 4.4 million ambulance call-outs in the north-west of England, academics from De Montfort University, Leicester, and New York University identified the criteria most likely to lead to a 999 call.

Their research, published in the journal *Physics and Society,* found correlations between call-outs and daytime populations, socio-economic indicators of deprivation, such as higher crime rates and lower income levels, as well as the movement patterns of people.

"Effectively, predicting the demand for ambulances across regions can both improve the operational capacity of emergency services as well as reduce costs by optimising resource utilisation and providing an optimal spatial deployment (deploying the paramedic crews in the locations where they are most likely to receive a call-out) and duty planning of paramedic crews," wrote the researchers.

"This results in quicker response times in attending emergency incidents, reducing fatalities."

The study serves as just one example of how drilling down into data and then cross-referencing it holds the key for transport planners and operators to achieve greater efficiency and productivity.

Data drawn from on-board vehicle sensors, road infrastructure, traffic lights and even parking bays is helping local authorities and public and private transport companies to ease congestion, improve the punctuality of services, boost vehicle reliability and minimise downtime through predictive maintenance.

Moreover, the integration of data from all of these sources with timetables and ticket fees is enabling MaaS companies to start offering door-to-door travel solutions. These calculate and sell the optimum combination of multimodal journey transport services for each individual trip, with the capacity to change their plans in real time.

Vehicle tracking and route planning

Precise predictive maintenance is a new addition to a well-established suite of management reports based on telematics data. These have historically focused on key performance indicators such as driver behaviour and engine idling times.

Analysis of the data can identify higher risk drivers who accelerate more quickly and brake more sharply than their peers, paving the way for subsequent training.

Tracking vehicles in real-time is central to a number of customer service initiatives, from courier firms being able to offer narrow time windows for deliveries, to taxi and ride-hailing businesses to give precise pick-up times.

Drilling into journey data has also provided valuable insights for route planners to avoid congestion hotspots. In one of the most productive applications of telematics data, logistics giant UPS identified that turning across the flow of traffic caused significant delays for its vehicles, costing time and fuel, so the company optimised its routes by minimising and even eliminating left-hand turns (the research was conducted in the US where vehicles drive on the right).

This simple idea has saved UPS more than 10 million gallons of fuel, with a commensurate fall in its CO_2 emissions, despite the extra distances involved in avoiding the left turns.

Solving the parking data problem

One of the principal causes of slow traffic, delays and congestion in cities is the search for parking spaces.

Research by Inrix, for example, found that drivers in Bristol spend on average 46 hours per year looking for a parking bay, with the situation even worse in Leeds (47 hours), Belfast (56), and London (67).

Inrix calculated that, across the country, the average driver wastes 44 hours annually searching for somewhere to park, at a total cost of £23.3 billion in lost time, fuel and emissions. It's a problem real-time data could solve.

"While 71% of drivers said there isn't enough parking available, occupancy for spaces can be as low as 50%," said Graham Cookson, chief economist, Inrix. "We have an information problem more than a parking problem."

It's a problem that parking application Appyparking is aiming to solve with Bluetooth low energy (BLE) sensors in roadside parking bays. The sensors can identify vacant bays, sync with the Appyparking app to navigate drivers to empty spaces, and automate parking payments, bringing greater efficiency both for drivers and for local authority revenue collection. Harrogate in North Yorkshire started an 18-month trial in January, installing 2,000 sensors in all paid-for on-street parking bays and in the off-street surface level car parks in the town centre.

"This system should mean users travel shorter distances looking for a parking space, which will help us to improve the environment and traffic management," said Don Mackenzie, executive member for access, North Yorkshire County Council.

return or if they don't know where it's going and how it will be handled," says KPMG's Domke.

The incentives may not need to be monetary, however, with the public cautiously open-minded about the benefits of sharing their data.

Fleets of shared cars could, for instance, record the individual presets of users, so that as the driver opens the car door the vehicle's infotainment system automatically syncs with the driver's contacts and social media and Spotify accounts to give a shared car the feel of a private car.

Safety is another area where individuals appear more inclined to share their data.

A study carried out last year by Otonomo/Edison Research found that 94% of connected car owners are interested in a feature that would alert them to dangerous driving conditions ahead; 92% are very interested in features that can detect maintenance or repair requirements.

The study also found that two-thirds of drivers consider it to be very important that they know exactly what their data is being used for and who has access to it. Car manufacturers scored particularly highly in terms of trust.

Volvo hopes this public spirit will support its new safety programmes, having established a cloud-based system that allows its connected cars to communicate with each other in real time, transmitting data such as the use of hazard lights or ABS to warn vehicles travelling along the same route of potential dangers ahead.

"Sharing real-time safety data based on our connected safety technology can help avoid accidents," says Malin Ekholm, vice-president of the Volvo Cars Safety Centre. "The more vehicles we have sharing safety data in real time, the safer our roads become."

Importantly, drivers can choose to opt in or out of the connected services and all the data is anonimised, which touches upon a new sector of the transport data industry – the anonimisers and aggregators.

"The market is going to aggregator models, it's so much more valuable than a single set of data," says Domke.

"It is very attractive to offer aggregated or bundled data, but the question is who is going to offer that?

"Will it be the authorities, or new consortia or OEMs or transportation companies or banks, or different aggregators based on industries.

"One thing is very clear – the aggregators will become very powerful because they have direct client contact and they have the data available. It's a very lucrative area." ST