

# Telematics – is New Zealand ready?

HOLMES, J and MIRAMS, A

## 1 Abstract

The motor insurance industry stands on the brink of the first major development in many years: telematics – motor policies in which the premium depends upon some measure of how well (and how much) the policyholder drives. Telematics insurers overseas promise to revolutionise the way consumers purchase and use motor insurance, leaving their more traditionally focused competitors to pick up the less desirable risks. But will these promises eventuate and, if so, how long will it take? What are the implications for New Zealand insurers and what are the potential risks and rewards for the New Zealand market?

In this paper we explore telematics developments in insurance markets overseas, particularly the UK and US. Drawing upon the experience of MJW's global alliance partner, Towers Watson, we consider some of the obstacles which need to be overcome when launching a telematics product – particularly implementation costs and privacy concerns. Our investigations have given us insight into some of the challenges experienced by foreign insurers; we consider the implications of these challenges for New Zealand market.

We look at the various types of telematics or usage based insurance products, from simple mileage based rating to complex analytics incorporating a raft of driver behaviours. We compare the different devices available for monitoring driver behaviour and examine the pros and cons of each option. Some focus is given to Tower Insurance's SmartDriver product launched earlier this year.

We explore the issue of anti-selection and the pros and cons of being an early adopter in this new and interesting market. Finally, we look ahead to the near future and consider the question of whether New Zealand is ready to support a competitive telematics insurance market.

## 2 Introduction

### ***What is telematics?***

The term 'telematics' generally refers to the use of telecommunications technologies within vehicles. Applications include GPS navigation/mapping systems sold as standalone devices, or increasing these days, as factory fitted features in new vehicles. While the term telematics encompasses a wide range of applications, this paper focuses on the application of telematics to private motor vehicle insurance.

In an insurance context, the terms telematics and usage based insurance are often used interchangeably, with the latter being more common in the US.

### ***How does it work?***

Telematics takes the pricing of motor vehicle insurance one giant step further. Rather than pricing a policy based only on the general characteristics of the driver and vehicle, we can set a price which incorporates an actual observation of how the policyholder drives. The concept usually involves installing some sort of device into the vehicle to monitor any of:

- How well the insured drives
- How far they drive
- Where they drive
- How often they drive

The 'how well' question is the almost always the trickiest to answer. In general, the answer is based on some combination of speed, acceleration, braking and cornering.



Having observed the insured’s driving behaviour, the insurer can then augment their rating structure to incorporate information specific to a particular driver. In practice this is usually achieved via some sort of discount to the standard, non-telematics, annual premium. Although, in some cases, insurers have offered a form of ‘per km’ type policy rather than a simple annual premium.

From the insurer’s perspective, the reduced claims costs benefits are threefold:

- Self-selection – generally only drivers who consider themselves to be better than average would opt for a telematics policy when given the choice.
- Behaviour modification – the presence of a monitoring device tends to encourage safer driving, at least in the short term.
- Advanced pricing – an insurer with superior pricing abilities is able to target better drivers.

**Some history**

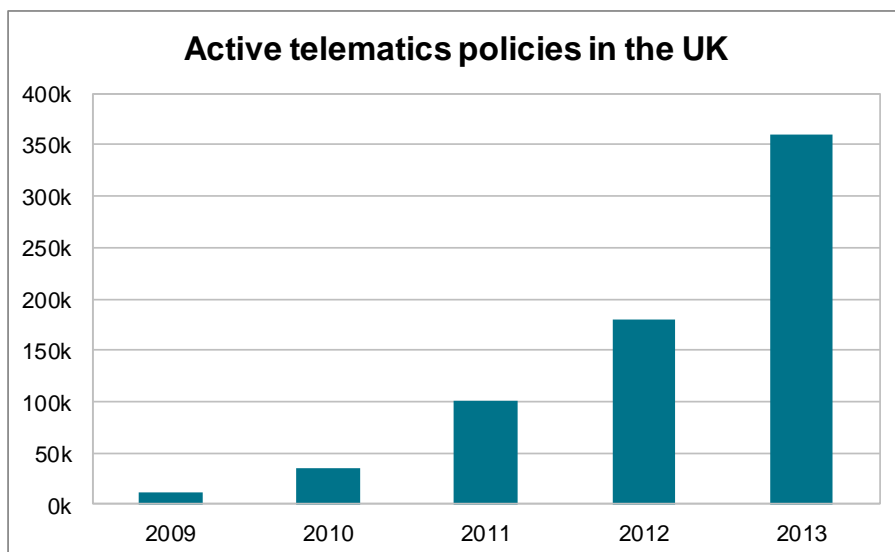
The concept of usage based motor insurance is not a new one. In the 1929-30 Proceedings of the Casualty Actuarial Society Paul Dorweiler discusses the use of both mileage and operational hours as exposure bases for motor insurance. However, he discounts both as impractical under present conditions.

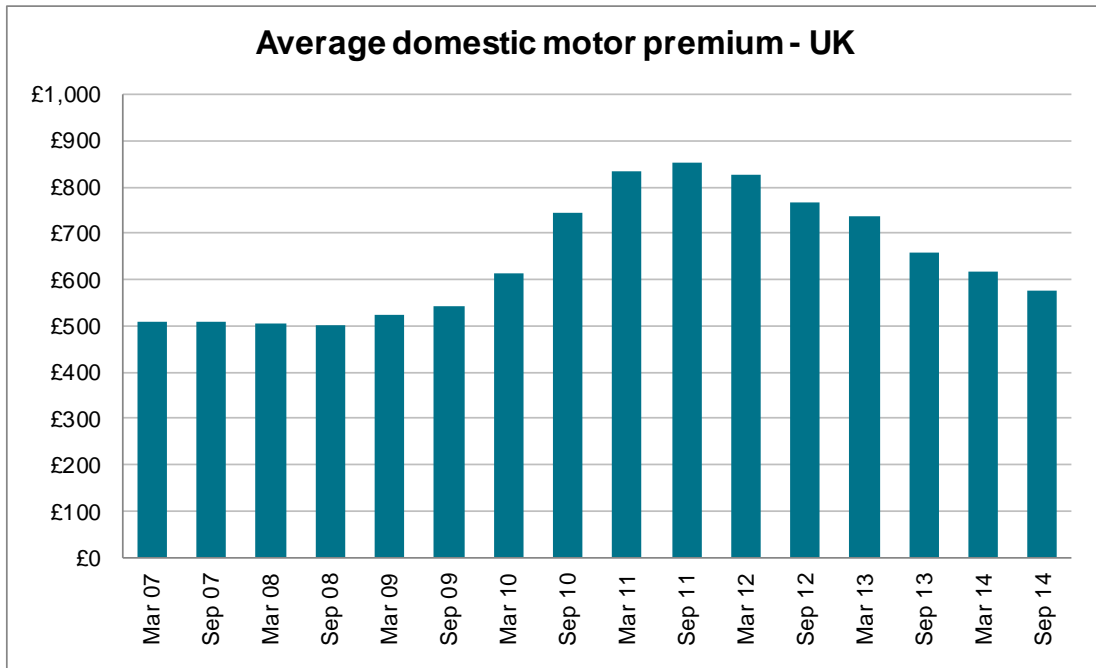
It wasn’t until the 1990s that insurers made any serious moves towards telematics or usage based insurance. Progressive (a large US insurer) launched one of the first telematics programs in 1997. Their ‘Autograph’ product, whilst simple by today’s standards, was rather innovative at the time. Progressive customers using Autograph were eligible for a discount based on:

- When they drove
- Where they drove
- What time of day they drove

Today, there are dozens of US insurers offering telematics programmes in most states across the country.

The UK telematics market kicked off slightly later in the early 2000s. Norwich Union launched one of the first trial PAYD policies in the UK, although later scrapped the product due to a lack of sales. In recent years telematics policies in the UK have gained some traction (see chart below) – in no small part due to the combination of rising motor premiums (at least until 2011) and decreasing technology costs. However, with the number of vehicles in the UK at around 35 million, telematics policies still comprise only a small slice of the market.





UK domestic motor premiums increased at remarkable rates up to 2011 although that trend has largely reversed in recent years.

### 3 Telematics products

Most telematics policies offered by insurers today are generally some form of pay-how-you-drive policy. The types of policy offered depend on the device used to measure driver performance. These 'devices' generally fall into one of four categories:

- In-built units in new cars
- Professionally installed 'black boxes'
- A dongle utilising the vehicle's on-board diagnostics (OBD) port
- An application on the user's smartphone

Below we take a look the pros and cons of each option

#### ***In-built units in new cars***

Many new cars today include some form of in-built navigation system. These systems will usually measure some combination of:

- Vehicle location
- Speed
- g-force – braking, cornering, acceleration
- Time of day



A typical factory fitted navigation system

In most cases the systems log more than enough information to adequately price a telematics policy. Yet there is an issue regarding who owns the data: The vehicle manufacturer? The driver? The insurer?

The in-built option does have some significant advantages:

- The cost of the navigation system is met by the vehicle manufacturer – and ultimately the buyer of the new vehicle.
- Very little action is required by the driver; navigation systems can happily run in the background, whether the driver is actively using the system or not.
- Navigation systems are not easily tampered with by drivers wishing to manipulate their results. In any case, drivers are unlikely to risk damaging their vehicle for the sake of their insurance premium.
- In-built systems can usually incorporate a range of ancillary benefits, as discussed later.

However, there are some formidable disadvantages too:

- The target pool is limited to drivers of selected new model vehicles (of which there is little overlap with the ideal telematics market i.e. young males)
- To provide an insurance policy requires cooperation between vehicle manufacturers and insurers, particularly around the sharing of sensitive data

For the time being, in-built navigation systems don't seem to be a viable option for an insurer looking to enter the telematics market, either in New Zealand or overseas. Nevertheless, the insurance industry needs to keep a close eye on developments in this space, as vehicle manufacturers are likely to play a key role in this industry in years to come.

### **Black boxes**

A so called 'black box' is a telematics device which is retrofitted into existing vehicles by a professional installer. Such a device is generally hard-wired into the vehicle's electronics system and remains out of sight (and perhaps out of mind) of the driver. A black box will typically record much the same information as an in-built navigation system.



Installation of a typical black box

On the up-side:

- Black boxes are fairly inconspicuous – for the most part the driver simply carries on as before.
- Data can be transmitted directly to insurers – bypassing third parties such as vehicle manufacturers.
- As for in-built systems, black boxes are difficult to tamper with.
- Little or no input is required from the driver to maintain a telematics policy.

On the other hand:

- The devices themselves are expensive, and the cost of installation is significant too.
- There is a cost for transferring the device should the driver purchase a different car.

The growth of telematics business is a balance between improved claims experience and the additional costs that telematics policies impose. The black box option represents one end of the scale – high installation costs, but with the potential for significant improvement in loss ratios.

### **Dongles**

A dongle is a self-installed device which the driver plugs into their vehicle's on-board diagnostics port. The on-board diagnostics system is basically just a system which reports information from the vehicle's computer. Such systems have grown in sophistication since their introduction in the 1980s. For the average driver, knowledge of the on-board diagnostics system extends as far as noticing that the check engine light is on and asking a mechanic to fix the fault.



A typical dongle which plugs into a vehicle's OBD II port – in this case Progressive's Snapshot device

To diagnose a vehicle fault the mechanic needs to plug in some sort of connector to read the car's computer. This connector plugs into the OBD port which is usually found under the steering wheel. Most cars today use an upgraded version of OBD, known as OBD-II.

American cars built since 1996 will generally all have an OBD-II port, whilst European and Japanese vehicles began the switchover to from ODB to OBD-II in the early 2000s.

A number of dongles exist which have been developed specifically for the telematics insurance market. Such devices plug into the vehicle's OBD-II port and measure a range of metrics used for telematics pricing.

The dongle option presents some real benefits:

- Cost effective compared to the black box option.
- Easy to upgrade as technology changes.
- Easily transferred to a different vehicle.
- Able to provide a wide range of driving diagnostics, similar to the in-built and black box options.

However, there are some drawbacks:

- The device can be removed by drivers looking to manipulate their results (though there are ways to combat this).
- Some older vehicles aren't compatible.
- Ability to remove the device reduces theft protection.

Whilst a telematics dongle can be easily removed by the driver, any driving undertaken without the dongle will show up as an anomaly in the data and can be priced accordingly. A dongle can record a vehicle's mileage from the vehicle computer. A gap in the tracked mileage may indicate use of the vehicle without the dongle.

The dongle option presents a good compromise between cost and reliability. In the US a dongle typically costs between \$50 and \$100, depending on the sophistication of the device. This places it cheaper than most black boxes. Compared to the more expensive and permanent alternatives, the dongle option achieves flexibility and portability without significantly compromising the quality of the data received.

### Smartphone apps

Another option is to utilise the driver's smartphone by installing an application, such as Tower's SmartDriver. Most smartphones today include location services – identifying where the phone is located via GPS – and an accelerometer, measuring the orientation of the phone and whether it is being accelerated in a particular direction. The accelerometer is what enables a smartphone to determine how the phone is being held and whether to orient the display landscape or portrait. The accelerometer is also utilised by many smartphone games which are controlled by tilting the phone left or right.

The idea behind the smartphone option is that the policyholder downloads the insurer's application to their smartphone. Then, when the driver gets into their car they activate the application and begin driving. The application then records a range of metrics related to how far and how well the policyholder drives. When the driver completes the journey, they turn off the application.

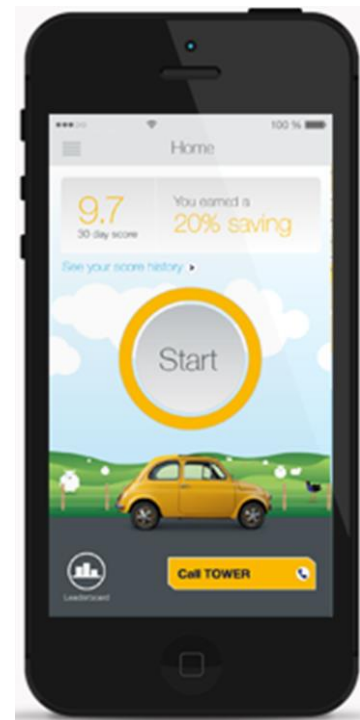
There are some advantages of the smartphone option, mostly related to cost:

- There is no 'device' to purchase meaning the insurers upfront costs are limited.
- The data transmission charges are met by the policyholder.
- The application stays with the policyholder if they purchase a new vehicle.

However, there are some serious limitations to the smartphone option:

- It usually requires on-going cooperation from the insured to switch the application on and off as they start and stop driving (although there are options to address this issue).
- Some applications can drain the smartphone's battery very quickly.
- The data obtained is usually not as good as that from a dedicated device.
- It can be difficult to distinguish between when the policyholder is driving their own vehicle and when they are a passenger, for example, on a bus.
- There are still the initial costs of app development which must be met by the insurer, either directly for an in house development, or indirectly in the case of an 'off the shelf' app.

The smartphone option is perhaps the easiest and cheapest way for an insurer to enter the telematics market. However, the smartphone limitations mean that an insurer looking to make some serious developments in the telematics space will need to consider a more robust long term solution.



Tower's SmartDriver app

## 4 Data transmission

In addition to the initial costs of launching a telematics product there are the on-going costs of data transmission. Depending on the type of device used, these costs can be met by either the policyholder or the insurer.

A typical telematics black box will contain a modem to send the data back to the insurer via a cellular network. Given the sheer volume of data captured, the costs imposed by the Telcos can be significant. In the US data transmission costs are typically around \$2-\$3 per device per month,



which can quickly absorb the profit margin on a motor policy. In New Zealand's oligopolistic telecommunications market data transmission costs are likely to be more onerous.

The smartphone option conveniently moves the data costs from the insurer to the policyholder. A well designed smartphone application can make use of Wi-Fi networks to minimise the mobile data cost for the policyholder.

Many dongles include a modem similar to the black box option and thus impose the same data transmission costs on the insurer. However, there have been some dongles released which are essentially hybrid options utilising the driver's smartphone for data transmission whilst retaining many advantages of the dongle.

When it comes to in-built new car devices the question of data transmission is closely related to the question of who owns the data. It's still early days for collaboration between vehicle manufacturers and insurers, so many of the data issues remain to be resolved.

## 5 The metrics

In this section we take a look at what sort of data is captured by a telematics device and how it might be used. As noted above the data recorded is usually some combination of vehicle speed, location and g-force in each direction. At one end of the spectrum a black box may record second by second snapshots of each item, or in some cases even more frequent. However, to save on data storage and transmission costs a number of devices have been developed to only record such data after a trigger, such a hard braking or cornering event. A dongle may also record certain information from the vehicle's on board diagnostics system such as the rev count or the odometer reading.

Once this data has been recorded, the next step is to convert it into risk metrics. This involves questions such as:

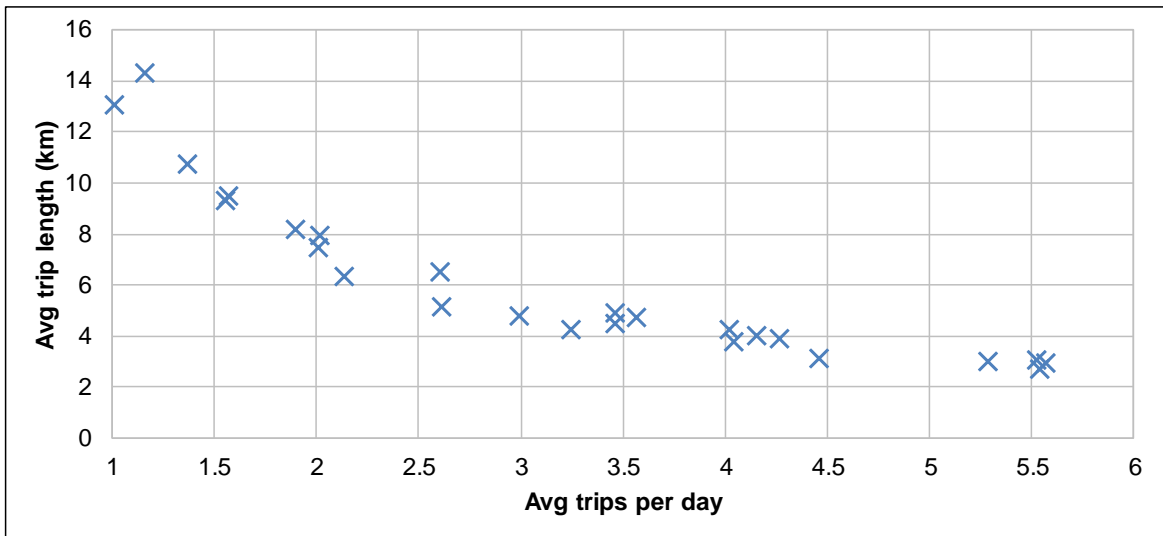
- How far does the vehicle travel each day?
- Which roads are most commonly used, and at what time of day?
- How frequently is the vehicle subject to a 'hard brake'?
- What is the driver's typical braking pattern when approaching an intersection?

One of main purposes of a telematics policy is to provide the insurer with a superior pricing model. In order to achieve this, the insurer needs to understand how the telematics risk metrics provide information over and above that provided by standard rating factors.

### **Mileage**

Say we establish that a vehicle is travelling around 7,000km per year. How do we determine whether this should constitute a higher or lower premium? To some extent, vehicle mileage is already accounted for by standard rating factors. Indeed driver age and vehicle type are generally quite predictive of vehicle mileage; newer cars travel further each year whilst younger (<30) and older (>60) drivers tend to drive fewer kilometres than those in the middle bracket. The purpose of the telematics policy is to determine whether a particular insured travels more or less than one would otherwise expect given factors like the driver and vehicle age.

When it comes to mileage, not every kilometre travelled is equal. The chart on the following page illustrates average daily commutes for 25 hypothetical drivers. Each driver averages around 15km per day, though the make-up of that 15km is very different.

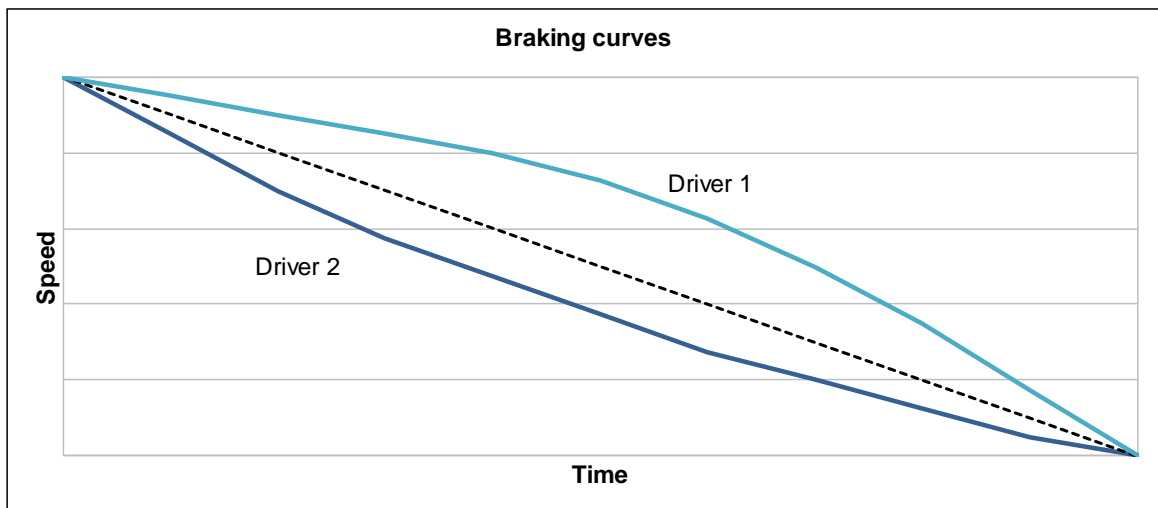


On the left we might have a university student living on the outskirts of the city who often catches the bus. When she does use her car, it's usually for a fairly long journey, and probably in fairly heavy traffic too.

On the right we might have a stay at home mother doing school runs and grocery trips. She also averages around 15km per day, although in this case it's comprised of larger number of shorter journeys spread throughout the day.

**Braking behaviour**

Another potential rating variable is the driver's braking pattern. The chart below illustrates the manner in which two drivers might come to a stop when approaching an intersection.



Driver 1 applies only light braking at first. Then, as the need to stop the vehicle becomes imminent, he increases the braking pressure. The strongest deceleration occurs when the vehicle is nearest the intersection.

Driver 2, on the other hand, applies slightly heavier braking at first, then eases off as he approaches the intersection. The pressure on the brakes gets lighter as he nears the intersection, thus leaving some room for error when it is needed most.



## 6 Challenges

### **Costs**

The first challenge when considering launching a telematics programme is that of cost. The costs of different device options vary considerably. Whilst there isn't an established market in New Zealand for dedicated insurance telematics devices, we can get some feel based on overseas experience:

- Black boxes tend to be in the range of a few hundred dollars each, depending on the sophistication.
- A dongle will usually cost between \$100 and \$150, though there are less sophisticated options entering the market now at around \$50.
- Smartphone apps are considerably cheaper than a dedicated device and become more economical as policy numbers increase.
- New car in-built devices are expensive, but the costs are borne by the vehicle manufacturers. Though there will be a cost in allowing insurers to access the data.

With personal motor policies churning at around a third of the portfolio each year, and the technology behind the devices changing rapidly, an insurer would be doing well to get anything more than two or three years out of a single device. A telematics policy with long term benefits and rewards might go some way to improve customer retention, but it will be a challenge to increase retention to the point where something like a black box pays for itself. Even though ownership of a dongle might be held by the insurer, in reality the cost of recovering these devices after a customer leaves the programme can be onerous.

Add to that the monthly data costs and the cost of running a telematics programme is looking ominous. And that's before we've even considered the upfront costs of establishing a telematics programme, the required IT infrastructure and the analytics expertise to make the most of the data.

### ***Privacy and trust issues***

As a rule, consumers are sceptical of insurers' willingness to pay claims. Whether justified or not, public opinion of insurers is fragile at best. One of the biggest concerns raised by consumers overseas is that insurers will use the data obtained from a telematics device to decline a claim. In order to overcome this, insurers have had to give some form of assurance that this will not be the case for legitimate claims. Although, telematics data is occasionally used to assist in determining fault and to identify fraudulent claims.

The issue of data privacy is a peculiar one. On the one hand, consumers are increasingly more aware of data privacy issues and the fact that there is a wealth of information being collected about them. On the other hand, consumers seem quite happy to share their data with the likes of Google and Facebook on a day-to-day basis. One would be optimistic to think that consumers might be happy to share data with their insurer in the same way that they do with the internet giants.

The question of who will ultimately own telematics data is still up in the air. Will it be insurers, vehicle manufacturers, other third parties, or the consumers themselves? General opinion seems to be that the market may eventually get to the point where drivers effectively own their own telematics data (hosted by a third party) and can share this with a potential insurer if they choose.

### ***Engaging consumers***

A telematics policy necessarily involves some degree of cooperation from the insured. With a black box the insured simply needs to agree to the installation of the box, and from there can take a fairly hands off approach (until they sell the vehicle of course).

At the other end of the spectrum smartphone apps requires considerable input from the driver. Tower's SmartDriver app requires the user to turn it on and off every time they use their vehicle.

Anecdotal feedback is that drivers tend to use the app consistently for only a short period. After a few journeys driver use of the app declines, although there is a subset which continues consistently with the app to achieve the required 250km to qualify for a discount with Tower. Tower's approach to driver engagement has been to include features in the app such as completion milestones and to encourage competition with friends. Perhaps further gamification development may increase customer engagement in future.

Some apps have the option of an 'auto-on' feature which activates when the phone detects 'vehicle-like' movement, though this is not without its challenges. For example, consumers have complained that having the app run continuously in the background tends to drain the battery. Additionally, there is no way to automatically determine whether the insured is the driver or a passenger in another vehicle.

In the interests of engaging customers many insurers include some ancillary benefits as part of their telematics package:

- Automatic contact with the insurer if a major crash event is detected.
- Breakdown assistance tied to the location of the vehicle as detected by the device.
- Personalised feedback on driving habits and trends.
- Theft recovery assistance.

## 7 The New Zealand market

The New Zealand market is considerably smaller than any other market which has achieved meaningful growth in the telematics space. With around a billion dollars in annual domestic motor premiums, our market simply doesn't justify the sort of spending that companies like Progressive and AllState have invested in the US. The considerable fixed costs involved in running a telematics programme are such that an insurer needs to obtain a very large and profitable segment of the market to make it worthwhile.

The size of the New Zealand market is not the only hindrance to the development of telematics policies. With average motor premiums comparatively cheap in New Zealand, it's difficult to achieve reductions in loss ratios commensurate with the additional expense. However, there are clearly segments of the New Zealand market where premiums are much higher – young males for example. An insurer with the ability to separate the 'boy racer' from the responsible youth is at a distinct advantage. Traditional rating factors go some way towards this, but telematics has the potential to go considerably further.

The motor insurance market for young males in New Zealand is not nearly as expensive as that seen in the UK and US – primarily due to the existence of ACC. In many cases, third party bodily injury comprises most of the premium paid by an American or British young male. In New Zealand the Sentencing Amendment Act would appear to be bringing a small component of third party bodily injury liability into motor premiums. However, the impact of The Act is unlikely to make a material difference to the cost effectiveness of a telematics programme.

All of this leads us to suggest that a smartphone or hybrid option might be the most cost effective means for an insurer to gain some market share in the personal lines telematics market, at least in the short term. Foreign insurers have struggled to produce meaningful profits on the more ambitious telematics programmes to date. Nevertheless, if indeed this is the direction that the motor market is heading – even just for certain segments – then a defensive strategy may prove necessary.

The focus of this paper is on personal motor insurance; however, it is worth noting that the commercial motor market in New Zealand may present some interesting opportunities for insurers. Many commercial vehicles contain fleet management technology that could potentially be utilised for insurance purposes. It is a case of adequately incentivising commercial operators to share data with insurer their insurer. When it comes to commercial motor there is a spectrum of operator sizes. At the one end very small fleets are unlikely to invest in the required technology. At the

other end very large fleets effectively self-insure for all but the largest losses. For medium sized operators there may be options where the cost of investment is adequately balanced by the insurance savings. Perhaps this is an area to be investigated further.

## 8 Early adopters

If the world does seem to be heading in this direction, then what sort of strategy should an insurer adopt? Market leader, fast follower, or a wait and watch approach?

Tower has taken the first move in New Zealand, albeit a limited one with a smartphone app. And while there are limitations to what can be achieved with a smartphone product, Tower has achieved some advantages over the slower movers:

- It gives Tower the opportunity to market themselves as a progressive insurer and a market leader in this space.
- Tower will be the first insurer to collect any sort of meaningful telematics data specific to the New Zealand market.
- Tower is in a prime position to move into more sophisticated options should the economics stack up in the near future.

As insurers like Tower develop more sophisticated rating mechanisms through telematics, there is the risk that the insurer taking a 'wait and watch' approach may be selected against. Even if the rating mechanisms used by early adopters are not that sophisticated, simple self-selection may mean that other insurers are left with a less profitable pool of drivers.

It is difficult to establish any solid estimates of market penetration of telematics products. However, general consensus seems to be that perhaps 1-3% of UK and US policies sold recently involve telematics. Given such low penetration to date, the remaining 98% of drivers don't yet represent a materially inferior pool of risks. But if penetration increases to say, 20% or 30%, there is the risk that drivers who refuse a telematics policy will begin to be viewed as bad risks and will pay premiums accordingly. If this sort of 'critical mass' is achieved, then take-up numbers on telematics policies could grow quickly.

## 9 The future of insurance

So where is the New Zealand insurance market heading with regard to telematics? Cost considerations, and the presence of ACC, mean that we're unlikely to see a sudden upsurge in telematics policies any time in the near future. But perhaps we will see other insurers choose to 'dip their toes' in the market as Tower has done. With technology getting cheaper every year it is probably only a matter of time before telematics policies become much more widespread, in New Zealand and across the globe.

Vehicle manufacturers will probably play a key role in years to come as factory fitted navigation units become more common. Though with New Zealand's relatively old vehicle fleet it will be some time before we see widespread use of in-built navigation units, particularly amongst the young males for which telematics policies are most viable.

All of this doesn't mean that New Zealand insurers should simply sit back and wait until the market is ready. The insurer that stands ready to capitalise on new developments, and has the expertise and infrastructure to do so, is at a distinct advantage to their less prepared peers.