STRUCTURE OF THE UK AUTOMOTIVE TELEMATICS MARKET
With a focus on the use of telematics in road safety solutions

Hannah Griffiths
FUTURE CITIES CATAPULT
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INTRODUCTION

1.1 MARKET OVERVIEW

Automotive telematics is the technology of sending, receiving and storing information relating to vehicles, or their drivers, using telecommunication devices. The word telematics is formed by the combination of telecommunications and informatics. Information transmitted can include data on vehicle use, maintenance requirements, automotive servicing, crashes and accidents, and the location of stolen vehicles. [1]

1.2 MARKET SIZE AND GROWTH

The global automotive telematics market is set to experience rapid growth in the coming years, with approximately 104m, or 88%, of new cars expected to have some form of connectivity by 2025. Tethered integration of telematics amongst the existing car stock is expected to stabilise at 28% by 2025. [2] In terms of key growth regions, the US is expected to lead sales of new cars with embedded telematics between now and 2025, while western European countries, Japan and BRIC nations present huge growth opportunities due to the increasing proliferation of mobile technology and upcoming regulations to support driver safety. [2]
1.3 MARKET DEVELOPMENT

A recent report by EY details the progression and future direction of the automotive telematics market. The market has developed rapidly over the last decade, starting with the incorporation of basic hands-free calling technologies (telematics 1.0) and progressing to include portable navigation applications (telematics 2.0). The market is currently at the stage of introducing comprehensive connectivity in the vehicle which is enabling a range of secondary use-cases (telematics 3.0). (2)

Looking to the future, EY predicts that the telematics market will reach a point where the internet is seamlessly integrated into vehicles, allowing the implementation of many use-cases that so far, have been limited to fixed point connectivity infrastructure (telematics 4.0). (2)

1.4 CURRENT MARKET SEGMENTATION

The GSMA segments the automotive telematics market into the following areas:

Navigation
Navigation services and the provision of traffic information are among the most established automotive telematics applications, and are increasingly ranked as ‘must have’ services for consumers.

Infotainment
While in the past, in-car entertainment has relied on portable devices being connected to internal platforms, the automotive section is moving with the times, and is looking at ways in which the car can be connected directly to the cloud, without the need to leverage intermediary devices.

Convenience
Telematics enabled convenience applications include: remote air conditioning or heating activation, remote vehicle monitoring and ‘find my car’ applications.

Electric Vehicle Services
It is expected that electric vehicles will require the more extensive deployment of connectivity infrastructure to enable them to communicate with the driver, charging stations and utility companies. Potential use-cases include reservation of charging points and automated billing at local charging stations.

Vehicle Relationship Management
GSMA uses this term to refer to any maintenance or warranty-related services that vehicle manufacturers use to better understand the status of their cars, and which ones require routine or more advanced servicing.

Pay-as-you-drive (PAYD or usage-based) Insurance
Telematics is increasingly being used by insurance companies to more effectively model risk profiles for their customers. By using the data generated by on-board devices, insurance companies are able to tailor their premiums, giving customer better rates.

Fleet Management
Fleet operators are using data generated by telematics devices to better understand the utilisation and efficiency of their fleets, which in turn enables them to optimise routes and make financial gains.

Electronic Toll Collection
Many governments, such as Singapore, are using on-board telematics devices to enforce dynamic toll charges along their motorways. This is a cost-effective alternative to expensive and restrictive roadside sensors.

Security
Telematics-enabled security applications include stolen vehicle tracking. Demand for these security applications is growing rapidly in countries with high rates of vehicle theft such as Brazil.
Safety:
A number of road safety applications are enabled through telematics devices. The remainder of this report will focus on exploring the road safety segment of the automotive telematics market.
TELEMATICS FOR ROAD SAFETY MARKET SEGMENT

In line with the wider automotive telematics market, the road-safety market segment is poised to experience rapid growth between now and 2030. This growth is being driven by:

Increase in deaths by road accidents
The World Health Organisation (WHO) estimates that globally 1.25m people die in traffic accidents annually. The WHO also predicts that without immediate action, traffic accidents could become the 7th leading cause of death globally by 2030.

Driving standards
The RAC reports that there is widespread concern among motorists about the hazardous behaviour of other road users. 63% of RAC survey respondents stated that in-car technologies such as automatic emergency breaking, telematics and dashcams, play an important role in ensuring their safety while driving.

Poor conditions of local roads
In the same RAC survey, motorists reported that the poor condition of local roads were a big concern and stated that telematics could play an important role in notifying drivers where road hazards were.

Road safety telematics solutions are able to combat several of these trends through monitoring, alerting and educating drivers in correct driving procedures and rewarding them for demonstrating safe driving behaviours. Through improving driving behaviours telematics devices have been seen to lead to a reduction in accidents, while also generating efficiencies in traffic management.

2.1 FUNCTIONALITY REQUIREMENTS: METRICS

In order to improve driver behaviour and minimise accidents, telematics devices and systems are developing some standardised functionality requirements. The main reasons recorded for the cause of accidents include a lack of hazard perception, poor basic steering, loss of control of the vehicle and not maintaining a safety envelope (the safe space around the car from other vehicles). In line with these known causes, road safety telematics devices seek to capture and alert against driving behaviours that may lead to one of these outcomes. (4)

The specific types of metrics that tend to be monitored and measured include:

- Journey start and finish times
- Vehicle speed
- Vehicle location
- Acceleration
- Braking
- Cornering
- Seat belt use
- Fuel consumption

More advanced systems provide a video of the external road and traffic environment and/or inside the vehicle itself in order to provide contextual details about the journey and driver.

The systems use customised and proprietary algorithms to determine whether any safety-relevant events have taken place or whether pre-set parameters have been exceeded. These algorithms vary widely.

2.2 FUNCTIONALITY REQUIREMENTS: MONITORING

Road safety telematics devices typically have in-built accelerometers and GPS capabilities.

Event data recorders (EDRs)
Also known as crash data recorders or accident data recorders, they monitor the how and where the vehicle is being driven throughout a journey, but only record data when an event, such as a collision, or a dangerous behaviour, such as sharp breaking, exceeds pre-set parameters. They typically record data several seconds before, during and after an event, and analysis and feedback is provided to the driver and/or

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third party after the journey through a website or smartphone app. (4)

**Journey data recorders (JDRs)**
Also known as in-vehicle monitoring devices, JDRs monitor how and where a vehicle is being driven, recording data continuously, typically at 1 second intervals, throughout a journey. Again, analysis and feedback is given to the driver and/or a third party, and in some cases non-invasive visual or audible alerts are provided to the driver during the journey. (4)

### 2.3 FUNCTIONALITY REQUIREMENTS: FEEDBACK

A number of methods are typically employed to provide feedback to drivers and/or third parties. Firstly, immediate in-vehicle feedback can be provided directly to the driver when parameters are exceeded. This has the advantage of being able to alert the driver that they are potentially driving in an unsafe way, and gives them the opportunity to make an instant change, thus reducing the risk of them being involved in an accident. This immediate feedback can be provided in a number of non-invasive ways such as audible alerts and visual displays. Other less common methods include head-up displays and tactile feedback mechanisms such as vibrations in the steering wheel. (5)

Secondly, retrospective feedback can be provided to the driver and/or third parties in the form of reports through a website, email service or smartphone application. These reports aim to provoke self-reflection and changes in behaviour by drawing attention to incidents that happened during the drive, or by bringing to light behaviours that the driver may not have realised they were doing. (5)

Feedback has been shown to be critical for the success of telematics devices aiming to improve road safety, as driver behaviour has been shown to improve after beginning to receive feedback. However, more research is required to identify the most effective way of designing and delivering feedback, and to uncover better methods to encourage drivers and third-parties to regularly review feedback. Numerous studies to date have demonstrated that feedback has improved driver behaviour, however, very little has been written about the content or nature of the feedback. (5)

### 2.4 DELIVERY METHODS

Road-safety telematics products and services are typically delivered in 3 ways:

**Retrofit devices**
This method involves fitting a pre-built ‘black box’ device into the car, usually in a hidden location. These devices typically monitor how, when and where a vehicle is being driven, records the data and provides in-journey alerts or post-journey feedback to the driver and other parties. Until recently, this method was prohibitively expensive due to the cost of the physical device and the complex logistics of getting the device fitted. However, cheaper production and self-fitting mechanisms have since alleviated these barriers. (4)

**Smartphone Applications**
More recently, telematics products and services have been delivered through monitoring technologies within smartphone applications. This is a cheaper alternative for many providers as it does not require a physical device to be installed on the vehicle. The smartphone is also able to display feedback about the journey. The drawback of this method is that drivers have the choice of whether or not they use the software. With a black-box, it is always-on and obscured from view, making it harder to turn on and off. (4)

**Original Equipment**
The most reliable method of delivering telematics technology would be for it to be built into vehicles as original equipment at the point of manufacture. This is already happening in some cases, where inclusion is mandated by regulation. As mentioned previously, the eCall Directive in Europe mandates the inclusion of a technology that automatically sends the location of the vehicle to the emergency services in the event of a crash. Similarly, from September 2013, it became mandatory for all cars and light vehicles in the USA to be sold with Event Data Recorders (EDRs). These EDRs record technical vehicle and occupant-based information for a few seconds before, during and after a crash. (4)
The telematics for road safety market structure is largely comprised of three groups of actors.

- The first group of actors are the telematics device or service providers. This group provides the telematics technology.

- The second group of actors are the target end-users or consumers of the telematics device, system or solution. Direct sales between the technology provider and the target user group only represent a small percentage of overall transactions within the market. The majority of large-volume transactions are facilitated through a third-party actor which has been termed a ‘potential investor’ actor in this report.

- The final group of actors are the potential investors, who are the principal buyers of telematics technology from the providers, and the main suppliers of the technology to the target user groups.
3.1 TELEMATICS SOLUTION PROVIDERS

There are a large number of telematics solution providers established in the UK, ranging from large multinational corporates to innovative local SMEs. The majority of these providers are focused on serving the most developed market verticals of fleet operators (including local authority fleet operators) and insurance companies.

Examples of providers include:

<table>
<thead>
<tr>
<th>COMPANY NAME</th>
<th>DESCRIPTION</th>
<th>TARGET USER GROUPS</th>
<th>DELIVERY METHOD(S)</th>
<th>METRICS COLLECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ctrack (1990s, UK)</td>
<td>One of the world’s largest telematics companies with ~1,000,000 units deployed in over 50 countries across 5 continents. Ctrack offers the widest range of solutions available in the UK telematics marketplace. Ctrack is the most well established provider in the local authority vertical.</td>
<td>Fleet operators: • Local authorities • Rental and leasing • Service sector • Transport and logistics • Utilities • Waste management Insurance companies Car sharing businesses Automotive companies (for eCall directive)</td>
<td>Black box device Online portal containing 85+ reports Optional: • Mobile phone communication module • Consultancy services • Driver identification • In-cab feedback • Panic buttons for lone workers, etc</td>
<td>• Driver behaviours such as acceleration and braking • Fuel efficiency • Fleet utilisation • Productivity</td>
</tr>
<tr>
<td>GreenRoad (2004)</td>
<td>Leader in driving performance and safety management for fleets and other organisations. Offers a strong return on investment (ROI) proposition with average savings between $1200 to $4000 per vehicle per year. Savings are comprised of fuel savings, accident cost reduction and reduced repair and maintenance costs.</td>
<td>Fleet operators: • Transport and logistics • Bus and coaches • Construction • Telecommunication s • Service sector • Food and beverage • utilities</td>
<td>Black-box device Smartphone application Optional: • In-vehicle video • Gamification modules • Fleet performance advisory service</td>
<td>Patented algorithms analyses and corrects more than 150 manoeuvres and compound events across 5 categories: • Acceleration • Braking • Lane handling • Cornering • Speeding</td>
</tr>
<tr>
<td>MiX Telematics (1996)</td>
<td>Global provider of fleet management, driver safety and vehicle tracking solutions. MiX has 130</td>
<td>Fleet operators • Bus and coach • Transport and distribution</td>
<td>Black box device Online tracking and information portal Optional:</td>
<td>Metrics include: • Vehicle location • Driver identity • Fuel usage</td>
</tr>
</tbody>
</table>
channel partners and 10,000s of customers in 120 countries.

- Utilities and deliveries
- Emergency services
- Real-time driver notifications via email or text messages
- In-cab display
- In-vehicle buzzer
- Fleet performance consultancy services
- Distances travelled
- Journey start and end points

| Quartix (Founded in 2001) (6) | One the UK’s leading suppliers of vehicle tracking solutions for both the fleet management and insurance sectors. Currently installs more than 8000 devices a month, and supplies vehicle telematics systems to 12 major insurance providers. | Insurance providers
Fleet operators:
- Building and construction
- Specialised site and field services
- Transportation
- Security
- Product distribution
- Black box device
  - (Available through a rental or purchase mechanism)
- Online portal
- Smartphone application
- Metrics include:
  - Vehicle acceleration and braking tracking
  - Vehicle location
  - Journey start and end times
  - Speeding |

| Trak Global Group (Launched 2009) (7) | A diverse group of companies covering the full spectrum of telematics services. Comprised of:
- Telematics
- Insurance services
- Connected technologies and driver risk R&D labs |

Trak Group is consistently ranked as one of the most innovative telematics companies in the world.

| Insurance providers (also runs its own insurance company called Carrot) |
| Fleet operators |
| Rental companies |
| Other auto-sector companies |
| Black box devices |
| Smartphone application (Appy Fleet) |
| Online portal for feedback, analysis and reporting |
| Optional: |
- Lab space is available to encourage developers, entrepreneurs and data scientists to explore new opportunities in insurtech, geotech and IoT. |

| TomTom Telematics (founded 1991) | TomTom Telematics is one of the world's leading telematics solutions providers with more than 670,000 subscriptions. In 2015, road safety charity Brake awarded TomTom its Fleet Safety Innovation Award. |

Fleet operators:
- Construction
- Utilities
- Service and maintenance
- Long haulage
- Passenger transport
- Healthcare
- Sales fleets
- Emergency services
- Courier services
- Insurance providers
- Black box devices
- SaaS platform
- Bespoke driver terminals
- Smartphone application
- Metrics include:
  - Speeding
  - Harsh steering and braking
  - Idling
  - Gear shifting

- Predictive and real-time feedback
- Pre-trip guidance |
While the vendors discussed above are all well established in the traditional road safety telematics verticals in the UK, there are a number of innovative providers that are starting to target more emerging verticals.

For example: Over the next 18 months telematics solution provider Satsafe will be working with Manchester City Council, Transport for Greater Manchester and leading technology businesses to demonstrate the benefits of telematics ‘black box’ technologies when applied to a range of less well-known use-cases. These use-cases include the application of telematics technologies to improve road safety in the elderly and vulnerable driver groups. Satsafe will also apply Machine Learning techniques to telematics data in order to create a dynamic and self-learning approach to improving driver safety and optimising efficiency and performance. (12)

3.2 TARGET USER GROUPS

This section discusses why the user groups listed above are targeted by both direct telematics device and service providers and third-party providers.

Young Drivers
The most targeted user group for in-vehicle telematics devices is the young driver user group (typically drivers between the ages of 18 and 24). The RAC has reported that the year-on-year decline of road casualty numbers has faltered in recent years with accidents involving young drivers still disproportionately high. The RAC has called on the government to tackle the worrying trend with “an open-minded approach that includes new technical solutions, such as telematics, and best practice from overseas.” (6)

Several studies have demonstrated that the presence of in-vehicle monitoring telematic devices can significantly reduce unsafe driving behaviours in risk-prone young drivers. Young drivers have acknowledged that the technology could support them in improving their driving by helping them to correct mistakes and bad habits, restrain their tendency to drive too fast, and deter them from being negatively influenced by their peers. They have also stated that the technology could improve their driving confidence by providing positive, objective feedback. (5)

Research shows that in some cases the mere presence of the device was sufficient to impact behaviour (the Hawthorne effect), however improvements were greater when journey data was analysed by parents or third-parties and feedback was given. This again highlights how important the feedback functionality is with road safety telematics devices. (5)

However, in terms of technology improvements, young drivers have noted that the technology only monitors a limited number of ‘safe driving’ parameters. Typically, the technology does not monitor many external variables such as keeping a safe distance or avoiding hazards.

Young drivers also expressed that feedback provided should not just highlight problems, but should provide answers.

While, much of the published literatures does not yet quantify the reduction in crash or insurance claim rates for young novice drivers, a number of individual studies have released some promising results.

A report by the Royal Society for the Prevention of Accidents, ‘Road safety and in-vehicle monitoring technology’ makes the following observations:

‘An Event Data Recorder in the cars of young drivers with in-vehicle alerts and website feedback to parents, resulted in a 76% reduction in the rate of safety-relevant events. Most of the improvement was among the higher risk young drivers.’

‘In-Vehicle Data Recorders (IVDRs) which provided data to a website for young drivers and their parents to access, resulted in a substantial decrease in average risk ratings of the young drivers, but the risk ratings of the young male drivers (not the female drivers) increased back again once the feedback ceased. Only half of parents and just over one quarter of young drivers accessed the feedback. Young drivers’ “risk ratings” fell when their parents monitored their driving behaviour, but increased, although not significantly, when they checked their own driving records.’

‘In-vehicle alerts and online feedback reduced the risk rates of the young drivers, but only when their parents accessed the driving reports and discussed them with their children. Only half of parents accessed the web analysis and only one quarter of the young drivers did so.’ (5)
At Work Drivers (and their Employers)
The second most targeted group for telematics devices are at work drivers, and their employers.

An increasing number of employers with fleets of vehicles are utilising in-vehicle telematics devices to reduce risk and/or improve efficiencies amongst their drivers. Several studies have shown that the technology can lead to reduced crash rates among their fleet drivers, as employers are able to use the data produced to change schedules and routes, offer driving training courses and in some cases, initiate disciplinary action.

‘Some studies have found that accident rates for vehicles fitted with a monitoring device reduced by 20%, others found a reduction of 38% in accidents, and the rate of specific unsafe driving behaviours reduced by up to 82% in one case.’ (5)

In the case of at work drivers, the type of metrics being recorded include: speed of driving, braking force, acceleration speed, whether or not the drive is taking place on an urban road and whether it is day or night time. When efficiency is also a concern metrics such as fuel use, mileage, location and whether an engine has been left running whilst the driver is not in the vehicle, are also recorded.

Examples:

‘Two trials were conducted in America to test whether an in-vehicle monitoring device improved the driving of ambulance drivers. Both found that there was a dramatic and sustained improvement in driver performance, without any increase in response times. Costs savings more than paid for the monitoring equipment.’

‘A major bus operator, fitted telematics to 9,000 buses in the UK and Ireland, after a trial showed a significant decrease in emissions and unnecessary driving manoeuvres. They experienced a 70% decrease in unnecessary driving manoeuvres, a 5% improvement in fuel-efficiency, 8.4% reduction in passenger injuries and a 6.3% reduction in collisions.’ (5)

Elderly Drivers
Historically, the elderly driver group has not been a target market for road-safety telematics providers, however it is emerging fast and driven by the UK’s aging population.

There are currently 11 million people aged 65 or over, and this number is projected to rise by almost 50% by 2030. There are 2.97 million people aged over 80, and almost half a million aged over 90. These figures are expected to rise to 5.3 million and 1.2 million by 2030. (7)

Driving remains the most common form of transport for older people in the UK, with 68% of households where someone is aged over 70 having their own car. Older people state that travelling by car is more convenient, involving less walking than many public transport options. Also in rural areas, driving is often the only option to reach vital amenities. (7)

In March 2016, the Department for Transport released figures showing that there were 4.3 million full licence drivers aged 70 or over, 1.2 million aged 80 or over and 83,000 aged 90 or over. The Department for Transport also reported that ‘there was a sharp increase in accident rates among car occupants aged 60 or over in 2014: the number of those killed or seriously injured rose by 10%, double the rate of increase in all age groups.’ In line with these statistics, the RAC has also reported that in its latest driver survey, 1 in 10 motorists listed older drivers (those over 70 years old) as one of their top 4 concerns when taking to the road. (6)

There is some basis for these concerns. Some elderly drivers suffer from problems caused by age-related deterioration of their physical capabilities. Typical problems include an increase in reaction times, a decline in cognitive perception and visual field limitations which all increase accident risk for elderly drivers.

However, the point at which these physical capabilities deteriorate is different for each individual person and there isn’t an age at which all drivers become unsafe. (8) Conversely, research by Age UK shows that it is in fact health problems, rather than age alone that is likely to make an older person give up driving. ‘Only 1% of people surveyed aged 60+ would give up driving because of their age, while 43% would stop driving due to health concerns.’ (7)

There is an opportunity to utilise in-vehicle telematics devices to support older people in driving for longer. By allowing themselves, as well as third-party actors such as families and insurance providers, to view data and feedback about their driving, concerns are alleviated, and it becomes easier to determine whether the person is a safe and competent driver.
Devices and systems used for this demographic may need certain changes made. For example: the timing, modality and intensity of in-vehicle alerts or warning may need to be altered. An alert may need to be longer and have a milder intensity so the driver is not startled. (8)

Using telematics in this way has the potential to deliver a number of benefits to both the driver, the local community and the wider economy;

• Firstly, mobility has been shown to be beneficial to wellbeing. Travel enables older people to maintain contact with family and friends, and helps them to avoid loneliness and social isolation which have negative effects on wellbeing. Studies have also drawn connections between travel and quality of life. If car transport is the preferred method of transport for older people, then efforts need to be made to ensure they can continue to be mobile for as long as possible. (7)

• Secondly, mobility has been shown to be beneficial to physical health. Evidence suggests that people who travel more regularly are more active, and therefore enjoy the health benefits that are associated with a more active lifestyle. (7)

• Lastly, the mobility of older people has been shown to have positive benefits for the wider community. KPMG and Greener Journeys have released analysis which showed that ‘for each £1 spent on concessionary travel, £2.87 is generated in benefits. Of these benefits, 50% go to the older person themselves, 20% to other passengers and other road users who are sharing the road, and the remaining 30% to the wider economic community’. The study also found that by improving transport opportunities for older people, this increases the likelihood that they are able to volunteer within the local community. The value of older volunteers is expected to reach £15.7 billion by 2033, representing a considerable opportunity. (7)

**Disabled and Vulnerable Drivers**

A smaller and more niche target group are the disabled and vulnerable drivers. There is an opportunity for in-vehicle telematics devices to be used to better support disabled and vulnerable drivers. The functionality of devices used for this target group vary more than those used for other groups due to the range and severity of disabilities and vulnerabilities they need to cater to.

For example:

• Changes may be needed to the way immediate feedback is given for those with hearing loss. The system may need to be adapted to give haptic alerts through the steering wheel or seat rather than audible alerts. (8)

• New alert types may need to be created for people with certain disabilities. People with upper body disabilities may have a limited field of vision as they cannot turn around, therefore a new alert may need to be created for blind-spot monitoring.

More advanced systems have incorporated driver monitoring functionality which is designed to monitor things such as driver fatigue or the onset of various medical conditions. This is done through sensing seats, or through wearable devices that are able to acquire surface electromiographic (sEMG) and electrocardiographic (ECG) signals, as well as behavioural activity through micro-accelerometers and intelligent signal processing algorithms. These systems alert when they detect a driver may be fatigued or about to experience an episode. (8)

These systems may enable disabled and vulnerable drivers to feel more confident and comfortable driving. This improved mobility may also lead to increased social interactions with associated benefits and a reduced dependence on others to get around.

**Road Offenders**

A Freedom of Information [FOI] request from July 2016 has revealed that a third of motorists with 12 or more penalty points on their licence are still on the road and have not been disqualified from driving.

In response to this finding the DVLA has replied that ‘In a small percentage of cases the Agency understands a court can exercise its discretion and not disqualify the driver. In the majority of these cases, magistrates may have decided to allow drivers to retain their entitlement to drive where it is considered disqualification would cause exceptional hardship. Examples of “exceptional hardship” include a person losing their job and as a result their home, a person
who is unable to care for a disabled or reliant loved one or the impact on a business resulting in redundancies. ‘(9)

In these cases, it may be appropriate for an in-vehicle telematics device to be installed to monitor the offending driver’s behaviour for a set amount of time. If the driver displays further unsafe driving behaviour, there may be grounds to take them back to court. This approach would reinforce the current process and would close what many view as a ‘loophole’ in the system. Motoring Lawyer Neil Davies explains that under the current system ‘if the motorist commits another offence within three years and finds themselves again “totting up” with 12 or more points, they will not be able to use the same reasons. This is therefore perhaps far from a total let off, and exceptional hardship must very much be considered a one-time get out of jail free card.’

A further use for telematics devices within this user group is to monitor the driving of drivers that have requalified since serving a driving ban.

3.3 POTENTIAL INVESTORS

This sections describes why the actors listed under the ‘potential investor’ heading have invested in road safety telematics solutions, or why they are considering investing.

Insurance Companies

Insurance companies are utilising black-box and smartphone application telematics devices to monitor and build up a picture of the driving behaviour of their customers. The data produced is used to inform risk models, which in turn determines the cost of insurance and premiums offered to the customer. This approach should lead to a fairer pricing system that is based on the individual customer, rather than a generic set of assumptions. The lower premiums offered through this insurance approach act as financial incentives for safer driving, while the data produced provides drivers with feedback on how to further improve their driving habits. (10)

From an insurer’s perspective, since the European Court of Justice’s gender ruling in December 2012 made it illegal for them to take gender into account when calculating premiums, they are looking for new methods to accurately assess the risk profile of drivers.

Previously, gender was a major factor in determining premiums offered to drivers, particularly young drivers. The introduction of telematics allows insurers to provide personalised, tailored insurance premiums. Furthermore, if an insurance claim is submitted, the data captured by the device provides a more accurate picture of what actually happened in the incident, helping the insurer to establish blame, settle claims and reduce fraudulent activity. (5)

Telematics insurance policies typically operate under one of three models:

- Pay as you drive (PAYD): under these policies, premiums are set based on how far a driver drives. Typically used by ‘low mileage’ drivers, customers pay a relatively low fixed monthly premium, and a variable monthly fee based on how many miles they drive. The reasoning being that if the driver has not used the car much, their premium will be lower. While not directly a road safety intervention, the presence of the telematics box and data it generates provides drivers with feedback on their driving behaviours and how they can improve. (11)

- Pay how you drive (PHYD): this is the fastest growing telematics insurance model and involves insurance companies monitoring the driving style and behaviours of customers using a telematics device and using this data to produce risk indicators and create risk profiles. Premiums are priced accordingly. In some cases, a smartphone app is used to achieve the same results. Reports are usually sent to the driver indicating how they are driving on a regular basis. Providers such as Aviva claim that drivers could save an average of £104 per year using this type of insurance policy. It should be noted that insurance companies reserve the right to cancel a policy if a driver’s behaviour consistently exceeds their pre-set parameters. (11)

- Manage how you drive (MHYD): Several insurers are looking beyond financial discounts and are now considering the connectivity provided by telematics devices as a way to develop deeper relationships with their customer by bundling other value-added services in with their insurance policies. For example: vehicle tracking systems and roadside assistance. (11)
### Table showing a selection of telematics insurance providers in the UK

<table>
<thead>
<tr>
<th>INSURANCE COMPANY</th>
<th>LAUNCHED</th>
<th>TYPE OF MODEL</th>
<th>DELIVERY METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admiral (Little Box)</td>
<td>2013</td>
<td>PHYD</td>
<td>Black Box</td>
</tr>
<tr>
<td>The Co-operative (Smart Box)</td>
<td>2011</td>
<td>MHYD</td>
<td>Black Box</td>
</tr>
<tr>
<td>Direct Line (Drive Plus)</td>
<td>2013</td>
<td>MHYD</td>
<td>Dongle and Smartphone Application</td>
</tr>
<tr>
<td>Insure the Box</td>
<td>2010</td>
<td>MHYD</td>
<td>Black Box</td>
</tr>
<tr>
<td>Marmalade</td>
<td>2011</td>
<td>MHYD</td>
<td>Black Box and Smartphone Application</td>
</tr>
</tbody>
</table>

Types of data collected to inform these models include speed patterns, acceleration, harsh braking, harsh cornering, distance travelled, the type of road you are using and when you are using it (day/night). The models these indicators are fed into vary by insurance provider and are fiercely protected.

The market for telematics insurance is growing fast, with a recent study by consultancy Ptolemus estimating that globally there are currently 12 million telematic based insurance policies, and this is projected to increase to 100 million by 2020. (12) Research from Allied Business Intelligence has revealed that Europe, in particular the UK and Italy, are leading the way in telematics insurance provision and adoption. By 2017, 44 million Europeans are expected to have ‘black boxes’ fitted in their vehicles, with a further 89 million being fitted worldwide. (10)

Growth has been driven in the UK and Italy largely by the young driver target group due to high insurance premiums. The installation of telematics devices gives the young driver the chance to demonstrate to insurers that they are responsible, low-risk drivers, and therefore deserve lower premiums. In 2015, Consumer Intelligence confirmed that take up of telematics insurance was highest among drivers aged 18 to 24, with 22% of men and 14% of women in this group using such policies. (6)

This growth driver goes some way to explain why adoption in Germany and France has been slower, as their insurance premiums have always been lower. In Germany there is also the barrier of heightened data privacy and tracking regulations which have inhibited the growth of the market. (11)

In terms of barriers for the growth of this market, a major blocker has been cost. In order to provide a telematics based insurance policy, insurers must absorb the cost of: the device itself, installing the device into the vehicle, the feedback method (eg: website or app), providing a discount on the insurance premium and removing the device from the vehicle when it is no longer wanted. (5) It is normally only commercially viable for an insurer to cover these costs and still make a profit on high premiums, which usually belong to young drivers, explaining why this user group represents the most established market. However, other groups such as previous offenders are also likely to have high premiums which creates opportunities for insurance companies to expand their offering to other target groups.

A further opportunity is the utilisation of the data that is generated by the telematics devices, although there are currently a number of debates taking place around ownership of data generated. With large numbers of the devices deployed, insurance companies have a wealth of data that may be of use to other stakeholders in the road safety ecosystem. Local authorities, for example, have expressed a desire to have access to anonymised and aggregated data about their jurisdiction in order to understand where drivers have had near misses or are having to repeatedly execute unsafe driving behaviours (eg: harsh braking). Currently, local authorities only have data about serious or fatal accidents where the police have been called. This additional data would create a more complete and granular dataset which would allow authorities to proactively make changes and improvements to road networks.
Government and Local Authorities:

There are a wide range of reasons why governments and local authorities may want to invest in in-vehicle telematics devices.

The most established use of telematics within local authorities is by their ‘at work drivers’ and fleets of vehicles. This involves fitting authority-owned vehicles with telematics devices and issuing drivers with fobs. By touching the fob against the vehicle when entering, the driver is identified and journey information is recorded against that driver. Recorded metrics are typically in line with those discussed previously and include harsh breaking and acceleration, journey times and idling times. Immediate alerts are provided to the driver in the event of a pre-set parameter being exceeded and data is collected and compiled into reports.

In one example, the data was used to place drivers onto a ‘league table’ with the best performing drivers at the top and worst at the bottom. This league table was used as a self-management tool by passively encouraging drivers to improve their behaviour. Only in the case of repeat offenses were drivers spoken to by their seniors and encouraged to undertake training. An improvement in driving behaviour was seen in most of the drivers.

While behaviours conducive to good road safety have been seen to improve with the introduction of telematics devices, for many authorities it is not the core reason for investment. The efficiency savings offered by telematics devices across fleets of vehicles has proven a more compelling driver for investment. In these times of decreasing budgets, councils have fitted various types of vehicle with telematic devices including refuse vehicles, street sweepers, community transport vehicles and even mowers in their drive to realise efficiency gains. Telematics device providers have a good understanding of this market and are able to offer many councils up to 20% efficiency gains, translating into huge financial savings in areas of decreasing budgets.

Examples:

In April 2016, the Crown Commercial Service launched a vehicle telematics agreement to support the public sector improve fleet safety and efficiency. The agreement was developed in conjunction with police, ambulance, local government and central government customers and features a range of suppliers, all of which are small and medium sized businesses.
such as overtime payments, fuel bills and insurance premiums.

The Crown Commercial Service expects savings to be made across the following areas:

- Reduction in fuel consumption
- Maximising vehicle usage
- Reduction in accidents
- Reduction in insurance premiums.

Based on data provided from fleets who are already using vehicle telematics, the service anticipates that customers will save £3 for every £1 invested in a telematics solution. (13)

A further reason for investment was stated to be the digital mapping capabilities some telematics devices offer. When vehicles with telematics devices are going about their duties, the device can track and map infrastructure and certain actions. For example: gully cleaners are able to map the exact location of drains, and gritters are able to track what streets have been gritted. This leads to further efficiency savings and also provides the council with valuable data to absolve them of liability for not carrying out expected services. There have been experiences of accidents taking place during icy weather and the council having to admit liability as they could not prove they had gritted the road.

With the benefits of telematics devices, both in terms of efficiency and road safety, well understood, many authorities have started implementing solutions. However, some have reported difficulties in realising the desired results.

The first issue reported has been the systems not capturing the necessary information to allow fleet operators to make changes in an informed way. Zurich Insurance reports that systems should monitor and measure key behaviours such as braking, acceleration, cornering, lane changing, speed versus posted speed limit and fatigue. However, they have found that not all systems provide this information. For example, a system may record speed, but not posted speed limit, making it difficult to conduct an accurate behavioural assessment and provide correctional feedback. (4)

In relation to this first point, fleet operators have stated that a lack of standards is inhibiting the success of telematics systems. Zurich note that at present, ‘there is no standard definition of what behaviours, when measured with a telematics device will help the purchaser achieve their expected results in terms of improving driver behaviour.’ They, along with others, would like to see the market decide on a standard set of criteria that is recognised as telematics driver behaviour metrics by all telematics service providers. (4)

Lastly, some authorities have met opposition from unions when moving to implement telematics systems due to concerns around privacy and surveillance. Authorities have overcome these barriers by highlighting the potential role of telematics in absolving the driver of responsibility and fault during accident disputes. They are also considering introducing incentives for the best performing drivers in order to make the experience more positive. They have also lent heavily on the telematics device providers, who often have a lot of experience in drafting appropriate terms of use policies which reduce anxiety and concern on the part of the drivers.

Further to the fleet management use-case, local authorities are also interested in the use of telematics as part of their business-as-usual road safety activities. Authorities have a responsibility to ensure roads are safe for use, and their traditional approach tends to be identifying accident hotspots and trouble areas and taking remedial action. In some cities, very few accident blackspots remain and accidents are now more randomly dispersed and caused by human error and poor driving.

In order to consider investing in telematics devices to improve road safety, authorities stated they would need to understand what type of accidents the devices were most adept at preventing. There is a high cost to society of a fatality, taking into account all impacts including productivity losses, grievance, health services costs, infrastructure repairs etc. Therefore, while not pleasant to admit, accident types that have higher fatality rates are more likely to induce an authority to invest. For example: one council stated that shunt accidents do not typically cause fatalities, therefore if these are the types of accident prevented by authorities through deterring the use of harsh braking, it is unlikely...
that the authority would invest. They stated that the jumping of red lights was an area for concern, as accidents caused in this way are typically very serious. Therefore, if telematics devices included functionality which allowed them to communicate and alert against traffic signals, this would be of interest to them. A further functionality development that would be of interest is the ability of in-vehicle telematics devices to communicate with other vehicles and devices. For example: early braking warnings could be communicated. This is seen as a significant step on the road to the holy-grail of semi-autonomous and autonomous vehicles.

Local authorities stated that in reality they do not see themselves investing in telematics devices for the general public, largely due to budget constraints. However, as mentioned in the insurance provider section, they are very interested in gaining access to relevant data gathered by insurance providers. One exception to this position is the investment in telematics devices for elderly and vulnerable driver user groups. As detailed in the previous section, there are huge benefits to keeping elderly people active and able to drive for longer. Therefore, there may be a compelling business case for investment in this area, however, further information is required around how long driving is likely to be extended for, and how to identify appropriate candidates.

Finally, there are examples in Europe of local authorities using simple telematics devices to control congestion in cities. In Milan for example, the authority has offered drivers that agree to have their cars tracked, and that leave them at home all day, one free ticket on local rail and bus services. For every week day that they leave their car at home, they get a free ticket. By making public transport a cheaper option, it is hoped that the number of cars on the road during rush hour periods is reduced. (13)
**Fleet Operators**

The case for fleet operators to invest in telematics devices has largely been explained above in the local authority section, as they operate a range of fleets themselves. However, there is an additional model of investment that has been seen outside of the local authority fleet scenario.

Telematics device providers have started to offer fleet operators ‘telematics-as-a-service’ offerings. Under this model, a third-party company aggregates data from multiple drivers and vehicles and undertakes the analysis of events and report compilation, on the agreement they will deliver a series of benefits to the fleet operator. These benefits include ensuring maximum uptime of vehicles, scheduling of preventative maintenance, tracking of vehicles and more efficient route planning. While this is again an efficiency driven model, improved road safety is realised through the documentation and correction of risky behaviours could be a well-received benefit. As well as being applicable for traditional fleet operators, this service offering model could also be applied to upcoming car sharing or ride hailing applications.

While not currently widely used, there is an opportunity for telematics service providers to use a performance contracting approach in order to build confidence in the benefits that can be delivered through this technology.

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### Current and Future Relationships between Fleet Operators and Target User Groups

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*Current user groups*  
*Future user groups?*
Vehicle Manufacturers

Vehicle manufacturers first considered in-vehicle telematics as a value-add device that they could charge customers for. However, there was limited appetite on the part of customers to pay. As the cost of devices has decreased, they are now investigating the possibility of making the functionality available as standard. From the consumers point of view, this is a helpful feature to improve safety. From the manufacturers perspective, it is another feature they can use to drive sales and differentiate themselves in the market, and they are also able to derive additional value from the data generated. Data on consumer behaviours and usage patterns is valuable and has the potential to be used across the organisation in departments such as product development, sales and marketing and warranty. EY estimates that there are between 1% and 15% of operational savings to be made across vehicle manufacturing organisations. At the moment, this is not a widely-adopted approach and data is not being used effectively.

This approach may be hindered by the ongoing debates around data ownership. As connectivity in cars increases, consumer are developing growing concerns around how data is being used, which in turn is inhibiting exploitation.

Current and Future Relationships between Vehicle Manufacturers and Target User Groups

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Current and Future Relationships between Vehicle Manufacturers and Target User Groups

- Likely to access all user groups through provision of telematics technology as standard in vehicles.
Telecommunications Providers

As the use of telematics increases, vehicles will require seamless connectivity. This connectivity will be provided by a telecommunications provider. There are opportunities for the telecom provider to sell some of the bandwidth from inside the vehicle, however the money that can be made from bandwidth is limited. Instead, they are in the process of working out how they can evolve their role from being a ‘pipe provider’, to a role that takes advantage of the services that are being delivered through the pipe.

Telecommunications providers are starting to investigate agreements with device and vehicle manufacturers in which they provide cheaper bandwidth in exchange for data access. With access to this data they can provide a range of analytics services, creating new value and revenue streams.

Current and Future Relationships between Telecommunication Providers and Target User Groups

Target User Groups
- Young Drivers
- “At Work” Drivers
- Elderly Drivers
- Disabled Drivers
- Road Offenders

Potential Investors
- Vehicle Manufacturers
- Telecommunications Providers

Desire for sharing of data (arrow represents direct of data travel)

Likely to access data through vehicle and device manufacturers rather than directly invest themselves.
Parents and Families of Drivers

The final potential investor group is parents and families of drivers. This is particularly applicable for the young driver, elderly driver and disabled driver user groups.

For young drivers, parents felt that in-vehicle telematics devices could be useful in monitoring driving behaviours soon after their child had passed their driving test. However, parents did express concerns about how the prolonged use of monitoring technology could affect the level of trust in their relationship with their child. In response to this concern, one study revealed that some parents would prefer to rent, rather than buy, an in-vehicle telematics device, as this would be more cost effective and give them more flexibility to stop using it when they felt it was no longer helpful.

Furthermore, the families of older drivers also felt that telematics devices could reassure them that their loved-one was driving safely on the road, and could provide information that would indicate when it was no longer safe for them to drive.
CONCERNS AND BARRIERS

Issues surrounding data privacy, ownership and portability are inhibiting the adoption and exploitation of in-vehicle telematics solutions.

With regards to data privacy, many of the user groups discussed have expressed concerns about the security of their data. Specifically, concerns emerge around who might have access to their driving data and how they might use it. For example: concerns have been raised that historic data may be used against a driver in court. (5) Concerns surrounding data privacy are currently inhibiting the adoption of telematics devices within the general population.

Secondly, ownership of data is increasingly becoming a barrier to realising the full potential of telematics solutions. As discussed above, the sharing of telematics data could deliver a number of benefits. For example: local authorities could have access to more granular data on dangerous roads or junctions and take proactive action to remedy these areas. Individual drivers may find it useful to use the driving data they have generated to seek more competitive insurance quotes from other insurance companies. Fleet operators may find it useful to use the driving data to assess driver behaviour and risk during recruitment. This is not possible at present due to ongoing disputes about who owns the data generated by telematics devices. Drivers, insurance companies, fleet operators, vehicle manufacturers (in the case of built-in telematics devices) and tethered telematics service providers all claim some level of ownership of the data. Until this data ownership dispute is resolved, it will remain a significant barrier to the wider exploitation of in-vehicle telematics devices.

Finally, and closely related to the ownership point above, regulations surrounding data sharing and portability are currently hindering the realisation of full value from telematics devices. In many cases, even if many of the actors listed above wanted to share data, they are prevented from doing so by complex regulations and legislation. It should be noted that progress has been made in this area with the latest update to the EU’s General Data Protection Regulation. This 2016 update introduces the ‘right to data portability’ which allows individuals to request copies of their personal data from data controllers or processors, so that they can transfer their data to another provider. This has considerable impacts for insurance providers, (14) however wider reforms are required to facilitate the sharing of data between different market verticals.
CONCLUSION

The road safety telematics market is poised to grow rapidly in the coming years due to growing concerns about hazardous driving behaviours and increases in deaths and injuries by road accidents. This growth is expected to be compounded with developments in other market segments, such as fleet performance management, where although adoption is primarily driven by efficiency gains, solutions in this area typically deliver residual benefits in the area of road safety.

In order to improve road safety, telematics devices monitor, measure and feedback on driver behaviours and their surroundings. Metrics monitored are becoming increasingly standardised and usually include measures such as journey start and finish times, vehicle speed, vehicle location, acceleration, braking, cornering and lane handling. Monitoring approaches are also fairly consistent, usually utilising an event recorder or a full-journey recorder model. Possibly the most important, but least standardised, aspect of telematics solutions is the feedback mechanism. Audio, visual and, in rarer cases, tactile feedback is used, however further research needs to be conducted into the most effective ways to provide feedback to drivers.

In terms of solution delivery methods, there are three main approaches. Firstly, devices are retrofitted (or tethered) into vehicles. Secondly, smartphones applications are being increasingly utilised due to the ease of deployment and use. Thirdly, an emerging delivery method is to build in the equipment at the point of manufacture. While not a widely-used delivery method at this point of time, the approach is expected to increase in prevalence in the future.

The market structure for road safety telematics comprises three main groups of actors; telematics solution providers, potential investors and target end-user groups.

Telematics Solution Providers
There are a large number of telematics solution providers established in the UK, ranging from large-multi-national corporates to innovative local SMEs. The majority of these providers are focused on serving the most developed market verticals of fleet operators (including local authority fleet operators) and insurance providers. Recently, a number of innovative SMEs are starting to target emerging market verticals with telematics solutions. For example: SatSafe is planning on applying telematics technology to older drivers in the Manchester CityVerve IoT programme.

Target user groups
Young drivers are targeted with telematics solutions since they are statistically more likely to have a road accident than more experienced drivers. Studies have shown that the presence of in-vehicle telematics devices can significantly reduce unsafe behaviours in risk-prone young drivers.

At work drivers (and their employers) are also targeted due to the opportunities to reduce risk and realise efficiency gains. While the most compelling benefits in this user group lie outside of the road safety domain, residual benefits include reduced crash rates among fleet drivers. An emerging user group is the elderly drivers. The UK’s population is ageing and car transport is the preferred method of transport for the over 60s. Some elderly drivers suffer from problems caused by age-related deterioration of their physical capabilities. There is an opportunity to utilise in-vehicle telematics devices to support older people in driving for longer. Through using this technology wider benefits can be realised including the improved wellbeing and physical health of older people (leading to lower social and healthcare costs), and economic benefits to the wider society.

In a similar manner to the elderly driver user group, there is an opportunity to utilise in-vehicle telematics to support disabled and vulnerable drivers. For example: new alert types can be created to support those with certain disabilities such as blind-spot monitoring for those with limited fields of vision, which in turn improves road safety.

The final user group discussed in this report is the road offender group. In-vehicle telematics can be used to monitor convicted road offenders or recently re-qualified drivers, in order to ensure they are demonstrating safe driving behaviours.
Potential Investors
One of the most established investors in the in-vehicle telematics space is the insurance sector. Insurance companies are utilising black-box and smartphone application telematics devices to monitor and build up a picture of the driving behaviours of their customers. The data produced is used to inform risk models, which in turn results in more cost-effective insurance premiums for customers that exhibit safe driving behaviours. These financial incentives are driving growth in this area. Adoption is being led by young driver user groups in the UK and Italy due to the high costs of premiums for these demographics in these regions.

Fleet operators, including local authority fleet operators, represent another well-established investor market for in-vehicle telematics solutions. While behaviours conducive to good road safety have been seen to improve with the introduction of telematics devices, the efficiency savings delivered by the introduction of telematics devices across fleets of vehicles have proven to be the most compelling driver for investment.

Outside of the ‘at work driver’ user group, local authorities have shown interest in using telematics devices across other user groups such as older drivers and offenders. For example: telematics devices could be used to ensure the safety of older drivers on the road, while also leading to cost savings in areas such as health and social care.

In the future, it is expected that vehicle manufacturers will start to include telematics devices as standard in their vehicles in order to differentiate themselves in the market, and derive additional value from the data generated.

Despite the promise of in-vehicle telematics solutions, there are several barriers inhibiting the adoption and exploitation of the technology. Firstly, many user groups have expressed concerns over data privacy. Secondly, data ownership disputes and regulations surrounding data portability are preventing telematics solutions from realising their full potential. For example: local authorities have expressed a wish to use anonymised telematics insurance data to identify areas in the road network which consistently cause dangerous driving behaviours and near-misses. They would then be able to proactively address these areas before an accident occurs. This data sharing agreement could also help insurance companies by reducing the number of costly pay-outs they are required to make. Until these disputes are resolved and regulations clarified, data ownership and portability will remain a significant barrier to the wider exploitation of in-vehicle telematic devices.

Concerns aside, in-vehicle telematics undoubtedly has a promising future in improving road safety through driver monitoring and feedback. As the sector continues to develop it is being seen by many as the first step on the road to semi-autonomous and autonomous vehicles, both of which are seen as necessary and revolutionary developments in efforts to radically improve road safety worldwide.
STRUCTURE OF THE UK AUTOMOTIVE TELEMATICS MARKET
With a focus on the use of telematics in road safety solutions
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